VOLUME I

TECHNICAL REPORT FOR CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

FOR THE SHIPYARD SEDIMENT SITE • SAN DIEGO BAY, SAN DIEGO, CA

March 14, 2012

CALIFORNIA Water Boards

STATE WATER RESOURCES CONTROL BOARD

REGIONAL WATER QUALITY CONTROL BOARDS

COVER PAGE

FOR

VOLUME 1 of 3

OF THE

Technical Report for

CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

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SAN DIEGO REGION

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Technical Report for

CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

For the Shipyard Sediment Site San Diego Bay, San Diego, CA

Volume 1 of 3

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on March 14, 2012

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Acronyms & Abbreviations

AET	Apparent Effects Threshold
AFFF	Aqueous Film Forming Foam
ASTM	American Society of Testing Material
ANOVA	Analysis of Variance
AQUA	Aquaculture Beneficial Use
ARCO	Atlantic Richfield Company
ASTs	Aboveground Storage Tanks
AT & SF	Atchison, Topeka, and Santa Fe Railroad
AVS/SEM	Acid Volatile Sulfide / Simultaneously Extracted Metals
BAF	Biota Accumulation Factor
BAP	Benzo[a]pyrene
Bight 98	Southern California Bight 1998 Regional Marine Monitoring Survey
BIOL	Preservation of Biological Habitats of Special Significance
BMPs	Best Management Practices
BPJ	Best Professional Judgment
BRI-E	Benthic Response Index for Embayments
BSAFs	Biota-to-Sediment Accumulation Factors
BTAG	U.S. Navy/U.S. EPA Region 9 Biological Technical Assistance Group
CAD	Confined Aquatic Disposal
CCC	Criterion Continuous Concentration
CCR	California Code of Regulation
CDFs	Confined Disposal Facilities
CEQA	California Environmental Quality Act
CMC	Criterion Maximum Concentration
CNRSW	Commander Navy Region Southwest
COCs	Contaminants of Concern
COMM	Commercial and Sport Fishing Beneficial Use
CoPC	Chemicals of Potential Concern
CSF	Cancer Slope Factor
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
DFG	California Department of Fish and Game
DRO	Diesel Range Organics
DTSC	California Department of Toxic Substances Control
DWQ	Division of Water Quality
EC50	Median Effective Concentration
EMC	Event Mean Concentration
EqP	Equilibrium Partitioning Approach
ERL	Effects Range Low
ERM	Effects Range Medium
EST	Estuarine Habitat Beneficial Use
FACs	Fluorescent Aromatic Compounds
FSP	Field Sampling Plan
GRO	Gasoline Range Organics
HPAH	High Molecular Weight Polynuclear Aromatic Hydrocarbons
HQ	Hazard Quotient
IND	Industrial Service Supply Beneficial Use
IR	Ingestion Rate
IRIS	Integrated Risk Information System
Kp	Partition Coefficients
LAET	Lowest Apparent Effects Threshold
LC50	Median Lethal Concentration
LOAELs	Low-Adverse-Effects-Levels
LOE	Lines of Evidence
LPAH	Low Molecular Weight Polynuclear Aromatic Hydrocarbons
LPL	Lower Prediction Limit
MAR	Marine Habitat Beneficial Use
MARCO	Marine Construction and Design Company
MEK	Methyl Ethyl Ketone
MIGR	Migration of Aquatic Organisms Beneficial Use
MS4	Municipal Separate Storm Sewer System
MTDB	Metropolitan Transit Development Board

NASSCO	National Steel and Shipbuilding Company
NAV	Navigation Beneficial Use
NAVSTA	Naval Station
NOAA	National Oceanic and Atmospheric Administration
NOAELs	No-Adverse-Effects-Levels
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRTAs	Natural Resource Trustees Agencies
NTR	National Toxics Rule
OHHEA	Office of Environmental Health and Hazard Assessment
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCTs	Polychlorinated Terphenyls
PL	Prediction Limit
PPPAH	Priority Pollutant Polynuclear Aromatic Hydrocarbon
PRGs	Preliminary Remediation Goals
PW	Pore Water
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/ Quality Control
RAP	Remedial Action Plan
RARE	Rare, Threatened or Endangered Species Beneficial Use
REC1	Contact Water Recreation Beneficial Use
REC2	Non Contact Water Recreation Beneficial Use
RfD	Reference Dose
RLs	Response Levels
RME	Reasonable Maximum Exposure
RRO	Residual Range Organics
SCCWRP	Southern California Coastal Water Research Project
SDG&E	San Diego Gas and Electric
SDMC	San Diego Marine Construction Company
SDUPD	San Diego Unified Port District
SHELL	Shellfish Harvesting Beneficial Use
SQGs	Sediment Quality Guidelines
SQGQ	Sediment Quality Guideline Quotient
SS-MEQ	Site-Specific Median Effects Quotient
SVOCs	Semi Volatile Organic Compounds
S-W Diversity	Shannon-Weiner Diversity Index
SWAC	Surface-Area Weighted Average Concentration
SWI	Sediment Water Interface
SWM	Southwest Marine, Inc.
SWCS	Storm Water Conveyance System
SWPPP	Storm Water Pollution Prevention Plan
SWPMP	Storm Water Pollution Monitoring Plan
TBT	Tributyltin
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TR	Tissue Residue (biota-water-sediment equilibrium partitioning approach)
TRGs	Tissue Residue Guidelines
TRI	Toxic Release Inventory
Triad	Sediment Quality Triad
TRV	Toxicity Reference Value
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
TUc	Toxic Unit Chronic
UPL	Upper Prediction Limit
U.S. EPA	U. S. Environmental Protection Agency
U.S. FWS	U. S. Fish and Wildlife Service
VOCs	Volatile Organic Compounds
WDRs	Waste Discharge Requirements
WILD	Wildlife Habitat Beneficial Use
WOE	Weight of Evidence

Preface

The Technical Report (TR) contained herein is the culmination of revisions over several years to the draft TR first released to support to Tentative Cleanup and Abatement Order (TCAO) No. R9-2005-0126 in January 2005. This Technical Report provides the rationale and factual information supporting the findings of the CAO No. R9-2012-0024. The text of each CAO finding is presented first, followed by a summary of the rationale and factual evidence supporting the finding. A copy of CAO No. R9-2012-0024 and this TR, as well as prior versions are posted on the San Diego Water Board website at http://www.waterboards.ca.gov/sandiego. CAO No. R9-2012-0024 incorporates the Technical Report as a finding in support of CAO No. R9-2012-0024 as if fully set forth therein.

1. Finding 1: Waste Discharge

Finding 1 of CAO No. R9-2012-0024 states:

Elevated levels of pollutants above San Diego Bay background conditions exist in the San Diego Bay bottom marine sediment along the eastern shore of central San Diego Bay extending approximately from the Sampson Street Extension to the northwest and Chollas Creek to the southeast, and from the shoreline out to the San Diego Bay main shipping channel to the west. This area is hereinafter collectively referred to as the "Shipyard Sediment Site." The National Steel and Shipbuilding Company Shipyard facility (NASSCO), the BAE Systems San Diego Ship Repair Facility (BAE Systems), the City of San Diego, San Diego Marine Construction Company,[1] Campbell Industries (Campbell); San Diego Gas and Electric (SDG&E); the United States Navy, and the San Diego Unified Port District (Port District) have each caused or permitted the discharge of waste to the Shipyard Sediment Site resulting in the accumulation of waste in the marine sediment. The contaminated marine sediment has caused conditions of pollution, contamination or nuisance in San Diego Bay that adversely affect aquatic life, aquatic-dependent wildlife and human health San Diego Bay beneficial uses. A map of the Shipyard Sediment Area is provided in Attachment 1 to this Order (referred to interchangeably as CAO or Order).

1.1. Shipyard Sediment Site

Discharges of metals and other pollutant[2] wastes to San Diego Bay marine sediment and water have resulted in the accumulation of pollutants in bay bottom marine sediment, which creates conditions that adversely impacts beneficial uses corresponding to three target receptors: aquatic life, aquatic-dependent wildlife, and human health. The sediment containing elevated levels of pollutants is referred to in this Technical Report as "contaminated marine sediment."[3]

The contaminated marine sediments are located along the eastern shore of central San Diego Bay and encompass an area extending approximately from the Sampson Street Extension to the northwest and Chollas Creek to the southeast and from the shoreline out to the San Diego Bay

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[1] San Diego Marine Construction Company is not identified as a discharger with responsibility for compliance with this Order because San Diego Marine Construction Company no longer exists and no corporate successor with legal responsibility for San Diego Marine Construction Company's liabilities has been identified. See Finding No. 5 and the Technical Report Section 5.

[2] Any type of industrial, municipal, and agricultural waste discharged into water is a pollutant. The term "pollutant" is defined in Clean Water Act section 502(6) as dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, "chemical wastes," biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. The term "pollutant" has been further broadened by the NPDES regulations (40 CFR 122) and court cases. As used in this technical report, the term "pollutant" is intended to refer to a substance that meets the definition of "waste" under Water Code section 13050(d).

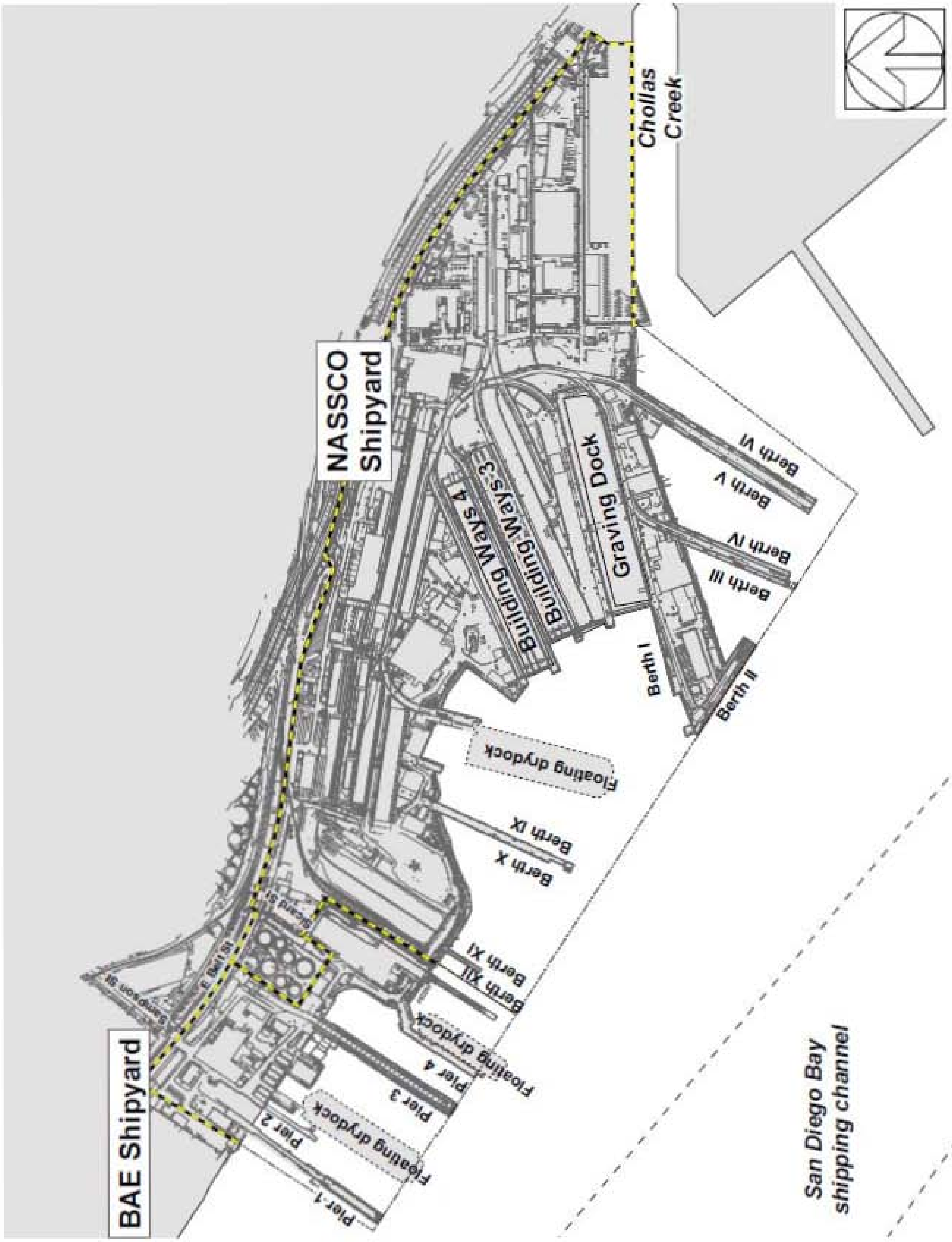
[3] As used in this Technical Report, the term "contaminated marine sediment" is intended to refer to sediment that either meets the definition of "contamination" under Water Code section 13050(k) or that creates, or threatens to create, a condition of "pollution" under Water Code section 13050(l).

main shipping channel on the southwest. This area is referred to by the term "Shipyard Sediment Site" in the Cleanup and Abatement Order and throughout this Technical Report.

The Shipyard Sediment Site is located on the eastern shore of central San Diego Bay, approximately one half mile south of the Coronado Bridge and half the total distance into the Bay. The NASSCO and BAE Systems leaseholds, portions of which lie in the Shipyard Sediment Site, are adjacent to each other, have a similar range of water depths, and lie within the same hydrologic and biogeographic area. The total combined San Diego Bay water acres included in the NASSCO and BAE Systems leaseholds is approximately 56 acres. The Shipyard Sediment Site encompasses the entire 56 water acres of the NASCCO and BAE Systems leaseholds. Also included in the Shipyard Sediment Site investigation were areas just outside the northwestern boundary of the BAE Systems leasehold and areas west of the leasehold near the eastern edge of the shipping channel. The vertical and horizontal extent of the Shipyard Sediment Site includes bay bottom marine sediment with pollutant levels greater than "background conditions"[4] found in relatively "clean" regions of San Diego Bay and includes areas that extend beyond the NASSCO and BAE Systems leaseholds. This area is referred to as the Shipyard Sediment Site Study Area. A map of the area is provided in Figure 1-1 below.

4 The term background conditions, as used in this Technical Report, refers to sediment quality conditions found in areas of San Diego Bay that are remote from known pollution sources. A discussion of the factors considered in defining San Diego Bay background conditions for use in identifying areas at the Shipyard Sediment Site that may require remediation or cleanup is contained in Sections 16 and 29 of the Technical Report.

Figure 1-1 Shipyard Sediment Area



1.2. Elevated Pollutant Levels

The San Diego Water Board compared sediment chemistry levels found at the Shipyard Sediment Site to various sediment quality guidelines (SQGs) as well as background reference sediment chemistry levels found in other parts of present-day San Diego Bay. Consistent with the principles described in Section 17.1, the San Diego Water Board selected stations to establish a reference condition reflective of the sediment quality condition that existed within and adjacent to the Shipyard Sediment Site before the discharges occurred. This contemporary ambient background condition is not representative of pristine pre-industrial background condition as it considers the global spread of pollutants in the bay from current and historical discharges. Factoring in low levels of pollutants at a reference site is consistent with U.S. EPA guidelines on selecting and establishing reference conditions. The purpose of this comparison was to evaluate 1) if sediment chemistry levels at the Shipyard Sediment Site chemistry levels exceeded background conditions in San Diego Bay and 2) the potential threat to aquatic life from chemical pollutants detected in the marine sediment.

Sediment quality guidelines (SQGs) are reference values above which sediment pollutant concentrations could pose a significant threat to aquatic life and can be used to evaluate sediment chemistry data. SQGs have been used by regulatory agencies, research institutions, and environmental organizations throughout the United States to identify contamination hot spots, characterize the suitability of dredge material for disposal, and establish goals for sediment cleanup and source control (Vidal and Bay, 2005).

The San Diego Water Board used the following empirical SQGs to evaluate chemical levels at Shipyard Sediment Site stations: 1) Effects Range-Median (ERM) for metals (Long et al., 1998), 2) Consensus midrange effects concentration for PAHs and PCBs (Swartz, 1999; MacDonald et al., 2000), and 3) Sediment Quality Guideline Quotient (SQGQ) for chemical mixtures. The San Diego Water Board also used chemistry levels found in background reference areas of San Diego Bay to compare Shipyard Sediment Site sediment chemistry levels. The results of this evaluation indicated that pollutant levels for arsenic, copper, lead, mercury, zinc, PCBs, PAHs, and TBT in the sediment at the Shipyard Sediment Site are elevated and represent a potential threat to aquatic life. Additional details on SQGs and chemistry levels found at the Shipyard Sediment Site are provided in Sections 18 and 20 of this Technical Report.

1.3. Responsible Parties

NASSCO, BAE Systems, the City of San Diego, Campbell Industries, San Diego Gas and Electric (SDG&E), a subsidiary of Sempra Energy Company, the United States Navy, and the San Diego Unified Port District (Port District) are each named as dischargers in the Cleanup and Abatement Order, responsible for the cleanup of waste and the abatement of the effects of waste discharges at the Shipyard Sediment Site. This section provides an overview of the general principles applied by the San Diego Water Board in determining the responsible parties or Dischargers identified in the Cleanup and Abatement Order.

1.3.1. Water Code Section 13304

California Water Code (Water Code) section 13304 contains the cleanup and abatement authority of the Regional Water Quality Control Boards (Regional Water Boards), including the San Diego Water Board. Section 13304(a) provides that any person who has discharged or discharges waste[5] into waters of the state in violation of any waste discharge requirement[6] or other order or prohibition issued by a Regional Water Board or the State Water Resources Control Board (State Water Board) or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution[7] or nuisance[8] may be required to clean up the discharge and abate the effects thereof. This section authorizes the San Diego Water Board to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge).[9]

1.3.2. Resolution No. 92-49

State Water Board Resolution No. 92-49 (*Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*) describes the policies and procedures that apply to the cleanup and abatement of all types of discharges subject to Water Code section 13304 (SWRCB, 1996). Resolution No. 92-49 provides that the San Diego Water Board shall, in its decisions on who shall be held accountable for the cleanup and abatement of waste, use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

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5 "Waste" is very broadly defined in Water Code section 13050(d) "such that it includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal". See Sections 2 through 10 for discussion of the specific waste discharges. See Section 36 regarding legal and regulatory authority.

6 The term waste discharge requirements include those which implement the National Pollutant Discharge Elimination System (NPDES).

7 Pollution is defined in Water Code section 13050(1) as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects either of the following: (A) The waters for beneficial uses, (B) Facilities which serve these beneficial uses." Pollution may include "contamination."

8 Nuisance is defined in Water Code section 13050(m) "… anything which: (1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, and (2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal, and (3) occurs during or as a result of the treatment or disposal of wastes."

9 Finding 4 of State Water Resources Control Board Resolution No. 92-49, *Policies And Procedures For Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304*, (As Amended on April 21, 1994 and October 2, 1996).

- Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;
- Site characteristics and location in relation to other potential sources of a discharge;
- Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;
- Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;
- Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;
- Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;
- Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;
- Reports and complaints;
- Other agencies' records of possible known discharge; and
- Refusal or failure to respond to San Diego Water Board inquiries.

1.3.3. State Water Resources Control Board Decisions Dealing with Responsible Parties

The State Water Board has also, in a series of orders dealing with the review of Regional Water Board decisions on who is responsible for cleanups, established the following general principles regarding responsible parties in cleanup and abatement orders:

- In general, name all persons who have caused or permitted a discharge (Orders Nos. WQ 85-7 and 86-16).
- "Discharge" is to be construed broadly to include both active discharges and continuing discharges (Order No. WQ 86-2).
- There must be reasonable basis for naming a responsible party. It is inappropriate to name persons who are only remotely related to the problem such as suppliers and distributors of gasoline (Orders Nos. WQ 85-7, 86-16, 87-1, 89-13, and 90-2).
- Persons who are in current possession, ownership or control of the property should be named, including current landowners and lessees (numerous orders, including

Orders Nos. WQ 84-6, 86-11, 86-18, 89-1, 89-8, 89-13 and 90-3). Lessee/sublessors may be responsible (WQ 86-15).

- Generally, Regional Water Boards should not try to apportion responsibility between parties (WQ 86-2 and 88-2).

- However, in some cases, current landowners should only be named as secondarily liable. Factors: Landowner did not cause or know of actual discharge; tenant, lessee or prior owner is responsible; cleanup is proceeding; and lease is long-term (Orders Nos. WQ 86-11, 86-18, 87-6, and 92-13). Secondary responsibility is also appropriate where landowner is trustee-type governmental agency such as Forest Service (Order No. WQ 87-5).

- Prior landowners and lessees should be named if they owned or were in possession of Shipyard Sediment Site at the time of discharge, had knowledge of the activities that resulted in the discharge, and had the legal ability to prevent the discharge (numerous orders, including Orders Nos. WQ 85-7, 86-15, 91-7 and 92-13). Narrow exceptions based on such factors as: site owned or leased for short time, person did not cause actual discharge, are other responsible parties, person did not use property, no or minimal knowledge of problem (Orders Nos. WQ 92-4 and 92-13).

- It is appropriate to name government agencies as responsible parties (Orders Nos. WQ 88-2, 89-12, and 90-3).

- Corporations should be named even where a dissolved corporation (Order No. WQ 89-14) or a successor in interest (Order No. WQ 89-8).

1.3.4. Responsible Parties Named as Dischargers

The San Diego Water Board applied the principles cited above in determining who should be named as a discharger in the Cleanup and Abatement Order. For the reasons set forth in Sections 2, 3, 4, 5, 6, 9, and 10 of this Technical Report the San Diego Water Board determined that NASSCO, BAE Systems, the City of San Diego, San Diego Marine Construction Company, Campbell Industries, SDG&E, a subsidiary of Sempra Energy Company, the United States Navy, and the Port District have each caused or permitted the discharge of pollutants to the Shipyard Sediment Site resulting in the accumulation of pollutants in the marine sediment. Accordingly, with the exception of San Diego Marine Construction Company, for which no corporate successor has yet been determined, these parties are named as dischargers in the Cleanup and Abatement Order.

1.3.5. Parties the San Diego Water Board Declined to Name as Dischargers

1.3.5.1. ChevronTexaco, BP and the Atlantic Richfield Company (ARCO)

The San Diego Water Board applied the principles cited above in determining that Chevron, a subsidiary of ChevronTexaco, BP and the Atlantic Richfield Company (ARCO) should not be named as dischargers in the Cleanup and Abatement Order. For the reasons set forth in Sections

7 and 8 of this Technical Report the San Diego Water Board determined that there is insufficient evidence to conclude that these parties contributed to the accumulation of pollutants in the marine sediment at the Shipyard Sediment Site to levels, which create, or threaten to create, conditions of pollution or nuisance.

1.3.5.2. Star & Crescent Boat Company (Star & Crescent)

The San Diego Water Board declines to resolve the factual and legal issues necessary to determine whether Star & Crescent is the corporate successor of and responsible for discharges of waste caused or permitted by San Diego Marine Construction Company. If the federal court determines that Star & Crescent is the corporate successor of San Diego Marine Construction Company, assuming its liabilities, the San Diego Water Board directs the San Diego Water Board Cleanup Team to reevaluate whether it is appropriate to add Star & Crescent as a discharger under this CAO. See discussion in Finding 5 of this CAO and the corresponding sections in this Technical Report.

1.4. Pollution and Contamination Conditions at the Shipyard Sediment Site

Water Code section 13304 requires a person to clean up waste or abate the effects of the waste if so ordered by a regional water board in the event there has been a discharge in violation of waste discharge requirements, or if a person has caused or permitted waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates or threatens to create a condition of pollution or nuisance. "Pollution" is defined as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects … the waters for beneficial uses.…"[10] "Contamination" is defined as "an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."[11]

Contaminated marine sediment at the Shipyard Sediment Site threatens San Diego Bay beneficial uses and creates a condition of pollution and contamination in waters of the State. The pollution and contamination conditions found at the Shipyard Sediment Site described in the subsections below are the result of the discharge of waste by the responsible parties described in Section 1.3.4, above.

1.4.1. Overview of Potential Adverse Effects[12]

Bay bottom marine sediment provides habitat for many aquatic organisms and functions as an important component of aquatic ecosystems. Sediment also serves as a major repository for persistent and toxic chemical pollutants released into the environment. In the aquatic environment, chemical waste products of anthropogenic (human) origin that do not easily degrade can eventually accumulate in sediment. The environmental threat associated with

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[10] Water Code section 13050(1).

[11] Water Code section 13050(k).

[12] Adapted from U.S. EPA. 1997d.

elevated levels of pollutants in sediment is caused by the tendency of many chemical substances discharged into marine waters to attach to sediment particles and thus accumulate to high concentrations in the bay bottom sediment.

Adverse effects on organisms in or near sediment can occur even when pollutant levels in the overlying water are low. Benthic (bottom-dwelling) organisms can be exposed to pollutants in sediment through direct contact, ingestion of sediment particles, or uptake of dissolved contaminants present in the interstitial (pore) water. In addition, natural and human disturbances of the sediment can release pollutants to the overlying water, where pelagic (open-water) organisms can be exposed. Evidence from laboratory tests shows that contaminated sediment can cause both immediate lethality (acute toxicity) and long-term deleterious effects (chronic toxicity) to benthic organisms. Field studies have revealed other effects, such as tumors and other lesions, on bottom-feeding fish. These effects can reduce or eliminate species of recreational, commercial, or ecological importance (such as crabs, shrimp, and fish) in water bodies either directly or by affecting the food supply that sustainable populations require.

Furthermore, contaminated sediment can also lead to the accumulation of pollutants in organisms due to the effects of bioaccumulation. In addition, biomagnification of the contaminants can occur in the food chain when smaller contaminated organisms are consumed by higher trophic level species, including humans. Thus pollutants in the marine sediment might accumulate in edible tissue to levels that cause health risks to wildlife and human consumers.

In summary, contaminated marine sediments are a threat to water quality and beneficial uses for the following reasons:

- Various toxic contaminants found only in barely detectable amounts in the water column can accumulate in sediment to much higher levels over time.
- Sediment serves as both a reservoir for contaminants and a source of contaminants to the water column and organisms.
- Sediment contaminants (in addition to water column contaminants) directly affect benthic infauna and higher trophic level organisms (including humans) which contact these fauna through the food web.
- Sediment is an integral part of the aquatic environment that provides habitat, feeding, spawning, and rearing areas for many aquatic organisms.

1.4.2. San Diego Bay Beneficial Uses

The Water Quality Control Plan for the San Diego Basin (Basin Plan) designates the following 12 beneficial uses for San Diego Bay that must be protected against water quality degradation. These beneficial uses are applicable to the Shipyard Sediment Site.[13] (RWQCB, 1994):

[13] Basin Plan (RWQCB, 1994), Table 2-3, Beneficial Uses of Coastal Waters at page 2-47.

- **Estuarine Habitat (EST)** – Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds);

- **Marine Habitat (MAR)** - Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds);

- **Migration of Aquatic Organisms (MIGR)** – Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish;

- **Wildlife Habitat (WILD)** – Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources;

- **Preservation of Biological Habitats of Special Significance (BIOL)** – Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection;

- **Rare, Threatened, or Endangered Species (RARE)** – Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered;

- **Contact Water Recreation (REC-1)** – Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs;

- **Non-contact Water Recreation (REC-2)** – Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities;

- **Shellfish Harvesting (SHELL)** – Includes uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial, or sport purposes;

- **Commercial and Sport Fishing (COMM)** – Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes;

- **Navigation (NAV)** – Includes uses of water for shipping, travel, or other transportation by private, military, or commercial vessels; and

- **Industrial Service Supply (IND)** – Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

1.4.2.1. Adverse Effects to San Diego Bay Beneficial Uses

Contaminated marine sediment at the Shipyard Sediment Site threatens three target receptors: aquatic life, aquatic-dependent wildlife, and human health. San Diego Bay beneficial uses applicable to each of these target receptors are identified in Table 1-1. Actual or potential impairments to these target receptors are described in the following sections of this Technical Report:

- Aquatic life impairments are discussed in Sections 14 to 20.
- Aquatic dependent wildlife impairments are discussed in Sections 21 to 24.
- Human health impairments are discussed in Sections 25 to 28.

Table 1-1 Target Receptors Associated with San Diego Bay Beneficial Uses

TARGET RECEPTORS	AQUATIC LIFE	AQUATIC-DEPENDENT WILDLIFE	HUMAN HEALTH
BENEFICIAL USES	Estuarine Habitat (EST)	Wildlife Habitat (WILD)	Contact Water Recreation (REC-1)
	Marine Habitat (MAR)	Preservation of Biological Habitats of Special Significance (BIOL)	Non-Contact Water Recreation (REC-2)
	Migration of Aquatic Organisms (MIGR)	Rare, Threatened or Endangered Species (RARE)	Shellfish Harvesting (SHELL)
			Commercial and Sport Fishing (COMM)

Table 1-2 Overview of Potential Impacts to Aquatic Life, Aquatic Dependent Wildlife and Human Health.

Description of Adverse Effects Observed	Technical Report Section	Beneficial Uses Potentially Impacted
Aquatic Life Risks. Six of 30 stations sampled at the Shipyard Sediment Site are categorized as "Likely" impacted based on the results of the Triad lines of evidence. The chemicals of potential concern (CoPCs) present in the sediment, therefore, have the potential to adversely impact the organisms living in or on the sediment (i.e., benthic community).	18	MAR, MIGR
Bioaccumulation. For many chemical pollutants, concentrations in tissues of clams exposed in the laboratory to shipyard sediment samples increase as chemical pollutant concentrations in sediment increases. Indicates the likelihood of chemicals entering the aquatic food web.	19	MAR, MIGR, WILD, BIOL, RARE, SHELL, COMM
Aquatic-Dependent Wildlife Risks. Hazard quotients calculated at the Shipyard Sediment Site exceed 1.0 at the no-effect TRV exposure threshold for some receptors and chemicals, and are greater than the hazard quotients calculated at the reference area. Ingestion of prey items at the Shipyard Sediment Site, therefore, potentially poses a risk to wildlife receptors of concern.	24	MAR, WILD, RARE
Human Health Risks. Cancer risks calculated at the Shipyard Sediment Site for some chemicals exceed the target cancer risk level of $1x10^{-6}$ and are greater than the cancer risks calculated at the reference area. Ingestion of fish and shellfish caught at the Shipyard Sediment Site, therefore, potentially poses a cancer risk to recreational and subsistence anglers.	28	SHELL, COMM
Human Health Risks. Non-cancer risks calculated at the Shipyard Sediment Site for some chemicals exceed the target non-cancer risk level of 1.0 and are greater than the non-cancer risks calculated at the reference area. Ingestion of fish and shellfish caught at the Shipyard Sediment Site, therefore, potentially poses a non-cancer risk to recreational and subsistence anglers.	28	SHELL, COMM

1.4.2.2. Navigation (NAV) and the Industrial Service Supply (IND) Beneficial Uses

Contaminated marine sediment at the Shipyard Sediment Site may also threaten San Diego Bay Navigation (NAV) and the Industrial Service Supply (IND) beneficial uses if cleanup of the Shipyard Sediment Site does not occur. Shipping, travel, or transportation by private, military, or commercial vessels is an important beneficial use in San Diego Bay. The protection of this beneficial use is dependent upon maintaining appropriate depths in shipping channels and vessel berthing areas by carrying out maintenance dredging. The Navigation (NAV) beneficial use can be adversely affected when maintenance-dredging projects are stymied due to water quality problems associated with the resuspension and migration of pollutants from contaminated bay sediment to previously uncontaminated areas. The Navigation beneficial use can also be affected when pollutants in bay sediment complicate the disposal of dredged sediment by exceeding criteria for the ocean disposal of dredged sediment or the beneficial reuse of dredged sediment (e.g. beach replenishment) from maintenance dredging projects. The Industrial Service Supply (IND) beneficial use can be adversely affected by pollutants migrating from the sediment into the water column causing a decline in water quality conditions.

The Cleanup and Abatement Order does not specifically identify impairments to the Navigation (NAV) or the Industrial Service Supply (IND) beneficial uses. It is assumed that cleanup levels protective of the beneficial uses tabulated in Table 1-1 will also be protective of the Navigation (NAV) or the Industrial Service Supply (IND) beneficial uses.

1.4.3. San Diego Bay Water Quality Objectives

The Basin Plan sets narrative and numerical water quality objectives[14] that must be attained or maintained to protect the designated beneficial uses and conform to the state's antidegradation policy (RWQCB, 1994). The narrative water quality objective for toxicity[15] applicable to San Diego Bay and the Shipyard Sediment Site provides that:

> *"All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the [San Diego Water] Board."*

> *"The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in US EPA, State Water Resources Control Board or other protocol authorized by the [San Diego Water] Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay."*

> *"In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged."*

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14 "Water quality objectives" are defined in Water Code section 13050(h) as "the limits or levels water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

15 Basin Plan, Chapter 3. Water Quality Objectives, Page 3-15.

"Pollution" is defined under Water Code section 13050(l), in part, to mean an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects beneficial uses. A condition of pollution exists when applicable water quality objectives are violated as a result of the discharge of waste.

The bioassay tests results show that the narrative toxicity objective was not attained at the Shipyard Sediment Site. A suite of three bioassay tests was conducted to test for toxicity of marine sediment. The majority of samples collected were significantly different than the negative (clean) control sample. Some of these same samples also exceeded the 95 percent prediction limit threshold value for that particular test. Processing the test responses in a toxicity decision matrix found 43 percent (13 out of 30 stations) to be moderately toxic and 57 percent to have low toxicity. Further details are provided in Section 18.

1.4.4. California Toxics Rule

U.S. EPA promulgated a final rule prescribing water quality criteria for toxic pollutants in inland surface waters, enclosed bays, and estuaries in California in 2000 (The California Toxics Rule or "CTR;").[16] CTR criteria constitute applicable water quality objectives in California. In addition to the CTR, certain criteria for toxic pollutants in the National Toxics Rule (NTR) [40 CFR 131.36] constitute applicable water quality objectives in California as well.

Comparisons were made to the CTR saltwater quality criterion continuous concentration (CCC), which is the highest concentration of a pollutant to which marine aquatic life can be exposed for an extended period of time without deleterious effects. Of the 12 site stations sampled for pore water, 12 stations exceeded the copper CTR value, 6 stations exceeded the lead CTR value, and 12 stations exceeded the total PCBs CTR value. Although CTR values are derived based on toxicity to planktonic organisms, and the chemical sensitivities of planktonic and benthic organisms may differ, this comparison provides a screening-level evaluation of which chemicals may deserve further evaluation. Further details are provided in the Appendix for Section 15 (Pore Water Analyses).

1.5. Nuisance Conditions at the Shipyard Sediment Site

Deposits of pollutant waste in marine sediment at the Shipyard Sediment Site cause nuisance conditions because of the following:

There is an increased health risk to humans that consume fish and shellfish from San Diego Bay that bioaccumulate pollutants from the Shipyard Sediment Site;

There is a community of affected persons, including a considerable number of persons from minority populations, that consume fish and shellfish with a greater potential for adverse health effects; and

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[16] The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

There is obstruction to the public's free use of property.

1.5.1. Definition of Nuisance

Water Code section 13050 (m) cites three criteria, which determine whether nuisance conditions exist in waters of the state:

"*Nuisance" means anything that meets all of the following requirements:*

(1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.

(2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

(3) Occurs during, or as a result of, the treatment or disposal of wastes.

The pollution and contamination conditions found at the Shipyard Sediment Site meet all three criteria.

1.5.2. Increased Human Health Risk Associated with Consumption of San Diego Bay Fish

Fish consumption is the primary route of human exposure to the pollutants found at the Shipyard Sediment Site. Humans may eat fish that have bioaccumulated pollutants from the Shipyard Sediment Site. The San Diego Water Board evaluated potential impacts on human health by estimating potential carcinogenic risks and non-carcinogenic hazards associated with the consumption of Shipyard Sediment Site pollutants that bioaccumulate in fish tissue. The San Diego Water Board used U.S. EPA procedures for estimating human health risks due to the consumption of chemically contaminated fish tissue and employed appropriate human fish consumption rates and bioaccumulation factors in the analysis. The San Diego Water Board concludes in Section 28 of this Technical Report that human ingestion of seafood caught within all four assessment units at the Shipyard Sediment Site poses a cancer risk greater than $1x10^{-6}$ (i.e., 1 in 1,000,000 extra chance of cancer over a lifetime) and non-cancer risk greater than 1 to both recreational and subsistence anglers, given the assumptions of the exposure scenarios modeled. The San Diego Water Board also concludes the Shipyard Sediment Site poses a greater cancer and non-cancer risk to recreational and subsistence anglers than the risks posed at reference conditions in San Diego Bay. The carcinogenic chemicals of potential concern (CoPCs) include total polychlorinated biphenyls (PCBs) and inorganic arsenic. The non-carcinogenic CoPCs include cadmium, copper, mercury, and total PCBs. The calculations and results are provided in the Appendix for Section 28.

1.5.2.1. PCB Health Effects

U.S. EPA (2000b) has classified PCBs as "probable human carcinogens." Studies have suggested that PCBs may play a role in inducing breast cancer. Studies have also linked PCBs to increased risk for several other cancers including liver, biliary tract, gall bladder, gastrointestinal tract, pancreas, melanoma, and non-Hodgkin's lymphoma. PCBs may also cause non-carcinogenic effects, including reproductive effects and developmental effects (primarily to the nervous system). PCBs tend to accumulate in the human body in the liver, adipose tissue (fat), skin, and breast milk. PCBs have also been found in human plasma, follicular fluid, and sperm fluid. Fetuses may be exposed to PCBs in utero, and babies may be exposed to PCBs during breastfeeding. According to U.S. EPA (2000b), "[s]ome human studies have also suggested that PCB exposure may cause adverse effects in children and developing fetuses while other studies have not shown effects. Reported effects include lower IQ scores, low birth weight, and lower behavior assessment scores."

1.5.2.2. Inorganic Arsenic Health Effects

Arsenic is strongly associated with lung and skin cancer in humans, and may cause other internal cancers as well. Skin lesions, peripheral neuropathy, and liver and kidney disorders are commonly associated with chronic arsenic ingestion (U.S. EPA, 2000b).

1.5.2.3. Cadmium Health Effects

Kidney toxicity is the primary concern with cadmium exposure (U.S. EPA, 2000b). Chronic exposure to cadmium may also include anemia and bone disorders, including osteomalacia, osteoporosis, and spontaneous bone fractures. Some studies have suggested an association between neurotoxicity and cadmium exposure at levels below those that cause kidney toxicity. According to U.S. EPA (2000b), reproductive and developmental toxicity have been associated with cadmium ingestion.

1.5.2.4. Copper Health Effects

Although copper is an essential human nutrient, large intakes of copper can cause liver or kidney damage, or even death in cases of extreme exposure.

Short periods of exposure to levels above the U.S. EPA's Action Level of 1.3 parts per million can cause gastrointestinal disturbance, including nausea and vomiting. Use of water that exceeds this Action Level over many years could cause liver or kidney damage (U.S. EPA, 1995).

1.5.2.5. Mercury Health Effects

Methylmercury (CH_3Hg) is the form of mercury that builds up in the tissues of fish and is the most toxic. It affects the immune system, alters genetic and enzyme systems, and damages the nervous system, including coordination and the senses of touch, taste, and sight. Exposure to methylmercury is usually by ingestion, and it is absorbed more readily and excreted more slowly than other forms of mercury (U.S. Geological Survey, 2000).

Methylmercury readily crosses the placental and blood/brain barriers (U.S. EPA, 2000b) and is particularly damaging to developing embryos, which are five to ten times more sensitive than adults (U.S. Geological Survey, 2000). Studies found that offspring born of women exposed to methylmercury during pregnancy have exhibited a variety of developmental neurological abnormalities, including the following: delayed onset of walking, delayed onset of talking, cerebral palsy, altered muscle tone and deep tendon reflexes, and reduced neurological test scores (U.S. EPA, 1997e).

1.5.3. Adversely Affected Community from Consumption of San Diego Bay Fish

There are people in the local community that catch and consume fish and shellfish from San Diego Bay. The San Diego Bay Health Risk Study (County of San Diego, 1990), summarized in Section 1.5.3.2 below, reported that 74 percent of people who catch and consume fish from the Bay are people of color. The 1990 study reported that consumption patterns of ethnic populations indicate that they tend to eat more fish in their diet and eat parts of the fish that have higher pollutant accumulation. This group of anglers, including their family members that may also consume fish and shellfish caught in San Diego Bay, has a disproportionately higher health risk from pollution in the San Diego Bay than other San Diego Bay anglers.

1.5.3.1. Environmental Justice

Environmental justice is defined in California law[17] as “the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.” The California Environmental Protection Agency (Cal EPA), and it’s Boards, Departments, and Offices, which include the State and Regional Water Boards, are charged[18] with conducting its programs, policies, and activities in a manner that ensures the fair treatment of people of all races, cultures, and income levels, including minority populations and low-income populations of the state.

Cal EPA’s stated mission, as described in its 2004 Intra-Agency Environmental Justice Strategy, is to accord the highest respect and value to every individual and community, by developing and conducting our public health and environmental protection programs, policies, and activities in a manner that promotes equity and affords fair treatment, accessibility, and protection for all Californians, regardless of race, age, culture, income, or geographic location. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

[17] Government Code section 65040.12(e).

[18] Public Resources Code sections 71110 – 71113.

1.5.3.2. County of San Diego, 1990 San Diego Bay Health Risk Study

The County of San Diego's 1990 report, *San Diego Bay Health Risk Study*, identified the demographics and consumption patterns of people in the San Diego Region who catch and consume fish from San Diego Bay. Three hundred and sixty nine (369) anglers[19] were surveyed over a period of one year from October 1988 through October 1989. The survey was used to:

- Identify the species of fish most commonly caught by anglers of San Diego Bay;
- Identify the demographics of the population of anglers who catch fish; and
- Characterize the fish consumption patterns of the anglers and others who may consume fish.

The San Diego Bay angler interview locations selected by the California Department of Fish and Game (DFG) included Glorietta Bay, Coronado Ferry Landing, Shelter Island, Harbor Island, Spanish Landing, Embarcadero Park, Sweetwater Port District, the City of Chula Vista Bayside Park, and G Street Pier. Boat launches were also surveyed for anglers returning with their catch from the Bay.

The majority of anglers surveyed lived in municipalities adjacent to San Diego Bay. Table 1-3 provides a breakdown of the anglers' place of residence.

Table 1-3 Anglers' Reported Place of Residence

Residence	Percent of Total Anglers Interviewed1
City of San Diego	50.7%
City of Chula Vista	10.6 %
City of National City	8.1 %
San Diego County	15.9%
Outside San Diego County	3.5%
Undetermined	11.1%

1. County of San Diego (1990) Table IV-D, Demographic Profile of 369 Anglers.

Five distinct ethnic subpopulations were identified as constituting significant portions of the interviewed anglers: Caucasian, Filipino, Hispanic, Asian (Vietnamese, Laotian, Japanese, Cambodian, Chinese, Korean and Thai) and Black. Table 1-4 provides a comparison of fishing patterns for the ethnic populations surveyed.

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19 An angler is a person who catches fish with a hook.

Table 1-4 Comparison of Fishing Patterns by Ethnicity

Ethnicity	Percent of Total Anglers[1]	Fishing Frequency (Times per Month)[2]	Percent of Anglers that Caught and Ate Fish	Average Yield (grams of fish /successful trip)[3]	Percent of Anglers who Fish Year Round
Caucasian	42.0	7.3	37.2	1,028	78.9
Filipino	20.1	7.1	73.6	2,156	60.9
Hispanic	12.5	4.5	40.0	969	52.6
Asian[4]	11.1	4.8	87.9	1,791	38.7
Black	6.5	3.9	38.9	1,896	79.2
Other Ethnic Groups[5]	2.2	7.3	50.0	767	62.5
Unidentified	5.6	NC	100.0	326	NC
Total Population	**100**	**6.4**	**53.4**	**1,504**	**67.8**

1. County of San Diego (1990) Table IV-D, Demographic Profile of 369 Anglers.
2. A 30-day month was assumed.
3. Based on interviews only where catch was consumed.
4. Group includes Vietnamese, Laotian, Japanese, Cambodian, Chinese, Korean, and Thai.
5. Group includes Indian, American, Indian, Hawaiian, and Polynesian.

NC = not calculated
(Table IV-E; County of San Diego, 1990)

County of San Diego (1990) drew the following conclusions from the data in Table 1-4:

- Caucasians and Filipinos were the most frequent anglers at 7.3 and 7.1 times per months respectively. Asians, Hispanics and Blacks were less frequent at 4.8, 4.5 and 3.9 times per month.

- Filipinos caught and consumed fish 73.6 percent of the time while Asians caught and consumed fish 87.9 percent of the time. Caucasians, Hispanics and Blacks all caught and consumed fish 40 percent or less of the time. This may indicate that Filipinos and Asians, more than other populations, are fishing in San Diego Bay for food rather than sport.

- In terms of average yield of fish in grams per successful trip (when fish were caught) Filipinos and Asians tended to be more successful than other portions of the population at 2,156 grams and 1,791 grams/successful trip respectively.

- In terms of the percentages of each population that fish year round, Blacks and Caucasians had the highest percentages at 79.2 % and 78.9 % respectively. Values for other populations ranged from a low of 38.7% for Asians to a high of 60.9% for Filipinos. These values are difficult to interpret because they do not contain any indication of what portion of the year was fished.

County of San Diego (1990) also evaluated patterns of consumption by ethnicity and the distribution of risk between ethnic groups. The results are summarized in Table 1-5, below.

Table 1-5 Comparison of Consumption Patterns By Ethnicity

Ethnicity	Percent of Total Consumers[1]	Percent of Total Measured Catch[2]	Projected Percent of Total Catch[2]	Consumption Rate (g/day)[3]
Caucasian	24	24.6	37.8	10.8
Filipino	32.6	39.0	28.7	49.5
Asian[4]	25.6	22.8	16.4	81.9
Hispanic	8.9	5.7	5.5	23.6
Black	4.7	6.5	9.7	NC[5]
Other Ethnic Groups[6]	2.2	1.4	1.9	NC[5]
Total	**100**	**100**	**100**	**31.2**

1. This distribution is based on a sample size of 143 interviews, representing 490.5 potential consumers.
2. These percentages represent only catch that was indicated would be consumed. These calculations assume that successful anglers not represented in the measured catch are catching fish at the same rate as those who are represented.
3. Consumption rates calculated using the following factors: fish weight, a cleaning factor, number of consumers, and fishing frequency.
4. Group includes Vietnamese, Laotian, Japanese, Cambodian, Korean, and Thai.
5. NC = not calculated. Sample sizes for these groups are insufficient to allow calculations of consumption rates.
6. Group includes Indian, American Indian, Hawaiian, Polynesian, and Unidentified.

(Table IV-F; County of San Diego, 1990)

County of San Diego (1990) drew the following conclusions from the data in Table 1-5 and other data contained in the report:

- Filipinos were determined to represent 32.6 percent of the total consumers in spite of the fact that they comprise only 20.1 percent of all anglers. Although Asians represent only 11.1 percent of the total anglers, 25.6 percent of the total consumers were Asian. Caucasians were determined to represent only 24 percent of the total consumers in spite of the fact that they comprise only 42 percent of all anglers. Hispanics and blacks made up only 8.9 percent and 4.7 percent of the totals consumers respectively.

- Caucasians were projected to consume 37.8 percent of the total consumed fish catch. Filipinos and Asians were projected to consume 28.7 percent and 16.4 percent of the total consumed fish catch respectively. Blacks and Hispanics were projected to consume the smallest portion of the total consumed fish catch at 9.7 percent and 5.5 percent respectively. While these estimates give some indication of the relative portion of total contaminated fish ingested by each group, it is important to note that other factors, such as the parts of a fish consumed may influence the actual amount of contaminants consumed.

- The fish consumption rate of 10.8 grams/day for Caucasians is considerably lower than the 31.2 grams/day determined for the entire population. The fish consumption rates for Filipinos, Asians and Hispanics were considerably higher than the Caucasian fish consumption rate. However limitations on population sample sizes especially for Hispanics and Asians, make comparisons of the consumption rates problematic.[20]

Individuals that consume a greater portion of the fish, such as internal organs may be at greater risk of consuming a greater amount of contaminants. Other data contained in Appendix J, Table J-10, Comparison of Parts Eaten By Ethnicity of County of San Diego (1990) indicates there were significant variations between ethnic populations in the parts of fish consumed. Only 5.6 percent of Caucasian anglers consumed the entire fish and 66.7 percent eat only the muscle. Approximately 40 percent of both Filipinos and Asians consume the entire fish. This means that on the average a given amount of fish consumed may result in a lower amount of ingested contaminants for Caucasians as compared to Filipinos and Asians.

1.5.3.3. Environmental Health Coalition, Survey of Fishers on Piers in San Diego Bay

The Environmental Health Coalition (EHC)[21] conducted what they classified as an "opportunity" sample survey in 2004 of people fishing from piers near the Shipyard Sediment Site, NAVSTA San Diego and in the south end of San Diego Bay to ensure the interests of this population were considered in the Cleanup and Abatement Order decision-making process. The EHC described the survey group as a "…selective sample that is highly exposed to fish from near the shipyards, Naval Station San Diego, and the southern portion of San Diego Bay." The results of this survey are contained in a report titled, "*Survey of Fishers on Piers in San Diego Bay, Results and Conclusions*" (EHC, 2005), and are summarized below.

The EHC reported that a total of 109 fishers were interviewed in English, Spanish, or Tagalog, as appropriate, during the winter and spring of 2004. Piers surveyed by EHC included the following:

[20] The fish consumption rates for Caucasians were estimated based on an interview sample size of 20 or more. The consumption rates for Asians and Hispanics were based on an interview sample size of 4 and 5 interviews respectively, and should only be considered an approximation of the actual consumption rates for those groups.

[21] The Environmental Health Coalition (EHC), is a self–described nonprofit environmental justice organization in San Diego dedicated to the prevention and cleanup of toxic pollution, monitoring actions causing pollution and educating communities about toxics.

Fishing Pier	Approximate Miles from Shipyard Sediment Site
Convention Center pier (downtown San Diego)	1.7
Pepper Park Pier (National City)	3.2
Chula Vista Pier	5.1

EHC (2005) reported the following:

- Of all of the fishers surveyed, the places of residence supplied by the interviewees were as follows:
  - Eighty three percent (83%) lived in EHC target communities such as the following:
    - National City (59%);
    - Barrio Logan (14%);
    - Western Chula Vista and Imperial Beach (10%); and
    - Seven percent (7%) lived in Tijuana, Mexico.
- Ninety-six percent of the fishers surveyed were people of color and consisted of the following ethnic groups:
  - Fifty seven percent (57%) Latino; and
  - Thirty nine percent (39%) Filipino.
- Of the surveyed fishers, the fishing patterns consisted of the following:
  - Fifty eight percent (58%) fished at least once a week; and
  - Twenty five percent (25%) fished daily.
- Almost two thirds (61%) of the fishers reported that they eat the fish they catch and two percent give the fish away.
- Of the surveyed fishers, 78 percent have children and 41 percent of those children eat fish caught from the Bay.
- Thirteen percent (13%) of the fishers surveyed reported eating fish skin, among them people who fish frequently and who catch large amounts of fish.
- Of the fishers surveyed, 73 percent eat other types of seafood in addition to what they catch.

The San Diego Water Board recognizes that there are limitations to the EHC Survey. The survey was not a representative sample of all San Diego Bay fishers or all South Bay residents. The survey assumed income based on place of residence and the appearance that someone appeared to be engaged in subsistence fishing.

1.5.4. Obstruction of Public's Free Use of Property

The Water Code provides that all waters, surface and underground, are property of the people of the state.[22] The Legislature has also provided that the people of the state have a primary interest in the conservation of waters of the state and that the quality of all waters of the state shall be protected for the use and enjoyment of the people of the state.[23] Thus, impairment of water quality interferes with a right common to the general public. Waste discharges to the Shipyard Sediment Site have resulted in excessive levels of pollutants in the sediment that can in turn accumulate in edible tissue to levels that cause human health risks and present a threat to the public health. This condition adversely affects the Shellfish Harvesting (SHELL) and the Commercial and Sport Fishing (COMM) beneficial uses of San Diego Bay cited in Table 1-1 and also is a violation of the narrative water quality objective for toxicity applicable to San Diego Bay and cited in Section 1.4.3. This unreasonable impact on San Diego Bay beneficial uses and water quality presents an obstruction to the free use of property – property over which the state exercises governmental authority. On that basis, the San Diego Water Board concludes that the Dischargers have caused nuisance conditions in waters of the state, even without proof that the conditions are injurious to health or indecent or offensive to the senses.

San Diego Bay is bordered by the cities of San Diego, National City, Chula Vista and Coronado, with an estimated population of approximately 1.2 million persons. San Diego County has a population of over 2.4 million and is growing at a rate of about 50,000 per year. By the year 2010 there are predicted to be 3.5 million residents in the county, most of them in the metropolitan western portion.

San Diego Bay is an important and valuable resource to San Diego and the Southern California region. It provides habitat for fish and wildlife, extensive commercial and industrial economic benefits, and recreational opportunities to citizens and visitors. It is also a key element for the military security of the United States. The Bay is also a significant economic value to California and the Nation. It provides considerable shelter from ocean waves and is one of the finest natural harbors in the world. The Bay is a major tourist and convention destination, international shipping center, plays a key role in the national defense, and has many other recreational, industrial, and commercial uses. Most of these uses rely on a healthy Bay. Shipping, shipbuilding, boat repair, tourism, and other industries are either directly dependent on, or otherwise benefit from, the Bay. Because of its beauty and availability as a recreational resource, San Diego Bay is a major draw for the tourist industry. In 1997, tourism in the greater San Diego area accounted for 14 million overnight visitors and 4.4 billion dollars in income. Much of this activity occurred around San Diego Bay and downtown San Diego where the hotels and San Diego Convention Center are located.

San Diego Bay is designated as a State Estuary under Section 1, Division 18 (commencing with section 28000) of the Public Resources Code. A State Estuary is defined as a California saltwater bay or body of water, receiving freshwater stream flows, which supports human beneficial uses and wildlife and merits high priority action for preservation.

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[22] Wat. Code §§ 102 and 104.

[23] Wat. Code §§13000.

1.5.5. Summary of Nuisance Condition

The waste at the Shipyard Sediment Site constitutes a public nuisance because it is injurious to human health and obstructs the free use of property and interferes with the comfortable enjoyment of life and property, and affects at the same time an entire community where the extent of the annoyance or damage inflicted upon individuals is unequal.

Human ingestion of seafood caught at the Shipyard Sediment Site poses an increased risk of cancer and toxicity to both recreational and subsistence anglers. This increased risk is based on total PCBs, inorganic arsenic, cadmium, copper, and mercury concentrations found in spotted sand bass and lobster tissue and whole body measurements. The *San Diego Bay Health Risk Study* (County of San Diego, 1990) reported PCBs and mercury in fish species caught by anglers in San Diego Bay.

The *San Diego Bay Health Risk Study* (County of San Diego, 1990) demonstrates that a considerable number of persons exists within the community surrounding San Diego Bay that consumes fish from the Bay that contain levels of contaminants, which are also found in sediment of the Shipyard Sediment Site, that have the potential to adversely affect their health. The survey by EHC (2005) supports the findings in the 1990 *San Diego Bay Health Risk Study* that a number of San Diego Bay anglers are people of color who fish frequently, consume their catch, and sometimes prepare the fish in ways that maximize exposure to contaminants.

Consistent with the Cal EPA’s Environmental Justice Strategy, the San Diego Water Board must promote enforcement of the Clean Water Act (CWA) and CWC in a manner that ensures the fair treatment of people of all races, cultures, and income levels. A failure to act by the San Diego Water Board would violate principles of environmental justice because the health risk from regular consumption of fish caught in the San Diego Bay falls disproportionately on minority groups.

The consumption of fish and shellfish contaminated by pollutants from the Shipyard Sediment Site creates a threat to human health and an obstruction to the public’s free use of San Diego Bay and its aquatic life resources thus interfering with the enjoyment of life and property.

2. Finding 2: National Steel and Shipbuilding Company (NASSCO), A Subsidiary of General Dynamics Company

Finding 2 of CAO No. R9-2012-0024 states:

The San Diego Water Board finds that NASSCO has caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance. These wastes contained metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), butyl tin species, polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs), polynuclear aromatic hydrocarbons (PAHs), and total petroleum hydrocarbons (TPH).

NASSCO, a subsidiary of General Dynamics Company, owns and operates a full service ship construction, modification, repair, and maintenance facility on 126 acres of tidelands property leased from the Port District on the eastern waterfront of central San Diego Bay at 2798 Harbor Drive in San Diego. Shipyard operations have been conducted at this site by NASSCO over San Diego Bay waters or very close to the waterfront since at least 1960. Shipyard facilities operated by NASSCO over the years at the Site have included concrete platens used for steel fabrication, a graving dock, shipbuilding ways, and berths on piers or land to accommodate the berthing of ships. An assortment of waste is generated at the facility including spent abrasive, paint, rust, petroleum products, marine growth, sanitary waste, and general refuse. Based on these considerations NASSCO is referred to as “Discharger(s)” in this Cleanup and Abatement Order (CAO).

2.1. Jurisdiction

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person “who has discharged or discharges waste into the waters of the state in violation of any waste discharge requirements … or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance….”

For the reasons set forth below, the San Diego Water Board has determined that the NASSCO, a subsidiary of General Dynamics Company, should be named as a discharger in Cleanup and Abatement Order No. R9-2012-0024 pursuant to Water Code section 13304.

2.2. Admissible Evidence – State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996) the State Water Board adopted Resolution No. 92-49, *Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304.* Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under CWC section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;
2. Site characteristics and location in relation to other potential sources of a discharge;
3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;
4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;
5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;
6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;
7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;
8. Reports and complaints;
9. Other agencies' records of possible known discharge; and
10. Refusal or failure to respond to San Diego Water Board inquiries.

2.3. NASSCO Owns and Operates a Full Service Ship Construction, Modification, Repair, and Maintenance Facility

2.3.1. Facility Description

From at least 1960 to the present, NASSCO owns and operates a full service ship construction, modification, repair, and maintenance facility on approximately 126 acres of tidelands property on the eastern waterfront of central San Diego Bay. The facility is located on land leased from the Port District at 28th Street and Harbor Drive in San Diego, California. NASSCO's primary business has historically been ship repair, construction, and maintenance for the U.S. Navy and commercial customers. The facility covers approximately 126 acres of tidelands on property leased from the Port District. The land portion and offshore area of the lease are comprised of approximately 80 acres and 46 acres, respectively. Current site improvements include offices, shops, warehouses, concrete platens for steel fabrication, a floating dry dock, a graving dock, two shipbuilding ways, and five piers, which provide 12 berthing spaces.

Shipbuilding and repair operations at NASSCO historically encompassed a large number and variety of activities and industrial processes including, but not limited to, formation and assembly of steel hulls; application of paint systems; installation and repair of a large variety of mechanical, electrical, and hydraulic systems and equipment; repair of damaged vessels; removal and replacement of expended/failed paint systems; and provision of entire utility/support systems to ships (and crews) during repair.

There are three major types of building/repair facilities at NASSCO, which, together with cranes, enable ships to be assembled, launched, or repaired. These facilities are a floating dry dock, a graving dock, and berths/piers. With the exception of berths and piers, the basic purpose of each facility is to separate a vessel from the bay to provide access to parts of the ship normally underwater. NASSCO currently has a floating dry dock, a graving dock, and five piers, which provide 12 berthing spaces and two (2) shipbuilding ways. The berths and piers are over-water structures where vessels are tied during repair or construction activities. Because dry dock space is limited and expensive, many operations are conducted pier side. For example, after painting the parts of a ship normally underwater, the ship is moved from the dry dock to a berth where the remainder of the painting is completed.

Prior to the early 1990's, when a storm water first-flush capture system was installed for portions of the facility, all surface water runoff from NASSCO discharged directly into San Diego Bay. Capture of first-flush storm water from high-risk areas (dry dock, graving dock, paint and blasting areas) was initiated by NASSCO in the early 1990s. Capture of first-flush storm water was extended to additional areas of the facility in 1997 (Exponent, 2003).

2.3.2. Activities Conducted by NASSCO

The primary activities at NASSCO involve a multitude of industrial processes, many of which are conducted over San Diego Bay waters or very close to the waterfront. As a result of these processes, an assortment of wastes is generated. The industrial processes at NASSCO include the following:

- **Surface Preparation and Paint Removal**. Methods of surface preparation and paint removal include dry abrasive blasting, wet abrasive or slurry blasting, hydroblasting, and chemical paint stripping;

- **Paint Application**. After preparation, surfaces are painted. Most painting occurs in a dry dock and involves the ship hull and internal tanks. Painting is also conducted in other locations throughout the shipyard including piers and berths. Paint application is accomplished by way of air or airless spraying equipment and is a major activity at NASSCO;

- **Tank Cleaning**. Tank cleaning operations use steam to remove dirt and sludge from internal tanks, particularly fuel tanks and bilges. Detergents, cleaners, and hot water may be injected into the steam supply hoses. NASSCO reports that wastewater generated has typically been removed and disposed of at an on-site treatment facility;

- **Mechanical Repair/Maintenance/Installation**. A variety of mechanical systems and machinery require repair, maintenance, and installation;

- **Structural Repair/Alteration/Assembly**. Structural repair, alteration, and assembly generally involve welding, cutting, and fastening of steel plates or assembly blocks and other industrial processes;

- **Integrity/Hydrostatic Testing**. Hydrostatic or strength testing and flushing are conducted on hulls, tanks, or pipe repairs. Integrity testing is also conducted on new systems during ship construction phases;

- **Paint Equipment Cleaning**. All air and airless paint spraying equipment is typically cleaned following use. Paint equipment cleaning is a major producer of waste, including solvents, thinners, paint wastes, and sludges;

- **Engine Repair/Maintenance/Installation**. Automotive repair, ship engine repair, maintenance, and installation generate waste oils, solvents, fuels, batteries, and filters;

- **Steel Fabrication and Machining**. Fabrication of engine and ship parts occurs at NASSCO. Cutting oils, fluids, and solvents are used extensively, including acetone, methyl ethyl ketone (MEK) and chlorinated solvents;

- **Electrical Repair/Maintenance/Installation**. The repair, maintenance, and installation of electrical systems involves the use of numerous hazardous materials including trichlorethylene, trichloroethane, methylene chloride, and acetone;

- **Hydraulic Repair/Maintenance/Installation**. The repair, maintenance, and installation of hydraulic systems involves the replacement of spent hydraulic oils;
- **Tank Emptying**. Bilge, fuel, and ballast tanks are typically emptied prior to ship repair activities;
- **Fueling**. Fueling operations occur at NASSCO;
- **Shipfitting**. Shipfitting is conducted at NASSCO, and is defined as the forming of ship plates and shapes, etc. according to plans, patterns, or molds;
- **Carpentry**. Woodworking, with associated wood dust production, is conducted at NASSCO; and
- **Refurbishing/Modernization/Cleaning**. Refurbishing, modernization, and cleaning of ships are conducted at NASSCO.

2.3.3. Materials Used at NASSCO

Materials commonly used at NASSCO are summarized below. Although a few specific materials are included, the list consists primarily of major categories.

- **Abrasive Grit**. Abrasive grit sometimes consists of slag collected from coal-fired boilers and contains iron, aluminum, silicon, and calcium oxides. Other metals, such as copper, zinc, and titanium are also sometimes present. Sand, cast iron, or steel shot are also used as abrasives. Enormous amounts of abrasive are needed to remove paint; removing paint from a 15,000 square foot hull can take up to 6 days and consume 87 tons of grit. Grit is needed in all dry and wet abrasive blasting.
- **Paint**. Paints contain copper, zinc, chromium, and lead as well as hydrocarbons. Two major types of paints used on ship hulls are:
  - Anticorrosive paints, vinyl, vinyl-lead, or epoxy-based coatings are used. Others contain zinc chromate and lead oxide; and
  - Antifouling paints are used to prevent growth and attachment of marine organisms by continuously releasing toxic substances into the water. Cuprous oxide and tributyltin fluoride or tributyltin oxide are the principal toxicants in copper-based and organotin-based paints, respectively.
- **Miscellaneous Materials**. Oils (engine, cutting, and hydraulic), lubricants, grease, fuels, weld, detergents, cleaners, rust inhibitors, paint thinners, hydrocarbon and chlorinated solvents, degreasers, acids, caustics, resins, adhesives/cement/sealants, and chlorine.

2.3.4. Wastes Generated by NASSCO

Categories of wastes commonly generated by NASSCO's industrial processes include, but are not limited to, those listed below.

- **Abrasive Blast Waste: Spent Grit, Spent Paint, Marine Organisms, and Rust**. Abrasive blast waste, consisting of spent grit, spent paint, marine organisms, and rust is generated in significant quantities during all dry or wet abrasive blasting procedures. The constituent of greatest concern with regard to toxicity is the spent paint, particularly the copper and tributyltin antifouling components, which are designed to be toxic and to continuously leach into the water. Other pollutants in paints include zinc, chromium, and lead. Abrasive blast waste can be conveyed by water flows, become airborne (especially during dry blasting), or fall directly into receiving waters. Based on available data for the years 1987 through 1991, NASSCO generates an average of 198 tons of abrasive blast waste per month.

- **Fresh Paint**. Losses occur when paint ends up somewhere other than its intended location (e.g., dry dock floor, bay, worker's clothing). These losses result from spills, drips, and overspray. Typical overspray losses are estimated at approximately 5 percent for air spraying; and 1 to 2 percent for airless spraying.

- **Bilge Waste/Other Oily Wastewater**. This waste is generated during tank emptying, leaks, and cleaning operations (bilge, ballast, fuel tanks, etc). In addition to petroleum products (fuel, oil), tank wash water also contains detergents or cleaners and is generated in large quantities.

- **Blast Wastewater**. Hydroblasting generates large quantities of wastewater. In addition to suspended and settleable solids (spent abrasive, paint, rust, marine organisms) and water, blast wastewater also contains rust inhibitors such as diammonium phosphate and sodium nitrite.

- **Oils (engine, cutting, and hydraulic)**. In addition to spent products, fresh oils, lubricants, and fuels are released as a result of spills and leaks from ship or dry dock equipment, machinery, and tanks (especially during cleaning and refueling).

- **Waste Paints/Sludges/Solvents/Thinners**. These wastes are generated from cleaning paint equipment.

- **Construction/Repair Wastes and Trash**. These wastes include scrap metal, welding rods, slag (from arc welding), wood, rags, plastics, cans, paper, bottles, packaging materials, etc.

- **Miscellaneous Wastes**. These wastes include lubricants, grease, fuels, sewage (black and gray water from vessels or docks), boiler blowdown, condensate, discard, acid wastes, caustic wastes, and aqueous wastes (with and without metals).

2.3.5. Abrasive Blast Waste and Other Waste Discharges - Sampling Results

During numerous inspections, San Diego Water Board inspectors observed abrasive blast waste and other wastes deposited in areas where it would probably be discharged into the waters of the state via storm water runoff (see Section 2.6 NASSCO Waste Discharges). Samples of abrasive blast waste and other wastes were collected in the vicinity of storm drains, or in other areas susceptible to being transported to San Diego Bay via storm water runoff, during inspections on August 3, 1989, August 14, 1989, October 16, 1991, and February 27, 1992.

2.3.5.1. May, June, and August 1989 Inspections and Sampling

The San Diego Water Board conducted a series of inspections during May, June, and August 1989. Abrasive blast waste was noted on Harbor Drive or other locations during inspections on May 31, June 29, August 1, August 2, August 3, August 7, August 8, and August 14, where it would probably be discharged into San Diego Bay via storm water runoff. The June 29, 1989 inspection report noted, "Sandblast waste was on the sidewalk at the same location noted during the NPDES inspection on 5-31-89." The San Diego Water Board Executive Officer sent a letter dated July 5, 1989, to NASSCO via certified mail requesting:

> "… immediate action to correct the deficiencies noted regarding: 1) sandblast and other waste discharges from the dry dock to San Diego Bay; 2) sandblast waste discharges to Harbor Drive; 3) failure to clean storm drain sumps; and 4) failure to properly certify monitoring reports."

During the August 1989 inspections, Samples LKM 890-52-A and LKM 890-37-A of the abrasive blast waste were collected and analyzed for metals. Sample LKM 890-52-A was collected from waste next to a sump near Building 6. The inspector reported that "… the sandblast pit is a major problem. Sandblast waste is everywhere w/o runoff controls" (RWQCB, 1989a). Sample LKM 890-37-A was collected from the blasting pit area. The analytical results are presented in Table 2-1, below.

2.3.5.2. October 16, 1991 Inspection and Sampling

During an inspection on October 16, 1991, the San Diego Water Board inspector noted violations of the NPDES permit and reported "a threaten[ed] discharge to the storm drains from blasting, painting and dust collection activities in the yard" (RWQCB, 1991). Abrasive blast waste was noted in the vicinity of storm drain inlets within the grit blast and painting area near the southeast corner of the NASSCO facility. Samples GRF 912-064A and GRF 912-064B were collected from gray and rust colored grit near the storm drain inlets at this location. The analytical results are shown in Table 2-1, below.

The San Diego Water Board inspector noted that two of the storm drains had valves that were shut and that another storm drain was covered with a steel plate with an opening in the middle. In a response letter dated December 18, 1991, NASSCO reported "a berm was installed around Storm Drain #3 in the grit blast and paint areas of the facility. A drain pipe was embedded though the berm, with a valve on the storm drain side to control discharges." However, in the same December 18, 1991 letter, NASSCO reported rainwater that backed up around the berm at

Storm Drain #3 "…was discovered missing." NASSCO indicated that they would take additional actions to avoid this happening in the future (Haumschilt, 1991).

In the primer line yard, sample GRF 912-064C was collected from smoke gray, powdery residue. The San Diego Water Board inspector noted that this area is open to potential contamination from the outside dust collection activity conducted at this location. The analytical results for sample GRF 912-064C are shown in Table 2-1, below.

2.3.5.3. February 27, 1992 Inspection and Sampling

During an inspection on February 27, 1992, the San Diego Water Board inspector noted spent abrasive blast waste on the surfaces of Storm Drain #2 and in the vicinity of Storm Drain #7. One sample (GRF 912-142) of sandy grit was collected near Storm Drain #7. In a response letter dated May 1, 1992, NASSCO indicated that they would initiate corrective actions in response to the findings of threatened discharges noted during the inspection (Snider, 1992).

Table 2-1 Abrasive Blast Waste Sampling Results

Chemical	LKM 890-52-A	LKM 890-37-A	GRF 912-064A	GRF 912-064B	GRF 912-064C	GRF 912-142	Background
Date	**8/3/89**	**8/14/89**	**10/16/91**	**10/16/91**	**10/16/91**	**2/27/92**	
Metals							
Arsenic (mg/kg)	136	57.8	< 24.1	60.2	< 22.6	< 210	7.5
Chromium (mg/kg)	93.5	31.9	1,520	147	547	1,870	57
Copper (mg/kg)	3,240(1)	1760	2,270	3,130(1)	388	955	121
Lead (mg/kg)	264	114	< 12	320	< 11.3	< 105	53
Mercury (μg/kg)	< 49	< 49	< 48	< 47	< 48	< 42	0.57
Nickel (mg/kg)	31.9	6.4	939	37.5	345	1,130	15
Silver (mg/kg)	4.76	1.96	5.01	1.09	2.03	< 16.8	1.1
Zinc (mg/kg)	1,240	268	19,800(1)	2,620	2,690	2,200	129

Note: The result exceeds criteria for characterization of hazardous waste per California Code of Regulations, Title 22, Chapter 11, section 66261.24. The total threshold limit concentration (TTLC) for copper is 2500 mg/kg and the TTLC for zinc is 5000 mg/kg. The TTLC represents the total concentration of a constituent that may be present before a waste is classified as a hazardous waste.

2.3.5.4. Discussion of Sampling Results

The inspections and analytical results indicate that abrasive blast wastes and other waste with elevated levels of metals were discharged or deposited where they were, or probably would have been, discharged into San Diego Bay and thereby creating, or threatening to create, a condition of pollution or nuisance. The analytical laboratory results for chromium, copper, nickel, and zinc for at least 5 of the 6 waste samples exceed the background sediment chemistry levels presented in Section 29 of this Technical Report.

In addition, two of the samples (LKM 890-52-A and GRF 912-064B) exceed the criteria for total concentration of copper that may be present before the waste is classified as hazardous waste due to toxicity, and one of the samples (GRF 912-064A) exceed the hazardous waste classification criteria for zinc (CCR Title 22). The waste would be classified as hazardous waste and proper disposal would be in a Class I Landfill licensed to receive hazardous waste.

2.4. NASSCO Discharged Waste to San Diego Bay Creating Pollution, Contamination, and Nuisance Conditions in San Diego Bay

NASSCO has discharged waste, or deposited waste where it was discharged, into San Diego Bay and created, or threatened to create, a condition of pollution, contamination, and nuisance. CWC section 13304 provides that a person who causes any waste to be discharged, or deposited where it probably will be discharged, into waters of the state creating, or threatening to create, a condition of pollution or nuisance is subject to cleaning up or abating the effects of the waste.

Pollutants generated at the NASSCO facility as a result of shipyard activities include metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), butyl tin species, PAHs, TPH, and probably PCBs, and PCTs. These same pollutants are present in the marine sediment adjacent to the NASSCO facility in highly elevated concentrations as compared to sediment chemistry levels found at off-site reference stations located in areas of San Diego Bay.[24]

The Shipyard Report (Exponent, 2003) provides the following findings about the distribution of elevated sediment chemical concentrations at the Shipyard Sediment Site:

- Elevated concentrations of metals are found near the municipal storm drain outfall in the BAE Systems leasehold and in the center of the NASSCO leasehold near the floating dry dock;

- Elevated concentrations of PCBs are found near the northern boundary of BAE Systems, at the storm drain outfall on BAE Systems' leasehold, and at the foot of Sicard Street near the common boundary between the two shipyards (BAE Systems and NASSCO);

- Petroleum hydrocarbons are distributed similarly to metals and PCBs, with an additional area of elevation near the southern boundary of NASSCO's leasehold; and

- Concentrations of all chemicals generally decrease with distance from shore.

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[24] "NASSCO's discharges of pollutants at the Shipyard Sediment Site have created or threaten to create a condition of nuisance in waters of the State. The discharges have caused or contributed to the accumulation of pollutants in the sediment in concentrations that are potentially injurious to the public health and affects a considerable number of persons as provided in Water Code section 13050(m)."

NASSCO has a history of discharging pollutants to San Diego Bay as a result of systemic problems and overall inadequacies in the implementation of its Best Management Practices Program to prevent such discharges. Some of NASSCO's discharges are presented in Sections 2.6, 2.7, 2.8 and 2.9 of this Technical Report. As described in Sections 13 through 28 of this Technical Report, these same pollutants in the discharges have accumulated in San Diego Bay sediment adjacent to the NASSCO facility in concentrations that may:

1. Adversely affect the beneficial uses of San Diego Bay as described in later sections of this Technical Report;

2. Cause pollution, contamination, or nuisance[25] conditions in San Diego Bay; and

3. Degrade marine communities, cause adverse effects on the environment or the public health, or result in harmful concentrations of pollutants in marine sediment.

The Porter-Cologne Water Quality Act defines "pollution" as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects … the waters for beneficial uses.…"[26] "Contamination" is defined as "an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."[27]

Accordingly, it is concluded that NASSCO has caused or permitted the discharge of waste to San Diego Bay in a manner causing the creation of pollution, contamination, and nuisance conditions and that it is appropriate for the San Diego Water Board to issue a cleanup and abatement order naming NASSCO as a discharger pursuant to CWC section 13304.

Further discussions on pollution, contamination, and nuisance are available in Sections 1.4 and 1.5 of this Technical Report.

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[25] NASSCO's discharges of pollutants at the Shipyard Sediment Site have created or threaten to create a condition of nuisance in waters of the State. The discharges have caused or contributed to the accumulation of pollutants in the sediment in concentrations that are potentially injurious to the public health and affects a considerable number of persons as provided in Water Code section 13050(m).

[26] Water Code section 13050(1).

[27] Water Code section 13050(k).

2.5. NPDES Requirement Regulation

Waste discharges from the NASSCO facility have historically been regulated under Waste Discharge Requirements (WDRs) prescribed by the San Diego Water Board pursuant to CWA section 402 and Water Code section 13376. These requirements are referred to as either NPDES requirements[28] or by the federal terminology "NPDES Permit." NASSCO's first NPDES requirements started in 1974, when the San Diego Water Board issued WDRs to regulate specific shipyard activities (hereafter referred to as Shipyard NPDES Permit). A listing of the NPDES requirements adopted by the San Diego Water Board in effect at the time the facility was owned and operated by NASSCO is provided in Table 2-2 below.

Table 2-2 NASSCO NPDES Permits

Order Number / NPDES No.	Order Title	Adoption Date	Expiration Date
Order No. 74-79, Shipyard NPDES No. CA0107671	Waste Discharge Requirements For National Steel And Shipbuilding Company	November 4, 1974	October 29, 1979
Order No. 79-63, Shipyard NPDES No. CA0107671	Waste Discharge Requirements For The National Steel And Shipbuilding Company	October 29, 1979	June 10, 1985
Order No. 85-05, Shipyard NPDES No. CA0107697	Waste Discharge Requirements For National Steel And Shipbuilding Company San Diego County	June 10, 1985	October 15, 1997
Order No. 97-36, Shipyard NPDES No. CAG039001	Waste Discharge Requirements For Discharges From Ship Construction, Modification, Repair, And Maintenance Facilities And Activities Located In The San Diego Region (TTWQ/CPLX 1A)	October 15, 1997	February 5, 2003
Order No. R9-2003-0005, Shipyard NPDES No. CA0109134	Waste Discharge Requirements For National Steel And Shipbuilding Company San Diego County	February 5, 2003	September 1, 2009
Order No. R9-2009-0099, Shipyard NPDES No. CA0109134	Waste Discharge Requirements, General Dynamics, National Steel And Shipbuilding Company (NASSCO), Discharge To The San Diego Bay	August 12, 2009	Present

28 Pursuant to Chapter 5.5 of the Porter-Cologne Water Quality Act, to avoid the issuance by the United States Environmental Protection Agency of separate and duplicative NPDES permits for discharges in California that would be subject to the Clean Water Act, the State's Waste Discharge Requirements (WDRs) for such discharges implement the NPDES regulations and entail enforcement provisions that reflect the penalties imposed by the Clean Water Act for violation of NPDES permits issued by the U.S. EPA. Thus, the State's WDRs that implement federal NPDES regulations (NPDES requirements) serve in lieu of NPDES permits.

Pursuant to the NPDES requirements cited above, NASSCO was required to develop and implement "Best Management Practices"[29] (BMPs) plans to limit discharges of pollutants into San Diego Bay. As described in the current NPDES requirements, R9-2009-0099, BMPs may be "structural" (e.g., overhead coverage, retention ponds, control devices, secondary containment structures, and treatment) or "non-structural" (e.g., good housekeeping, preventive maintenance, material handling and storage, spill and leak response, onsite personnel training, waste handling/recycling, recordkeeping and internal reporting, erosion control and site stabilization, inspections, and quality assurance). Beginning in 1997 numerical effluent limitations for oil and grease, settleable solids, turbidity, pH, and temperature were established in the NPDES requirements for certain discharges (e.g. Non-Contact Cooling Water; Miscellaneous Low Volume Water, and Fire Protection Water).

In 1992, NASSCO obtained coverage under the State Water Board's 1991 General Industrial NPDES Requirements for storm water discharges. These NPDES requirements supplemented NASSCO's NPDES requirements listed in Table 2-2. The industrial storm water NPDES requirements applied specifically to discharges of pollutants through storm water, while the NPDES permits listed in Table 2-2 applied to other discharges. A listing of the General Industrial NPDES Requirements for storm water discharges adopted by the State Water Board in effect at the time the facility was owned and operated by NASSCO is provided in Table 2-3 below.

Table 2-3 NASSCO General Industrial NPDES Permits

Order Number / NPDES No.	Order Title	Adoption Date	Expiration Date
Order No. 91-13 DWQ, Industrial NPDES No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	(Notice of Intent Filed) November 4, 1992	(Notice of Intent Filed) February 5, 1998
Order No. 97-03 DWQ, Industrial NPDES No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	(Notice of Intent Filed) February 5, 1998	(Superseded by R9-2003-0005, Shipyard NPDES No. CA0109134) February 5, 2003

The General Industrial NPDES Requirements for storm water discharges required NASSCO to develop and implement plans to limit its discharges of pollutants from storm water runoff into San Diego Bay. Rather than relying on specific numerical effluent limitations, the NPDES requirements directed NASSCO to create and follow "Best Management Practices" (BMPs). The General Industrial NPDES Requirements for storm water discharges also required NASSCO to develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and a Storm Water

[29] Best management practices ("BMPs") means schedules of activities, prohibitions of maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Pollution Monitoring Plan (SWPMP). The requirements specified that the SWPPP include, among other things, the following:

- Descriptions of sources that might add significant quantities of pollutants to storm water discharges;
- A detailed site map;
- Descriptions of materials that had been treated, stored, spilled, disposed of, or leaked into storm water discharges since November 1988;
- Descriptions of the management practices that were employed to minimize contact between storm water and pollutants from vehicles, equipment, and materials;
- Descriptions of existing structural and non-structural measures to reduce pollutants in storm water discharges;
- Descriptions of methods of on-site storage and disposal of significant materials;
- Descriptions of outdoor storage, manufacturing, and processing activities;
- A list of pollutants likely to be present in significant quantities in storm water discharges and an estimate of the annual amounts of those pollutants in storm water discharge;
- Records of significant leaks or spills of toxic or hazardous pollutants to storm water;
- Summary of existing data describing pollutants in storm water discharge;
- Descriptions of storm water management controls, including good housekeeping procedures, preventive maintenance, and measures to control and treat polluted storm water; and
- A list of the specific individuals responsible for developing and implementing the SWPPP.

The above requirements were incorporated into, and superseded by, Order No. R9-2003-0005, Shipyard NPDES No. CA0109134 upon adoption on February 5, 2003.

2.5.1. Order No. 74-79, Shipyard NPDES Permit No. CA0107671

Order No. 74-79, Shipyard NPDES Permit No. CA0107671, was in effect from November 4, 1974 to October 29, 1979, and contained the following key requirement that relates to the discussions contained herein:

- B. PROVISIONS … 1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination or nuisance as defined in the CWC.

2.5.2. Order No. 79-63, Shipyard NPDES Permit No. CA0107671

Order No. 79-63, Shipyard NPDES Permit No. CA0107671, in effect from October 29, 1979 to June 10, 1985, contained the following key requirement that relates to the discussions contained herein:

- B. PROVISIONS … 1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination or nuisance as defined in the CWC.

2.5.3. Order No. 85-05, Shipyard NPDES Permit No. CA0107671

Order No. 85-05, Shipyard NPDES Permit No. CA0107671, in effect from June 10, 1985 to October 15, 1997 contained the following key requirements that relate to the discussions contained herein:

- A. PROHIBITIONS … 2. The deposition or discharge of refuse, rubbish, materials of petroleum origin, spent abrasives (including old primer and antifouling paint), paint, paint chips, or marine fouling organisms into San Diego Bay or at any place where they would be eventually transported to San Diego Bay is prohibited;

- B. DISCHARGE SPECIFICATIONS … 2. Effluent discharged to San Diego Bay must be essentially free of: …(b) Settleable material or substances that form sediments which degrade benthic communities or other aquatic life. …(c) Substances toxic to marine life due to increases in concentrations in marine waters or sediments. …;

- B. DISCHARGE SPECIFICATIONS … 3. The discharger shall comply with the Water Pollution Control Plan described in Finding No. 7.

  Finding 7 states: The Water Pollution Control Plan details the following measures for controlling the pollutants identified in Finding 6: A. FLOATING DRY DOCK (1) During sandblasting and painting the dock basin will be under constant cleaning to remove sandblast grit and paint chips. Mechanical sweepers and skip loaders will be employed in the cleaning operations. (2) The dock will be encased in an oil boom during sandblasting and painting to contain overspray. (3) Prior to dry dock flooding, the entire dock floor will be swept broom-clean and all trash will be removed from the dock. (4) The wastewater from ship's bilge tanks will be pumped into vacuum trucks and transported to a disposal site approved by the San Diego Water Board Executive Officer. (5) All waste categories will be transferred to proper containers and disposed of at a dumpsite approved by the San Diego Water Board Executive Officer. B. SHIPBUILDING DRY DOCK (BUILDING POSITION NO. 1) AND SHIPBUILDING WAYS (BUILDING POSITIONS NOS. 2, 3, AND 4) (1) All dock basins will be subjected to the same sweep cleaning procedures as outline for the floating dry dock prior to flooding of the dock and during the sandblasting and painting operation. (2) All waste categories will be removed from drainage channels and sumps at least once a month. All controllable water sources shall be routed directly to the drainage channels by hose to avoid contact with any waste categories. C. OTHER FACILITIES (1) A floating catch barge will be used when sandblasting or paint chipping a ship over water. During this operation the barge will be rigged with burlap curtains to prevent the blast material from reaching the bay water. (2) Sanitary wastes will be discharged to the San Diego Metropolitan sewer system, except in the case of sanitary wastes collected in portable chemical toilets, which will be disposed of by an authorized waste hauler. (3) Open work areas will be routinely swept to maintain broom clean grounds. Mechanical sweepers will be available and several dumpsters will be placed at strategic locations around the NASSCO premises. (4) All storm drains shall be directed through screen baskets designed to entrap solid waste categories and prevent their discharge in the bay. These settling tanks shall be cleaned immediately following each rainfall. D. ACCIDENTAL SPILLS Accidental spills could result in the release of liquid pollutants such as fuel, oil, paints or sewage. The control and prevention of spills are generally covered in the NASSCO Spill Prevention and Contingency Plan dated March 1984. The plan outlines the procedures to be followed for the prevention, control, or cleanup of spills;

- C. RECEIVING WATER LIMITATIONS. NASSCO's discharge shall not cause violation of the following water quality objectives in San Diego Bay: … 5. Toxicity (a) All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. … ;

- D. PROVISIONS … 1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by section 13050 of the CWC; and

- D. PROVISIONS … 11. The discharger shall at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order.

2.5.4. Order No. 97-36, Shipyard NPDES Permit No. CAG039001

Order No. 97-36, Shipyard NPDES Permit No. CAG039001, in effect from October 15, 1997 to February 5, 2003 contained the following key requirements that relate to the discussions contained herein:

- A. PROHIBITIONS … 2. The discharge of sewage (except as noted in the Basin Plan Waste Discharge Prohibitions) to San Diego Bay is prohibited;

- A. PROHIBITIONS … 5. The discharge of rubbish, refuse, debris, materials of petroleum origin (other than ship launch grease / wax) waste zinc plates, abrasives, primer, paint, paint chips, solvents, marine fouling organisms, and the deposition of such wastes at any place where they could eventually be discharged is prohibited. This pollution does not apply to the discharge of marine fouling organisms removed from unpainted, uncoated surfaces by underwater operations (see Prohibition 11). (Rubbish and refuse include any cans, bottles, paper, plastic, vegetable matter, or dead animals or dead fish deposited or caused to be deposited by man.);

- A. PROHIBITIONS … 8. Discharges of wastes and pollutants identified in Finding 2.a.i through 2.a.ix of this Order are prohibited. Discharges of wastes and pollutants not specifically identified in Finding 2.b through 2.e of this Order are prohibited.

  Finding 2 states the following: … a. Ship construction, modification, repair, and maintenance activities result or have the potential to result in discharges to San Diego Bay of wastes and pollutants which are likely to cause or threaten to cause pollution, contamination, or nuisance; adversely impact human health or the environment; cause or contribute to violation of an applicable water quality objective; and/or otherwise adversely affect the quality and/or beneficial uses of waters of the state and waters of the United States. Such discharges include: i. water contaminated with abrasive blast materials, paint, oils, fuels, lubricants, solvents, or petroleum; ii. hydroblast water; iii. tank cleaning water from tank cleaning to remove sludge and/or dirt; iv. clarified water from oil/water separation; v. steam cleaning water; vi. demineralizer / reverse osmosis brine; vii. floating dry dock sump water when the dry dock is in use as a work area or when the dry dock is not in use as a work area but before the sump has been purged following such use; viii. oily bilge water; ix. contaminated ballast water; and x. the first flush of storm water runoff from high-risk areas. … b. Ship construction, modification, repair, and maintenance activities also result or have the potential to result in discharges to San Diego Bay of wastes and pollutants which pose less threat than those identified in Finding 2.a above. Such discharge included: i. vessel wash down water; ii. floating dry dock submergence/emergence water; iii. graving dock flood water; iv. graving dock sump pump test water; v. shipbuilding ways flood water; vi. floating dry dock sump water when the dry dock is not in use as a work area after the sump has been purged following such use; vii. pipe and tank hydrostatic test water; viii. graving dock gate and wall leakage water; ix. shipbuilding ways gate and wall leakage and hydrostatic relief water; x. miscellaneous low-volume water; and xi. storm water runoff other than the first flush of storm water runoff from high-risk areas;

- B. DISCHARGE SPECIFICATIONS … 5. Waste discharges shall be essentially free of:

  a) Material that is floatable or will become floatable upon discharge;

  b) Settleable material or substances that may form sediments, which will degrade benthic communities or other aquatic life;

c) Substances, which will accumulate to toxic levels in marine waters, sediments, or biota;

d) Materials that result in aesthetically undesirable discoloration of receiving waters; and

e) Substances that significantly decrease the natural light to benthic communities and other marine life;

- C. RECEIVING WATER LIMITATIONS … Discharges shall not cause or contribute to violation of the following receiving water limitations:

1. There shall be no adverse impact on human health or the environment;

2. There shall be no impairment of any beneficial use or violations of the applicable Basin Plan Water Quality Objectives (Attachment C) or any applicable state Water Quality Control Plan or Policy;

3. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded;

4. Natural light shall not be significantly reduced as the result of the discharge of waste;

5. The rate of deposition of inert solids and the characteristics of inert solids in sediments shall not be changed such that benthic communities are degraded;

6. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions;

7. The concentration of substances in marine sediments shall not be increased to levels that would degrade indigenous biota;

8. The concentration of organic materials in sediment shall not be increased to levels that would degrade marine life;

9. Substances shall not be present in the water column, sediments, or biota at concentrations that adversely affect beneficial uses or which will bioaccumulate to levels that are harmful to aquatic organisms, wildlife, or human health; and

The daily maximum chronic toxicity of waters of the United States shall not exceed 1 Toxic Unit Chronic (TUc), as determined using a standard test species and protocol approved by the Executive Officer; and

- ATTACHMENT C. STANDARD PROVISIONS … 22. Pollution, Contamination, Nuisance: The handling, transport, treatment, or disposal of waste or the discharge of waste to waters of the state in a manner which causes or threatens to cause a condition of pollution, contamination, or nuisance, as those terms are defined in CWC 13050, is prohibited.

2.5.5. Order No. R9-2003-0005, Shipyard NPDES Permit No. CA0109134

Order No. R9-2003-0005, Shipyard NPDES Permit No. CA0109134, in effect from February 5, 2003 to Present, contains the following key requirements that relate to the discussions contained herein:

- A. PROHIBITIONS … 2. The discharge of sewage, except as noted in the Basin Plan Waste Discharge Prohibitions, to San Diego Bay is prohibited;

- A. PROHIBITIONS … 6. The discharge of rubbish, refuse, debris, materials of petroleum origin, waste zinc plates, abrasives, primer, paint, paint chips, solvents, and marine fouling organisms, and the deposition of such wastes at any place where they could eventually be discharged is prohibited. This prohibition does not apply to the discharge of marine fouling organisms removed from unpainted, uncoated surfaces by underwater operations and discharges that result from cleaning of floating booms that were installed for 'Force Protection' purposes (see Prohibition 10). (Rubbish and refuse include any cans, bottles, paper, plastic, vegetable matter, or dead animals deposited or caused to be deposited by man.);

- A. PROHIBITIONS … 8. The discharge or bypassing of untreated waste to San Diego Bay is prohibited. (This prohibition does not apply to non-contact cooling water, miscellaneous low volume water, and fire protection water streams, which comply with the requirements of this Order for elevated temperature waste discharges and which do not contain pollutants or waste other than heat.);

- B. DISCHARGE SPECIFICATIONS … 4. The following acute toxicity effluent limit applies to undiluted storm water discharges to San Diego Bay, that are associated with industrial activity: Acute toxicity: In a 96-hour static or continuous flow bioassay test, the discharge shall not produce less than 90 percent survival, 50 percent of the time, and not less than 70 percent survival, 10 percent of the time, using a standard test species and protocol approved by the San Diego Water Board;

- B. DISCHARGE SPECIFICATIONS … 9. Waste discharges shall be essentially free of:

  a) Material that is floatable or will become floatable upon discharge;

b) Settleable material or substances that may form sediments, which will degrade benthic communities or other aquatic life;

c) Substances, which will accumulate to toxic levels in marine waters, sediments, or biota;

d) Materials that result in aesthetically undesirable discoloration of receiving waters; and

e) Substances that significantly decrease the natural light to benthic communities and other marine life;

- C. RECEIVING WATER LIMITATIONS. Discharges shall not cause or contribute to violation of the following receiving water limitations:

  1. There shall be no adverse impact on human health or the environment;

  2. There shall be no impairment of any beneficial use or violations of the applicable Basin Plan Water Quality Objectives (Attachment C) or any applicable state Water Quality Control Plan or Policy;

  3. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded;

  4. Natural light shall not be significantly reduced as the result of the discharge of waste;

  5. The rate of deposition of inert solids and the characteristics of inert solids in sediments shall not be changed such that benthic communities are degraded;

  6. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions;

  7. The concentration of substances in marine sediments shall not be increased to levels that would degrade indigenous biota;

  8. The concentration of organic materials in sediment shall not be increased to levels that would degrade marine life; and

  9. Substances shall not be present in the water column, sediments, or biota at concentrations that adversely affect beneficial uses or which will bioaccumulate to levels that are harmful to aquatic organisms, wildlife, or human health.

- ATTACHMENT D, STANDARD PROVISIONS … 22. Pollution, Contamination, Nuisance: The handling, transport, treatment, or disposal of waste or the discharge of waste to waters of the state in a manner which causes or threatens to cause a condition of pollution, contamination, or nuisance, as those terms are defined in CWC 13050, is prohibited.

2.5.6. Order No. 91-13-DWQ, NPDES Permit No. CAS000001, General Industrial NPDES Requirements for Storm Water Discharges

Order No. 91-13-DWQ, NPDES Permit No. CAS000001, in effect from November 4, 1992 to February 5, 1998 contained the following key narrative limitations that relate to the discussions contained herein:

- A. DISCHARGE PROHIBITIONS: … 3. Storm water discharges shall not cause or threaten to cause pollution, contamination, or nuisance; and

- B. RECEIVING WATER LIMITATIONS. … 1. Storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

2.6. NASSCO's Waste Discharges

NASSCO has discharged or deposited waste where it was discharged into San Diego Bay creating, or threatening to create, a condition of pollution or nuisance.

NASSCO Shipyard discharges are documented in the San Diego Water Board records via discharger monitoring and spill reports (filed by NASSCO), citizen complaints, San Diego Water Board inspection reports, and San Diego Water Board Notices of Violation issued to NASSCO. These discharges are itemized in Tables 2-4 through 2-8, below.

Table 2-4 NASSCO Discharges from 1974 to 1979

Date	Description	Technical Report Reference[1]	Source	Citation[2]
March 6, 1976	Discharge of approximately 200 gallons of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 74-79, B. Provisions 1
June 25, 1976	Discharge of approximately 500 gallons of oily water to Bay.	Section 2.4	NASSCO Spill Report	Order No. 74-79, B. Provisions 1
February 7, 1978	Discharge of trash to Bay.	Section 2.4	RWQCB Inspection	Order No. 74-79, B. Provisions 1

1. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
2. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.

Table 2-5 NASSCO Discharges from 1979 to 1985

Date	Description	Technical Report Reference[1]	Source	Citation[2]
January 16, 1980	Discharge of abrasive blast waste to Bay.	Section 2.4	Citizen Complaint[3]	Order No. 79-63, B. Provisions 1
January 23, 1980	Discharge of abrasive blast waste to Bay.	Section 2.4	RWQCB Inspection	Order No. 79-63, B. Provisions 1
February 11, 1982	Discharge of abrasive blast waste to Bay.	Section 2.4	Citizen Complaint[3]	Order No. 79-63, B. Provisions 1

1. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
2. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.
3. Anonymous citizen complaints constitute hearsay evidence and cannot alone support findings. However, the hearsay evidence is admissible to support findings of the San Diego Water Board if corroborated by other evidence.

Table 2-6 NASSCO Discharges from 1985 to 1998

Date	Description	Technical Report Reference[1]	Source	Citation[2]
June 15, 1987	Discharge of lead to Bay from sacrificial anode.	Section 2.4	Citizen Complaint[3]	Order No. 85-05, D. Provisions 1
June 25, 1987	Discharge of a large amount of paint to Bay.	Section 2.4	Citizen Complaint[3]	Order No. 85-05, A. Prohibitions 2
November 30, 1987	Discharge of abrasive blast waste to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
February 29, 1988	Discharge of abrasive blast waste to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
March 2, 1988	Discharge of abrasive blast waste to Bay.	Section 2.4	RWQCB Inspection; NASSCO Report[4]	Order No. 85-05, A. Prohibitions 2
February 27, 1989	Discharge of abrasive blast waste to Bay.	Section 2.4	RWQCB Inspection; NASSCO Report[4]	Order No. 85-05, A. Prohibitions 2
May 31, 1989	Discharge of abrasive blast waste to Bay.	Section 2.4	RWQCB Inspection; NASSCO Report[4]	Order No. 85-05, A. Prohibitions 2
June 29, 1989	Deposit of abrasive blast waste where it will probably be discharged to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
August 1, 1989	Deposit of abrasive blast waste where it will probably be discharged to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
August 2, 1989	Deposit of abrasive blast waste where it will probably be discharged to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2

Date	Description	Technical Report Reference[1]	Source	Citation[2]
August 3, 1989	Deposit of abrasive blast waste where it will probably be discharged to Bay. Sample results in Section 2.3.5.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
August 7, 1989	Deposit of abrasive blast waste where it will probably be discharged to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
August 8, 1989	Deposit of abrasive blast waste where it will probably be discharged to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
August 14, 1989	Deposit of abrasive blast waste where it will probably be discharged to Bay. Sample results in Section 2.3.5.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
June 20, 1990	Discharge of oil to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
June 20, 1990	Deposit of paint and debris in sump where it will probably be discharged to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
June 27, 1990	Discharge of 200 gallons of oily bilge wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
November 27, 1990	Deposit of abrasive blast waste and paint where it will probably be discharged to Bay.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
October 16, 1991	Deposit of abrasive blast waste and paint where it will probably be discharged to Bay. Sample results in Section 2.3.5.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
December 10, 1991	Discharge of 100 gallons of wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
February 27, 1992	Deposit of abrasive blast waste and paint where it will probably be discharged to Bay. Sample results in Section 2.3.5.	Section 2.4	RWQCB Inspection	Order No. 85-05, A. Prohibitions 2
April 22, 1992	Discharge of 30 gallons of waste oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
September 11, 1992	Discharge of approximately 10 gallons of waste (floor cement grindings) to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, D. Provisions 1
September 28, 1992	Discharge of approximately 25 gallons of wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, D. Provisions 1
September 29, 1992	Discharge of unknown quantity of shredded document slurry to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, D. Provisions 1

Date	Description	Technical Report Reference[1]	Source	Citation[2]
October 28, 1992	Discharge of 1,500 to 2,000 gallons of sewage wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, D. Provisions 1
December 19, 1992	Discharge of less than 1 gallon diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
January 25, 1993	Discharge of ½ gallon oily bilge water to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
February 1, 1993	Discharge of about 100 gallons of oily wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
February 2, 1993	Discharge of about 100 gallons of oil and water to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
February 11, 1993	Discharge of about 1,000 gallons raw sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, D. Provisions 1
March 22, 1993	Discharge of less than 250 pounds abrasive blast waste (copper slag blasting material) to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
March 31, 1993	Discharge of 8 - 10 gallons of bilge wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
April 30, 1993	Discharge of less than 1/2 gallon of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
September 8, 1993	Discharge of 10 gallons spent hydroblast waste to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
October 20, 1993	Discharge of 60 to 100 gallons of treated sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, D. Provisions 1
November 24, 1993	Discharge of 5 gallons of diesel oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
November 30, 1993	Discharge of less than 5 gallons of oily wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
December 14, 1993	Discharge of 5 gallons of bilge wastewater /petroleum to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
December 15, 1993	Discharge of between 250 and 400 gallons of diesel #2 fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
January 23, 1994	Discharge of approximately 2 gallons of gasoline to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
January 24, 1994	Discharge of 5 gallons of diesel oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
January 24, 1994	Discharge of 1-quart of lube oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
February 11, 1994	Discharge of 300 to 400 gallons of oily wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
February 22, 1994	Discharge of less than one pint of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2

Date	Description	Technical Report Reference[1]	Source	Citation[2]
June 10, 1994	Discharge of unknown quantity of oily bilge wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
November 7, 1994	Discharge of 2 to 5 gallons of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
December 5, 1994	Discharge of approximately 1 quart of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
January 12, 1995	Discharge of an estimated 150 gallons of NR 1 marine diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
April 8, 1995	Discharge of 15 gallons of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
June 9, 1995	Discharge of various unpermitted discharges to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2 & D. Provisions 1
July 17, 1995	Discharge of 5 to 10 gallons of water and diesel oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
August 25, 1995	Discharge of 1 pint of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
September 2, 1995	Discharge of an estimated 2 gallons of oily water to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
September 16, 1995	Discharge of an estimated 10 gallons of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
November 15, 1995	Discharge of 1 quart of transmission fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
November 20, 1995	Discharge of less than 1 pint of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
December 3, 1995	Discharge of 2 to 5 gallons of oil to Bay.	Section 2.4	US Navy Spill Report	Order No. 85-05, A. Prohibitions 2
January 17, 1996	Discharge of 1 to 2 gallons of T68 flushing oil to Bay.	Section 2.4	MSO San Diego Spill Report	Order No. 85-05, A. Prohibitions 2
February 5, 1996	Discharge of 1 pint of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
April 16, 1996	Discharge of 5 gallons of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
May 19, 1996	Discharge of less than 1 gallon of lube oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
June 13, 1996	Discharge of less than 5 gallons of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
July 20, 1996	Discharge of less than 1 pint of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
August 29, 1996	Discharge of 1 pint of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2

Date	Description	Technical Report Reference[1]	Source	Citation[2]
September 5, 1996	Discharge of 1 gallon of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
September 27, 1996	Discharge of less than 5 gallons of jet fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
September 30, 1996	Discharge of 1 gallon of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
October 3, 1996	Discharge of 1 pint of turpentine to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
December 2, 1996	Discharge of ½ to 1 gallon hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
January 14, 1997	Discharge of 1 pint of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
January 19, 1997	Discharge of less than 2 pounds copper slag to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
February 18, 1997	Discharge of 1 quart petroleum to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
April 5, 1997	Discharge of 10 to 15 gallons of red dye diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
May 19, 1997	Discharge of less than 1 quart of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
May 30, 1997	Discharge of less than 1 gallon of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
June 25, 1997	Discharge of unknown quantity of process wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, D. Provisions 1
September 17, 1997	Discharge of approximately 2 gallons of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
September 17, 1997	Discharge of less than one quart JP5 jet fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
September 29, 1997	Discharge of 20 gallons of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 85-05, A. Prohibitions 2
June 30, 1998	For failure to sufficiently clean Graving Dock before flooding, and failure to properly maintain and store equipment and failure to prevent deposition or discharge of refuse, rubbish, materials of petroleum origin, spent abrasives, paint, paint chips, or marine fouling organisms at a place where they could be transported to San Diego Bay and failure to give the San Diego Water Board notice of NASSCO's intent to flood the Dry Dock (i.e.	Section 2.4	RWQCB NOV Letter to NASSCO	Order No. 85-05, A. Prohibitions 2 & D. Provisions 11

Date	Description	Technical Report Reference[1]	Source	Citation[2]
	Graving Dock) at least 48 hours before beginning the flooding.			

1. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
2. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.
3. Anonymous citizen complaints constitute hearsay evidence and cannot alone support findings. However, the hearsay evidence is admissible to support findings of the San Diego Water Board if other evidence can corroborate it.
4. NASSCO Letter Report dated March 7, 1989.

Table 2-7 NASSCO Discharges from 1997 to 2003

Date	Description	Technical Report Reference[1]	Source	Citation[2]
November 26, 1997	Discharge of between 1 pint and 1 quart of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
January 14, 1998	Discharge of less than 4 ounces of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
January 15, 1998	Discharge of 50 gallons of oily wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
January 22, 1998	Discharge of 1 pint of paint to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
February 3, 1998	Discharge of at less than 50 gallons of hydroblast water to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
February 9, 1998	Discharge of at least 2 gallons of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
March 17, 1998	Discharge of 2 gallons of oily water to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
April 1, 1998	Discharge of 1 to 2 gallons of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
April 7, 1998	Discharge of about 1 gallon diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
April 21, 1998	Discharge of 175 gallons of 3% AFFF to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8
April 27, 1998	Discharge of less than 1 pint of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
June 17, 1998	Deposit of oil drips, abrasive grit & other material where it could be discharged to Bay.	Section 2.4	RWQCB Inspection Report	Order No. 97-36, A. Prohibitions 5
January 8, 1999	Discharge of less than 1 gallon of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5

Date	Description	Technical Report Reference[1]	Source	Citation[2]
January 21, 1999	Discharge of less than 1/2 gallon of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
March 4, 1999	Discharge of between 1 pint and 1 quart of fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
June 16, 1999	Discharge of 20 to 30 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
July 13, 1999	Discharge of less than 50 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
August 19, 1999	Discharge of 10 gallons of cooking fat to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
August 27, 1999	Discharge of 1/2 pint of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
September 10, 1999	Discharge of 2 gallon of hydraulic fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
September 22, 1999	Discharge of an unknown quantity of dust particulate material to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8
October 15, 1999	Discharge of 1/2 gallon of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
November 4, 1999	Discharge of less than 1 pint of paint to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
November 18, 1999	Discharge of less than 1 pint of paint to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
November 29, 1999	Discharge of less than 2 gallons of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
December 2, 1999	Discharge of 30 to 50 gallons of Turbine Lube Oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
December 17, 1999	Discharge of 1 pint of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
January 31, 2000	Discharge of 50 gallons of marine diesel oil discharged to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
February 18, 2000	Discharge of 50 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
March 27, 2000	Discharge of less than 1 gallon of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
June 6, 2000	Discharge of 1 to 2 gallons of oily wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
July 26, 2000	Discharge of several drops of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
August 4, 2000	Discharge of small amount of paint chips to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5

Date	Description	Technical Report Reference[1]	Source	Citation[2]
August 7, 2000	Discharge of less than 1 gallon of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
September 14, 2000	Discharge of 1 pint of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
November 7, 2000	Discharge of less than 1 gallon of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
November 13, 2000	Discharge of less than 1 gallon of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
November 15, 2000	Discharge of 50 gallons of steam condensate to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8
December 12, 2000	Discharge of ½ pint of yellow/green dye to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8
December 20, 2000	Discharge of 200 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
January 2, 2001	Discharge of 2 gallons of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
January 3, 2001	Discharge of 1 quart of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
January 8, 2001	Discharge of ½ pint of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
January 12, 2001	Discharge of 30 gallons of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
February 24, 2001	Discharge of small quantity of paint dust to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
March 28, 2001	Discharge of less than 5 gallons of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
May 14, 2001	Discharge of small quantity of wood dust to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8
May 15, 2001	Discharge of less than 8 ounces of paint chips to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
May 17, 2001	Discharge of small quantity of copper slag dust to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
May 18, 2001	Discharge of unknown quantity of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
May 21, 2001	Discharge of less than 1 quart of oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
May 22, 2001	Discharge of less than 50 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
May 22, 2001	Discharge of small quantity of paint chips to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
May 24, 2001	Discharge of shop-vac contents to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8

Date	Description	Technical Report Reference[1]	Source	Citation[2]
May 24, 2001	Discharge of small quantity of chalky substance to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8
May 24, 2001	Discharge of small quantity of fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
May 25, 2001	Discharge of small quantity of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
July 3, 2001	Discharge of less than 10 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
July 6, 2001	Discharge of 10 gallons of wastewater to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8
August 18, 2001	Discharge of approximately 100 gallons of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
November 7, 2001	Discharge of less than one gallon of paint to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
September 26, 2001	Discharge of less than 5 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
January 4, 2002	Discharge of approximately 1/2 gallon spent blast grit to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
February 13, 2002	Discharge of approximately ¼ cup of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
April 2, 2002	Discharge of approximately 25 gallons of oily water to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
April 6, 2002	Discharge of less than 5 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
May 31, 2002	Discharge of unknown quantity of paint overspray to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibition 5
July 2, 2002	Discharge of approximately 1 pint of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
August 5, 2002	Discharge of an estimated 3 gallons of oily water to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
August 13, 2002	Discharge of an estimated 120 gallons of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
August 23, 2002	Discharge of an estimated 2 gallons of diesel fuel to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
September 6, 2002	Discharge of unspecified large quantity of AFFF to Bay.	Section 2.4	RWQCB Violation Letter	Order No. 97-36, A. Prohibitions 8
September 8, 2002	Discharge of an estimated 1/2 cup of lube oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
September 12, 2002	Discharge of less than 1 pint of lube oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 5
September 17, 2002	Discharge of less than 1,000 gallons of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2

Date	Description	Technical Report Reference[1]	Source	Citation[2]
September 17, 2002	Discharge of estimated 75 gallons of AFFF discharged to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 8
December 6, 2002	Discharge of estimated less than 1 gallon of sewage to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2
January 7, 2003	Discharge of estimated 1 quart of sewage discharged to Bay.	Section 2.4	NASSCO Spill Report	Order No. 97-36, A. Prohibitions 2

1. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
2. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.

Table 2-8 NASSCO Discharges from 2003 to 2005

Date	Description	Technical Report Reference[1]	Source	Citation[2]
February 10, 2003	Discharge of 500 gallons of raw sewage to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 2
February 24, 2003	Discharge of 3 gallons of hydraulic oil to Bay.	Section 2.4	NASSCO Spill Report	Order No. R9-2003-0005, A. Prohibitions 6
April 17, 2003	Discharge of 100 gallons of cleaning fluid to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 8
June 5, 2003	Discharge of approximately 10 gallons of hydroblast wastewater to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 6
June 6, 2003	Discharge of approximately 5 gallons of hydroblast wastewater to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 6
June 6, 2003	Discharge of approximately 2 gallons of hydroblast wastewater to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 6
June 12, 2003	Discharge of 5 gallons of hydroblast wastewater to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 6
June 12, 2003	Discharge of 25 gallons of sewage to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 2
June 23, 2003	Discharge of 50 gallons of sewage to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 2

Date	Description	Technical Report Reference[1]	Source	Citation[2]
June 30, 2003	Discharge of 1 cup of paint chips to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 6
August 15, 2003	Discharge of approximately ¼ cup of spray paint to Bay.	Section 2.4	NASSCO Spill Report	Order No. R9-2003-0005, A. Prohibitions 6
September 2, 2003	Discharge of less than 1 gallon of sewage discharged to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 2
October 24, 2003	Discharge of unknown quantity of substance causing oily sheen to Bay.	Section 2.4	RWQCB Enforcement Letter	Order No. R9-2003-0005, A. Prohibitions 6
December 2, 2003	Discharge of unknown quantity of paint chips to Bay.	Section 2.4	NASSCO Spill Report	Order No. R9-2003-0005, A. Prohibitions 6
November 29, 2004	Discharge of small amount of hydraulic fluid to Bay.	Section 2.4	NASSCO Spill Report	Order No. R9-2003-0005, A. Prohibitions 6
January 20, 2005	Violations of storm water toxicity effluent limitations on February 22, 2004 and February 26, 2004.	Section 2.4	RWQCB Notice of Violation	Order No. R9-2003-0005, B. Discharge Specifications 4

1. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
2. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.

2.7. NASSCO's Storm Water Monitoring for Shipyard NPDES Requirements

Since 1985, NASSCO's Shipyard NPDES Permits have included Discharge Specifications and Receiving Water Limitations, which established a narrative limit on discharge pollutant concentrations to reduce or eliminate toxic chemical concentrations in marine water, marine life, and sediment.

While operating under various Shipyard NPDES Permits, NASSCO discharged constituents at levels that are elevated compared to levels established by the California Toxics Rule (CTR) for saltwater.[30] The U.S. EPA finalized the CTR on May 18, 2000. None of the numerical values in CTR were included as numerical effluent limitations in any of the Shipyard NPDES Permits issued to NASSCO. However, the numerical values in CTR represent the latest, most up-to-date numerical thresholds for use in determining whether a chemical concentration in a water body is

[30] The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

detrimental to its beneficial uses. By comparing CTR values with pollutant levels in historical discharges, the San Diego Water Board is able to determine which discharges *may* have contributed to toxic chemical concentrations in marine water, marine life, and sediment at the Shipyard Sediment Site in the past. Also, where there are historical discharges elevated above CTR values, there exists an *elevated probability* that those same discharges contributed to the present condition of pollution. In retrospect, to the extent that those historical, elevated discharges *did* cause toxic chemical concentrations in marine water, marine life, and sediment, and/or *did* contribute to the present condition of pollution at the Shipyard Sediment Site, there exists a Shipyard NPDES violation.

While NASSCO's various Shipyard NPDES Requirements[31] did not provide specific numerical limitations for all possible chemicals, the San Diego Water Board did require that discharges from NASSCO not cause a violation of the key requirements, described in Section 2.5, above. Monitoring reports submitted by NASSCO during the years 1991 and 2002 through 2004 indicate that elevated levels of copper, nickel, and zinc were present in storm water discharged from the NASSCO site. Specific discharges are presented in Tables 2-9 through 2-11, below.

Table 2-9 Discharge Sample Results Above CTR Criteria Occurring from 1985 to 1997

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
December 10, 1991	Zinc	6.2 mg/L	0.081 mg/L	Section 2.4	Storm Water Connection	Lab Report of NASSCO Sample	Order No. 85-05, B. Discharge Specifications 2b and 2c, and C. Receiving Water Limitations 5a

1. 40 CFR 131.38
2. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
3. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.

[31] Order No. 85-05, Shipyard NPDES Permit No. CA0107671, Order No. 97-36, Shipyard NPDES Permit No. CAG039001, and Order No. R9-2003-0005, Shipyard NPDES Permit No. CA0109134

Table 2-10 Discharge Sample Results Above CTR Criteria Occurring from 1997 to 2003

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
September 11, 2002	Copper	0.0208 mg/L	0.0031 mg/L	Section 2.4	Storm Water Ship Bldg Ways 4 Hydro-static relief	NASSCO Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
September 11, 2002	Zinc	0.0841 mg/L	0.081 mg/L	Section 2.4	Storm Water Ship Bldg Ways Hydro-static relief	NASSCO Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10

1. 40 CFR 131.38
2. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
3. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.

Table 2-11 Discharge Sample Results Above CTR Criteria Occurring from 2003 to 2004

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 26, 2003	Copper	0.00534 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 26, 2003	Copper	0.00351 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock HR	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 26, 2003	Zinc	0.362 mg/L	0.081 mg/L	Section 2.4	Storm Water Graving Dock HR	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 26, 2003	Copper	0.01725 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 26, 2003	Copper	0.0459 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 26, 2003	Zinc	0.331 mg/L	0.081 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 21, 2003	Copper	0.00613 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 21, 2003	Copper	0.00381 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock HR	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 21, 2003	Zinc	0.27 mg/L	0.081 mg/L	Section 2.4	Storm Water Graving Dock HR	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 21, 2003	Copper	0.0146 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 21, 2003	Zinc	0.127 mg/L	0.081 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 23, 2003	Copper	0.00938 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 23, 2003	Copper	0.0131 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 23, 2003	Zinc	0.153 mg/L	0.081 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 23, 2003	Copper	0.00371 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 23, 2003	Zinc	0.225 mg/L	0.081 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
April 23, 2003	Copper	0.00726 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 21, 2003	Copper	0.00975 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 21, 2003	Nickel	0.011 mg/L	0.0082 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 21, 2003	Copper	0.00432 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 21, 2003	Copper	0.006205 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
June 13, 2003	Copper	0.0067 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
June 13, 2003	Copper	0.00726 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
June 13, 2003	Copper	0.0045 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
August 6, 2003	Copper	0.00468 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
August 6, 2003	Copper	0.0046 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3 HR	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
August 6, 2003	Copper	0.00478 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4 HR	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 9, 2003	Copper	0.005 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 9, 2003	Copper	0.0503 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 9, 2003	Nickel	0.00861 mg/L	0.0082 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 9, 2003	Zinc	0.126 mg/L	0.081 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 9, 2003	Copper	0.00557 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 25, 2003	Copper	0.0068 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock HR	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November 25, 2003	Copper	0.00759 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November 25, 2003	Copper	0.0168 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November 25, 2003	Nickel	0.0187 mg/L	0.0082 mg/L	Section 2.4	Storm Water Graving Dock Flood Water	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
December 12, 2003	Copper	0.00405 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
December 12, 2003	Copper	0.00541 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
December 12, 2003	Copper	0.0037 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
January 7, 2004	Copper	0.00603 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
January 7, 2004	Copper	0.00623 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
January 7, 2004	Copper	0.00522 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 4, 2004	Copper	0.0305 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 4, 2004	Copper	0.00597 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 17, 2004	Copper	0.00837 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 17, 2004	Copper	0.00379 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 17, 2004	Nickel	0.00923 mg/L	0.0082 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 17, 2004	Copper	0.00494 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 17, 2004	Copper	0.00552 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 21, 2004	Copper	0.00313 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 21, 2004	Copper	0.0225 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 21, 2004	Zinc	0.237 mg/L	0.081 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 21, 2004	Copper	0.00317 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 17, 2004	Copper	0.0063 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 17, 2004	Nickel	0.00962 mg/L	0.0082 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 17, 2004	Copper	0.00664 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
May 17, 2004	Nickel	0.0107 mg/L	0.0082 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 17, 2004	Copper	0.0155 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
June 9, 2004	Copper	0.00767 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
June 9, 2004	Copper	0.00793 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 12, 2004	Copper	0.00468 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 12, 2004	Copper	0.00781 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 12, 2004	Copper	0.00674 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 12, 2004	Copper	0.0037 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
August 23, 2004	Copper	0.00383 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
August 23, 2004	Copper	0.00743 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
August 23, 2004	Copper	0.00321 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
September 13, 2004	Copper	0.00392 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
September 13, 2004	Copper	0.00733 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 13, 2004	Copper	0.00483 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 13, 2004	Copper	0.00319 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 13, 2004	Copper	0.00642 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November, 12, 2004	Copper	0.00415 mg/L	0.0031 mg/L	Section 2.4	Storm Water Fire Protection	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November, 12, 2004	Copper	0.00318 mg/L	0.0031 mg/L	Section 2.4	Storm Water Graving Dock	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November, 12, 2004	Copper	0.0068 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 3	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November, 12, 2004	Copper	0.00457 mg/L	0.0031 mg/L	Section 2.4	Storm Water Shipbuilding Ways 4	NASSCO Monitoring Report	Order No. R9-2003-0005, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

1. 40 CFR 131.38
2. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
3. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.

2.8. NASSCO's Storm Water Monitoring for the General Industrial NPDES Requirements for Storm Water Discharges

From 1992 until 2003, NASSCO's General Industrial NPDES Requirements for Storm Water Discharges included Discharge Prohibitions and Receiving Water Limitations, which set a narrative limit on discharge pollutant concentrations to reduce or eliminate toxic chemical concentrations in marine water, marine life, and sediment.

While subject to regulation under the General Industrial NPDES Requirements for Storm Water Discharges, NASSCO discharged pollutants at elevated levels compared to levels established by the CTR for saltwater.[32] The U.S. EPA finalized the CTR on May 18, 2000. None of the numerical values in CTR were included as numerical effluent limitations in any of the Industrial NPDES Requirements issued to NASSCO. However, the numerical values in the CTR represent

[32] The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

the latest, most up-to-date numerical thresholds for use in determining whether a chemical concentration in a water body is detrimental to its beneficial uses. By comparing CTR values with pollutant levels in historical discharges, the San Diego Water Board is able to determine which discharges *may* have contributed to toxic chemical concentrations in marine water, marine life, and sediment at the Shipyard Sediment Site in the past. Also, where there are historical discharges elevated above CTR values, there exists an *elevated probability* that those same discharges contributed to the present condition of pollution. To the extent that those historical, elevated discharges *did* cause toxic chemical concentrations in marine water, marine life, and sediment, and/or *did* contribute to the present condition of pollution at the Shipyard Sediment Site, such discharges may have constituted an Industrial NPDES Requirements violation.

While NASSCO's Industrial NPDES Requirements did not provide specific numerical limitations for all possible chemicals, the San Diego Water Board did require that discharges from NASSCO not cause a violation of discharge prohibitions and receiving water limitations described in Section 2.5.6, above. Monitoring reports submitted by NASSCO during the years 1992 through 1998, pursuant to the General Industrial NPDES Requirements for storm water discharges, indicate that elevated levels of chromium, copper, lead, nickel, and zinc have been present in storm water discharged from the NASSCO site when compared to levels established by the CTR for saltwater. The specific discharges above the CTR are cited in Table 2-12, below.

Table 2-12 Discharges Above CTR Value Occurring from 1992 to 1998

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 18, 1993	Chromium	0.11 mg/L	0.05 mg/L	Section 2.4	SW-5	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Chromium	0.22 mg/L	0.05 mg/L	Section 2.4	SW-7	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Copper	0.40 mg/L	0.0031 mg/L	Section 2.4	SW-1	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Copper	0.06 mg/L	0.0031 mg/L	Section 2.4	SW-2	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Copper	0.37 mg/L	0.0031 mg/L	Section 2.4	SW-3	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 18, 1993	Copper	0.43 mg/L	0.0031 mg/L	Section 2.4	SW-4	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Copper	0.43 mg/L	0.0031 mg/L	Section 2.4	SW-5	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Copper	0.31 mg/L	0.0031 mg/L	Section 2.4	SW-6	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Copper	2.2 mg/L	0.0031 mg/L	Section 2.4	SW-7	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Copper	0.37 mg/L	0.0031 mg/L	Section 2.4	SW-8	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Lead	0.11 mg/L	0.0081 mg/L	Section 2.4	SW-3	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Lead	0.07 mg/L	0.0081 mg/L	Section 2.4	SW-4	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Lead	0.06 mg/L	0.0081 mg/L	Section 2.4	SW-5	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Lead	0.05 mg/L	0.0081 mg/L	Section 2.4	SW-6	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Lead	1.0 mg/L	0.0081 mg/L	Section 2.4	SW-7	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 18, 1993	Nickel	0.19 mg/L	0.0082 mg/L	Section 2.4	SW-4	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Nickel	0.15 mg/L	0.0082 mg/L	Section 2.4	SW-7	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Zinc	2.4 mg/L	0.081 mg/L	Section 2.4	SW-1	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Zinc	1.0 mg/L	0.081 mg/L	Section 2.4	SW-2	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Zinc	2.7 mg/L	0.081 mg/L	Section 2.4	SW-3	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Zinc	4.0 mg/L	0.081 mg/L	Section 2.4	SW-4	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Zinc	5.4 mg/L	0.081 mg/L	Section 2.4	SW-5	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Zinc	5.2 mg/L	0.081 mg/L	Section 2.4	SW-6	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Zinc	10.6 mg/L	0.081 mg/L	Section 2.4	SW-7	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 18, 1993	Zinc	4.0 mg/L	0.081 mg/L	Section 2.4	SW-8	NASSCO 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 17, 1994	Chromium	0.1 mg/L	0.05 mg/L	Section 2.4	SW-5	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Chromium	0.2 mg/L	0.05 mg/L	Section 2.4	SW-7	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.09 mg/L	0.0031 mg/L	Section 2.4	SW-2	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.47 mg/L	0.0031 mg/L	Section 2.4	SW-3	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	6.1 mg/L	0.0031 mg/L	Section 2.4	SW-5	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	1.6 mg/L	0.0031 mg/L	Section 2.4	SW-6	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	1.6 mg/L	0.0031 mg/L	Section 2.4	SW-7	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.16 mg/L	0.0031 mg/L	Section 2.4	SW-8	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Lead	0.77 mg/L	0.0081 mg/L	Section 2.4	SW-7	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Nickel	20.0 mg/L	0.0082 mg/L	Section 2.4	SW-5	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 17, 1994	Nickel	0.3 mg/L	0.0082 mg/L	Section 2.4	SW-6	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Nickel	0.07 mg/L	0.0082 mg/L	Section 2.4	SW-7	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	1.5 mg/L	0.081 mg/L	Section 2.4	SW-1	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	10.0 mg/L	0.081 mg/L	Section 2.4	SW-2	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	1.9 mg/L	0.081 mg/L	Section 2.4	SW-3	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	2.6 mg/L	0.081 mg/L	Section 2.4	SW-5	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	2.6 mg/L	0.081 mg/L	Section 2.4	SW-6	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	9.2 mg/L	0.081 mg/L	Section 2.4	SW-7	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	4.3 mg/L	0.081 mg/L	Section 2.4	SW-8	NASSCO 1993-1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 11, 1994	Chromium	0.06 mg/L	0.05 mg/L	Section 2.4	SW-02	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
October 11, 1994	Copper	0.97 mg/L	0.0031 mg/L	Section 2.4	SW-02	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 11, 1994	Lead	0.07 mg/L	0.0081 mg/L	Section 2.4	SW-02	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 11, 1994	Nickel	0.28 mg/L	0.0082 mg/L	Section 2.4	SW-02	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 11, 1994	Zinc	11.0 mg/L	0.081 mg/L	Section 2.4	SW-02	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Chromium	0.05 mg/L	0.05 mg/L	Section 2.4	SW-03	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Chromium	0.06 mg/L	0.05 mg/L	Section 2.4	SW-05	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Copper	1.9 mg/L	0.0031 mg/L	Section 2.4	SW-03	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Copper	0.92 mg/L	0.0031 mg/L	Section 2.4	SW-05	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Lead	0.15 mg/L	0.0081 mg/L	Section 2.4	SW-03	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Lead	0.12 mg/L	0.0081 mg/L	Section 2.4	SW-05	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 10, 1994	Nickel	0.10 mg/L	0.0082 mg/L	Section 2.4	SW-03	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Nickel	0.07 mg/L	0.0082 mg/L	Section 2.4	SW-05	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Zinc	9.14 mg/L	0.081 mg/L	Section 2.4	SW-03	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 10, 1994	Zinc	14.0 mg/L	0.081 mg/L	Section 2.4	SW-05	NASSCO 1994-1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Copper	0.20 mg/L	0.0031 mg/L	Section 2.4	SW-01	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Copper	0.08 mg/L	0.0031 mg/L	Section 2.4	SW-02	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Copper	0.29 mg/L	0.0031 mg/L	Section 2.4	SW-03	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Copper	0.21 mg/L	0.0031 mg/L	Section 2.4	SW-05	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Copper	0.42 mg/L	0.0031 mg/L	Section 2.4	SW-07	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Lead	0.12 mg/L	0.0081 mg/L	Section 2.4	SW-07	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 21, 1995	Nickel	0.11 mg/L	0.0082 mg/L	Section 2.4	SW-01	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Zinc	1.1 mg/L	0.081 mg/L	Section 2.4	SW-01	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Zinc	0.84 mg/L	0.081 mg/L	Section 2.4	SW-02	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Zinc	1.45 mg/L	0.081 mg/L	Section 2.4	SW-03	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Zinc	2.5 mg/L	0.081 mg/L	Section 2.4	SW-05	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 21, 1995	Zinc	2.95 mg/L	0.081 mg/L	Section 2.4	SW-07	NASSCO 1995-1996 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Copper	1.2 mg/L	0.0031 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Copper	0.39 mg/L	0.0031 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Copper	0.86 mg/L	0.0031 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Copper	0.46 mg/L	0.0031 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
October 30, 1996	Copper	0.56 mg/L	0.0031 mg/L	Section 2.4	SW-06	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Copper	1.1 mg/L	0.0031 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Copper	0.09 mg/L	0.0031 mg/L	Section 2.4	SW-08	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Lead	0.14 mg/L	0.0081 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Lead	0.2 mg/L	0.0081 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Lead	0.11 mg/L	0.0081 mg/L	Section 2.4	SW-06	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Lead	0.38 mg/L	0.0081 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Nickel	0.38 mg/L	0.0082 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Nickel	0.28 mg/L	0.0082 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Nickel	0.28 mg/L	0.0082 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
October 30, 1996	Nickel	0.31 mg/L	0.0082 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Nickel	0.21 mg/L	0.0082 mg/L	Section 2.4	SW-06	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Nickel	0.14 mg/L	0.0082 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Nickel	0.25 mg/L	0.0082 mg/L	Section 2.4	SW-08	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Zinc	7.0 mg/L	0.081 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Zinc	5.0 mg/L	0.081 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Zinc	7.2 mg/L	0.081 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Zinc	7.9 mg/L	0.081 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Zinc	10.9 mg/L	0.081 mg/L	Section 2.4	SW-06	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 30, 1996	Zinc	12.3 mg/L	0.081 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
October 30, 1996	Zinc	14.0 mg/L	0.081 mg/L	Section 2.4	SW-08	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Chromium	0.06 mg/L	0.05 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Chromium	0.09 mg/L	0.05 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Chromium	0.24 mg/L	0.05 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Chromium	0.07 mg/L	0.05 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Copper	2.1 mg/L	0.0031 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Copper	0.89 mg/L	0.0031 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Copper	0.94 mg/L	0.0031 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Copper	0.46 mg/L	0.0031 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Copper	1.2 mg/L	0.0031 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 21, 1996	Nickel	1.2 mg/L	0.0082 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Nickel	0.35 mg/L	0.0082 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Nickel	0.70 mg/L	0.0082 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Nickel	0.48 mg/L	0.0082 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Nickel	0.79 mg/L	0.0082 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Zinc	11.9 mg/L	0.081 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Zinc	6.5 mg/L	0.081 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Zinc	8.1 mg/L	0.081 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Zinc	16.5 mg/L	0.081 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 21, 1996	Zinc	9.4 mg/L	0.081 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
April 2, 1997	Chromium	0.2 mg/L	0.05 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Chromium	0.2 mg/L	0.05 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Copper	0.98 mg/L	0.0031 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Copper	0.57 mg/L	0.0031 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Copper	0.99 mg/L	0.0031 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Copper	0.53 mg/L	0.0031 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Copper	0.76 mg/L	0.0031 mg/L	Section 2.4	SW-06	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Copper	2.6 mg/L	0.0031 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Copper	0.91 mg/L	0.0031 mg/L	Section 2.4	SD 9-14	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Lead	1.1 mg/L	0.0081 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
April 2, 1997	Nickel	0.2 mg/L	0.0082 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Nickel	0.05 mg/L	0.0082 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Nickel	0.05 mg/L	0.0082 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Nickel	0.08 mg/L	0.0082 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Nickel	0.05 mg/L	0.0082 mg/L	Section 2.4	SW-06	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Nickel	0.17 mg/L	0.0082 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Nickel	0.09 mg/L	0.0082 mg/L	Section 2.4	SD 9-14	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Zinc	6.2 mg/L	0.081 mg/L	Section 2.4	SW-01	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Zinc	9.0 mg/L	0.081 mg/L	Section 2.4	SW-02	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Zinc	6.0 mg/L	0.081 mg/L	Section 2.4	SW-03	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
April 2, 1997	Zinc	8.6 mg/L	0.081 mg/L	Section 2.4	SW-05	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Zinc	12.0 mg/L	0.081 mg/L	Section 2.4	SW-06	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Zinc	14.7 mg/L	0.081 mg/L	Section 2.4	SW-07	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 2, 1997	Zinc	13.8 mg/L	0.081 mg/L	Section 2.4	SD 9-14	NASSCO 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.49 mg/L	0.0031 mg/L	Section 2.4	SW-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.24 mg/L	0.0031 mg/L	Section 2.4	SW-06	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	1.6 mg/L	0.0031 mg/L	Section 2.4	SWDS-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.88 mg/L	0.0031 mg/L	Section 2.4	SWDS-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.81 mg/L	0.0031 mg/L	Section 2.4	SWDS-3	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.37 mg/L	0.0031 mg/L	Section 2.4	SWDS-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 13, 1997	Copper	0.49 mg/L	0.0031 mg/L	Section 2.4	SD 2-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.32 mg/L	0.0031 mg/L	Section 2.4	SD 2-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.23 mg/L	0.0031 mg/L	Section 2.4	SD 2-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.76 mg/L	0.0031 mg/L	Section 2.4	SD 3-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.46 mg/L	0.0031 mg/L	Section 2.4	SD 5-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.25 mg/L	0.0031 mg/L	Section 2.4	SD 5-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	1.4 mg/L	0.0031 mg/L	Section 2.4	SD 7-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.11 mg/L	0.0031 mg/L	Section 2.4	SD 9-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.61 mg/L	0.0031 mg/L	Section 2.4	SD 9-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.4 mg/L	0.0031 mg/L	Section 2.4	SD 9-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 13, 1997	Copper	0.84 mg/L	0.0031 mg/L	Section 2.4	SD 9-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.74 mg/L	0.0031 mg/L	Section 2.4	SD 9-6	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.71 mg/L	0.0031 mg/L	Section 2.4	SD 9-7	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.55 mg/L	0.0031 mg/L	Section 2.4	SD 9-8	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.80 mg/L	0.0031 mg/L	Section 2.4	SD 9-9	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.57 mg/L	0.0031 mg/L	Section 2.4	SD 9-10	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.19 mg/L	0.0031 mg/L	Section 2.4	SD 9-11	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.51 mg/L	0.0031 mg/L	Section 2.4	SD 9-12	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.64 mg/L	0.0031 mg/L	Section 2.4	SD 9-14	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Copper	0.11 mg/L	0.0031 mg/L	Section 2.4	SD 9-15	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 13, 1997	Lead	0.10 mg/L	0.0081 mg/L	Section 2.4	SWDS-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Lead	0.11 mg/L	0.0081 mg/L	Section 2.4	SD 2-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Lead	0.17 mg/L	0.0081 mg/L	Section 2.4	SD 3-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Lead	0.46 mg/L	0.0081 mg/L	Section 2.4	SD 7-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Lead	0.17 mg/L	0.0081 mg/L	Section 2.4	SD 9-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Lead	0.24 mg/L	0.0081 mg/L	Section 2.4	SD 9-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.43 mg/L	0.0082 mg/L	Section 2.4	SW-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.62 mg/L	0.0082 mg/L	Section 2.4	SW 06	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.48 mg/L	0.0082 mg/L	Section 2.4	SWDS-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	1.2 mg/L	0.0082 mg/L	Section 2.4	SWDS-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 13, 1997	Nickel	0.43 mg/L	0.0082 mg/L	Section 2.4	SWDS-3	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.43 mg/L	0.0082 mg/L	Section 2.4	SWDS-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.66 mg/L	0.0082 mg/L	Section 2.4	SD 2-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.52 mg/L	0.0082 mg/L	Section 2.4	SD 2-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.72 mg/L	0.0082 mg/L	Section 2.4	SD 2-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.57 mg/L	0.0082 mg/L	Section 2.4	SD 3-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.95 mg/L	0.0082 mg/L	Section 2.4	SD 5-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.95 mg/L	0.0082 mg/L	Section 2.4	SD 5-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	1.0 mg/L	0.0082 mg/L	Section 2.4	SD 7-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.78 mg/L	0.0082 mg/L	Section 2.4	SD 9-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 13, 1997	Nickel	0.74 mg/L	0.0082 mg/L	Section 2.4	SD 9-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.6 mg/L	0.0082 mg/L	Section 2.4	SD 9-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.55 mg/L	0.0082 mg/L	Section 2.4	SD 9-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.36 mg/L	0.0082 mg/L	Section 2.4	SD 9-6	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.21 mg/L	0.0082 mg/L	Section 2.4	SD 9-7	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.48 mg/L	0.0082 mg/L	Section 2.4	SD 9-8	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.67 mg/L	0.0082 mg/L	Section 2.4	SD 9-9	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.07 mg/L	0.0082 mg/L	Section 2.4	SD 9-10	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.76 mg/L	0.0082 mg/L	Section 2.4	SD 9-11	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.49 mg/L	0.0082 mg/L	Section 2.4	SD 9-12	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 13, 1997	Nickel	0.74 mg/L	0.0082 mg/L	Section 2.4	SD 9-14	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Nickel	0.58 mg/L	0.0082 mg/L	Section 2.4	SD 9-15	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	1.7 mg/L	0.081 mg/L	Section 2.4	SW-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	2.8 mg/L	0.081 mg/L	Section 2.4	SW 06	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	2.4 mg/L	0.081 mg/L	Section 2.4	SWDS-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	2.4 mg/L	0.081 mg/L	Section 2.4	SWDS-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	1.6 mg/L	0.081 mg/L	Section 2.4	SWDS-3	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	0.8 mg/L	0.081 mg/L	Section 2.4	SWDS-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	7.1 mg/L	0.081 mg/L	Section 2.4	SD 2-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	1.7 mg/L	0.081 mg/L	Section 2.4	SD 2-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 13, 1997	Zinc	5.0 mg/L	0.081 mg/L	Section 2.4	SD 2-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	3.3 mg/L	0.081 mg/L	Section 2.4	SD 3-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	2.0 mg/L	0.081 mg/L	Section 2.4	SD 5-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	3.9 mg/L	0.081 mg/L	Section 2.4	SD 5-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	5.3 mg/L	0.081 mg/L	Section 2.4	SD 5-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	4.7 mg/L	0.081 mg/L	Section 2.4	SD 9-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	2.8 mg/L	0.081 mg/L	Section 2.4	SD 9-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	1.9 mg/L	0.081 mg/L	Section 2.4	SD 9-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	5.9 mg/L	0.081 mg/L	Section 2.4	SD 9-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	9.7 mg/L	0.081 mg/L	Section 2.4	SD 9-6	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 13, 1997	Zinc	5.8 mg/L	0.081 mg/L	Section 2.4	SD 9-7	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	4.1 mg/L	0.081 mg/L	Section 2.4	SD 9-8	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	3.4 mg/L	0.081 mg/L	Section 2.4	SD 9-9	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	5.9 mg/L	0.081 mg/L	Section 2.4	SD 9-10	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	1.6 mg/L	0.081 mg/L	Section 2.4	SD 9-11	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	4.4 mg/L	0.081 mg/L	Section 2.4	SD 9-12	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	5.8 mg/L	0.081 mg/L	Section 2.4	SD 9-14	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 13, 1997	Zinc	0.95 mg/L	0.081 mg/L	Section 2.4	SD 9-15	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	2.2 mg/L	0.0031 mg/L	Section 2.4	SW-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.27 mg/L	0.0031 mg/L	Section 2.4	SW-02	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 25, 1998	Copper	0.34 mg/L	0.0031 mg/L	Section 2.4	SW-03	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.11 mg/L	0.0031 mg/L	Section 2.4	SW-05	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.08 mg/L	0.0031 mg/L	Section 2.4	SW-06	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.19 mg/L	0.0031 mg/L	Section 2.4	SW-07	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.26 mg/L	0.0031 mg/L	Section 2.4	SWDS-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.10 mg/L	0.0031 mg/L	Section 2.4	SWDS-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.72 mg/L	0.0031 mg/L	Section 2.4	SWDS-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.28 mg/L	0.0031 mg/L	Section 2.4	SD 9-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	1.5 mg/L	0.0031 mg/L	Section 2.4	SD 9-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.16 mg/L	0.0031 mg/L	Section 2.4	SD 9-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 25, 1998	Copper	0.21 mg/L	0.0031 mg/L	Section 2.4	SD 9-6	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	1.6 mg/L	0.0031 mg/L	Section 2.4	SD 9-7	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.60 mg/L	0.0031 mg/L	Section 2.4	SD 9-8	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	1.2 mg/L	0.0031 mg/L	Section 2.4	SD 9-9	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	1.0 mg/L	0.0031 mg/L	Section 2.4	SD 9-10	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.65 mg/L	0.0031 mg/L	Section 2.4	SD 9-11	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.16 mg/L	0.0031 mg/L	Section 2.4	SD 9-12	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	1.6 mg/L	0.0031 mg/L	Section 2.4	SD 9-14	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.13 mg/L	0.0031 mg/L	Section 2.4	SD 9-15	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Lead	0.26 mg/L	0.0081 mg/L	Section 2.4	SW-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 25, 1998	Lead	0.38 mg/L	0.0081 mg/L	Section 2.4	SW-05	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Lead	0.17 mg/L	0.0081 mg/L	Section 2.4	SD 9-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Lead	0.12 mg/L	0.0081 mg/L	Section 2.4	SD 9-7	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Lead	0.13 mg/L	0.0081 mg/L	Section 2.4	SD 9-11	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Lead	0.92 mg/L	0.0081 mg/L	Section 2.4	SD 9-14	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.22 mg/L	0.0082 mg/L	Section 2.4	SW-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.27 mg/L	0.0082 mg/L	Section 2.4	SW-02	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.28 mg/L	0.0082 mg/L	Section 2.4	SW-03	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.22 mg/L	0.0082 mg/L	Section 2.4	SW-05	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.32 mg/L	0.0082 mg/L	Section 2.4	SW-06	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 25, 1998	Nickel	0.25 mg/L	0.0082 mg/L	Section 2.4	SW-07	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.15 mg/L	0.0082 mg/L	Section 2.4	SWDS-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.33 mg/L	0.0082 mg/L	Section 2.4	SWDS-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.39 mg/L	0.0082 mg/L	Section 2.4	SWDS-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.13 mg/L	0.0082 mg/L	Section 2.4	SD 9-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.33 mg/L	0.0082 mg/L	Section 2.4	SD 9-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.20 mg/L	0.0082 mg/L	Section 2.4	SD 9-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.28 mg/L	0.0082 mg/L	Section 2.4	SD 9-6	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.71 mg/L	0.0082 mg/L	Section 2.4	SD 9-7	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.32 mg/L	0.0082 mg/L	Section 2.4	SD 9-8	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 25, 1998	Nickel	0.21 mg/L	0.0082 mg/L	Section 2.4	SD 9-9	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.36 mg/L	0.0082 mg/L	Section 2.4	SD 9-10	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.21 mg/L	0.0082 mg/L	Section 2.4	SD 9-11	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.24 mg/L	0.0082 mg/L	Section 2.4	SD 9-12	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.35 mg/L	0.0082 mg/L	Section 2.4	SD 9-14	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Nickel	0.19 mg/L	0.0082 mg/L	Section 2.4	SD 9-15	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	4.5 mg/L	0.081 mg/L	Section 2.4	SW-01	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	1.6 mg/L	0.081 mg/L	Section 2.4	SW-02	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	1.1 mg/L	0.081 mg/L	Section 2.4	SW-03	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	1.1 mg/L	0.081 mg/L	Section 2.4	SW-05	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 25, 1998	Zinc	0.48 mg/L	0.081 mg/L	Section 2.4	SW-06	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	0.93 mg/L	0.081 mg/L	Section 2.4	SW-07	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	0.97 mg/L	0.081 mg/L	Section 2.4	SWDS-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	0.80 mg/L	0.081 mg/L	Section 2.4	SWDS-4	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	1.6 mg/L	0.081 mg/L	Section 2.4	SWDS-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	1.1 mg/L	0.081 mg/L	Section 2.4	SD 9-1	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	4.3 mg/L	0.081 mg/L	Section 2.4	SD 9-2	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	0.79 mg/L	0.081 mg/L	Section 2.4	SD 9-5	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	1.1 mg/L	0.081 mg/L	Section 2.4	SD 9-6	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	5.9 mg/L	0.081 mg/L	Section 2.4	SD 9-7	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 25, 1998	Zinc	1.6 mg/L	0.081 mg/L	Section 2.4	SD 9-8	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	3.7 mg/L	0.081 mg/L	Section 2.4	SD 9-9	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	3.7 mg/L	0.081 mg/L	Section 2.4	SD 9-10	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	2.2 mg/L	0.081 mg/L	Section 2.4	SD 9-11	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	1.2 mg/L	0.081 mg/L	Section 2.4	SD 9-12	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	4.7 mg/L	0.081 mg/L	Section 2.4	SD 9-14	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 25, 1998	Zinc	0.68 mg/L	0.081 mg/L	Section 2.4	SD 9-15	NASSCO 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

1. 40 CFR 131.38
2. Reference to Section 2.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 2.4.
3. The cited waste discharge requirement(s) can be found in Section 2.5 of this Technical Report.

2.9. Prior History of Enforcement Actions for Violations of NPDES Requirements

2.9.1. Administrative Civil Liability Orders

On May 22, 1989, the San Diego Water Board issued Complaint No. 89-42 Administrative Civil Liability to NASSCO, for the discharge of spent abrasive waste from a floating dry dock to San Diego Bay and to have operated its graving dock in a manner that was in violation of Order No.

85-05, NPDES No. CA0107671. NASSCO elected to waive a hearing and accepted liability for the discharge of cooling water contaminated with wastes from the hull and freeboard abrasive blasting operations to San Diego Bay, failing to prevent miscellaneous water flows from coming in contact with sand blast residue in the graving dock, and the discharge of slurry blast wastes to San Diego Bay. NASSCO agreed to pay a total civil penalty of $10,000.

On January 30, 2001, the San Diego Water Board issued Complaint No. 2001-24 Administrative Civil Liability to NASSCO, for violations of the storm water runoff requirements of its NPDES permit. NASSCO sampled twenty-one discharge points on February 12, 2000, with all samples results showing toxic responses that violated the storm water discharge requirements of Order No. 97-36, NPDES permit No. CAG039001. The San Diego Water Board determined that each sample failure was a violation and assessed a civil liability fine of $135,801 against NASSCO.

2.10. Industry-wide Historical Operational Practices

In November of 1997, the U.S. Environmental Protection Agency released a study titled "EPA Office of Compliance Sector Notebook Project: PROFILE OF SHIPBUILDING AND REPAIR INDUSTRY." According to the 1995 Toxic Release Inventory (TRI) data, the reporting shipbuilding and repair facilities released and transferred 39 different TRI chemicals for a total of approximately 6.5 million pounds of pollutants during calendar year 1995. These releases and transfers were dominated by volatile organic compounds (VOCs) and metal-bearing wastes, approximately 52 percent and 48 percent respectively (U.S. EPA, 1997c).

Releases to the air, water, and land have accounted for 37 percent (2.4 million pounds) of the reporting shipbuilding and repair facilities' total reportable chemicals. Of these releases, over 98 percent were released to the air from fugitive (74.6 percent; 1,778,818 pounds) or point (24.1 percent; 574,097 pounds) sources, while approximately 1.2 percent (29,479 pounds) was release directly to water (U.S. EPA, 1997c). However, a significant percentage of the total pollutants released as fugitive air or point air releases end up in the water, adding significantly to the 1.2 percent which is released directly to water.

VOCs accounted for about 86 percent of the reporting shipbuilding and repair facilities' reported TRI releases. Xylenes, n-butyl alcohol, toluene, methyl ethyl ketone, and methyl isobutyl ketone account for about 65 percent of the reporting shipbuilding and repair facilities' reported releases. These organic compounds are typically found in solvents that were used extensively by the industry in thinning paints and for cleaning and degreasing metal parts and equipment (U.S. EPA, 1997c).

The remainder of the releases was primarily metal-bearing wastes. Copper, zinc, and nickel-bearing wastes accounted for about 14 percent of the reporting shipbuilding and repair facilities' reported releases. These pollutants were released primarily as fugitive emissions during metal plating operations and as overspray in painting operations and could also have been released as fugitive dust emissions during blasting operations (U.S. EPA, 1997c).

3. Finding 3: BAE Systems San Diego Ship Repair, Inc., Formerly Southwest Marine, Inc. (Southwest Marine)

Finding 3 of CAO No. R9-2012-0024 states:

The San Diego Water Board finds that BAE Systems caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance. These wastes contained metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), butyl tin species, PCBs, PCTs, PAHs, and TPH.

From 1979 to the present, Southwest Marine, Inc. and its successor BAE Systems have owned and operated a ship repair, alteration, and overhaul facility on approximately 39.6 acres of tidelands property on the eastern waterfront of central San Diego Bay. The facility, currently referred to as BAE Systems San Diego Ship Repair, is located on land leased from the Port District at 2205 East Belt Street, foot of Sampson Street in San Diego, San Diego County, California. Shipyard facilities operated by BAE Systems over the years have included concrete platens used for steel fabrication, two floating dry docks, five piers, and two marine railways. An assortment of waste has been generated at the facility including spent abrasive, paint, rust, petroleum products, marine growth, sanitary waste, and general refuse. Based on these considerations BAE Systems is referred to as “Discharger(s)” in this CAO.

3.1. Jurisdiction

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance….”

For the reasons set forth below, the San Diego Water Board has determined that Southwest Marine, Inc. (SWM) and its successor BAE Systems should be named as dischargers in Cleanup and Abatement Order No. R9-2012-0024 pursuant to Water Code section 13304.

3.2. Admissible Evidence – State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996) the State Water Board adopted Resolution No. 92-49, Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code section 13304. Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under Water Code section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under Water Code section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;

2. Site characteristics and location in relation to other potential sources of a discharge;

3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;

4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;

5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;

6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;

7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;

8. Reports and complaints;

9. Other agencies' records of possible known discharge; and

10. Refusal or failure to respond to San Diego Water Board inquiries.

3.3. BAE Systems Owns and Operates the San Diego Ship Repair Facility

3.3.1. Facility Description

From 1979 to the present, SWM and its successor BAE,[33] hereinafter collectively referred to as BAE Systems, have owned and operated a ship repair, alteration, and overhaul facility on approximately 39.6 acres of tidelands property on the eastern waterfront of central San Diego Bay. The facility is located on land leased from the Port District at 2205 East Belt Street, foot of

[33] BAE Systems, Inc. acquired Southwest Marine, Inc. on June 28, 2005 and Southwest Marine, Inc. simultaneously changed its name to BAE Systems San Diego Ship Repair Inc.

Sampson Street in San Diego, San Diego County, California. The facility covers approximately 39.6 acres of tidelands property, leased from the Port District from 1979 to the present. The land portion and offshore area of the lease includes approximately 23 acres and 16.6 acres, respectively. BAE Systems' primary business has historically been ship repair and maintenance for the U.S. Navy and commercial customers.

Ship repair facilities at BAE Systems have historically included five piers, two floating dry docks and two marine railways, which, together with cranes, enable ships to be launched or repaired. The basic purpose of the dry dock is to separate the vessel from the bay to provide access to parts of the ship normally underwater. The piers are used to support berthed vessels that are undergoing maintenance and repair operations as well as berthing barges used to house vessel crews while ship repairs are being conducted. Because dry dock space is limited and expensive, many operations are conducted pier side. Marine railways were used to wheel vessels out of water (also called dry berthing a vessel). Activities conducted on dry berthed vessels are similar to those conducted in dry docks, but usually on a much smaller scale. The marine railways, located between Piers 1 and 2, were removed in 1998.

On-shore facilities also included an abrasive blasting building and a paint spray booth area located at the foot of Pier 3 on the southeast section of the facility. On the northern end of the facility is an area used for steam cleaning/pressure washing of vehicles and equipment. This area includes a sump where the effluent is collected and drained to a three-stage clarifier that is connected to the Metropolitan Sanitary Sewer System. Other shore-side facilities include manufacturing and storage areas to support ship repair operations and material staging. Material staging is managed by zones for incoming and outgoing material to and from ships and shops.

BAE Systems manages a solid waste reclamation and recycling area, located at the foot of the gantry crane tracks adjacent to Belt Street, south of Building 8. The solid waste and recycling area segregates, consolidates, reclaims, recycles, and disposes municipal solid waste that is typically generated by shipyard activities. These wastes include metals, wood, and paper/cardboard. A hazardous waste reclamation facility, located west of the solid waste reclamation and recycling area, handles the spent abrasives, paint wastes, oil wastes, oil-contaminated debris, and miscellaneous chemicals removed from ships.

3.3.2. Activities Conducted by BAE Systems

Ship modification, repair, and maintenance activities at the BAE Systems facility have historically encompassed a large variety of activities including, but not limited to, application of paint systems; installation and repair of a large variety of mechanical, electrical, and hydraulic systems and equipment; repair of damaged vessels; removal and replacement of expended/failed paint systems; and provision of entire utility/support systems to ships (and crews) during repair.

These activities involve a multitude of industrial processes, many of which have been conducted over San Diego Bay waters or very close to the waterfront. As a result of these processes, an assortment of wastes has been generated including paint chips, abrasive grit, solvents, materials of petroleum origin, and heat. The industrial processes at the BAE Systems facility included the following:

- **Surface Preparation and Paint Removal**. Methods of surface preparation and paint removal include dry abrasive blasting, wet abrasive or slurry blasting, hydroblasting, and chemical paint stripping;

- **Paint Application**. After preparation, surfaces are painted. Most painting occurs in a dry dock and involves the ship hull and internal tanks. Painting is also conducted in other locations throughout the shipyard including piers and berths. Paint application is accomplished by way of air or airless spraying equipment and is a major activity at BAE Systems;

- **Tank Cleaning**. Tank cleaning operations use steam to remove dirt and sludges from internal tanks, particularly fuel tanks and bilges. Detergents, cleaners, and hot water may be injected into the steam supply hoses. BAE Systems reports that wastewater generated has typically been removed and disposed of at an on-site treatment facility;

- **Mechanical Repair/Maintenance/Installation**. A variety of mechanical systems and machinery require repair, maintenance, and installation;

- **Structural Repair/Alteration/Assembly**. Structural repair, alteration, and assembly generally involve welding, cutting, and fastening of steel plates or assembly blocks and other industrial processes;

- **Integrity/Hydrostatic Testing**. Hydrostatic or strength testing, and flushing are conducted on hulls, tanks, or pipe repairs. Integrity testing is also conducted on new systems during ship construction phases;

- **Paint Equipment Cleaning**. All air and airless paint spraying equipment is typically cleaned following use. Paint equipment cleaning is a major producer of waste, including solvents, thinners, and paint wastes, and sludges;

- **Engine Repair/Maintenance/Installation**. Automotive repair, ship engine repair, maintenance, and installation generate waste oils, solvents, fuels, batteries, and filters;

- **Steel Fabrication and Machining**. Fabrication of engine and ship parts occurs at BAE Systems. Cutting oils, fluids, and solvents are used extensively including acetone, methyl ethyl ketone (MEK) and chlorinated solvents;

- **Electrical Repair/Maintenance/Installation**. The repair, maintenance, and installation of electrical systems involve the use of numerous hazardous materials including trichlorethylene, trichloroethane, methylene chloride, and acetone;

- **Hydraulic Repair/Maintenance/Installation**. The repair, maintenance, and installation of hydraulic systems involve the replacement of spent hydraulic oils;

- **Tank Emptying**. Bilge, fuel, and ballast tanks are typically emptied prior to ship repair activities;

- **Fueling**. Fueling operations occur at BAE Systems;
- **Shipfitting**. Shipfitting is conducted at BAE Systems, and is defined as the forming of ship plates and shapes, etc. according to plans, patterns, or molds;
- **Carpentry**. Woodworking, with associated wood dust production, is conducted at BAE Systems; and
- **Refurbishing/Modernization/Cleaning**. Refurbishing, modernization, and cleaning of ship processes are conducted at BAE Systems.

3.3.3. Materials Used by BAE Systems

Materials commonly used at BAE Systems are summarized below. Although a few specific materials are included, the list consists primarily of major categories.

- **Abrasive Grit**. Typically slag is collected from coal-fired boilers and consists principally of iron, aluminum, silicon, and calcium oxides. Trace elements such as copper, zinc, and titanium are also present. Sand, cast iron, or steel shot are also used as abrasives. Enormous amounts of abrasive are needed to remove paint; removing paint from a 15,000 square foot hull can take up to 6 days and consume 87 tons of grit. Grit is needed in all dry and wet abrasive blasting.
- **Paint**. Paints contain copper, zinc, chromium, and lead as well as hydrocarbons. Two major types of paints used on ship hulls are:
  - Anticorrosive paints (primers) vinyl, vinyl-lead, or epoxy-based coatings are used. Others contain zinc chromate and lead oxide.
  - Antifouling paints are used to prevent growth and attachment of marine organisms by continuously releasing toxic substances into the water. Cuprous oxide and tributyltin fluoride or tributyltin oxide are the principal toxicants in copper-based and organotin-based paints, respectively.
- **Miscellaneous Materials**. Oils (engine, cutting, and hydraulic), lubricants, grease, fuels, weld, detergents, cleaners, rust inhibitors, paint thinners, hydrocarbon and chlorinated solvents, degreasers, acids, caustics, resins, adhesives/cement/sealants, and chlorine.

3.3.4. Waste Generated by BAE Systems

Categories of wastes commonly generated by BAE Systems' industrial processes include, but are not limited to, those listed below.

- **Abrasive Blast Waste: Spent Grit, Spent Paint, Marine Organisms, and Rust**. Abrasive blast waste, consisting of spent grit, spent paint, marine organisms, and rust is generated in significant quantities during all dry or wet abrasive blasting procedures. The constituent of greatest concern with regard to toxicity is the spent paint, particularly the copper and tributyltin antifouling components, which are designed to be toxic and to continuously leach into the water. Other pollutants in paint included zinc, chromium, and lead. Abrasive blast waste can be conveyed by water flows, become airborne (especially during dry blasting), or fall directly into receiving waters. Based on available data for the years 1987 through 1991, BAE Systems generates an average of 178 tons of abrasive blast waste per month.

- **Fresh Paint**. Losses occur when paint ends up somewhere other than its intended location (e.g., dry dock floor, bay, worker's clothing). These losses result from spills, drips, and overspray. Typical overspray losses are estimated at approximately 5 percent for air spraying, and 1 to 2 percent for airless spraying.

- **Bilge Waste/Other Oily Wastewater**. This waste is generated during tank emptying, leaks, and cleaning operations (bilge, ballast, fuel tanks). In addition to petroleum products (fuel, oil), tank wash water also contains detergents or cleaners and is generated in large quantities.

- **Blast Wastewater**. Hydroblasting generates large quantities of wastewater. In addition to suspended and settleable solids (spent abrasive, paint, rust, marine organisms) and water, blast wastewater also contains rust inhibitors such as diammonium phosphate and sodium nitrite.

- **Oils (engine, cutting, and hydraulic)**. In addition to spent products, fresh oils, lubricants, and fuels are released as a result of spills and leaks from ship or dry dock equipment, machinery, and tanks (especially during cleaning and refueling).

- **Waste Paints/Sludges/Solvents/Thinners**. These wastes are generated from cleaning paint equipment.

- **Construction/Repair Wastes and Trash**. These wastes include scrap metal, welding rods, slag (from arc welding), wood, rags, plastics, cans, paper, bottles, packaging materials, etc.

- **Miscellaneous Wastes**. These wastes include lubricants, grease, fuels, sewage (black and gray water from vessels or docks), boiler blowdown, condensate, discard, acid wastes, caustic wastes, and aqueous wastes (with and without metals).

3.3.5. Abrasive Blast Waste and Other Waste Discharges - Sampling Results

During numerous inspections, San Diego Water Board inspectors observed abrasive blast waste and other wastes deposited in areas where it would probably be discharged into the waters of the state via storm water runoff (see Section 3.6 BAE Systems Waste Discharges). Samples of abrasive blast waste and other wastes were collected in the vicinity of storm drains, or in other areas susceptible to being transported to San Diego Bay, during inspections on March 3, 1987, November 9, 1988, February 24 and 27, 1989, May 31, 1989, and August 14 and 15, 1989.

3.3.5.1. 1987 Inspections and Sampling

During an inspection on March 3, 1987, the San Diego Water Board inspector noted violations of the NPDES permit and reported "… this facility discharged water from the dry dock to the San Diego Bay." (RWQCB, 1987a). The inspector observed water carrying sand blasting grit and oil discharged to the bay. A follow-up inspection on March 18, 1987 noted the problem stilled existed and it appeared no corrective actions had been implemented (RWQCB, 1987b). Sample DTQ 867-407D was collected from undiluted discharge from the dry dock. The analytical results are shown in Table 3-1, below.

3.3.5.2. 1988 Inspections and Sampling

During an inspection on November 9, 1988, the San Diego Water Board inspector noted violations of the NPDES permit and reported "Sand blast waste and sewage are being discharged to San Diego Bay" (RWQCB, 1988a). Samples LKM 889-90137-035A and LKM 889-90137-035B were collected from sand blast waste that had accumulated on the barge and from San Diego Bay sediment where the waste entered the bay directly. The analytical results are shown in Table 3-1, below.

A subsequent inspection on November 15, 1988 noted that none of the violations cited in the previous inspection had been corrected (RWQCB, 1988b).

3.3.5.3. 1989 Inspections and Sampling

The San Diego Water Board conducted a series of inspections in February, May, and August 1989. Abrasive blast waste was noted during inspections on February 24 and 27, May 31, August 10, 15, and August 16 where it would probably be discharged into San Diego Bay via storm water runoff, tidal action from the bay, or whenever the dry dock was submerged. The February 27, 1989 inspection noted potential problems as "The small floating dry dock has a wooden deck through which sand blast waste falls. This should be cleaned prior to sinking the dry dock." and "The large floating dry dock appears to have been sunk with sand blast waste in the port-aft stairwell." (RWQCB, 1989c).

During the inspections, samples were collected from various locations and analyzed for metals. On February 24, a sediment sample, DSJ-889-087, was collected from San Diego Bay and on February 27 another sample, LKM 889-112-5, was collected near the marine railway. Additional samples near the marine railways, LKM 889-200-E and F, were collected in May. During the August inspections, samples LKM 890-37-A through D was also collected from the Pride of San Diego and the small floating dry dock. In his summary report for the August inspections, the inspector reported that "The available evidence shows that both dry docks were sunk with sand blast waste on board in violation of Prohibition A.2." The analytical results are presented in Table 3-1, below (RWQCB, 1989d).

Table 3-1 Abrasive Blast Waste Sampling Results

Chemical	DTQ 867-407D[2,3]	LKM-90137-035A[2,3]	LKM-90137-035B[3]	DSJ 889-087[3]	LKM 889-112-5[3]	LKM 889-200-E[3]	Background
Date	3/18/87	11/9/88	11/9/88	2/24/89	2/27/89	5/31/89	
Metals							
Arsenic (mg/kg)	0.54	<0.55	89	99.3	<23.4	133	7.5
Chromium (mg/kg)	7.5	<0.055	5.9	68.5	28.9	140	57
Copper (mg/kg)	85	<0.066	2,800[1]	323	6,690[1]	2,200	121
Lead (mg/kg)	1.8	<0.27	54	1,120	130	520	53
Mercury (mg/kg)	0.0067	0.003	<0.05	1.10	<0.50	0.231	0.57
Nickel (mg/kg)	1.5	<0.11	<0.38	18.4	18.1	25.6	15
Silver (mg/kg)	0.02	<0.044	<0.15	<2.28	5.20	4.18	1.1
Zinc (mg/kg)	2,000	<0.044	580	234	5,010[1]	5,556[1]	129

1. The result exceeds criteria for characterization of hazardous waste per California Code of Regulations, Title 22, Chapter 11, section 66261.24. The total threshold limit concentration (TTLC) for copper is 2500 mg/kg and the TTLC for zinc is 5000 mg/kg. The TTLC represents the total concentration of a constituent that may be present before a waste is classified as a hazardous waste.
2. Chemistry units in mg/l.
3. Sample collected in San Diego Bay near discharge location.
4. Sample collected from Pride of San Diego or small floating dry dock.

Table 3-1. Continued. Abrasive Blast Waste Sampling Results

Chemical	LKM 889-200-F[3]	LKM 890-37A[4]	LKM 890-37B[4]	LKM 890-37C[4]	LKM 890-37D[4]	Background
Date	5/31/89	8/14/89	8/14/89	8/14/89	8/15/89	
Metals						
Arsenic (mg/kg)	147	21.6	24.6	16.8	26.5	7.5
Chromium (mg/kg)	158	9.33	24.0	12.07	22.6	57
Copper (mg/kg)	3,464[1]	3,635[1]	2,500[1]	4,210[1]	5,538[1]	121
Lead (mg/kg)	856	534	53.6	214	61.0	53
Mercury (mg/kg)	0.145	<0.051	0.050	<0.062	<0.061	0.57
Nickel (mg/kg)	26.4	6.24	18.4	8.27	17.0	15
Silver (mg/kg)	5.59	2.54	2.39	2.33	4.59	1.1
Zinc (mg/kg)	6,567[1]	1,698	987	653	1,713	129

1. The result exceeds criteria for characterization of hazardous waste per California Code of Regulations, Title 22, Chapter 11, section 66261.24. The total threshold limit concentration (TTLC) for copper is 2500 mg/kg and the TTLC for zinc is 5000 mg/kg. The TTLC represents the total concentration of a constituent that may be present before a waste is classified as a hazardous waste.
2. Chemistry units in mg/l.
3. Sample collected near discharge location.
4. Sample collected from Pride of San Diego or small floating dry dock.

3.3.5.4. Discussion of Sampling Results

The inspections and analytical results indicate that abrasive blast wastes and other waste with elevated levels of metals have been discharged or deposited where they were, or probably will be, discharged into San Diego Bay creating, or threatening to create, a condition of pollution or nuisance. The analytical laboratory results for arsenic, chromium, copper, lead, mercury, nickel, silver, and zinc exceed the background sediment chemistry levels presented in Section 29 of this Technical Report at least once from the 11 samples collected. Copper and zinc samples exceed the background sediment chemistry levels in 9 out of the 11 samples.

Seven of the samples (LKM 90137-035B, LKM 889-112-5, LKM 889-200-F, LKM 890-37A, B, C, and D) exceed the criteria for total concentration of copper that may be present before the waste is classified as hazardous waste due to toxicity and 3 of the samples (LKM 889-112-5, LKM 889-200-E, and LKM 889-200-F) exceed the hazardous waste classification criteria for zinc (CCR Title 22). Furthermore, sample DSJ 889-087 exceed the hazardous waste classification criteria for lead (CCR Title 22). Under Title 22 the waste would be classified as hazardous and proper disposal would be in a Class I Landfill licensed to receive hazardous waste.

3.4. BAE Systems Discharged Waste to San Diego Bay Creating Pollution, Contamination, and Nuisance Conditions in San Diego Bay

BAE Systems has discharged waste, or deposited waste where it was discharged, into San Diego Bay and created, or threatens to create, a condition of pollution, contamination, and nuisance. Water Code section 13304 requires that a person who causes any waste to be discharged, or deposited where it probably will be discharged, into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance is subject to cleaning up or abating the effects of the waste.

Pollutants generated at the BAE Systems facility as a result of shipyard activities include metals, butyltins, PCBs, PCTs, PAHs, and petroleum hydrocarbons. Many of these same pollutants are present in the marine sediment adjacent to the BAE Systems facility in highly elevated concentrations as compared to sediment chemistry levels found at off-site reference stations located in areas of San Diego Bay.[34]

The Shipyard Report (Exponent, 2003) made the following findings about the chemical conditions at the Shipyard Sediment Site:

- The highest concentrations of most chemicals are found at the northern boundary of the BAE Systems site;

- The highest concentrations of PAH are found in proximity of the municipal storm drain outfall in the BAE Systems leasehold;

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[34] See Section 16 of this Technical Report.

- Elevated concentrations of metals are also found near the municipal storm drain outfall in the BAE Systems leasehold;

- Elevated concentrations of PCBs are found near the northern boundary of BAE Systems, at the storm drain outfall on BAE Systems' leasehold, and at the foot of Sicard Street on the boundary of the two shipyards (BAE Systems and NASSCO);

- Petroleum hydrocarbons are distributed similarly to metals and PCBs, with an additional area of elevation near the southern boundary of NASSCO's leasehold; and

- Concentrations of all chemicals generally decrease with distance from shore.

BAE Systems has a history of discharging substantial quantities of pollutants to San Diego Bay as a result of systemic problems and overall inadequacies in the implementation of its Best Management Practices Program to prevent such discharges. Some of BAE Systems' discharges are presented in Sections 3.6, 3.7, 3.8 and 3.9 of this Technical Report. As described in Sections 14 through 28 of this Technical Report, these same pollutants in the discharges have accumulated in San Diego Bay sediment adjacent to the BAE facility in concentrations that:

1. Adversely affect the beneficial uses of San Diego Bay as described in later sections of this Technical Report;

2. Cause pollution, contamination, or nuisance[35] conditions in San Diego Bay; and

3. Degrade marine communities, cause adverse effects on the environment or the public health, or result in harmful concentrations of pollutants in marine sediment.

The Porter-Cologne Water Quality Act defines "pollution" is defined as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects … the waters for beneficial uses …."[36] "Contamination" is defined as "an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."[37]

Accordingly it is concluded that BAE Systems has caused or permitted the discharge of waste to San Diego Bay in a manner causing the creation of pollution or nuisance conditions and that it is appropriate for the San Diego Water Board to issue a cleanup and abatement order naming BAE Systems as a discharger pursuant to Water Code section 13304.

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[35] BAE System's discharge of pollutants at the Shipyard Sediment Site has created or threatens to create a condition of nuisance in waters of the State. The discharges have caused or contributed to the accumulation of pollutants in the sediment in concentrations that are potentially injurious to the public health and affects a considerable number of persons as provided in Water Code section 13050(m).

[36] Water Code section 13050(1).

[37] Water Code section 13050(k).

Further discussion on pollution, contamination, and nuisance are available in Sections 1.4 and 1.5 of this Technical Report.

3.5. NPDES Requirement Regulation

Waste discharges from the BAE Systems facility have historically been regulated under Waste Discharge Requirements (WDRs) prescribed by the San Diego Water Board pursuant to CWA section 402 and Water Code section 13376. These requirements are referred to as either NPDES requirements[38] or by the federal terminology "NPDES Permit." BAE Systems' first NPDES requirements started in 1979, when the San Diego Water Board issued WDRs to regulate specific shipyard activities (hereafter referred to as Shipyard NPDES Permit). A listing of the NPDES requirements adopted by the San Diego Water Board in effect at the time the facility was owned and operated by Southwest Marine, Inc., and its successor, BAE Systems, is provided in Table 3-2 below.

Table 3-2 Southwest Marine/BAE Systems NPDES Permits

Order Number/ NPDES No.	Order Title	Adoption Date	Expiration Date
Order No. 79-74, NPDES No. CA0107697	Waste Discharge Requirements For Southwest Marine, Inc.	November 26, 1979	April 18, 1983
Order No. 83-11, NPDES No. CA0107697	Waste Discharge Requirements and Monitoring And Reporting Program For Southwest Marine, Inc. County Of San Diego	April 18, 1983	October 15, 1997
Order No. 97-36, NPDES No. CAG039001	Waste Discharge Requirements and Monitoring And Reporting Program For Discharges From Ship Construction, Modification, Repair, And Maintenance Facilities And Activities Located In The San Diego Region (TTWQ/CPLX 1A)	October 15, 1997	November 13, 2002
Order No. R9-2002-0161 NPDES No. CA0109151	Waste Discharge Requirements For Southwest Marine, Inc. San Diego County	November 13, 2002	June 10, 2009
Order No. R9-2009-0080 NPDES No. CA0109151	Waste Discharge Requirements, BAE Systems San Diego Ship Repair Inc., Discharge to the San Diego Bay	June 10, 2009	Present

[38] Pursuant to Chapter 5.5 of the Porter-Cologne Water Quality Act, to avoid the issuance by the United States Environmental Protection Agency of separate and duplicative NPDES permits for discharges in California that would be subject to the Clean Water Act, the State's Waste Discharge Requirements (WDRs) for such discharges implement the NPDES regulations and entail enforcement provisions that reflect the penalties imposed by the Clean Water Act for violation of NPDES permits issued by the U.S. EPA. Thus, the State's WDRs that implement federal NPDES regulations (NPDES requirements) serve in lieu of NPDES permits.

Pursuant to the NPDES requirements cited above, SWM and its successor BAE Systems were required to develop and implement "Best Management Practices"[39] (BMPs) plans to limit discharges of pollutants into San Diego Bay. As described in the current NPDES requirements, R9-2009-0080, BMPs may be "structural" (e.g., overhead coverage, retention ponds, control devices, secondary containment structures, and treatment) or "non-structural" (e.g., good housekeeping, preventive maintenance, material handling and storage, spill and leak response, onsite personnel training, waste handling/recycling, recordkeeping and internal reporting, erosion control and site stabilization, inspections, and quality assurance). Beginning in 1997 numerical effluent limitations for oil and grease, settleable solids, turbidity, pH, and temperature were established in the NPDES requirements for certain discharges (e.g. Non-Contact Cooling Water; Miscellaneous Low Volume Water, and Fire Protection Water).

In 1992, BAE Systems obtained coverage under the State Water Board's 1991 General Industrial NPDES Requirements for storm water discharges. These NPDES requirements supplemented BAE Systems NPDES requirements listed in Table 3-2. The industrial storm water NPDES requirements applied specifically to discharges of pollutants through storm water, while the NPDES requirements listed in Table 3-2 applied to other discharges. A listing of the General Industrial NPDES Requirements for storm water discharges adopted by the State Water Board in effect at the time the facility was owned and operated by Southwest Marine, Inc. and its successor, BAE Systems, is provided in Table 3-3 below.

Table 3-3 Southwest Marine/BAE Systems NPDES Permits

Order Number/ NPDES No.	Order Title	Adoption Date	Expiration Date
Order No. 91-13-DWQ, Industrial NPDES No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	(Notice of Intent Filed) November 4, 1992	(Notice of Termination Approved) June 31, 1999
Order No. 97-03-DWQ, Industrial NPDES No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	(Notice of Intent Filed) June 31, 1999	(Notice of Termination Approved) July 29, 1999

The General Industrial NPDES Requirements for storm water discharges required BAE Systems to develop and implement plans to limit its discharges of pollutants from storm water runoff into San Diego Bay. Rather than relying on specific numerical effluent limitations, the NPDES requirements directed BAE Systems to create and follow "Best Management Practices" (BMPs). The General Industrial NPDES Requirements for storm water discharges also required BAE Systems to develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and a Storm Water Pollution Monitoring Plan (SWPMP). The requirements specified that the SWPPP be required to include, among other things, the following:

[39] Best management practices ("BMPs") means schedules of activities, prohibitions of maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

- Descriptions of sources that might add significant quantities of pollutants to storm water discharges;
- A detailed site map;
- Descriptions of materials that had been treated, stored, spilled, disposed of, or leaked into storm water discharges since November 1988;
- Descriptions of the management practices that were employed to minimize contact between storm water and pollutants from vehicles, equipment, and materials;
- Descriptions of existing structural and non-structural measures to reduce pollutants in storm water discharges;
- Descriptions of methods of on-site storage and disposal of significant materials;
- Descriptions of outdoor storage, manufacturing, and processing activities;
- A list of pollutants likely to be present in significant quantities in storm water discharges and an estimate of the annual amounts of those pollutants in storm water discharge;
- Records of significant leaks or spills of toxic or hazardous pollutants to storm water;
- Summary of existing data describing pollutants in storm water discharge;
- Descriptions of storm water management controls, including good housekeeping procedures, preventive maintenance, and measures to control and treat polluted storm water; and
- A list of the specific individuals responsible for developing and implementing the SWPPP.

3.5.2. Order No. 79-74, Shipyard NPDES Permit No. CA0107697

Order No. 79-74, Shipyard NPDES Permit No. CA0107697 was in effect from November 26, 1979 to April 18, 1983, and contained the following requirement that relates to the discussions contained herein:

- B. PROVISIONS … 3. The discharger shall comply with Monitoring and Reporting Program No. 79-74 as contained in this Order or as modified by the Executive Officer. Within 30 days of the adoption of this Order, the discharger shall submit, in writing, the name of the person authorized to sign the monitoring reports in accordance with the attached "General Monitoring and Reporting Provisions." In accord with the provisions of section 13267(b) of the Water Code, the monitoring reports shall be submitted under penalty of perjury.

3.5.3. Order No. 83-11, Shipyard NPDES Permit No. CA0107697

Order No. 83-11, Shipyard NPDES Permit No. CA0107697 was in effect from April 18, 1983 to October 15, 1997, and contained the following requirements that relate to the discussions contained herein:

- A. PROHIBITIONS … 2. The deposition or discharge of refuse, rubbish, materials of petroleum origin, spent abrasives (including old primer and antifouling paint), paint, paint chips, or marine fouling organisms into San Diego Bay or at any place where they would be eventually transported to San Diego Bay is prohibited;

- B. DISCHARGE SPECIFICATIONS … 2. Effluent discharged to San Diego Bay must be essentially free of: (a) Material that is floatable or will become floatable upon discharge. (b) Settleable material or substances that form sediments which degrade benthic communities or other aquatic life. (c) Substances toxic to marine life due to increases in concentrations in marine waters or sediments;

- B. DISCHARGE SPECIFICATIONS … 3. The discharger shall comply with the Water Pollution Control Plan described in Finding No. 9. Any proposed amendment to the Water Pollution Control Plan must be approved in writing by the Executive Officer.

  Finding 9 states the following: The Water Pollution Control Plan by BAE Systems identifies the following measures to be taken for the control of pollutants: A. Demolition Activities (1) Quay wall (a) Structures will be removed from the land and debris removed to an approved disposal site as it accumulates. (b) Excavation behind the existing quay wall will be done before the sheet piles are pulled. The sheet piles will act as a curtain to prevent debris resulting from demolition activities from entering the bay. (c) Excavation material not to be replaced and compacted will be removed from the site. Thus, excavation material will not be available to be carried into the bay by any rain runoff. (2) Buildings (a) Buildings will be emptied of all furnishings prior to demolition. (b) Building debris and concrete foundations will be removed from the yard as demolition proceeds. (3) Piers (a) Piers will be cleared of debris and broom-cleaned prior to deck demolition. (b) Pier decks will be removed by SWM. No deck material will be dumped into the bay. (c) Piles will be pulled and disposed of on land. B. Construction Activities (1) Pier Replacement (a) Piles will be precast off the yard with no surplus concrete allowed within the construction area. (b) Care will be taken while casting pile caps and cast-in-place sections of the deck to prevent spillage into the bay. (c) Extensive use of precast deck will be made to minimize the pouring of concrete over the water. (d) Deck fittings and utility anchorages will use either bolt-through-connections or cast-in-place anchors. No coring or drilling for anchors will be done. This will eliminate concrete chips and dust. (2) Quay wall (a) Sheet piling will be driven prior to any backfilling to prevent fill materials from entering the bay. (b) Care will be taken while pouring the quay wall pile cap to prevent concrete spillage into bay. (c) After compaction and grading, exposed areas will be protected with Asphaltic Concrete paving to prevent soil from entering the bay. (3) Shore Improvements (a)

Excavation for foundations will be minimized. Excavation material will be removed by the Contractor as work progresses in order to prevent their materials from entering the bay. (b) Slopes will be protected from runoff by Asphaltic Concrete paving. (4) Miscellaneous (a) All parking lots will, as part of their improvement, be paved. (b) Concrete spillage will be removed by the contractor. Concrete delivered in excess of that required for a given pour will not be disposed of on the yard. C. Marine Railways (1) Sump areas and waste dams will be cleaned out manually. Cleaning will be done as necessary when a ship is being worked on. (2) Work areas adjacent to the railways will be swept broom-clean as necessary when a ship is being worked on. (3) Material removed from sump areas, and dams will be removed by truck by a contract waste removal service or by BAE Systems. D. Dry docks (1) Sandblast curtains will be rigged prior to conducting sandblasting. (2) After work is complete and prior to dry dock flooding, the dry dock floor will be swept broom-clean. (3) The waste (usually sandblast grit, trash, scale, rust, paint chips, and removed marine organisms) will be transferred to trucks and removed by a contract waste removal service or BAE Systems and disposed of at a dumpsite approved by the San Diego Water Board Executive Officer. E. Piers (1) Separate containers for trash, garbage, and metal scrap are located on all piers. (2) Piers will be swept broom-clean, as necessary. F. Transfer Platforms (1) Shore platforms, transfer carriages, and work areas adjacent to the platforms will be swept broom-clean as necessary when a ship is being worked on. (2) Sandblast curtains will be rigged prior to conducting sandblasting. (3) Waste (usually sandblast grit, trash, scale, rust, paint chips, and removed marine organisms) will be transferred to trucks and removed by a contract waste removal service or BAE Systems and disposed of at a dumpsite approved by the San Diego Water Board Executive Officer. G. Open Work Areas (1) Open work areas will be swept broom-clean as necessary. (2) Containers for waste are located at all open work areas. H. Accidental Spills Accidental spills could result in the release of oil, fuel, coolants, paint, and sandblast material. Emergency response procedures for liquid spills on land or on water are contracted with Cleaning Dynamics Corporation (approximately three blocks from BAE Systems). Minor liquid spills on land and sandblast material spills would be cleaned by BAE Systems;

- C. RECEIVING WATER LIMITATIONS. BAE Systems discharge shall not cause violation of the following water quality objectives in San Diego Bay: "…5. Toxicity (a) All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life…;" and

- Prohibitions in the Basin Plan were also applicable to Order No. 83-11, NPDES Permit No. CA0107697 and were summarized in Finding 15 as follows: The Basin Plan established the following prohibitions which are applicable to the discharge:

  "The dumping or deposition from shore or from vessels of oil, garbage, trash or other solid municipal, industrial or agricultural waste directly into waters subject to tidal action or adjacent to waters subject to tidal action in any manner which may permit it to be washed into the waters subject to tidal action is prohibited.

"The discharge of municipal and industrial waste sludge and sludge digester supernatant directly to the ocean or into a waste stream that discharges to the ocean without further treatment, is prohibited.

"The discharge of sewage from shore or vessels into the waters of San Diego Bay, Mission Bay, or small boat harbors is prohibited.

"Discharge of industrial wastewaters exclusive of cooling water, clear brine or other waters which are essentially chemically unchanged, into waters subject to tidal action is prohibited.

"The dumping or deposition of chemical wastes, chemical agents or explosives into waters subject to tidal action is prohibited."

3.5.4. Order No. 97-36, Shipyard NPDES Permit No. CAG039001

Order No. 97-36, Shipyard NPDES Permit No. CAG039001, was in effect from October 15, 1997 to November 13, 2002 and contained the following requirements that relate to the discussions contained herein:

- A. PROHIBITIONS … 2. The discharge of sewage (except as noted in the Basin Plan Waste Discharge Prohibitions) to San Diego Bay is prohibited;

- A. PROHIBITIONS … 5. The discharge of rubbish, refuse, debris, materials of petroleum origin (other than ship launch grease / wax) waste zinc plates, abrasives, primer, paint, paint chips, solvents, and marine fouling organisms, and the deposition of such wastes at any place where they could eventually be discharged is prohibited. This pollution does not apply to the discharge of marine fouling organisms removed from unpainted, uncoated surfaces by underwater operations (see Prohibition 11). (Rubbish and refuse include any cans, bottles, paper, plastic, vegetable matter, or dead animals or dead fish deposited or caused to be deposited by man.);

- A. PROHIBITIONS … 8. Discharges of wastes and pollutants identified in Finding 2.a.i through 2.a.ix of this Order are prohibited. Discharges of wastes and pollutants not specifically identified in Finding 2.b through 2.e of this Order are prohibited.

  Finding 2 states the following: "FINDING 2. a. Ship construction, modification, repair, and maintenance activities result or have the potential to result in discharges to San Diego Bay of wastes and pollutants which are likely to cause or threaten to cause pollution, contamination, or nuisance; adversely impact human health or the environment; cause or contribute to violation of an applicable water quality objective; and/or otherwise adversely affect the quality and/or beneficial uses of waters of the state and waters of the United States. Such discharges include: i. water contaminated with abrasive blast materials, paint, oils, fuels, lubricants, solvents, or petroleum; ii. hydroblast water; iii. tank cleaning water from tank cleaning to remove sludge and/or dirt; iv. clarified water from oil/water separation; v. steam cleaning water; vi. demineralizer / reverse osmosis brine; vii. floating dry dock sump water when the dry dock is in use as a work area or when the dry dock is not in use as a work area but before the sump has been purged following such use; viii. oily bilge water; ix. contaminated ballast water; and x. the first flush of storm water runoff from high risk areas. b. Ship construction, modification, repair, and maintenance activities also result or have the potential to result in discharges to San Diego Bay of wastes and pollutants which pose less threat than those identified in Finding 2.a above. Such discharge included: i. vessel washdown water; ii. floating dry dock submergence/emergence water; iii. graving dock flood water; iv. graving dock sump pump test water; v. shipbuilding ways flood water; vi. floating dry dock sump water when the dry dock is not in use as a work area after the sump has been purged following such use; vii. pipe and tank hydrostatic test water; viii. graving dock gate and wall leakage water; ix. shipbuilding ways gate and wall leakage and hydrostatic relief water; x. miscellaneous low-volume water; and xi. storm water runoff other than the first flush of storm water runoff from high risk areas.;"

- B. DISCHARGE SPECIFICATIONS … 5. Waste discharged shall be essentially free of: "…b. Settleable material or substances that may form sediments which will degrade benthic communities or other aquatic life. c. Substances which will accumulate to toxic levels in marine waters, sediments, or biota. …;" and

- C. RECEIVING WATER LIMITATIONS. Discharges shall not cause or contribute to violation of the following receiving water limitations: 1. There shall be no adverse impact on human health or the environment. 2. There shall be no impairment of any beneficial use or violations of the applicable Basin Plan Water Quality Objectives (Attachment C) or any applicable state Water Quality Control Plan or Policy. 3. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded. 4. Natural light shall not be significantly reduced as the result of the discharge of waste. 5. The rate of deposition of inert solids and the characteristics of inert solids in sediments shall not be changed such that benthic communities are degraded. 6. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions. 7. The concentration of substances in marine sediments shall not be increased to levels that would degrade indigenous biota. 8. The concentration of organic materials in sediment shall not be increased to levels that would degrade marine life. 9. Substances shall not be present in the water column, sediments, or biota at concentrations that adversely affect beneficial uses or which will bioaccumulate to levels that are harmful to aquatic organisms, wildlife, or human health. 10. The daily maximum chronic toxicity of waters of the United States shall not exceed 1 Toxic Unit Chronic (TUc), as determined using a standard test species and protocol approved by the Executive Officer.

3.5.5. Order No. R9-2002-0161, Shipyard NPDES Permit No. CA0109151

Order No. R9-2002-0161, Shipyard NPDES Permit No. CA0109151, in effect from November 13, 2002 to present, contains the following requirements that relate to the discussions contained herein:

- A. PROHIBITIONS … 6. The discharge of rubbish, refuse, debris, materials of petroleum origin, waste zinc plates, abrasives, primer, paint, paint chips, solvents, and marine fouling organisms, and the deposition of such wastes at any place where they could eventually be discharged is prohibited. This prohibition does not apply to the discharge of marine fouling organisms removed from unpainted, uncoated surfaces by underwater operations and discharges that result from cleaning of floating booms that were installed for 'Force Protection' purposes (see Prohibition 10). (Rubbish and refuse include any cans, bottles, paper, plastic, vegetable matter, or dead animals deposited or caused to be deposited by man.);

- A. PROHIBITIONS … 8. The discharge or bypassing of untreated waste to San Diego Bay is prohibited. (This prohibition does not apply to non-contact cooling water, miscellaneous low volume water, and fire protection water streams which comply with the requirements of this Order for elevated temperature waste discharges and which do not contain pollutants or waste other than heat.) ; and

- B. DISCHARGE SPECIFICATIONS … 4. The following acute toxicity effluent limit applies to Undiluted storm water discharges to San Diego Bay, that are associated with industrial activity: Acute toxicity: In a 96-hour static or continuous flow bioassay test, the discharge shall not produce less than 90 percent survival, 50 percent of the time, and not less than 70 percent survival, 10 percent of the time, using a standard test species and protocol approved by the San Diego Water Board.

- B. DISCHARGE SPECIFICATIONS … 9. Waste discharges shall be essentially free of: b. Settleable material or substances that may form sediments which will degrade benthic communities or other aquatic life. c. Substances which will accumulate to toxic levels in marine waters, sediments, or biota; and

- C. RECEIVING WATER LIMITATIONS. Discharges shall not cause or contribute to violation of the following receiving water limitations: 1. There shall be no adverse impact on human health or the environment. 2. There shall be no impairment of any beneficial use or violations of the applicable Basin Plan Water Quality Objectives (Attachment C) or any applicable state Water Quality Control Plan or Policy. 3. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded. 4. Natural light shall not be significantly reduced as the result of the discharge of waste. 5. The rate of deposition of inert solids and the characteristics of inert solids in sediments shall not be changed such that benthic communities are degraded. 6. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions. 7. The concentration of substances in marine sediments shall not be increased to levels that would degrade indigenous biota. 8. The concentration of organic materials in sediment shall not be increased to levels that would degrade marine life. 9. Substances shall not be present in the water column, sediments, or biota at concentrations that adversely affect beneficial uses or which will bioaccumulate to levels that are harmful to aquatic organisms, wildlife, or human health.

3.5.6. Order No. 91-13-DWQ, NPDES Permit No. CAS000001, General Industrial NPDES Requirements for Storm Water Discharges

Order No. 91-13-DWQ, NPDES Permit No. CAS000001, in effect from November 4, 1992 to February 5, 1998 contained the following key narrative limitations that relate to the discussions contained herein:

- A. DISCHARGE PROHIBITIONS: … 3. Storm water discharges shall not cause or threaten to cause pollution, contamination, or nuisance; and
- B. RECEIVING WATER LIMITATIONS. … 1. Storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

3.6. BAE Systems' Waste Discharges

BAE Systems has discharged or deposited waste where it was discharged into San Diego Bay creating, or threatening to create, a condition of pollution or nuisance.

BAE Systems discharges are documented in the San Diego Water Board records via discharger monitoring and spill reports (filed by BAE Systems predecessor Southwest Marine), citizen complaints, San Diego Water Board inspection reports, and San Diego Water Board Notices of Violation issued to BAE Systems. These discharges are itemized in Tables 3-4 through 3-7, below.

Table 3-4 BAE Systems' Discharges from 1979 to 1983

Date	Description	Technical Report Reference[1]	Source	Citation[2]
April 16, 1981	Dumping spent abrasive grit waste to a landfill without prior approval of San Diego Water Board Executive Officer.	Section 3.4	Notice of Violation	Order No. 79-74, B. Provisions 3

1. Reference to Section 3.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 3.4.
2. The cited waste discharge requirement(s) can be found in Section 3.5 of this Technical Report.

Table 3-5 BAE Systems' Discharges from 1983 to 1997

Date	Description	Technical Report Reference[1]	Source	Citation[2]
February 25, 1986	Discharge of turbid runoff water to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
October 30, 1986	Discharge of cooling water carrying sand and other floatables to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
May 5, 1987	Elevated levels of zinc, copper and chromium in blast grit discharge sampled during 3/18/1987 RWQCB inspections.	Section 3.4	Notice of Violation	Order No. 83-11, A. Prohibitions 2 and B. Discharge Specifications 2
March 2, 1988	Discharge of abrasive blast waste to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
October 26, 1988	Discharge of steam cleaning waste to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
November 9, 1988	Discharge of abrasive blast waste and sewage to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
November 15, 1988	Discharge of abrasive blast waste and sewage to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
November 23, 1988	Discharge of sewage to San Diego Bay.	Section 3.4	Spill Report	Order No. 83-11, A. Prohibitions 2
February 27, 1989	Sample collected near marine railway contained hazardous levels of copper (6,690 mg/kg) and zinc (5,010 mg/kg) found in area where it could be washed in to San Diego Bay due to storm runoff.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
May 31, 1989	Discharge of abrasive blast waste from Marine Railway to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
August 14, 1989	Discharge of abrasive blast waste from large floating dry dock to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
August 15, 1989	Discharge of abrasive blast waste from small floating dry dock to San Diego Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
August 16, 1989	Discharge of abrasive blast waste from small floating dry dock to San Diego Bay. Sample contained 3,635 mg/kg copper.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
August 17, 1989	Discharge of 10 to 20 gallons of diesel to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
October 12, 1989	Discharge approximately 1 gallon of paint overspray to San Diego Bay.	Section 3.4	Spill Report/ Complaint	Order No. 83-11, A. Prohibitions 2
November 15, 1989	Discharge of sewage overflow to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
December 8, 1989	Discharge 5 gallons of paint to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
December 8, 1989	Discharge 5 gallons of solvent to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2

Date	Description	Technical Report Reference[1]	Source	Citation[2]
December 8, 1989	50 gallons of oil spilled. Unknown quantity discharged into the storm drain and to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
December 12, 1990	Discharge of small amount of oil to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
January 7, 1991	Discharge of abrasive blast and paint waste to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
January 8, 1991	Discharge of 15 gallons of bilge waste oil to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
February 1, 1991	Discharge of 1 gallon of a mixture of oily and soapy liquid to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
June 18, 1992	Deposit of abrasive blast waste where it will probably be discharged to Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, B. Discharge Specifications 3/ Finding 9
June 18, 1992	Deposit of sand and grit waste where it will probably be discharged to Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, B. Discharge Specifications 3/Finding 9
June 18, 1992	Anchor chain blasting barge without containment BMPs.	Section 3.4	RWQCB Inspection	Order No. 83-11, B. Discharge Specifications 3/Finding 9
June 18, 1992	Deposit of abrasive blast waste on marine railway where it will probably be discharged to Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2
October 20, 1992	Discharge of abrasive blast waste to San Diego Bay.	Section 3.4	Anonymous Spill Report	Order No. 83-11, A. Prohibitions 2
February 19, 1993	Discharge of 5 gallons of oil waste to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
March 18, 1993	Discharge of unknown quantity of oil to San Diego Bay	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
March 19, 1993	Discharge of 1 gallon of oil to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
September 15, 1993	Discharge of 30 to 50 gallons of lube oil to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
September 20, 1993	Discharge of 5 gallons of diesel fuel to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
November 17, 1993	Large hole on the anchor chain barge allowing blast grit to spread to open end of barge.	Section 3.4	RWQCB Inspection	Order No. 83-11, B. Discharge Specifications 3/Finding 9
October 13, 1994	Deposit of abrasive blast waste where it will probably be discharged to Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, A. Prohibitions 2

Date	Description	Technical Report Reference[1]	Source	Citation[2]
June 16, 1995	Deposit of debris and other substances in storm drains where it will probably be discharged to Bay.	Section 3.4	RWQCB Inspection	Order No. 83-11, B. Discharge Specifications 3/Finding 9
June 16, 1995	Sump needs cleaning of observed contaminated soil. Rain occurred the night before and discharge valve is open.	Section 3.4	RWQCB Inspection	Order No. 83-11, B. Discharge Specifications 3/Finding 9
September 29, 1996	Discharge of 3 gallons of oil to San Diego Bay.	Section 3.4	USCG Spill Report	Order No. 83-11, A. Prohibitions 2
February 18, 1997	Discharge of less than ½ gallon of CHT - sewage to Bay.	Section 3.4	BAE Spill Report	Order No. 83-11, Basin Plan Prohibitions / Finding 15
May 1, 1997	Discharge of abrasive blast waste to Bay.	Section 3.4	BAE Spill Report	Order No. 83-11, A. Prohibitions 2

1. Reference to Section 3.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 3.4.
2. The cited waste discharge requirement(s) can be found in Section 3.5 of this Technical Report.

Table 3-6 BAE Systems' Discharges from 1997 to 2002

Date	Description	Technical Report Reference[1]	Source	Citation[2]
March 17, 1998	Discharge of 20 ounces of Betadine solution to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
March 18, 1998	Discharge of unknown quantity of fuel to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
March 20, 1998	Discharge of less than 1 gallon of paint overspray to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
May 8, 1998	Discharge of 20 gallons of CHT – sewage to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 2
May 9, 1998	Discharge 60 gallons of hydroblast/ballast water to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
July 23, 1998	Discharge of 0.025 gallons of paint spray from ruptured hose to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
October 8, 1998	Discharge of 10 gallons of diesel/water mix to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
October 9, 1998	Discharge of ¼ gallon of diesel/water mix to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
November 25, 1998	Discharge of unknown quantity of dust film to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8

Date	Description	Technical Report Reference[1]	Source	Citation[2]
December 8, 1998	Discharge of a 50’ x 5’ film of dust to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
December 13, 1998	Discharge of a 75’ x 25’ film of abrasive blast waste dust to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
January 22, 1999	Discharge of approximately 15 gallons of basin wash down wastewater to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
March 10, 1999	Discharge of approximately 4,320 gallons of sewage to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 2
March 11, 1999	Discharge of approximately 1 gallon of diesel to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
March 26, 1999	Discharge of unknown quantity of sewage to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 2
March 26, 1999	Discharge of a 50’ x 50’ film of dust to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
March 30, 1999	Discharge of a 5’ x 5’ film of paint overspray to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
April 7, 1999	Discharge of a 2’ x 3’ film of paint overspray to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
April 8, 1999	Discharge of approximately 35 gallons of dry dock wash wastewater to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
April 12, 1999	Discharge of a 10’ x 30’ film of diesel to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
April 13, 1999	Discharge of less than 100 gallons of pressure wash waster to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
April 14, 1999	Discharge of ½ gallon of liquid degreaser to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
April 14, 1999	Discharge of a 10’ x 20’ film of paint overspray to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
April 22, 1999	Discharge of unknown quantity of petroleum product to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
April 28, 1999	Discharge of 2.5 gallons oily water to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
May 2, 1999	Discharge of less than 5 gallons diesel to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
May 7, 1999	Discharge of 1 gallon of petroleum product to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
May 13, 1999	Discharge of unknown quantity of a yellow petroleum substance to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
May 16, 1999	Discharge of an unknown quantity of dust and fine debris to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
May 28, 1999	Discharge of less than 0.25 gallons of hydraulic oil to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5

Date	Description	Technical Report Reference[1]	Source	Citation[2]
March 30, 1999	Discharge of 5’ x 5’ film of paint to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
June 1, 1999	Discharge of 1 gallon of pressure wash wastewater to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
August 5, 1999	Discharge of 5 gallons of diesel to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
October 5, 1999	Discharge of 1 gallon of diesel to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
October 8, 1999	Discharge of less than 10 gallons of diesel to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
February 20, 2000	Discharge of less than 5 gallons of CHT – sewage to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 2
April 6, 2000	Discharge of 200 gallons of CHT – sewage to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 2
April 28, 2000	Discharge of 200 gallons of CHT – sewage to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 2
May 1, 2000	Discharge of ½ gallon of water-based paint to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
September 22, 2000	Discharge of 50 gallons of JP -5 to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
October 29, 2000	Discharge of ½ ounce of diesel fuel to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
November 2, 2000	Discharge of a 5’x 8’ sheen of paint chips to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
November 20, 2000	Discharge of 5 gallons of abrasive blast waste to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
December 5, 2000	Discharge of less than one gallon of abrasive blast waste to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
December 11, 2000	Discharge of a 20’ x 20’ film of paint to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
December 12, 2000	Discharge of < 5 gallons abrasive blast waste to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
January 29, 2001	Discharge of ½ gallon of hydraulic fluid to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
April 2, 2001	Discharge of 3 to 5 gallons of unknown fuel product to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
April 26, 2001	Discharge of about 1 ounce of water, waste paint, and thinner to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
October 15, 2001	Discharge of 1,275 gallons of CHT – non-contact cooling water to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 2
October 16, 2001	Discharge of a 15’ x 10’ film of abrasive dust to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8

Date	Description	Technical Report Reference[1]	Source	Citation[2]
October 20, 2001	Discharge of less than 1 gallon of oil to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
November 2, 2001	Discharge 1 gallon of JP 5 to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
April 9, 2002	Discharge of 2 pints of engine oil to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 5
September 25, 2002	Discharge of less than 5 gallons of unknown liquid to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8
November 12, 2002	Discharge of less than 5 gallons of abrasive blast waste dust to Bay.	Section 3.4	BAE Spill Report	Order No. 97-36, A. Prohibitions 8

1. Reference to Section 3.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 3.4.
2. The cited waste discharge requirement(s) can be found in Section 3.5 of this Technical Report.

Table 3-7 BAE Systems' Discharges from 2002 to 2005

Date	Description	Technical Report Reference[1]	Source	Citation[2]
November 25, 2002	Discharge of approximately 5 gallons of AFFF (aqueous film forming foam) to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
January 6, 2003	Discharge less than 1 gallon of diesel to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
January 23, 2003	Discharge of 750 gallons of AFFF to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
January 24, 2003	Discharge of less than 1 gallon of diesel to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
March 4, 2003	Discharge of less than 1 gallon of diesel to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
March 13, 2003	Discharge of less than 1 gallon of oil to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
September 23, 2003	Discharge of 1 gallon of petroleum to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
October 1, 2003	Discharge of 1 cup of hydraulic oil to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6

Date	Description	Technical Report Reference[1]	Source	Citation[2]
October 3, 2003	Discharge of less than 1 gallon of hydraulic oil to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
October 9, 2003	Discharge of 10 gallons of mopping wastewater to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
October 17, 2003	Discharge of unknown quantity of oily product to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
October 29, 2003	Discharge of unknown quantity of oily product to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
November 4, 2003	Discharge of less than 1 gallon of water and grit to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
December 2, 2003	Discharge of more than 1000 gallons of dry dock wash down wastewater to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
December 16, 2003	Discharge of unknown quantity of ash to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
January 14, 2004	Discharge of unknown quantity of oil and particulates to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
January 19, 2004	Discharge of 10 gallons of soapy water to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
February 5, 2004	Discharge of a trickle of hydroblast wastewater to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
February 19, 2004	Discharge of 5 gallons of liquid from “flammable” marked bucket to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
February 25, 2004	Discharge of 100 gallons of rust colored water to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
March 19, 2004	Discharge of unknown quantity of dust to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
March 19, 2004	Discharge of less than 1 quart of DFM to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 8
May 12, 2004	Discharge of 10’ x 30’ overspray of paint to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6

Date	Description	Technical Report Reference[1]	Source	Citation[2]
May 21, 2004	Discharge of 2 lbs. of abrasive blast waste to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
September 9, 2004	Discharges of 10 gallons of soapy water and trickle of hydroblast water spilled to Bay on January 19, 2004 and February 5, 2004 (respectively).	Section 3.4	Notice of Violation	Order No. R9-2002-0161, A. Prohibitions 8
September 9, 2004	Discharges of 10' x 30 area of paint overspray and approximately two lbs. of abrasive blast waste dust spilled to Bay on May 12, 2004 and May 21, 2004 (respectively).	Section 3.4	Notice of Violation	Order No. R9-2002-0161, A. Prohibitions 6
December 7, 2004	Discharge of less than 1 ounce of petroleum product to Bay.	Section 3.4	BAE Spill Report	Order No. R9-2002-0161, A. Prohibitions 6
March 21, 2005	Discharge of 2,487 gallons of storm water spilled to Bay with 85% toxicity survival not meeting 90% toxicity survival on February 26, 2004.	Section 3.4	Notice of Violation	Order No. R9-2002-0161, B. Discharge Specifications 4

1. Reference to Section 3.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 3.4.
2. The cited waste discharge requirement(s) can be found in Section 3.5 of this Technical Report.

3.7. Storm Water Monitoring for Shipyard NPDES Requirements

Since 1983, BAE Systems' NPDES Permits have included Discharge Specifications and Receiving Water Limitations that have set a narrative limit on discharge pollutant concentrations with intent to reduce or eliminate toxic chemical concentrations in marine water, marine life, and sediment.

While operating under various Shipyard NPDES Permits, BAE Systems has discharged constituents at levels that are elevated compared to levels established by the CTR for saltwater.[40] The U.S. EPA finalized the CTR on May 18, 2000. None of the numerical values in CTR were included as numerical effluent limitations in any of the NPDES Permits issued to BAE Systems. However, the numerical values in the CTR represent the latest, most up-to-date numerical thresholds for use in determining whether a chemical concentration in a water body is detrimental to its beneficial uses. By comparing CTR values with pollutant levels in historical discharges, the San Diego Water Board is able to determine which discharges may have contributed to toxic chemical concentrations in marine water, marine life and sediment at the Shipyard Sediment Site in the past. Also, where there are historical discharges elevated above CTR values, there exists an elevated probability that those same discharges contributed to the

[40] The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

present condition of pollution. In retrospect, to the extent that those historical, elevated discharges did cause toxic chemical concentrations in marine water, marine life, and sediment, and/or did contribute to the present condition of pollution at the Shipyard Sediment Site, there exists an NPDES violation.

While BAE Systems' various Shipyard NPDES Requirements[41] did not provide specific numerical limitations for all possible chemicals, the San Diego Water Board did require that discharges from BAE not cause a violation of the key requirements, described in Section 3.5, above. Monitoring reports submitted by BAE Systems during the years 1987 through 1989, 2000, and 2002 through 2004 indicate that elevated levels of arsenic, cadmium, chromium, copper, lead, nickel, and zinc were present in storm water discharged from the BAE Systems site to San Diego Bay. Specific discharges are presented in Tables 3-8 through 3-10 below.

Table 3-8 Discharge Samples above CTR Values Occurring from 1983 to 1997

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 18, 1987	Arsenic	0.54 mg/L	0.036 mg/L	Section 3.4	Dry dock Sample	San Diego Water Board Sample Report	Order No. 83-11, B. Discharge Specifications 2 and C. Receiving Water Limitations 5(a)
March 18, 1987	Cadmium	0.05 mg/L	0.0093 mg/L	Section 3.4	Dry dock Sample	San Diego Water Board Sample Report	Order No. 83-11, B. Discharge Specifications 2 and C. Receiving Water Limitations 5(a)
March 18, 1987	Chromium	7.5 mg/L	0.05 mg/L	Section 3.4	Dry dock Sample	San Diego Water Board Sample Report	Order No. 83-11, B. Discharge Specifications 2 and C. Receiving Water Limitations 5(a)
March 18, 1987	Copper	85 mg/L	0.0031 mg/L	Section 3.4	Dry dock Sample	San Diego Water Board Sample Report	Order No. 83-11, B. Discharge Specifications 2 and C. Receiving Water Limitations 5(a)
March 18, 1987	Lead	1.8 mg/L	0.0081 mg/L	Section 3.4	Dry dock Sample	San Diego Water Board Sample Report	Order No. 83-11, B. Discharge Specifications 2 and C. Receiving Water Limitations 5(a)
March 18, 1987	Nickel	1.5 mg/L	0.0082 mg/L	Section 3.4	Dry dock Sample	San Diego Water Board Sample Report	Order No. 83-11, B. Discharge Specifications 2 and C. Receiving Water Limitations 5(a)

[41] Order No. 83-11, Shipyard NPDES No. CAO107697, Order No. 97-36, Shipyard NPDES Permit No. CAG039001, and Order No. R9-2002-0161, Shipyard NPDES Permit No. CA0109151

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 18, 1987	Zinc	2000 mg/L	0.081 mg/L	Section 3.4	Dry dock Sample	San Diego Water Board Sample Report	Order No. 83-11, B. Discharge Specifications 2 and C. Receiving Water Limitations 5(a)

1. 40 CFR 131.38
2. Reference to Section 3.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 3.4.
3. The cited waste discharge requirement(s) can be found in Section 3.5 of this Technical Report.

Table 3-9 Discharge Samples above CTR Values Occurring from 1997 to 2002

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 12, 2000	Copper	0.553 mg/L	0.0031 mg/L	Section 3.4	Storm Water Discharge Pier 1	Southwest Marine (SWM) Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
February 12, 2000	Copper	0.0955 mg/L	0.0031 mg/L	Section 3.4	Storm Water Discharge Pier 3	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
February 12, 2000	Lead	0.0384 mg/L	0.0081 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
February 12, 2000	Nickel	0.0189 mg/L	0.0082 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
February 12, 2000	Zinc	0.541 mg/L	0.081 mg/L	Section 3.4	Storm Water Discharge Pier 1	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 12, 2000	Zinc	0.0871 mg/L	0.081 mg/L	Section 3.4	Storm Water Discharge Pier 3	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
March 5, 2000	Copper	0.238 mg/L	0.0031 mg/L	Section 3.4	Storm Water Discharge Pier 3	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
March 5, 2000	Lead	0.015 mg/L	0.0081 mg/L	Section 3.4	Storm Water Discharge Pier 1	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
March 5, 2000	Zinc	0.333 mg/L	0.081 mg/L	Section 3.4	Storm Water Discharge Pier 3	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
March 26, 2002	Copper	0.014 mg/L	0.0031 mg/L	Section 3.4	Non-Contact Cooling Water	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10
March 26, 2002	Copper	0.017 mg/L	0.0031 mg/L	Section 3.4	Fire Protection Water	SWM Monitoring Report	Order No. 97-36, B. Discharge Specifications 5b and 5c, and C. Receiving Water Limitations 1 through 10

1. 40 CFR 131.38
2. Reference to Section 3.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 3.4.
3. The cited waste discharge requirement(s) can be found in Section 3.5 of this Technical Report.

Table 3-10 Discharge Samples above CTR Values Occurring from 2002 to 2004

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 27, 2002	Copper	0.0163 mg/L	0.0031 mg/L	Section 3.4	Building 13	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November 27, 2002	Copper	0.00934 mg/L	0.0031 mg/L	Section 3.4	Building 13	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
December 10, 2002	Copper	0.0153 mg/L	0.0031 mg/L	Section 3.4	Pier 1 Fire Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
December 10, 2002	Copper	0.00772 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
January 8, 2003	Copper	0.0159 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
January 10, 2003	Copper	0.0197 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 27, 2003	Copper	0.0104 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 27, 2003	Copper	0.0105 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 27, 2003	Copper	0.00947 mg/L	0.0031 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 27, 2003	Copper	0.00917 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 17, 2003	Copper	0.00835 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 17, 2003	Copper	0.00837 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 17, 2003	Copper	0.0066 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
March 17, 2003	Copper	0.00665 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 9, 2003	Copper	0.00954 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 9, 2003	Copper	0.00948 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
April 9, 2003	Copper	0.00673 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 9, 2003	Copper	0.00702 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 12, 2003	Copper	0.00853 mg/L	0.0031 mg/L	Section 3.4	Building 13 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 12, 2003	Copper	0.00759 mg/L	0.0031 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 12, 2003	Copper	0.00702 mg/L	0.0031 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 21, 2003	Copper	0.0097 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 21, 2003	Copper	0.00997 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 21, 2003	Copper	0.0252 mg/L	0.0031 mg/L	Section 3.4	Building 13 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
July 21, 2003	Copper	0.0254 mg/L	0.0031 mg/L	Section 3.4	Building 13 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 21, 2003	Copper	0.00849 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
July 21, 2003	Copper	0.00849 mg/L	0.0031 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
August 15, 2003	Copper	0.0113 mg/L	0.0031 mg/L	Section 3.4	Pier 1 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
August 15, 2003	Copper	0.0111 mg/L	0.0031 mg/L	Section 3.4	Pier 1 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
August 15, 2003	Copper	0.007 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
August 15, 2003	Copper	0.00593 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
October 17, 2003	Copper	0.00772 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
October 17, 2003	Copper	0.00985 mg/L	0.0031 mg/L	Section 3.4	Building 13 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November 19, 2003	Copper	0.00632 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
November 19, 2003	Copper	0.00737 mg/L	0.0031 mg/L	Section 3.4	Building 13 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
January 14, 2004	Copper	0.00922 mg/L	0.0031 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
January 14, 2004	Copper	0.00589 mg/L	0.0031 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
January 14, 2004	Copper	0.0126 mg/L	0.0031 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
January 14, 2004	Copper	0.00844 mg/L	0.0031 mg/L	Section 3.4	Storm Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
February 18, 2004	Copper	0.00781 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 18, 2004	Copper	0.00491 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 22, 2004	Copper	0.00847 mg/L	0.0031 mg/L	Section 3.4	Building 13 Cooling Water	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
April 22, 2004	Copper	0.00863 mg/L	0.0031 mg/L	Section 3.4	Building 13 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 14, 2004	Copper	0.00591 mg/L	0.0031 mg/L	Section 3.4	Pier 1 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 14, 2004	Copper	0.0243 mg/L	0.0031 mg/L	Section 3.4	Pier 3 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9
May 14, 2004	Copper	0.0318 mg/L	0.0031 mg/L	Section 3.4	Building 13 Fire Pump	SWM Monitoring Report	Order No. R9-2002-0161, B. Discharge Specifications 9b and 9c, and C. Receiving Water Limitations 1 through 9

1. 40 CFR 131.38
2. Reference to Section 3.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 3.4.
3. The cited waste discharge requirement(s) can be found in Section 3.5 of this Technical Report.

3.8. Storm Water Monitoring for General Industrial NPDES Requirements for Storm Water Discharges

Since 1992, BAE Systems' General Industrial NPDES Requirements for Storm Water Discharges have included Discharge Prohibitions and Receiving Water Limitations that have set a narrative limit on discharge pollutant concentrations with intent to reduce or eliminate toxic chemical concentrations in marine water, marine life, and sediment.

While subject to regulation under the General Industrial NPDES Requirements for Storm Water Discharges, BAE Systems discharged pollutants at levels that are elevated compared to levels established by the CTR for saltwater.[42] The U.S. EPA finalized the CTR on May 18, 2000. None of the numerical values in the CTR were included as numerical effluent limitations in any of the Industrial NPDES Requirements issued to BAE Systems. However, the numerical values in the CTR represent the latest, most up-to-date numerical thresholds for use in determining whether a chemical concentration in a water body is detrimental to its beneficial uses. By comparing CTR values with pollutant levels in historical discharges, the San Diego Water Board is able to determine which discharges may have contributed to toxic chemical concentrations in marine water, marine life and sediment at the Shipyard Sediment Site in the past. Also, where there are historical discharges elevated above CTR values, there exists an elevated probability that those same discharges contributed to the present condition of pollution. To the extent that those historical, elevated discharges did cause toxic chemical concentrations in marine water, marine life, and sediment, and/or did contribute to the present condition of pollution at the Shipyard Sediment Site, such discharges may have constituted an Industrial NPDES requirement violation.

While BAE Systems' Industrial NPDES Requirements did not provide specific numerical limitations for all possible chemicals, the San Diego Water Board did require that discharges from BAE Systems not cause a violation of discharge prohibitions and receiving water limitations described in Section 3.5.6, above. Monitoring reports submitted by BAE Systems during the years 1992 through 1993 and 1996 through 1999, pursuant to the General Industrial NPDES Requirements for storm water discharges, indicate that elevated levels of chromium, copper, lead, nickel, and zinc were present in storm water discharged from the BAE Systems site when compared to levels established by the CTR for saltwater. Specific discharge violations are cited in Table 3-11, below.

[42] The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

Table 3-11 Discharge Sample above CTR Value Occurring from 1992 to 1999

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
December 7, 1992	Chromium	0.34 mg/L	0.05 mg/L	Section 3.4	Unknown	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 7, 1992	Copper	0.37 mg/L	0.0031 mg/L	Section 3.4	Unknown	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 7, 1992	Lead	0.34 mg/L	0.0081 mg/L	Section 3.4	Unknown	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 7, 1992	Nickel	0.09 mg/L	0.0082 mg/L	Section 3.4	Unknown	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 7, 1992	Zinc	2.25 mg/L	0.081 mg/L	Section 3.4	Unknown	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Cadmium	0.01 mg/L	0.0093 mg/L	Section 3.4	Discharge Point #4	Southwest Marine (SWM) 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Chromium	0.22 mg/L	0.05 mg/L	Section 3.4	Discharge Point #1A	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Chromium	0.17 mg/L	0.05 mg/L	Section 3.4	Discharge Point #4	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Copper	1.97 mg/L	0.0031 mg/L	Section 3.4	Discharge Point #1A	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Copper	0.77 mg/L	0.0031 mg/L	Section 3.4	Discharge Point #4	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

January 25, 1993	Lead	0.28 mg/L	0.0081 mg/L	Section 3.4	Discharge Point #1A	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Lead	0.28 mg/L	0.0081 mg/L	Section 3.4	Discharge Point #4	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Nickel	0.04 mg/L	0.0082 mg/L	Section 3.4	Discharge Point #4	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Zinc	3.17 mg/L	0.081 mg/L	Section 3.4	Discharge Point #1A	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1993	Zinc	2.49 mg/L	0.081 mg/L	Section 3.4	Discharge Point #4	SWM 1992-1993 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 4, 1994	Chromium	0.07 mg/L	0.05 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 14, 1994	Chromium	0.07 mg/L	0.05 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 4, 1994	Copper	0.24 mg/L	0.0031 mg/L	Section 3.4	SW1	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 4, 1994	Copper	0.57 mg/L	0.0031 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 4, 1994	Lead	0.61 mg/L	0.0081 mg/L	Section 3.4	SW1	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 4, 1994	Lead	0.73 mg/L	0.0081 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

February 4, 1994	Nickel	0.02 mg/L	0.0082 mg/L	Section 3.4	SW1	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 4, 1994	Nickel	0.08 mg/L	0.0082 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 4, 1994	Zinc	2.75 mg/L	0.081 mg/L	Section 3.4	SW1	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 4, 1994	Zinc	3.4 mg/L	0.081 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 14, 1994	Copper	1.55 mg/L	0.0031 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 14, 1994	Copper	2.95 mg/L	0.0031 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 14, 1994	Nickel	0.17 mg/L	0.0082 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 14, 1994	Zinc	4.12 mg/L	0.081 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 14, 1994	Zinc	5.45 mg/L	0.081 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
April 19, 1995	Copper	1.26 mg/L	0.0031 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
April 19, 1995	Lead	0.24 mg/L	0.0081 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

April 19, 1995	Zinc	4.5 mg/L	0.081 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 22, 1996	Copper	0.97 mg/L	0.0031 mg/L	Section 3.4	SW6	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 22, 1996	Lead	0.33 mg/L	0.0081 mg/L	Section 3.4	SW6	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 22, 1996	Nickel	0.27 mg/L	0.0082 mg/L	Section 3.4	SW6	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 22, 1996	Zinc	3.55 mg/L	0.081 mg/L	Section 3.4	SW6	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 5, 1996	Copper	2.68 mg/L	0.0031 mg/L	Section 3.4	SW3	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 5, 1996	Lead	0.15 mg/L	0.0081 mg/L	Section 3.4	SW3	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 5, 1996	Nickel	0.21 mg/L	0.0082 mg/L	Section 3.4	SW3	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 5, 1996	Zinc	10.01 mg/L	0.081 mg/L	Section 3.4	SW3	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 13, 1996	Copper	0.41 mg/L	0.0031 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 13, 1996	Lead	0.21 mg/L	0.0081 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

March 13, 1996	Nickel	0.06 mg/L	0.0082 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 13, 1996	Zinc	1.22 mg/L	0.081 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
April 8, 1996	Copper	0.12 mg/L	0.0031 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
April 8, 1996	Lead	0.06 mg/L	0.0081 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
April 8, 1996	Nickel	0.07 mg/L	0.0082 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
April 8, 1996	Zinc	0.88 mg/L	0.081 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Chromium	0.31 mg/L	0.05 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Copper	0.12 mg/L	0.0031 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Copper	0.52 mg/L	0.0031 mg/L	Section 3.4	SW1	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Copper	7.6 mg/L	0.0031 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Copper	0.64 mg/L	0.0031 mg/L	Section 3.4	SW3	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

February 10, 1997	Copper	0.99 mg/L	0.0031 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Copper	1.2 mg/L	0.0031 mg/L	Section 3.4	SW6	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Lead	0.057 mg/L	0.0081 mg/L	Section 3.4	SW1	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Lead	1.4 mg/L	0.0081 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Lead	0.021 mg/L	0.0081 mg/L	Section 3.4	SW3	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Lead	0.019 mg/L	0.0081 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Lead	0.04 mg/L	0.0081 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Nickel	0.017 mg/L	0.0082 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Nickel	0.018 mg/L	0.0082 mg/L	Section 3.4	SW6	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Nickel	0.022 mg/L	0.0082 mg/L	Section 3.4	SW1	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Nickel	0.032 mg/L	0.0082 mg/L	Section 3.4	SW3	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

February 10, 1997	Nickel	0.042 mg/L	0.0082 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Nickel	0.083 mg/L	0.0082 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Zinc	0.38 mg/L	0.081 mg/L	Section 3.4	SW4	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Zinc	0.91 mg/L	0.081 mg/L	Section 3.4	SW1	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Zinc	1.4 mg/L	0.081 mg/L	Section 3.4	SW6	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Zinc	2.5 mg/L	0.081 mg/L	Section 3.4	SW3	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Zinc	3.4 mg/L	0.081 mg/L	Section 3.4	SW5	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 10, 1997	Zinc	6.5 mg/L	0.081 mg/L	Section 3.4	SW2	SWM 1996-1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 6, 1997	Copper	0.45 mg/L	0.0031 mg/L	Section 3.4	Pier 3	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 6, 1997	Copper	0.84 mg/L	0.0031 mg/L	Section 3.4	Pier 1	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 6, 1997	Lead	0.018 mg/L	0.0081 mg/L	Section 3.4	Pier 1	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

December 6, 1997	Lead	0.045 mg/L	0.0081 mg/L	Section 3.4	Pier 3	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 6, 1997	Nickel	0.3 mg/L	0.0082 mg/L	Section 3.4	Pier 1	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 6, 1997	Nickel	0.3 mg/L	0.0082 mg/L	Section 3.4	Pier 3	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 6, 1997	Zinc	2.95 mg/L	0.081 mg/L	Section 3.4	Pier 1	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
December 6, 1997	Zinc	0.64 mg/L	0.081 mg/L	Section 3.4	Pier 3	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 29, 1998	Copper	0.62 mg/L	0.0031 mg/L	Section 3.4	Pier 1	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 29, 1998	Copper	0.27 mg/L	0.0031 mg/L	Section 3.4	Pier 3	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 29, 1998	Lead	0.029 mg/L	0.0081 mg/L	Section 3.4	Pier 1	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 29, 1998	Lead	0.022 mg/L	0.0081 mg/L	Section 3.4	Pier 3	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 29, 1998	Nickel	0.2 mg/L	0.0082 mg/L	Section 3.4	Pier 1	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 29, 1998	Zinc	0.83 mg/L	0.081 mg/L	Section 3.4	Pier 1	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

January 29, 1998	Zinc	0.56 mg/L	0.081 mg/L	Section 3.4	Pier 3	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 3, 1998	Copper	0.2 mg/L	0.0031 mg/L	Section 3.4	SD3 & SD4	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 3, 1998	Copper	0.2 mg/L	0.0031 mg/L	Section 3.4	SD10	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 3, 1998	Copper	1.6 mg/L	0.0031 mg/L	Section 3.4	SW03	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 3, 1998	Lead	0.1 mg/L	0.0081 mg/L	Section 3.4	SW03	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 3, 1998	Zinc	3.0 mg/L	0.081 mg/L	Section 3.4	SW 03	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 3, 1998	Zinc	0.4 mg/L	0.081 mg/L	Section 3.4	SD3 & SD4	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 3, 1998	Zinc	0.6 mg/L	0.081 mg/L	Section 3.4	SD10	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 19, 1998	Copper	0.5 mg/L	0.0031 mg/L	Section 3.4	SW05	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 19, 1998	Copper	0.6 mg/L	0.0031 mg/L	Section 3.4	SW07	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
February 19, 1998	Zinc	1.1 mg/L	0.081 mg/L	Section 3.4	SW05	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

February 19, 1998	Zinc	1.8 mg/L	0.081 mg/L	Section 3.4	SW07	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 25, 1998	Copper	0.3 mg/L	0.0031 mg/L	Section 3.4	SW03	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 25, 1998	Copper	1.2 mg/L	0.0031 mg/L	Section 3.4	SD23	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 25, 1998	Lead	0.1 mg/L	0.0081 mg/L	Section 3.4	SD23	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 25, 1998	Zinc	0.9 mg/L	0.081 mg/L	Section 3.4	SW03	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
March 25, 1998	Zinc	1.7 mg/L	0.081 mg/L	Section 3.4	SD23	SWM 1997-1998 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.35 mg/L	0.0031 mg/L	Section 3.4	SD1	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.67 mg/L	0.0031 mg/L	Section 3.4	SD3	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Copper	1.24 mg/L	0.0031 mg/L	Section 3.4	SD6	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Lead	0.027 mg/L	0.0081 mg/L	Section 3.4	SD1	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Lead	0.022 mg/L	0.0081 mg/L	Section 3.4	SD3	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

November 8, 1998	Lead	0.254 mg/L	0.0081 mg/L	Section 3.4	SD6	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Nickel	0.06 mg/L	0.0082 mg/L	Section 3.4	SD1	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Nickel	0.05 mg/L	0.0082 mg/L	Section 3.4	SD3	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Nickel	0.14 mg/L	0.0082 mg/L	Section 3.4	SD6	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Zinc	1.80 mg/L	0.081 mg/L	Section 3.4	SD1	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Zinc	2.14 mg/L	0.081 mg/L	Section 3.4	SD3	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
November 8, 1998	Zinc	2.82 mg/L	0.081 mg/L	Section 3.4	SD6	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1999	Copper	0.38 mg/L	0.0031 mg/L	Section 3.4	Stormdrain #2	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1999	Copper	0.44 mg/L	0.0031 mg/L	Section 3.4	Stormdrain #1	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1999	Lead	0.055 mg/L	0.0081 mg/L	Section 3.4	Stormdrain #2	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1999	Lead	0.126 mg/L	0.0081 mg/L	Section 3.4	Stormdrain #1	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

January 25, 1999	Nickel	0.06 mg/L	0.0082 mg/L	Section 3.4	Stormdrain #1	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1999	Nickel	0.05 mg/L	0.0082 mg/L	Section 3.4	Stormdrain #2	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1999	Zinc	1.41 mg/L	0.081 mg/L	Section 3.4	Stormdrain #1	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1
January 25, 1999	Zinc	1.53 mg/L	0.081 mg/L	Section 3.4	Stormdrain #2	SWM 1998-1999 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3, and B. Receiving Water Limitations 1

1. 40 CFR 131.38
2. Reference to Section 3.4 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 3.4.
3. The cited waste discharge requirement(s) can be found in Section 3.5 of this Technical Report.

3.9. Prior History of Enforcement Actions for Violations of NPDES Requirements

3.9.1. Administrative Civil Liability Orders

The San Diego Water Board issued Complaint No. 89-02 for Administrative Civil Liability against BAE Systems in 1989. Site inspections were performed on November 8, 1988 and November 15, 1988 following a citizen complaint. San Diego Water Board staff observed the discharge of abrasive grit waste and raw sewage to San Diego Bay on both occasions. The abrasive grit waste was sampled and analyzed and found to contain elevated concentrations of arsenic, chromium, lead, and zinc, and hazardous levels of copper. BAE Systems had not made an attempt to remove the sandblast grit. San Diego Water Board staff also observed improper disposal of abrasive grit waste during inspections in 1986, 1987, and earlier in the year of 1988. A civil liability fine was imposed on BAE Systems for $15,000.

In 2001, the San Diego Water Board issued Complaint No. 2001-138 Administrative Civil Liability to BAE Systems for violation of the storm water runoff requirements of its NPDES permit. Storm water runoff samples at two locations exceeded the levels established by General NPDES Order No. 97-36 for copper and zinc. A civil liability fine of $12,664 was imposed.

3.9.2. Court Findings and Judgments Against BAE Systems

On April 30, 1996, the Natural Resources Defense Council, Inc.; San Diego Baykeeper, Inc.; and Kenneth J. Moser (hereinafter referred to as Plaintiffs) brought CWA legal action in District

Court against BAE Systems claiming the facility was violating its NPDES requirements by discharging unlawful amounts of pollutants into San Diego Bay and failing to prepare and implement environmental compliance and monitoring plans required by CWA.

On September 7, 1999, the United States District Court, San Diego, California issued its findings of fact and conclusions of law. The court found: (1) that Plaintiffs had presented “convincing evidence” that Defendant had not made the required inspections that it claimed to have made; (2) that, even accepting BAE Systems’ statement that it had made the required inspections, BAE Systems had not maintained adequate records of those inspections, with the result that a large number of inspection reports were missing; (3) that the reports that BAE Systems had provided demonstrated a pattern of poor housekeeping at BAE Systems’ facility and showed that violations, when reported, were not always remedied in a timely manner; (4) that BAE Systems’ inadequate implementation of its plans had led to “significant contributions of pollutants to BAE Systems’ leasehold;” (5) that BAE Systems’ leasehold within the Bay was “devoid of life;” (6) that the evidence conclusively demonstrated that substantial quantities of pollutants from BAE Systems’ paint-blasting operations had entered San Diego Bay in BAE Systems’ storm water discharges; (7) that BAE Systems’ failure to implement its storm water plans adequately was contributing to and perpetuating the contamination of its marine leasehold; and (8) that the harm to BAE Systems’ leasehold “could be remedied by BAE Systems with improved practices.” Based on those findings, the court concluded: (1) that it had subject matter jurisdiction over the action; (2) that Plaintiffs had standing; (3) that BAE Systems had violated, and was continuing to violate, the relevant permits and plans; and (4) that BAE Systems’ failure to implement its plans adequately was the result of “systemic problems” and “overall inadequacies” in implementation, rather than mere “snapshots” of isolated violations.

The findings and ruling was appealed to the Ninth Circuit Court of Appeals where the Circuit Judge held that: (1) individual citizen and citizen groups had standing to enforce provisions of the CWA; (2) CWA notice was sufficiently specific; (3) finding as to ongoing nature of BAE Systems’ violations was not clearly erroneous; (4) injunctive relief granted by district court was consistent with, and complementary to, existing permit requirements, and was not abuse of discretion or usurpation of authority of executive branch; and (5) civil penalty of $799,000 was not excessive.

Finally, the findings and ruling was appealed to the United States Supreme Court via Petition for Writ of Certiorari where the appeal was denied.

3.10. Shipyard Industry-wide Historical Operational Practices

In November of 1997, the U.S. Environmental Protection Agency released a study titled “EPA Office of Compliance Sector Notebook Project: PROFILE OF SHIPBUILDING AND REPAIR INDUSTRY.” According to the 1995 Toxic Release Inventory (TRI) data, the reporting shipbuilding and repair facilities released and transferred 39 different TRI chemicals for a total of approximately 6.5 million pounds of pollutants during calendar year 1995. These releases and transfers were dominated by volatile organic compounds (VOCs) and metal-bearing wastes, approximately 52 percent and 48 percent respectively (U.S. EPA, 1997c).

Releases to the air, water, and land have accounted for 37 percent (2.4 million pounds) of the reporting shipbuilding and repair facilities' total reportable chemicals. Of these releases, over 98 percent were released to the air from fugitive (74.6 percent; 1,778,818 pounds) or point (24.1 percent; 574,097 pounds) sources, while approximately 1.2 percent (29,479 pounds), and were release directly to water (U.S. EPA, 1997c). However, a significant percentage of the total pollutants released as fugitive air or point air releases end up in the water, adding significantly to the 1.2 percent that is released directly to water.

VOCs accounted for about 86 percent of the reporting shipbuilding and repair facilities' reported TRI releases. Xylenes, n-butyl alcohol, toluene, methyl ethyl ketone, and methyl isobutyl ketone account for about 65 percent of the reporting shipbuilding and repair facilities' reported releases. These organic compounds are typically found in solvents that were used extensively by the industry in thinning paints and for cleaning and degreasing metal parts and equipment (U.S. EPA, 1997c).

The remainder of the releases was primarily metal-bearing wastes. Copper, zinc, and nickel-bearing wastes accounted for about 14 percent of the reporting shipbuilding and repair facilities' reported releases. These pollutants were released primarily as fugitive emissions during metal plating operations and as overspray in painting operations and could also have been released as fugitive dust emissions during blasting operations (U.S. EPA, 1997c).

4. Finding 4: City of San Diego

Finding 4 of CAO No. R9-2012-0024 states:

The San Diego Water Board finds that the City of San Diego caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance. From the early 1900s through February 1963, when the relevant tideland areas were transferred from the City of San Diego to the Port District, the City was the trustee of and leased to various operators, all relevant portions of the Shipyard Sediment Site. The wastes the City of San Diego caused or permitted to be discharged, or to be deposited where they were discharged into San Diego Bay through its ownership of the Shipyard Sediment Site contained metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), butyl tin species, PCBs, PCTs, PAHs, and TPH.

The City of San Diego also owns and operates a municipal separate storm sewer system (MS4) through which it discharges waste commonly found in urban runoff to San Diego Bay subject to the terms and conditions of a National Pollutant Discharge Elimination System (NPDES) Storm Water Permit. The San Diego Water Board finds that the City of San Diego has discharged urban storm water containing waste directly to San Diego Bay at the Shipyard Sediment Site. The waste includes metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), total suspended solids, sediment (due to anthropogenic activities), petroleum products, and synthetic organics (pesticides, herbicides, and PCBs) through its SW4 (located on the BAE Systems leasehold) and SW9 (located on the NASSCO leasehold) MS4 conduit pipes.

The San Diego Water Board finds that the City of San Diego has also discharged urban storm water containing waste through its MS4 to Chollas Creek resulting in the exceedances of chronic and acute California Toxics Rule copper, lead, and zinc criteria for the protection of aquatic life. Studies indicate that during storm events, storm water plumes toxic to marine life emanate from Chollas Creek up to 1.2 kilometers into San Diego Bay, and contribute to pollutant levels at the Shipyard Sediment Site. The urban storm water containing waste that has discharged from the on-site and off-site MS4 has contributed to the accumulation of pollutants in the marine sediments at the Shipyard Sediment Site to levels, that cause, and threaten to cause, conditions of pollution, contamination, and nuisance by exceeding applicable water quality objectives for toxic pollutants in San Diego Bay. Based on these considerations the City of San Diego is referred to as “Discharger(s)” in this CAO.

4.1. Jurisdiction

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person “who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirements ... or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance….”

For the reasons set forth below, the San Diego Water Board has determined that the City of San Diego should be named as a discharger in Cleanup and Abatement Order No. R9-2012-0024 pursuant to Water Code section 13304.

4.2. Admissible Evidence - State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996) the State Water Board adopted Resolution No. 92-49, *Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304.* Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under CWC section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;

2. Site characteristics and location in relation to other potential sources of a discharge;

3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;

4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;

5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;

6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;

7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;

8. Reports and complaints;

9. Other agencies' records of possible known discharge; and

10. Refusal or failure to respond to San Diego Water Board inquiries.

4.3. The City of San Diego Owns and Operates a Municipal Separate Storm Sewer System (MS4) Through Which It Discharges Urban Runoff

4.3.1. MS4 Description

The City of San Diego (City) owns and operates an MS4 conveyance through which it discharges urban runoff into waters of the United States within the San Diego Region. The City's MS4 conveys urban runoff from approximately 237 square miles of urbanized area and includes more than 39,000 storm drain structures and over 900 miles of storm drain pipes and channels.

The City of San Diego owns and operates the following MS4 storm drains which convey urban runoff from source areas upgradient of the Shipyard Sediment Site's property and discharge directly or indirectly into San Diego Bay within the NASSCO and BAE Systems leasehold:

- **City of San Diego, Chollas Creek MS4 Storm Drains**

  The City of San Diego owns and operates approximately 816 MS4 storm drain outfalls[43] which convey urban runoff into Chollas Creek, a tributary of San Diego Bay, upstream of the NASSCO and BAE Systems leaseholds. The City's MS4 urban runoff discharges into Chollas Creek contribute to the elevated pollutant concentrations found at the downstream Shipyard Sediment Site. The mouth of Chollas Creek is immediately adjacent to the southern boundary of the Shipyard Sediment Site. Available studies (Schiff, 2003, Katz et al., 2003; Chadwick et al., 1999) indicate that storm water plumes emanating from Chollas Creek outflow to San Diego Bay are toxic to marine life and introduce suspended solids, copper, zinc, and lead to the Shipyard Sediment Site through settling of particles.

- **City of San Diego MS4 Storm Drain SW4**

  The storm drain outfall identified as SW4 in the Shipyard Report (Exponent, 2003) enters BAE Systems leasehold with two contributing storm pipes located at the foot of Sampson and Sicard Streets. These pipes join together somewhere beneath BAE Systems' leasehold, ultimately discharging into San Diego Bay at the SW4 outfall located at a point between Piers 3 and Pier 4 on the BAE Systems leasehold[44] at the Shipyard Sediment site. This storm drain receives runoff from Sicard, Belt, and Sampson streets. Figure 4-1shows the storm drain outfalls at the BAE Systems' leasehold.

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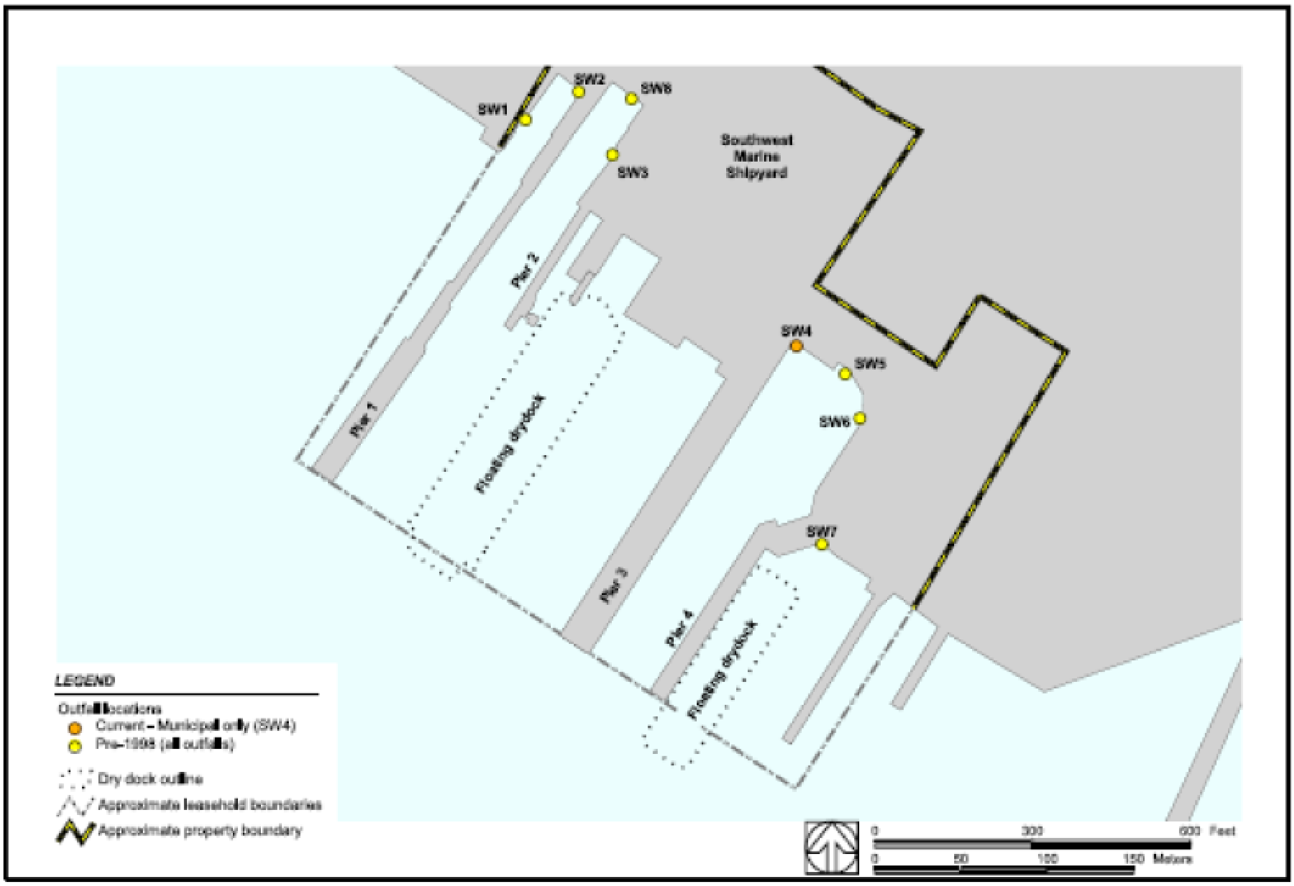
[43] Zirkle, Chris, Deputy Director, City of San Diego, 2006. Letter to John Robertus, Regional Board Executive Officer, regarding "Comments on the Total Maximum Daily Load for Indicator Bacteria, Project I- Beaches and Creeks in the San Diego Region." Page 9. February 3, 2006.

[44] A 1968 City of San Diego drainage easement figure shows a 42-inch storm drain, discharging into the Bay between Piers 3 and 4. No further information was provided by the City of San Diego concerning the SW4 outfall.

Figure 4-1 Storm Drain Outfalls at BAE Systems' Leasehold

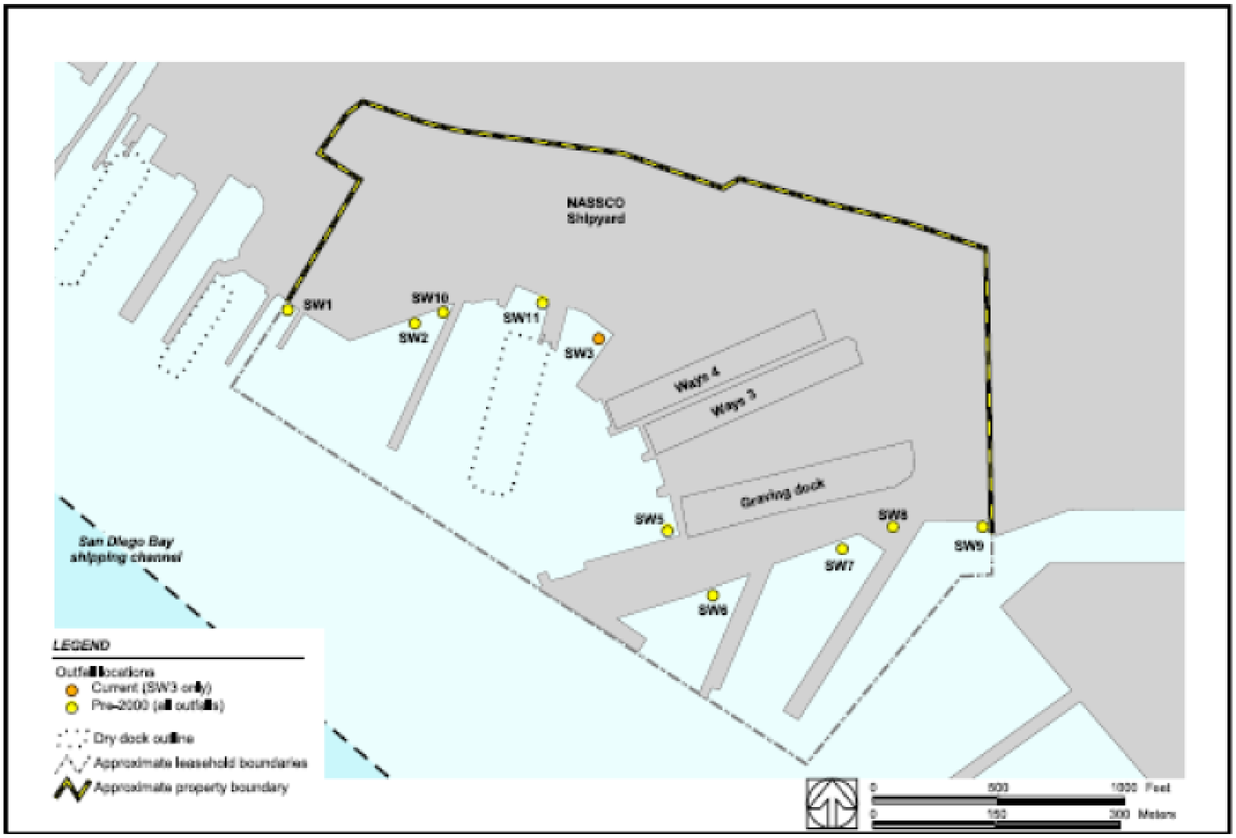


(Exponent, 2003)

- **City of San Diego MS4 Storm Drain SW9**

  This storm drain outfall is identified as SW9 in the Shipyard Report (Exponent, 2003) and enters NASSCO's leasehold at the foot of 28th Street and discharges at the southeasterly corner of the leasehold into Chollas Creek, a tributary of San Diego Bay. (Exponent, 2003; ENV America, 2004a; City of San Diego, 2004a) Storm Drain SW9 collects flow from 28th Street, and stretches from the I-5 freeway to the bay including parts of Belt Street and Harbor Drive. Figure 4-2 shows the storm drain outfalls at NASSCO's leasehold.

Figure 4-2 Storm Drain Outfalls at NASSCO's Leasehold



(Exponent, 2003)

4.3.2. Urban Runoff is a "Waste" and a "Point Source Discharge" of Pollutants

Urban runoff is a waste, as defined in the Water Code that contains pollutants and adversely affects the quality of the waters of the state.[45] The discharge of urban runoff from an MS4 conveyance is a "discharge of pollutants from a point source" into waters of the United States as defined in the CWA.[46]

The most common categories of pollutants in urban runoff include total suspended solids (TSS), sediment (due to anthropogenic activities), pathogens (e.g., bacteria, viruses, protozoa), heavy

[45] See Water Code Section 13050(d). Waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

[46] 40 CFR 122.2 defines "point source" as "any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any 'pollutant' or combination of pollutants to 'waters of the United States' from any point source."

metals (e.g., copper, lead, zinc, and cadmium), petroleum products and polynuclear aromatic hydrocarbons (PAHs and HPAHs), synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.[47]

4.4. The City of San Diego Discharged Waste to San Diego Bay

The City of San Diego has caused or permitted the discharge of urban storm water pollutants directly to San Diego Bay at the Shipyard Sediment Site. The pollutants include metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), TSS, sediment (due to anthropogenic activities), petroleum products, and synthetic organics (pesticides, herbicides, and PCBs) through its SW4 (located on the BAE Systems leasehold) and SW9 (located on the NASSCO leasehold) MS4 conduit pipes. The City of San Diego has also caused or permitted the discharge of these urban storm water pollutants through its MS4 conveyance to Chollas Creek resulting in the exceedances of chronic and acute CTR copper, lead, and zinc criteria for the protection of aquatic life.

Urban runoff discharges from the City of San Diego's MS4 are regulated under NPDES requirements prescribed by the San Diego Water Board pursuant to CWA section 402 and CWC section 13376. The City of San Diego must comply with all conditions of the NPDES requirements. Any noncompliance of NPDES requirements constitutes a violation of the CWA and CWC and is grounds for enforcement action, including the issuance of a cleanup and abatement order under the circumstances described in CWC section 13304. CWC section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides, in relevant part, that the San Diego Water Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirement…"

The City of San Diego's NPDES Permit requirement urban runoff discharges are documented in the San Diego Water Board records via monitoring reports (filed by the *San Diego County Municipal Copermittees*). The City of San Diego's urban runoff discharges are presented below in Section 4.7 of this Technical Report.

4.5. The City of San Diego Discharged Waste to San Diego Bay Creating Pollution, Contamination, and Nuisance Conditions in San Diego Bay

The City of San Diego has contributed to the accumulation of pollutants in marine sediment at the Shipyard Sediment Site by discharging urban storm water pollutants from MS4 discharges at levels, which cause, and threaten to cause, conditions of pollution, contamination, and nuisance by exceeding applicable water quality objectives for toxic pollutants in San Diego Bay. Water Code section 13304 requires that any person who causes any waste to be discharged, or

[47] Finding 7 of Order No.2001-001, NPDES No. CAS0108758, Waste Discharge Requirements For Discharges Of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego, the Incorporated Cities Of San Diego County, and the San Diego Unified Port District.

deposited where it probably will be discharged, into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance is subject to cleaning up or abating the effects of the waste.

The Porter-Cologne Water Quality Act defines "pollution" as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects … the waters for beneficial uses.…"[48] "Contamination" is defined as "an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."[49]

Pollutants conveyed and discharged by the MS4 conveyance include metals, TSS, sediment, petroleum products, pesticides, herbicides, and PCBs. Many of these same pollutants are present in marine sediment at the Shipyard Sediment Site in highly elevated concentrations as compared to sediment chemistry levels found at off-site reference stations located in areas of San Diego Bay.[50]

As stated above, since 1990 the City of San Diego's NPDES requirements have specifically prohibited urban runoff discharges that cause pollution, contamination or nuisance conditions in San Diego Bay or otherwise cause or contribute to violations of San Diego Bay water quality standards.

Based on the evidence presented in Section 4.7 of this Technical Report, the City of San Diego has a history of discharging pollutants from MS4 Storm Drains SW4, SW9, and Chollas Creek, to the Shipyard Sediment Site at levels that have contributed to a condition of pollution, contamination, or nuisance at the Shipyard Sediment Site. As described in Sections 14 through 28 of this Technical Report these same pollutants in the discharges have accumulated in San Diego Bay sediment at levels that may:

1. Adversely affect the beneficial uses of San Diego Bay, violating a NPDES requirement prohibitions pertaining to discharges that cause pollution, contamination, or nuisance conditions in San Diego Bay; and

2. Violate NPDES requirements pertaining to discharges that degrade marine communities, cause adverse effects on the environment or the public health, or result in harmful concentrations of pollutants in marine sediment.

Accordingly, it is concluded that the City of San Diego has caused or permitted the discharge of waste to San Diego Bay in a manner causing the creation of pollution or nuisance conditions and that it is appropriate for the San Diego Water Board to issue a cleanup and abatement order naming the City of San Diego as a discharger pursuant to Water Code section 13304.

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48 Water Code section 13050(1).

49 Water Code section 13050(k).

50 See Section 16 of this Technical Report.

4.6. NPDES Requirement Regulation

Urban runoff discharges from the City of San Diego's MS4 are regulated under NPDES requirements prescribed by the San Diego Water Board pursuant to CWA section 402 and Water Code section 13376. These requirements are referred to as either NPDES requirements[51] or by the federal terminology "NPDES Permit." The City of San Diego's first NPDES requirements started in 1990, when the San Diego Water Board issued WDRs for storm water and urban runoff. A listing of the successive NPDES requirements adopted by the San Diego Water Board to regulate the City of San Diego's MS4 Urban Runoff discharges is provided in Table 4-1 below.

Table 4-1 City of San Diego NPDES Permits

Order Number / NPDES No.	Order Title	Adoption Date	Expiration Date
Order No. 90-42 NPDES No. CA0108758	Waste Discharge Requirements For Storm water and Urban Runoff from the County of San Diego the Incorporated Cities of San Diego County and the San Diego Unified Port District	July 16, 1990	February 21, 2001
Order No. 2001-01, NPDES No. CAS0108758	Waste Discharge Requirements For Discharges Of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego, the Incorporated Cites of San Diego County, and the Unified Port District	February 21, 2001	January 24, 2007
Order No. R9-2007-01, NPDES No. CAS0108758	Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of The County Of San Diego, The Incorporated Cities Of San Diego County, The San Diego Unified Port District, and The San Diego County Regional Airport Authority	January 24, 2007	Present

The City of San Diego must comply with all conditions of the NPDES requirements. Any noncompliance of NPDES requirements constitutes a violation of the CWA and Water Code and is grounds for enforcement action, including the issuance of a cleanup and abatement order under the circumstances described in Water Code section 13304.

Each of the City of San Diego's successive NPDES requirements described here has specifically prohibited urban runoff discharges that cause pollution, contamination or nuisance conditions in San Diego Bay, or otherwise cause or contribute to violations of San Diego Bay water quality standards.

[51] Pursuant to Chapter 5.5 of the Porter-Cologne Water Quality Act, to avoid the issuance by the United States Environmental Protection Agency of separate and duplicative NPDES permits for discharges in California that would be subject to the Clean Water Act, the State's Waste Discharge Requirements (WDRs) for such discharges implement the NPDES regulations and entail enforcement provisions that reflect the penalties imposed by the Clean Water Act for violation of NPDES permits issued by the U.S. EPA. Thus, the State's WDRs that implement federal NPDES regulations (NPDES requirements) serve in lieu of NPDES permits.

4.6.2. Order No. 90-42, NPDES No. CA0108758

Order 90-42, NPDES No. CA0108758, in effect from July 16, 1990 to February 21, 2001, contains the following narrative limits that relate to the discussions contained herein:

- VIII. ILLICIT CONNECTION/ILLEGAL DUMPING DETECTION PROGRAM B. The permittee shall effectively eliminate all identified illegal/illicit discharges in the shortest time practicable, and in no case later than July 16, 2005… …If it is determined that any of the preceding discharges cause or contribute to violations of water quality standards or are significant contributors of pollutants to waters of the United States, the discharges shall be prohibited from entering storm water conveyance systems; and

- XIII. PROVISIONS A. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by section 13050 of the CWC.

4.6.3. Order No. 2001-01, NPDES No. CAS0108758

Order No. 2001-01, NPDES No. CAS0108758, in effect from February 21, 2001 contains the following provisions that relate to the discussions contained herein:

- A. PROHIBITIONS - DISCHARGES … 1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC § 13050), in waters of the state are prohibited.

- A. PROHIBITIONS DISCHARGES … 2. Discharges from MS4s which cause or contribute to exceedances of receiving water quality objectives for surface water or ground water are prohibited.

- C. RECEIVING WATER LIMITATIONS … 1. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.

The above NPDES requirement narrative limits are applicable to urban runoff discharges to San Diego Bay from the City of San Diego MS4 Storm Drains SW4, SW9, and Chollas Creek, which occurred during the effective term of Order Nos. 90-42 and 2001-01.

4.7. City of San Diego's NPDES Waste Discharges

4.7.1. City of San Diego, Chollas Creek MS4 Storm Drain Discharges

As described in Section 4.3.1, above, the City of San Diego owns and operates approximately 816 MS4 storm drains that convey urban runoff into Chollas Creek, a tributary of San Diego Bay, upstream of the NASSCO and BAE Systems leaseholds. The mouth of Chollas Creek is immediately adjacent to the southern extremity of the Shipyard Sediment Site. Available studies (Schiff, 2003; Katz et al., 2003; Chadwick et al., 1999) indicate that the storm water plumes emanating from Chollas Creek to San Diego Bay during storm events are toxic to marine life and can introduce a large fraction of the total storm event's production of suspended solids, copper, zinc, and lead to the Shipyard Sediment Site through settling of particles.

4.7.1.1. NPDES Requirements in Chollas Creek Monitoring Reports

The *San Diego County Municipal Copermittees 2002-2003 Urban Runoff Monitoring Final Report* submitted by the City of San Diego indicates that elevated levels of zinc, copper, and lead are present in the urban runoff outflow discharged from Chollas Creek into San Diego Bay. This sampling information indicates that zinc, copper, and lead are discharged at levels that are elevated compared to levels established by the CTR for saltwater.[52]

The numerical water quality criteria values in CTR were not included as numerical effluent limitations in the NPDES requirements issued to the City. However, the numerical values in CTR represent the latest, most up-to-date numerical thresholds for use in determining whether a chemical concentration in water is detrimental to its beneficial uses. By comparing CTR values with pollutant levels found in historical discharges, the San Diego Water Board is able to determine which discharges *may* have contributed to a condition of pollution, contamination, or nuisance at the Shipyard Sediment Site in the past. Also, where there are historical discharges elevated above CTR values, there exists an *elevated probability* that those same discharges are presently contributing to the condition of pollution, contamination, or nuisance at the Shipyard Sediment Site. In retrospect, to the extent that those historical, elevated discharges *did* contribute to the condition of pollution, contamination, or nuisance at the Shipyard Sediment Site in the past, and/or *did* contribute to the present condition of pollution at the Shipyard Sediment Site.

While not providing specific numerical effluent limitations for all possible chemicals, the San Diego Water Board did include an NPDES requirement condition that the City's urban runoff discharges not cause or threaten to cause, a condition of pollution, contamination, or nuisance.

[52] The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

To the extent that the City's urban runoff discharges in Chollas Creek were elevated above CTR criteria values the following specific discharges listed in Table 4-2 have caused or threatened to cause, a condition of pollution, contamination, or nuisance by contributing to the pollutants at the Shipyard Sediment Site, and/or contributed to the present condition of pollution at the Shipyard Sediment Site.

Table 4-2 Discharge Samples above CTR Values Occurring from 2001 to 2003

Date	Constituent	Urban Runoff Pollutant Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Source	Citation[3]
November 8, 2002	Copper	0.028 mg/L	0.0031 mg/L	Sections 4.4 and 4.5	2002 - 2003 Monitoring Report	Order No. 2001-01, A. Prohibition - Discharges 1 and 2, and C. Receiving Water Limitations 1
November 8, 2002	Lead	0.017 mg/L	0.0081 mg/L	Sections 4.4 and 4.5	2002 - 2003 Monitoring Report	Order No. 2001-01, A. Prohibition - Discharges 1 and 2, and C. Receiving Water Limitations 1
November 8, 2002	Zinc	0.118 mg/L	0.081 mg/L	Sections 4.4 and 4.5	2002 - 2003 Monitoring Report	Order No. 2001-01, A. Prohibition - Discharges 1 and 2, and C. Receiving Water Limitations 1
February 11, 2003	Copper	0.033 mg/L	0.0031 mg/L	Sections 4.4 and 4.5	2002 - 2003 Monitoring Report	Order No. 2001-01, A. Prohibition - Discharges 1 and 2, and C. Receiving Water Limitations 1
February 11, 2003	Lead	0.029 mg/L	0.0081 mg/L	Sections 4.4 and 4.5	2002 - 2003 Monitoring Report	Order No. 2001-01, A. Prohibition - Discharges 1 and 2, and C. Receiving Water Limitations 1
February 25, 2003	Copper	0.016 mg/L	0.0031 mg/L	Sections 4.4 and 4.5	2002 - 2003 Monitoring Report	Order No. 2001-01, A. Prohibition Discharges 1 and 2, and C. Receiving Water Limitations 1
February 25, 2003	Lead	0.023 mg/L	0.0081 mg/L	Sections 4.4 and 4.5	2002 - 2003 Monitoring Report	Order No. 2001-01, A. Prohibition Discharges 1 and 2, and C. Receiving Water Limitations 1
February 25, 2003	Zinc	0.23 mg/L	0.081 mg/L	Sections 4.4 and 4.5	2002 - 2003 Monitoring Report	Order No. 2001-01, A. Prohibition Discharges 1 and 2, and C. Receiving Water Limitations 1

1. 40 CFR 131.38
2. Reference to Sections 4.4 and 4.5 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Sections 4.4 and 4.5.

3. The cited waste discharge requirement(s) can be found in Section 4.6 of this Technical Report.

4.7.1.2. Chollas Creek Metals Total Maximum Daily Loads (TMDL)

Chollas Creek was placed on the CWA section 303(d) List of Water Quality Limited Segments (List of Water Quality Limited Segments) in 1996 for the metals cadmium, copper, lead and zinc.

On June 29, 2005 the San Diego Water Board adopted a TMDL for metals in Chollas Creek.[53] This TMDL provides additional evidence that concentrations of dissolved copper, lead, and zinc in Chollas Creek waters have frequently exceeded numeric water quality criteria values contained in the CTR. Furthermore, in a Toxicity Identification Evaluation performed in 1999, Chollas Creek storm water concentrations of zinc and to a lesser extent copper were identified as causing or contributing to reduced fertility in the purple sea urchin.[54]

Urban runoff discharges from the City of San Diego's MS4 are considered to be one of the leading causes of receiving water quality impairments in the Chollas Creek Watershed. Storm water samples from Chollas Creek collected by various sources between 1994 and 2003 frequently exceeded CTR freshwater quality criteria for copper, lead, and zinc (Table 4-3).

[53] See Regional Board Resolution No. R9-2005-0111, A Resolution Adopting An Amendment To The Water Quality Control Plan For The San Diego Region To Incorporate Total Maximum Daily Loads For Dissolved Copper, Lead, And Zinc In Chollas Creek, Tributary To San Diego Bay, June 29, 2005. See also Regional Board Technical Report, Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay, June 29, 2005.

[54] Regional Board Resolution No. R9-2005-0111. Footnote 7, supra. Finding 8.

Table 4-3 Chollas Creek CTR Exceedances[55]

COPPER			Concentrations reported in µg / L				# of exceedances (CTR) [4]	
Collection Dates	**Organization**	**n**	**min**	**max**	**mean**	**median**	**CMC**	**CCC**
Feb 94 - Feb 03	MS4 Copermittees	58	2.5 [1]	81.6 [2]	16.4 [3]	11.0 [3]	16 of 32	20 of 32
Feb - Apr, 00	Caltrans	4	5.1	11	7.8	7.5	NA [5]	NA [5]
Feb - Mar, 00	SCCWRP	2	51.2	63	57.1	57.1	NA [5]	NA [5]
Jan , Feb & Nov, 01	DPR	14	5	34	11.7	9.8	5 of 12	7 of 12
Sep-00	ES Babcock	4	1.92	28.8	9.8	4.3	NA [7]	NA [7]
Mar - Apr 99	SCCWRP (TIE)	3	10	30	18.3	15	2 of 3	3 of 3
Jun 91 & Mar 92	SD Water Board	5	3	8	6.4	7	0 of 5	0 of 5

LEAD			**Concentrations reported in µg / L**				**# of exceedances (CTR) [4]**	
Collection Dates	**Organization**	**n**	**min**	**max**	**mean**	**median**	**CMC**	**CCC**
Feb 94 - Feb 03	MS4 Copermittees	57	1.0 [1]	118 [2]	16.4 [3]	3.0 [3]	0 of 19	10 of 19
Feb - Apr, 00	Caltrans	4	2.9	11	5.5	4	NA [5]	NA [5]
Jan , Feb & Nov, 01	DPR	14	1.0 [1]	46	7.3	2	1 of 12	6 of 12
Sep-00	ES Babcock	4	2.0 [1]	4.1	1.9	1.2	NA [7]	NA [7]
Mar - Apr 99	SCCWRP (TIE)	3	10.0 [1]	82	39	30	1 of 2	2 of 2
Jun 91 & Mar 92	SD Water Board	5	5.0 [1]	29	12.2	11	0 of 3	1 of 3

ZINC			**Concentrations reported in µg / L**				**# of exceedances (CTR) [4]**	
Collection Dates	**Organization**	**n**	**min**	**max**	**mean**	**median**	**CMC**	**CCC**
Feb 94 - Feb 03	MS4 Copermittees	57	8	548 [2]	105.6 [3]	73 [3]	12 of 42	12 of 42
Feb - Apr, 00	Caltrans	4	17	42	28.8	28	NA [5]	NA [5]
Feb - Mar, 00	SCCWRP	2	146	150.8	148.4	148.4	NA [5]	NA [5]
Jan , Feb & Nov, 01	DPR	14	16.8	370	137.6	105	7 of 12	7 of 12

55 From the Regional Board Technical Report, Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay, June 29, 2005.

COPPER			Concentrations reported in µg / L				# of exceedances (CTR) [4]	
Sep-00	ES Babcock/RB	4	10.0 [1]	45	21.3	17.5	NA [7]	NA [7]
Mar - Apr 99	SCCWRP (TIE)	3	90	220	173.3	210	2 of 3	2 of 3
Jun 91 & Mar 92	SD Water Board	5	3	188	45	11	0 of 5	1 of 5

1. Sample below Reporting Limit
2. Calculated from total concentration
3. Using all samples (measured dissolved and calculated from total). Samples below detection limit entered as 1/2 detection limit for calculations
4. Considering only measured dissolved concentrations and samples not below DL or RL (number in parenthesis represents available sample pool under these criteria).
5. No associated hardness values available
6. All samples reported as “less than”
7. All dissolved samples calculated from total

4.7.1.3. Chollas Creek Outflow Plume

Chollas Creek, a tributary of San Diego Bay, is an urban creek with highly variable flows. The highest flow rates are associated with storm events. Extended periods with no surface flows occur during dry weather, although pools of standing water may be present. Much of the creek has been channelized and concrete lined, but some sections of earthen creek bed remain. The mouth of the creek is located on the eastern shoreline of central San Diego Bay. San Diego Bay, at the mouth of Chollas Creek, is on the List of Water Quality Limited Segments for sediment toxicity and degraded benthic community impairments. The mouth of Chollas Creek is immediately adjacent to the southern boundary of the Shipyard Sediment Site. Based on the considerations discussed below the San Diego Water Board concludes that storm water outflows from Chollas Creek has contributed to the accumulation of pollutants in marine sediment at the Shipyard Sediment Site.

Chollas Creek provides significant freshwater flow, and elevated suspended solids and chemical pollutant loading into San Diego Bay. Urban runoff from Chollas Creek has been shown to be toxic to both saltwater and freshwater organisms. In-channel wet-weather monitoring from previous storm seasons showed that samples of Chollas Creek storm water were toxic to the water flea (*Ceriodaphnia dubia*), the fathead minnow (*Pimephales promelas*), and the purple sea urchin (*Strongylocentrotus purpuratus*). A study conducted by Southern California Coastal Research Project (SCCWRP) in 2001 to establish the linkage between the Chollas Creek in-channel toxicity measurements and potential impairments in the receiving water of San Diego Bay, (Schiff, 2003), concluded that:

- Storm water plumes from Chollas Creek extended over an area of 2 km^2 in San Diego Bay. The study observed that storm water plumes emanating from Chollas Creek extended between 0.02 and 2.25 km^2 over San Diego Bay during small to moderately-sized storm events. Plumes were easily distinguished using salinity as a conservative tracer of wet weather inputs. Turbidity was also a good tracer of the plume.

- Toxicity extended up to 1 km from the Creek mouth and was proportional to the amount of runoff dilution. The SCCWRP study measured toxicity using the purple sea urchin (Strongylocentrotus purpuratus) fertilization test in both storm water samples taken from the creek and samples taken from the storm water plume in San Diego Bay. This toxicity varied across the gradient of plume influence and was well correlated with the amount of storm water present in the sample. All samples were salinity adjusted before toxicity testing, so the gradient in toxicity appears to be a function of toxicants present in the storm water discharges.

- The toxic part of the plume was smaller than the salinity signal. Although toxicity was measured in the storm water plume emanating from Chollas Creek, the entire plume was not toxic. In the two storms that were mapped from this study, the toxic portion of the plume was approximately 25% to 50% of the plumes' salinity signal. This reduction in the spatial extent of plume toxicity was likely due to dilution and mixing of the plume in the Bay.

- In-channel and plume toxicity was primarily due to trace metals including zinc and copper. TIEs conducted on storm water samples from both the Creek and from the storm water plume in the Bay identified dissolved trace metals, predominantly zinc, as the toxicant responsible for the majority of toxicity. Toxicity was eliminated by the addition of the metal chelating agent EDTA. Concentrations of dissolved zinc, and to a lesser extent copper, were high enough in the tested samples to account for the observed toxicity.

U.S. Navy studies (Katz et al., 2003; Chadwick et al., 1999) indicate that the Chollas Creek outflow (plume) to San Diego Bay can introduce pollutants to the Shipyard Sediment Site. The U.S. Navy funded a project in 2001 to quantify storm event mass loading of pollutants from upstream MS4/creek sources and from near-bay Navy sources as well as to characterize the spatial and temporal impacts from the plumes generated in the bay. Specific conclusions of the study Katz et al., 2003, include:

- During a single storm event in February 2001, the sediment plume containing pollutants from Chollas Creek was measured to cover an area up to 1.2 km away from the mouth of Chollas Creek.

- Storm water plumes developed off Chollas Creek quickly after the start of rainfall and were dispersed through tidal mixing 12 hours after run off ceased.

- Plume evolution in the bay was well tracked by all real-time measurement parameters though most clearly with salinity, light transmission, and oil fluorescence.

- Contaminants were primarily associated with particles and their strong association with total suspended solids (TSS) provides a good first order approximation for their distribution.

- Storm water is a continuing source of excessive levels of lead, zinc, chlordane, DDT, and PCBs, and possibly for TPAH and mercury to sediment at the mouth of the Chollas Creek.

The City of San Diego's own review of data suggests that Chollas Creek may be a localized source for metals in the Bay (City of San Diego, 2004a, b). The City's enforcement action against a metal plating shop is evidence of upstream industrial discharge to Chollas Creek, which discharges directly to the Bay (City of San Diego, 2004a, b).

4.7.2. City of San Diego, MS4 Storm Drain SW4 Discharges

As described in Section 4.3.1, the City of San Diego owns and operates an MS4 storm drain identified as SW4 in the Shipyard Report (Exponent, 2003) (see Figure 4-1 above) which conveys urban runoff from source areas upgradient of BAE Systems' property and discharges directly within the BAE Systems leasehold. Urban runoff discharged into the SW4 storm drain outfall is subject to the NPDES requirements cited in Section 4.6. Although no monitoring data is available for this outfall, it is highly probable that historical and current discharges from this outfall have discharged heavy metals and organics to San Diego Bay at the Shipyard Sediment Site.[56]

Recent evidence of illicit discharges from the City of San Diego's Storm Drain SW4 into the Shipyard Sediment Site is provided by the results of a recent sampling investigation conducted by the City of San Diego. On October 3, 2005, the City of San Diego conducted an investigation and observed evidence of an illegal discharge into the SW4 MS4 catch basin on the north side of Sampson Street between Belt Street and Harbor Drive, approximately 10 feet east of the railroad line that runs parallel with Belt Street. Specifically, the catch basin is located immediately to the east of the BAE Systems' parking lot and the SDG&E Silver Gate Power Plant, which is adjacent to the parking lot. During the City's investigation, three sediment samples were collected and analyzed for PCBs and PAHs. The first sample was collected from inside and at the base of a six-inch lateral entering the catch basin from the east. The second sample was collected from inside and at the base of the 12-inch lateral entering the catch basin from the north. The third sample was collected from the 18-inch pipe exiting the catch basin. The results of these three samples, presented in Table 4-4 below, indicate the presence of both PCBs and PAHs entering and exiting the municipal storm drain system catch basin and resulted in the City of San Diego issuing a Notice of Violation (NOV) to SDG&E (Zirkle, 2005a; Kolb, 2005b).

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[56] See Section 4.3.2 for a description of the most common categories of pollutants found in urban runoff .

Table 4-4 City of San Diego MS4 Sediment Sample Results for PCBs and PAHs on October 3, 2005

Constituent	Effects Range-Low (ERL)[1] µg/kg	Effects Range-Median (ERM)[1] µg/kg	Alternative Sediment Cleanup Levels µg/kg	6" Lateral µg/kg	12" Lateral µg/kg	Catch Basin µg/kg
Aroclor-1016				< 50	< 50	< 50
Aroclor-1221				< 50	< 50	< 50
Aroclor-1232				< 50	< 50	< 50
Aroclor-1242				< 50	< 50	< 50
Aroclor-1248				< 50	< 50	< 50
Aroclor-1254				650	130	260
Aroclor-1260				720	120	360
Aroclor-1262				< 50	< 50	< 50
Sum of Aroclors®	22.7[2]	180[2]	420[3]	**1,370**	**250**	**620**
Naphthalene[4]	160	2,100		70	330	170
Acenaphthylene[4]	44	640		< 50	< 50	< 50
Acenaphthene[4]	16	500		< 50	< 50	< 50
Fluorene[4]	19	540		< 50	< 50	< 50
Phenanthrene[4]	240	1,500		210	140	< 50
Anthracene[4]	85.3	1,100		< 50	< 50	< 50
Fluoranthene[5]	600	5,100		< 50	< 50	3,300
Pyrene[5]	665	2,600		500	170	91
Benzo [a] Anthracene[5]	261	1,600		450	< 50	< 50
Chrysene[5]	384	2,800		210	65	< 50
Benzo [b] Fluoranthene[5]	NA	NA		260	67	< 50
Benzo [k] Fluoranthene[5]	NA	NA		160	110	< 50
Benzo [a] Pyrene[5]	430	1,600	1,010	130	59	< 50
Dibenz [a,h] Anthracene[5]	63.4	260		< 50	< 50	< 50
Benzo [g,h,i] Perylene[5]	NA	NA		< 50	< 50	< 50
Indeno [1,2,3-c,d] Pyrene[5]	NA	NA		93	< 50	< 50
Total PAHs	4,022	44,792		**2,083**	**941**	**3,391**

1. Long et al., 1995.
2. ERL and ERM levels are for Total PCBs
3. Cleanup level is for Total PCB Congeners
4. LPAH - low molecular weight polynuclear aromatic hydrocarbon
5. HPAH - high molecular weight polynuclear aromatic hydrocarbon

Non-detections are represented as less than the reporting limit.
(CEL, 2005)

The City of San Diego MS4 Storm Drain SW4 discharges into the BAE Systems leasehold between Piers 3 and 4. Sample stations from the Detailed Sediment Investigation (Exponent, 2003) in the area of this outfall include SW20 through SW25. The sample results for PCBs and PAHs are presented in Table 4-5.

Table 4-5 NASSCO & BAE Systems Detailed Sediment Investigation PCB and PAH Results for SW20 through SW25

Constituent	SW20 µg/kg	SW21 µg/kg	SW22 µg/kg	SW23 µg/kg	SW24 µg/kg	SW25 µg/kg
Aroclor-1016	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1221	< 500	< 520	< 57	< 58	< 460	< 51
Aroclor-1232	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1242	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1248	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1254	1,500	1,600	670	550	790	330
Aroclor-1260	1,600	1,800	790	710	870	380
Sum of Aroclors®	**3,100**	**3,400**	**1,500**	**1,300**	**1,700**	**710**
Naphthalene[1]	< 13	13	31	< 15	26	< 13
Acenaphthylene[1]	120	130	150	130	290	180
Acenaphthene[1]	16	14	17	19	14	13
Fluorene[1]	53	53	56	53	220	45
Phenanthrene[1]	300	220	330	360	810	260
Anthracene[1]	450	370	500	500	6,000	440
Fluoranthene[2]	930	580	910	960	7,100	750
Pyrene[2]	1,200	850	1,100	1,000	3,100	940
Benzo [a] Anthracene[2]	760	650	890	850	6,300	710
Chrysene[2]	1,800	1,400	1,900	1,800	11,000	1,300

Constituent	SW20 µg/kg	SW21 µg/kg	SW22 µg/kg	SW23 µg/kg	SW24 µg/kg	SW25 µg/kg
Benzo [b] Fluoranthene[2]	1,500	1,600	1,800	1,500	7,000	2,000
Benzo [k] Fluoranthene[2]	1,200	1,100	1,300	1,200	7,300	1,600
Benzo [a] Pyrene[2]	1,400	1,500	1,700	1,500	8,800	2,000
Dibenz [a,h] Anthracene[2]	200	210	230	220	1,100	240
Benzo [g,h,i] Perylene[2]	770	780	830	820	2,800	800
Indeno [1,2,3-c,d] Pyrene[2]	970	990	1,100	1,000	3,700	1,100
Total PAHs	**11,669**	**10,460**	**12,844**	**11,912**	**65,560**	**12,378**

1. LPAH - low molecular weight polynuclear aromatic hydrocarbon
2. HPAH - high molecular weight polynuclear aromatic hydrocarbon

Non-detections are represented as less than the quantitation limit.
(Exponent, 2003)

PCBs in sediment from the laterals and catch basin of the storm water conveyance system were found at levels that exceed the ERL and ERM of 22.7 µg/kg and 180 µg/kg, respectively (Long et al., 1995), as well as the proposed Alternative Sediment Cleanup Levels.

Sediment PCB levels, specifically Aroclor-1254 and 1260, and sediment PAH levels reported in the storm water conveyance system are also reported in the bay sediment near the storm water outfall as indicated by comparing Tables 4-4 and 4-5.

As outlined above, the City of San Diego MS4 Storm Drain SW4 has discharged pollutants, specifically Aroclor-1254 and 1260, and PAHs, into the BAE Systems leasehold and San Diego Bay at the Shipyard Sediment Site. These facts provide evidence that the City of San Diego MS4 Storm Drain SW4 has discharged and deposited pollutants to the Shipyard Sediment Site, both presently and in the past.

4.7.3. City of San Diego, MS4 Storm Drain SW9 Discharges

As described in Section 4.3.1, the City of San Diego owns and operates an MS4 storm drain identified as SW9 in the Shipyard Report (Exponent, 2003) (see Figure 4-2, above), which conveys urban runoff from source areas upgradient of NASSCO's property and discharges directly within the NASSCO leasehold. Urban runoff discharged into the SW9 storm drain outfall is subject to the NPDES requirements cited in Section 4.6. Although no monitoring data is available for this outfall, it is highly probable that historical and current discharges from this outfall have discharged heavy metals and organics to San Diego Bay at the Shipyard Sediment Site.[57]

[57] See Section 4.3.2 for a description of the most common categories of pollutants found in urban runoff.

A review of maps of the City's storm drain outfalls shows that the City's storm drain SW9 outfall is located in the NASSCO leasehold at the foot of 28th St. near the mouth of Chollas Creek (Exponent, 2003; ENV America, 2004a; City of San Diego, 2004a). SW9 collects flow from 28th Street, and stretches from the I-5 freeway to the bay including parts of Belt Street and Harbor Drive.

Surface sediment data at NASSCO sample station NA22, which is located near the SW9 storm drain outfall shows elevated concentrations of total high-molecular-weight polynuclear aromatic hydrocarbons (Total HPAHs) at 3,600 µg/kg), Dichlorodiphenyltrichloroethane (DDT) at 29.7µg/kg), and Chlordane at 21.1µg/kg. These pollutant levels are indicators of an urban runoff source (Exponent, 2003) and therefore indicate that historical urban runoff discharges occurred from the City via the SW9 outfall.

As described above, the surface sediment data at NASSCO sample station NA22 provides evidence that the City of San Diego MS4 Storm Drain SW9 conveys the HPAHs, DDT, and Chlordane pollutants into the NASSCO leasehold and San Diego Bay at the Shipyard Sediment Site. The urban runoff characteristics of the sediment pollutants at Station NA22 adjacent to the City of San Diego's MS4 Storm Drain SW9 provide evidence that the City has discharged pollutants to the Shipyard Sediment Site, both presently and in the past. The weight of evidence suggests that there are past and continuing discharges from Storm Drain SW9 that are contributing to the accumulation of pollutant in marine sediment.

5. Finding 5: Star & Crescent Boat Company

Finding 5 of CAO No. R9-2012-0024 states:

The San Diego Water Board finds that between 1914 and 1972, San Diego Marine Construction Company operated a ship repair, alteration, and overhaul facility on what is now the BAE Systems leasehold at the foot of Sampson Street in San Diego. Shipyard operations were conducted at this site over San Diego Bay water or very close to the waterfront. An assortment of waste was generated at the facility, including spent abrasive blast waste, paint, rust, petroleum products, marine growth, sanitary waste and general refuse. These wastes contained metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), butyl tin species, PCBs, PCTs, PAHs, and TPH. In July 1972, San Diego Marine Construction Company sold its shipyard operations to Campbell Industries, and changed its corporate name, effective July 14, 1972, to Star & Crescent Investment Co. On March 19, 1976, Star & Crescent Boat Company (Star & Crescent) was incorporated in California and on April 9, 1976, Star & Crescent Investment Co. (formerly San Diego Marine Construction Company) transferred some portion of its assets and liabilities to Star & Crescent. The San Diego Water Board's Cleanup Team and several other designated parties allege that Star & Crescent Investment Co. (formerly San Diego Marine Construction Company) transferred all of its liabilities and assets to Star & Crescent. Accordingly, these parties allege that Star & Crescent is the corporate successor of and responsible for the conditions of pollution or nuisance caused or permitted by San Diego Marine Construction Company. Star & Crescent denies that it is the corporate successor to San Diego Marine Construction Company and denies any responsibility for San Diego Marine Construction Company's and denies any responsibility for San Diego Marine Construction Company's discharges of waste to the San Diego Bay Shipyard Sediment Site from 1914 to 1972.

The San Diego Water Board finds that San Diego Marine Construction Company caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance. San Diego Marine Construction Company is no longer in existence. The San Diego Water Board declines to decide the legal and factual questions necessary to determine whether Star & Crescent is the corporate successor to and therefore liable for San Diego Marine Construction Company's discharges. Due to Star & Crescent's uncertain legal status and due to the pending federal court litigation to which Star & Crescent is a party and that the San Diego Water Board expects will address allocation issues associated with this Order, the San Diego Water Board does not name Star & Crescent as a Discharger under this Order. The San Diego Water Board retains the authority to exercise its discretion to add Star & Crescent as a Discharger under this Order in the future. If the federal court determines that Star & Crescent is the corporate successor to San Diego Marine Construction Company (later Star & Crescent Investment Company), the San Diego Water Board directs the Cleanup Team to reevaluate whether it is appropriate to amend the Order to add Star & Crescent as a Discharger.

5.1. Jurisdiction

CWC section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirements… ...or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance…."

For the reasons set forth below, the San Diego Water Board has determined that there is sufficient evidence to conclude that San Diego Marine Construction Company caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create a condition of pollution or nuisance. The San Diego Water Board has further determined that due to Star & Crescent's uncertain legal status as a corporate successor and due to the federal litigation in which allocation issues under this Order will be resolved, Star & Crescent is not named as a discharger under this Order.

5.2. Admissible Evidence – State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996) the State Water Board adopted Resolution No. 92-49, *Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304*. Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under CWC section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC Code section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;

2. Site characteristics and location in relation to other potential sources of a discharge;

3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;

4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;

5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;

6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;

7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;

8. Reports and complaints;

9. Other agencies' records of possible known discharge; and

10. Refusal or failure to respond to San Diego Water Board inquiries.

5.3. San Diego Marine Construction Company Operations within the BAE Leasehold From Approximately 1915 Through 1972

5.3.1. Leasehold Information

San Diego Marine Construction Company contributed to the accumulation of pollutants in marine sediment through waste discharges from its shipyard facility located within or adjacent to the current BAE Systems leasehold between 1914 and 1972 (Woodward-Clyde, 1995).

The City of San Diego granted a lease to San Diego Marine Construction Company at the foot of Sampson Street in 1914 (SDUPD, 2004). In July 1972, San Diego Marine Construction Company sold its shipyard operations to Campbell Industries, and changed its corporate name, effective July 14, 1972, to Star & Crescent Investment Co. On March 19, 1976, Star & Crescent Boat Company was incorporated in California and on April 9, 1976, Star & Crescent Investment Co. (formerly San Diego Marine Construction Company) transferred some portion of its assets and liabilities to Star & Crescent. The San Diego Water Board declines to determine the legal issue of whether or not Star & Crescent is the corporate successor of and therefore responsible for the conditions of pollution or nuisance caused or permitted by San Diego Marine Construction Company from approximately 1914 through July 1972.

5.4. San Diego Marine Construction Company Owned and Operated a Full Service Ship Construction, Modification, Repair, and Maintenance Facility

5.4.1. Facility Description

San Diego Marine Construction Company was a ship construction and repair facility located at the foot of Sampson Street in the City of San Diego. Ship repair facilities included two floating dry docks and three marine railways, which together with cranes, enabled ships to be launched or repaired. The basic purpose of the dry docks was to separate the vessel from the bay to provide access to parts of the ship normally underwater. Piers were used to support berthed vessels undergoing maintenance and repair operations and berthing barges were used to house vessel crews while ship repairs were being conducted. Because dry dock space was limited and expensive, many operations were conducted pier side. Marine railways were used to wheel vessels out of water (also called dry berthing a vessel). Activities conducted on dry berthed vessels were similar to those conducted in dry docks, but usually on a much smaller scale.

5.4.2. Activities Conducted by San Diego Marine Construction Company

Ship construction and repair have many industrial processes in common, including machining and metalworking, metal plating and surface finishing, surface preparation, solvent cleaning, application of paints and coatings, and welding. It is reasonable to assume that San Diego Marine Construction Company's industrial activities were typical for the ship construction and repair industry and involved a multitude of industrial processes, many of which were conducted over San Diego Bay waters or very close to the waterfront. San Diego Marine Construction Company's operations likely included the following industrial processes:

- **Surface Preparation and Paint Removal**. Methods of surface preparation and paint removal included dry abrasive blasting, wet abrasive or slurry blasting, hydroblasting, and chemical paint stripping;

- **Paint Application**. After preparation, surfaces were painted. Most painting occurred in a dry dock and involved the ship hull and internal tanks. Painting was also conducted in other locations throughout the shipyard including piers and berths. Paint application was accomplished by way of air or airless spraying equipment and was a major activity at San Diego Marine Construction Company;

- **Tank Cleaning**. Tank cleaning operations used steam to remove dirt and sludge from internal tanks, particularly fuel tanks and bilges. Detergents, cleaners, and hot water were injected into the steam supply hoses;

- **Mechanical Repair/Maintenance/Installation**. A variety of mechanical systems and machinery required repair, maintenance, and installation;

- **Structural Repair/Alteration/Assembly**. Structural repair, alteration, and assembly generally involved welding, cutting, and fastening of steel plates or assembly blocks and other industrial processes;

- **Integrity/Hydrostatic Testing**. Hydrostatic or strength testing and flushing were conducted on hulls, tanks, or pipe repairs. Integrity testing was also conducted on new systems during ship construction phases;

- **Paint Equipment Cleaning**. All air and airless paint spraying equipment was typically cleaned following use. Paint equipment cleaning was a major producer of waste, including solvents, thinners, paint wastes, and sludges;

- **Engine Repair/Maintenance/Installation**. Automotive repair, ship engine repair, maintenance, and installation generated waste oils, solvents, fuels, batteries, and filters;

- **Steel Fabrication and Machining**. Fabrication of engine and ship parts occurred at San Diego Marine Construction Company. Cutting oils, fluids, and solvents were used extensively including acetone, methyl ethyl ketone (MEK) and chlorinated solvents;

- **Electrical Repair/Maintenance/Installation**. The repair, maintenance, and installation of electrical systems involved the use of numerous hazardous materials including trichlorethylene, trichloroethane, methylene chloride, and acetone;

- **Hydraulic Repair/Maintenance/Installation**. The repair, maintenance, and installation of hydraulic systems involved the replacement of spent hydraulic oils;

- **Tank Emptying**. Bilge, fuel, and ballast tanks were typically emptied prior to ship repair activities;

- **Fueling**. Fueling operations occurred at San Diego Marine Construction Company;

- **Shipfitting**. Shipfitting was conducted at San Diego Marine Construction Company, and is defined as the forming of ship plates and shapes, etc. according to plans, patterns, or molds;

- **Carpentry**. Woodworking, with associated wood dust production, was conducted at San Diego Marine Construction Company; and

- **Refurbishing/Modernization/Cleaning**. Refurbishing, modernization, and cleaning of ships were conducted at San Diego Marine Construction Company.

5.4.3. Materials Used by San Diego Marine Construction Company

Materials that were commonly used for the above listed industrial shipyard activities are summarized below. Although a few specific materials are included, the list consists primarily of major categories.

- **Abrasive Grit**. Typically slag was collected from coal-fired boilers and consisted principally of iron, aluminum, silicon, and calcium oxides. Trace elements such as copper, zinc and titanium were also likely present. Sand, cast iron, or steel shot were also used as abrasives. Enormous amounts of abrasive were needed to remove paint; for example, removing paint from a 15,000 square foot hull could take up to 6 days and consume 87 tons of grit. Grit was needed in all dry and wet abrasive blasting.

- **Paint**. Paints contained copper, zinc, chromium, and lead as well as hydrocarbons. Two major types of paints used on ship hulls were:

    - Anticorrosive Paints (primers) Vinyl, vinyl-lead, or epoxy based coatings are used. Others contained zinc chromate and lead oxide.

- Antifouling Paints were used to prevent growth and attachment of marine organisms by continuously releasing toxic substances into the water. Cuprous oxide and tributyltin fluoride or tributyltin oxide were the principal toxicants in copper-based and organotin-based paints, respectively.

- **Miscellaneous Materials**. Oils (engine, cutting, and hydraulic), lubricants, grease, fuels, weld, detergents, cleaners, rust inhibitors, paint thinners, hydrocarbon and chlorinated solvents, degreasers, acids, caustics, resins, adhesives/cement/sealants, and chlorine.

5.4.4. Waste Generated by San Diego Marine Construction Company

Categories of wastes commonly generated by the above listed industrial shipyard activities include, but are not limited to, those listed below.

- **Abrasive Blast Water: Spent Grit, Spent Paint, Marine Organisms, and Rust**. Abrasive blast waste, consisting of spent grit, spent paint, marine organisms, and rust was generated in significant quantities during all dry or wet abrasive blasting procedures. The constituent of greatest concern with regard to toxicity is the spent paint, particularly the copper and tributyltin antifouling components, which are designed to be toxic and to continuously leach into the water. Other pollutants in paint included zinc, chromium, and lead. Abrasive blast waste was conveyed by water flows, by becoming airborne (especially during dry blasting), or by falling directly into receiving waters;

- **Fresh Paint**. Losses occurred when paint ended up somewhere other than its intended location (e.g., dry dock floor, bay, worker's clothing). These losses resulted from spills, drips, and overspray. Typical overspray losses are estimated to have been approximately 5 percent for air spraying; and 1 to 2 percent for airless spraying;

- **Bilge Waste/Other Oily Wastewater**. This waste was generated during tank emptying, leaks, and cleaning operations (bilge, ballast, fuel tanks). In addition to petroleum products (fuel, oil), tank wash water also contained detergents or cleaners and was generated in large quantities;

- **Blast Wastewater**. Hydroblasting generated large quantities of wastewater. In addition to suspended and settleable solids (spent abrasive, paint, rust, marine organisms) and water, blast wastewater also may have contained rust inhibitors such as diammonium phosphate and sodium nitrite;

- **Oils (engine, cutting, and hydraulic)**. In addition to spent products, fresh oils, lubricants, and fuels were released as a result of spills and leaks from ship or dry dock equipment, machinery, and tanks (especially during cleaning and refueling);

- **Waste Paints/Sludges/Solvents/Thinners**. These wastes were generated from cleaning paint equipment;

- **Construction/Repair Wastes and Trash**. These wastes included scrap metal, welding rods, slag (from arc welding), wood, rags, plastics, cans, paper, bottles, packaging materials, etc.; and

- **Miscellaneous Wastes**. These wastes included lubricants, grease, fuels, sewage (black and gray water from vessels or docks), boiler blowdown, condensate, discard, acid wastes, caustic wastes, and aqueous wastes (with and without metals).

The San Diego Marine Construction Company facility was located immediately adjacent to San Diego Bay. Surface water runoff from the facility, unless diverted, directly entered the bay. Wastes from the facility were conveyed to the bay by water flows, becoming airborne (especially during painting and blasting operations), or falling directly into the bay.

5.5. San Diego Marine Construction Company Discharged Waste to San Diego Bay Creating Pollution, Contamination, and Nuisance Conditions in San Diego Bay

Based on the information regarding the leasehold history and historical activities provided in Sections 5.3, 5.4, 5.7 and 5.8 the San Diego Water Board has determined that San Diego Marine Construction Company is responsible for discharging pollutants to the Shipyard Sediment Site as a result of its shipyard operations on what is currently the BAE Systems leasehold. CWC section 13304 provides that a person who causes any waste to be discharged, or deposited where it probably will be discharged, into waters of the state creating, or threatening to create, a condition of pollution or nuisance is subject to cleaning up or abating the effects of the waste.

The Porter-Cologne Water Quality Act defines "pollution" as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects… …the waters for beneficial uses …"[58] "Contamination" is defined as "an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."[59]

The discharge of pollutants included heavy metals and organics, including arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, butyl tin species, PCBs, PCTs, PAHs, and TPH. As described in other sections of this report, these same pollutants have accumulated in San Diego Bay sediment adjacent to the former San Diego Marine Construction Company facility in concentrations that adversely affect the beneficial uses of San Diego Bay and present a public health risk.

Accordingly, it is concluded that San Diego Marine Construction Company, has caused or permitted waste to be discharged or deposited where it was discharged to San Diego Bay in a manner causing the creation of pollution, contamination, or nuisance conditions, and while it is appropriate for the San Diego Water Board to issue a cleanup and abatement order to an entity determined to be the legal corporate successor of San Diego Marine Construction Company as dischargers pursuant to CWC section 13304, the San Diego Water Board declines to determine

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[58] Water Code section 13050(1).

[59] Water Code section 13050(k).

the factual and legal questions to establish whether Star & Crescent is the corporate successor of San Diego Marine Construction Company.

Further discussion on pollution, contamination, and nuisance are available in Sections 1.4 and 1.5 of this Technical Report.

5.6. 1972 San Diego Water Board Ship Building and Repair Yard Investigation

In March of 1972, the San Diego Water Board initiated an investigation to determine the amount and kinds of pollutants that entered San Diego Bay from shipbuilding and repair facilities, and the possible effects that the pollutants could have on beneficial uses of San Diego Bay.[60] All shipbuilding and repair facilities located on San Diego Bay were inspected, including San Diego Marine Construction Company. Interviews with owners and managers of the facilities were conducted to determine (for the year 1971) the number of ships built or refinished at each facility; the cleaning methods employed; the amounts and kinds of vessel hull paints used; and the methods of disposing of trash, sandblasting waste, paints and oils. Bay sediment core samples were collected from San Diego Bay at various locations including the San Diego Marine Construction Company leasehold. The report contains the following information pertaining to San Diego Marine Construction Company discharges:

- San Diego Marine Construction Company was engaged in shipbuilding and repair activities during 1971. Facilities included two dry docks (360 foot and 220 foot capacity respectively) and three marine railways (100 foot vessel capacity);

- During 1971, San Diego Marine Construction Company constructed six new ships and refinished 70 ships up to 390 feet in length. Approximately 80 percent of the vessels were constructed of steel, 15 percent from wood and 5 percent from fiberglass. Approximately 20 to 50 percent of these ships were sand blasted. Approximately 8,000 gallons of paint and primer containing copper and tributyltin were used. Air sand blasting with black sand was used to strip vessels to bare metal in the dry docks and on marine railways;

- The San Diego Marine Construction Company facility was located immediately adjacent to San Diego Bay. Wastes from the facility were conveyed to the bay by water flows, by becoming airborne (especially during painting and blasting operations), or by falling directly into the bay;

- It was estimated by workers and managers at all San Diego Bay shipyards that 5 to 10 percent of the sand blasted waste and other waste was discharged to San Diego Bay. Based on San Diego Water Board waste volume estimates, this resulted in 335

[60] The results of this investigation are contained in California Regional Water Quality Control Board, San Diego Region, Wastes Associated with Shipbuilding and Repair Facilities in San Diego Bay, June 1972 (RWQCB, 1972).

tons of sand, 27 tons of copper oxide, 3 tons of lead oxide and 1 ton of zinc chromate being discharged to San Diego Bay on an annual basis in 1971; and

- On March 7, 1972 the San Diego Water Board collected bay sediment core samples from 11 selected sites in San Diego Bay offshore of the ship building and repair facilities (RWQCB, 1972). The results of the core sampling indicated that heavy metal concentrations in bay sediment were higher near the ship building and repair facilities than at other locations of San Diego Bay. Sampling Station No. 1 was located at San Diego Marine Construction Company dry dock 1 and was included in the group of five stations that had the highest total concentration of metals (arsenic, chromium, copper, lead, mercury, nickel, and zinc).

5.7. Industry-wide Historical Operational Practices

In November of 1997, the U.S. EPA released a study titled "EPA Office of Compliance Sector Notebook Project: PROFILE OF SHIPBUILDING AND REPAIR INDUSTRY." According to the 1995 Toxic Release Inventory (TRI) data, the reporting shipbuilding and repair facilities released and transferred 39 different TRI chemicals for a total of approximately 6.5 million pounds of pollutants during calendar year 1995. These releases and transfers were dominated by volatile organic compounds (VOCs) and metal-bearing wastes, approximately 52 percent and 48 percent, respectively (U.S. EPA, 1997c).

Releases to the air, water, and land have accounted for 37 percent (2.4 million pounds) of the reporting shipbuilding and repair facilities' total reportable chemicals. Of these releases, over 98 percent were released to the air from fugitive (74.6 percent; 1,778,818 pounds) or point (24.1 percent; 574,097 pounds) sources, while approximately 1.2 percent (29,479 pounds) was released directly to water (U.S. EPA, 1997c). However, a significant percentage of the total pollutants released as fugitive air or point air releases end up in the water, adding significantly to the 1.2 percent that is released directly to water.

VOCs accounted for about 86 percent of the reporting shipbuilding and repair facilities' reported TRI releases. Xylenes, n-butyl alcohol, toluene, methyl ethyl ketone, and methyl isobutyl ketone account for about 65 percent of the reporting shipbuilding and repair facilities' reported releases. These organic compounds are typically found in solvents that were used extensively by the industry in thinning paints and for cleaning and degreasing metal parts and equipment (U.S. EPA, 1997c).

The remainder of the releases was primarily metal-bearing wastes. Copper, zinc, and nickel-bearing wastes accounted for about 14 percent of the reporting shipbuilding and repair facilities' reported releases. These pollutants were released primarily as fugitive emissions during metal plating operations and as overspray in painting operations and could also have been released as fugitive dust emissions during blasting operations (U.S. EPA, 1997c).

5.7.1. Miscellaneous Information on San Diego Marine Construction Company Discharges

Historical operations at San Diego Marine Construction Company during the years from 1914 to the early 1970's included the following (SDUPD, 2004):

- Used formaldehyde and arsenic in pretreated wood at the woodshop;
- Performed blasting, welding, and painting activities for Navy contract work in the blasting area;
- Used a dust suppression system for the blasting house, which consisted of blowers directed at the bay with a water spray to cause the blast dust to settle in the water; and
- Discharged all wastes generated on the dry dock, including blast grit, paint, etc. into the bay.

The shipyard operations that generate wastes including heavy metals and organic chemicals at San Diego Marine Construction Company included the following (SDUPD, 2004):

- Surface preparation and paint removal;
- Paint application;
- Tank cleaning; and
- Mechanical repair/maintenance/installation.

Delta Lines submitted a complaint to the SDUPD in 1970 regarding sandblasting residue from San Diego Marine Construction Company (SDUPD, 2004.)

5.8. Sediment Core Analytical Results

The sediment core analytical results were evaluated to assess the potential presence of wastes released by San Diego Marine Construction Company. The Shipyard Report provides analytical results from sediment cores collected down to depths of approximately 6 to 8 feet (Exponent, 2003). The results from Stations SW04, SW08 and SW17, the core locations closest to the shoreline within the former San Diego Marine Construction Company leasehold, are discussed below.

Peng et. al. (2003) reports a sedimentation rate of 0.92 centimeters per year (cm/yr) at a sampling station in the vicinity of the Shipyard Sediment Site outside the former San Diego Marine Construction Company leasehold. The sedimentation rate may be higher within the leasehold closer to the shoreline since the currents may be less and the shoreline is nearer the source(s) of sediment input. Table 5-1 shows the estimated years associated with the core depths for two different sedimentation rates. A sedimentation rate of 0.92 cm/yr suggests that the sediment in the 2 to 4 foot core were deposited prior to approximately 1936. Assuming a higher sedimentation rate of 2 cm/yr indicates that the sediment in the 2 to 4 foot core was deposited from approximately 1972 to 1942.

Table 5-1 Deposition Years for Cores Based on Sedimentation Rates

Core Depth	0.92 cm/year[1]	2.0 cm/year[2]
0 to 2 feet	2002 to 1936	2002 to 1972
2 to 4 feet	1936 to 1870	1972 to 1942
4 to 6 feet	1870 to 1804	1942 to 1912

1. 0.92 cm/year corresponds to approximately 33 years per foot.
2. cm/year corresponds to approximately 15 years per foot.

The analytical results from Stations SW04, SW08 and SW17, the core locations closest to the shoreline within the former San Diego Marine Construction Company leasehold, are provided in Table 5-2 below. The analytical results for tributyltin (TBT) were used to evaluate the applicability of the two deposition rates in Table 5-1. TBT was first used as a marine antifouling coating in the 1960s (GlobalSecurity.org, 2005). Therefore TBT should not be reported in sediment deposited prior to the 1960s unless TBT in the overlying sediment contaminated the underlying sediment by mechanisms such as bioturbation or disturbances via propeller wash.

Review of the 2 to 4 foot core results presented in Table 5-2 indicates the presence of significant TBT levels. A deposition rate of 0.92 cm/yr, suggests that the sediment at 2 to 4 feet were deposited between 1936 and 1870. However the TBT concentrations suggest that the 2 to 4 foot core interval includes sediment from the late 1960s or early 1970s. Therefore it is judged that the sedimentation rate is higher than 0.92 cm/year. A deposition rate of 2 cm/year suggests that the sediment in the core from 2 to 4 feet were deposited from 1942 to 1972. These dates are consistent with presence of TBT in cores collected at those depths. Therefore, the higher deposition rate of 2 cm/year is judged to be more applicable to the Shipyard Sediment Site than the lower 0.92 cm/yr rate.

Based on this evaluation it is concluded that the pollutants in the 2 to 4 foot cores include discharges made during the time of San Diego Marine Construction Company tenancy from 1914 to 1972. As indicated in Table 5-2, some of the highest concentrations for PCBs, benzo[a] pyrene, tributyltin, arsenic, cadmium, chromium, copper, mercury, and nickel within each core are from the 2 to 4 feet depth.

Table 5-2 Selected Results from Core Stations SW04, SW08 and SW17

Depth	Contaminant	SW04	SW08	SW17
0 to 0.06 feet	PCB homologs µg/kg	5,200	2,700	-
0 to 2 feet	PCB homologs µg/kg	1,300	10,000	1,100
2 to 4 feet	PCB homologs µg/kg	27,000	13,000	1,300

Depth	Contaminant	SW04	SW08	SW17
4 to 5 feet	PCB homologs µg/kg			
4 to 6 feet	PCB homologs µg/kg		490	420
6 to 6.5 feet	PCB homologs µg/kg		6.2	
0 to 0.06 feet	Benzo [a] pyrene µg/kg	2,100	3,300	-
0 to 2 feet	Benzo [a] pyrene µg/kg	1,100	2,600	1,600
2 to 4 feet	Benzo [a] pyrene µg/kg	5,800	3,000	620
4 to 5 feet	Benzo [a] pyrene µg/kg			
4 to 6 feet	Benzo [a] pyrene µg/kg		85	200
6 to 6.5 feet	Benzo [a] pyrene µg/kg		6	
0 to 0.06 feet	Tributyltin µg/kg	3,300	1,900	-
0 to 2 feet	Tributyltin µg/kg	1,900	7,000	920
2 to 4 feet	Tributyltin µg/kg	5,000	5,100	600
4 to 5 feet	Tributyltin µg/kg			
4 to 6 feet	Tributyltin µg/kg		44	57
6 to 6.5 feet	Tributyltin µg/kg		2.3	
0 to 0.06 feet	Arsenic mg/kg	73	24	-
0 to 2 feet	Arsenic mg/kg	68	24	15
2 to 4 feet	Arsenic mg/kg	110	13	15
4 to 5 feet	Arsenic mg/kg			
4 to 6 feet	Arsenic mg/kg		4.9	3.7
6 to 6.5 feet	Arsenic mg/kg		2.1	
0 to 0.06 feet	Cadmium mg/kg	1.9	0.73	-
0 to 2 feet	Cadmium mg/kg	0.79	1.1	0.68
2 to 4 feet	Cadmium mg/kg	3.2	0.86	1.4
4 to 5 feet	Cadmium mg/kg			
4 to 6 feet	Cadmium mg/kg		0.07	.44

Depth	Contaminant	SW04	SW08	SW17
6 to 6.5 feet	Cadmium mg/kg		0.03	
0 to 0.06 feet	Chromium mg/kg	80	83	-
0 to 2 feet	Chromium mg/kg	26	100	87
2 to 4 feet	Chromium mg/kg	97	110	54
4 to 5 feet	Chromium mg/kg			
4 to 6 feet	Chromium mg/kg		7.4	30
6 to 6.5 feet	Chromium mg/kg		3.7	
0 to 0.06 feet	Copper mg/kg	1,500	900	-
0 to 2 feet	Copper mg/kg	370	1,500	440
2 to 4 feet	Copper mg/kg	2,200	1,500	280
4 to 5 feet	Copper mg/kg			
4 to 6 feet	Copper mg/kg		49	530
6 to 6.5 feet	Copper mg/kg		4.2	
0 to 0.06 feet	Lead mg/kg	430	220	-
0 to 2 feet	Lead mg/kg	150	360	100
2 to 4 feet	Lead mg/kg	410	340	90
4 to 5 feet	Lead mg/kg			
4 to 6 feet	Lead mg/kg		11	23
6 to 6.5 feet	Lead mg/kg		1.8	
0 to 0.06 feet	Mercury mg/kg	1.7	2.3	-
0 to 2 feet	Mercury mg/kg	1.1	4.8	1.30
2 to 4 feet	Mercury mg/kg	7.4	6.0	0.67
4 to 5 feet	Mercury mg/kg			
4 to 6 feet	Mercury mg/kg		0.3	0.17
6 to 6.5 feet	Mercury mg/kg		0.005	
0 to 0.06 feet	Nickel mg/kg	18	21	-

Depth	Contaminant	SW04	SW08	SW17
0 to 2 feet	Nickel mg/kg	8.3	15	19
2 to 4 feet	Nickel mg/kg	40	9.1	12
4 to 5 feet	Nickel mg/kg			
4 to 6 feet	Nickel mg/kg		2.6	7.6
6 to 6.5 feet	Nickel mg/kg		1.5	
0 to 0.06 feet	Silver mg/kg	1.6	1.5	-
0 to 2 feet	Silver mg/kg	0.59	1	2.0
2 to 4 feet	Silver mg/kg	1.4	0.49	1.1
4 to 5 feet	Silver mg/kg			
4 to 6 feet	Silver mg/kg		0.03	0.29
6 to 6.5 feet	Silver mg/kg		0.01	
0 to 0.06 feet	Zinc mg/kg	3400	830	-
0 to 2 feet	Zinc mg/kg	670	1,300	500
2 to 4 feet	Zinc mg/kg	1,500	790	400
4 to 5 feet	Zinc mg/kg			
4 to 6 feet	Zinc mg/kg		34	130
6 to 6.5 feet	Zinc mg/kg		10	

(Exponent, 2003)

There are uncertainties associated with this analysis. The estimated age associated with the core depths is dependent upon the sedimentation rate. However, unless the actual sedimentation rate is significantly higher than the 0.92 cm/yr to 2 cm/yr rates discussed above, it is likely that the much of the sediment below 2 feet were deposited before 1972, which was the end of San Diego Marine Construction Company's occupancy of the leasehold. Physical disturbances, such as bioturbation, dredging, and propeller wash, also introduce uncertainty into this interpretation. For example, if propeller wash from ship movements removes material from the bottom, the shallow sediment may be older than that indicated by applying the sedimentation rate. If disturbances result in re-deposition of older sediment on top of newer sediment, the shallow sediment may be older than interpreted.

The Shipyard Report uses the presence of graded bedding in the sediment profiles to identify areas of no apparent physical disturbance. Stations SW08 and SW17 were reported to be stations with no apparent physical disturbance (Exponent, 2003). Therefore, assuming a deposition rate of 2 cm/yr or less, the pollutants reported in the sediment below 2 feet at Stations SW08 and SW17 include discharges prior to 1972 and include wastes discharged by San Diego Marine Construction Company during their tenancy from 1914 to 1972.

6. Finding 6: Campbell Industries

Finding 6 of CAO No. R9-2012-0024 states:

The San Diego Water Board finds that Campbell caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance. These wastes contained metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), butyl tin species, PCBs, PCTs, PAHs, and TPH. From July 1972 through 1979, Campbell's wholly owned subsidiaries MCCSD and later San Diego Marine Construction Corporation operated a ship repair, alteration, and overhaul facility on what is now the BAE Systems leasehold at the foot of Sampson Street in San Diego. Shipyard operations were conducted at this site by Campbell over San Diego Bay waters or very close to the waterfront. An assortment of waste was generated at the facility including spent abrasive blast waste, paint, rust, petroleum products, marine growth, sanitary waste, and general refuse. Based on these considerations, Campbell is referred to as "Discharger(s)" in this CAO.

6.1. Jurisdiction

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirements … or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance…."

For the reasons set forth below, the San Diego Water Board has determined that Campbell should be named as dischargers in Cleanup and Abatement Order No. R9-2012-0024 pursuant to Water Code section 13304.

6.2. Admissible Evidence – State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996) the State Water Board adopted Resolution No. 92-49, *Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304.* Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under CWC section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC Code section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;

2. Site characteristics and location in relation to other potential sources of a discharge;

3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;

4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;

5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;

6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;

7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;

8. Reports and complaints;

9. Other agencies' records of possible known discharge; and

10. Refusal or failure to respond to San Diego Water Board inquiries.

6.3. Campbell Industries Owned the San Diego Marine Construction Facility From 1972 Through 1979

6.3.1. Leasehold Information

Campbell through its wholly owned subsidiary San Diego Marine Construction Corporation contributed to the accumulation of pollutants in marine sediment through waste discharges from its shipyard facility located within or adjacent to the current BAE Systems leasehold between 1972 and 1979 (Woodward-Clyde, 1995).

San Diego Marine Construction Company sold the business and assets of its Marine Division to MCCSD, a wholly owned subsidiary of Campbell Industries in July 1972, as indicated in the minutes of the first meeting of Directors of MCCSD approving that transaction. The purchase did not include the leasehold. San Diego Marine Construction Company surrendered its leasehold to the San Diego Unified Port District (SAR 163149), and the Port District entered into a new lease with MCCSD (SAR 174131). On September 14, 1979, San Diego Marine

Construction Corporation surrendered its lease to the Port District, which entered into a new lease with Southwest Marine, Inc., now BAE Systems. On August 24, 1981, San Diego Marine Construction Corporation was merged into Campbell Industries. Campbell ceased all operations on San Diego Bay in October 1999 (SDUPD, 2004).

The stock of Campbell Industries was acquired by Marco Holdings, Inc. ("MARCO"), a Washington corporation, in 1979. Marco Holdings, Inc. is a wholly-owned subsidiary of Marine Construction and Design Company, a Washington Corporation.

On February 19, 2004 the San Diego Water Board issued Investigative Order R9-2004-0026 directing MARCO to submit a historical site assessment report that completely documented all leasehold information and activities in the vicinity of the BAE Systems leasehold that may have affected water quality, including chemical and waste handling and storage activities, discharges, and monitoring data. To date MARCO contends it has been unable to locate any responsive documents.

Further investigation by the San Diego Water Board into the ownership of San Diego Marine Construction Corporation found that:

- San Diego Marine Construction Corporation, a California corporation, was the immediate predecessor tenant to BAE Systems at the Shipyard Sediment Site, occupying the premises from July 14, 1972 until August 31, 1979. (See Appendix for Section 6, Tab A);

- San Diego Marine Construction Corporation was a wholly owned subsidiary of Campbell Industries, a California corporation and certain assets of San Diego Marine Construction Corporation were sold to BAE Systems, as stated in a resolution adopted by the directors of Campbell Industries on July 27, 1979. (See Appendix for Section 6, Tab B);

- BAE Systems commenced occupation of the shipyard on September 1, 1979, immediately following San Diego Marine Construction Corporation's surrender of its leasehold interest to the Port District. (See Appendix for Section 6, Tab C); and

- San Diego Marine Construction Corporation was merged into Campbell on August 24, 1981 (Please see Appendix for Section 6, Tabs D & E) and Campbell Industries remains an active California corporation. (See Appendix for Section 6, Tabs F & G).

Based on these considerations, the San Diego Water Board has determined that Campbell operated within the BAE Systems leasehold from 1972 through 1979.

6.4. Campbell Owned and Operated a Full Service Ship Construction, Modification, Repair, and Maintenance Facility

6.4.1. Facility Description

Campbell was a ship construction and repair facility located at the foot of Sampson Street in the City of San Diego. Ship repair facilities at Campbell included two floating dry docks and three marine railways, which together with cranes, enabled ships to be launched or repaired. The basic purpose of the dry docks was to separate the vessel from the bay to provide access to parts of the ship normally underwater. Piers were used to support berthed vessels undergoing maintenance and repair operations and berthing barges were used to house vessel crews while ship repairs were being conducted. Because dry dock space was limited and expensive, many operations were conducted pier side. Marine railways were used to wheel vessels out of water (also called dry berthing a vessel). Activities conducted on dry berthed vessels were similar to those conducted in dry docks, but usually on a much smaller scale.

6.4.2. Activities Conducted by Campbell

Ship construction and repair have many industrial processes in common, including machining and metalworking, metal plating and surface finishing, surface preparation, solvent cleaning, application of paints and coatings, and welding. Although MARCO indicated that it had no records pertaining to San Diego Marine Construction Corporation or Campbell Industries' activities, it is reasonable to assume that its industrial activities were typical for the ship construction and repair industry and involved a multitude of industrial processes, many of which were conducted over San Diego Bay waters or very close to the waterfront. Campbell's operations likely included the following industrial processes:

- **Surface Preparation and Paint Removal**. Methods of surface preparation and paint removal included dry abrasive blasting, wet abrasive or slurry blasting, hydroblasting, and chemical paint stripping;

- **Paint Application**. After preparation, surfaces were painted. Most painting occurred in a dry dock and involved the ship hull and internal tanks. Painting was also conducted in other locations throughout the shipyard including piers and berths. Paint application was accomplished by way of air or airless spraying equipment and was a major activity at Campbell;

- **Tank Cleaning**. Tank cleaning operations used steam to remove dirt and sludge from internal tanks, particularly fuel tanks and bilges. Detergents, cleaners, and hot water were injected into the steam supply hoses;

- **Mechanical Repair/Maintenance/Installation**. A variety of mechanical systems and machinery required repair, maintenance, and installation;

- **Structural Repair/Alteration/Assembly**. Structural repair, alteration, and assembly generally involved welding, cutting, and fastening of steel plates or assembly blocks and other industrial processes;

- **Integrity/Hydrostatic Testing**. Hydrostatic or strength testing and flushing were conducted on hulls, tanks, or pipe repairs. Integrity testing was also conducted on new systems during ship construction phases;

- **Paint Equipment Cleaning**. All air and airless paint spraying equipment was typically cleaned following use. Paint equipment cleaning was a major producer of waste, including solvents, thinners, paint wastes, and sludges;

- **Engine Repair/Maintenance/Installation**. Automotive repair, ship engine repair, maintenance, and installation generated waste oils, solvents, fuels, batteries, and filters;

- **Steel Fabrication and Machining**. Fabrication of engine and ship parts occurred at Campbell. Cutting oils, fluids, and solvents were used extensively including acetone, methyl ethyl ketone (MEK) and chlorinated solvents;

- **Electrical Repair/Maintenance/Installation**. The repair, maintenance, and installation of electrical systems involved the use of numerous hazardous materials including trichloroethylene, trichloroethane, methylene chloride, and acetone;

- **Hydraulic Repair/Maintenance/Installation**. The repair, maintenance, and installation of hydraulic systems involved the replacement of spent hydraulic oils;

- **Tank Emptying**. Bilge, fuel, and ballast tanks were typically emptied prior to ship repair activities;

- **Fueling**. Fueling operations occurred at Campbell;

- **Shipfitting**. Shipfitting was conducted at Campbell, and is defined as the forming of ship plates and shapes, etc. according to plans, patterns, or molds;

- **Carpentry**. Woodworking, with associated wood dust production, was conducted at Campbell; and

- **Refurbishing/Modernization/Cleaning**. Refurbishing, modernization, and cleaning of ships were conducted at Campbell.

6.4.3. Materials Used by Campbell Industries

Materials that were commonly used for the above listed industrial shipyard activities are summarized below. Although a few specific materials are included, the list consists primarily of major categories.

- **Abrasive Grit**. Typically slag was collected from coal-fired boilers and consisted principally of iron, aluminum, silicon, and calcium oxides. Trace elements such as copper, zinc and titanium were also likely present. Sand, cast iron, or steel shot were also used as abrasives. Enormous amounts of abrasive were needed to remove paint; for example, removing paint from a 15,000 square foot hull could take up to 6 days and consume 87 tons of grit. Grit was needed in all dry and wet abrasive blasting.

- **Paint**. Paints contained copper, zinc, chromium, and lead as well as hydrocarbons. Two major types of paints used on ship hulls were:
  - Anticorrosive Paints (primers) Vinyl, vinyl-lead, or epoxy based coatings are used. Others contained zinc chromate and lead oxide.
  - Antifouling Paints were used to prevent growth and attachment of marine organisms by continuously releasing toxic substances into the water. Cuprous oxide and tributyltin fluoride or tributyltin oxide were the principal toxicants in copper-based and organotin-based paints, respectively.
- **Miscellaneous Materials**. Oils (engine, cutting, and hydraulic), lubricants, grease, fuels, weld, detergents, cleaners, rust inhibitors, paint thinners, hydrocarbon and chlorinated solvents, degreasers, acids, caustics, resins, adhesives/cement/sealants, and chlorine.

6.4.4. Waste Generated by Campbell

Categories of wastes commonly generated by the above listed industrial shipyard activities include, but are not limited to, those listed below.

- **Abrasive Blast Water: Spent Grit, Spent Paint, Marine Organisms, and Rust**. Abrasive blast waste, consisting of spent grit, spent paint, marine organisms, and rust was generated in significant quantities during all dry or wet abrasive blasting procedures. The constituent of greatest concern with regard to toxicity is the spent paint, particularly the copper and tributyltin antifouling components, which are designed to be toxic and to continuously leach into the water. Other pollutants in paint included zinc, chromium, and lead. Abrasive blast waste was conveyed by water flows, by becoming airborne (especially during dry blasting), or by falling directly into receiving waters;

- **Fresh Paint**. Losses occurred when paint ended up somewhere other than its intended location (e.g., dry dock floor, bay, worker's clothing). These losses resulted from spills, drips, and overspray. Typical overspray losses are estimated to have been approximately 5 percent for air spraying; and 1 to 2 percent for airless spraying;

- **Bilge Waste/Other Oily Wastewater**. This waste was generated during tank emptying, leaks, and cleaning operations (bilge, ballast, fuel tanks). In addition to petroleum products (fuel, oil), tank wash water also contained detergents or cleaners and was generated in large quantities;

- **Blast Wastewater**. Hydroblasting generated large quantities of wastewater. In addition to suspended and settleable solids (spent abrasive, paint, rust, marine organisms) and water, blast wastewater also may have contained rust inhibitors such as diammonium phosphate and sodium nitrite;

- **Oils (engine, cutting, and hydraulic)**. In addition to spent products, fresh oils, lubricants, and fuels were released as a result of spills and leaks from ship or dry dock equipment, machinery, and tanks (especially during cleaning and refueling);

- **Waste Paints/Sludges/Solvents/Thinners**. These wastes were generated from cleaning paint equipment;

- **Construction/Repair Wastes and Trash**. These wastes included scrap metal, welding rods, slag (from arc welding), wood, rags, plastics, cans, paper, bottles, packaging materials, etc.; and

- **Miscellaneous Wastes**. These wastes included lubricants, grease, fuels, sewage (black and gray water from vessels or docks), boiler blowdown, condensate, discard, acid wastes, caustic wastes, and aqueous wastes (with and without metals).

The Campbell facility was located immediately adjacent to San Diego Bay. Surface water runoff from the facility, unless diverted, directly entered the bay. Wastes from the facility were conveyed to the bay by water flows, becoming airborne (especially during painting and blasting operations), or falling directly into the bay.

6.5. Campbell Discharged Waste to San Diego Bay Creating Pollution, Contamination, and Nuisance Conditions in San Diego Bay

Based on the information regarding the leasehold history and historical activities provided in Sections 6.3, 6.4, 6.6, 6.7 and 6.8 the San Diego Water Board has determined that Campbell, through its wholly owned subsidiary San Diego Marine Construction Corporation, is responsible for discharging pollutants to the Shipyard Sediment Site as a result of its shipyard operations on what is currently the BAE Systems leasehold. Water Code section 13304 provides that a person who causes any waste to be discharged, or deposited where it probably will be discharged, into waters of the state creating, or threatening to create, a condition of pollution or nuisance is subject to cleaning up or abating the effects of the waste.

The Porter-Cologne Water Quality Act defines “pollution” as “an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects… …the waters for beneficial uses …”[61] “Contamination” is defined as “an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. “Contamination” includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.”[62]

The discharge of pollutants included heavy metals and organics, including arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, butyl tin species, PCBs, PCTs, PAHs, and TPH. As described in other sections of this report, these same pollutants have accumulated in

[61] Water Code section 13050(1).

[62] Water Code section 13050(k).

San Diego Bay sediment adjacent to the former Campbell facility in concentrations that adversely affect the beneficial uses of San Diego Bay and present a public health risk.

Accordingly, it is concluded that Campbell Industries, Inc., through its wholly owned subsidiary San Diego Marine Construction Corporation, caused or permitted waste to be discharged or deposited where it was discharged to San Diego Bay in a manner causing the creation of pollution, contamination, or nuisance conditions, and that it is appropriate for the San Diego Water Board to issue a cleanup and abatement order naming Campbell as dischargers pursuant to Water Code section 13304.

6.6. NPDES Requirement Regulation

Waste discharges from the Campbell facility were regulated under Waste Discharge Requirements (WDRs) prescribed by the San Diego Water Board pursuant to CWA section 402 and Water Code section 13376. These requirements are referred to as either NPDES requirements[63] or by the federal terminology "NPDES Permit." Campbell's NPDES requirements started in 1974, when the San Diego Water Board issued WDRs to regulate specific shipyard activities.

On or about July 16, 1974, Campbell submitted an NPDES Permit application to the San Diego Water Board for the discharge of pollutants to San Diego Bay from its facility at the foot of Sampson Street in the City of San Diego. The discharges to San Diego Bay subject to NPDES requirement regulation reported by Campbell included "... fouling organisms, paint, sandblasting sand and debris, oil, fuel , trash, cooling water, sewage.…"[64] On November 4, 1974, the San Diego Water Board adopted Order No. 74-84, NPDES Permit No. CA0107697, *Waste Discharge Requirements for San Diego Marine Construction Corporation*. Order No. 74-84 remained in effect for Campbell until August 31, 1979, when the facility was sold to Southwest Marine, now BAE Systems.

6.6.1. Order No. 74-84, NPDES Permit No. CA0107697

Order No. 74-84, NPDES Permit No. CA0107697 was in effect from November 4, 1974, to August 31, 1979, and contained the following finding and requirements that relate to the discussions contained herein:

- FINDING 5. During construction, repair, and cleaning operations, some pollutants, such as fouling organisms, paint, sandblasting sand and debris, oil, fuel, trash, cooling water, sewage, etc. are discharged or washed into San Diego Bay. Runoff

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63 Pursuant to Chapter 5.5 of the Porter-Cologne Water Quality Act, to avoid the issuance by the United States Environmental Protection Agency of separate and duplicative NPDES permits for discharges in California that would be subject to the Clean Water Act, the State's Waste Discharge Requirements (WDRs) for such discharges implement the NPDES regulations and entail enforcement provisions that reflect the penalties imposed by the Clean Water Act for violation of NPDES permits issued by the U.S. EPA. Thus, the State's WDRs that implement federal NPDES regulations (NPDES requirements) serve in lieu of NPDES permits.

64 See Finding 5 of Order No. 74-84, NPDES Permit No. CA0107697, Waste Discharge Requirements for San Diego Marine Construction Corporation adopted by the Regional Board on November 4, 1974.

of precipitation falling within the work yard, marine railways and floating dry docks also washes pollutants to San Diego Bay.

- B. PROVISIONS … 1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination or nuisance as defined in the CWC.

- B. PROVISIONS … 2. The discharger shall develop and implement a Water Pollution Control Plan, acceptable to the Executive Officer, detailing means of controlling the discharge of pollutants from each marine railway, floating dry dock and work area. The plan must address all of the following waste source categories that are generated at each facility and detail specific methods by which pollution from these sources will be controlled: trash, scale, rust, old paint, marine growths, new paint, oil and grease, sewage, wash water and cooling water. In developing the plan, the Discharger should consider methods of segregating the wastes listed above to prevent contact with precipitation and other liquids discharged to San Diego Bay, as well as methods of maintaining working areas in "broom clean" or equivalent conditions. Upon approval by the Executive Officer and the Regional Administrator, the Water Pollution Control Plan developed by the discharger shall become a condition of this permit.

- B. PROVISIONS … 3. The discharger shall comply with the following time schedule to assure compliance with Provision B.2 of this order:

Task	Completion Date	Report of Compliance Due
Develop Water Pollution Control Plan and submit plan to the Executive Officer	2-1-75	--
Begin implementation of approved Water Pollution Control Plan	5-1-75	5-15-75
Complete implementation of approved Water Pollution Control Plan	6-1-75	6-15-75

- B. PROVISIONS … 6. This order includes Items 1, 2, 4, 5, 6, 7, 8, 9 and 10 of the attached "Standard Provisions."

  Standard Provisions … 1. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from his liabilities under federal, state, or local laws, nor guarantee the discharger a capacity right in the receiving waters. … 2. The discharge of any radiological, chemical, or biological warfare agent or high level radiological waste is prohibited. … 4. The discharger shall permit the San Diego Water Board: (a) Entry upon premises in which an effluent source is located or in which any required records are kept; (b) access to copy any records required to be kept under terms and conditions of this order; (c) inspections of monitoring equipment or records, and (d)

> sampling of any discharge. … 5. All discharges authorized by this order shall be consistent with the terms and conditions of this order. The discharge of any pollutant more frequently than or at a level in excess of that identified and authorized by this order shall constitute a violation of the terms and conditions of this order. … 6. The discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed by the discharger to achieve compliance with the waste discharge requirements. … 7. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of at a legal point of disposal, and in accordance with the provisions of Division 7.5 of the CWC. For that purpose of this requirement, a legal point of disposal is defined as one for which waste discharge requirements have been prescribed by a Regional Water Board and which is in full compliance therewith. … 8. After notice and opportunity for a hearing, this order may be terminated or modified for cause, including, but not limited to: (a) violation of any term or condition contained in this order; (b) obtaining this order by misrepresentation, or failure to disclose fully all relevant facts; (c) a change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge. … 9. If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under section 307(a) of the Federal Water Pollution Control Act, or amendments thereto, for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in this order, the Board will revise or modify this order in accordance with such toxic effluent standard or prohibition and so notify the discharger. … 10. There shall be no discharge of harmful quantities of oil or hazardous substances, as specified by regulation adopted pursuant to section 311 of the Federal Water Pollution Control Act, or amendments thereto.

6.7. Industry-wide Historical Operational Practices

In November of 1997, the U.S. EPA released a study titled "EPA Office of Compliance Sector Notebook Project: PROFILE OF SHIPBUILDING AND REPAIR INDUSTRY." According to the 1995 Toxic Release Inventory (TRI) data, the reporting shipbuilding and repair facilities released and transferred 39 different TRI chemicals for a total of approximately 6.5 million pounds of pollutants during calendar year 1995. These releases and transfers were dominated by volatile organic compounds (VOCs) and metal-bearing wastes, approximately 52 percent and 48 percent, respectively (U.S. EPA, 1997c).

Releases to the air, water, and land have accounted for 37 percent (2.4 million pounds) of the reporting shipbuilding and repair facilities' total reportable chemicals. Of these releases, over 98 percent were released to the air from fugitive (74.6 percent; 1,778,818 pounds) or point (24.1 percent; 574,097 pounds) sources, while approximately 1.2 percent (29,479 pounds) was released directly to water (U.S. EPA, 1997c). However, a significant percentage of the total pollutants released as fugitive air or point air releases end up in the water, adding significantly to the 1.2 percent that is released directly to water.

VOCs accounted for about 86 percent of the reporting shipbuilding and repair facilities' reported TRI releases. Xylenes, n-butyl alcohol, toluene, methyl ethyl ketone, and methyl isobutyl ketone account for about 65 percent of the reporting shipbuilding and repair facilities' reported releases. These organic compounds are typically found in solvents that were used extensively by the industry in thinning paints and for cleaning and degreasing metal parts and equipment (U.S. EPA, 1997c).

The remainder of the releases was primarily metal-bearing wastes. Copper, zinc, and nickel-bearing wastes accounted for about 14 percent of the reporting shipbuilding and repair facilities' reported releases. These pollutants were released primarily as fugitive emissions during metal plating operations and as overspray in painting operations and could also have been released as fugitive dust emissions during blasting operations (U.S. EPA, 1997c).

6.7.1. Miscellaneous Information on Campbell Discharges

Historical operations at Campbell and its predecessor San Diego Marine Construction Company during the years from 1914 to the late 1970's included the following (SDUPD, 2004):

- Used formaldehyde and arsenic in pretreated wood at the woodshop;
- Performed blasting, welding, and painting activities for Navy contract work in the blasting area;
- Used a dust suppression system for the blasting house, which consisted of blowers directed at the bay with a water spray to cause the blast dust to settle in the water; and
- Discharged all wastes generated on the dry dock, including blast grit, paint, etc. into the bay.

The shipyard operations that generate wastes including heavy metals and organic chemicals at Campbell and San Diego Marine Construction Company included the following (SDUPD, 2004):

- Surface preparation and paint removal;
- Paint application;
- Tank cleaning; and
- Mechanical repair/maintenance/installation.

In 1973, an undetermined amount of fuel was released into San Diego Bay from Campbell, resulting in temporary closure of the site (SDUPD, 2004).

6.8. Sediment Core Analytical Results

The sediment core analytical results were evaluated to assess the potential presence of wastes released by Campbell. The Shipyard Report provides analytical results from sediment cores collected down to depths of approximately 6 to 8 feet (Exponent, 2003). The results from Stations SW04, SW08 and SW17, the core locations closest to the shoreline within the former Campbell leasehold, are discussed below.

Peng et al. (2003) reports a sedimentation rate of 0.92 centimeters per year (cm/yr) at a sampling station in the vicinity of the Shipyard Sediment Site outside the former Campbell leasehold. The sedimentation rate may be higher within the leasehold closer to the shoreline since the currents may be less and the shoreline is nearer the source(s) of sediment input. Table 6-1 shows the estimated years associated with the core depths for two different sedimentation rates. A sedimentation rate of 0.92 cm/yr suggests that the sediment in the 2 to 4 foot core were deposited prior to approximately 1936. Assuming a higher sedimentation rate of 2 cm/yr indicates that the sediment in the 2 to 4 foot core was deposited from approximately 1972 to 1942.

Table 6-1 Deposition Years for Cores Based on Sedimentation Rates

Core Depth	0.92 cm/year[1]	2.0 cm/year[2]
0 to 2 feet	2002 to 1936	2002 to 1972
2 to 4 feet	1936 to 1870	1972 to 1942
4 to 6 feet	1870 to 1804	1942 to 1912

1. 0.92 cm/year corresponds to approximately 33 years per foot.
2. cm/year corresponds to approximately 15 years per foot.

The analytical results from Stations SW04, SW08 and SW17, the core locations closest to the shoreline within the former Campbell leasehold, are provided in Table 6-2 below. The analytical results for tributyltin (TBT) were used to evaluate the applicability of the two deposition rates in Table 6-1. TBT was first used as a marine antifouling coating in the 1960s (GlobalSecurity.org, 2005). Therefore TBT should not be reported in sediment deposited prior to the 1960s unless TBT in the overlying sediment contaminated the underlying sediment by mechanisms such as bioturbation or disturbances via propeller wash.

Review of the 2 to 4 foot core results presented in Table 6-2 indicates the presence of significant TBT levels. A deposition rate of 0.92 cm/yr, suggests that the sediment at 2 to 4 feet were deposited between 1936 and 1870. However the TBT concentrations suggest that the 2 to 4 foot core interval includes sediment from the late 1960s or early 1970s. Therefore it is judged that the sedimentation rate is higher than 0.92 cm/year. A deposition rate of 2 cm/year suggests that the sediment in the core from 2 to 4 feet were deposited from 1942 to 1972. These dates are consistent with presence of TBT in cores collected at those depths. Therefore, the higher deposition rate of 2 cm/year is judged to be more applicable to the Shipyard Sediment Site than the lower 0.92 cm/yr rate.

Based on this evaluation it is concluded that at least some of the pollutants in the 2 to 4 foot cores include discharges made during the time of Campbell's tenancy from 1972 to 1979. As indicated in Table 6-2, some of the highest concentrations for PCBs, benzo[a] pyrene, tributyltin, arsenic, cadmium, chromium, copper, mercury, and nickel within each core are from the 2 to 4 feet depth.

Table 6-2 Selected Results from Core Stations SW04, SW08 and SW17

Depth	Contaminant	SW04	SW08	SW17
0 to 0.06 feet	PCB homologs µg/kg	5,200	2,700	-
0 to 2 feet	PCB homologs µg/kg	1,300	10,000	1,100
2 to 4 feet	PCB homologs µg/kg	27,000	13,000	1,300
4 to 5 feet	PCB homologs µg/kg			
4 to 6 feet	PCB homologs µg/kg		490	420
6 to 6.5 feet	PCB homologs µg/kg		6.2	
0 to 0.06 feet	Benzo [a] pyrene µg/kg	2,100	3,300	-
0 to 2 feet	Benzo [a] pyrene µg/kg	1,100	2,600	1,600
2 to 4 feet	Benzo [a] pyrene µg/kg	5,800	3,000	620
4 to 5 feet	Benzo [a] pyrene µg/kg			
4 to 6 feet	Benzo [a] pyrene µg/kg		85	200
6 to 6.5 feet	Benzo [a] pyrene µg/kg		6	
0 to 0.06 feet	Tributyltin µg/kg	3,300	1,900	-
0 to 2 feet	Tributyltin µg/kg	1,900	7,000	920
2 to 4 feet	Tributyltin µg/kg	5,000	5,100	600
4 to 5 feet	Tributyltin µg/kg			
4 to 6 feet	Tributyltin µg/kg		44	57
6 to 6.5 feet	Tributyltin µg/kg		2.3	
0 to 0.06 feet	Arsenic mg/kg	73	24	-
0 to 2 feet	Arsenic mg/kg	68	24	15
2 to 4 feet	Arsenic mg/kg	110	13	15
4 to 5 feet	Arsenic mg/kg			
4 to 6 feet	Arsenic mg/kg		4.9	3.7
6 to 6.5 feet	Arsenic mg/kg		2.1	
0 to 0.06 feet	Cadmium mg/kg	1.9	0.73	-
0 to 2 feet	Cadmium mg/kg	0.79	1.1	0.68
2 to 4 feet	Cadmium mg/kg	3.2	0.86	1.4

Depth	Contaminant	SW04	SW08	SW17
4 to 5 feet	Cadmium mg/kg			
4 to 6 feet	Cadmium mg/kg		0.07	.44
6 to 6.5 feet	Cadmium mg/kg		0.03	
0 to 0.06 feet	Chromium mg/kg	80	83	-
0 to 2 feet	Chromium mg/kg	26	100	87
2 to 4 feet	Chromium mg/kg	97	110	54
4 to 5 feet	Chromium mg/kg			
4 to 6 feet	Chromium mg/kg		7.4	30
6 to 6.5 feet	Chromium mg/kg		3.7	
0 to 0.06 feet	Copper mg/kg	1,500	900	-
0 to 2 feet	Copper mg/kg	370	1,500	440
2 to 4 feet	Copper mg/kg	2,200	1,500	280
4 to 5 feet	Copper mg/kg			
4 to 6 feet	Copper mg/kg		49	530
6 to 6.5 feet	Copper mg/kg		4.2	
0 to 0.06 feet	Lead mg/kg	430	220	-
0 to 2 feet	Lead mg/kg	150	360	100
2 to 4 feet	Lead mg/kg	410	340	90
4 to 5 feet	Lead mg/kg			
4 to 6 feet	Lead mg/kg		11	23
6 to 6.5 feet	Lead mg/kg		1.8	
0 to 0.06 feet	Mercury mg/kg	1.7	2.3	-
0 to 2 feet	Mercury mg/kg	1.1	4.8	1.30
2 to 4 feet	Mercury mg/kg	7.4	6.0	0.67
4 to 5 feet	Mercury mg/kg			
4 to 6 feet	Mercury mg/kg		0.3	0.17
6 to 6.5 feet	Mercury mg/kg		0.005	
0 to 0.06 feet	Nickel mg/kg	18	21	-

Depth	Contaminant	SW04	SW08	SW17
0 to 2 feet	Nickel mg/kg	8.3	15	19
2 to 4 feet	Nickel mg/kg	40	9.1	12
4 to 5 feet	Nickel mg/kg			
4 to 6 feet	Nickel mg/kg		2.6	7.6
6 to 6.5 feet	Nickel mg/kg		1.5	
0 to 0.06 feet	Silver mg/kg	1.6	1.5	-
0 to 2 feet	Silver mg/kg	0.59	1	2.0
2 to 4 feet	Silver mg/kg	1.4	0.49	1.1
4 to 5 feet	Silver mg/kg			
4 to 6 feet	Silver mg/kg		0.03	0.29
6 to 6.5 feet	Silver mg/kg		0.01	
0 to 0.06 feet	Zinc mg/kg	3400	830	-
0 to 2 feet	Zinc mg/kg	670	1,300	500
2 to 4 feet	Zinc mg/kg	1,500	790	400
4 to 5 feet	Zinc mg/kg			
4 to 6 feet	Zinc mg/kg		34	130
6 to 6.5 feet	Zinc mg/kg		10	

(Exponent, 2003)

There are uncertainties associated with this analysis. The estimated age associated with the core depths is dependent upon the sedimentation rate. However, unless the actual sedimentation rate is significantly higher than the 0.92 cm/yr to 2 cm/yr rates discussed above, it is likely that the sediment below 2 feet were deposited before 1979, which was during Campbell's occupancy of the leasehold. Physical disturbances, such as bioturbation, dredging, and propeller wash, also introduce uncertainty into this interpretation. For example, if propeller wash from ship movements removes material from the bottom, the shallow sediment may be older than that indicated by applying the sedimentation rate. If disturbances result in re-deposition of older sediment on top of newer sediment, the shallow sediment may be older than interpreted.

The Shipyard Report uses the presence of graded bedding in the sediment profiles to identify areas of no apparent physical disturbance. Stations SW08 and SW17 were reported to be stations with no apparent physical disturbance (Exponent, 2003). Therefore, assuming a deposition rate of 2 cm/yr or less, the pollutants reported in the sediment below 2 feet at Stations SW08 and

SW17 include discharges between 1972 and 1979, and include wastes discharged by Campbell during its tenancy from 1972 to 1979.

Technical Report
for
Cleanup and Abatement
Order No. R9-2012-0024

APPENDIX FOR SECTION 6

CAMPBELL INDUSTRIES

March 14, 2012

TAB A

County Recorder
9/18/79 File/Page # 79-390698

AGREEMENT

FOR

SURRENDER AND TERMINATION OF LEASE

SAN DIEGO UNIFIED PORT DISTRICT
DOCUMENT No. 12222
FILED SEP 11 1979
MICROFILM No.
OFFICE OF THE CLERK

The parties to this Agreement are the SAN DIEGO UNIFIED PORT DISTRICT, a public corporation, (Lessor) and SAN DIEGO MARINE CONSTRUCTION CORP. (formerly MCCSD), a California corporation, (Lessee).

Recitals:

Lessor and Lessee entered into a written lease dated, July 14, 1972, (the lease) for premises which are San Diego Bay tidelands located in the City of San Diego, California. The lease is Document No. 6222, on file in the office of the Clerk of Lessor and particularly described in Exhibits "A" and "B", attached hereto and by this reference made a part hereof. The parties intend to terminate the lease by Lessee surrendering and vacating the premises and Lessor accepting such surrender and leasing the premises to a third party.

The Parties Agree:

1. The effective date of this Agreement shall be August 31, 1979, subject to the Lessor entering into and granting a new lease to Southwest Marine, Inc., a California corporation, for the same premises. In the event a new lease is not entered into and granted to Southwest Marine, Inc., a California corporation, this Agreement shall be null and void and of no force or effect.

2. Lessee surrenders the lease and Lessor accepts such surrender on the effective date of this Agreement. The lease shall be fully and finally surrendered and terminated on said effective date, subject to Paragraph 1, above. Lessee shall vacate said premises on said effective date.

3. Any remaining rights, duties or obligations of the parties pursuant to the terms, covenants and conditions in the lease shall continue in full force and effect and shall not be affected by this Agreement. Nothing herein is intended nor shall be construed as a waiver of any such rights or as a release of any such duties or obligations, whether known or unknown at this time or upon the effective date of this Agreement.

DATED: 9-14, 1979.

SAN DIEGO UNIFIED PORT DISTRICT

By [signature] ASSISTANT Port Director

APPROVED as to form and legality
Port Attorney

[signature]
JOSEPH D. PATELLO
Port Attorney

SAN DIEGO MARINE CONSTRUCTION CORP.

By [signature]
Title: PRES.

STATE OF CALIFORNIA) ss.
COUNTY OF SAN DIEGO)

On this 14 day of SEPT., 1979, before me, a Notary Public in and for the County of San Diego, State of California, personally appeared GABRIEL J. GABRINO, known to me to be the ASSISTANT PORT DIR. of the San Diego Unified Port District, a public corporation, and known to me to be the person who executed the within instrument on behalf of said public corporation and acknowledged to me that such public corporation executed the same.

OFFICIAL SEAL
SALLY LOMBARDO
NOTARY PUBLIC - CALIFORNIA
SAN DIEGO COUNTY
My comm. expires MAY 17, 1983

Sally Lombardo

STATE OF CALIFORNIA) ss.
COUNTY OF SAN DIEGO)

On this 3rd day of August, 1979, before me, a Notary Public in and for the County of San Diego, State of California, personally appeared Peter G. Schmidt, known to me to be the President of San Diego Marine Construction Corp., a California corporation, and known to me to be the person who executed the within instrument on behalf of said corporation and acknowledged to me that such corporation executed the same.

OFFICIAL SEAL
VIRGINIA R. MAYBERRY
NOTARY PUBLIC - CALIFORNIA
PRINCIPAL OFFICE IN
SAN DIEGO COUNTY
My Commission Expires March 23, 1983

Virginia R. Mayberry

SAN DIEGO UNIFIED PORT DISTRICT
DOCUMENT No. 12222

TAB B

CERTIFICATE

The undersigned, Secretary of Campbell Industries, a California corporation (the "Company"), does hereby certify that the following is a true and correct copy of resolution duly adopted by the directors of the Company on July 27, 1979 and that the same has not since been modified or rescinded:

> RESOLVED that the sale of certain assets of San Diego Marine Construction Corp., a wholly-owned subsidiary of the Company, to Southwest Marine, Inc. at the price of $3.65 million, substantially on the terms and conditions set forth in the form of Agreement of Purchase and Sale attached hereto as Exhibit "A" is hereby authorized and approved.

The undersigned does hereby further certify that the document attached hereto as Exhibit "A" is the Agreement of Sale and Purchase referred to in the foregoing resolution.

IN WITNESS WHEREOF, the undersigned has hereunto set his hand and the seal of the Company this 19th day of September, 1979.

Secretary

TAB C

L E A S E

THIS LEASE, made and entered into this 1 day of [illegible], 1979, between the SAN DIEGO UNIFIED PORT DISTRICT, a public corporation, hereinafter called "Lessor," and SOUTHWEST MARINE, INC., a California corporation, hereinafter called "Lessee," WITNESSETH:

Lessor, for the consideration hereinafter set forth, hereby leases to Lessee for the term and upon the conditions hereinafter set forth, a portion of those lands conveyed to the San Diego Unified Port District by that certain Act of Legislature of the State of California entitled "San Diego Unified Port District Act," Stats. 1962, 1st Ex. Sess., c. 67, as amended, which lands are more particularly described as follows:

> Approximately 836,378 square feet of tideland area in the City of San Diego, California, more particularly described and delineated on Drawing No. 2087-B revised July 27, 1979, attached hereto as Exhibits "A" and "B" and by this reference made a part hereof.

TO HAVE AND TO HOLD said leased premises for the term of this lease and upon the conditions as follows:

1. TERM: The term of the lease shall be for a period of thirty-nine (39) years, three (3) months, commencing on September 1, 1979, and ending on November 30, 2018, unless sooner terminated as herein provided.

2. RENT: Lessee agrees to pay to Lessor rent in accordance with the following schedules and procedures:

(a) The term of this lease shall be divided into a series of rental periods, each consisting of sixty (60) months, 15

TAB D

California Business Portal

Secretary of State Kevin Shelley

DISCLAIMER: The information displayed here is current as of JUL 23, 2004 and is updated weekly. It is not a complete or certified record of the Corporation.

Corporation		
SAN DIEGO MARINE CONSTRUCTION CORP.		
Number: C0654347	**Date Filed:** 6/23/1972	**Status:** merged out
Jurisdiction: California		
Mailing Address		
P O BOX 1870		
SAN DIEGO, CA 92112		
Agent for Service of Process		

For information about certification of corporate records or for additional corporate information, please refer to Corporate Records. If you are unable to locate a corporate record, you may submit a request to this office for a more extensive search. Fees and instructions for requesting this search are included on the Corporate Records Order Form.

Blank fields indicate the information is not contained in the computer file.

If the status of the corporation is "Surrender", the agent for service of process is automatically revoked. Please refer to California Corporations Code Section 2114 for information relating to service upon corporations that have surrendered.

TAB E

09/21/04 SECRETARY OF STATE STATUS INQUIRY - PAGE 1 14:26:22 SCRN ID: C1
NAME: SAN DIEGO MARINE CONSTRUCTION CORP.

CORP NO: C0654347 INC. DATE: 06/23/1972 STATUS: MERGED OUT 08/24/1981
DOMESTIC STOCK CLASS:
NO OF PAGES: 00 FOREIGN ST/CTRY:
LAST COMPLETE STMNT OF OFFICERS: DATE: 04/17/81 NO: 0135599
SECOND STATEMENT: COMPLETE DATE: 05/05/80 NO: 0130214
AMENDMENT: DATE: NO:

CEO:

AGENT:

1=NEW SEARCH 2=SECOND PAGE 3=DISPLAY HISTORY COST THIS SEARCH $ 1.00
PRESS 'ENTER' TO CONTINUE OR SELECT OPTION BY NUMBER: _

09/21/04 SECRETARY OF STATE STATUS INQUIRY - PAGE 2 14:26:28 SCRN ID: C2
NAME: SAN DIEGO MARINE CONSTRUCTION CORP.

CORP NO: C0654347 DOMESTIC STOCK STATUS: MERGED OUT 08/24/1981

PRINCIPAL EXECUTIVE ADDR:

CALIFORNIA ADDRESS:

MAILING ADDRESS: P O BOX 1870
SAN DIEGO, CA 92112

TYPE OF BUSINESS:

1=NEW SEARCH 3=DISPLAY HISTORY COST THIS SEARCH $ 1.00
PRESS 'ENTER' TO CONTINUE OR SELECT OPTION BY NUMBER: _

NAME: SAN DIEGO MARINE CONSTRUCTION CORP.

DATE	TRANSACTION	DOC NO.	NO.OF PAGES	ADDITIONAL INFORMATION
08/24/1981	MERGER CAMPBELL INDUSTRIES		0	OUTGOING-MERGED INTO C0289743

1=NEW SEARCH 4=FIRST PAGE COST THIS SEARCH $ 1.00
PRESS 'ENTER' TO CONTINUE OR SELECT OPTION BY NUMBER: _

TAB F

California Business Portal

Secretary of State Kevin Shelley

DISCLAIMER: The information displayed here is current as of JUL 23, 2004 and is updated weekly. It is not a complete or certified record of the Corporation.

Corporation		
CAMPBELL INDUSTRIES		
Number: C0289743	**Date Filed:** 8/3/1954	**Status:** active
Jurisdiction: California		
Mailing Address		
P O BOX 1870		
SAN DIEGO, CA 92112		
Agent for Service of Process		
ROBERT F ALLEN		
FOOT OF 8TH & HARBOR DRIVE		
SAN DIEGO, CA 92101		

For information about certification of corporate records or for additional corporate information, please refer to Corporate Records. If you are unable to locate a corporate record, you may submit a request to this office for a more extensive search. Fees and instructions for requesting this search are included on the Corporate Records Order Form.

Blank fields indicate the information is not contained in the computer file.

If the status of the corporation is "Surrender", the agent for service of process is automatically revoked. Please refer to California Corporations Code Section 2114 for information relating to service upon corporations that have surrendered.

TAB G

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09/21/04   SECRETARY OF STATE STATUS INQUIRY - PAGE 1   14:26:57    SCRN ID: C1
NAME: CAMPBELL INDUSTRIES


CORP NO: C0289743      INC. DATE: 08/03/1954 STATUS: ACTIVE
DOMESTIC STOCK                     CLASS:
                       NO OF PAGES: 00 FOREIGN ST/CTRY:
LAST COMPLETE STMNT OF OFFICERS:  DATE: 08/13/90 NO: 0360025
    SECOND STATEMENT: NO CHANGE   DATE: 06/09/03 NO: 0220894
                     AMENDMENT:   DATE:            NO:

      CEO: PETER G SCHMIDT
           FOOT OF 8TH & HARBOR DRIVE
           SAN DIEGO, CA 92101

    AGENT: ROBERT F ALLEN
           FOOT OF 8TH & HARBOR DRIVE
           SAN DIEGO, CA 92101

1=NEW SEARCH   2=SECOND PAGE   3=DISPLAY HISTORY     COST THIS SEARCH $   1.00
    PRESS 'ENTER' TO CONTINUE OR SELECT OPTION BY NUMBER:  _
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09/21/04   SECRETARY OF STATE STATUS INQUIRY - PAGE 2   14:27:01    SCRN ID: C2
NAME: CAMPBELL INDUSTRIES


CORP NO: C0289743 DOMESTIC STOCK              STATUS: ACTIVE

PRINCIPAL EXECUTIVE ADDR: FOOT OF 8TH & HARBOR DRIVE
                          SAN DIEGO, CA 92101

      CALIFORNIA ADDRESS: FOOT OF 8TH & HARBOR DRIVE
                          SAN DIEGO, CA 92101

         MAILING ADDRESS: P O BOX 1870
                          SAN DIEGO, CA 92112


TYPE OF BUSINESS: SHIP REPAIR


1=NEW SEARCH   3=DISPLAY HISTORY                   COST THIS SEARCH $   1.00
    PRESS 'ENTER' TO CONTINUE OR SELECT OPTION BY NUMBER:  _
```

NAME: CAMPBELL INDUSTRIES

DATE	TRANSACTION	DOC NO.	NO.OF PAGES	ADDITIONAL INFORMATION
12/17/1979	MERGER		0	SURVIVOR-MERGED IN C0944123
	CAMPBELL ACQUISITION CORPORATION			
08/24/1981	MERGER		0	SURVIVOR-MERGED IN C0700548
	CAMPBELL YACHTS, INC.			
				SURVIVOR-MERGED IN C0654347
	SAN DIEGO MARINE CONSTRUCTION CORP.			

1=NEW SEARCH 4=FIRST PAGE COST THIS SEARCH $ 1.00

PRESS 'ENTER' TO CONTINUE OR SELECT OPTION BY NUMBER: _

NAME: CAMPBELL INDUSTRIES

DATE	TRANSACTION	DOC NO.	NO.OF PAGES	ADDITIONAL INFORMATION
08/24/1982	MERGER N-S SALE, INC.		0	SURVIVOR-MERGED IN C0563437
05/19/1989	MERGER CAMPBELL EXPORT CORPORATION	A0370883	1	MERGED IN C0649353

1=NEW SEARCH 4=FIRST PAGE COST THIS SEARCH $ 1.00
PRESS 'ENTER' TO CONTINUE OR SELECT OPTION BY NUMBER: _

7. Finding 7: Chevron, A Subsidiary of ChevronTexaco

Finding 7 of CAO No. R9-2012-0024 states:

Chevron, a subsidiary of ChevronTexaco (hereinafter, Chevron) owns and operates the Chevron Terminal, a bulk fuel storage facility currently located at 2351 East Harbor Drive in the City of San Diego adjacent to the NASSCO and BAE Systems leaseholds. Fuel products containing petroleum hydrocarbons have been stored at the Chevron Terminal since the early 1900s at both the currently operating 7 million gallon product capacity upper tank farm and the closed 5 million gallon capacity lower tank farm. Based on the information that the San Diego Water Board has reviewed to date, there is insufficient evidence to find that discharges from the Chevron Terminal contributed to the accumulation of pollutants in the marine sediments at the Shipyard Sediment Site to levels, which create, or threaten to create, conditions of pollution or nuisance. Accordingly, Chevron is not referred to as "Discharger(s)" in this CAO.

7.1. Jurisdiction

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirements ... or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance…."

For the reasons set forth below, the San Diego Water Board has determined that Chevron, a subsidiary of ChevronTexaco, should not be named as a discharger in Cleanup and Abatement Order No. R9-2012-0024 because there is insufficient evidence to find that discharges from the Chevron Terminal contributed to the accumulation of pollutants in the marine sediment at the Shipyard Sediment Site to levels, which create, or threaten to create, conditions of pollution or nuisance.

7.2. Admissible Evidence – State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996) the State Water Board adopted Resolution No. 92-49, *Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304*. Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under CWC section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;

2. Site characteristics and location in relation to other potential sources of a discharge;

3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;

4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;

5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;

6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;

7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;

8. Reports and complaints;

9. Other agencies' records of possible known discharge; and

10. Refusal or failure to respond to San Diego Water Board inquiries.

7.3. Chevron, A Subsidiary of ChevronTexaco

Chevron companies (including Standard Oil Company and Chevron Products Company) have operated bulk fuel storage terminal #100-1252 (Chevron Terminal) since the early 1900s. The Chevron Terminal current address is 2351 East Harbor Drive in the City of San Diego. Fuel products containing petroleum hydrocarbons have been stored at Chevron Terminal at both the currently operating 7 million gallon product capacity upper tank farm and the closed 5 million gallon capacity lower tank farm and relocated lower tank farm. In addition to the tank farms, the Chevron Facilities formerly included a fueling pier, wharf, petroleum warehouse, and associated pipelines. Details regarding current and historical activities are provided in Section 7.4 below.

Chevron submitted a Technical Data Report (LFR Report) and the report "Evaluation of Polynuclear Aromatic Hydrocarbons and Metals in the San Diego Shipyard Site Sediments" (List Report) in response to San Diego Water Board Investigation Orders No. R9-2004-0026 and R9-2004-0027 (LFR Levine-Fricke, 2004; List, 2005). The LFR Report provides information regarding current and historical activities associated with the Chevron Terminal. The List Report evaluates the PAHs and metals in the sediment to identify likely sources. The List Report is discussed below in Section 7.11 Analyses and Evaluations of Petroleum Hydrocarbons.

7.4. Current and Historical Activities

Chevron's operations have involved the transport, handling, and use of a wide variety of chemicals including premium unleaded gasoline, mid-grade unleaded gasoline, regular unleaded gasoline, product contact water, transmix, generic additive, techron additive, diesel fuel, ethanol, jet fuel, solvent, household cleaning products, motor oil, engine coolant, paint, thinner, lube oil, stove oil, Stoddard solvent, aviation gasoline, pearl oil, distillate oil, and black oil (SDUPD, 2004).

Chevron formerly operated bulk fuel storage and transfer operations at locations on the current NASSCO property and adjacent to the BAE Systems property (LFR Levine-Fricke, 2004). The relocated lower tank farm was adjacent to the BAE Systems leasehold and approximately 100 feet from San Diego Bay. According to information provided by Chevron, their former operations on the NASSCO property included a fueling pier (National Steel Marine Terminal Pier 1) in San Diego Bay, the former relocated tank farm, and associated pipelines from the fueling pier to the tank farm (LFR Levine-Fricke, 2004). Chevron leased a portion of the area between the Chevron Terminal and San Diego Bay for operation of the fueling pier and pipeline connecting the pier to the current and former tank farms from approximately 1920 to 1974. The Chevron Report refers to this as the wharf lease.

Storm water flows from the Chevron Terminal enter a City of San Diego MS4 storm drain that terminates in San Diego Bay in the Shipyard Sediment Site approximately 300 feet south of the Sampson Street extension. Petroleum hydrocarbons from tanks and/or piping releases have been found in soil and ground water at the upper and the former lower tank farms. The regional groundwater gradient is generally towards San Diego Bay. Over 30 ground water monitoring wells have been installed by Chevron to investigate the impacts to groundwater in the vicinity of their current and former tank farms. The monitoring results indicate that the groundwater contamination does not extend to San Diego Bay (LFR Levine-Fricke, 2004).

7.5. NPDES Requirement Regulation

Waste discharges from the Chevron Terminals facility have been regulated since 1974 under Waste Discharge Requirements (WDRs) prescribed by the San Diego Water Board pursuant to CWA section 402 and Water Code section 13376. These requirements are referred to as either NPDES requirements or by the federal terminology "NPDES Permit." Chevron currently discharges storm water runoff from Chevron Terminal to San Diego Bay at the Shipyard Sediment Site subject under the terms and conditions of the statewide Industrial NPDES Storm Water Permit. The San Diego Water Board conducted a file review and determined that no significant NPDES requirement violations occurred at the Chevron Terminal facility during the period when it was subject to NPDES requirement regulation. Table 7-1, below, summarizes the NPDES Requirement history for the Chevron Terminal.

Table 7-1 Chevron NPDES Permits

Order Number / NPDES No.	Title	Adoption Date	Expiration Date
Order No. 74-38, NPDES Permit No. CAS0107476	Waste Discharge Requirements for a Discharge of Storm Water Runoff from a Petroleum Storage Area through a City of San Diego Storm Drain Terminating in San Diego Bay, 350 feet south of the Extension of Sampson Street	November 4, 1974	June 25, 1979
Order No. 79-42, NPDES Permit No. CAS0107476	(same as above)	June 25, 1979	July 16, 1984
Order No. 84-26, NPDES Permit No. CA01074761	(same as above)	July 16, 1984	March 10, 1994
Order No. 94-30, NPDES Permit No. CA0107476	An Order Rescinding Order No. 84-26	March 10, 1994	Order No. 94-30 rescinds Order No. 84-26 since facility discharge is covered by statewide General Industrial Storm Water Permit, Order No. 91-13
Order No. 91-13, NPDES Permit No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities (Statewide General Industrial Storm Water Permit)	June 8, 1992	February 5, 1998
Order No. 97-03-DWQ, NPDES Permit No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	February 5, 1998	Ongoing

7.6. Documented Releases

The following is a summary of the documented releases of petroleum related products from the Chevron facility.

7.6.1. Belt Street Pipeline

On February 1, 2001, the Belt Street Pipeline was ruptured during geotechnical drilling activities for a City of San Diego water project. The drilling was performed by AMEC Earth and Environmental Inc., under contract with the City of San Diego. An estimated 3,000 to 4,000 gallons of gasoline were released (SDUPD, 2004). When neither the City nor AMEC would accept responsibility for the cleanup efforts, Chevron implemented a dual phase extraction

(DPE) system at NAS-1 with the use of a thermal oxidizing Mobile Treatment System (MTS). Chevron commenced with the cleanup effort to ensure that there was no adverse effect to San Diego Bay as a result of the pipeline rupture. The San Diego Water Board ultimately issued a Cleanup and Abatement Order to the City of San Diego and AMEC. As a result of the emergency response actions taken by Chevron, and the assessment work performed by the City and/or AMEC, the San Diego Water Board ultimately issued a "no further action" letter to the City and AMEC, dated August 21, 2003 (LFR Levine-Fricke, 2004).

7.6.2. Upper Tank Farm

The Upper Tank Farm area has three documented releases. Most recently, on April 30, 1973, an evidence of an estimated 200 gallons of petroleum was found on the surface of San Diego Bay. The San Diego Water Board identified the Chevron facility as the likely source of the release (SDUPD, 2004). Chevron stated that the investigation was incomplete because 1) Terminal drains were dry at the time of the release, 2) there was no direct evidence of a spill on the Chevron property, 3) there were five openings on the drain line to the Bay, which were not on Chevron Property, but on public streets, and 4) there were no updated drawings which show the drain system does not extend beyond the Chevron property limit (LFR Levine-Fricke, 2004).

On August 14, 1967, an estimated 400-gallon release of diesel fuel due to a leak in a filter gasket was reported by terminal personnel. No further information is available to determine whether the spill reached San Diego Bay. (LFR Levine-Fricke, 2004)

Historical records maintained by the San Diego Fire Department contain a summary of a fire at the Chevron associated facility (originally owned by Standard Oil) in October 1913. A spark from a passing locomotive was reportedly the cause of the fire in a 250,000-gallon tank of distillate oil. This caused a second fire in a 1,500,000-gallon tank of black oil resulting in the explosion of a third, 250,000-gallon tank containing gasoline. The explosion reportedly spread burning gasoline to nearby lumberyards that caught fire as well. The fire burned for 35 hours before it was extinguished. Reportedly the total estimated two million gallons of crude oil and leaded gasoline were destroyed by the fire and/or released into the San Diego Bay. According to the San Diego Union, the burning oil spread out over the bay and nearby lumberyards. (SDUPD, 2004)

7.7. Dredge and Fill Reclamation Projects

Much of the current land area of the NASSCO and BAE Systems leaseholds was created during a major dredge and fill project completed between 1935 and 1936 (SDUPD, 2004). A bulkhead was used to retain the dredged sediment, creating additional land area. It is likely that contaminated sediment present within the dredge and fill areas, such as any that resulted from the 1913 fire, are buried within the fill area behind the bulkhead.

7.8. Petroleum and Ethanol Storage and Handling

Petroleum products are delivered to the Chevron facility via an underground pipeline owned and operated by Kinder Morgan Energy Partners. The pipeline surfaces before it enters the tank farm. The petroleum is transferred to the aboveground storage tanks (ASTs) within the containment walls of the tank farm, and it is transferred to tanker trucks via aboveground piping. Storm water from the tank farm is collected in an underground storage tank, sent to a clarifier for processing, and only then discharged to the storm sewer system (LFR Levine-Fricke, 2004).

Ethanol is transferred directly from railcars to the facility on the day of arrival via aboveground piping. Terminal personnel manually connect the tank cars before the transfer is started and are present during the transfer. The ethanol facility, which includes a rail spur, is underlain by a double containment system designed to capture any accidental releases of ethanol during off-loading operations (LFR Levine-Fricke, 2004).

7.9. Comparison of Shipyard Sediment Data to Location of Chevron Facilities

The former Chevron fueling pier, now known as the National Steel Marine Terminal Pier 1, is located near the boundary between BAE Systems and NASSCO, and south of BAE Systems Pier 4. The Shipyard Report (Exponent, 2003) sediment sampling sites SW20 through SW25 are located between BAE Systems' Piers 3 and 4 (which is northwest of the Chevron Lower Tank Farm site).

Review of the shipyard sediment sampling data for high molecular weight PAHs (HPAHs) shows that some of the highest concentrations are north of the former Chevron fueling pier (National Steel Marine Terminal Pier 1) and both lower tank farms (Exponent, 2003). Table 7-2 shows the HPAH sampling results for selected sampling stations in the vicinity of the Chevron facilities and in the vicinity of the mouth of Chollas Creek. For comparison purposes the background sediment concentration for HPAHs is 673 µg/kg.

Table 7-2 Sediment Sampling Results for HPAHs

Station	Depth (Feet)	HPAH (µg/kg)	Station Location Description
SW 20	Surface 0 – 1.5 1.5 – 2.42	11,000 6,300 400	Approximately 200 feet southwest of the former Chevron lower tank farm.
SW 24	Surface 0 – 2 2 – 3	58,000 17,000 2,900	Approximately 270 feet southwest of the former Chevron lower tank farm.
SW 27	Surface 0 – 2 2 – 4.24 5.29 – 5.6	12,000 3,800 630 37	Approximately 260 feet southwest of the Standard Oil pipelines.
SW 28	Surface 0 – 2 2 – 4 4 – 5.29	20,000 25,000 8,700 1,900	Approximately 100 feet southwest of the Standard Oil pipelines and approximately 300 feet west of the former fueling pier.
NA 01	Surface 0 – 2 2 – 4 5 – 5.5	7,400 7,200 9,100 8,800	Less than 100 feet west of the mid-point of the former fueling pier.
NA 23	Surface 0 – 2 2 – 4	3,400 8,500 4,200	Approximately 100 feet south of the Chevron wharf lease and approximately 300 feet east of the fueling pier and pipelines.
NA 20	Surface 0 – 2 2 – 4 4 – 6 6 – 8.1	2,900 2,400 4,000 2,500 1,200	Near mouth of Chollas Creek

Station	Depth (Feet)	HPAH (µg/kg)	Station Location Description
NA 21	Surface	2,100	Near mouth of Chollas Creek
	0 – 2	6,100	
	2 – 4	3,200	
	4 – 6	460	
	6 – 7.6	<15	
Background	NA	673	Based on 95% upper prediction limit of reference stations

(Exponent, 2003; LFR Levine-Fricke, 2004)

The Table 7-2 data indicates that:

- Stations SW20 through SW24, located closest to the former Chevron lower tank farm (between Piers 3 and 4), have considerably higher HPAH results than the stations located closest to the mouth of Chollas Creek for most depth intervals. This suggests source(s) other than Chollas Creek have made significant contributions to the accumulation of HPAHs reported in the stations near the former Chevron operations.

- The second highest surface sediment HPAH concentration for the entire Shipyard Sediment Site was reported for station SW24 (58,000 µg/kg).

Sediment deposition and erosional processes in the vicinity of the Shipyard Sediment Site are not well known. Very little evidence of maintenance dredging in the northern portion of the NASSCO lease area has been found in documents, although the nearby area between BAE Systems Piers 1 through 4 was dredged in 1984. It is likely that this dredging removed some of the petroleum hydrocarbon-impacted sediment deposited prior to 1984. Chevron ceased operations at the National Steel Marine Terminal 1 (south of BAE Systems Pier 4) in 1974 (LFR Levine-Fricke, 2004).

7.10. Properties and Sources of Polynuclear Aromatic Hydrocarbons

PAHs are a class of compounds that occur naturally in fossil fuels such as coal and crude oil. PAHs are also present in refined petroleum products including diesel fuel and fuel oil. The PAH make-up of crude oil and refined petroleum products is highly complex and variable and no two sources have the same composition (Nagpal, 1993). Physical and chemical properties of PAHs vary with molecular weight. The solubility in water decreases as the molecular weight increases. Accordingly, PAHs of different molecular weight vary in their behavior and distribution in the environment and in biological effects. For aquatic biota, toxicity increases as molecular weight increases (Eisler, 1987). High molecular weight PAHs (HPAHs) include benzo[a] pyrene.

Benzo[a] pyrene has carcinogenic properties and, because of this, is frequently used as an indicator of PAHs (Eisler, 1987).

Major sources of PAHs in the atmosphere include forest and prairie fires (19,513 metric tons), agricultural burning (13,009 metric tons), and refuse burning (4,769 metric tons). The major sources of PAHs to aquatic environments are petroleum spillage (170,000 metric tons) and atmospheric deposition (50,000 metric tons) (Eisler, 1987).

When released to the environment, PAHs become associated with particulate materials. PAHs released into the atmosphere eventually reach the ground as the particles they attach to are deposited. PAHs released in petroleum spills enter the aquatic environment, either directly or via runoff, where they become incorporated into bottom sediment, concentrate in aquatic biota, or experience chemical oxidation and biodegradation (Eisler, 1987).

7.11. Analyses and Evaluations of Petroleum Hydrocarbons

The List Report, submitted by Chevron, states that “chemical analyses of sediment samples taken at the Shipyard Sediment Site … have shown that the high molecular weight polynuclear aromatic hydrocarbons (HPAHs) found in those sediments cannot be traced to products stored, transferred or distributed by Chevron at its San Diego Terminal.” (List, 2005). Chevron reports that, based on independent and Chevron proprietary product analyses, the HPAHs present in the sediment are not present in the Chevron products at the site. Their report suggests that the HPAHs are of coal tar origin.

BP submitted the report “Forensic Geochemical Analysis of TPH and PAH Data Collected from Sediments at BAE Systems, San Diego, CA” (Haddad Report) (Haddad, 2005). The Haddad Report states that the TPH and PAH contamination “could not have come from BP Terminal operations.” The report’s conclusions are based their analysis of the data provided in the Shipyard Report (Exponent, 2003). TPH carbon range-based quantifications were used the analysis. The analysis also included using PAH “fingerprinting” and the fact that there are two basic types of PAHs: parent PAHs and alkylated PAHs. Comparisons of the PAH “fingerprints” and TPH carbon ranges were used in the Haddad Report to conclude that the hydrocarbons in shipyard sediment are from pyrogenic sources, not petrogenic sources. PAHs from petrogenic sources would provide evidence of a possible release of PAHs from a bulk storage terminal.

Using the molecular weight technique, TPH can be categorized as gasoline range organics (GRO), diesel range organics (DRO), or residual range organics (RRO). Some petroleum products can fall into more than one category. By graphing the spectrum of molecular weights, a curve of each product or mixture of products, can be generated. GRO was found in inconsiderable amounts in sediment samples with only one detection in over 80 sediment samples. Elevated concentrations of DRO were found in near-shore sediment, while RRO concentrations were found near the northwest corner of the sampling area (at sampling stations SW01 and SW02) and near storm water outfalls. The lack of GRO in samples suggests sources other than the refined products in the Chevron and BP facilities (Haddad, 2005).

The fingerprinting technique separates the PAHs into six homologous PAH families: naphthalenes, flourenes, dibenzothiophenes, anthracenes/phenanthrenes, fluoranthenes/pyrenes, and chrysenes. Each family is composed of a parent PAH, with no carbon atoms attached to their rings, and the alkylated PAHs with 1 to 4 carbon atoms attached to the parent rings. The amount of each type of PAH found in a sample is then plotted on a graph and grouped according to family. The PAHs can then be grouped according to whether the sample of petroleum product is a petrogenic or pyrogenic sources. Petrogenic sources are derived from petroleum products that have not been exposed to high temperatures such as the petroleum products in storage at the Chevron and BP Terminals. Pyrogenic sources are derived from high temperature processes, and include atmospheric deposition/urban runoff, automobile combustion products, creosote, coal tar, etc. (Haddad, 2005).

The fingerprinting results indicate that the samples collected near the BP and Chevron facilities are composed mainly of pyrogenic sources, thereby excluding the fuels stored at the Chevron and BP Terminals as a possible source of the petroleum hydrocarbons found in bay sediment. One sampling event at sampling station SW24 in August 2002 did show the presence of a petrogenic source, however samples taken before and after this sampling event at the same sampling station did not indicate any petrogenic source product present (Haddad, 2005). Chevron has not used the pier/wharf near the sampling site since 1974, and therefore, is a highly unlikely source of the PAHs found in the sediment during this one sampling event.

Creosote impregnated marine pilings have been shown to be a significant source of PAH contamination in San Diego Bay (Chadwick et al., 1999). At the San Diego Naval Station south of the Shipyard Sediment Site, the Navy has been mitigating the effects of the creosote pilings by replacing them with plastic ones. There are numerous creosote pilings within the Shipyard Sediment Site. Review of a 1942 aerial photograph show several piers, very likely constructed with creosote pilings, in the vicinity of sampling stations SW20 through SW24, SW27, and SW28 listed in Table 7-2 as having some of the highest reported HPAH concentrations. Many of the old piers at the Shipyard Sediment Site have been removed over the long history of shipyard activities. Pyrogenic PAHs can be released from creosote pilings via leaching or by deterioration from ship and boat contact or during removal.

Based on the information that the San Diego Water Board has reviewed to date, it is likely that most of the PAH contamination present at the Shipyard Sediment Site is of pyrogenic origin and not caused by releases from the Chevron Terminal. Potential sources for the pyrogenic PAHs include vehicle combustion products transported via air deposition and/or storm water runoff, and creosote pilings.

8. Finding 8: BP as the Parent Company and Successor to Atlantic Richfield Company

Finding 8 of CAO No. R9-2012-0024 states:

BP owns and operates the Atlantic Richfield Company (ARCO) Terminal, a bulk fuel storage facility with approximately 9 million gallons of capacity located at 2295 East Harbor Drive in the City of San Diego. Fuel products containing petroleum hydrocarbons and related constituents such as PAHs have been stored at ARCO Terminal since the early 1900s. ARCO owned and operated ancillary facilities include a wharf, fuel pier (currently BAE Systems Pier 4), and a marine fueling station used for loading and unloading petroleum products and fueling from 1925 to 1978, and five pipelines connecting the terminal to the pier and wharf in use from 1925 to 1978. Storm water flows from ARCO Terminal enter a City of San Diego MS4 storm drain that terminates in San Diego Bay in the Shipyard Sediment Site approximately 300 feet south of the Sampson Street extension. Based on the information that the San Diego Water Board has reviewed to date, there is insufficient evidence to find that discharges from the ARCO Terminal contributed to the accumulation of pollutants in the marine sediments at the Shipyard Sediment Site to levels, which create, or threaten to create, conditions of pollution or nuisance. Accordingly, BP and ARCO are not referred to as "Discharger(s)" in this CAO.

8.1. Jurisdiction

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirements ... or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance…."

For the reasons set forth below, the San Diego Water Board has determined that BP and its predecessor and subsidiary companies, including Atlantic Petroleum, Richfield Oil Company, Richfield Petroleum, Atlantic Richfield, and ARCO Chevron, a subsidiary of ChevronTexaco, should not be named as dischargers in Cleanup and Abatement Order No. R9-2012-0024 because there is insufficient evidence to find that discharges from the ARCO Terminal contributed to the accumulation of pollutants in marine sediment at the Shipyard Sediment Site to levels, which create, or threaten to create, conditions of pollution or nuisance.

8.2. Admissible Evidence – State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996), the State Water Board adopted Resolution No. 92-49, *Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304.* Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under CWC section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;

2. Site characteristics and location in relation to other potential sources of a discharge;

3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;

4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;

5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;

6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;

7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;

8. Reports and complaints;

9. Other agencies' records of possible known discharge; and

10. Refusal or failure to respond to San Diego Water Board inquiries.

8.3. Current and Historical Activities

BP or its predecessor and subsidiary companies, including Atlantic Petroleum, Richfield Oil Company, Richfield Petroleum, Atlantic Richfield, and ARCO, have owned or operated bulk fuels storage and distribution facilities in the vicinity of the Shipyard Sediment Site since approximately 1925. ARCO has submitted a Historical Site Assessment Report (ARCO Report) in response to San Diego Water Board Investigation Order No. R9-2004-0026 (SECOR, 2004).

The following is a summary of the current and historical facilities and activities associated with the ARCO bulk fuels storage and distribution terminal located at 2995 East Harbor Drive in San Diego, California. This information is based in part on reports provided by ARCO/ BP and the Port District (SECOR, 2004; Haddad, 2005; Woodward-Clyde, 1995).

- In 1925 Richfield Oil Company purchased property on the southwest corner of Sicard Street and Harbor Drive for use as a petroleum terminal. By 1928 the terminal property was developed with buildings and large above ground storage tanks (ASTs).

- Five pipelines ran from the terminal to a fueling pier approximately 700 feet long (currently BAE Systems Pier 4). This area is referred to as the wharf area.

- The fueling pier was used to transfer refined petroleum products from barges to the terminal and for the sale of petroleum products at their marine fueling station.

- The pipelines, fueling pier, and wharf were used for loading and unloading petroleum products from approximately 1925 to 1978.

- The terminal was adjacent to San Diego Bay until the 1930s when dredge material was used to expand the land area with fill, effectively moving the shoreline from what is now approximately Belt Street to the current configuration. As a result of the land area expansion the terminal is now located approximately 700 feet from San Diego Bay.

- Richfield Oil Company had a lease in 1948 (renewed in 1955, 1963, and 1978) with Standard Oil to use Standard Oil’s wharf, mooring facilities, and pipelines, and for the right to connect to Standard’s pipelines (SECOR, 2004).

- The products handled at the wharf and/or stored at the terminal included gasoline, diesel fuels and stove oil, fuel oils, jet fuel, kerosene, and ethanol (SECOR, 2004).

- Storage and handling of jet fuel (kerosene) was discontinued in 2001.

- Waste product and other liquid wastes at the ARCO Terminal are stored in a waste product tank and periodically trucked off-site for recycling and/or treatment and disposal.

8.4. Storm Water Discharges

Storm water flows from ARCO Terminal enter a City of San Diego MS4 storm drain that terminates at outfall SW4 in San Diego Bay in the Shipyard Sediment Site approximately 300 feet south of the Sampson Street extension. Product storage and handling at the BP facility is currently managed under a Spill Prevention Control and Countermeasure Plan as required by the U.S. EPA. The plan has been implemented by using such measures as secondary containment, tank inspection, and collection sumps, which have been in place since at least 1983. The entire tank farm is bermed with storm water flowing into a drainage basin located on the southern corner of the facility. Storm water from the facility has been sampled and analyzed before it is discharged since the early 1990s as required by law, and prior to that, it was visually inspected for floating hydrocarbons before discharged (SECOR, 2004).

8.5. NPDES Requirement Regulation

Since 1992 waste discharges from the ARCO Terminal facility have been regulated under Waste Discharge Requirements (WDRs) prescribed by the San Diego Water Board pursuant to CWA section 402 and Water Code section 13376. These requirements are referred to as NPDES requirements. BP currently discharges storm water runoff from ARCO Terminal to San Diego Bay at the Shipyard Sediment Site subject under the terms and conditions of the statewide Industrial NPDES Storm Water Permit.

The table below summarizes the NPDES requirement history for the ARCO Terminal.

Table 8-1 ARCO Terminal Facility NPDES Permits

Order Number / NPDES No.	Title	Adoption Date	Expiration Date
Order No. 91-13, NPDES Permit No. CAS000001,	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities (Statewide General Industrial Storm Water Permit)	June 8, 1992	February 5, 1998
Order No. 97-03-DWQ, NPDES Permit No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	February 5, 1998	Ongoing

8.6. Documented Releases

The following is a summary of the documented releases of petroleum related products from the ARCO Terminal (SECOR, 2004).

In 1992, soil and groundwater contamination was identified at the terminal. To date more than 30 ground water monitoring wells have been installed with liquid phase hydrocarbons (LPH) identified in approximately 12 wells. A Corrective Action Plan recommending vapor extraction and natural attenuation was approved by the San Diego County Department of Environmental Health in February 1997. The remediation system was installed and started in 1998. Manual and active LPH recovery activities since 1992 have resulted in the recovery of approximately 3,147 gallons (SECOR, 2004).

On January 15, 1997, approximately 95 gallons of jet fuel was released. A contractor removed product with a vacuum truck and excavated approximately three cubic yards of soil and gravel. The spill was within the area of influence of the vapor extraction system and therefore incorporated into the system.

On August 7, 1998, approximately 700 gallons of gasoline were released at the terminal near the vapor recovery system at the southwest portion of the site during a Kinder Morgan Pipeline leak. Approximately 100 gallons of product and 80 tons of impacted soil were removed. Soil sampling was conducted to assess the hydrocarbon concentrations left in place after the excavation.

The SECOR report concludes that "…hydrocarbon-impacted soil at the Terminal is generally limited to the property boundaries with limited off-site impact (<100 feet) towards San Diego Bay" and that "…the Terminal-associated LPH and dissolved hydrocarbon plumes are predominately present below the southern and southwestern portions of the Terminal with limited off-site migration (<100 feet) towards San Diego Bay, which is located approximately 750 feet southwest of the site." (SECOR, 2004)

8.7. Properties and Sources of Polynuclear Aromatic Hydrocarbons

PAHs are a class of compounds that occur naturally in fossil fuels such as coal and crude oil. PAHs are also present in refined petroleum products including diesel fuel and fuel oil. The PAH make-up of crude oil and refined petroleum products is highly complex and variable and no two sources have the same composition (Nagpal, 1993). While lighter diesel fuels typically contain less than five percent PAHs, marine diesel fuel may contain as high as ten percent PAHs (IARC, 1989).

Physical and chemical properties of PAHs vary with molecular weight. The solubility in water decreases as the molecular weight increases. Accordingly, PAHs of different molecular weight vary in their behavior and distribution in the environment and in biological effects. For aquatic biota, toxicity increases as molecular weight increases (Eisler, 1987). High molecular weight PAHs (HPAHs) include benzo[a]pyrene (BAP). BAP has carcinogenic properties and because of this it is frequently used as an indicator of PAHs (Eisler, 1987).

Major sources of PAHs in the atmosphere include forest and prairie fires (19,513 metric tons), agricultural burning (13,009 metric tons), and refuse burning (4,769 metric tons) (Eisler, 1987). The major sources of PAHs to aquatic environments are petroleum spillage (170,000 metric tons) and atmospheric deposition (50,000 metric tons) (Eisler, 1987).

When released to the environment, PAHs become associated with particulate materials. PAHs released into the atmosphere eventually reach the ground as the particles they attach to are deposited. PAHs released in petroleum spills enter the aquatic environment, either directly or via runoff, where they become incorporated into bottom sediment, concentrate in aquatic biota, or experience chemical oxidation and biodegradation (Eisler, 1987).

8.8. Comparison of Shipyard Sediment Data to Location of ARCO/BP Facilities

The former ARCO fueling pier is now known as BAE Systems Pier 4. The Shipyard Report (Exponent, 2003) sediment sampling sites SW20 through SW25 are located between Piers 3 and 4 (which is immediately west of the ARCO/BP tank farm).

Review of the shipyard sediment sampling data for high molecular weight PAHs (HPAHs) shows that some of the highest concentrations are in the vicinity of the former ARCO fueling wharf (between Piers 3 and 4), which seems to be associated with piping within their wharf lease (Exponent, 2003). Table 8-2 shows the HPAH sampling results for selected sampling stations in the vicinity of the ARCO facilities and in the vicinity of the mouth of Chollas Creek. For comparison purposes the background sediment concentration for HPAHs is 673 µg/kg.

Table 8-2 Sediment Sampling Results for HPAHs

Station	Depth (feet)	HPAH (µg/kg)	Station Location Description
SW 20	Surface 0 – 1.5 1.5 – 2.42	11,000 6,300 400	Approximately 275 feet north of the former ARCO fueling wharf.
SW 24	Surface 0 – 2 2 – 3	58,000 17,000 2,900	Approximately 150 feet north of the former ARCO fueling wharf.
SW 27	Surface 0 – 2 2 – 4.24 5.29 – 5.6	12,000 3,800 630 37	Approximately 200 feet south of the former ARCO fueling wharf.

Station	Depth (feet)	HPAH (µg/kg)	Station Location Description
SW 28	Surface 0 – 2 2 – 4 4 – 5.29	20,000 25,000 8,700 1,900	Approximately 200 feet southeast of the former ARCO fueling wharf.
NA 01	Surface 0 – 2 2 – 4 5 – 5.5	7,400 7,200 9,100 8,800	Less than 100 feet west of the mid-point of the former Chevron fueling pier.
NA 23	Surface 0 – 2 2 – 4	3,400 8,500 4,200	Approximately 100 feet south of the Chevron wharf lease and approximately 300 feet east of the fueling pier and pipelines.
NA 20	Surface 0 – 2 2 – 4 4 – 6 6 – 8.1	2,900 2,400 4,000 2,500 1,200	Near mouth of Chollas Creek
NA 21	Surface 0 – 2 2 – 4 4 – 6 6 – 7.6	2,100 6,100 3,200 460 < 15	Near mouth of Chollas Creek
Background	NA	673	Based on 95 % upper prediction limit of reference stations

(Exponent, 2003; LFR Levine Fricke, 2004)

The Table 8-2 data indicates the following:

- Stations SW20 through SW24, located closest to the former ARCO wharf/pier (between BAE Systems Piers 3 and 4), have considerably higher HPAH results than the stations located closest to the mouth of Chollas Creek for most depth intervals. This suggests source(s) other than Chollas Creek have made significant contributions to the accumulation of HPAHs reported in the stations near the former ARCO operations; and

- The second highest surface sediment HPAH concentration for the entire Shipyard Sediment Site was reported for station SW24 (58,000 μg/kg).

Sediment deposition and erosional processes in the vicinity of the Shipyard Sediment Site have not been documented. Very little evidence of maintenance dredging in the northern portion of the NASSCO lease has been reported, although the area between BAE Systems Piers 1 through 4 was dredged in 1984. It is likely that this dredging would have removed some of the petroleum-hydrocarbon impacted sediment deposited prior to 1978, when ARCO ceased operations at the wharf/pier (Haddad, 2005).

8.9. Analyses and Evaluations of Petroleum Hydrocarbons

The List Report, submitted by Chevron, states that "chemical analyses of sediment samples taken at the Shipyard Sediment Site…have shown that the HPAHs found in those sediments cannot be traced to products stored, transferred or distributed by Chevron at its San Diego Terminal." (List, 2005). Chevron reports that, based on independent and Chevron proprietary product analyses, the HPAHs present in the sediment are not present in the Chevron products at the site. Their report suggests that the HPAHs are of coal tar origin. The BP facility stores and distributes products very similar to those stored and distributed by Chevron.

BP submitted the report "Forensic Geochemical Analysis of TPH and PAH Data Collected from Sediments at BAE Systems, San Diego, CA" (Haddad Report) (Haddad, 2005). The Haddad Report states that the TPH and PAH contamination "could not have come from BP Terminal operations" (Haddad, 2005). The report's conclusions are based on their analysis of the data provided in the Shipyard Report (Exponent, 2003). TPH carbon range-based quantifications were used the analysis. The analysis also included using PAH "fingerprinting" and the fact that there are two basic types of PAHs: parent PAHs and alkylated PAHs. Comparisons of the PAH "fingerprints" and TPH carbon ranges were used in the Haddad Report to conclude that the hydrocarbons in the shipyard sediment are from pyrogenic sources, not petrogenic sources. PAHs from petrogenic sources would provide evidence of a possible release of PAHs from a bulk storage terminal.

Using the molecular weight technique, TPH can be categorized as GRO, DRO, or residual range organics (RRO). Some petroleum products can fall into more than one category. By graphing the spectrum of molecular weights, a curve of each product or mixture of products, can be generated. GRO was found in inconsiderable amounts in sediment samples with only one detection in over 80 sediment samples. Elevated concentrations of DRO were found in near-shore sediment, while RRO concentrations were found near the northwest corner of the sampling area (at sampling stations SW01 and SW02) and near storm water outfalls. The lack of GRO in samples suggests sources other than the refined products in the Chevron and BP facilities (Haddad, 2005).

The fingerprinting technique separates the PAHs into six homologous PAH families: naphthalenes, fluorenes, dibenzothiophenes, anthracenes/phenanthrenes, fluoranthenes/pyrenes, and chrysenes. Each family is composed of a parent PAH, with no carbon atoms attached to their rings, and the alkylated PAHs with 1 to 4 carbon atoms attached to the parent rings. The amount of each type of PAH found in a sample is then plotted on a graph and grouped according to family. The PAHs can then be grouped according to whether the sample of petroleum product is a petrogenic or pyrogenic sources. Petrogenic sources are derived from petroleum products that have not been exposed to high temperatures such as the petroleum products in storage at the Chevron and BP Terminals. Pyrogenic sources are derived from high temperature processes, and include atmospheric deposition/urban runoff, automobile combustion products, creosote, coal tar, etc. (Haddad, 2005).

The fingerprinting results indicate that the samples collected near the BP and Chevron facilities are composed mainly of pyrogenic sources, thereby excluding the fuels stored at the Chevron and BP Terminals as a possible source of the petroleum hydrocarbons found in bay sediment. One sampling event at sampling station SW24 in August 2002 did show the presence of a petrogenic source, however samples taken before and after this sampling event at the same sampling station did not indicate any petrogenic source product present (Haddad, 2005). BP has not used the pier/wharf near the sampling site since 1978, and therefore, is a highly unlikely source of the PAHs found in the shipyard sediment during this one sampling event.

Creosote impregnated marine pilings have been shown to be a significant source of PAH contamination in San Diego Bay (Chadwick et. al, 1999). At the San Diego Naval Station, the Navy has been mitigating the effects of the creosote pilings by replacing them with plastic ones. There are numerous creosote pilings within the Shipyard Sediment Site. Review of a 1942 aerial photograph show several piers, very likely constructed with creosote pilings, in the vicinity of sampling stations SW20 through SW24, SW27, and SW28 listed in Table 8-2 as having some of the highest reported HPAH concentrations. Many of the old piers at the Shipyard Sediment Site have been removed over the long history of shipyard activities. Pyrogenic PAHs can be released from creosote pilings via leaching or by deterioration from ship and boat contact or during removal.

Based on the information that the San Diego Water Board has reviewed to date, it is likely that most of the PAH contamination present at the Shipyard Sediment Site is of pyrogenic origin and not caused by releases from the ARCO Terminal. Potential sources for the pyrogenic PAHs include vehicle combustion products transported via air deposition and/or storm water runoff, and creosote pilings.

9. Finding 9: San Diego Gas and Electric, A Subsidiary of Sempra Energy Company

Finding 9 of CAO No. R9-2012-0024 states:

SDG&E owned and operated the Silver Gate Power Plant along the north side of the BAE Systems leasehold from approximately 1943 to the 1990s. SDG&E utilized an easement to San Diego Bay along BAE Systems' north property boundary for the intake and discharge of cooling water via concrete tunnels at flow rates ranging from 120 to 180 million gallons per day. SDG&E operations included discharging waste to holding ponds above the tunnels near the Shipyard Sediment Site.

The San Diego Water Board finds that SDG&E has caused or permitted waste (including metals [chromium, copper, lead, nickel, and zinc], PCBs, PAHs, and total petroleum hydrocarbons [TPH-d and TPH-h]) to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance. Based on these considerations SDG&E is referred to as "Discharger(s)" in this CAO.

9.1. Jurisdiction

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirements ... or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance…."

For the reasons set forth below, the San Diego Water Board has determined that SDG&E should be named as a discharger in Cleanup and Abatement Order No. R9-2012-0024 pursuant to Water Code section 13304.

9.2. Admissible Evidence – State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996), the State Water Board adopted Resolution No. 92-49, *Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304*. Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under CWC section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;
2. Site characteristics and location in relation to other potential sources of a discharge;
3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;
4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;
5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;
6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;
7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;
8. Reports and complaints;
9. Other agencies' records of possible known discharge; and
10. Refusal or failure to respond to San Diego Water Board inquiries.

9.3. Historical Activities

SDG&E owned and operated the Silver Gate Power Plant from 1943 through 1984 (Gonzales, 2005). The plant includes four steam turbine electrical generators. The boilers initially burned fuel oil, and in later years were converted to burn both natural gas and fuel oil (ENV America, 2004a).

SDG&E maintained an easement to San Diego Bay for cooling water discharge lines (CW discharge lines) needed to deliver and remove seawater used for cooling the turbines. This water was non-contact cooling water and the only chemical added to the circulating water was chlorine, which was used to reduce biofouling. Prior to 1978, boiler blowdown (relatively clean water from the steam system that contained settled and precipitated solids) was routed directly to the CW discharge tunnels. Boiler blowdown water may have contained solids and low-level metals. After 1978, the blowdown water was tested for iron and copper and then either treated and discharged to the bay, or directly discharged to the Bay. Additionally, basement bilge water (liquids that accumulated in trenches in the plant basement from the turbine side of the plant) was piped into the CW discharge tunnels. Potential releases in the bilge water may have included oil and grease from equipment lubrication, total suspended solids from water system drains, and possible service system water leaks or spills that contained chromium VI. The location of the easement for the CW discharge tunnels was between the SDMC (now the location of BAE Systems) leasehold and the Kelco leasehold. (ENV America, 2004b; SDUPD, 2004).

Historical photographs indicate that there were two wastewater settling/evaporation ponds and two sub grade oil/water separators on the SDG&E easement. SDG&E reported that basement bilge water from the boiler side of the plant was pumped to a pond for settling and evaporation, and that some of the water from the pond was discharged to the Bay. Historical photographs also indicate that a surface spill at Pond A occurred in 1952 when a plug in piping led to overflow of liquid onto the adjacent ground. Pond B was used from 1966 to 1973 as an oil-water settling pond (ENV America, 2004a, b).

SDG&E reported that the facility had transformers onsite. The transformers were contained within concrete sumps as part of the spill prevention and control plan measures for secondary containment for oil storage units (ENV America, 2004b).

Silver Gate Power Plant was taken off-line by 1984 and was maintained in mothball status until several years ago. SDG&E planned to begin disassembly and removal of the boilers and turbine generating units in late 2004. The ponds were filled in at some unknown time in the past (ENV America, 2004b; SDUPD, 2004).

9.4. Site Characteristics, Hydrology and Hydrogeology

Based on a review of the United States Geological Survey (USGS), Point Loma, California 7.5-minute quadrangle map (1994), the Silver Gate Power Plant facility is currently situated within the low-lying area developed near San Diego Bay. Elevations at the site range from approximately 10 to 30 feet above mean sea level. Based on topographic conditions, surface drainage is generally to the west and southwest toward Chollas Creek and San Diego Bay. Based on the proximity to San Diego Bay and Chollas Creek, the depth to groundwater in the study area is estimated at between 10 and 20 feet below ground surface (SDUPD, 2004).

9.5. SDG&E's Discharges Have Created Pollution, Contamination, and Nuisance Conditions in San Diego Bay

Based on the information regarding the historical activities provided in Sections 9.3, 9.7, 9.8, 9.9 and 9.10 the San Diego Water Board has determined that SDG&E is responsible for discharging pollutants including metals (chromium, copper, lead, nickel, and zinc), PCBs, PAHs, TPH-d, and TPH-h to San Diego Bay at the Shipyard Sediment Site as a result of their operations at the Silver Gate Power Plant. As described below in Sections 9.8, 9.9 and 9.10, and Tables 9-4, 9-5, 9-6, 9-7 and 9-8, the same pollutants in the SDG&E discharges have accumulated in San Diego

Bay sediment in the vicinity of the MS4 Storm Drain SW4 within the BAE Systems facility portion of the Shipyard Sediment Site in concentrations that adversely affect the beneficial uses of San Diego Bay. See Section 4 of this Technical Report for more details on MS4 Storm Drain SW4[65].

PCBs are a family of organic compounds that are produced by substituting chlorine atoms for hydrogen atoms on a biphenyl molecule. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were commonly used in onsite industrial applications including electrical, heat transfer, and hydraulic equipment. From 1929 to 1977 700,000 tons of PCBs were produced in the United States and an estimated 141,000 tons of pure PCBs remained in service at the end of 1988 (EPA, 2006). The majority of PCBs were used in the production of dielectric fluids for transformers, capacitors, and other electrical components. Concern over the toxicity and persistence in the environment of PCBs led Congress in 1976 to enact section 6(e) of the Toxic Substances Control Act (TSCA) that included, among other things, prohibitions on the manufacture, processing, and distribution in commerce of PCBs.

The evidence of PCB discharges is of particular concern as PCB sediment concentration levels in the vicinity of the MS4 Storm Drain SW4 are among the highest in the Shipyard Sediment Site. The discharge of PCBs from the MS4 Storm Drain SW4 and from the wastewater ponds to San Diego Bay can cause a condition of pollution, contamination, and nuisance in San Diego Bay through the following pathways:

PCB Bioaccumulation. PCBs tend to be sorbed to bay bottom marine sediment and are transported and deposited with bay sediment. Bay sediment re-suspension can reintroduce PCBs into the aquatic environment and extend their environmental impacts. Fish and other aquatic organisms are exposed to PCBs through direct intake of contaminated water and sediment, or through consumption of contaminated food. PCBs have the potential to bioaccumulate in organisms and biomagnify through the food chain.

Human Health Threat. The accumulation of PCBs in the sediment is a threat to human health primarily through the consumption of fish and shellfish contaminated by PCBs in the sediment through the processes of bioaccumulation and biomagnification. Other potential pathways of exposure include direct contact with contaminated sediment by swimmers or divers and incidental ingestion of contaminated sediment or associated water by swimmers or divers.

As described in Sections 14 through 28 of this Technical Report these same pollutants have accumulated in San Diego Bay sediment at levels that may:

1. Adversely affect the beneficial uses of San Diego Bay, as described in later sections of this Technical Report;

2. Cause pollution, contamination, or nuisance conditions in San Diego Bay; and

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[65] SDG&E asserts that its contribution of pollutants was not a substantial factor in causing a condition of pollution or nuisance and therefore liability may not be imposed under Water Code section 13304. For the reasons discussed in the San Diego Water Board Cleanup Team's Response to Comments Report (Aug. 23, 2011), pp. 9-1 through 9-12, SDG&E's argument is one of allocation of responsibility rather than liability.

3. Degrade marine communities, cause adverse effects on the environment or the public health, or result in harmful concentrations of pollutants in marine sediment.

Accordingly, it is concluded that SDG&E has caused or permitted the discharge of waste to San Diego Bay in a manner contributing to the creation of pollution or nuisance conditions at the Shipyard Sediment Site. It is therefore appropriate for the San Diego Water Board to name SDG&E as a discharger in this CAO pursuant to Water Code section 13304.

9.6. NPDES Requirement Regulation

Waste discharges from the SDG&E facility have historically been regulated under NPDES requirements prescribed by the San Diego Water Board pursuant to CWA section 402 and Water Code section 13376. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the CWA and Water Code is grounds for enforcement action, including but not limited to, the issuance of a Cleanup and Abatement Order under CWC section 13304.

SDG&E discharged plant process water to San Diego Bay from the SDG&E facility to the Shipyard Sediment Site subject to the terms and conditions of NPDES permits for plant process waters and storm water, respectively. A listing of the plant process water NPDES requirements adopted by the San Diego Water Board is provided below.

Table 9-1 SDG&E's Plant Process Water NPDES Permits

Order Number / NPDES No.	Order Title	Adoption Date	Expiration Date
Order No. 76-9, NPDES No. CA0001376	Waste Discharge Requirements For San Diego Gas And Electric Company Silver Gate Power Plant San Diego County	May 10, 1976	January 28, 1985
Order No. 85-07, NPDES No. CA0001376	Waste Discharge Requirements For San Diego Gas & Electric Company Silver Gate Power Plant San Diego County	January 28, 1985	April 13, 1995

In 1992, SDG&E's Silver Gate Power Plant obtained coverage under the State Water Board's 1991 General Industrial NPDES Requirements for storm water discharges. These NPDES requirements supplemented SDG&E's NPDES requirements listed in Table 9-1. The industrial storm water NPDES requirements applied specifically to discharges of pollutants through storm water, while the NPDES permits listed in Table 9-1 applied to plant process water. The General Industrial NPDES Requirements for storm water discharges adopted by the State Water Board in effect at the time the facility was operated by SDG&E is provided in Table 9-2 below.

Table 9-2 SDG&E General Industrial Storm Water NPDES Requirements

Order Number / NPDES No.	Order Title	Adoption Date	Expiration Date
91-13-DWQ, Industrial NPDES No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	November 19, 1991 (Notice of Intent Filed April 7, 1992)	April 17, 1997 (Notice of Intent Filed September 12, 1997)

The General Industrial Storm Water Permit required SDG&E to develop and implement plans to limit its discharges of pollutants from storm water runoff into San Diego Bay. Rather than relying on specific numerical effluent limitations, the General Permit directed SDG&E to create and follow "Best Management Practices"[66] (BMPs). The General Industrial Storm Water NPDES Requirements also required SDG&E to develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and a storm water Monitoring and Reporting Program Plan (MRPP).

9.6.2. Order No. 76-9, NPDES Permit No. CA0001376

Order No. 76-9, NPDES Permit No. CA0001376, in effect from May 10, 1976 to January 28, 1985, contained the following narrative limitations that relate to the discussions contained herein:

- A. EFFLUENT LIMITATIONS … 1.D. The discharge of polychlorinated biphenyls is prohibited.
- A. EFFLUENT LIMITATIONS…1.F. The discharge of chemicals or other wastes not described in the findings of this Order and the discharger's Report of Waste Discharge is prohibited.
- C. PROVISIONS…5. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination or nuisance as defined by the CWC.
- B. PROVISIONS … 8. This order includes Items 1, 2, 4, 5, 6, 7, 8, 9, 10 and 11 of the attached "Standard Provisions."

  Standard Provisions … 1. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from his liabilities under federal, state, or local laws, nor guarantee the discharger a capacity right in the receiving waters. … 2. The discharge of any radiological, chemical, or biological warfare agent or high level radiological waste is

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[66] Best management practices ("BMPs") means schedules of activities, prohibitions of maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

prohibited. … 4. The discharger shall permit the San Diego Water Board: (a) Entry upon premises in which an effluent source is located or in which any required records are kept; (b) access to copy any records required to be kept under terms and conditions of this order; (c) inspections of monitoring equipment or records, and (d) sampling of any discharge. … 5. All discharges authorized by this order shall be consistent with the terms and conditions of this order. The discharge of any pollutant more frequently than or at a level in excess of that identified and authorized by this order shall constitute a violation of the terms and conditions of this order. … 6. The discharger shall maintain in good working order and operate as efficiently as possible any facility or control system installed by the discharger to achieve compliance with the waste discharge requirements. … 7. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of at a legal point of disposal, and in accordance with the provisions of Division 7.5 of the CWC. For that purpose of this requirement, a legal point of disposal is defined as one for which waste discharge requirements have been prescribed by a Regional Water Board and which is in full compliance therewith. … 8. After notice and opportunity for a hearing, this order may be terminated or modified for cause, including, but not limited to: (a) violation of any term or condition contained in this order; (b) obtaining this order by misrepresentation, or failure to disclose fully all relevant facts; (c) a change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge. … 9. If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under section 307(a) of the Federal Water Pollution Control Act, or amendments thereto, for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in this order, the Board will revise or modify this order in accordance with such toxic effluent standard or prohibition and so notify the discharger. … 10. There shall be no discharge of harmful quantities of oil or hazardous substances, as specified by regulation adopted pursuant to section 311 of the Federal Water Pollution Control Act, or amendments thereto. … 11. In the event the discharger is unable to comply with any of the conditions of this order due to: (a) breakdown of waste treatment equipment; (b) accidents caused by human error or negligence; or (c) other causes such as acts of nature. The discharger shall notify the Executive Officer by telephone as soon as he or his agents have knowledge of the incident and confirm this notification in writing within two weeks of the telephone notification. The written notification shall include pertinent information explaining reasons for the noncompliance and shall indicate what steps were taken to correct the problem and the dates thereof, and what steps are being taken to prevent the problem from recurring.

9.6.3. Order No. 85-07, NPDES Permit No. CA0001376

Order No. 85-07, NPDES Permit No. CA0001376, in effect from January 28, 1985 to April 13, 1995, contained the following narrative limitations that relate to the discussions contained herein:

- A. PROHIBITIONS … 2. The discharge of polychlorinated biphenyl compounds, such as those commonly used for transformer fluid, is prohibited.

- B. DISCHARGE SPECIFICATIONS … 2. The Silver Gate Power Plant discharge to San Diego Bay shall be essentially free of: (b) Settleable material or substances that form sediments which degrade benthic communities or other aquatic life; (c) Substances toxic to marine life due to increases in concentrations in marine waters or sediments.

- D. RECEIVING WATER LIMITATIONS. The Silver Gate Power Plant discharge to San Diego Bay shall not by itself or jointly with any discharge or discharges cause the following water quality objective to be violated: … 1. Physical Characteristics … (d) Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses. … 5 Toxicity … (a) All waters shall be maintained free of toxic substances in concentrations that are toxic to or that produce detrimental physiological responses in human, plant, animal, or aquatic life.

- E. PROVISIONS … 1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the CWC.

9.6.4. Order No. 91-13-DWQ, NPDES Permit No. CAS000001, General Industrial NPDES Requirements for Storm Water Discharges

Order No. 91-13-DWQ, NPDES Permit No. CAS000001, in effect from April 7, 1992 to September 12, 1997, contained the following key narrative limitations that relate to the discussions contained in herein:

- A. DISCHARGE PROHIBITIONS: … 3. Storm water discharges shall not cause or threaten to cause pollution, contamination, or nuisance; and

- B. RECEIVING WATER LIMITATIONS. … 1. Storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

9.7. SDG&E's Process Water Monitoring for Plant Process Water NPDES Requirements

SDG&E discharged plant process water to the Shipyard Sediment Site subject to the terms and conditions of two NPDES Permits beginning in 1976 and ending in 1995 when the plant was decommissioned.

Between 1985 and 1995, Order No. 85-07, NPDES Permit No. CA0001376 established monitoring requirements, numerical waste discharge limitations, and narrative waste discharge limitations. The narrative waste discharge limits were in the form of a Discharge Specification which set a narrative limit on discharge pollutant concentrations with intent to reduce or eliminate toxic chemical concentrations in marine water, marine life, and sediment.

During the permit cycle, SDG&E stayed within the permit specified numerical limitations for copper, nickel, and zinc, but the San Diego Water Board also required that the discharge from SDG&E not cause a violation of the Discharge Specifications presented in Section 9.6.3 above. During that time, SDG&E violated narrative waste discharge limitations by discharging constituents at levels that were elevated compared to levels established by the CTR for saltwater.[67]

U.S. EPA finalized the CTR on May 18, 2000. None of the numerical values in CTR were included in any of the NPDES Permits issued to SDG&E. However, the numerical values in CTR represent the latest, most up-to-date numerical thresholds for use in determining whether a chemical concentration in water is detrimental to its beneficial uses. By comparing CTR values with historical discharges, the San Diego Water Board is able to determine which discharges *may* have contributed to toxic chemical concentrations in marine water, marine life, and sediment at the shipyard sediment site in the past. Also, where there are historical discharges elevated above CTR values, there exists an *elevated probability* that those same discharges contributed to the present condition of pollution. To the extent that those historical, elevated discharges *did* cause toxic chemical concentrations in marine water, marine life, and sediment, and/or *did* contribute to the present condition of pollution at the shipyard sediment site, there exists an NPDES violation.

To the extent that SDG&E's discharge was elevated above these values and caused violations of the above Discharge Specifications by causing toxic chemical concentrations in marine water, marine life, and sediment, and/or contributed to the present condition of pollution at the shipyard sediment site, the following specific discharges are violations of narrative limits of Order No. 85-07, NPDES Permit No. CA0001376. Monitoring data provided by SDG&E during the years 1990 through 1994, indicate that elevated levels of copper, nickel, and zinc were present in the water discharged from the site when compared to levels established by the CTR for saltwater. Specific discharges are cited below in Table 9-3.

Table 9-3 Discharges above CTR Values Occurring from 1990 to 1994

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Source	Citation[3]
January-June 1990	Copper	0.025 mg/L	0.0031 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1

[67] The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Source	Citation[3]
January-June 1990	Nickel	0.089 mg/L	0.0082 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
January-June 1990	Zinc	0.081 mg/L	0.081 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
July-December 1990	Copper	0.019 mg/L	0.0031 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
January-June 1991	Copper	0.01 mg/L	0.0031 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
January-June 1991	Zinc	0.16 mg/L	0.081 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
July-December 1991	Copper	0.012 mg/L	0.0031 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
July-December 1991	Zinc	0.19 mg/L	0.081 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
January-June 1992	Zinc	0.094 mg/L	0.081 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
July-December 1992	Copper	0.031 mg/L	0.0031 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Source	Citation[3]
July-December 1992	Zinc	0.16 mg/L	0.081 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
January-June 1993	Copper	0.025 mg/L	0.0031 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
January-June 1993	Zinc	0.13 mg/L	0.081 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
January-June 1994	Copper	0.018 mg/L	0.0031 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1
January-June 1994	Zinc	0.12 mg/L	0.081 mg/L	Section 9.5	SDG&E Monitoring Report	Order No. 85-07, B. Discharge Specifications 2b and 2c, D. Receiving Water Limitations 1d and 5a, and E. Provisions 1

1. 40 CFR 131.38
2. Reference to Section 9.5 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 9.5.
3. The cited waste discharge requirement(s) can be found in Section 9.6 of this Technical Report.

9.8. Unauthorized Discharge of Toxic Pollutants to Land

In 2006, SDG&E closed in place three 220,000 gallon concrete underground storage tanks (USTs) (TN & Associates, 2006). Prior to excavating the overburden above the tanks, eighteen surface soil samples were collected from depths less than 0.5 feet below ground surface. Ten of these samples were collected from locations observed to have oil-like staining (SS1 through SS10) and the remaining eight were randomly selected from locations with no visible staining (SS11 through SS18). These 18 samples were collected over an area approximately 440 feet long by 80 feet wide, approximately 900 feet from San Diego Bay. The UST area is bounded by an alley on the south and Sampson Street on the east.

Samples SS1 through SS10 were analyzed for TPH, PCBs, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Samples SS11 through SS 18 were analyzed for TPH, PCBs, and metals. The results for PCBs, copper, lead, zinc, and TPH are presented in Table 9-4. Elevated concentrations of chromium and nickel were also reported in the surface soil samples.

All 18 of the samples, including those collected from locations with no visible staining, were reported to contain PCBs (TN & Associates, 2006). Eleven of the 18 samples had PCB concentrations greater than 1,000 µg/kg. The samples with the highest concentrations (SS12, SS17, and SS18) had PCB concentrations of 125,000 µg/kg, 14,700 µg/kg, and 34,700 µg/kg, respectively.

Storm water run-off from the SDG&E property is generally directed to the nearest storm drain which discharges to San Diego Bay through a 30-inch pipe that runs along Sampson Street (ENV America, 2004b). Aroclor 1260 was the only PCB reported in the 18 surface soil samples collected in the UST overburden (TN & Associates, 2006). Aroclor 1260 was also the highest PCB concentrations reported in the sediment samples collected from the MS4 catch basin on Sampson Street in the immediate vicinity of the UST area. See Section 9.9 below on the investigation of illegal discharges to the MS4. In addition, Aroclor 1260 was the highest PCB concentration reported in the Shipyard Sediment Site samples SW20 through SW25 collected in San Diego Bay the vicinity of the MS4 outfall (see Table 9-6).

The PCBs, metals, and TPH pollutants reported in the surface soils were discharged or deposited over a large area where they were, or would probably be, discharged into San Diego Bay via storm water runoff creating, or threatening to create, a condition of pollution or nuisance.

Table 9-4 SDG&E Underground Storage Tank Closure - Selected Surface Soil Sampling Results

Soil Sample No.	PCBs (Aroclor 1260) µg/kg	Copper mg/kg	Lead mg/kg	Zinc mg/kg	TPH as Diesel (C13 - C22) mg/kg	TPH as Heavy HC (C23 - C40) mg/kg	TPH as Diesel and Heavy HC (C13 - C40) mg/kg
SS1	890	1,300	2,960	3540	99,400	5,510	105,000
SS2	1,140	3,400	3,740	8380	132,000	17,400	149,000
SS3	3,020	3,830	1,240	1,640	50,500	14,300	64,800
SS4	1,050	1,240	580	3,730	89,700	12,200	102,000
SS5	428	2,740	2,550	3,760	64,900	2,890	67,800
SS6	862	2,820	3,360	4,190	78,900	3,910	82,800
SS7	2,470	2,350	3,700	2,600	145,000	10,300	155,000
SS8	1,160	1,890	4,240	4,690	124,000	5,700	130,000
SS9	1,140	5,180	1,780	5,350	77,600	4,620	82,200

Soil Sample No.	PCBs (Aroclor 1260) µg/kg	Copper mg/kg	Lead mg/kg	Zinc mg/kg	TPH as Diesel (C13 - C22) mg/kg	TPH as Heavy HC (C23 - C40) mg/kg	TPH as Diesel and Heavy HC (C13 - C40) mg/kg
SS10	3,270	358	905	786	42,600	20,300	62,900
SS11	80.8	1,510	570	5,930	98	110	208
SS12	125,000	178	57	1,080	200	348	548
SS13	70.0 J	84	35	2,530	ND <5.0	ND <5.0	ND <5.0
SS14	1,720	5,370	923	8,700	114	364	478
SS15	98.9	81	27	237	49	57	106
SS16	56.2 J	83	13	1,290	233	96	329
SS17	14,700	217	69	1,090	1	1	1
SS18	3,4700	1,220	710	7,920	1	1	1

1. No analytical results reported
(TN & Associates, 2006)

9.9. Unauthorized Discharge of Toxic Pollutants into the MS4

The City of San Diego reported that on October 3, 2005, they conducted an investigation and observed evidence of an illegal discharge into the MS4 catch basin on the north side of Sampson Street between Belt Street and Harbor Drive, approximately 10 feet east of the railroad line that runs parallel with Belt Street. Specifically, the catch basin is located immediately to the east of the BAE Systems' parking lot and the SDG&E Silver Gate Power Plant, which is adjacent to the parking lot. During the City's investigation, three sediment samples were collected and analyzed for PCBs and PAHs. The first sample was collected from inside and at the base of a six-inch lateral entering the catch basin from the former Silver Gate Power Plant leasehold. The second sample was collected from inside and at the base of the 12-inch lateral entering the catch basin from another area draining storm water from the facility. The third sample was collected from the 18-inch pipe exiting the catch basin and conveying urban runoff to San Diego Bay at the Shipyard Sediment Site. The results of these three samples, presented in Table 9-5 below, indicate the presence of both PCBs and PAHs entering the municipal storm water system from SDG&E's former Silver Gate Power Plant leasehold and exiting the municipal storm drain system catch basin to San Diego Bay. The City of San Diego issued a Notice of Violation (NOV) to SDG&E (Zirkle, 2005a; Kolb, 2005b).

Table 9-5 City of San Diego MS4 Sediment Sample Results for PCBs and PAHs on October 3, 2005

Constituent	Effects Range-Low (ERL)[1] µg/kg	Effects Range-Median (ERM)[1] µg/kg	6" Lateral µg/kg	12" Lateral µg/kg	Catch Basin µg/kg
Aroclor-1016			< 50	< 50	< 50
Aroclor-1221			< 50	< 50	< 50
Aroclor-1232			< 50	< 50	< 50
Aroclor-1242			< 50	< 50	< 50
Aroclor-1248			< 50	< 50	< 50
Aroclor-1254			650	130	260
Aroclor-1260			720	120	360
Aroclor-1262			< 50	< 50	< 50
Sum of Aroclors®	22.7[2]	180[2]	**1,370**	**250**	**620**
Naphthalene[3]	160	2,100	70	330	170
Acenaphthylene[3]	44	640	< 50	< 50	< 50
Acenaphthene[3]	16	500	< 50	< 50	< 50
Fluorene[3]	19	540	< 50	< 50	< 50
Phenanthrene[3]	240	1,500	210	140	< 50
Anthracene[3]	85.3	1,100	< 50	< 50	< 50
Fluoranthene[4]	600	5,100	< 50	< 50	3,300
Pyrene[4]	665	2,600	500	170	91
Benzo [a] Anthracene[4]	261	1,600	450	< 50	< 50
Chrysene[4]	384	2,800	210	65	< 50
Benzo [b] Fluoranthene[4]	NA	NA	260	67	< 50
Benzo [k] Fluoranthene[4]	NA	NA	160	110	< 50
Benzo [a] Pyrene[4]	430	1,600	130	59	< 50
Dibenz [a,h] Anthracene[4]	63.4	260	< 50	< 50	< 50

Constituent	Effects Range-Low (ERL)[1] µg/kg	Effects Range-Median (ERM)[1] µg/kg	6" Lateral µg/kg	12" Lateral µg/kg	Catch Basin µg/kg
Benzo [g,h,i] Perylene[4]	NA	NA	< 50	< 50	< 50
Indeno [1,2,3-c,d] Pyrene[4]	NA	NA	93	< 50	< 50
Total PAHs	4,022	44,792	**2,083**	**941**	**3,391**

1. Long et al., 1995
2. ERL and ERM levels are for Total PCBs
3. LPAH – low molecular weight polynuclear aromatic hydrocarbon
4. HPAH – high molecular weight polynuclear aromatic hydrocarbon

Non-detections are represented as less than the reporting limit.
(CEL, 2005)

The municipal storm drain system discharges into the BAE Systems leasehold at the Shipyard Sediment Site between Piers 3 and 4. This outfall is indicated as MS4 Storm Drain SW4 in Section 4 of this Technical Report. Sediment sample stations in San Diego Bay from the Detailed Sediment Investigation (Exponent, 2003) in the area of this outfall include SW20 through SW25. The Bay sediment sample results for PCBs and PAHs are presented in Table 9-6.

Table 9-6 NASSCO and BAE Systems Detailed Sediment Investigation PCB and PAH Results for SW20 through SW25

Constituent	SW20 µg/kg	SW21 µg/kg	SW22 µg/kg	SW23 µg/kg	SW24 µg/kg	SW25 µg/kg
Aroclor-1016	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1221	< 500	< 520	< 57	< 58	< 460	< 51
Aroclor-1232	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1242	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1248	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1254	1,500	1,600	670	550	790	330
Aroclor-1260	1,600	1,800	790	710	870	380
Sum of Aroclors®	**3,100**	**3,400**	**1,500**	**1,300**	**1,700**	**710**
Naphthalene[1]	< 13	13	31	< 15	26	< 13
Acenaphthylene[1]	120	130	150	130	290	180
Acenaphthene[1]	16	14	17	19	14	13
Fluorene[1]	53	53	56	53	220	45
Phenanthrene[1]	300	220	330	360	810	260
Anthracene[1]	450	370	500	500	6,000	440
Fluoranthene[2]	930	580	910	960	7,100	750
Pyrene[2]	1,200	850	1,100	1,000	3,100	940
Benzo [a] Anthracene[2]	760	650	890	850	6,300	710
Chrysene[2]	1,800	1,400	1,900	1,800	11,000	1,300
Benzo [b] Fluoranthene[2]	1,500	1,600	1,800	1,500	7,000	2,000
Benzo [k] Fluoranthene[2]	1,200	1,100	1,300	1,200	7,300	1,600
Benzo [a] Pyrene[2]	1,400	1,500	1,700	1,500	8,800	2,000
Dibenz [a,h] Anthracene[2]	200	210	230	220	1,100	240
Benzo [g,h,i] Perylene[2]	770	780	830	820	2,800	800
Indeno [1,2,3-c,d] Pyrene[2]	970	990	1,100	1,000	3,700	1,100

Constituent	SW20 µg/kg	SW21 µg/kg	SW22 µg/kg	SW23 µg/kg	SW24 µg/kg	SW25 µg/kg
Total PAHs	**11,669**	**10,460**	**12,844**	**11,912**	**65,560**	**12,378**

1. LPAH – low molecular weight polynuclear aromatic hydrocarbon
2. HPAH – high molecular weight polynuclear aromatic hydrocarbon

Non-detections are represented as less than the quantitation limit.
(Exponent, 2003)

PCBs in sediment from the laterals and catch basin of the MS4 conveyance were found at levels that exceed the ERL and ERM of 22.7 µg/kg and 180 µg/kg, respectively (Long et al., 1995), as well as the proposed Alternative Sediment Cleanup Levels.

Sediment PCB levels, specifically Aroclor-1254 and 1260, and sediment PAH levels reported in the MS4 conveyance are also reported in the bay sediment near the storm water outfall as indicated by comparing Tables 9-5 and 9-6. This data provides evidence that discharges from the SDG&E facility have contributed to the pollution in the Shipyard Sediment Site.

9.10. Characterization of Wastewater Pond Operations and Discharge to San Diego Bay

Soil boring samples taken at the locations of the former wastewater ponds found residual metals, PAH, and PCB contamination. The proximity of the ponds to San Diego Bay and evidence that a discharge happened on at least one occasion provide a potential for discharges that contributed pollution to the Shipyard Sediment Site.

SDG&E Landside Tidelands Lease Area Site Assessment Report describes an investigation that characterized the potential residual contamination that may be present at the location of two former wastewater pond operations (ENV America, 2004a). These ponds reportedly were used to settle solids and separate oil and grease from bilge water collected from the boiler side of the plant before being discharged to the Bay (ENV America, 2004b).

The investigation included the collection and analysis of seven soil borings and ground water samples. Each boring produced three samples (approximate depth of fill material, pond sediment, and soil underlying the pond sediment) and a groundwater sample. The samples were analyzed for one or more of the following TPHs within the gasoline, diesel, and heavy hydrocarbon ranges (TPH-g, TPH-d, and TPH-h), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals (ENV America, 2004a).

In SDG&E's July 14, 2004, response to the 13267 investigative order, it is clearly stated that "[s]ome water from the pond was discharged to the Bay" (ENV America, 2004b). However, it is not clear whether both ponds discharged or whether only one of the two ponds discharged to the Bay. In any case, discharge to the Bay from either pond is reason for concern based on the investigation results.

Pond A soil contained low concentrations of organic compounds, including TPH-d and TPH-h, and SVOCs. However, none of the soil samples from Pond A was reported to contain detectable VOCs, PCBs, or appreciable metals.

Soil data from Pond B showed the presence of organic and metal analytes. The occurrence of shallow soil contaminants was generally coincident with what was visually identified to be the base of the former ponds. Hydrocarbon soil concentrations typically decreased rapidly with depth, suggesting limited vertical migration. Chromium and benzo [a] anthracene were detected in one sample from Pond B soil at concentrations above U.S. EPA industrial Preliminary Remediation Goals (PRGs) (ENV America, 2004a).

A comparison of Pond B soil boring results with sediment clean-up levels identifies several constituents at levels that would be of concern, especially if any of this waste stream was discharged to San Diego Bay. Additionally, the presence of residual contamination and the proximity of the pond to San Diego Bay indicate a potential for discharges from the pond to contribute pollution at the Shipyard Sediment Site via storm water runoff or airborne transport during both operation and post operation until the ponds were filled in and covered at some unknown date. The following tables present the data that exceed the effects range low (ERLs) and effects range median (ERMs).

Table 9-7 Comparison of Pond B Soil Boring Sample Results for PCBs and Metals

Constituent	Units	Effects Range-Low (ERL)[1]	Effects Range-Median (ERM)[1]	Soil Boring Sample Results	
				B2-2.0[3]	**B4-3.0[3]**
Total PCBs[2]	µg/kg	22.7	180	**380**	**4,400**
Chromium	mg/kg	81	370	**4,220**	**131**
Copper	mg/kg	34	270	**393**	**868**
Lead	mg/kg	46.7	218	**277**	**520**
Nickel	mg/kg	20.9	51.6	**125**	**33.8**
Zinc	mg/kg	150	410	**1,190**	**1,060**

1. Long et al., 1995
2. Sum of Aroclors®, includes detected results for Aroclor-1254 and Aroclor-1260
3. The first unit of the sample identification indicates the borehole number (e.g., B2) and the second unit indicates the sample depth (e.g., 2.0 feet below ground surface [bgs])

Table 9-8 Comparison of Pond B Soil Boring Sample Results for Benzo[a]pyrene

Constituent	Units	Effects Range-Low (ERL)[1]	Effects Range-Median (ERM)[1]	Soil Boring Sample Results		
				B2-2.0[2]	**B5-2.0[2]**	**B6-2.0[2]**
Benzo[a]pyrene	µg/kg	430	1,600	2,800	1,020	3,130

1. Long et al., 1995
2. The first unit of the sample identification indicates the borehole number (B2) and the second unit indicates the sample depth (e.g., 2.0 feet below ground surface [bgs])

Groundwater results indicated low hydrocarbon concentrations detected in both Pond A and B areas. Volatile compounds including chlorinated solvents were detected in groundwater (ENV America, 2004a).

10. Finding 10: United States Navy

Finding 9 of CAO No. R9-2012-0024 states:

The San Diego Water Board finds that the United States Navy (hereinafter "U.S. Navy") caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance. The U.S. Navy owns and operates a municipal separate storm sewer system (MS4) at Naval Base San Diego (NBSD), formerly Naval Station San Diego or NAVSTA, through which it has caused or permitted the discharge of waste commonly found in urban runoff to Chollas Creek and San Diego Bay, including excessive concentrations of copper, lead, and zinc in violation of waste discharge requirements. Technical reports by the U.S. Navy and others indicate that Chollas Creek outflows during storm events convey elevated sediment and urban runoff chemical pollutant loading and its associated toxicity up to 1.2 kilometers into San Diego Bay over an area including the Shipyard Sediment Site.

The San Diego Water Board finds that the U.S. Navy has caused or permitted marine sediment and associated waste to be resuspended into the water column as a result of shear forces generated by the thrust of propellers during ship movements at NBSD. The resuspended sediment and pollutants can be transported by tidal currents and deposited in other parts of San Diego Bay, including the Shipyard Sediment Site. The above discharges have contributed to the accumulation of pollutants in marine sediment at the Shipyard Sediment Site to levels that cause, and threaten to cause, conditions of pollution, contamination, and nuisance by exceeding applicable water quality objectives for toxic pollutants in San Diego Bay.

Also, from 1921 to the present, the U.S. Navy has provided shore support and pier-side berthing services to U.S. Pacific fleet vessels at NBSD located at 3445 Surface Navy Boulevard in the City of San Diego. NBSD currently occupies 1,029 acres of land and 326 water acres adjacent to San Diego Bay to the west, and Chollas Creek to the north near Pier 1. Between 1938 and 1956, the NBSD leasehold included a parcel of land within the Shipyard Sediment Site referred to as the 28th Street Shore Boat Landing Station, located at the south end of the present day NASSCO leasehold at the foot of 28th Street and including the 28th Street Pier. The San Diego Water Board finds that the U.S. Navy caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance at this location when it conducted operations similar in scope to a small boatyard, including solvent cleaning and degreasing of vessel parts and surfaces, abrasive blasting and scraping for paint removal and surface preparations, metal plating, and surface finishing and painting. Prevailing industry-wide boatyard operational practices employed during the 1930s through the 1980s were often not sufficient to adequately control or prevent pollutant discharges, and often led to excessive discharges of pollutants and accumulation of pollutants in marine sediment in San Diego Bay. The types of pollutants found in elevated concentrations at the Shipyard Sediment Site (metals, butyltin species, PCBs, PCTs, PAHs, and TPH) are associated with the characteristics of the waste the U.S. Navy operations generated at the 28th Street Shore Boat Landing Station site. Based on the preceding considerations, the U.S. Navy is referred to as "Discharger(s)" in this CAO.

10.1. Jurisdiction

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides in relevant part that the San Diego Water Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirements … or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance…."

For the reasons set forth below, the San Diego Water Board has determined that the U.S. Navy should be named as a discharger in Cleanup and Abatement Order No. R9-2012-0024 pursuant to Water Code section 13304.

10.2. Admissible Evidence – State Water Resources Control Board Resolution No. 92-49

On June 18, 1992 (amended on April 21, 1994 and October 2, 1996), the State Water Board adopted Resolution No. 92-49, *Policies And Procedures For The Investigation And Cleanup And Abatement Of Discharges Under Water Code Section 13304*. Resolution No. 92-49 provides in part that:

I. The San Diego Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under CWC section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC section 13304. The San Diego Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;

2. Site characteristics and location in relation to other potential sources of a discharge;

3. Hydrologic and hydrogeologic information, such as the difference in upgradient and downgradient water quality;

4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;

5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;

6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;

7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;

8. Reports and complaints;

9. Other agencies' records of possible known discharge; and

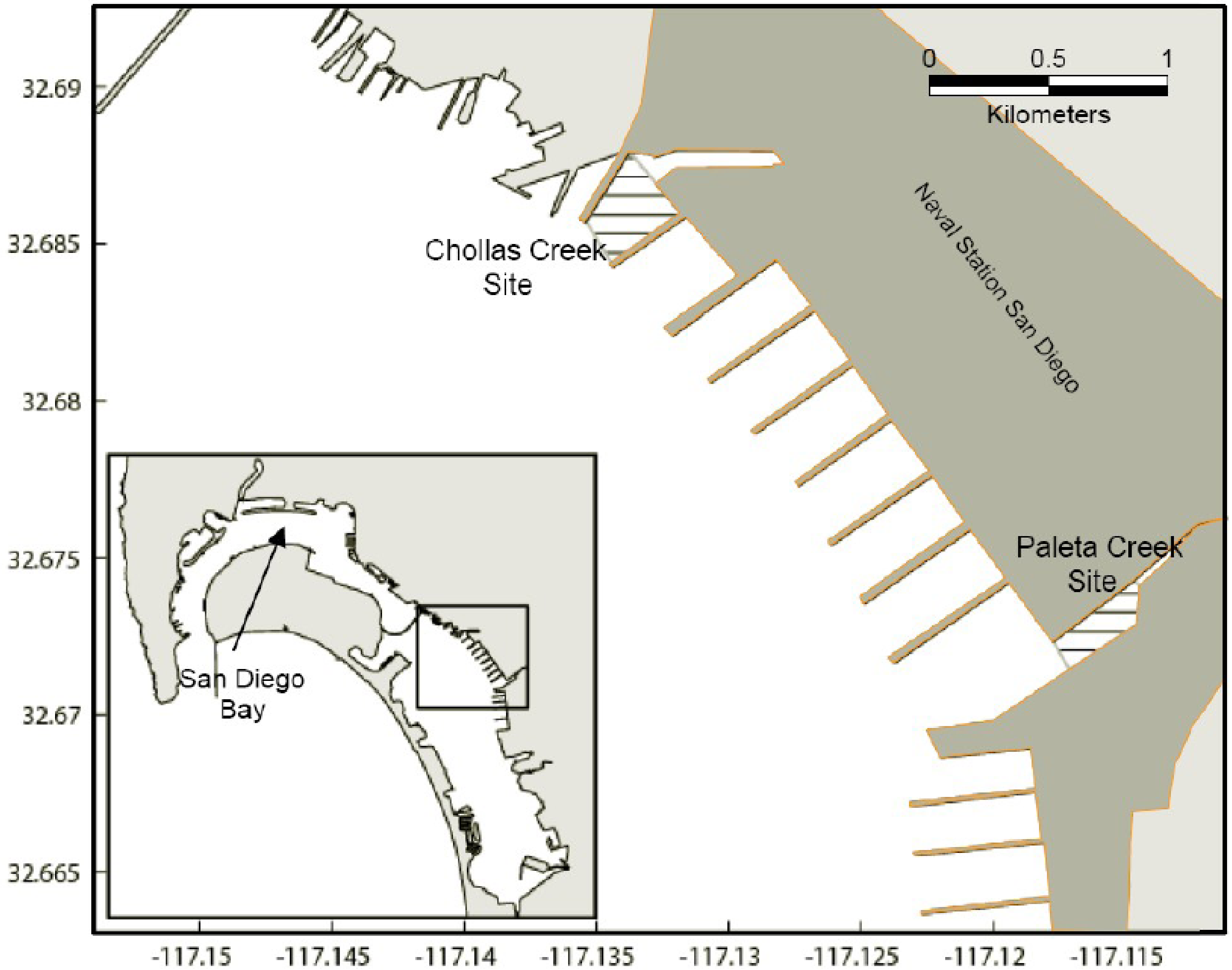
10. Refusal or failure to respond to San Diego Water Board inquiries.

10.3. Naval Station San Diego

From 1921 to the present the U.S. Navy has owned and operated the NBSD. NBSD provides supply and maintenance logistical support to numerous U.S. Navy vessels and is located at 32nd Street and Harbor Drive approximately 3 miles southeast of downtown San Diego on the eastern edge of San Diego Bay. It is bordered by the City of San Diego to the north and east and National City to the south and east and San Diego Bay to the west. NBSD is immediately south of, and adjacent to, the Shipyard Sediment Site, with Chollas Creek separating the two. NBSD's present day leasehold also includes a 24,653 square foot parcel north of Chollas Creek. This parcel is located at the south end of 28th Street in the City of San Diego and is immediately adjacent to Chollas Creek.

The following subsections present both historical and current information on NBSD operations, waste materials, and pollutant transport pathways.

Figure 10-1 Naval Station San Diego



(SCCWRP and U.S. Navy, 2005a)

10.4. Historical Operations

The property on which Naval Base San Diego is now located was deeded to the U.S. government by the City of San Diego on September 3, 1919, to build a docking and fleet repair base. The initial parcel of property consisted of 21 water acres and 77.2 land acres with the former being mostly tidelands and marsh flats. On February 15, 1921, the U.S. Navy acquired the land, buildings, and some machinery to establish a San Diego Ship Repair Base.

In February 1922 the U.S. Navy's U.S. Destroyer Base San Diego began operations at the facility with the mission of maintaining 39 decommissioned naval destroyer vessels. The base was used extensively during the 1920s and 1930s for the repair and maintenance of U.S. Navy Destroyer vessels. The following passage describing this activity in an excerpt from the historical magazine "San Diego's Navy" as quoted in the Port District's section 13267 investigative report (SDUPD, 2004):

> *"In mid-1923, the destroyer base was caring for eighty-four decommissioned destroyers. During 1924 seventy-seven of these destroyers were decommissioned and seven recommissioned. Destroyers were hauled up on the marine railway, their hulls cleaned of marine growth and rust and painted (many times with an orange-red paint undercoat that led to the public's nickname of "Red Lead Row" for San Diego's Reserve ships). All machinery was opened, dried, and treated with oil or heavy coats of grease. Piping connections were blanked off to prevent flooding and fuel (sic), and the water tanks were drained and cleaned. When the Navy closed its submarine base in San Pedro during 1923-25, it transferred repair and upkeep responsibility of fleet submarines to San Diego (SDUPD, 2004)."*

From the late 1930s to the late 1940s the base was expanded through a succession of land acquisition and facility development programs. The base expansion included leasing a parcel of property located within the present day NASSCO leasehold (discussed in Section 10.4.2 below). In 1943, the Destroyer Base was renamed U.S. Naval Repair Base San Diego to reflect an expanding industrial capacity and changing role. From 1943 to 1945, more than 5,000 ships were sent to the base for conversion, overhaul, battle damage repair, and maintenance; approximately 2,190 of these ships were dry-docked. In January 1944, the base was expanded to include approximately 823 acres, over 200 buildings, a 1,700 ton marine railway, a cruiser graving dry dock, five large repair piers, quay wall totaling 28,000 feet of berthing space and extensive industrial repair facilities. In 1946, the base was designated Naval Station San Diego with the primary mission of providing logistical support, including ship repair and dry docking, to locally based units of the US Naval fleet. NBSD remains in operation and is currently homeport for approximately 60 naval vessels and home base to 50 separate commands.

10.4.1. Installation Restoration Sites

Information on historical operations conducted at NBSD was submitted to the San Diego Water Board under the U.S. Navy's Installation Restoration (IR) program.[68] As a part of the IR an Initial Assessment Study[69] was conducted by the U.S. Navy that identified a number of past activities at NBSD that may have resulted in the discharge of pollutants to San Diego Bay in years past. Information regarding these activities obtained from the Initial Assessment Study as well as subsequent studies[70] is summarized in the subsections below.

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[68] The U.S. Navy's Installation Restoration (IR) program administered under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The purpose of the IR program is to identify, assess, characterize and cleanup or control contamination from past hazardous waste disposal operations and hazardous materials spills at U.S. Navy and Marine Corps installations.

[69] Initial Assessment Study of Naval Station, San Diego, California. SCS Engineers Inc. May 1986.

[70] Navy Clean 3 Program, Final Site Management Plan, Naval Station San Diego, San Diego, California, CTO-0020/0068, July 2002.

10.4.1.1. Former Ship Repair Basins

Between the years 1943 and 1945, more than 5,000 ships were sent to what was then called U.S. Naval Repair Base San Diego for conversion, overhaul, and repair. Many ship repair operations were conducted in four basins that were used as ship repair wet docks. Basins 1 and 2 were located north of present day Pier 11 and Basins 3 and 4 are located south of present day Pier 11, approximately 1.7 miles south of the present day Shipyard Sediment Site. The four basins measured approximately 400 feet long, 80 feet wide and 38 feet deep. The basins were constructed of steel sheet piling with concrete sides and were unlined at the bottom. The basins were enclosed on the San Diego Bay side by a reinforced concrete quay wall that U.S. Navy aerial photographs indicate was in place by 1953. The U.S. Navy reported that hazardous materials were not routinely disposed of in the basins during their years of operation and that less than 1000 gallons of waste oil and sludge were disposed of in the basins between 1940 and 1945.

In 1945, the U.S. Navy ceased use of the basins for ship repair. Decommissioning of naval vessels was conducted at Piers 8 and 12. From 1945 through 1972, Basins 3 and 4 were used as informal disposal sites for hazardous and non-hazardous solid waste. Materials filled and disposed in the ship repair basins included demolition spoil, debris and rubble, solid waste, scrap metals, lubricants and oils from decommissioned ships as well as wastes from other facilities at NBSD. U.S. Navy records indicate that Basins 3 and 4 received approximately 4,200 gallons of oils and sludges. The quantity of debris in the basins is unknown; however the sizes of Basins 3 and 4 indicate they may hold up to 88,000 cubic yards of debris and soil. The U.S. Navy reported that Basins 1 and 2 had a limited period of operation from approximately 1941 through 1945, and that aerial photographs indicate the basins were filled by 1946. Basins 1 and 2 combined may contain up to 118,000 cubic yards of fill material. By 1972 all four ship repair basins were paved over with asphalt and or concrete for use as parking lots or as a site for other facilities.

Chemical constituents identified in Ship Repair Basins 3 and 4 in the U.S. Navy's 1990s IR Program site investigations included lubricants, oils, metals, PCBs, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). In 1998, approximately 16 tons of PCB and PAH impacted soil was removed from the upper 10 feet of Basin 4 as part of an initial cleanup action to eliminate potential human health risks. The impacted soil was hauled to a regulated off-site landfill for disposal.

10.4.1.2. Mole Pier

The Mole Pier is a 22 acre triangular area bounded by 7th Street and Paleta Creek to the north, Cummings Road to the east, and Mole Road to the south. The area is located near present day Pier 9 adjacent to Paleta Creek and only a few hundred feet from San Diego Bay, approximately 1.5 miles south of the Shipyard Sediment Site. Mole Pier was created in 1942 with hydraulic fill material from San Diego Bay. By 1945, Mole Pier was enclosed with earthen berms and designated a disposal area. Materials such as creosote–coated pier pilings, lumber, refuse concrete, waste paints, gasoline, solvents, oil, and diesel fuel were burned at the site between approximately 1945 and 1972. During the 1970s, trucks and heavy equipment were routinely decontaminated by spraying with diesel fuel and using a crane to dunk the vehicles into Paleta Creek. It is estimated that approximately 500,000 gallons of fuel was sprayed, burned, or buried in this area during its years of operation. Hazardous wastes that were burned or buried at the Mole Pier area are listed in Table 10-1 below.

Table 10-1 Hazardous Wastes Burned or Buried at the Mole Pier Area

Waste	Source	Time Period	Estimated Total Quantity
Motor Oils, diesel fuel, gasoline hydraulic fluid	NBSD Vehicle Maintenance	1945-1963	400,000 Gallons
	Naval Repair Facility	1945-1964	140,000 Gallons
Stoddard Solvent	NBSD Vehicle Maintenance	1945-1963	2,800 Gallons
	Naval Repair Facility	1967-1972	1,000 Gallons
Mixed Solvents (acetone, MEK, toluene, methylene chloride)	Naval Repair Facility	1945-1964	6,000 Gallons
	Naval Public Works Center	1967-1970	1,000 Gallons
Mineral spirits	Naval Public Works Center	1967-1970	18,000 Gallons
Carbon remover (phenol, cresol, chlorinated hydrocarbons)	NBSD Vehicle Maintenance	1945-1963	500 Gallons
Methylene Chloride	Naval Development and Training Center	1967-1972	2,400 Gallons
Chlorinated solvents, unidentified	Naval Development and Training Center	1967-1972	1,000 Gallons
	Naval Repair Facility	1945-1964	20,000 Gallons
Sandblast Grit	Shore Intermediate Maintenance Activity	1950-1965	320,000 Pounds
	Naval Public Works Center	1963-1972	2,700,000 Pounds

Potential pollutant transport mechanisms to Paleta Creek and San Diego Bay during the Mole Pier years of operation (1945 through 1972) include direct deposition, air transport, surface water runoff, and pollutant movement through the highly to moderately permeable (10^{-2} to 10^{-3} cm/sec) fill material underlying the site. Chemical constituents identified at the Mole Pier Site from past discharges in the U.S. Navy's 1990s IR Program site investigations included fuels, oils, solvents, paint sludges, metals, TPH, VOCs, SVOCs, dibutyltin, monobutyltin, tetrabutyltin, and tributyltin. As of 2001, approximately 64,000 cubic yards of impacted soil was removed from the Mole Pier site as part of an initial cleanup action and hauled to a certified off-site landfill for disposal.

10.4.1.3. Salvage Yard

Between the years 1943 to about 1975, the U.S. Navy operated a salvage yard to receive, sell, donate, and dispose of excess Navy materials in an area approximately 1,050 feet by 300 feet in the south central portion of NBSD. Paleta Creek borders the site to the south – southeast at a point approximately 1.6 miles south of the Shipyard Sediment Site. Harbor Drive and Cummings Road border the site to the northeast and southwest, respectively. The U.S. Navy reports that items and materials handled by the site included transformers containing PCBs, mercury, electrolytes from old batteries, drummed petroleum wastes, solvents and thinners, refuse, demolition debris, infectious wastes from medical and dental clinics, and spoiled food items from incoming Navy vessels. It is estimated that between 100 and 200 drums per month of waste lubricating oil, lubricants, solvents, and acid alkaline solutions were transported to the site during its operation for handling. Liquid waste was typically incinerated, drained onto the ground, or recycled. Material that could not be sold, reused or donated was incinerated at the Site. The U.S. Navy's estimated quantities of pollutants drained onto the ground at the site are presented in Table 10-2 below. Potential pollutant pathways to Paleta Creek and San Diego Bay during the Salvage Yard's years of operation would have included surface water runoff and pollutant movement through the highly to moderately permeable (10^{-2} to 10^{-3} cm/sec) fill material underlying the site. Part of the salvage yard was located adjacent to Paleta Creek, which flows into San Diego Bay approximately 1200 feet west of the salvage yard site.

Table 10-2 Quantity of Pollutants Estimated Drained to Ground

Waste	Source Of Waste	Time Period	Estimated Total Quantity
Dielectric Fluids	Electrical shops at all San Diego Naval Facilities	1943-1975	7,500 – 15,000 Gallons
Mercury	Torpedoes, compasses, ballast tanks	1943-1975	750 – 1,800 Pounds
Waste Oils, Solvents Thinners	All San Diego naval facilities	1943-1975	15,000 – 110,000 Gallons
Battery Acids	Transportation	1943-1975	Unknown Quantity
Silver Nitrate	Photo Processing	1943-1975	Unknown Quantity

Chemical constituents identified at the Salvage Yard Site during the course of the U.S. Navy's IR Program site investigation included PCBs and lead. During 1996-1997, approximately 22,000 cubic yards of impacted soil were removed from the site as part of a cleanup action. The impacted soil was hauled to a certified off-site landfill for disposal.

10.4.1.4. Defense Property Disposal Office (DPDO) Storage Yard

Between the years 1943 through 1981, a 180,000 square foot area was designated for use as a storage yard. The former storage yard lies east of Harbor Dive and north of Paleta Creek at a point approximately 1.4 miles south of the Shipyard Sediment Site. Prior to 1975 the surface was reportedly oiled regularly as a dust-control measure. The U.S Navy reports that an estimated 35,000 to 75,000 gallons of oil were spread on the site as a dust control measure. This oil consisted of various waste petroleum, oils, and lubricants. In addition, containers of electrical insulating oils were stored at the site during the 1970s. Some of the containers reportedly leaked but no estimated quantities are available. The storage yard was paved with asphalt in 1975 and is currently used for parking and boat storage. Potential pollutant pathways to Paleta Creek and San Diego Bay during the storage yard's years of operation would have included surface water runoff and pollutant movement through the highly to moderately permeable (10^{-2} to 10^{-3} cm/sec) fill material underlying the site. Part of the storage yard was located adjacent to Paleta Creek along its southern edge, which flows into San Diego Bay approximately 1400 feet west of the storage yard site. Chemical constituents identified at the Salvage Yard Site in the U.S. Navy's 1990s IR Program site investigations have included petroleum, PCBs, and metals.

10.4.1.5. City of San Diego Sewage Treatment Plant

Between the years 1943 through 1963 the City of San Diego owned and operated its main sewage treatment plant at a location in NBSD bounded on the east by Harbor Drive, on the south by Vesta Street, and on the north by Knowlton Williams Road. During its initial years of operation from 1943 to 1950, the 14 million gallon per day (MGD) capacity plant was known as the 32nd Street Sewage Treatment Plant. In 1950 the plant capacity was expanded to 40 MGD capacity to accommodate increasing sewage flows resulting from San Diego's rapidly increasing population. The plant was renamed the Bayside Treatment Plant and was also sometimes referred to as the Harbor Drive Treatment Plant. The sewage treatment plant facilities consisted of maintenance and administration buildings, anaerobic digesters, clarifiers, elutriation tanks, sludge handling facilities, and other associated facilities. Effluent from the sewage treatment plant was discharged into an outfall pipeline and conveyed into San Diego Bay at a point 35 feet below the water line near present day Pier 5, approximately 0.9 miles south of the Shipyard Sediment Site. The Bayside Treatment Plant discharge would typically have included pollutants such as biochemical oxygen demand, suspended solids, grease and oils, metals, bacteria, and pathogens.

San Diego Bay water quality conditions drastically deteriorated during the years 1951-1963 due to the pollution effects caused by Bayside Treatment Plant discharge and other sewage, sludge, and industrial waste discharges entering the bay from various sources (Fairey et al 1996). Dissolved oxygen concentrations in the Bay declined to about half normal levels and turbidity in the water resulted in a visibility of less than 1 meter. Bait and game fish had virtually disappeared from the Bay. Coliform bacteria were routinely isolated from the Bay at significant levels. In 1955, the State Board of Public Health and the San Diego Department of Public Health declared much of the Bay contaminated, and posted quarantine and warning signs along 10 miles of shoreline. By 1963, sludge deposits from the treatment plant outfall were two meters deep, extended 200 meters seaward, and along 9000 meters of the shoreline. In 1960 the U.S. Navy began to complain that the Bayside Treatment Plant discharge was causing advanced corrosion to the hulls of naval ships while in port and that the sewage plant should be moved.[71] (Jamieson, 2002)

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[71] The ship hull corrosion was reportedly caused by electrolysis of the very high levels of organic matter present in San Diego Bay waters at the time. The U.S. Navy estimated at the time that the excessive corrosion was costing \$1.5 million dollars a year in repairs.

In 1960, San Diego voters approved a bond ($42.5 million) for construction of a new Metropolitan Sewerage System to alleviate the severe pollution conditions in San Diego Bay. In August 1963, the new collection, treatment, and ocean disposal system began operation when the Point Loma Sewage Treatment Plant and its two-mile Pacific Ocean outfall became operational. By February 1964, domestic sewage disposal had been totally eliminated in San Diego Bay. Following the termination of the sewage discharge the sludge banks that blanketed the eastern shore of the bay gradually disappeared and dissolved oxygen levels returned to normal.

10.4.1.6. Firefighting Training Facility

Between the years 1945 through 1995 the U.S. Navy operated a fire–fighting training facility at 1000 feet long by 200 feet wide site near Pier 8, approximately 1.3 miles south of the Shipyard Sediment Site. Training fires were lit at the facility using petroleum hydrocarbons, including approximately 3500 gallons per week of jet propellant grade 5 fuel (JP-5) and gasoline. In 1972 the training facility was redesigned with pollution control equipment. Quench water generated from each firefighting exercise was directed into a series of underground concrete tanks in the southwest portion of the site after passing through several oil water separators. Chemical constituents identified in soil and groundwater at the site in the U.S. Navy's IR Program site investigations included benzene, ethylbenzene, toluene, xylenes, and TPH (primarily JP-5) with lesser amounts of gasoline and bunker fuel. Two free product plumes were identified in the ground water resulting from underground pipe leaks at the site in the early 1990s. A multiphase extraction system was operated at the site from 1997 to 2001 that recovered approximately 15,000 gallons of free product. In 1996, the site was paved over and it is now used as a parking lot. The U.S. Navy reported that "the possibility of historical pathways linking site operations at the site and San Diego Bay was uncertain for the years prior to 1972 (when the training facility was redesigned with pollution control equipment).

10.4.1.7. PCB Storage Facility Electrical Storage Yard

Between the years 1981 through 1994 the U.S. Navy operated a PCB storage facility at a location approximately 1200 feet northwest of Paleta Creek and approximately 1000 feet east of San Diego Bay. The site is bounded on the south by Civic Center Drive. This location is approximately 1.2 miles south of the Shipyard Sediment Site. The facility was primarily used for maintenance of electrical equipment, including draining of transformer fluids and storage of fluids containing PCBs. Transformers were historically transported, repaired, and stored on soil, gravel, asphalt, and concrete at various locations throughout the yard. Until the late 1980s no attempt was made to contain fluids or to segregate PCB fluids from other fluids used in the yard. The operation also involved application of waste oil potentially containing PCBs to the ground for dust and weed suppression. The site is currently paved over with asphalt and is currently used as a parking lot. Aroclor 1260 was the primary PCB reported in soil and storm drain samples collected from the site during the course of the U.S. Navy's IR Program site investigation. The reported PCB concentrations ranged from below the detection limit to 18,500 mg/kg. PCB impacted soil was removed from the site and a nearby storm drain inlet in 1994. The Department of Toxic Substances Control (DTSC) certified that the site cleanup and site closure was achieved (i.e. no further remedial action was needed). Potential pollutant transport mechanisms to Paleta Creek and San Diego Bay during its years of operation included direct deposition, air transport, surface runoff, and pollutant movement through the highly to moderately permeable (10^{-2} to 10^{-3} cm/sec) fill material underlying the site.

10.4.1.8. Material Storage Yard

Between the years 1939 through 1995 the U.S. Navy operated an unpaved material storage yard on approximately 5 acres of land within NBSD approximately 800 feet east of San Diego Bay. The site is located approximately 1.2 miles south of the Shipyard Sediment Site in an area bounded by Vesta Street to the north, Woden Street to the south and Ward Road to the west. U.S. Navy aerial photographs indicate that the site was used as an unpaved storage yard for metal finishing, preservation, and packaging at Building 321. Operations conducted at this area from 1955 through 1996 included the use of solvents and corrosives for the cleaning of metals. The site is currently paved over and is primarily used as a parking lot. The primary pollutants identified in soil at the site during the course of the U.S. Navy's IR Program site investigations in the 1990s included metals, PAHs and PCBs. The dominant potential pollutant transport mechanism to San Diego Bay during the storage yard's years of operation was surface water runoff.

10.4.1.9. Brinser Street Parking Area

Between the years 1941 through 1945 the U.S. Navy constructed floating dry docks and barges at a site within NBSD near Pier 7, approximately 1.2 miles south of the Shipyard Sediment Site. Facilities at the site included two shallow creosote dip ponds used to treat lumber on the site. The site was paved over in 1966 and was subsequently used as a parking lot, a staging area for military equipment, and for shipping and receiving. U.S. Navy soil investigations from 1989 through 1992 revealed the presence of petroleum products, PAHs, metals, SVOCs and VOCs. In 1996 about 5,000 tons of PAH impacted soil was excavated and taken off-site to a soil recycling facility. DTSC certified the site cleanup complete in 1998. The dominant potential pollutant transport mechanism to San Diego Bay during the site's years of operation was surface water runoff.

10.4.1.10. Dry Dock Sandblast Area

The dry dock sandblast grit area is located immediately east of Piers 5 and 6, approximately 1.0 mile south of the Shipyard Sediment Site. The site has been used for the overhaul and maintenance of ships, repair of ship components, and contractor equipment storage since 1942. The site includes a dry dock basin that is approximately 700 feet long, 104 feet wide and 42 feet deep. This dry dock can accommodate vessels up to 688 feet long and 90 feet wide with a 30 foot draft.

The operations at this site were and still remain industrial in nature and include sand blasting and painting of ship components. Sandblasting operations began at the site following construction of the dry dock facility in 1942. Copper abrasive blast material was used on naval vessels in the dry dock to remove anticorrosive and antifouling paints[72] from the hulls of ships. Sand blasting

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[72] Anticorrosive paints generally contain zinc and chromates, while antifouling paints used by the Navy are currently copper based formulations.

of small ship parts also occurred on the ground outside of the dry dock. Construction drawings reveal that a railcar structure and a sandblast grit storage silo were present in the western portion of the site by 1952. The railcar shelter contained a hopper where copper slag (sandblast grit) was bottom dropped by train. Used grit was reportedly accumulated and collected for recycling. Open-air sand blasting operations took place at the dock until 1993. At that time sandblasting operations reportedly began being conducted under completely tented conditions to eliminate the dispersion of grit via wind.

In October 1992, visible surface contamination consisting of overlying gravel and dark gray grit and dust was removed to approximately 4 inches below grade at the site. The primary pollutants identified in soil at the site during the course of the U.S. Navy's IR Program site investigation included elevated concentrations of arsenic, iron, lead, manganese, thallium, and hexavalent chromium. Ground water samples have indicated elevated levels of copper, nickel, selenium, and dibromochloromethane.

Potential pollutant transport mechanisms to San Diego Bay during the site's years of operation prior to 1993 included air deposition (e.g., windborne dust) and surface water runoff.

10.4.2. Historic Operations within the Present Day NASSCO Leasehold

The U.S. Navy conducted a record review to compile historical information about U.S. Navy leases and use of property within the present day NASSCO shipyard leasehold. The results of the review are contained in the July 15, 2004 technical report entitled *Navy Technical Report Historical Navy Activities at NASSCO Shipyard* (U.S. Navy, 2004) and are summarized below.

Between the years 1938 and 1956 the U.S. Navy occupied a parcel of land at the south end of the current NASSCO leasehold at the foot of 28th Street, including the 28th Street Pier. This parcel was originally leased from the City of San Diego and was considered part of the U.S. Destroyer Base San Diego and was also referred to as the 28th Street Shore Boat Landing Station. The landing consisted of a finger pier that ship launches used to ferry sailors to and from Navy ships moored in San Diego Bay. The remaining northern side of the 28th Street Pier was used for buildings that housed activities including a machine shop, battery shop, planning mill, electric shop, mold loft, mill work office, naval stores, pipe shop, pipe threading area, overhead crane, and boat way. The U.S. Navy reported that information concerning these buildings and activities is limited but it is assumed that the activities were associated with maintaining ships launches and would involve use of materials similar in type to a small boatyard. The U.S. Navy did not maintain records related to the activities, hazardous materials usage, and any waste releases that may have occurred around NASSCO. Based on the historical record review, the U.S. Navy concluded that the industrial activities it conducted on NASSCO's present day leasehold were limited to maintenance of small boat launches. The U.S. Navy acknowledged the possibility that discharges from their boat launch maintenance operations on the north side of 28th Street Pier to the Shipyard Sediment Site may have occurred. However the U.S. Navy characterized these discharges, if they occurred, as being "limited in scale" and causing "… a relatively minimal contribution to elevated sediment contaminant concentrations" at the Shipyard Sediment Site. The U.S. Navy also hypothesized that if pollutants were discharged, they would likely have been removed from San Diego Bay as a result of dredging activities when "… the NASSCO dry dock was built." The U.S. Navy also reported that they "…were unable to find any records indicating the Navy operated a floating dry dock" for painting and blasting operations on the subject property and that "…records from the activities conducted by shops or ships at NASSCO shipyard have not been maintained."

10.4.2.1. Past Discharges within the Present Day NASSCO Leasehold

The U.S. Navy described the activities at the former 28th Street Shore Boat Landing Station as being associated with "…maintaining ships launches and involving use of materials similar in type to a small boatyard" (U.S. Navy, 2004). However, as described in the preceding section, specific documentation on the U.S. Navy's activities and wastes generated is lacking. In the absence of such direct evidence, the San Diego Water Board may consider relevant direct or circumstantial evidence in determining whether a person shall be required to clean up waste and abate the effects of a discharge or a threat of a discharge under CWC section 13304.[73]

10.4.2.2. Industry-Wide Operational Practices That Have Led to Discharges

Commercial boatyards are somewhat analogous to the U.S. Navy's former 28th Street Shore Boat Landing Station in terms of operations, materials used, and wastes generated. Industry-wide commercial boatyard operational practices that have historically led to discharges is a relevant consideration in determining the extent and types of waste discharges that may have occurred from the 28th Street Shore Boat Landing Station to the Shipyard Sediment Site.[74]

Boatyards provide services that are necessary to maintain and repair boats. These services include scrubbing boat hulls to remove attached marine organisms, painting and stripping antifouling hull paints, and other repair services. The hull paints typically contain metals that are toxic to marine organisms thereby retarding marine growth below the water line of a vessel.[75] Various inorganic and organic toxic chemicals have been used in antifouling paints. These include cuprous oxide, arsenic, mercury, and organolead.[76] Other products used at boatyards include solvents and petroleum products. The removal of marine organisms and paint from the boat hull may consist of using mediablasting (e.g., sandblasting, plastic media, etc), hydraulic jet spray (hydroblasting or hydro washing) equipment, or sanding the hull by hand or other mechanical means. Wastes generated from these procedures consist of spent abrasives, wash water, marine growth, old paint, rust, etc.

The various activities at boatyards are typically conducted predominantly in outdoor areas, although some boatyards have indoor working areas as well. The outdoor nature of the majority of these activities exposes various products and waste products to the environment, including

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73 See section I.A of the State Water Resources Control Board Resolution No. 92-49, *Policies and Procedures for the Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304*.

74 See section 1.A.4 of State Water Resources Control Board Resolution 92-49.

75 Fouling of boat hulls by marine organisms significantly increases the friction drag on the boat, resulting in increased fuel consumption and reduction in maximum speed. In addition, the attached biota may also damage the hull, clog seawater piping systems, interfere with operating equipment and sound devices, and enhance the corrosion on metal surfaces.

76 The use of many of these compounds is currently restricted or has been eliminated. Currently, the most commonly used chemical is cuprous oxide.

impervious surfaces (such as asphalt or concrete surfaces throughout the work areas) and to direct discharges to waters of the state (from work conducted directly over or adjacent to the receiving water). Typical boatyard operations are in close proximity to receiving waters and create the potential for discharge to surface waters via waterborne runoff from impervious surfaces, airborne transport of particulates, and via accidental/illicit pollutant releases from spills or otherwise. Some work at boatyards is also conducted on vessels that remain in, or are returned to the receiving water. This topside or interior work may also result in discharges of wastes or pollutants such as particulates from abrasive blasting, sanding, or spilled paints/solvents to receiving waters.

BMPs implemented by the boatyard industry in San Diego prior to the 1990s were deficient in many respects and led to excessive discharges of waste to San Diego Bay. In 1972, the San Diego Water Board initiated an investigation to determine the amount and kinds of pollutants that entered San Diego Bay from shipbuilding and repair facilities, and boatyard facilities and the possible effects that the pollutants could have on beneficial uses of San Diego Bay. As a result of that investigation, the San Diego Water Board concluded that heavy metal concentrations were higher in bay sediment near boatyards and shipyards than in other parts of San Diego Bay.[77] Additional evidence is documented in the series of cleanup and abatement orders issued by the San Diego Water Board to San Diego Bay boatyard owners and operators in the late 1980s.[78] Based on these considerations it is reasonable to assume that BMPs employed by the U.S. Navy at the 28th Street Shore Boat Landing Station during the years of operation (1938 to 1956) were not adequate to prevent discharges to San Diego Bay in the vicinity of 28th Street Pier and that such discharges likely resulted in the accumulation of metals and other pollutants in the marine sediment at that location.

10.4.2.3. Site Characteristics and Location in Relation to Other Potential Sources of Discharge

Consideration of Shipyard Sediment Site characteristics and location in relation to other potential sources of discharge is a relevant consideration in determining the extent and types of waste discharges that may have occurred from the 28th Street Shore Boat Landing Station to the Shipyard Sediment Site.[79] The San Diego Water Board has considered evidence of past discharges from the U.S. Navy's former 28th Street Shore Boat Landing Station to the Shipyard Sediment Site by reviewing pollutant levels in core samples at depths that would reflect pollutant contributions during the years 1938 through 1956.

"Significance of Sediment Resuspension and Tidal Exchange to Reduction of Polychlorinated Biphenyl Mass in San Diego Bay" (Peng et. al. 2003) reports a sedimentation rate of 0.92 centimeters per year (cm/yr) at a sampling station in the vicinity of the Shipyard Sediment Site outside of the current leaseholds. The sedimentation rate may be higher within the leasehold closer to the shoreline since the currents may be less and the shoreline is nearer the source(s) of

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[77] See California Regional Water Quality Control Board, San Diego Region, Wastes Associated with Shipbuilding and Repair Facilities in San Diego Bay, June 1972.

[78] See Regional Board Cleanup and Abatement Order Nos. 88-78, 88-79, 88-86, 89-31, and 89-32.

[79] See section I.A.2. of Resolution No. 92-49.

sediment input. Table 10-3 shows the estimated dates associated with the core depths for two different sedimentation rates. A sedimentation rate of 0.92 cm/yr suggests that the sediment in the 2 to 4 foot core were deposited prior to approximately 1936. Assuming a higher sedimentation rate of 2 cm/yr indicates that the sediment in the 2 to 4 foot core was deposited from approximately 1972 to 1942.

Table 10-3 Estimated Deposition Years for Cores Based on Sedimentation Rates

Core Depth	0.92 cm/year[1]	2 cm/year[2]
0 to 2 feet	2002 to 1936	2002 to 1972
2 to 4 feet	1936 to 1870	1972 to 1942
4 to 6 feet	1870 to 1804	1942 to 1912

1. 0.92 cm/year corresponds to approximately 33 years per foot.
2. 2 cm/year corresponds to approximately 15 years per foot.

The Shipyard Report provides analytic results from sediment cores collected down to depths of approximately 6 to 8 feet (Exponent, 2003). The results from Stations NA17 and NA19, the core locations closest to the former 28th Street Shore Boat Landing Station, are provided in Table 10-4.

The analytical results for tributyltin (TBT) were used to evaluate the applicability of the two deposition rates in Table 10-4. TBT was first used as a marine antifouling coating in the 1960s (GlobalSecurity.org, 2005). Therefore, TBT should not be reported in sediment deposited prior to the 1960s unless TBT in the overlying sediment contaminated the underlying sediment by mechanisms such as bioturbation or disturbances via propeller wash. Review of the core results indicate the presence of significant TBT levels in the cores collected from 2 to 4 feet in stations NA17 and NA19. The deposition rate of 0.92 cm/yr suggests that the sediment at 2 to 4 feet was deposited between 1936 and 1870. However the TBT concentrations suggest that the 2 to 4 ft. core interval includes sediment from the late 1960s or early 1970s (when TBT was first utilized), implying that the actual sedimentation rate was higher than 0.92 cm/year. A deposition rate of 2 cm/year indicates that the sediment in the core from 2 to 4 feet was deposited from 1942 to 1972. These dates are consistent with the presence of TBT in cores collected at the 2 to 4 ft. depth from stations NA17 and NA19 (see Table 10-4). Therefore, the higher deposition rate of 2 cm/year is judged to be more applicable to the Shipyard Sediment Site than the lower 0.92 cm/year rate.

Table 10-4 Selected Results from Core Stations NA17 and NA19

Depth	Contaminant	NA17	NA19
0 to 0.06 feet	PCB homologs µg/kg	620	1,400
0 to 2 feet	PCB homologs µg/kg	880	1,100
2 to 4 feet	PCB homologs µg/kg	720	1,100
4 to 5 feet	PCB homologs µg/kg	3.6	
4 to 6 feet	PCB homologs µg/kg		460

Depth	Contaminant	NA17	NA19
0 to 0.06 feet	Benzo[a]pyrene µg/kg	370	-
0 to 2 feet	Benzo[a]pyrene µg/kg	640	440
2 to 4 feet	Benzo[a]pyrene µg/kg	240	330
4 to 5 feet	Benzo[a]pyrene µg/kg	19	
4 to 6 feet	Benzo[a]pyrene µg/kg		370
0 to 0.06 feet	Tributyltin µg/kg	1,400	570
0 to 2 feet	Tributyltin µg/kg	1,300	1,400
2 to 4 feet	Tributyltin µg/kg	340	120
4 to 5 feet	Tributyltin µg/kg	1.7	
4 to 6 feet	Tributyltin µg/kg		450
0 to 0.06 feet	Arsenic mg/kg	14	14
0 to 2 feet	Arsenic mg/kg	15	17
2 to 4 feet	Arsenic mg/kg	10	13
4 to 5 feet	Arsenic mg/kg	4	
4 to 6 feet	Arsenic mg/kg		4.5
0 to 0.06 feet	Cadmium mg/kg	0.4	0.37
0 to 2 feet	Cadmium mg/kg	0.46	0.84
2 to 4 feet	Cadmium mg/kg	0.62	1.10
4 to 5 feet	Cadmium mg/kg	0.09	
4 to 6 feet	Cadmium mg/kg		0.78
0 to 0.06 feet	Chromium mg/kg	74	65
0 to 2 feet	Chromium mg/kg	84	59
2 to 4 feet	Chromium mg/kg	24	31
4 to 5 feet	Chromium mg/kg	7.5	
4 to 6 feet	Chromium mg/kg		28
0 to 0.06 feet	Copper mg/kg	510	270
0 to 2 feet	Copper mg/kg	450	450
2 to 4 feet	Copper mg/kg	170	160
4 to 5 feet	Copper mg/kg	9	
4 to 6 feet	Copper mg/kg		71
0 to 0.06 feet	Lead mg/kg	110	100
0 to 2 feet	Lead mg/kg	120	120
2 to 4 feet	Lead mg/kg	62	96
4 to 5 feet	Lead mg/kg	6.4	
4 to 6 feet	Lead mg/kg		35

Depth	Contaminant	NA17	NA19
0 to 0.06 feet	Mercury mg/kg	0.84	0.78
0 to 2 feet	Mercury mg/kg	0.89	0.94
2 to 4 feet	Mercury mg/kg	0.39	0.60
4 to 5 feet	Mercury mg/kg	0.05	
4 to 6 feet	Mercury mg/kg		0.87
0 to 0.06 feet	Nickel mg/kg	17	17
0 to 2 feet	Nickel mg/kg	16	18
2 to 4 feet	Nickel mg/kg	8.1	9.9
4 to 5 feet	Nickel mg/kg	3.7	
4 to 6 feet	Nickel mg/kg		8.4
0 to 0.06 feet	Silver mg/kg	1.3	1.1
0 to 2 feet	Silver mg/kg	1.5	1.6
2 to 4 feet	Silver mg/kg	0.66	0.72
4 to 5 feet	Silver mg/kg	0.03	
4 to 6 feet	Silver mg/kg		0.81
0 to 0.06 feet	Zinc mg/kg	620	450
0 to 2 feet	Zinc mg/kg	550	850
2 to 4 feet	Zinc mg/kg	380	540
4 to 5 feet	Zinc mg/kg	24	
4 to 6 feet	Zinc mg/kg		210

(Exponent, 2003)

There are uncertainties associated with this analysis. The estimated age associated with the core depths is dependent upon the sedimentation rate. There has been very little maintenance dredging reported at the Shipyard Sediment Site, which suggests that the deposition rate is low, in the order of 2 cm/year or less. Dredging was performed in 1981 for NASSCO's floating dry dock. However, the dredge footprint for NASSCO's floating dry dock does not include the entire area occupied by the U.S. Navy on the northwest side of the 28th Street Pier, thus historical discharges to the Shipyard Sediment Site by the U.S. Navy were not removed by the dredging for the dry dock.

Physical disturbances, such as bioturbation, dredging, and propeller wash, also introduce uncertainty into this interpretation. For example, if propeller wash from ship movements removes material from the bottom, the shallow sediment may be older than that indicated by applying the sedimentation rate. If disturbances result in redeposition of older sediment on top of newer sediment, the shallow sediment may be older than interpreted.

The Shipyard Report uses the presence of graded bedding in the sediment profiles to identify areas of no apparent physical disturbance. Stations NA17 and NA19 were reported to be stations with no apparent physical disturbance (Exponent, 2003). Therefore, assuming a deposition rate of 2 cm/year, it is likely that the pollutants reported in the sediment between 3 feet and 4.2 feet are from discharges between 1938 and 1956.

As indicated in Table 10-4, there are metals, PAHs, and PCBs above the tentative cleanup levels in the cores collected from 2 to 4 feet at stations NA17 and NA19. Therefore, it is likely that the pollutants reported in 2 to 4 foot cores at Stations NA17 and NA19 include discharges during the time of U.S. Navy operations at their 28th Street Shore Boat Landing Station.

10.4.2.3.2. Lack of Documentation of Responsible Management of Materials and Waste

According to the U.S. Navy's July 15, 2004 submittal to the San Diego Water Board, information concerning industrial activities conducted by the U.S. Navy in the area of the NASSCO leasehold is limited (U.S. Navy, 2004):

> *"… but it is assumed that these shops maintained ship's launches and would manage materials similar in type to a small boatyard. Records related to activities at these shops are unavailable. A search for records concerning hazardous material usage, waste disposal and any releases that may have occurred in and around NASSCO were nonproductive. Records from the activities conducted by shops or ships docked at NASSCO shipyard have not been maintained."*

As stated in Section 10.2 "lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal" is relevant evidence which the San Diego Water Board may consider in determining whether a party shall be required to clean up waste and abate the effects of discharge.

10.4.2.4. Other Records of Possible Known Discharge

Communications from NASSCO to the San Diego Water Board indicate that ADFL-37 floating dry dock was owned by the U.S. Navy and leased to NASSCO for a few years (Bermudez, 2005). As discussed in Section 10.4.2 the U.S. Navy reported that they "… were unable to find any records indicating the Navy operated a floating dry dock for painting and blasting operations" on the NASSCO leasehold. NASSCO did not submit any pertinent details on terms of the lease, the location of the floating dry dock on NASSCO's leasehold, the time period the floating dry dock was in operation, or the role the U.S. Navy played in operating the floating dry dock. The U.S. Navy's alleged ownership of ADFL-37 floating dry dock and the leasing of it to NASSCO for use in NASSCO's ship repair and construction activities does not constitute a sufficient basis to establish that the U.S. Navy caused or permitted the discharge of waste to the Shipyard Sediment Site.

10.5. Current Operations

NBSD is currently homeport for approximately 60 naval vessels and home base to 50 separate commands including major commands such as Fleet Training Center (FTC); Navy Public Works Center (PWC); Supervisor of Shipbuilding, Conversion, and Repair (SUPSHIP); Shore Intermediate Maintenance Activity (SIMA); and the Naval Supply Center (NSC). Each of these commands has specific and specialized fleet support purposes. NBSD is the workplace for approximately 48,000 military and civilian personnel.

NBSD currently occupies 1,029 acres of land and 326 water acres at the site lying east and west of Harbor Drive. The wetside consists of the San Diego Bay front area west of Harbor Drive in the City of San Diego. The dryside consists of the community facilities complex east of Harbor Drive.

10.5.1. Naval Station San Diego - Wetside

NBSD wetside located west of Harbor Drive is intensively developed and supports waterfront operations, ship berthing and maintenance, station maintenance, training, administration, and logistics functions. Operational facilities include piers, quay walls, a graving dock, small craft berthing facilities, fueling facilities, armories, and waterfront operations buildings. The straight-line map measurement of the shoreline at NBSD is approximately 1.6 miles. NBSD contains 13 berthing piers, a mole pier, two channels, one graving dock, one floating dry dock, and various quay walls that have a total shoreline measurement of approximately 5.6 miles.

10.5.1.1. Piers

The 13 piers at NBSD are used to berth surface ships, support vessels, and barges. The surface ships, support vessels, and barges receive various ship support services such as supplies and minor repair or maintenance when berthed. Ship support services on the 13 piers include loading supplies and equipment onto the ships. Berth side ship repair and maintenance conducted while the vessel is docked at the pier may include abrasive blasting, hydro-blasting, metal grinding, painting, tank cleaning, removal of bilge and ballast water, removal of anti-fouling paint, sheet metal work, electrical work, mechanical repair, engine repair, hull repair, and sewage disposal. Berth side ship repair activities are generally less complex than the ship repair activities conducted at commercial shipyards or at the U.S. Navy’s graving dock or floating dry dock. Naval personnel (ships’ force), civil service personnel, and civilian contractors conduct berth side maintenance. The diverse discharges from ship repair and maintenance activities could occur at several locations, including aboard ship when docked, on the piers, or on shore locations.

Ship repair activities may also be conducted on the piers. Boats, ship sections, or parts can be placed on the piers or adjacent lands for repairs. The ship repair activities may be conducted by U.S. Navy personnel (ships’ force), civil service personnel, and civilian contractors. The breadth of work performed by the civilian contractors is typically greater than the work performed by ships’ force. Most of the more complex ship repair work is conducted on ships berthed at Pier 13. Typically, civilian contractors will store materials and supplies on Pier 13 while working aboard the ship berthed at the Pier. However, ship repair activity is not limited to ships berthed at Pier 13. NBSD also has several SIMA repair shops at the facility. The SIMA repair shops conduct repairs on various parts of the vessels, such as antenna repair or mechanical repairs.

10.5.1.2. Graving Dock

The U.S. Navy Graving Dock facility occupies slightly more than six acres of land just south of Pier 5 at the NBSD. The facility is used for periodic maintenance and repair of U.S. Navy ships. The dock basin is approximately 700 feet long, 104 feet wide, and 42 feet deep and can accommodate vessels up to 688 feet long and 90 feet wide with a 30 foot draft. The U.S. Navy Graving Dock has an annual average of three ships in for repairs or maintenance. During ship repair operations, private contractors perform repair and overhaul work on vessels scheduled by the U.S. Navy, under contract to SUPSHIP. The industrial activity is limited to facility maintenance and vehicle parking when ship repair activity is not occurring. Operations at the U.S. Navy Graving Dock generate or have the potential to generate discharges of waste to San Diego Bay. The discharges may include industrial process water and/or storm water contaminated with abrasive blast material, paint, oils, lubricants, fuels, or solvents.

10.5.1.3. Other Land Parcels

Two land parcels within the NBSD perimeter are not under the control of NBSD. A 25.8-acre compound is owned by Naval Supply Center, and 40 acres of railroad right-of-way is owned by the Atchison, Topeka & Santa Fe Railroad (AT&SF) and the Metropolitan Transit Development Board (MTDB). Interstate 5, Harbor Drive, and various public utilities occupy 54.51 acres of NBSD real estate under easement or permit. There are no discharges reported as being associated with the land parcels not under the control of NBSD.

10.5.2. Naval Station San Diego - Dryside

NBSD dryside consists of the community facilities complex east of Harbor Drive. The MS4s east of Harbor Drive discharge into Chollas Creek. The entire watershed contributing to Chollas Creek drains a total of approximately 16,273 acres of land. The area of NBSD draining to Chollas Creek is approximately 266 acres. The U.S. Navy reports that there are at least 8 “non industrial” MS4 storm drains and 30 non-industrial sheet flow discharge points that discharge urban runoff from NBSD – Dryside directly to Chollas Creek (Chichester, 2006).

10.6. U.S. Navy Discharged Waste to San Diego Bay Creating Pollution, Contamination, and Nuisance Conditions in San Diego Bay

The U.S. Navy has caused or permitted discharges of pollutants from NBSD to San Diego Bay and has contributed to both the levels of pollutants, and the pollution and nuisance conditions, found at the Shipyard Sediment Site. Water Code section 13304 provides that a person who causes any waste to be discharged, or deposited where it probably will be discharged, into waters of the state creating, or threatening to create, a condition of pollution or nuisance is subject to cleaning up or abating the effects of the waste.

The Porter-Cologne Water Quality Act defines "pollution" as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects … the waters for beneficial uses.…"[80] "Contamination" is defined as "an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."[81]

Pollutants generated at NBSD were discharged in storm water to San Diego Bay, transported via tides and ship movement, and discharged directly to the Shipyard Sediment Site from the 28th Street Shore Boat Landing Station as a result of U.S. Navy operations. The pollutants include metals, butyl tins, PCBs, PCTs, PAHs, and TPH. Many of these same pollutants are present in the marine sediment of the Shipyard Sediment Site in highly elevated concentrations as compared to sediment chemistry levels found at off-site reference stations located in areas of San Diego Bay.[82]

Based on the evidence presented in Sections 10.8, 10.9 and 10.10 of this Technical Report, the U.S. Navy has a history of discharging pollutants at levels that have contributed to a condition of pollution, contamination, or nuisance at the Shipyard Sediment Site. As described in Sections 14 through 28 of this Technical Report these same pollutants in the discharges have accumulated in San Diego Bay sediment at levels that may:

1. Adversely affect the beneficial uses of San Diego Bay as described in later sections of this Technical Report,

2. Cause pollution, contamination, or nuisance conditions in San Diego Bay; and

3. Degrade marine communities, cause adverse effects on the environment or the public health, or result in harmful concentrations of pollutants in marine sediment.

Accordingly, it is concluded that the U.S. Navy has caused or permitted the discharge of waste to Chollas Creek and San Diego Bay in a manner causing the creation of pollution or nuisance conditions. These discharges have contributed to both the levels of pollutants and the pollution and nuisance conditions found at the Shipyard Sediment Site through the pollutant transport pathways. It is appropriate for the San Diego Water Board to name the U.S. Navy as a discharger pursuant to Water Code section 13304 in the CAO.

Further discussion on pollution, contamination, and nuisance are available in Sections 1.4 and 1.5 of this Technical Report.

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[80] Water Code section 13050(1).

[81] Water Code section 13050(k).

[82] See Section 16 of this Technical Report.

10.7. U.S. Navy NPDES Requirement Regulation

In 1992, NBSD obtained coverage under the State Water Board's General Industrial Storm Water National Pollutant Discharge Elimination System (NPDES) Requirements for the discharge of industrial storm water. A listing of successive General Industrial Storm Water Permits adopted by the State Water Board since 1991 and applicable to NBSD industrial storm water discharges is provided in Table 10-5 below.

Table 10-5 NBSD's General Industrial Storm Water NPDES Requirements

Order Number / NPDES No.	Order Title	Adoption Date	Expiration Date
91-13-DWQ, Industrial NPDES No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	November 19, 1991 (Notice of Intent Filed November 4, 1992)	April 17, 1997 (Notice of Intent Filed July 8, 1997)
97-03-DWQ, Industrial NPDES No. CAS000001	Waste Discharge Requirements (WDRs) For Discharge Of Storm Water Associated With Industrial Activities Excluding Construction Activities	April 17, 1997 (Notice of Intent Filed July 8, 1997)	(Notice of Termination Approved) November 13, 2002

The General Industrial Storm Water Permit required NBSD to develop and implement plans to limit its discharges of pollutants from storm water runoff into San Diego Bay. Rather than relying on specific numerical effluent limitations, the General Permit directed NBSD to create and follow "Best Management Practices"[83] (BMPs). The General Industrial Storm Water NPDES Requirements also required NBSD to develop and implement a Storm Water Pollution Prevention Plan (SWPPP) and a storm water Monitoring and Reporting Program Plan (MRPP). The requirements specified that the SWPPP include, among other things, the following:

- Descriptions of sources that might add significant quantities of pollutants to storm water discharges;
- A detailed site map;
- Descriptions of materials that had been treated, stored, spilled, disposed of, or leaked into storm water discharges since November 1988;
- Descriptions of the management practices that were employed to minimize contact between storm water and pollutants from vehicles, equipment, and materials;

[83] Best management practices ("BMPs") means schedules of activities, prohibitions of maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

- Descriptions of existing structural and non-structural measures to reduce pollutants in storm water discharges;

- Descriptions of methods of on-site storage and disposal of significant materials;

- Descriptions of outdoor storage, manufacturing, and processing activities;

- A list of pollutants likely to be present in significant quantities in storm water discharges and an estimate of the annual amounts of those pollutants in storm water discharge;

- Records of significant leaks or spills of toxic or hazardous pollutants to storm water;

- A summary of existing data describing pollutants in storm water discharge;

- Descriptions of storm water management controls, including good housekeeping procedures, preventive maintenance, and measures to control and treat polluted storm water; and

- A list of the specific individuals responsible for developing and implementing the SWPPP.

NBSD developed the MRPP and has implemented it since 1994. NBSD's MRPP identified 56 outfalls as industrial storm water outfalls that discharge to San Diego Bay. Typically, less than half of the 56 outfalls were sampled during rain events, pursuant to the General Industrial Storm Water NPDES Requirements.

In 2002, the San Diego Water Board issued Order No. R9-2002-0169, NPDES Permit No. CA0109169, *Waste Discharge Requirements for U.S. Navy, Naval Base San Diego (NBSD), San Diego County* (hereinafter NBSD NPDES Requirements or NBSD Permit). The NBSD NPDES Requirements regulates point source discharges from NBSD and three other San Diego naval installations.[84] The NBSD Permit incorporated and superseded the SWPPP and MRPP requirements of NBSD's previous General Industrial Storm Water NPDES Requirements. Order No. 2002-0169 currently regulates the following point source discharges from NBSD to San Diego Bay:[85]

- Utility vault & manhole dewatering,
- Steam condensate,
- Salt water system discharge,

[84] The Naval Base San Diego (NBSD) Complex includes four installations: (1) Naval Station, San Diego (NAVSTA); (2) Mission Gorge Recreational Facility (MGRF); (3) Broadway Complex; and (4) Naval Medical Center, San Diego (NMCSD).

[85] The following point source discharges from the NBSD Graving Dock facility are currently regulated under separate NPDES requirements contained in Order No. R9-2003-0265, *Waste Discharge Requirements for United States Navy Graving Dock Located at Naval Station San Diego, San Diego County*: (1) Saltwater supply system water, (2) Caisson gate ballast water, (3) Graving dock flood dewatering, (4) Ship repair and maintenance activities, and (5) Industrial storm water.

- Pier boom, mooring, and fender system cleaning,
- Miscellaneous discharges (landscape watering runoff, potable water & fire system maintenance),
- Ship repair and maintenance activities, and
- Industrial storm water.

Order No. 2002-0169 remains in effect as provided in Table 10-6 below.

Table 10-6 NBSD NPDES Requirements

Order Number / NPDES No.	Order Title	Adoption Date	Expiration Date
R9-2002-0169, NPDES No. CA0109169	Waste Discharge Requirements For U.S. Navy, Naval Base San Diego, San Diego County	November 13, 2002	Present

Pursuant to the NBSD NPDES Requirements cited above, NBSD was required to develop and implement BMP plans to limit discharges of pollutants into San Diego Bay. As described in the NBSD NPDES requirements (Order No. R9-2002-0169), BMPs may be “structural” (e.g., tarpaulins and shrouds to enclose work areas, retention ponds, devices such as berms to channel water away from pollutant sources, and treatment facilities) or “non-structural” (e.g., good housekeeping, preventive maintenance, personnel training, inspections, and record-keeping).

10.7.2. Order No. 91-13-DWQ, NPDES Permit No. CAS000001, General Industrial NPDES Requirements for Storm Water Discharges

Order No. 91-13-DWQ, NPDES Permit No. CAS000001, in effect from November 4, 1992 to July 8, 1997 contained the following narrative limitations that relate to the discussions contained herein:

- A. DISCHARGE PROHIBITIONS … 3. Storm water discharges shall not cause or threaten to cause pollution, contamination, or nuisance; and

- B. RECEIVING WATER LIMITATIONS … 1. Storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

- B. RECEIVING WATER LIMITATIONS … 2. Storm water discharges shall not cause or contribute to a violation of any applicable water quality standards contained in the California Ocean Plan, Inland Surface Water Plan, Enclosed Bays and Estuaries Plan, or the applicable San Diego Water Board’s Basin Plan.

10.7.3. Order No. 97-03-DWQ, NPDES Permit No. CAS000001, General Industrial NPDES Requirements for Storm Water Discharges

Order No. 97-03-DWQ, NPDES Permit No. CAS000001, in effect from July 8, 1997 to November 13, 2002 contained the following narrative limitations that relate to the discussions contained herein:

- A. DISCHARGE PROHIBITIONS … 3. Storm water discharges and authorized non-storm water discharges shall not cause or threaten to cause pollution, contamination, or nuisance; and

- C. RECEIVING WATER LIMITATIONS … 1. Storm water discharges and authorized non-storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

- C. RECEIVING WATER LIMITATIONS … 2. Storm water discharges and authorized non-storm water discharges shall not cause or contribute to an exceedance of any applicable water quality standards contained in a statewide Water Quality Control Plan or the applicable Regional Water Board’s Basin Plan.

10.7.4. Order No. R9-2002-0169, Naval Base San Diego NPDES Permit No. CA0109169

Order No. R9-2002-0169, NPDES Permit No. CA0109169, in effect from November 13, 2002 to the present, contains the following narrative limitations that relate to the discussions contained herein:

- A. PROHIBITIONS … 5. Industrial storm water discharges and authorized or permitted non-storm water discharges shall not cause or threaten to cause pollution, contamination, or nuisance as defined in CWC section 13050; and

- B. DISCHARGE SPECIFICATIONS … 1. The discharger shall not cause pollution, contamination, or nuisance, as those terms are defined in CWC section 13050, as a result of the treatment or discharge of wastes; and

- C. RECEIVING WATER LIMITATIONS … 1. The discharge of wastes shall not cause or contribute to an exceedance of any applicable water quality objective or standards contained in a state Water Quality Control Plan, the CTR, or the San Diego Basin Plan; and

- C. RECEIVING WATER LIMITATIONS … 2. Storm water discharges and authorized non-storm water discharges to any surface or ground water shall not adversely impact human health or the environment.

10.7.5. NBSD's Outfall Locations

NBSD's MRPP identified 56 outfalls as industrial storm water outfalls that discharge to San Diego Bay. Typically less than half of the 56 outfalls were monitored under the terms of the MRPP. Various outfalls were sampled over time, but in general, the twenty-one outfalls in Table 10-7 below were included:

Table 10-7 NBSD Outfall Locations

Industrial Storm Water Outfall	Location Description	Receiving Water
Outfall 5	24-inch diameter pipe west of Building 3116 between Pier 3 & Pier 4. A 12-inch diameter pipe is located about 4-feet above the outfall. Drainage area includes seven SIMA facilities,[86] and machine shop.	San Diego Bay
Outfall 9	A 12-inch diameter pipe west of dry dock 1. Drainage area includes four SIMA facilities and machine shop.	San Diego Bay
Outfall 11	24-inch diameter reinforced concrete pipe (RCP), near graving dock, west of Building 83. Drainage area includes three SIMA facilities and ship-to-shore utilities.	San Diego Bay
Outfall 14	30-inch diameter RCP west of Woden Street between Pier 6 and Pier 7. Drainage area includes warehouse and forklift and vehicle maintenance areas.	San Diego Bay
Outfall 22	18-inch diameter RCP east of Pier 7. Drainage area includes hazardous waste area.	San Diego Bay
Outfall 26	18-inch diameter RCP between Buildings 3322 and 68. Drainage area includes a formerly demolished industrial facility.	San Diego Bay
Outfall 30	18-inch diameter RCP between Cummings Road and Harbor Drive. Drainage area includes a diesel and gas fueling station.	Paleta Creek
Outfall 33	18-inch diameter RCP northeast of Building 197. Drainage area includes Pier #9 (Mole pier) with activities including sandblasting and painting.	San Diego Bay
Outfall 35	18-inch RCP west of 7th Street. Drainage area includes a roofing shop and areas with activities including sandblasting and painting.	San Diego Bay
Outfall 36	18-inch RCP at Paleta Creek Channel quay wall, north of Building 199.	Paleta Creek
Outfall 39	24-inch RCP at Pier 9 (Mole Pier) Drainage area includes activities including sandblasting and painting.	San Diego Bay

86 SIMA facilities may include the following: Production Facility, Engine Shop, Machine/Welding Shop, two-Maintenance Shops, Auxiliary Machine shop, Machine shop, Maintenance, Auxiliary Machine, Transportation and Maintenance, and Maintenance, Sheet Metal Shop/Corrosion, Antenna Repair Shop.

Industrial Storm Water Outfall	Location Description	Receiving Water
Outfall 45	18-inch diameter RCP, northwest of Building 335, between Pier 9 and Pier 10. Drainage area includes consolidated diver's unit and hazardous material reutilization area	San Diego Bay
Outfall 46	18-inch diameter RCP adjacent to Pier #10, southeast of 10th Street. Drainage area includes garbage cooker area, truck wash and storage yard, crane, rigging and construction area, shop storage, and shop stores.	San Diego Bay
Outfall 71	Swale at curb, northwest corner of 32nd Street and Norman Scott Road intersection. Drains directly into Chollas Creek. Drainage area includes Navy exchange, gasoline station and auto care center.	Chollas Creek
Outfall 78	30-inch diameter RCP at Paleta Creek, just east of SD Trolley bridge. Drainage area includes auto hobby shop and carports, Fleet Training Center and Fire Fighting School.	Paleta Creek
Outfall 80	42-inch diameter RCP at Paleta Creek just east of Atchinson Topeka and Santa Fe RR bridge. Drainage area includes garbage cooker area, truck wash and storage yard; diesel & gasoline fuel station; shop stores; recycling center; contractor storage site; crane and rigging area.	Paleta Creek
Outfall 99	12-inch diameter PVC pipe in Chollas Channel quay wall south of Building 185A. Drains directly into Chollas Creek. Drainage area includes former hazardous material storage facility (facility has been demolished).	Chollas Creek
Outfall 119	Two-foot wide asphalt/dirt swale, northwest corner of boat yard/storage area. Drainage area includes a scrap yard.	San Diego Bay
Outfalls 161-171	Pier 1—multiple discharge points. Pier #1 is located immediately adjacent to the area where Chollas Creek discharges into San Diego Bay. Drainage area includes Pier 1.	San Diego Bay
Outfalls 172-195	Pier 2—multiple discharge points. Drainage area includes Pier 2.	San Diego Bay
Outfalls 415-438	Pier 13—multiple discharge points. Drainage area includes Pier 13.	San Diego Bay

It is important to note that Outfall 71 and Outfall 99 discharge directly into Chollas Creek and that Outfalls 161 through 171 are located on Pier 1 which is immediately adjacent to the area where Chollas Creek discharges into San Diego Bay. Available U.S. Navy studies (Katz et al., 2003; Chadwick et al., 1999) indicate that pollutants from Chollas Creek outflows, and from NBSD in general (including resuspended sediment), can be conveyed to the Shipyard Sediment Site via storm water flows, tidal currents, and ship movements. (See Section 10.10 for a detailed discussion of these pollutant discharge pathways.)

10.8. U.S. Navy Discharges Associated with Current Operations

10.8.1. Storm Water Monitoring for General Industrial NPDES Requirements for Storm Water Discharges and NBSD NPDES Requirements

Since 1992, General Industrial Storm Water NPDES Requirements have included Discharge Prohibitions and Receiving Water Limitations that set a narrative limit on discharge pollutant concentrations with the intent to reduce or eliminate toxic chemical concentrations in marine water, marine life, and sediment.

While subject to regulation under the General Industrial Storm Water NPDES Requirements, NBSD discharged pollutants at levels that are elevated compared to levels established by the CTR for saltwater.[87] The U.S. EPA finalized the CTR on May 18, 2000. None of the numerical values in CTR were included as numerical effluent limitations in any of the General Industrial NPDES Requirements issued to NBSD before May 2000; however, they are included as a narrative receiving water limitation in the current NBSD NPDES Requirements issued in 2002.

The numerical values in CTR represent the latest, most up-to-date numerical thresholds for use in determining whether a chemical concentration in a water body is detrimental to its beneficial uses. By comparing CTR values with pollutant levels in historical discharges, the San Diego Water Board can determine which discharges may have contributed to toxic chemical concentrations in marine water, marine life, and sediment at the Shipyard Sediment Site in the past. Also, where there are historical discharges elevated above CTR values, there exists an *elevated probability* that those same discharges contributed to the present condition of pollution. To the extent that those historical, elevated discharges *did* cause toxic chemical concentrations in marine water, marine life, and sediment, and/or *did* contribute to the present condition of pollution at the Shipyard Sediment Site, there exists an NPDES requirement violation.

Monitoring reports submitted by NBSD during the years 1994 through 2005, pursuant to the General Industrial Storm Water NPDES Requirements and NBSD NPDES Requirements, indicate that elevated levels of several pollutants, including but not limited to copper and zinc, were present in storm water discharged from the NBSD facility to San Diego Bay. As an example of these pollutant discharges, specific discharge violations of copper and zinc are listed below.

10.8.1.1. Storm Water Monitoring for General Industrial NPDES Requirements for Storm Water Discharges

NBSD obtained coverage under the State Water Board's General Industrial Storm Water NPDES Requirements for the discharge of industrial storm water. Order No. 91-13-DWQ, NPDES Permit No. CAS000001 was in effect from November 4, 1992 to July 8, 1997. Order No. 97-03-DWQ, NPDES Permit No. CAS000001, was in effect from July 8, 1997 to November 13, 2002.

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[87] The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

While not providing specific numerical effluent limitations for all possible chemicals, the San Diego Water Board did require that discharges from NBSD not cause a violation of the discharge prohibitions and receiving water limitations presented in Section 10.7, above. NPDES discharge monitoring data provided by NBSD from 1992 through 1997 and 1998 through 2002 indicate elevated levels of discharged pollutants, including but not limited to copper and zinc, when compared to levels established by the CTR for saltwater.

To the extent that NBSD's discharges were elevated above CTR criteria values and violated General Industrial Storm Water NPDES requirement discharge prohibitions and receiving water limitations by causing toxic chemical concentrations in marine water, marine life, and sediment, and/or contributed to the present condition of pollution at the Shipyard Sediment Site (via storm flows, tidal movements (see Section 10.10), the following specific discharges are a violation of narrative limits of Order No. 91-13-DWQ, NPDES Permit No. CAS000001, and Order No. 97-03-DWQ, NPDES Permit No. CAS000001, and are cited in Tables 10-8 and 10-9[88] below.

Table 10-8 Discharges above CTR Criteria Values Occurring from 1992 to 1997

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 17, 1994	Copper	0.092 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.16 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.088 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.97 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.67 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

[88] On October 30, 2000, the U.S. EPA promulgated FR Vol. 65, No. 210, U.S. EPA Benchmark Values for pollutant discharge from industrial facilities. The U.S. EPA Benchmark Values for copper and zinc are 0.0636 mg/L and 0.117 mg/L, respectively. While the U.S. EPA Benchmark Values are not an enforceable numeric limit, they are used to indicate concentrations of concern and to alert the regulated discharger to take actions to lower the concentrations in its discharge. Some sample concentrations in this table, dated after October 30, 2000, exceed both CTR and U.S. EPA Benchmark Values for copper and zinc.

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 17, 1994	Copper	0.028 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.043 mg/L	0.0031 mg/L	Section 10.6	Outfall 99	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Copper	0.24 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	0.4 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	0.63 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	0.39 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	2.6 mg/L	0.081 mg/L	Section 10.6	Outfall 33	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	1.5 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	0.3 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 17, 1994	Zinc	1.0 mg/L	0.081 mg/L	Section 10.6	Outfall 99	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
February 17, 1994	Zinc	0.5 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 1994 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 1995	Copper	0.019 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 1995	Zinc	0.27 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Copper	0.0082 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Copper	0.028 mg/L	0.0031 mg/L	Section 10.6	Outfall 26	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Copper	0.16 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Copper	0.16 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Copper	0.17 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Copper	0.046 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Copper	0.075 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 5, 1995	Copper	0.012 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Copper	0.09 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Zinc	0.14 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Zinc	0.21 mg/L	0.081 mg/L	Section 10.6	Outfall 26	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Zinc	0.5 mg/L	0.081 mg/L	Section 10.6	Outfall 33	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Zinc	0.41 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Zinc	0.32 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Zinc	0.77 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Zinc	0.37 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 5, 1995	Zinc	0.07 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 5, 1995	Zinc	0.24 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 11, 1995	Copper	0.014 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 11, 1995	Copper	0.034 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 11, 1995	Copper	0.032 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 11, 1995	Zinc	0.31 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 11, 1995	Zinc	0.15 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.049 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.061 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.0014 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.59 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
April 18, 1995	Copper	0.57 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.2 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.16 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.028 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.03 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.072 mg/L	0.0031 mg/L	Section 10.6	Outfall 99	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.11 mg/L	0.0031 mg/L	Section 10.6	Outfall 99	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.031 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.37 mg/L	0.0031 mg/L	Section 10.6	Outfall 419	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Copper	0.45 mg/L	0.0031 mg/L	Section 10.6	Outfall 429	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
April 18, 1995	Copper	0.066 mg/L	0.0031 mg/L	Section 10.6	Outfall 433	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.25 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.32 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.068 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	1.6 mg/L	0.081 mg/L	Section 10.6	Outfall 33	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	1.4 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.64 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.59 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.15 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.23 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
April 18, 1995	Zinc	0.4 mg/L	0.081 mg/L	Section 10.6	Outfall 99	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.29 mg/L	0.081 mg/L	Section 10.6	Outfall 99	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 18, 1995	Zinc	0.12 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 1995 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.08 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.254 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.04 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.096 mg/L	0.0031 mg/L	Section 10.6	Outfall 26	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.138 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.354 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.864 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
December 09, 1996	Copper	1.68 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.142 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.41 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.173 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Copper	0.052 mg/L	0.0031 mg/L	Section 10.6	Outfall 429	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	0.43 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	0.984 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	0.17 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	0.858 mg/L	0.081 mg/L	Section 10.6	Outfall 26	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	0.52 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
December 09, 1996	Zinc	1.68 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	1.58 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	0.501 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	1.79 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
December 09, 1996	Zinc	0.523 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.0402 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.0378 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.0337 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.0239 mg/L	0.0031 mg/L	Section 10.6	Outfall 26	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.104 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
January 15, 1997	Copper	0.115 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	1.02 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	1.29 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.262 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.0426 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.485 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.28 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.324 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Copper	0.0754 mg/L	0.0031 mg/L	Section 10.6	Outfall 429	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	0.146 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
January 15, 1997	Zinc	0.233 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	0.173 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	0.178 mg/L	0.081 mg/L	Section 10.6	Outfall 26	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	0.323 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	1.41 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	2.82 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	0.743 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	0.134 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	0.134 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 15, 1997	Zinc	1.7 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
January 15, 1997	Zinc	0.741 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 1997	Copper	0.569 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 1997	Copper	0.0883 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 1997	Copper	0.0569 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 1997	Copper	0.4 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 1997	Zinc	0.198 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 1997	Zinc	0.429 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 1997	Zinc	0.323 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 1997	Zinc	0.323 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 1997 Annual Report	Order No. 91-13-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

1. 40 CFR 131.38
2. Reference to Section 10.6 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 10.6.
3. The cited waste discharge requirement(s) can be found in Section 10.7 of this Technical Report.

Table 10-9 Discharges above CTR Criteria Values Occurring from 1998 to 2002

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
November 8, 1998	Copper	0.13 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.14 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.07 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.02 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.09 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.03 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.11 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.86 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.41 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.18 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

November 8, 1998	Copper	0.08 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.05 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.06 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.10 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.56 mg/L	0.0031 mg/L	Section 10.6	Outfall 99	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Copper	0.11 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	1.01 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.45 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.81 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.34 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	1.16 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

November 8, 1998	Zinc	1.12 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.47 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.48 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.46 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.74 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.64 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.75 mg/L	0.081 mg/L	Section 10.6	Outfall 99	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 8, 1998	Zinc	0.23 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.075 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.05 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.072 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

February 4, 1999	Copper	0.03 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.05 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.05 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.06 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.30 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.95 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.068 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.055 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.033 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.122 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Copper	0.28 mg/L	0.0031 mg/L	Section 10.6	Outfall 99	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

February 4, 1999	Zinc	0.29 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.19 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.72 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.43 mg/L	0.081 mg/L	Section 10.6	Outfall 26	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.33 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.70 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	1.97 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.266 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.107 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.28 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.3 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

February 4, 1999	Zinc	0.4 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 4, 1999	Zinc	0.36 mg/L	0.081 mg/L	Section 10.6	Outfall 99	U.S. Navy 1998-1999 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.123 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.0716 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.0962 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.185 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.186 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.290 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.551 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.927 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.0688 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

February 10, 2000	Copper	0.123 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.107 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Copper	0.182 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	0.925 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	0.501 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	1.27 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	0.511 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	1.23 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	1.06 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	0.306 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	0.861 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

February 10, 2000	Zinc	0.146 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 10, 2000	Zinc	0.762 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 12, 2000	Copper	0.0201 mg/L	0.0031 mg/L	Section 10.6	Outfall 26	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 12, 2000	Copper	0.0088 mg/L	0.0031 mg/L	Section 10.6	Outfall 99	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 12, 2000	Copper	0.0909 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 12, 2000	Zinc	0.631 mg/L	0.081 mg/L	Section 10.6	Outfall 26	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 12, 2000	Zinc	0.021 mg/L	0.081 mg/L	Section 10.6	Outfall 99	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 12, 2000	Zinc	0.577 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
February 20, 2000	Copper	0.118 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0363 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0279 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

April 17, 2000	Copper	0.0189 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0527 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0603 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0778 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.314 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.17 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0696 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0398 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0291 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0762 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0371 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

April 17, 2000	Copper	0.0591 mg/L	0.0031 mg/L	Section 10.6	Outfall 99	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Copper	0.0419 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.278 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.412 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.123 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.14 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.189 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.096 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.163 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.119 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.295 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

April 17, 2000	Zinc	0.168 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.216 mg/L	0.081 mg/L	Section 10.6	Outfall 99	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 17, 2000	Zinc	0.191 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 21, 2000	Copper	0.0085 mg/L	0.0031 mg/L	Section 10.6	Outfall 26	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 21, 2000	Zinc	0.0154 mg/L	0.081 mg/L	Section 10.6	Outfall 26	U.S. Navy 1999-2000 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.38 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.0218 mg/L	0.0031 mg/L	Section 10.6	Outfall 26	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.163 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.243 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.413 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	1.18 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

October 27, 2000	Copper	0.261 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.125 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.0704 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.0591 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.138 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.125 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.0801 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.117 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Copper	0.32 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	2.34 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	0.456 mg/L	0.081 mg/L	Section 10.6	Outfall 26	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

October 27, 2000	Zinc	0.863 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	1.85 mg/L	0.081 mg/L	Section 10.6	Outfall 33	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	1.55 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	2.15 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	1.96 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	0.504 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	0.402 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	0.608 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	0.669 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	0.504 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	0.233 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

October 27, 2000	Zinc	0.410 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
October 27, 2000	Zinc	1.79 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.193 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.139 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.118 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.143 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.646 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.117 mg/L	0.0031 mg/L	Section 10.6	Outfall 26	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.255 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.266 mg/L	0.0031 mg/L	Section 10.6	Outfall 33	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.282 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

January 8, 2001	Copper	0.119 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.19 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	1.67 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.235 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.184 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Copper	0.234 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.561 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.695 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.283 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	1.49 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	2.91 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

January 8, 2001	Zinc	1.55 mg/L	0.081 mg/L	Section 10.6	Outfall 26	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.697 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.51 mg/L	0.081 mg/L	Section 10.6	Outfall 33	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.856 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.274 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.449 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	7.83 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	1.04 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.422 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 8, 2001	Zinc	0.642 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.0461 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

January 24, 2001	Copper	0.0555 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.0742 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.0742 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.293 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.881 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.121 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.0999 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.134 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Copper	0.282 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	0.249 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	0.356 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

January 24, 2001	Zinc	0.316 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	1.06 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	1.17 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	2.06 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	0.675 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	0.451 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	0.629 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
January 24, 2001	Zinc	0.856 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 2000-2001 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0844 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0816 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0537 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

November 24, 2001	Copper	0.287 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0177 mg/L	0.0031 mg/L	Section 10.6	Outfall 24	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.047 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0803 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0857 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0641 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0569 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0479 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.113 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.124 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0795 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

November 24, 2001	Copper	0.0398 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.0808 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Copper	0.151 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.553 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.639 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.813 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	1.27 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.14 mg/L	0.081 mg/L	Section 10.6	Outfall 24	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.194 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.2 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.0776 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

November 24, 2001	Zinc	0.423 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.278 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.320 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.578 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.622 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.134 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.0807 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.816 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 24, 2001	Zinc	0.478 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 29, 2001	Copper	0.0566 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 29, 2001	Copper	0.0569 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

November 29, 2001	Zinc	0.809 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
November 29, 2001	Zinc	0.453 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 7, 2002	Copper	0.209 mg/L	0.0031 mg/L	Section 10.6	Outfall 71	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 7, 2002	Copper	0.310 mg/L	0.0031 mg/L	Section 10.6	Outfall 78	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 7, 2002	Zinc	1.41 mg/L	0.081 mg/L	Section 10.6	Outfall 71	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
March 7, 2002	Zinc	2.33 mg/L	0.081 mg/L	Section 10.6	Outfall 78	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.234 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.117 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.206 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.299 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.0283 mg/L	0.0031 mg/L	Section 10.6	Outfall 24	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

April 24, 2002	Copper	0.166 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.454 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.604 mg/L	0.0031 mg/L	Section 10.6	Outfall 36	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.552 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.289 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.145 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.2 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.0685 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.0628 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Copper	0.195 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	1.23 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

April 24, 2002	Zinc	2.95 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	3.7 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	1.48 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	0.175 mg/L	0.081 mg/L	Section 10.6	Outfall 24	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	1.03 mg/L	0.081 mg/L	Section 10.6	Outfall 33	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	0.877 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	0.755 mg/L	0.081 mg/L	Section 10.6	Outfall 36	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	3.04 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	1.51 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	0.704 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	1.49 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

April 24, 2002	Zinc	0.202 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	0.332 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1
April 24, 2002	Zinc	0.47 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2001-2002 Annual Report	Order No. 97-03-DWQ, A. Discharge Prohibitions 3 and B. Receiving Water Limitations 1

1. 40 CFR 131.38
2. Reference to Section 10.6 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 10.6.
3. The cited waste discharge requirement(s) can be found in Section 10.7 of this Technical Report.

10.8.1.2. Storm Water Monitoring for NBSD, Naval Base San Diego NPDES Requirements

The Naval Base San Diego (NBSD) NPDES Requirements regulate point source discharges from NBSD and three other San Diego naval installations[89] in San Diego. Order No. R9-2002-0169, NPDES Permit No. CA0109169, is in effect from November 13, 2002 to the present.

While not providing specific numerical effluent limitations for all possible chemicals, the San Diego Water Board did require that discharges from NBSD not cause a violation of the above discharge prohibitions and receiving water limitations, which specifically referred to the CTR. NPDES discharge monitoring data provided by NBSD in 2003 through 2005 indicate elevated levels of discharged pollutants, including but not limited to copper and zinc, when compared to levels established by the CTR for saltwater.

To the extent that NBSD's discharges were elevated above the CTR criteria values and violated NBSD NPDES requirement discharge prohibitions and receiving water limitations by causing toxic chemical concentrations in marine water, marine life, and sediment, and/or contributed to the present condition of pollution at the Shipyard Sediment Site via storm flows, tidal movements, or other transport mechanisms (please see Section 10.10), the following specific discharges are a violation of narrative limits of Order No. R9-2002-0169, NPDES Permit No. CA0109169, and are cited in Table 10-10[90] below.

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[89] The Naval Base San Diego (NBSD) Complex includes four installations: (1) Naval Station, San Diego (NAVSTA); (2) Mission Gorge Recreational Facility (MGRF); (3) Broadway Complex; and (4) Naval Medical Center, San Diego (NMCSD).

[90] On October 30, 2000, the U.S. EPA promulgated FR Vol. 65, No. 210, U.S. EPA Benchmark Values for pollutant discharge from industrial facilities. The U.S. EPA Benchmark Values for copper and zinc are 0.0636

Table 10-10 Discharges above CTR Values Occurring from 2003 to 2005

Date	Constituent	Concentration	CTR Saltwater Criteria (Continuous Concentration)[1]	Technical Report Reference[2]	Discharge Source	Source	Citation[3]
March 15, 2003	Copper	0.150 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.091 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.014 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.012 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.19 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.15 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.11 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

mg/L and 0.117 mg/L, respectively. While the U.S. EPA Benchmark Values are not an enforceable numeric limit, they are used to indicate concentrations of concern and to alert the regulated discharger to take actions to lower the concentrations in its discharge. Some sample concentrations in this table, dated after October 30, 2000, exceed both CTR and U.S. EPA Benchmark Values for copper and zinc.

March 15, 2003	Copper	0.48 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.28 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.042 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.12 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.072 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.13 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.11 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Copper	0.46 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.330 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

March 15, 2003	Zinc	0.34 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.086 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.1 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	1.1 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.5 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.18 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	2.6 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.49 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.1 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

March 15, 2003	Zinc	0.45 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.2 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.36 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.45 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 15, 2003	Zinc	0.95 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2002-2003 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.083 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.029 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.064 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.032 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

February 18, 2004	Copper	0.067 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.1 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.057 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.047 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.047 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.11 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.082 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Copper	0.12 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.38 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

February 18, 2004	Zinc	0.16 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.42 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.55 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.29 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.25 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.28 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.47 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.3 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.47 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

February 18, 2004	Zinc	0.24 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 18, 2004	Zinc	0.36 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 1, 2004	Copper	0.05 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 1, 2004	Copper	0.046 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 1, 2004	Zinc	0.45 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 1, 2004	Zinc	0.17 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.11 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.210 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.12 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

April 17, 2004	Copper	0.092 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.11 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.27 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.19 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.12 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.056 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.16 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.17 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.26 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

April 17, 2004	Copper	0.065 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Copper	0.093 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.69 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	4.2 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.7 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	1.2 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	1.3 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.6 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	1.3 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

April 17, 2004	Zinc	0.99 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.42 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.81 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.33 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.72 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.51 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
April 17, 2004	Zinc	0.34 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2003-2004 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.039 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.056 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

January 28, 2005	Copper	0.0084 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.011 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.026 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.029 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.055 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.16 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.027 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.03 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.099 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

January 28, 2005	Copper	0.049 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.062 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.03 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Copper	0.14 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.21 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.43 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.032 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.045 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.21 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

January 28, 2005	Zinc	0.098 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.16 mg/L	0.081 mg/L	Section 10.6	Outfall 35	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.56 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.16 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.2 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.49 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.13 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	2.2 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
January 28, 2005	Zinc	0.28 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

January 28, 2005	Zinc	0.68 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Copper	0.018 mg/L	0.0031 mg/L	Section 10.6	Outfall 22	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Copper	0.037 mg/L	0.0031 mg/L	Section 10.6	Outfall 30	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Copper	0.12 mg/L	0.0031 mg/L	Section 10.6	Outfall 35	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Copper	0.028 mg/L	0.0031 mg/L	Section 10.6	Outfall 39	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Copper	0.029 mg/L	0.0031 mg/L	Section 10.6	Outfall 46	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Copper	0.07 mg/L	0.0031 mg/L	Section 10.6	Outfall 80	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Copper	0.05 mg/L	0.0031 mg/L	Section 10.6	Outfall 119	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Copper	0.039 mg/L	0.0031 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

February 10, 2005	Copper	0.2 mg/L	0.0031 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Zinc	0.56 mg/L	0.081 mg/L	Section 10.6	Outfall 22	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Zinc	0.27 mg/L	0.081 mg/L	Section 10.6	Outfall 30	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Zinc	0.4 mg/L	0.081 mg/L	Section 10.6	Outfall 35	2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Zinc	0.18 mg/L	0.081 mg/L	Section 10.6	Outfall 39	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Zinc	0.15 mg/L	0.081 mg/L	Section 10.6	Outfall 46	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Zinc	0.23 mg/L	0.081 mg/L	Section 10.6	Outfall 80	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Zinc	0.15 mg/L	0.081 mg/L	Section 10.6	Outfall 119	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 10, 2005	Zinc	1.5 mg/L	0.081 mg/L	Section 10.6	Outfall 167-171	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

February 10, 2005	Zinc	1.4 mg/L	0.081 mg/L	Section 10.6	Outfall 415-438	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 11, 2005	Copper	0.016 mg/L	0.0031 mg/L	Section 10.6	Outfall 14	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 11, 2005	Copper	0.044 mg/L	0.0031 mg/L	Section 10.6	Outfall 45	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 11, 2005	Copper	0.032 mg/L	0.0031 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 11, 2005	Zinc	0.16 mg/L	0.081 mg/L	Section 10.6	Outfall 14	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 11, 2005	Zinc	0.13 mg/L	0.081 mg/L	Section 10.6	Outfall 45	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
February 11, 2005	Zinc	0.3 mg/L	0.081 mg/L	Section 10.6	Outfall 172-195	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 4, 2005	Copper	0.072 mg/L	0.0031 mg/L	Section 10.6	Outfall 5	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 4, 2005	Copper	0.05 mg/L	0.0031 mg/L	Section 10.6	Outfall 9	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

March 4, 2005	Copper	0.08 mg/L	0.0031 mg/L	Section 10.6	Outfall 11	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 4, 2005	Zinc	0.32 mg/L	0.081 mg/L	Section 10.6	Outfall 5	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 4, 2005	Zinc	0.52 mg/L	0.081 mg/L	Section 10.6	Outfall 9	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2
March 4, 2005	Zinc	0.34 mg/L	0.081 mg/L	Section 10.6	Outfall 11	U.S. Navy 2004-2005 Annual Report	Order No. R9-2002-0169, A. Prohibitions 5, B Discharge Specifications 1, C. Receiving Water Limitations 1 and 2

1. 40 CFR 131.38
2. Reference to Section 10.6 indicates discharging or depositing waste where it will be discharged into San Diego Bay creating, or threatening to create a condition of pollution, contamination, and nuisance. See Section 10.6.
3. The cited waste discharge requirement(s) can be found in Section 10.7 of this Technical Report.

10.8.2. NBSD Storm Water and Other Discharges to Chollas Creek[91]

Chollas Creek drains a total of approximately 16,273 acres of land. The area of NBSD draining to Chollas Creek is approximately 266 acres. Table 10-11 provides a statistical summary of U.S. Navy monitoring of U.S. Navy owned storm water outfalls discharging into Chollas Creek between the years 1994 through 2000. The data in Table 10-11 indicates that elevated levels of copper, lead, and zinc were almost always detected in the U.S. Navy's Chollas Creek storm water discharges between the years 1994 through 2000. Zinc was detected on all occasions while copper was detected 94 percent of the time and lead 91 percent of the time. Cadmium, chromium and nickel were also detected approximately 65 percent of the time.

Table 10-11 Statistical Summary of U.S. Navy Storm Water Monitoring for Chollas Creek Storm Drain Outfalls (1994 through 2000)

Parameter Total Metal	Geometric Mean Concentration (mg/L)	Arithmetic Mean Concentration (mg/L)	Number of Records (n=)	Standard Deviation	Range (mg/L)	Sample Dates	Number of Non-Detects	Method Detection Ranges (mg/L)

[91] Unless otherwise explicitly stated, the data and technical information contained in this section were obtained from the U.S. Navy August 2000 Report, *Toxic Hot Spot Assessment Study at Chollas Creek and Paleta Creek, Historical Data Review*. (U.S. Navy 2000)

Arsenic	4.3	4.8	25	3	3 – 10	1994 - 1997	25	3 – 10
Cadmium	0.8	1.2	38	1	0.2 – 3.7	1994 - 1997	13	0.2 – 1.0
Chromium	8.8	13.1	41	10	1.3 – 50	1994 - 1999	13	1.5 – 20
Copper	**88.0**	**166.3**	**54**	**239**	**8.8 – 1,080**	**1994 - 2000**	**3**	**5 – 10**
Lead	**15.7**	**29.6**	**44**	**30**	**2 – 110**	**1994 - 2000**	**4**	**2.0 – 20**
Mercury	0.4	0.4	25	0.1	0.2 – 0.4	1994 - 1997	25	0.2 – 0.5
Nickel	18.4	23.7	32	16	4.8 – 63	1994 - 1997	11	5 – 40
Selenium	4.6	5.0	25	3	4 – 21	1994 - 1997	24	4 – 5
Silver	6.7	8.4	26	3	0.2 – 10	1994 - 1997	26	0.2 – 10
Zinc	**386**	**708**	**48**	**946**	**21 – 4,880**	**1994 - 2000**	**0**	**Unknown**

(U.S. Navy, 2000)

Leaching from U.S. Navy ship hull antifouling paint and cathodic protection systems provide continuing sources of copper and zinc to San Diego Bay waters at the mouth of Chollas Creek. The U.S. Navy has estimated loading rates from service craft and active military vessels typically moored in or near Chollas Creek waters, in an area bounded by Chollas Creek mooring locations and the south side of Pier 1. At the time of the study in 2000, seven commercial tugs and six U.S. Navy barges were typically berthed in Chollas Creek waters. One vessel, the USNS Mercy, was berthed for prolonged periods on the south side of Pier 1.[92] The U.S. Navy's copper and zinc loading estimates by vessel type are provided in Table 10-12. Total copper loading to the mouth of Chollas Creek area from ship hull antifouling paints was estimated at 220 kg/yr based on a conservative copper leach rate of 11 µg /cm^2/day.[93] Total zinc loading from leaching anodes associated with ship hull cathodic protection systems was estimated to be 508 kg/year using U.S. EPA estimated leach rates for the vessel types shown in Table 10-12 below.

Table 10-12 Estimated Copper and Zinc Loading from Service Craft and Active Military Vessels at Chollas Creek

Chollas Creek Service Craft	Number of Vessels	Copper Load (kg/yr)	Zinc Load (kg/yr)
Tiger FOSS commercial tug	1	9.9	22
Tractor commercial tug	6	59.4	132
Open Lighter YC1469 class (110x8x694)	6	101.4	354
USNS Mercy	1	49.0	-
Water Column Total (kg/yr):		**220**	**508**

Note: The values represent total loading to the water column. (U.S. Navy, 2000)

92 Berthing of larger naval vessels (e.g. cruisers or destroyers) may sometimes occur at Pier 1. The operational berthing of these vessels at Pier 1 was not determined at the time the US Navy prepared its loading estimates. (U.S. Navy, 2000)

93 Hull bottom leach rate determination is the subject of on-going research and can be influenced by paint age, cleaning frequency, water temperature and formation of surface algal film. As such the 11 ug /cm^2/day is a conservative estimate as there are some unpublished experimental data that suggest the true leach rate is likely lower. (U.S. Navy, 2000)

The U.S. Navy also estimated loading from U.S. Navy storm water outfalls and upstream urban storm water outfalls[94] to the mouth of Chollas Creek. The U.S. Navy's loading estimates for storm water and hull leachate are provided in Table 10-13 below.

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[94] The upstream storm water outfalls are primarily owned and operated by the City of San Diego. The City of San Diego owns and operates approximately 816 MS4 storm drain outfalls, which convey urban runoff into Chollas Creek.

Table 10-13 Estimated Annual Contaminant Loading to the Chollas Creek Toxic Hot Spot Region with Storm Water Inputs Listed by U.S. Navy and Upstream Portions of the Chollas Creek Watershed

	Size Acres	Copper kg/yr	Lead kg/yr	Mercury kg/yr	Zinc kg/yr	PAH total kg/yr	PCB total kg/yr
NBSD Chollas Creek Storm Water	209	16	3	0	71	-	-
Upstream Chollas Creek Storm Water	16,064	186	139	0	1,526	-	58
Hull Leachate	n/a	110	n/a	n/a	259	n/a	n/a
Total	**16,273**	**312**	**142**	**0**	**1,856**	**-**	**58**

Notes: Simple method used to calculate loading. EMC data by land use category available for copper, lead, and zinc. All others used storm water averages reported in this document assuming annual rainfall of 10.2 inches (1960-2000 average rainfall at Lindbergh Field, San Diego).

Dash (-) represents data not available to calculate loading at this time, typically due to unavailability of monitoring data.

Underlined = Data below method detection limit (DL) so conservatively used average DL as estimate of concentration. This makes loading estimates highly subjective, at best.

(U.S. Navy, 2000)

The U.S. Navy's loading estimates in Table 10-13, above, indicate that storm water is an ongoing major contributor of copper, lead, and zinc to the mouth of Chollas Creek. The data suggests that that the primary loading of copper, lead, and zinc is from the urban upstream portion of the Chollas Creek watershed. U.S. Navy storm water outfalls were estimated to introduce 5% of the cooper, 2% of the lead and 4% of the zinc. However, leaching of copper from U.S. Navy ship hull coatings was estimated to be 35% of the copper load and leaching of zinc from U.S. Navy cathodic protection system anodes was estimated to be 14% of the load. In summary, the U.S. Navy's pollutant contributions to the mouth of Chollas Creek, including storm water discharges, hull leaching, and cathodic protection account for approximately 40% of the copper load, 2% of the lead load, and 18% of the zinc load.

10.8.3. NBSD Pier Pilings

The outcome of various U.S. Navy environmental studies in San Diego Bay during the early 1990s suggests that there was a substantial chronic source of PAHs to San Diego Bay and that the hydrocarbons were predominately derived from a pyrogenic heat-producing source (Chadwick et al., 1999). The studies concluded that creosote treated[95] pilings were potentially a significant source of PAHs discharges to San Diego Bay due to the large number of such pilings in the Bay at the time the studies were conducted. The flux of PAHs from in-place creosote pilings was determined to be 0.0022 to 0.0033 $g \cdot cm^{-2} \cdot yr$. The total number of creosote pilings in

95 At the time the studies were conducted, creosote was extensively used in the treatment of wood products exposed to the marine environment to minimize wood degradation.

San Diego Bay in 1995 was estimated by visual count at 13,600 pilings. Up until 1996, approximately 8,700 pilings (64%) were located mostly south of Coronado Bridge in the back bay, and of these, approximately 4,460 pilings were located in the vicinity of NBSD. Since 1996 approximately 50 percent of the pilings in the back bay have been replaced, leaving 2,230 in the vicinity of NBSD, 4,350 in the back bay as a whole, and 9,250 throughout the entire bay. Assuming a flux of 0.0022 to 0.0033 $g \cdot cm^{-2} \cdot yr$, Chadwick et al. (1999) determined the total historical contribution of PAHS to San Diego Bay prior to 1996 from creosote pilings to be 3.1 to 4.6 metric tons per year. The total “current” contribution of PAHS to San Diego Bay from the remaining creosote pilings in San Diego Bay in 2001 was estimated to be 2.1 to 3.1 metric tons per year. Since 1996, the U.S. Navy has been replacing creosote pier pilings at NBSD with plastic pilings and this effort is continuing.

10.9. Clean Water Act Section 303(d) Listed Impaired Waters Adjacent to NBSD

Data collected for the Bay Protection Toxic Cleanup Program (Fairey et al., 1996) were used to place portions of San Diego Bay on the CWA section 303(d) List. Three segments of the San Diego Bay shoreline adjacent to the NBSD were listed for sediment toxicity and benthic community degradation: Mouth of Chollas Creek, Mouth of Paleta Creek, and NBSD at 32nd Street. Historical and recent discharges from NBSD as well as other upstream urban sources in the Chollas Creek and Paleta Creek watersheds have contributed to pollutant levels found at these sites. The study, titled “Sediment Assessment Study for Mouths of Chollas and Paleta Creeks, San Diego, Phase I” (SCCWRP and U.S. Navy, 2005b) defined potential impairments for these two segments. In addition, the Shipyard Sediment Site is listed on the CWA section 303(d) List as San Diego Bay Shoreline, between Sampson and 28th Streets.[96]

10.9.1. Mouth of Chollas Creek

The location for the CWA 303(d) listing of San Diego Bay Shoreline at the mouth of Chollas Creek extends from the weir downstream of the Belt Street Bridge, bounded on the north by the NASSCO pier and to the south by the NBSD Pier 1, and extends to the end of the piers. The estimated total area is 15 acres.

The Phase I Study, (SCCWRP and U.S. Navy, 2005b) reported that PAHs, PCBs, chlordane, and DDT concentrations indicated potential impairment to aquatic life, while copper concentration was specified for bioaccumulation concern, and benzo [a] pyrene and PCB concentrations were indicated for human health risks. The TIE Study, titled “Sediment Toxicity Identification Evaluation for the Mouths of Chollas and Paleta Creeks, San Diego” (Greenstein et al., 2005), designated chlordane, PAHs, and non-polar organics (including PCBs) as probable causes of toxicity.

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96 Final 2002 Clean Water Act Section 303(d) List of Water Quality Impaired Segments, approved by U.S. EPA in July 2003. http://www.waterboards.ca.gov/tmdl/docs/2002reg9303dlist.pdf

10.9.2. Mouth of Paleta Creek

The designated CWA 303(d) listing for San Diego Bay Shoreline at the mouth of Paleta Creek (7th Street Channel) extends from the outlet of Paleta Creek (downstream of the Harbor Drive Bridge and Cummings Road), bound by NBSD Pier 8 to the north and Pier 9 (mole pier) to the south, and extends to the end of the piers. The Phase I Study reports that PAHs, PCBs, chlordane, DDT, and lead concentrations indicate potential impairment to aquatic life, and similarly, benzo [a] pyrene and PCB concentrations indicated possible human health risks. The TIE Study report found that PAHs, chlordane, and non-polar organics (including PCBs) were probable causes of toxicity.

10.9.3. NBSD at 32nd Street

The designated CWA 303(d) listing for San Diego Bay Shoreline for NBSD at 32nd Street extends out from the shoreline, with northern and southern limits at Pier 1 (at the mouth of Chollas Creek) and Pier 8 (at the mouth of Paleta Creek), respectively.

Studies associated with TMDL development have not been generated at this point. However, the U.S. Navy has produced a report, titled “Sediment Quality Characterization Naval Station San Diego: Final Summary Report” (Chadwick et al., 1999) which addresses this area. The area between Piers 2 and 7 were classified as high-to-moderately impacted areas. Sediment concentrations exceeding the ERM for a specific contaminant were reported for silver, copper, mercury, zinc, and PCBs. Bioaccumulation data indicate that metals and PAHS were found to bioaccumulate at NBSD sites with mercury, copper, and zinc being “most notable.” PCBs were not bioaccumulated.

10.10. Discharge Contributions to the Accumulation of Pollutants at the Shipyard Sediment Site

The U.S. Navy has caused or permitted discharges of pollutants from NBSD to San Diego Bay and has contributed to both the levels of pollutants, and the pollution and nuisance conditions, found at the Shipyard Sediment Site through the pollutant transport mechanisms described in the subsections below.

10.10.1. Chollas Creek Outflow

Chollas Creek consists of freshwater flow with elevated suspended solids containing significant chemical pollutants. Chollas Creek is currently listed on the CWA section 303(d) List of Water Quality Limited Segments (303(d) List) for impairment caused by copper, lead and zinc concentrations exceeding applicable numerical water quality criteria in the CTR.[97] San Diego

[97] See Regional Board Resolution No. R9-2005-0111, A Resolution Adopting An Amendment To The Water Quality Control Plan For The San Diego Region To Incorporate Total Maximum Daily Loads For Dissolved Copper, Lead, And Zinc in Chollas Creek, Tributary to San Diego Bay, June 29, 2005. See also Regional Board Technical Report, Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay, June 29, 2005.

Bay marine sediment at the mouth of Chollas Creek is also listed on the 303(d) List for sediment toxicity and degraded benthic community impairments. As discussed in Section 10.8.2, the U.S. Navy's discharges, including storm water discharges, hull leaching, and cathodic protection, account for approximately 40% of the copper load, 2% of the lead and 18% of the zinc load in Chollas Creek. The U.S. Navy's discharges into Chollas Creek therefore contribute to the pollutants discharged from Chollas Creek outflows into San Diego Bay. The mouth of Chollas Creek is immediately adjacent to the southern boundary of the Shipyard Sediment Site.

Urban runoff in Chollas Creek has been shown to be toxic to both saltwater and freshwater organisms. In-channel wet-weather monitoring from previous storm seasons showed that samples of Chollas Creek storm water were toxic to the water flea (*Ceriodaphnia dubia*), the fathead minnow (*Pimephales promelas*), and the purple sea urchin (*Strongylocentrotus purpuratus*). A study conducted by Southern California Coastal Research Project (SCCWRP) in 2001 to establish the linkage between the Chollas Creek in-channel toxicity measurements and potential impairments in the receiving water of San Diego Bay, (Schiff, 2003), concluded that:

- *Storm water plumes from Chollas Creek extended over an area of two km2 in San Diego Bay*. The study observed that storm water plumes emanating from Chollas Creek extended between 0.02 and 2.25 km2 over San Diego Bay during small to moderately-sized storm events. Plumes were easily distinguished using salinity as a conservative tracer of wet weather inputs. Turbidity was also a good tracer of the plume. Storm water plumes formed relatively thin lenses of 1 to 3 meters, floating on top of the more dense bay water.

- *Toxicity extended up to 1 km from the Creek mouth and was proportional to the amount of runoff dilution*. The SCCWRP study measured toxicity using the purple sea urchin (Strongylocentrotus purpuratus) fertilization test in both storm water samples taken from the creek and samples taken from the storm water plume in San Diego Bay. This toxicity varied across the gradient of plume influence and was well correlated with the amount of storm water present in the sample. All samples were salinity adjusted before toxicity testing, so the gradient in toxicity appears to be a function of toxicants present in the storm water discharges.

- *The toxic part of the plume was smaller than the salinity signal*. Although toxicity was measured in the storm water plume emanating from Chollas Creek, the entire plume was not toxic. In the two storms that were mapped from this study, the toxic portion of the plume was approximately 25 percent to 50 percent of the plumes' salinity signal. This reduction in the spatial extent of plume toxicity was likely due to dilution and mixing of the plume in the Bay.

- *In-channel and plume toxicity was primarily due to trace metals including zinc and copper*. TIEs conducted on storm water samples from both the Creek and from the storm water plume in the Bay identified dissolved trace metals, predominantly zinc, as the toxicant responsible for the majority of toxicity. Toxicity was eliminated by the addition of the metal chelating agent EDTA. Concentrations of dissolved zinc, and to a lesser extent copper, were high enough in the tested samples to account for the observed toxicity.

Additionally, available U.S. Navy studies (Katz et al., 2003; Chadwick et al., 1999) indicate that the Chollas Creek outflow (plume) to San Diego Bay can introduce pollutants to the Shipyard Sediment Site. The U.S. Navy funded a project in 2001 to quantify storm event mass loading of pollutants from upstream MS4 creek sources and from near-bay U.S. Navy sources as well as to characterize the spatial and temporal impacts from the plumes generated in the bay. Specific conclusions of the study by Katz et al. (2003) include:

- During a single storm event in February 2001, the sediment plume containing pollutants from Chollas Creek was measured to cover an area up to 1.2 km away from the mouth of Chollas Creek. (Although not a specific conclusion of Katz et al., 2003, the San Diego Water Board has inferred that this area would include a portion of BAE Systems' waterside leasehold, which is located approximately 1 km north of the mouth of Chollas Creek, and the entire NASSCO waterside leasehold, located directly adjacent to the Chollas Creek mouth.)

- Storm water plumes from Chollas Creek developed quickly after the start of rainfall and were dispersed through tidal mixing 12 hours after runoff ceased.

- Plume evolution in the bay was well tracked by all real-time measurement parameters though most clearly with salinity, light transmission, and oil fluorescence.

- Contaminants were primarily associated with particles and their strong association with total suspended solids (TSS) provides a good first order approximation for their distribution.

- Upstream storm water sources (i.e. sources upstream of U.S. Navy sources) dominate the loading of contaminants to the bay via Chollas Creek, with discharges from Naval Station property accounting for only an average of 5% of total contaminants.

- Storm water is a continuing source of excessive levels of lead, zinc, chlordane, DDT, and PCBs, and possibly Total PAH and mercury, to the sediment at the mouth of the Chollas Creek.

10.10.2. Tidal Transport of Sediment Resuspended by Ships

Marine sediment pollutant levels and distribution in San Diego Bay are generally consistent with source locations (i.e. marine sediment pollutant levels tend to decrease as a function of distance from source locations). However, there are physical, biological, biochemical, and chemical processes that alter marine sediment and pollutants over time, irrespective of proximity to source locations. In San Diego Bay these processes may include dredging, boat tugging and docking of large vessels, tidal or wind driven currents, bioturbation,[98] biological uptake, and dissolution or chemical reactions.

The redistribution of contaminated marine sediment from NBSD to other areas of San Diego Bay can be caused by both ship movements and natural processes in which marine sediment is resuspended into the water column and redistributed by bay currents. Ship movement resuspension of marine sediment occurs as a result of shear forces generated by the thrust of propellers during boat tugging and docking of large naval vessels. Natural resuspension of marine sediment is caused by the shear forces induced by bay currents and wind induced wave action. The majority of sediment resuspension at NBSD is caused by ship movement.[99] Polluted sediment resuspension and transport by tidal currents is a pathway for pollutants from NBSD to migrate to the Shipyard Sediment Site.

10.10.2.1. Sediment Resuspension by Ships

Ship movements and the associated tug boat activity at NBSD resuspends and redistributes marine sediment and its associated pollutants in San Diego Bay. The U.S. Navy has estimated the loading of sediment in San Diego Bay from NBSD due to resuspension of sediment by ship movements and concluded that this is a significant source of sediment loading to the bay (Chadwick et al., 1999).

The U.S. Navy used their records of ship movement frequency and considered movements away from the piers into the main channel as well as the reverse docking movements. Their analysis also took into account the number of tug boats used. The survey of ship movements at NBSD indicated just less than an average of five ship movements per day with one to two tugs per ship for a total of 1730 ship movements per year.[100] Field measurements of total suspended sediment (TSS) were taken before and after ship movements. The calculations also included subtracting background TSS concentrations.

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[98] "Bioturbation" refers to the turning and mixing of sediments particles by benthic fauna (animals) or flora (plants). The sediment-water interface increases in area as a result of bioturbation, affecting chemical fluxes and thus exchange between the sediment and water column.

[99] U.S. Navy studies indicate sediment resuspension at NBSD is caused to a much lesser extent by currents and wind waves. San Diego Bay has very mild bottom shear stresses and mild bottom erosion. Under typical conditions the minimum bottom shear needed for the movement of fine bottom sediments is about 1.0 dynes-cm^{-2}. In the pier areas and shipping channel, the average bottom shear stress does not exceed 0.25 dynes-cm^{-2} (Chadwick et al., 1999).

[100] The ship movements considered were for tug assisted movements (launching/docking) of larger ships with drafts greater than about 22 feet. The movements considered were for launching movements away from the piers into the main channel, the initial acceleration in the main channel until underway, and for docking, i.e., the reverse of this process (Chadwick et al., 1999).

The U.S. Navy estimated that, from 16,700 to 71,400 kilograms per day (kg/day), an average of 41,700 kg/day, of sediment is resuspended due to ship movements in the NBSD pier area. For comparison purposes, the U.S. Navy reported that (Chadwick et al., 1999):

> *"This daily input represents 29 percent of the background mass of suspended sediment for NAVSTA and adjacent shipping channel. In comparison to TSS loading from Chollas and Paleta Creeks, which drain into NAVSTA, the yearly estimated total sediment resuspension from tug-assisted ship movements was roughly 300 percent of the storm estimated total mass coming from the creeks."*

10.10.2.2. Sediment Transport from Naval Station San Diego

The U.S. Navy utilized a hydrodynamic model (TRIM-2D) and a sediment transport model (TRIM-SED) to evaluate the transport of resuspended sediment and associated chemicals in the vicinity of NBSD (Chadwick et al., 1999). The study showed that the majority of resuspended clay (77.5%) and silt (66.4%) sized sediment is transported from the pier area and deposited outside the pier area. Lesser percentages of the fine sand (31.7%) and coarse sand (10.6%) are also transported and deposited outside of the piers. The modeling concludes that overall, approximately 55% of the sediment resuspended from within the piers is deposited outside the piers.

The models were also used to simulate the footprint of suspended sediment and chemical levels that have settled on the bay bottom during and after storm events. The model results show that fine TSS particles (less than 12 microns) extend throughout the bay. Particles sized from 12 to 55 microns are also transported to the front and back sections of the bay but are localized along the eastern shoreline. Medium sized particles settle within 1 to 2 km of the creek outfalls, and the course particles settle right at the outfalls (Chadwick et al., 1999). The model considered only tidal currents as the transport mechanism, not ship movements and associated tugboat activity. Although the simulated footprint of deposition of the suspended sediment was to evaluate inputs from the creeks (e.g. Chollas Creek) during storm events, it is reasonable to assume that the tidal currents and movements would also similarly redistribute and deposit sediment resuspended by ship movements in the pier area. Therefore, it is concluded that tidal movements have resulted in resuspended sediment from NBSD being deposited at the Shipyard Sediment Site.

10.10.3. 28th Street Shore Boat Landing Station

As previously described in Section 10.4.2, between the years 1938 and 1956 the U.S. Navy occupied a parcel of land at the south end of the current NASSCO leasehold at the foot of 28th Street, including the 28th Street Pier. This parcel was originally leased from the City of San Diego and was referred to as the 28th Street Shore Boat Landing Station.

The U.S. Navy activities on the north side of the 28th Street Pier included operation of a machine shop, battery shop, planning mill, electric shop, mold loft, mill work office, naval stores, pipe shop, pipe threading area, overhead crane, and boat way. The facilities were used for naval vessel repair including solvent cleaning and degreasing of vessel parts and surfaces, abrasive blasting and scraping for paint removal and surface preparations, metal plating, and surface finishing and painting. Painting and scraping operations generate wastes that can be conveyed by water flows, become airborne (especially during dry blasting), or fall directly into receiving waters. The types of pollutants found in elevated concentrations at the Shipyard Sediment Site (metals, butyltin species, PCBs, PCTs, PAHs, and TPH) are associated with the characteristics of the waste the U.S. Navy operations generated at the NASSCO site.

11. Finding 11: San Diego Unified Port District

Finding 11 of CAO No. R9-2012-0024 states:

The San Diego Water Board finds that the Port District caused or permitted wastes to be discharged or to be deposited where they were discharged into San Diego Bay and created, or threatened to create, a condition of pollution or nuisance. The Port District is a special government entity, created in 1962 by the San Diego Unified Port District Act, California Harbors and Navigation Code Appendix I, in order to manage San Diego Harbor, and administer certain public lands along San Diego Bay. The Port District holds and manages as trust property on behalf of the People of the State of California the land occupied by NASSCO, BAE Systems, and the cooling water tunnels for SDG&E's former Silver Gate Power Plant. The Port District is also the trustee of the land formerly occupied by San Diego Marine Construction Company and by Campbell at all times since 1963 during which they conducted shipbuilding and repair activities.[101] The Port District's own ordinances, which date back to 1963, prohibit the deposit or discharge of any chemicals or waste to the tidelands or San Diego Bay and make it unlawful to discharge pollutants in non-storm water directly or indirectly into the storm water conveyance system.

The wastes the Port District caused or permitted to be discharged, or to be deposited where they were discharged into San Diego Bay through its ownership of the Shipyard Sediment Site contained metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), butyl tin species, PCBs, PCTs, PAHs, and TPH.

The San Diego water Board has discretion to name the Port district in its capacity as the State's trustee as a "discharger" in the Shipyard Sediment Site CAO and hereby does so in this CAO, consistent with its responsibility for the actions, omissions and operations of its tenants and to the extent indicated by previous State Water Board and San Diego Water Board orders. The Port District asserts that its status as a lessor and the State's trustee as well as other factors should only give rise to secondary and not primary liability as a discharger under this Order. Allocation of responsibility has not been determined and there is insufficient evidence to establish that present and former Port District tenants at the Site each have sufficient financial resources to perform all of the remedial activities required by this CAO. In addition, cleanup is not underway at this time. Under those circumstances, it is not appropriate to accord the Port District the secondary liability status it seeks.

The Port District also owns and operates a municipal separate storm sewer system (MS4) through which it discharges waste commonly found in urban runoff to San Diego Bay subject to the terms and conditions of an NPDES Storm Water Permit. The San Diego Water Board finds that the Port District has discharged urban storm water containing waste directly or indirectly to San Diego Bay at the Shipyard Sediment Site. The waste includes metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), total suspended solids, sediment (due to anthropogenic activities), petroleum products, and synthetic organics (pesticides, herbicides, and PCBs).

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[101] San Diego Marine Construction Company and Campbell Industries owned and operated ship repair and construction facilities in past years prior to BAE Systems San Diego Ship Repair, Inc.'s occupation of the leasehold. See Sections 5 and 6 of the Technical Report.

The urban storm water containing waste that has discharged from the on-site and off-site MS4 has contributed to the accumulation of pollutants in the marine sediments at the Shipyard Sediment Site to levels, that cause, and threaten to cause, conditions of pollution, contamination, and nuisance by exceeding applicable water quality objectives for toxic pollutants in San Diego Bay. Based on these considerations the San Diego Unified Port District is referred to as "Discharger(s)" in this CAO.

11.1. The Port District May Be Named as a Discharger

The Port District is a special government entity, created in 1962 by the San Diego Unified Port District Act, California Harbors and Navigation Code Appendix I, in order to manage San Diego Harbor, and administer certain public lands along San Diego Bay. The Port District holds and manages as trust property on behalf of the People of the State of California the land occupied by NASSCO, BAE Systems, and the cooling water tunnels for SDG&E's former Silver Gate Power Plant. The Port District is also the trustee of the land formerly occupied by the San Diego Marine Construction Company and by Campbell at all times since 1963 during which they conducted shipbuilding and repair activities.[102] The San Diego Water Board has the discretion to name the Port District in its capacity as the State's trustee as a "discharger" in the Shipyard Sediment Site CAO and hereby does so, consistent with its responsibility for the actions, omissions and operations of its tenants and to the extent indicated by previous State Water Board and San Diego Water Board orders.

The San Diego Water Board's discretion to hold landowners accountable for discharges which occurred on the landowner's property is based on three criteria. As the State's designated trustee for the relevant lands, the Port District meets all three of these criteria:

- Ownership of the land;
- Knowledge of the activity causing the discharge; and
- The ability to control the activity.[103]

It is undisputable that the Port District is the State's designated statutory trustee and that it is responsible for the use and maintenance of the land leased by NASSCO, BAE Systems, and SDG&E, and the land formerly leased by San Diego Marine Construction Company and Campbell Industries. The Port District has responsibility for land use on these lands and can control decisions regarding the use and sizing of facilities located on lands under its jurisdiction. The Port District has, through its interactions with the San Diego Water Board over many years, and otherwise, known of the potential for discharges from the NASSCO, BAE Systems, San

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[102] San Diego Marine Construction Company and Campbell Industries owned and operated ship repair and construction facilities in past years prior to BAE Systems San Diego Ship Repair, Inc.'s occupation of the leasehold. See Sections 5 and 6.

[103] These principles on the issue of landowner liability under both waste discharge requirements and enforcement orders were established in a series of orders adopted by the State Water Resources Control Board and in memoranda issued by the State Board Office of Chief Counsel. (See e.g., State Board Order Nos. WQ 87-6, 87-5, 86-18, 86-16, 86-15, 86-11, 84-6, 90-03; Memorandum dated May 8, 1987 from William R. Attwater to Regional Board Executive Officers entitled "Inclusion of Landowners in Waste Discharge Requirements and Enforcement Orders").

Diego Marine Construction Company, Campbell Industries, and SDG&E facilities to contribute to accumulations of pollutants in San Diego Bay sediment to deleterious levels. Finally, it is also clear that the Port District has, and at all times relevant had, the obligation and ability under its lease agreements with these entities to impose controls that could prevent or reduce waste discharges. (See e.g. Port District Ordinance No. 62.)

In years past, the State Water Board examined the terms of a lease in order to ascertain whether the lessor has the legal power to prevent a discharge.[104] In Order No. WQ 84-6 (page 12), for example the State Water Board concluded that former landowner/lessors had the opportunity to obviate dangerous conditions on their property on the basis of lease provisions stipulating that "the tenant shall not commit waste or nuisance on the premises, and shall obey all laws, state, federal, and local, with respect to the use of the premises." Port District Ordinance No. 62 contains similar provisions. In addition, the State Water Board cited a term of the lease authorizing the landowners to re-enter the premises upon the failure of the tenant to perform any of its obligations under the lease.

Past lease agreements between the Port District and its tenants typically contained terms similar to those discussed in State Water Board Order No. WQ 84-6. For example, Port District leases reviewed by the San Diego Water Board in years past obligated its tenants to "abide by and conform to … any applicable laws of the State of California and Federal Government…." The Port of San Diego's leases required its tenants to keep the leased premises in a clean and sanitary condition, free and clear of waste. The leases authorized the Port District to enter and inspect the leased premises at any time during normal business hours. The leases also authorized the Port District to terminate the lease after 60 days written notice, if the tenant defaulted in the performance of the lease provisions. Under State Water Board Order No. WQ 84-6, these lease terms would provide a sufficient basis for a finding that the Port District had the requisite degree of control over a tenant's activities to name it as a responsible party.

Based upon the three elements of ownership, knowledge of, and the ability to regulate the discharges which occurred during the lease terms, the San Diego Water Board can and hereby does conclude that that the Port District caused or permitted waste to be discharged into San Diego Bay, creating a condition of pollution and/or nuisance in the Bay at the Shipyard Sediment Site, consistent with its responsibility for the actions, omissions and operations of its tenants. Based on these considerations, and to the extent indicated by previous State Water Resources Control Board and San Diego Water Board orders, the Port District is referred to as "Discharger(s)" herein.

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[104] See State Water Resources Control Board Order Nos. WQ 84-6 and 86-15.

11.2. The Port District Should Not Bear Merely Secondary Responsibility at this Time

In certain situations, the State Water Board has found it appropriate to consider a lessee primarily responsible and the lessor secondarily responsible for compliance with a cleanup and abatement order. A secondarily responsible party is one that is not obligated to comply with the cleanup and abatement order unless the primarily responsible party fails to do so. State Water Board Orders WQ 86-10 and 87-6 identified factors that should be considered in determining whether it is appropriate to assign secondary liability to the Port District for compliance with the Cleanup and Abatement Order. These factors include:

- The status of the lessee's compliance with the Order;
- The ability of the lessor to control the property, including the status of the lease agreement, the authority of the lessor under the lease, and the lessor's current ability to conduct the cleanup; and
- The lessor's role, if any, in the discharge of waste.

In general, the State Water Board Orders held that a landowner or lessor party may be placed in a position of secondary liability where it did not cause or permit the activity that led to the initial discharge into the environment and there is a primarily responsible party who is performing the cleanup. Other factors considered by the State Water Board include whether the landowner or lessor:

- Is a public entity that should be treated in a manner similar to the U.S. Forest Service in State Water Board Order No. WQ 87-05;
- Has a limited ability to conduct cleanup because another party has control over the site; and
- Contributed to or aggravated pollution conditions at the site.

The San Diego Water Board concludes that the Port District should be named as a "discharger" in the CAO consistent with its responsibility for the actions, omissions and operations of its tenants to the extent indicated by previous State Water Resources Control Board and San Diego Water Board orders. Although the Port District is a public government entity,[105] and there is no evidence in the record that the Port District initiated or contributed to the actual discharge of waste to the Shipyard Sediment Site, it is nevertheless appropriate to name the Port District as a discharger in the CAO to the extent the Port's tenants, past and present, have insufficient financial resources to cleanup the Shipyard Sediment Site and/or fail to comply with the order. (See egs. In the Matter of Petitions of Wenwest, Inc., et al., State Water Board Order No. WQ 92-13, p. 9; In the Matter of the Petitions of Arthur Spitzer, et al., State Water Board Order No. WQ 89-8, p. 21.) In the event the Port District's tenants, past and present, have sufficient financial resources to clean up the Shipyard Sediment Site and comply with the Order, then the San Diego Water Board may modify its status to secondarily responsible party in the future.

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[105] See Harb. and Nav. Code, Appendix I, section 28.

11.3. The San Diego Unified Port District Operates a Municipal Separate Storm Sewer System (MS4) Through Which It Discharges Urban Runoff

The San Diego Unified Port District (Port District) operates a municipal separate storm sewer system (MS4) through which it discharges waste commonly found in urban runoff to San Diego Bay subject to the terms and conditions of a NPDES Storm Water Permit (Order No. R9-2007-0001 NPDES No. CAS0108758). The Port District is the trustee of the tidelands property and lessor of the BAE Systems leasehold and NASSCO leasehold. The Port District is a co-permittee of current and prior NPDES Storm Water Permits which regulate the MS4 drains which outfall on the BAE Systems and NASSCO leaseholds as well as drains on other tidelands property over which the Port District is trustee. The permits specifically regulate the watershed of the Port District and the Port District is subject to all of the terms and conditions of the permits as an operator of the MS4 system.

The Port District's own ordinances, which date back to 1963, prohibit the deposit or discharge of any chemicals or waste to the tidelands or San Diego Bay and make it unlawful to discharge pollutants in non-storm water directly or indirectly into the storm water conveyance system.

The San Diego Water Board finds that the Port District has discharged urban storm water containing waste directly to San Diego Bay at the Shipyard Sediment Site through its MS4 conveyances. The waste includes metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), total suspended solids, sediment (due to anthropogenic activities), petroleum products, and synthetic organics (pesticides, herbicides, and PCBs) through SW4 (located on the BAE Systems leasehold) and SW9 (located on the NASSCO leasehold) MS4 conduit pipes as well as other minor drains on its tidelands property and watershed to the Shipyard Sediment Site.

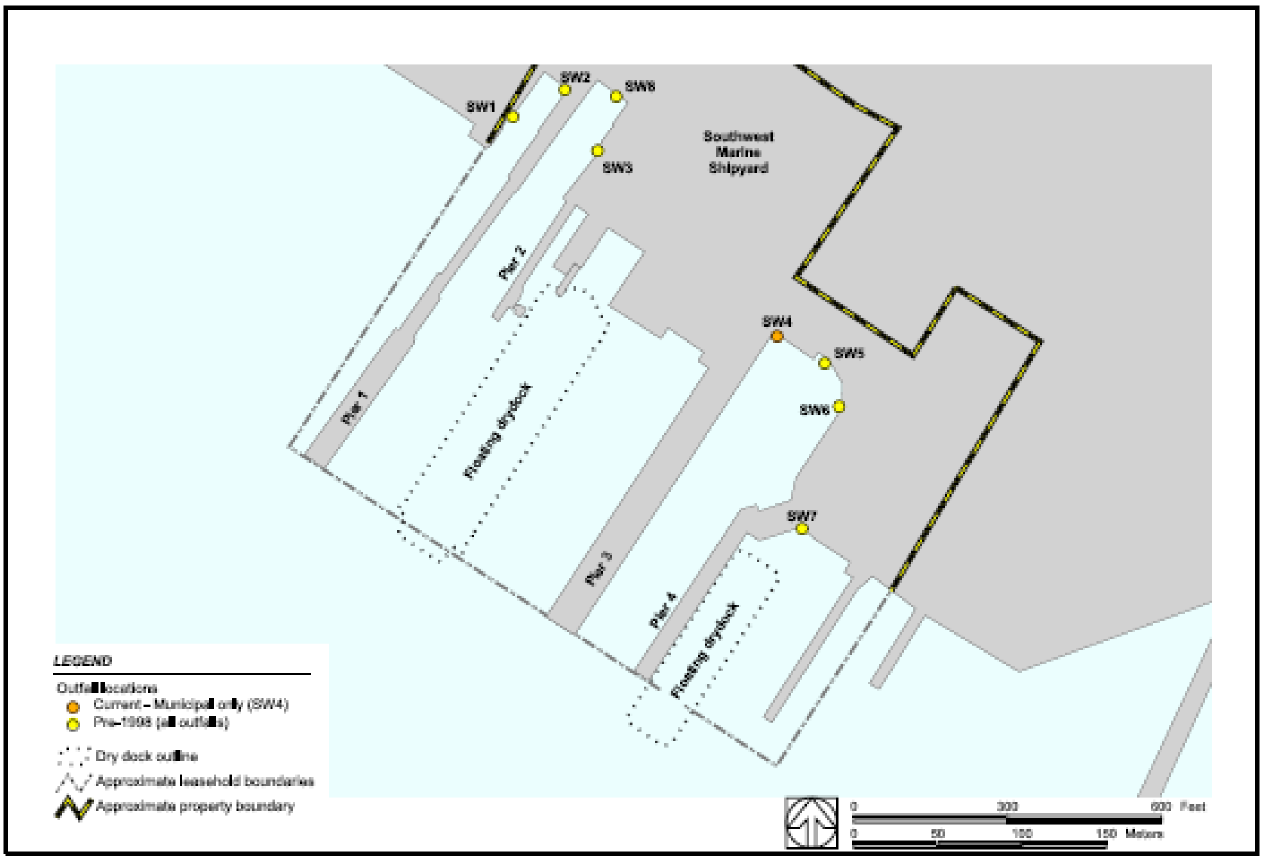
11.3.1. MS4 Description

The Port District operates an MS4 conveyance through which it discharges urban runoff into waters of the United States within the San Diego Region. The Port District's MS4 conveys urban runoff from the urbanized and largely industrial tidelands area storm drain structures and storm drain pipes that discharge into the Shipyards Site and greater San Diego Bay.

The Port District operates an MS4 that conveys urban runoff from source areas up-gradient of the Shipyard Sediment Site's property and discharge indirectly into San Diego Bay within the NASSCO and BAE Systems leasehold or directly through the following outfalls:

- **Storm Drain SW4**
  The storm drain outfall identified as SW4 in the Shipyard Report (Exponent, 2003) enters BAE Systems leasehold with two contributing storm pipes located at the foot of Sampson and Sicard Streets. These pipes join together somewhere beneath BAE Systems' leasehold, ultimately discharging into San Diego Bay at the SW4 outfall located at a point between Piers 3 and Pier 4 on the BAE Systems leasehold[106] at the Shipyard Sediment site. This storm drain receives runoff from Sicard, Belt, and Sampson streets and had historically received runoff directly from areas within the current BAE leasehold. Figure 11-1 shows the storm drain outfalls at the BAE Systems' leasehold.

Figure 11-1 Storm Drain Outfalls at BAE Systems' Leasehold

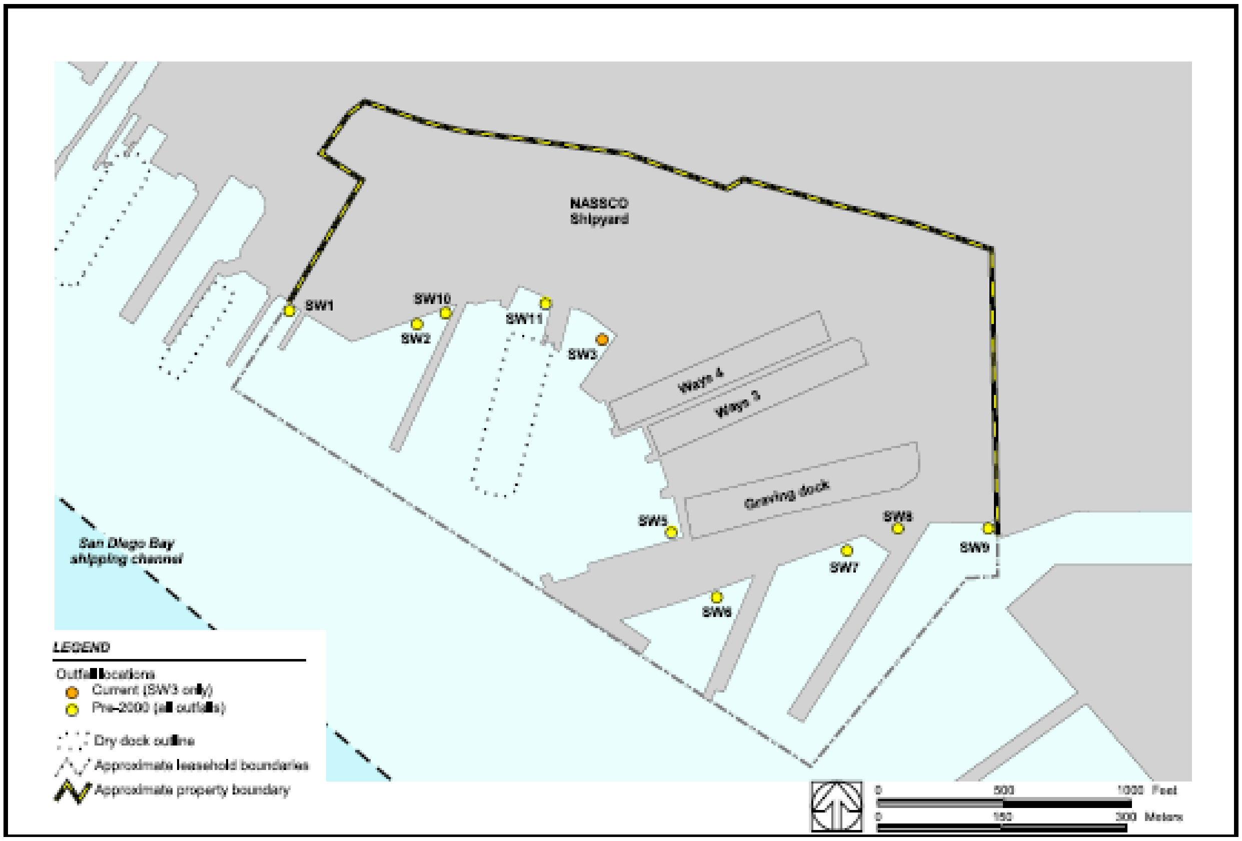


(Exponent, 2003)

[106] A 1968 City of San Diego drainage easement figure shows a 42-inch storm drain, discharging into the Bay between Piers 3 and 4. No further information was provided by the City of San Diego concerning the SW4 outfall.

- **Storm Drain SW9**
  This storm drain outfall is identified as SW9 in the Shipyard Report (Exponent, 2003) and enters NASSCO's leasehold at the foot of 28th Street and discharges at the southeasterly corner of the leasehold into Chollas Creek, a tributary of San Diego Bay. (Exponent, 2003; ENV America, 2004a; City of San Diego, 2004a) Storm Drain SW9 collects flow from 28th Street, and stretches from the I-5 freeway to the bay including parts of Belt Street and Harbor Drive and historically received runoff from areas within the current NASSCO leasehold. Figure 11-2 shows the storm drain outfalls at NASSCO's leasehold.

Figure 11-2 Storm Drain Outfalls at NASSCO's Leasehold



(Exponent, 2003)

11.3.2. Urban Runoff is a "Waste" and a "Point Source Discharge" of Pollutants

Urban runoff is a waste, as defined in the Water Code that contains pollutants and adversely affects the quality of the waters of the state.[107] The discharge of urban runoff from an MS4 conveyance is a "discharge of pollutants from a point source" into waters of the United States as defined in the Clean Water Act.[108]

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[107] See Wat. Code, § 13050, subd. (d). Waste includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing,

The most common categories of pollutants in urban runoff include total suspended solids (TSS), sediment (due to anthropogenic activities), pathogens (e.g., bacteria, viruses, protozoa), heavy metals (e.g., copper, lead, zinc, and cadmium), petroleum products and polynuclear aromatic hydrocarbons (PAHs and HPAHs), synthetic organics (e.g., pesticides, herbicides, and PCBs), nutrients (e.g., nitrogen and phosphorus fertilizers), oxygen-demanding substances (decaying vegetation, animal waste), and trash.[109]

11.4. The Port District Discharged Waste to San Diego Bay

The Port District has caused or permitted the discharge of urban storm water pollutants directly to San Diego Bay at the Shipyard Sediment Site. The pollutants include metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), TSS, sediment (due to anthropogenic activities), petroleum products, and synthetic organics (pesticides, herbicides, and PCBs) through SW4 (located on the BAE Systems leasehold) and SW9 (located on the NASSCO leasehold) MS4 conduit pipes, as well as other minor drains on its tidelands property and watershed to the Shipyard Sediment Site

Urban runoff discharges from the Port District are regulated under NPDES requirements prescribed by the San Diego Water Board pursuant to CWA section 402 and Water Code section 13376. The Port District must comply with all conditions of the NPDES requirements. Any noncompliance of NPDES requirements constitutes a violation of the CWA and Water Code and is grounds for enforcement action, including the issuance of a cleanup and abatement order under the circumstances described in Water Code section 13304. Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides, in relevant part, that the San Diego Water Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirement…."

The Port District's NPDES Permit requirement urban runoff discharges are documented in the San Diego Water Board records via monitoring reports (filed by the *San Diego County Municipal Copermittees*).

11.5. The Port District Discharged Waste to San Diego Bay Creating Pollution, Contamination, and Nuisance Conditions in San Diego Bay

The Port District has contributed to the accumulation of pollutants in marine sediment at the Shipyard Sediment Site by discharging urban storm water pollutants from MS4 discharges at

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manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

[108] 40 CFR 122.2 defines "point source" as "any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff." 40 CFR 122.2 defines "discharge of a pollutant" as "Any addition of any 'pollutant' or combination of pollutants to 'waters of the United States' from any point source."

[109] Finding 7 of Order No. 2001-001, NPDES No. CAS0108758, Waste Discharge Requirements For Discharges Of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego, the Incorporated Cities Of San Diego County, and the San Diego Unified Port District.

levels, which cause, and threaten to cause, conditions of pollution, contamination, and nuisance by exceeding applicable water quality objectives for toxic pollutants in San Diego Bay. Water code section 13304 requires that any person who causes any waste to be discharged, or deposited where it probably will be discharged, into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance is subject to cleaning up or abating the effects of the waste.

The Porter-Cologne Water Quality Act defines "pollution" as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects … the waters for beneficial uses.…"[110] "Contamination" is defined as "an impairment of the quality of the waters of the state by waste to a degree which creates a hazard to the public health through poisoning or through the spread of disease. "Contamination" includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."[111]

Pollutants conveyed and discharged by the MS4 conveyance include metals, TSS, sediment, petroleum products, pesticides, herbicides, and PCBs. Many of these same pollutants are present in marine sediment at the Shipyard Sediment Site in highly elevated concentrations as compared to sediment chemistry levels found at off-site reference stations located in areas of San Diego Bay.[112]

As stated above, since 1990 the Port District's NPDES requirements have specifically prohibited urban runoff discharges that cause pollution, contamination or nuisance conditions in San Diego Bay or otherwise cause or contribute to violations of San Diego Bay water quality standards.

Based on the evidence presented in Section 11.4 of this Technical Report, the Port District has a history of discharging pollutants through MS4 Storm Drains SW4, SW9, and other minor drains on its tidelands property and watershed to the Shipyard Sediment Site at levels that have contributed to a condition of pollution, contamination, or nuisance at the Shipyard Sediment Site. As described in Sections 13 through 30 of this Technical Report these same pollutants in the discharges have accumulated in San Diego Bay sediment at levels that may:

4. Adversely affect the beneficial uses of San Diego Bay, violating a NPDES requirement prohibitions pertaining to discharges that cause pollution, contamination, or nuisance conditions in San Diego Bay; and

5. Violate NPDES requirements pertaining to discharges that degrade marine communities, cause adverse effects on the environment or the public health, or result in harmful concentrations of pollutants in marine sediment.

Accordingly, it is concluded that the Port District has caused or permitted the discharge of waste to San Diego Bay in a manner causing the creation of pollution or nuisance conditions and that it

[110] Wat. Code, § 13050, subd. (1).

[111] Wat. Code, § 13050, subd. (k).

[112] See Section 15 of this Technical Report.

is appropriate for the San Diego Water Board to issue a cleanup and abatement order naming the Port District as a discharger pursuant to Water Code section 13304.[113]

11.6. NPDES Requirement Regulations & Port District Ordinances

Urban runoff discharges from the Port District's MS4 are regulated under NPDES requirements prescribed by the San Diego Water Board pursuant to Clean Water Act section 402 and Water Code section 13376. These requirements are referred to as either NPDES requirements[114] or by the federal terminology "NPDES Permit." The Port District's first NPDES requirements started in 1990, when the San Diego Water Board issued WDRs for storm water and urban runoff. A listing of the successive NPDES requirements adopted by the San Diego Water Board to regulate the Port District's MS4 Urban Runoff discharges is provided in Table 11-1 below.

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[113] The Port District asserts that under the Ninth Circuit opinion in Natural Resources Defense Council, Inc. v. County of Los Angeles, 636 F.3d 1235 (9th Cir. 2011) (NRDC Case), there is insufficient evidence in the record to support naming the Port District as a Discharger based upon urban runoff discharges. For the reasons stated in the San Diego Water Board Cleanup Team's Response to Comments Report, the NRDC Case is not applicable because it focused on whether an NPDES permittee had violated its NPDES permit limits. The weight of the evidence in this record supports finding that the Port District discharged waste to the Shipyard Sediment that caused a condition of pollution or nuisance. (See Response to Comments Report, August 23, 2011, pp. 11-16 through 11-17).

[114] Pursuant to Chapter 5.5 of the Porter-Cologne Water Quality Act, to avoid the issuance by the United States Environmental Protection Agency of separate and duplicative NPDES permits for discharges in California that would be subject to the Clean Water Act, the State's Waste Discharge Requirements (WDRs) for such discharges implement the NPDES regulations and entail enforcement provisions that reflect the penalties imposed by the Clean Water Act for violation of NPDES permits issued by the U.S. EPA. Thus, the State's WDRs that implement federal NPDES regulations (NPDES requirements) serve in lieu of NPDES permits.

Table 11-1 Port District NPDES Permits

Order Number / NPDES No.	Order Title	Adoption Date	Expiration Date
Order No. 90-42 NPDES No. CA0108758	Waste Discharge Requirements For Storm water and Urban Runoff from the County of San Diego the Incorporated Cities of San Diego County and the San Diego Unified Port District	July 16, 1990	February 21, 2001
Order No. 2001-01, NPDES No. CAS0108758	Waste Discharge Requirements For Discharges Of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego, the Incorporated Cites of San Diego County, and the Unified Port District	February 21, 2001	Present
Order No. 2007-001, NPDES No. CAS0108758	Waste Discharge Requirements For Discharges Of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego, the Incorporated Cites of San Diego County, and the Unified Port District	January 24, 2007	Present

The Port District must comply with all conditions of the NPDES requirements. Any noncompliance of NPDES requirements constitutes a violation of the CWA and Water Code and is grounds for enforcement action, including the issuance of a cleanup and abatement order under the circumstances described in Water Code section 13304.

Each of the Port District's successive NPDES requirements described here has specifically prohibited urban runoff discharges that cause pollution, contamination or nuisance conditions in San Diego Bay, or otherwise cause or contribute to violations of San Diego Bay water quality standards.

11.6.2. Order No. 90-42, NPDES No. CA0108758

Order 90-42, NPDES No. CA0108758, in effect from July 16, 1990 to February 21, 2001, contains the following narrative limits that relate to the discussions contained herein:

- VIII. ILLICIT CONNECTION/ILLEGAL DUMPING DETECTION PROGRAM B. The permittee shall effectively eliminate all identified illegal/illicit discharges in the shortest time practicable, and in no case later than July 16, 2005 … …If it is determined that any of the preceding discharges cause or contribute to violations of water quality standards or are significant contributors of pollutants to waters of the United States, the discharges shall be prohibited from entering storm water conveyance systems; and

- XIII. PROVISIONS A. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by section 13050 of the CWC.

11.6.3. Order No. 2001-01, NPDES No. CAS0108758

Order No. 2001-01, NPDES No. CAS0108758, in effect from February 21, 2001 contains the following provisions that relate to the discussions contained herein:

- A. PROHIBITIONS – DISCHARGES … 1. Discharges into and from MS4s in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC § 13050), in waters of the state are prohibited.

- A. PROHIBITIONS DISCHARGES … 2. Discharges from MS4s which cause or contribute to exceedances of receiving water quality objectives for surface water or groundwater are prohibited.

- C. RECEIVING WATER LIMITATIONS … 1. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.

11.6.4. Order No. 2007-0001, NPDES No. CAS0108758

Order No. 2007-0001, NPDES No. CAS0108758, in effect from January 24, 2007 contains the following provisions that relate to the discussions contained herein:

- A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS… 1. Discharges into and from municipal separate storm sewer systems (MS4s) in a manner causing, or threatening to cause, a condition of pollution, contamination, or nuisance (as defined in CWC section 13050), in waters of the state are prohibited.

- A. PROHIBITIONS AND RECEIVING WATER LIMITATIONS … 3. Discharges from MS4s that cause or contribute to the violation of water quality standards (designated beneficial uses and water quality objectives developed to protect beneficial uses) are prohibited.

The above NPDES requirement narrative limits are applicable to urban runoff discharges to San Diego Bay from the Port District MS4 Storm Drains SW4, SW9, and other minor drains on the Port District's tidelands property at the Site, which occurred during the effective terms of Order Nos. 90-42, 2001-01, and 2007-0001.

Additionally, the Port District's own ordinances, which date back to 1963, also prohibit the deposit or discharge of any chemicals or waste to the tidelands or San Diego Bay.[115] The Port District's ordinances make it unlawful to discharge pollutants in non-storm water directly or indirectly into storm water conveyance systems or receiving waters.[116] It is specifically among the powers of the Port District to "protect, preserve and enhance" the "natural resources of the Bay" and "the quality of water in the Bay."[117] The Port District has been charged with making

[115] Ordinance No. 62, "An Ordinance Regulating Disposal of Refuse and Dumping on the Tidelands and into the Bay of San Diego; Amending Port District Code by adding § 8.50 (May 1963) (See § 8.50 (b), (c)).

[116] Article 10, San Diego Unified Port District Stormwater Management & Discharge Control, § 10.05. Prohibitions, San Diego Unified Port District code (26Sep2011)

[117] Harbors & Navigation Code, Appx. § 4.

and enforcing all necessary rules and regulations governing the use and control of the Bay waters and tidelands, including making and enforcing any local sanitary regulations relating to public services and public utilities in the District, which would include municipal storm water systems, since the San Diego Unified Port District Act was enacted in 1962.[118]

11.6.5. Port District, MS4 Storm Drain SW4

As described in Section 11.3.1, the Port District operates an MS4 storm drain identified as SW4 in the Shipyard Report (Exponent, 2003) (see Figure 11-1 above) which conveys urban runoff from source areas upgradient of BAE Systems and historically from BAE Systems' property and discharges(d) directly within the BAE Systems leasehold. Urban runoff discharged into the SW4 storm drain outfall is subject to the NPDES requirements cited in Section 11.6. Although no monitoring data is available for this outfall, it is highly probable that historical and current discharges from this outfall have discharged heavy metals and organics to San Diego Bay at the Shipyard Sediment Site.[119]

The Storm Drain SW4 discharges into the BAE Systems leasehold between Piers 3 and 4. Sample stations from the Detailed Sediment Investigation (Exponent, 2003) in the area of this outfall include SW20 through SW25. The sample results for PCBs and PAHs are presented in Table 11-2.

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[118] San Diego Unified Port District Act, §§ 55, 56.

[119] See Section Figure 0-112816128 for a description of the most common categories of pollutants found in urban runoff.

Table 11-2 NASSCO & BAE Systems Detailed Sediment Investigation PCB and PAH Results for SW20 through SW25

Constituent	SW20 µg/kg	SW21 µg/kg	SW22 µg/kg	SW23 µg/kg	SW24 µg/kg	SW25 µg/kg
Aroclor-1016	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1221	< 500	< 520	< 57	< 58	< 460	< 51
Aroclor-1232	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1242	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1248	< 250	< 260	< 29	< 29	< 230	< 26
Aroclor-1254	1,500	1,600	670	550	790	330
Aroclor-1260	1,600	1,800	790	710	870	380
Sum of Aroclors®	**3,100**	**3,400**	**1,500**	**1,300**	**1,700**	**710**
Naphthalene[1]	< 13	13	31	< 15	26	< 13
Acenaphthylene[1]	120	130	150	130	290	180
Acenaphthene[1]	16	14	17	19	14	13
Fluorene[1]	53	53	56	53	220	45
Phenanthrene[1]	300	220	330	360	810	260
Anthracene[1]	450	370	500	500	6,000	440
Fluoranthene[2]	930	580	910	960	7,100	750
Pyrene[2]	1,200	850	1,100	1,000	3,100	940
Benzo [a] Anthracene[2]	760	650	890	850	6,300	710
Chrysene[2]	1,800	1,400	1,900	1,800	11,000	1,300
Benzo [b] Fluoranthene[2]	1,500	1,600	1,800	1,500	7,000	2,000
Benzo [k] Fluoranthene[2]	1,200	1,100	1,300	1,200	7,300	1,600
Benzo [a] Pyrene[2]	1,400	1,500	1,700	1,500	8,800	2,000
Dibenz [a,h] Anthracene[2]	200	210	230	220	1,100	240
Benzo [g,h,i] Perylene[2]	770	780	830	820	2,800	800
Indeno [1,2,3-c, d] Pyrene[2]	970	990	1,100	1,000	3,700	1,100
Total PAHs	**11,669**	**10,460**	**12,844**	**11,912**	**65,560**	**12,378**

1. LPAH – low molecular weight polynuclear aromatic hydrocarbon
2. HPAH – high molecular weight polynuclear aromatic hydrocarbon

Non-detections are represented as less than the quantitation limit.
(Exponent, 2003)

PCBs in sediment from the laterals and catch basin of the storm water conveyance system were found at levels that exceed the ERL and ERM of 22.7 μg/kg and 180 μg/kg, respectively (Long et al., 1995), as well as the proposed Alternative Sediment Cleanup Levels.

Sediment PCB levels, specifically Aroclor-1254 and 1260, and sediment PAH levels reported in the storm water conveyance system are also reported in the bay sediment near the storm water outfall as indicated in Table 11-2.

As outlined above, SW4 has discharged pollutants, specifically Aroclor-1254 and 1260, and PAHs, into the BAE Systems leasehold and San Diego Bay at the Shipyard Sediment Site, for which the Port District is required under its NPDES permit and by its own ordinances to prevent. These facts provide evidence that the Port District has discharged and deposited pollutants to the Shipyard Sediment Site.

11.6.6. Port District, MS4 Storm Drain SW9

As described in Section 11.3.1, the Port District operates an MS4 storm drain identified as SW9 in the Shipyard Report (Exponent, 2003) (see Figure 11-2, above), which conveys urban runoff from source areas upgradient of NASSCO's property and historically from areas within the current NASSCO leasehold and discharges(d) directly within the NASSCO leasehold. Urban runoff discharged into the SW9 storm drain outfall is subject to the NPDES requirements cited in Section 11.6. Although no monitoring data is available for this outfall, it is highly probable that historical and current discharges from this outfall have discharged heavy metals and organics to San Diego Bay at the Shipyard Sediment Site.[120]

A review of maps of the storm drain outfalls shows that the storm drain SW9 outfall is located in the NASSCO leasehold at the foot of 28th St. near the mouth of Chollas Creek (Exponent, 2003; ENV America, 2004a; City of San Diego, 2004a). SW9 collects flow from 28th Street, and stretches from the I-5 freeway to the bay including parts of Belt Street and Harbor Drive.

Surface sediment data at NASSCO sample station NA22, which is located near the SW9 storm drain outfall shows elevated concentrations of total high-molecular-weight polynuclear aromatic hydrocarbons (Total HPAHs) at 3600 μg/kg), Dichlorodiphenyltrichloroethane (DDT) at 29.7 μg/kg), and Chlordane at 21.1 μg/kg. These pollutant levels are indicators of an urban runoff source (Exponent, 2003) and therefore indicate that historical urban runoff discharges occurred from the Port District's tidelands via the SW9 outfall.

As described above, the surface sediment data at NASSCO sample station NA22 provides evidence that the Storm Drain SW9 conveys the HPAHs pollutants into the NASSCO leasehold and San Diego Bay at the Shipyard Sediment Site and the Port District under its NPDES permit and by its own ordinances is responsible for preventing those discharges. The urban runoff characteristics of the sediment pollutants at Station NA22 adjacent to the Storm Drain SW9 provide evidence that the Port District has discharged pollutants to the Shipyard Sediment Site. The weight of evidence suggests that there are discharges from Storm Drain SW9 that are contributing to the accumulation of pollutant in marine sediment.

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[120] See Section 1.3.2 for a description of the most common categories of pollutants found in urban runoff.

VOLUME II

TECHNICAL REPORT FOR CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

FOR THE SHIPYARD SEDIMENT SITE • SAN DIEGO BAY, SAN DIEGO, CA

March 14, 2012

California Water Boards

STATE WATER RESOURCES CONTROL BOARD

REGIONAL WATER QUALITY CONTROL BOARDS

COVER PAGE

FOR

VOLUME 2 of 3

OF THE

Technical Report for

CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

March 14, 2012

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SAN DIEGO REGION

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Technical Report for

CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

For the Shipyard Sediment Site
San Diego Bay, San Diego, CA

Volume 2 of 3

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on March 14, 2012

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Acronyms & Abbreviations

AET	Apparent Effects Threshold
AFFF	Aqueous Film Forming Foam
ASTM	American Society of Testing Material
ANOVA	Analysis of Variance
AQUA	Aquaculture Beneficial Use
ARCO	Atlantic Richfield Company
ASTs	Aboveground Storage Tanks
AT & SF	Atchison, Topeka, and Santa Fe Railroad
AVS/SEM	Acid Volatile Sulfide / Simultaneously Extracted Metals
BAF	Biota Accumulation Factor
BAP	Benzo[a]pyrene
Bight 98	Southern California Bight 1998 Regional Marine Monitoring Survey
BIOL	Preservation of Biological Habitats of Special Significance
BMPs	Best Management Practices
BPJ	Best Professional Judgment
BRI-E	Benthic Response Index for Embayments
BSAFs	Biota-to-Sediment Accumulation Factors
BTAG	U.S. Navy/U.S. EPA Region 9 Biological Technical Assistance Group
CAD	Confined Aquatic Disposal
CCC	Criterion Continuous Concentration
CCR	California Code of Regulation
CDFs	Confined Disposal Facilities
CEQA	California Environmental Quality Act
CMC	Criterion Maximum Concentration
CNRSW	Commander Navy Region Southwest
COCs	Contaminants of Concern
COMM	Commercial and Sport Fishing Beneficial Use
CoPC	Chemicals of Potential Concern
CSF	Cancer Slope Factor
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
DFG	California Department of Fish and Game
DRO	Diesel Range Organics
DTSC	California Department of Toxic Substances Control
DWQ	Division of Water Quality
EC50	Median Effective Concentration
EMC	Event Mean Concentration
EqP	Equilibrium Partitioning Approach
ERL	Effects Range Low
ERM	Effects Range Medium
EST	Estuarine Habitat Beneficial Use
FACs	Fluorescent Aromatic Compounds
FSP	Field Sampling Plan
GRO	Gasoline Range Organics
HPAH	High Molecular Weight Polynuclear Aromatic Hydrocarbons
HQ	Hazard Quotient
IND	Industrial Service Supply Beneficial Use
IR	Ingestion Rate
IRIS	Integrated Risk Information System
Kp	Partition Coefficients
LAET	Lowest Apparent Effects Threshold
LC50	Median Lethal Concentration
LOAELs	Low-Adverse-Effects-Levels
LOE	Lines of Evidence
LPAH	Low Molecular Weight Polynuclear Aromatic Hydrocarbons
LPL	Lower Prediction Limit
MAR	Marine Habitat Beneficial Use
MARCO	Marine Construction and Design Company
MEK	Methyl Ethyl Ketone
MIGR	Migration of Aquatic Organisms Beneficial Use
MS4	Municipal Separate Storm Sewer System
MTDB	Metropolitan Transit Development Board

NASSCO	National Steel and Shipbuilding Company
NAV	Navigation Beneficial Use
NAVSTA	Naval Station
NOAA	National Oceanic and Atmospheric Administration
NOAELs	No-Adverse-Effects-Levels
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRTAs	Natural Resource Trustees Agencies
NTR	National Toxics Rule
OHHEA	Office of Environmental Health and Hazard Assessment
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCTs	Polychlorinated Terphenyls
PL	Prediction Limit
PPPAH	Priority Pollutant Polynuclear Aromatic Hydrocarbon
PRGs	Preliminary Remediation Goals
PW	Pore Water
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/ Quality Control
RAP	Remedial Action Plan
RARE	Rare, Threatened or Endangered Species Beneficial Use
REC1	Contact Water Recreation Beneficial Use
REC2	Non Contact Water Recreation Beneficial Use
RfD	Reference Dose
RLs	Response Levels
RME	Reasonable Maximum Exposure
RRO	Residual Range Organics
SCCWRP	Southern California Coastal Water Research Project
SDG&E	San Diego Gas and Electric
SDMC	San Diego Marine Construction Company
SDUPD	San Diego Unified Port District
SHELL	Shellfish Harvesting Beneficial Use
SQGs	Sediment Quality Guidelines
SQGQ	Sediment Quality Guideline Quotient
SS-MEQ	Site-Specific Median Effects Quotient
SVOCs	Semi Volatile Organic Compounds
S-W Diversity	Shannon-Weiner Diversity Index
SWAC	Surface-Area Weighted Average Concentration
SWI	Sediment Water Interface
SWM	Southwest Marine, Inc.
SWCS	Storm Water Conveyance System
SWPPP	Storm Water Pollution Prevention Plan
SWPMP	Storm Water Pollution Monitoring Plan
TBT	Tributyltin
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TR	Tissue Residue (biota-water-sediment equilibrium partitioning approach)
TRGs	Tissue Residue Guidelines
TRI	Toxic Release Inventory
Triad	Sediment Quality Triad
TRV	Toxicity Reference Value
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
TUc	Toxic Unit Chronic
UPL	Upper Prediction Limit
U.S. EPA	U. S. Environmental Protection Agency
U.S. FWS	U. S. Fish and Wildlife Service
VOCs	Volatile Organic Compounds
WDRs	Waste Discharge Requirements
WILD	Wildlife Habitat Beneficial Use
WOE	Weight of Evidence

Preface

The Technical Report (TR) contained herein is the culmination of revisions over several years to the draft TR first released to support to Tentative Cleanup and Abatement Order (TCAO) No. R9-2005-0126 in January 2005. This Technical Report provides the rationale and factual information supporting the findings of the CAO No. R9-2012-0024. The text of each CAO finding is presented first, followed by a summary of the rationale and factual evidence supporting the finding. A copy of CAO No. R9-2012-0024 and this TR, as well as prior versions are posted on the San Diego Water Board website at http://www.waterboards.ca.gov/sandiego. CAO No. R9-2012-0024 incorporates the Technical Report as a finding in support of CAO No. R9-2012-0024 as if fully set forth therein.

12. Finding 12: Clean Water Act Section 303(d) List

Finding 12 of CAO No. R9-2012-0024 states:

The San Diego Bay shoreline between Sampson and 28th Streets is listed on the Clean Water Act section 303(d) List of Water Quality Limited Segments for elevated levels of copper, mercury, zinc, PAHs, and PCBs in the marine sediment. These pollutants are impairing the aquatic life, aquatic-dependent wildlife, and human health beneficial uses designated for San Diego Bay and are causing the Bay's narrative water quality objective for toxicity to not be attained. The Shipyard Sediment Site occupies this shoreline. Issuance of a CAO (in lieu of a Total Maximum Daily Load program) is the appropriate regulatory tool to use for correcting the impairment at the Shipyard Sediment Site.

12.1. Clean Water Act Section 303(d) List

CWA section 303(d) requires states to identify impaired waters that do not meet, or are not expected to meet by the next listing cycle, applicable water quality standards[1] after the application of certain technology-based controls, and schedule such waters for development of Total Maximum Daily Loads.[2] The states accomplish this by listing such waters and submitting an updated list from time to time (currently on a biennial basis in even numbered years) to U.S. EPA.

An impaired waterbody is one that does not attain and maintain water quality standards, due to an individual pollutant, multiple pollutants, pollution, or an unknown cause of impairment. A threatened waterbody is one that currently attains water quality standards but existing and readily available data and information on adverse declining trends indicate that water quality standards will likely be exceeded by the time the next list is required to be submitted to U.S. EPA.

The Shipyard Sediment Site, was added to the 2002 CWA Section 303(d) List under the name "San Diego Bay Shoreline between Sampson and 28th Streets" as an impaired waterbody segment due to elevated concentrations of copper, mercury, PAHs, PCBs, and zinc in bay bottom sediment. These pollutants are impairing the aquatic life, aquatic-dependent wildlife, and human health beneficial uses designated for San Diego Bay, and are causing the Bay's narrative water quality objective for toxicity to not be attained. Fact sheets prepared by the San Diego Water Board and submitted to the State Water Board in support of the listing are provided in the Appendix for Section 12. The State Water Board adopted the 2002 CWA Section 303(d) list of water quality limited segments at a February 4, 2003 Board Meeting and the list was approved by the U.S. EPA in July 2003. No changes were made to the Shipyard Sediment Site listing in either the 2006 or 2010 CWA Section 303(d) list. In the 2010 Integrated Report, however, the

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1 Water quality standards for a water body consist of its beneficial uses, criteria to protect those uses (referred to as water quality objectives in California), and an antidegradation policy. (40 CFR part 131).

2 A TMDL is the sum of waste load allocations for point sources, load allocations for nonpoint sources, and natural background sources of an impairing pollutant. (40 CFR section 130.2(i)).

Shipyard Sediment Site was moved from Category 5 (TMDL required) to Category 4B (being addressed by actions other than TMDLs).

Regional Water Boards have wide latitude, numerous options, and some legal constraints that apply when determining how to address impaired waters. All violations of water quality standards should be addressed, and the San Diego Water Board may use any combination of existing regulatory tools to do so. Existing regulatory tools include individual or general waste discharge requirements (be they under Chapter 4 or under Chapter 5.5 (NPDES permits) of the Porter-Cologne Water Quality Control Act), individual or general waivers of waste discharge requirements, enforcement actions (e.g. cleanup and abatement order), interagency agreements, regulations, basin plan amendments, and other policies for water quality control.

The San Diego Water Board has determined that issuance of a cleanup and abatement order (in lieu of a Total Maximum Daily Load program) is the appropriate regulatory tool to use for correcting the impairment at the Shipyard Sediment Site based on the following considerations:

1. Pollutant discharges from NASSCO and BAE Systems, two primary sources of the marine sediment contamination at the Shipyard Sediment Site, have been significantly curtailed in recent years as the result of improvements in BMPs implementation.

2. Pollutant contributions to the Shipyard Sediment Site from Chollas Creek outflows will be gradually and significantly reduced over the 10-year period from October 2008 to October 2018 as the result of implementation of the Chollas Creek Metals TMDLs[3] and future planned TMDLs for Chollas Creek.

3. Discharges from other sources to the Shipyard Sediment Site not described in Items 1 and 2 above are either entirely historical contributions and no longer occurring or can be controlled or terminated using existing San Diego Water Board regulatory tools such as waste discharge requirements or enforcement action.

4. The source control efforts summarized above will likely be sufficient to eliminate or significantly reduce continuing accumulation of pollutants at the Shipyard Sediment Site and ensure that remedial measures required under the cleanup and abatement order will not have to be repeated at a later date.

5. Attainment of the Cleanup Levels prescribed in Directive A of Cleanup and Abatement Order No. R9-2010-0002 will result in restoration of beneficial uses at the Shipyard Sediment Site and provide a basis for removing all of the primary and secondary constituents of concern listed for the Shipyard Sediment Site from the current CWA section 303(d) list.

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[3] See San Diego Water Board Resolution No. R9-2008-0054, A Resolution Adopting an Amendment to The Water Quality Control Plan for the San Diego Basin (9) to Incorporate Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay, and to Revise the Toxic Pollutants Section Of Chapter 3 to Reference the California Toxics Rule. See also Regional Board Technical Report, *Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay*, dated May 30, 2007.

Technical Report
for
Cleanup and Abatement
Order No. R9-2012-0024

APPENDIX FOR SECTION 12

CLEAN WATER ACT SECTION 303(D) LIST

March 14, 2012

Southeast Extension of Near Coronado Bridge
(Between Sampson and 28th Streets)
Hydrologic Subarea 908.22

NEW 303(d) LISTINGS
Benthic Community Degradation and Sediment Toxicity

PREVIOUS 303(d) LISTINGS
This listing represents an extension of the Near Coronado Bridge extent of impairment. Near Coronado Bridge is an existing impaired waterbody area on the 303(d) list.

WATERSHED CHARACTERISTICS
The area of San Diego Bay between Sampson and 28th Streets is located along the eastern shore of San Diego Bay. This area is approximately 64 acres. San Diego Bay is designated with the following beneficial uses: EST, MAR, MIGR, WILD, BIOL, RARE, REC-1, REC-2, SHELL, COMM, NAV, AND IND.[1]

WATER QUALITY OBJECTIVES NOT ATTAINED
Benthic degradation The Basin Plan[1] states that "all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the Regional Board."

Sediment toxicity The Basin Plan[1] states that "all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the Regional Board."

EVIDENCE OF IMPAIRMENT
Benthic degradation Sediment sampled in San Diego Bay between Sampson and 28th Streets by the Bay Protection Toxic Cleanup Program (BPTCP)[2] in 1993 indicated the presence of elevated chemistry, toxicity, and benthic degradation. Cores were sampled with 3 replicates to identify and quantify the benthic community. A Relative Benthic Index (RBI) was used to determine benthic degradation. The RBI ranges on a scale from 0 to 1. "It combines use of benthic community data (i.e. species diversity) with the presence or absence of positive and negative indicator species in order to provide a measure of the relative degree of degradation within the benthic fauna."[2] For example, *Capitella sp.* is a pollutant tolerant negative indicator species. Its presence in large numbers is indicative of a polluted benthic environment. Based on the results of the RBI, three samples (93210, 93211, and 90021) in San Diego Bay between Sampson and 28th Streets had degraded benthic community conditions.

Sediment toxicity Sediments sampled by the Bay Protection Toxic Cleanup Program (BPTCP)[2] in 1993 were also used for toxicity testing. Amphipod solid phase survival tests were performed using *Rhepoxynius abronius* that were exposed to sediments for 10 days. Sediment samples were divided into 5 replicates. The reference envelope approach that was utilized by the BPTCP indicated that toxicity for the amphipod sediment test was significant when survival was less than 48% in samples tested. Three samples (93210, 93181, and 90030) in San Diego Bay between Sampson and 28th Streets showed amphipod survival rates below 48%.

Sea urchin embryo-larval development testing was performed on *Strongylocentrotus purpuratus* at the sediment / water interface for 96 hours. After the exposure period, larvae were examined to determine the proportion of normally developed larvae. The proportions of normal larvae were compared against control cultures to determine toxicity. Two samples (93210 and 93211) in San Diego Bay between Sampson and 28th Streets showed toxicity to *S. purpuratus*.

Chemistry Sediments sampled by the Bay Protection Toxic Cleanup Program (BPTCP)[2] in 1993 were also analyzed for chemicals of concern. Chemical pollution was demonstrated by using comparisons to established sediment guidelines; Effects Range Medians (ERMs) and Probable Effect Levels (PELs). The ERM reflects the 50th percentile of ranked data and represents the level above which effects are expected to occur. The PEL value is derived by taking the geometric mean of the 85th percentile of the "no effects" data and the 50th percentile of the "effects" data. Stations with any chemical concentrations >4 times its respective ERM or >5.9 times its respective PEL were considered to exhibit elevated chemistry. Additionally, an ERM summary quotient >0.85 or a PEL summary quotient >1.29 was indicative of stations where multiple chemicals were significantly elevated. Two samples (93211 and 90030) in San Diego Bay between Sampson and 28th Streets exceeded the individual ERM and PEL thresholds for antimony, copper, total PCB, and total PAH concentrations. Furthermore, four samples (93210, 93211, 90030, and 93181) between Sampson and 28th Streets were above the ERM and PEL summary quotients. Combining these high concentrations with evidence of benthic degradation and sediment toxicity satisfies the same criteria that was used to list other San Diego Bay locations in 1998 based upon the same BPTCP data.[2,3]

Current sediment quality data collected in August 2001 supports the results from the BPTCP that elevated chemical concentrations are present between Sampson and 28th Streets.[4] Twelve samples exceeded the individual ERM and PEL thresholds for copper, mercury, zinc, and total PCBs. The chemistry data is currently being evaluated to determine its potential effects on toxicity and degraded benthic community conditions.

Of the nine BPTCP sediment samples collected in San Diego Bay between Sampson and 28th Streets, one sample (93210) had synoptic "hits" on all three components of the "Triad of Evidence" (i.e., elevated sediment chemistry, toxicity, and degraded benthic community) and two samples (93211 and 90030) had synoptic "hits" on two of three components. The weight of evidence from these samples indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28th Streets. This level of benthic degradation, sediment toxicity and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR and SHELL.

<u>EXTENT OF IMPAIRMENT</u>

Benthic degradation Area between the foot of Sampson and 28th Streets, extending to the edge of the piers.

Sediment toxicity Area between the foot of Sampson and 28th Streets, extending to the edge of the piers.

POTENTIAL SOURCES

Benthic degradation Elevated concentrations of copper, mercury, zinc, antimony, total PCBs, and total PAHs and/or contaminant mixtures could be the cause. National Steel and Shipbuilding Company (NASSCO) and Southwest Marine, Inc. occupy the shoreline between Sampson and 28th Streets. The current and historic activities at these shipyards may be a source because the elevated levels of contaminants are consistent with those produced as a result of shipyard operations. The shipyard operations consist of repair, construction, and maintenance of U.S. Navy and commercial ships. NASSCO and Southwest Marine are currently conducting an extensive investigation to determine the presence or absence of degraded benthic community conditions. Other potential sources are urban runoff and non-point sources.

Sediment toxicity Elevated concentrations of copper, mercury, zinc, antimony, total PCBs, and total PAHs and/or contaminant mixtures could be the cause. National Steel and Shipbuilding Company (NASSCO) and Southwest Marine, Inc. occupy the shoreline between Sampson and 28th Streets. The current and historic activities at these shipyards may be a source because the elevated levels of contaminants are consistent with those produced as a result of shipyard operations. The shipyard operations consist of repair, construction, and maintenance of U.S. Navy and commercial ships. The shipyard operations consist of repair, construction, and maintenance of U.S. Navy and commercial ships. NASSCO and Southwest Marine are currently conducting an extensive investigation to determine the presence or absence of sediment toxicity. Other potential sources are urban runoff and non-point sources.

TMDL PRIORITY

Benthic degradation High

Sediment toxicity High

INFORMATION SOURCES

Water Quality Objectives

[1] Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

[2] Bay Protection Toxic Cleanup Program, 1996. Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay Region. California State Water Resources Control Board.

[3] Bay Protection Toxic Cleanup Program, 1998. Chemistry, Toxicity and Benthic Community Conditions in Sediments of the San Diego Bay Region. Final Addendum Report. California State Water Resources Control Board.

[4] Exponent, 2001. Technical Memorandum 1 – Phase 1 Sediment Chemistry Data for the NASSCO and Southwest Marine Detailed Sediment Investigation. Bellevue, WA.

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Copper

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Stressor/Media/Beneficial Use	Copper/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the "Triad Approach" (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	• BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = 93211. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Copper is one of several contaminants used to calculate the quotient values. • NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = NA17, SW01, SW02, SW04, SW08, SW09, and SW13. • BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. • BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. • BPTCP Station 93210 had synoptic "hits" on all three components of the Triad Approach. • BPTCP Stations 93211 and 90030 had synoptic

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Copper

	"hits" on two of three components of the Triad Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard Methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Mercury

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Stressor/Media/Beneficial Use	Mercury/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the "Triad Approach" (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	• BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = None. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Mercury is one of several contaminants used to calculate the quotient values. • NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = NA06 and SW02. • BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. • BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. • BPTCP Station 93210 had synoptic "hits" on all three components of the Triad Approach.

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Mercury

	• BPTCP Stations 93211 and 90030 had synoptic "hits" on two of three components of the Triad Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Total PAHs

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Stressor/Media/Beneficial Use	Total PAHs/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the “Triad Approach” (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	• BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = 90030. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Total PAHs is one of several contaminants used to calculate the quotient values. • NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = None. • BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. • BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. • BPTCP Station 93210 had synoptic “hits” on all three components of the Triad Approach. • BPTCP Stations 93211 and 90030 had synoptic

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Total PAHs

	"hits" on two of three components of the Triad Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Total PCBs

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Stressor/Media/Beneficial Use	Total PCBs/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the “Triad Approach” (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	• BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = 93211. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Total PCBs is one of several contaminants used to calculate the quotient values. • NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = SW01, SW02, SW04, SW05, SW08, SW20, SW21, and SW28. • BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. • BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. • BPTCP Station 93210 had synoptic “hits” on all three components of the Triad Approach.

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Total PCBs

	• BPTCP Stations 93211 and 90030 had synoptic "hits" on two of three components of the Triad Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Zinc

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Stressor/Media/Beneficial Use	Zinc/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the "Triad Approach" (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	• BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = None. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Zinc is one of several contaminants used to calculate the quotient values. • NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = SW04. • BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. • BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. • BPTCP Station 93210 had synoptic "hits" on all three components of the Triad Approach. • BPTCP Stations 93211 and 90030 had synoptic "hits" on two of three components of the Triad

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Zinc

	Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

13. Finding 13: Sediment Quality Investigation

Finding 13 of CAO No. R9-2012-0024 states:

NASSCO and BAE Systems conducted a detailed sediment investigation at the Shipyard Sediment Site in San Diego Bay within and adjacent to the NASSCO and BAE Systems leaseholds. Two phases of fieldwork were conducted, Phase I in 2001 and Phase II in 2002. The results of the investigation are provided in the Exponent report *NASSCO and Southwest Marine Detailed Sediment Investigation, September 2003 (Shipyard Report, Exponent 2003*). Unless otherwise explicitly stated, the San Diego Water Board's finding and conclusions in this CAO are based on the data and other technical information contained in the Shipyard Report prepared by NASSCO's and BAE Systems' consultant, Exponent.

The Shipyard Sediment Site is exempt from the Phase I Sediment Quality Objectives promulgated by the State Water Board because a site assessment (the Shipyard Report) was completed and submitted to the San Diego Water Board on October 15, 2003. See State Water Board, *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality*, II.B.2 (August 25, 2009).

13.1. NASSCO and Southwest Marine Detailed Sediment Investigation

On February 21, 2001, the San Diego Water Board adopted Resolution Nos. 2001-02 and -03 directing the Executive Officer to issue Water Code section 13267 letters to NASSCO and BAE Systems requiring the submission of a site-specific study to develop sediment cleanup levels and identify sediment cleanup alternatives.

On June 1, 2001, the San Diego Water Board Executive Officer directed, under the authority provided in Water Code section 13267, NASSCO and BAE Systems to conduct a site-specific study to develop sediment cleanup levels and identify sediment cleanup alternatives. The study was conducted in accordance with the San Diego Water Board document, *Guidelines for Assessment and Remediation of Contaminated Sediments in San Diego Bay at NASSCO and Southwest Marine Shipyards, June 1, 2001*.

As a first step, NASSCO and BAE Systems developed and submitted to the San Diego Water Board a Work Plan (Exponent, 2001a) and time schedule for performance of a site assessment and development of sediment cleanup levels, sediment cleanup alternatives, and cleanup costs. Following San Diego Water Board concurrence with the work plan NASSCO and BAE Systems conducted the two phase sediment investigation at the Shipyard Sediment Site in San Diego Bay within and adjacent to the NASSCO and BAE Systems leaseholds. The results of the investigation are provided in the Shipyard Report.

13.2. Data Quality

The Work Plan for the Detailed Sediment Investigation included a field sampling plan (FSP) (Appendix A, Exponent, 2001a). The FSP presented the sampling methods that would be used during the investigation, including field sampling locations and procedures, the use of quality control samples, field data reporting and field custody procedures, and sample packaging and shipping requirements.

The Work Plan also included a quality assurance project plan (QAPP) (Appendix B, Exponent, 2001a) to ensure that the quality of the data was sufficiently high to support its intended use of determining the nature and extent of contamination, determining biological effects, assessing ecological and human health risks, and establishing remediation measures for the Shipyard Sediment Site. The QAPP described the procedures for field collection of samples, sample handling and custody (including preservation and holding time requirements), analytical methods, field and laboratory quality control, instrument maintenance and calibration, data validation methods, and data management. Data validation methods were provided for field procedures, chemical analyses, toxicity tests and laboratory bioaccumulation, and benthic macroinvertebrate identification.

The Shipyard Report presented a Quality Assurance Report for Chemistry Data that provided a data quality review (data validation and data quality assessment) of the data collected during the Detailed Sediment Investigation. The review verified that quality assurance and quality control (QA/QC) procedures were completed and documented as required by the QAPP. The data quality of chemistry data was determined by Exponent to be sufficiently high and no data were rejected. (Appendix F, Exponent, 2003)

Quality Assurance Reports were also provided for Toxicity Tests (Amphipod Toxicity, Echinoderm Toxicity, Sediment-Water Interface Toxicity, and Dilution Series Toxicity), Bioaccumulation Tests, and Benthic Macroinvertebrate Identification. The quality assurance reviews identified whether results met applicable performance standards, whether any deviations or inconsistencies with the specifications of the statement of work (with each contracted laboratory) occurred and then assessed whether there were any resulting effects on the quality of the data. Exponent determined that the data generated from the Detailed Sediment Investigation were acceptable for their intended use. (Appendices H, J, and L, Exponent, 2003)

13.3. Stakeholder Involvement

The San Diego Water Board conducted a series of stakeholder meetings and public workshops during the course of NASSCO's and BAE Systems' sediment investigation and received valuable input, which was factored into the investigation. At the meetings and workshops, experts, and interested parties representing the shipyards and a diverse group of stakeholders had the opportunity to provide critical input and share knowledge on various aspects of the Shipyard Sediment Site investigation, including review of the work plan. The stakeholder group included representatives from the Audubon Society; California Department of Fish and Game (DFG); City of San Diego, Environmental Health Coalition; National Oceanic and Atmospheric Administration (NOAA); San Diego Baykeeper; SDUPD; Sierra Club; Southern California

Coastal Water Research Project (SCCWRP); Surfrider Foundation; University of California, Davis, Marine Pollution Studies Laboratory; U.S. Fish and Wildlife (U.S. FWS); and U.S. Navy.

A summary of the meetings, workshops, and significant documents for the Shipyard Sediment Site investigation are listed in the Table 13-1 below.

Table 13-1 List of Meetings, Workshops, and Significant Documents

	Item or Event	Date
1	Adopt Resolution Nos. 2001-002 and 2001-003	2/21/2001
2	Issue CWC section 13267 letters to NASSCO and BAE Systems	6/01/2001
3	Issue Guidelines for Assessment and Remediation of Contaminated Sediments in San Diego Bay at NASSCO and BAE Systems Shipyards.	6/01/2001
4	Public Workshop #1	8/03/2001
5	Stakeholder Meeting #1	10/12/2001
6	Stakeholder Meeting #2	1/29 - 30/2002
7	Stakeholder Meeting #3	3/28 - 29/2002
8	Public Workshop #2	6/18/2002
9	Stakeholder Meeting #4	8/22/2002
10	Technical Meeting #1	12/12/2002
11	Technical Meeting #2	1/22 - 23/2003
12	San Diego Water Board Meeting – Status Report #1	9/10/2003
13	NASSCO and BAE Systems Detailed Sediment Investigation released for review.	10/10/2003
14	San Diego Water Board Meeting – Status Report #2	11/12/2003
15	Public Workshop #3	11/14/2003
16	Release Tentative CAO R9-2005-0126	5/1/2005
17	Public Workshop #4	6/29/2005
18	San Diego Water Board Meeting – Status Report #3	8/10/2005
19	Pre-Hearing Conference #1	8/26/2005
20	Pre-Hearing Conference #2	12/06/2005
21	Advisory Team / Cleanup Team public meeting	12/12/2005

It is anticipated that the San Diego Water Board will conduct additional prehearing conferences and workshops and at least one San Diego Water Board public hearing in considering the issuance of a final Cleanup and Abatement Order.

13.4. Conclusion

The San Diego Water Board's findings in the Tentative Cleanup and Abatement Order and conclusions in this Technical Report are based primarily on the data and other technical information provided in the Shipyard Report. The San Diego Water Board has reviewed the Quality Assurance Reports and found that the data reported in the Shipyard Report are found to be of sufficient quality to be used to develop the San Diego Water Board's findings and conclusions.

The San Diego Water Board's Technical Report identifies those instances where other data and technical information, in addition to that provided in the Shipyard Report, are used to support the Findings in the tentative Cleanup and Abatement Order and for the San Diego Water Board's management decisions.

14. Finding 14: Aquatic Life Impairment

Finding 14 of CAO No. R9-2012-0024 states:

Aquatic life beneficial uses designated for San Diego Bay are impaired due to the elevated levels of pollutants present in the marine sediment at the Shipyard Sediment Site. Aquatic life beneficial uses include: Estuarine Habitat (EST), Marine Habitat (MAR), and Migration of Aquatic Organisms (MIGR). This finding is based on the considerations described below in this *Impairment of Aquatic Life Beneficial Uses* section of the CAO.

14.1. Aquatic Life Beneficial Uses

There are three beneficial uses designated in the Basin Plan for San Diego Bay (RWQCB, 1994), which must be fully protected in order to provide for the protection of aquatic life. The three aquatic life beneficial uses are as follows:

- **Estuarine Habitat (EST)** – Includes uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

- **Marine Habitat (MAR)** – Includes uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

- **Migration of Aquatic Organisms (MIGR)** – Includes uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.

The concentrations of the pollutants present in the marine sediment within and adjacent to the Shipyard Sediment Site cause or threaten to cause a condition of pollution or contamination that adversely impacts these three beneficial uses and thereby constitute a threat to aquatic life. Information supporting this conclusion is contained in Sections 15 through 19 of this Technical Report.

15. Finding 15: Multiple Lines of Evidence Weight-of-Evidence Approach

Finding 15 of CAO No. R9-2012-0024 states:

The San Diego Water Board used a weight-of-evidence approach based upon multiple lines of evidence to evaluate the potential risks to aquatic life beneficial uses from pollutants at the Shipyard Sediment Site. The approach focused on measuring and evaluating exposure and adverse effects to the benthic macroinvertebrate community and to fish using data from multiple lines of evidence and best professional judgment. Pollutant exposure and adverse effects to the benthic macroinvertebrate community were evaluated using sediment quality triad measurements, and bioaccumulation analyses, and interstitial water (i.e., pore water) analyses. The San Diego Water Board evaluated pollutant exposure and adverse effects to fish using fish histopathology analyses and analyses of PAH breakdown products in fish bile.

15.1. No Single Method Can Measure the Effects of Contaminated Sediment

Pollutants in sediment can cause adverse effects either through direct toxicity to benthic organisms or through bioaccumulation and food chain transfer to human and wildlife consumers of fish and shellfish. As noted by U.S. EPA (1992a), there is no single method that will measure all contaminated sediment effects at all times and to all biological organisms. For example, sediment chemistry provides unambiguous measurements of pollutant levels in marine sediment, but provides inadequate information to predict biological impact. Benthic communities can provide a direct measurement of community impacts, but are subject to disturbances that are not necessarily caused by pollutant driven sediment toxicity (e.g. low dissolved oxygen). Measurements of sediment toxicity directly measure biological impacts and integrate the effect(s) of various pollutant mixtures, but are subject to test imprecision and lack of consistent correlations with biological community effects. In addition, the toxicity test organisms may not adequately reflect the sensitivity of the full range of species comprising the benthic community. Reliance on any one of these measurement endpoints (chemistry, benthic communities and toxicity) to evaluate exposure and effects is problematic for characterizing risk from sediment pollutants. In contrast, a weight of evidence assessment using all three measurement endpoints gives the assessor much more information to reach conclusions.

15.2. Weight-Of-Evidence Approach

Based on these considerations, the assessment of potential adverse effects from contaminated sediment is best performed using a “weight-of-evidence approach.” The central tenet of a weight-of-evidence approach is that “multiple lines of evidence” should support decision-making. The corollary is that no single line of evidence should drive decision-making (unless a single line of evidence gives all the information necessary, and decision makers are willing to accept the outcome). The weight-of-evidence approach is commonly defined in the literature as a determination related to possible ecological impacts based upon multiple lines of evidence, which contribute to an overall evaluation and conclusion. This determination incorporates judgments referred to as “best professional judgment” (BPJ) concerning the quality, extent, and congruence of the data contained in the different lines of evidence. BPJ comprises the use of expert opinion and judgment based on available data and site-situation specific conditions to determine, for example, environmental status or risk. BPJ can be initiated in cases where there are extensive data but few uncertainties and in cases where there are few data and many uncertainties.

15.3. San Diego Water Board Approach

The San Diego Water Board applied the weight-of-evidence approach principles to evaluate potential risks to aquatic life beneficial uses from the existing levels of pollutants at the Shipyard Sediment Site. The approach focused on evaluating the exposure and adverse impacts to the benthic macroinvertebrate community and to fish using multiple lines of evidence including sediment and pore water chemistry, laboratory studies of toxicity and bioaccumulation, benthic community evaluation, fish histopathology analyses and analyses of PAH breakdown products in fish bile. The details regarding pore water, fish histopathology, and fish bile analyses can be found in the Appendix for Section 15. The data used to establish these lines of evidence are contained in the NASSCO and BAE Systems’ report (Exponent, 2003) referenced in Section 13 of this Technical Report. The San Diego Water Board’s evaluation of these data and multiple lines of evidence are discussed in Sections 16 through 19 of this Technical Report.

15.4. State Water Resources Control Board’s Sediment Quality Objectives

The State Water Board’s *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1. Sediment Quality* was effective on August 25, 2009 (SWRCB, 2009).

This plan contains sediment quality objectives (SQOs) for direct (benthic communities) and indirect (human health) effects, and a plan of implementation for direct effects. The SQOs are designed to provide the State and Regional Water Boards, stakeholders, and interested parties with a process to differentiate sediments impacted by toxic pollutants from those that are not. To protect benthic communities in bays and estuaries of California, the SQO describes a multiple lines of evidence (MLOE) approach that integrates sediment toxicity, sediment chemistry, and benthic community analysis into a station level assessment.

The State Water Board’s MLOE approach, sometimes referred to as the Triad approach, is similar to the San Diego Water Board’s approach identified in Section 15.3 above. Both methodologies evaluate the potential for the pollutants in the sediment to impact benthic communities by integrating sediment toxicity, sediment chemistry, and benthic community data.

The results of the station level MLOE assessment classify the impacts to the benthic communities into one of the following 6 categories:

a. Unimpacted;
b. Likely Unimpacted;
c. Possibly Impacted;
d. Likely Impacted;
e. Clearly Impacted; or
f. Inconclusive.

The SQO recommends a dividing line between “Likely Unimpacted” and “Possibly Impacted.” Protected sediments are defined by the categories “Unimpacted” and “Likely Unimpacted.” All other categories would be considered as not representing the protective condition.

The Principal Scientist on the project was Mr. Steve Bay, with SCCWRP. Mr. Bay evaluated a number of stations within San Diego Bay utilizing the MLOE approach in the SQO. This evaluation included 27 stations at the Shipyard Sediment Site, (Bay, 2007). The results are presented in Table 32-17 in Section 32.5.1 Analysis for Aquatic Life at Triad Stations.

The Shipyard Sediment Site is exempt from the Phase I Sediment Quality Objectives promulgated by the State Water Resources Control Board (State Water Board) because a site assessment (the Shipyard Report) was completed and submitted to the San Diego *Water Board on October 15, 2003. See State Water Board, Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality*, II.B.2 (August 25, 2009).

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APPENDIX FOR SECTION 15

SUPPLEMENTAL DOCUMENTATION FOR WEIGHT OF EVIDENCE APPROACH

March 14, 2012

A15.1. Pore Water Analyses

The San Diego Water Board evaluated the chemistry of pore water (the water occupying the spaces between sediment particles) to evaluate the potential of site chemicals to contribute to ecological risks. This evaluation was carried out by comparing chemical concentrations in pore water to California Toxics Rule (CTR) water quality criteria. Although CTR values are derived based on toxicity to planktonic organisms, and the chemical sensitivities of planktonic and benthic organisms may differ, this comparison provides a screening-level evaluation of which chemicals may deserve further evaluation.

Comparisons were made to the CTR saltwater quality criterion continuous concentration, which is the highest concentration of a pollutant to which marine aquatic life can be exposed for an extended period of time without deleterious effects. Of the 12 site stations sampled for pore water (SW02 was excluded due to the presence of some suspended material remaining after centrifugation), 12 stations exceeded the copper CTR value, 6 stations exceeded the lead CTR value, and 12 stations exceeded the total PCBs CTR value. Although the comparisons to the CTR criteria identified several pollutants for which measured pore water concentrations are above levels of concern, the measured pore water concentrations may be biased high due to the possible presence of very fine suspended or colloidal material in the pore water samples that could not be removed by centrifugation.

A15.1.1. Pore Water

Pore water, the water occupying the spaces between sediment particles, was evaluated to determine compliance with CTR water quality criteria and the potential risks to the benthic community from chemical pollutants present in the sediment at the Shipyard Sediment Site. Pore water is considered one of several key exposure routes for contaminants to benthic organisms associated with sediment (Chapman et al., 2001; U.S. EPA, 1994). Other routes of exposure include sediment ingestion and overlying water. A key advantage of analyzing pore water is that the measured concentrations can be compared to water quality criteria to identify potential risks to the benthic community. A direct comparison can be made between pore water concentrations and water quality criteria because available data suggest that benthic species may exhibit the same sensitivity to chemical pollutants as water column species that were tested to derive water quality criteria (U.S. EPA, 2003b, 2005b).

Pore water was collected at a total of 13 stations at the Shipyard Sediment Site (Exponent 2001a). The measured pore water concentrations at these stations were compared to water quality criteria established in the CTR (U.S. EPA, 2000a) in 40 CFR 131.38. The CTR water quality criteria are applicable as water quality objectives[1] in California's inland surface waters, enclosed bays, and estuaries. Pore water chemical pollutant concentration excursions to levels above the CTR water quality criteria resulting from waste discharges represents a condition of

[1] "Water quality objectives" are defined in Water Code section 13050(h) as "the limits or levels water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

condition of pollution[2] in waters of the state. This pollution condition would provide a basis for issuance of a cleanup and abatement order under CWC section 13304.[3]

Comparisons were made to the saltwater CCC, which is the highest concentration of a chemical pollutant to which marine aquatic life can be exposed for an extended period of time without deleterious effects (Table A15-1) (Exponent, 2003). Of the 12 Shipyard Sediment Site stations sampled for pore water (SW02 was excluded by Exponent due to the presence of some suspended material remaining after centrifugation), 12 stations exceeded the copper CTR value, 6 stations exceeded the lead CTR value, and 12 stations exceeded the total PCBs CTR value (Table A15-2).

Table A15-1 Water Quality Criteria Established in the California Toxics Rule

Compound	Saltwater Criterion Continuous Concentration (μg/L)
Arsenic	36
Cadmium	9.3
Chromium (VI)	50
Copper	3.1
Lead	8.1
Nickel	8.2
Selenium	71
Zinc	81
Total Polychlorinated Biphenyls[1]	0.03

1. Sum of aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016.

[2] "Pollution" is defined in Water Code section 13050 (1) as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects either of the following: (A) The waters for beneficial uses, (B) Facilities which serve these beneficial uses." "Pollution" may include "contamination."

[3] Water Code section 13304 contains the cleanup and abatement authority of the Regional Board. Section 13304(a) provides in relevant part that the Regional Board may issue a cleanup and abatement order to any person "who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirements… ...or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance…"

Table A15-2 Comparison of Shipyard Pore Water Concentrations to CTR Water Quality Criteria

	Metals and PCBs (µg/L)								
Station	**As**	**Cd**	**Cr (VI)**	**Cu**	**Pb**	**Ni**	**Se**	**Zn**	**Total PCBs (Sum of Homologs)**
NA01	19	0.05	25	**14**	5.2	2.3	5.2	23	**0.068**
NA06	9.1	0.05	25	**33**	**12**	2.2	2.5	44	**0.20**
NA13	12	0.05	25	**14**	6.5	2.5	2.5	30	**0.056**
NA16	17	0.05	25	**22**	**9**	2.7	2.5	33	**0.094**
NA17	20	0.05	25	**23**	7	2.9	2.5	32	**0.084**
SW01	6.1	0.05	25	**17**	6.6	3	2.5	22	**0.50**
SW02 (outlier)	(11)	(4.2)	(25)	**(390)**	**(120)**	(37)	(6.1)	**(610)**	**(16)**
SW04	15	0.05	25	**55**	**20**	3.3	2.5	60	**0.60**
SW08	9.9	0.05	25	**33**	**12**	2	2.5	34	**0.52**
SW12	19	0.05	25	**17**	7.1	2.8	2.5	32	**0.08**
SW24	10	0.05	25	**25**	**9.8**	2.6	2.5	37	**0.67**
SW25	17	0.05	25	**28**	**13**	2.9	2.5	42	**.018**
SW28	9	0.05	25	**19**	7.5	2.4	2.5	31	**0.29**

Note: Boxed and shaded values for shipyard locations exceed CTR water quality criteria.

Although the CTR criteria identified several chemical pollutants for which measured pore water concentrations are above maximum allowable CTR levels, the measured pore water concentrations may be biased high due to the possible presence of very fine suspended or colloidal material in the pore water samples that were not removed by centrifugation (Exponent, 2003). The pore water samples collected at the Shipyard Sediment Site were not filtered, in accordance with U.S. EPA guidance (U.S. EPA, 2001b), and were reported as total concentrations, whereas the CTR values are filtered and are reported as dissolved concentrations. However, the pore water results exceed the CTR criteria by multiples ranging from 1.1 to 20, excluding the results for SW02, as indicated in Table A15-3. Based on the magnitude of these exceedances, it is judged that the accumulation of pollutants in the Shipyard sediment has caused the pore water chemical pollutant concentrations to exceed the CTR water quality criteria. These exceedances represent a condition of pollution in waters of the state.

Table A15-3 Pore Water Concentrations as Multiples of CTR Water Quality Criteria

	Metals and PCBs (µg/L)								
Station	**As**	**Cd**	**Cr (VI)**	**Cu**	**Pb**	**Ni**	**Se**	**Zn**	**Total PCBs (Sum of Homologs)**
NA01	NA	NA	NA	**5**	NA	NA	NA	NA	**2**
NA06	NA	NA	NA	**11**	**15**	NA	NA	NA	**7**
NA13	NA	NA	NA	**5**	NA	NA	NA	NA	**2**
NA16	NA	NA	NA	**7**	**1.1**	NA	NA	NA	**3**
NA17	NA	NA	NA	**7**	NA	NA	NA	NA	**3**
SW01	NA	NA	NA	**5**	NA	NA	NA	NA	**17**
SW02 (outlier)	NA	NA	NA	**(126)**	**(15)**	NA	NA	**(8)**	**(533)**
SW04	NA	NA	NA	**18**	**2**	NA	NA	NA	**20**
SW08	NA	NA	NA	**11**	**1.5**	NA	NA	NA	**17**
SW12	NA	NA	NA	**5**	NA	NA	NA	NA	**3**
SW24	NA	NA	NA	**8**	**12**	NA	NA	NA	**22**
SW25	NA	NA	NA	**9**	**2**	NA	NA	NA	**6**
SW28	NA	NA	NA	**6**	NA	NA	NA	NA	**10**

1. NA = Not applicable because the pore water concentration is below the CTR water quality criteria.

A15.2. Fish Histopathology Analyses

The San Diego Water Board evaluated fish histopathology data to determine the potential exposure and associated adverse effects on fish from chemical pollutants present within and adjacent to the Shipyard Sediment Site. A total of 253 spotted sand bass were examined for various histopathological lesions. These spotted sand bass were collected from four discrete assessment units at the Shipyard Sediment Site and at a reference area located across San Diego Bay near Reference Station 2240. The fish histopathology data indicates a total of 70 types of histopathological lesions were found in the spotted sand bass. Of the 70 types of lesions found, five lesions that exhibited statistically significant elevations relative to reference conditions. The five lesions are abundant lipofuscin in liver, abundant hemosiderin in liver, cholangitis/biliary hyperplasia (CBH) in liver, nephritis in kidney, and shiny gill foci. A sixth lesion (i.e., foci of cellular alteration in livers) was considered important even though no statistical differences were found because the existence of these lesions indicates a harmful effect strongly linked to PAH exposure. Of the six lesions identified as significantly elevated with respect to reference conditions, two lesions, CBH and foci of cellular alteration, have been identified as being associated with contaminant exposure. There were also six lesions types that were significantly elevated in reference area fish, relative to shipyard area fish. Scientific literature describing lesions that are potential biomarkers of environmental stressors in fish does not attribute causation of lipofuscin, hemosiderin, nephritis, and shiy gill foci to pollution-related factors. It is plausible that the lesions could have been caused by naturally occurring environmental factors such as infectious parasites. Based on these considerations the fish histopathology data does not indicate that the fish lesions observed in the data set can be conclusively attributed to contaminant exposure at the Shipyard Sediment Site.

A15.2.1. Fish Histopathology Analyses

The Phase 1 sediment chemistry and bioaccumulation data indicated the potential for aquatic life impacts from elevated levels of contaminants in the sediment at the Shipyard Sediment Site. The sediment chemistry exceeded published threshold values for PAHs and PCBs therefore it was deemed necessary to assess the impacts on aquatic life from the contaminated sediment at the Shipyard Sediment Site through fish histopathology[4] analyses.

By letter dated July 16, 2002, the San Diego Water Board directed NASSCO and BAE Systems, pursuant to WC 13267, to investigate the potential for contaminant bioaccumulation in fish and the associated risks to fish health from the Shipyard Sediment Site and adjacent areas and to document the results in a technical report. The rationale and general guidelines for the fish histopathology investigation are provided in the July 16, 2002 letter (RWQCB, 2002a). The San Diego Water Board consulted with the Natural Resource Trust Agencies (NRTAs) (U.S. FWS, DFG, NOAA, and OEHHA) to determine the study guidelines. The study was conducted in accordance with their recommendations.

PAHs and PCBs were of concern because the sediment concentrations indicated levels that exceeded published literature values and were potentially harmful to marine/estuarine fish within the Shipyard Investigation Site. PAH concentrations exceed a suggested sediment quality threshold of 1,000 ppb for PAHs at every NASSCO and BAE Systems sample station except for the reference stations (Johnson, 2000). Furthermore, studies on chinook salmon (*Oncorhynchus tshawytscha*) resulted in a PCB threshold value of 300 ppb (for total organic carbon (TOC) at 2 percent dry weight) (Meador, 2000). Of the 43 sample locations analyzed for PCBs at NASSCO and BAE Systems, the average TOC was 2.13 percent and 38 sample locations exceeded the suggested PCB threshold.

PAHs are of particular interest because it is a common sediment contaminant found in coastal urban and industrial waterbodies and are found throughout the Shipyard Sediment Site. PAHs generally do not bioaccumulate in fish tissue like chlorinated hydrocarbons therefore exposure to PAHs cannot be assessed using traditional tissue analysis. PAH compounds are readily metabolized by the liver and secreted in the bile. While metabolism of these compounds serves as a way of breaking down and then excreting the PAH breakdown products, or metabolites, the metabolites have been shown to be carcinogenic, mutagenic, and cytotoxic (Johnson, 2000). Most fish histopathological studies focus on the liver because contaminants tend to concentrate in this organ; however, fish kidneys, gonads, and gills were also examined in the Shipyard Sediment Site.

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4 Histopathology is the study of microscopic changes in tissue caused by disease.

A15.2.2. Fish Histopathology Results

The findings and conclusions of the fish histopathology investigation are summarized below and are contained in the Shipyard Report (Exponent 2003). Some additional information concerning other lesions is provided in this section of the Technical Report.

A total of 70 types of histopathological lesions were found in the spotted sand bass collected from four discrete assessment units at the Shipyard Sediment Site and within a reference area located across the bay from the shipyard sites. The four assessment units are as follows:

- Inside NASSCO – the area inside the NASSCO leasehold;
- Outside NASSCO – the area between the NASSCO leasehold and the shipping channel;
- Inside BAE Systems – the area inside the BAE Systems leasehold; and
- Outside BAE Systems – the area between the BAE Systems leasehold and the shipping channel.

Of the 70 types of lesions, five exhibited significant ($p \leq 0.05$) elevations at one or more shipyard locations relative to reference conditions. A sixth lesion (i.e., foci of cellular alteration in liver) was considered important even though no statistical differences were found because the existence of these lesions at any location indicates a harmful effect strongly linked to PAH. The six significant lesions included the following:

- Liver – Abundant lipofuscin – greater inside NASSCO and BAE Systems shipyards than in the reference area;
- Liver – Abundant hemosiderin – greater outside the NASSCO shipyard than in the reference area;
- Liver – Foci of cellular alteration – No significant differences from reference;
- Liver – Cholangitis/biliary hyperplasia (CBH) – greater inside the NASSCO shipyard than in the reference area;
- Kidney – Nephritis – greater outside the NASSCO shipyard than in the reference area; and
- Gill – Shiny gill foci – greater inside the BAE Systems shipyard than in the reference area.

The documented contaminate-related lesions are shown in Table A15-4. The severity of CBH lesions elevated above reference conditions were considered none to mild in most individual fish, with a few individual fish that had a lesion score of moderate. The presence foci of cellular alteration (eosinophilic foci, basophilic foci, and clear cell foci) were found not to be statistically elevated above reference but the presence of these lesions indicate exposure effects are occurring from PAHs.

Six different lesion types were found to be significantly elevated in reference area fish, relative to fish caught at the Shipyard Site. These included:

- **Kidney**: Renal tubular regeneration—greater in the reference area than outside the NASSCO shipyard
- **Gonads**: Atresia of yolked follicles—greater in the reference area than inside the Southwest Marine shipyard
- **Fins**: Caudal fin reddening—greater in the reference area than outside the Southwest Marine shipyard
- **Fins**: Caudal fin fraying—greater in the reference area than inside or outside the NASSCO shipyard
- **Body cavity**: Diffuse opaque epicardium—greater in the reference area than inside the two shipyards
- **Body cavity**: Mean number of Anisakis parasites—greater in the reference area than inside the two shipyards.

Table A15-4 Summary of Prevalence of Contaminant-Related Lesions

		Prevalence of Lesions (Percent)				
		Nassco		BAE Systems		Reference Area
Lesion	Severity Scores	Inside	Outside	Inside	Outside	
Microscopic						
Liver						
Cholangitis/ Biliary Hyperplasia	0 – None	**66**	76	80	80	88
	1 – Mild	**28**	24	14	20	12
	2 – Moderate	**6**	0	6	0	0
	3 – Severe	**0**	0	0	0	0
Foci of Cellular Alteration						
Eosinophilic Foci	NA	8	4	0	6	4
Basophilic Foci	NA	10	10	4	8	13
Clear Cell Foci	NA	10	2	6	4	2

Note: Boxed and shaded values for shipyard locations are significantly greater relative to reference values.

As shown in Table A15-5, the severity of the four other lesions elevated above reference conditions were considered none to mild in most individual fish, while relatively few individual fish had lesions that were considered moderate (with the exception of shiny gill foci inside BAE Systems and severe. Moderate levels were observed in three of the lesions exceeding reference conditions with the most notable being shiny gill foci. Inside BAE Systems, all 51 fish had shiny gill foci lesion scores of 2 (moderate). Severe levels were observed in only one lesion elevated above reference conditions. Inside NASSCO and BAE Systems, 12 of the 101 fish collected had a lipofuscin lesion score of 3 (severe).

Table A15-5 Summary of Other Microscopic and Macroscopic Lesions Significantly Elevated Relative to Reference Conditions

		Prevalence of Lesions (Percent)				
		Nassco		BAE Systems		Reference Area
Lesion	**Severity Scores**	**Inside**	**Outside**	**Inside**	**Outside**	
Microscopic						
Liver						
Abundant Lipofuscin	0 – None	**74**	92	**75**	88	96
	1 – Mild	**12**	6	**6**	12	4
	2 – Moderate	**2**	2	**8**	0	0
	3 – Severe	**12**	0	**12**	0	0
Abundant Hemosiderin	0 – None	98	**78**	98	80	94
	1 – Mild	12	**6**	6	12	4
	2 – Moderate	2	**2**	8	0	0
	3 – Severe	12	**0**	12	0	0
Kidney						
Nephritis	0 – None	**48**	66	76	66	75
	1 – Mild	**48**	32	22	32	25
	2 – Moderate	**4**	2	0	2	0
	3 – Severe	**0**	0	2	0	0
Macroscopic						
Gill						
Shiny Gill Foci	0 – None	12	10	**0**	0	10
	1 – Mild	62	81	**0**	70	69
	2 – Moderate	24	8	**100**	28	20
	3 – Severe	2	0	**0**	2	2

Note: Boxed and shaded values for shipyard locations are significantly greater relative to reference values.

A15.2.3. Fish Histopathology Evaluation

A total of 253 spotted sand bass were collected using nets and by hook and line in five locations within San Diego Bay:

- Inside the NASSCO leasehold (50 fish);
- Immediately outside of the NASSCO leasehold (50 fish);
- Inside the BAE Systems leasehold (51 fish);
- Immediately outside of the BAE Systems leasehold (50 fish); and
- Within a reference area near Station 2240 located across the bay from NASSCO and BAE Systems (52 fish).

Field and laboratory methods used in the fish health assessment are presented in the Shipyard Report (Exponent, 2003) and Dr. Gary Marty's fish histopathology report (Marty, 2003).

Similar to the other lines of evidence, a key step in the fish histopathology evaluation is to determine whether the site conditions pose a greater risk than reference conditions. For the fish histopathology line of evidence, the lesions found in the spotted sand bass at the Shipyard Sediment Site were statistically compared to the presence (or absence) of lesions identified in spotted sand bass at the reference area. As specified by the San Diego Water Board (RWQCB, 2002a), the reference area used for the fish histopathology evaluation is located near Station 2240 located across the bay from the shipyards. This reference area was selected because of its similar physical characteristics to the shipyard sites (grain size and water depth) and because of its relatively low PCB and PAH sediment concentrations. The statistical procedure used to compare site lesions to reference conditions consisted of nonparametric ANOVA, based upon the severity score for each lesion in each fish (i.e., scores of 0, 1, 2, and 3) (Exponent, 2003). When the ANOVA results were significant, two-tailed *a posteriori* comparisons were made between the results for each shipyard location and the results for the reference area.

The fish histopathology line of evidence was assessed by identifying lesions in each fish and then comparing the lesions to reference conditions in San Diego Bay. Identification of lesions and comparisons to reference conditions address absolute risk and site-specific relative risk, respectively. To determine whether lesion prevalence and severity were greater than the reference population and were potentially related to chemical exposure, the lesions were crosschecked against a list of toxicopathic lesions likely associated with contaminant exposure (Exponent, 2004; Klimas, 2004).

While it is difficult to establish a clear linkage between lesions in field-collected fish and contaminant exposure, studies have established lesions associated with contaminated sediment exposure (Johnson, 2000; Myers et al., 1994; Myers et al., 1998). Specifically, Exponent (2004) and NOAA (Klimas, 2004) identified lesions in field-collected fish that were contaminant-related. The lesions identified by Exponent are listed in the Table A15-6. Of the six types of lesions specifically mentioned in this section two are listed in Table A15-6: CBH (referred to in Table A15-6 as hepatocellular/biliary epithelial cell regeneration and hyperplasia) and FCA.

Table A15-6 Lesions Associated with Sediment Contaminant Exposure

Organ	Lesion
Liver	Loss of glycogen/increased basophilia
Liver	Hepatocellular coagulative necrosis, hypertrophy, hydropic degeneration, hepatocellular hyalinization
Liver	**Hepatocellular/biliary epithelial cell regeneration and hyperplasia; oval cell proliferation and cholangio-fibrosis**
Liver	Hepatocellular nuclear pleomorphism, megalocytosis
Liver	Hydropic vacuolation of biliary epithelial cells/hepatocytes
Liver	**Foci of cellular alteration (FCA) or altered hepatocellular foci (AHF), includes clear cell, vacuolated, eosinophilic, and basophilic foci**
Liver	Enzyme-altered foci
Liver	Hepatocellular adenoma and carcinoma; cholangioma, cholangiocarcinoma; mixed hepatobiliary carcinoma
Kidney	Tubular epithelial degeneration, necrosis, vacuolation, hyalinization, and exfoliation
Kidney	Glomerular lesions such as mesangiolysis and mesangiosclerosis
Ovary	Atresia of oocytes
Ovary	Intersex condition
Ovary	Atrophy, inhibited development
Ovary	Alteration in maturation
Testis	Germinal epithelial degeneration, necrosis, atrophy
Testis	Intersex condition

(Exponent, 2004)

Based on these considerations the fish histopathology data does not conclusively indicate that the fish lesions observed in the data set can be attributed to contaminant exposure at the Shipyard Sediment Site.

A15.3. Fish Bile Analyses

The San Diego Water Board evaluated fish bile sampling results to determine the potential exposure of fish to PAH compounds within and adjacent to the Shipyard Sediment Site. The bile samples were analyzed for fluorescent aromatic compounds (FACs) and total proteins. Three groups of FACs were measured that correspond to metabolites (PAH breakdown products) from naphthalene, phenanthrene, and benzo[a]pyrene (BAP). Metabolites were detected in bile of spotted sand bass captured inside and outside of the Shipyard Sediment Site and within a reference area located across the bay from the shipyard sites near Reference Station 2240. Metabolites of two contaminants exhibited elevated levels relative to reference conditions in spotted sand bass collected immediately outside of the Shipyard Sediment Site when their mean concentrations were compared against reference data. No metabolites were significantly elevated relative to reference conditions in spotted sand bass collected inside of the Shipyard Sediment Sites.

The upper prediction limit (UPL) at the 95 percent confidence interval was also calculated for the metabolites of the reference area fish and compared to replicate fish bile samples from the four areas of the Shipyard Sediment Site (i.e., inside and outside of both NASSCO and BAE Systems leaseholds). The inside and outside areas of NASSCO had samples that exceeded the UPL. Inside NASSCO accounted for six of the 19 UPL exceedances. Two fish bile samples from inside NASSCO exceeded the UPL for naphthalene, phenanthrene, and BAP metabolites. From Outside NASSCO, 12 of the 13 UPL exceedances came from phenanthrene and BAP metabolite samples.

For BAE Systems, all exceedances came from outside BAE Systems of which nine of 11 exceedances were for the BAP metabolite samples. The remaining two exceedances were for the phenanthrene metabolite samples. No exceedances were found from inside BAE Systems; however, the PAH sediment chemistry data from inside BAE Systems showed the highest levels of sediment contamination.

The inconsistent relationship between the levels of FACs in fish and PAH contaminated sediment indicates that this data is inconclusive and the FAC concentrations observed in the fish cannot be exclusively attributed to contaminant exposure at the Shipyard Sediment Site. The variable nature of the sediment contamination found in bays and the mobility of the fish are confounding factors when attempting to correlate fish sampling results with sediment contamination.

A15.3.1. Fish Bile

To evaluate the potential aquatic life impacts from PAHs in the sediment at the Shipyard Investigation Site, fish bile from fish collected within and adjacent to the NASSCO and BAE Systems leaseholds was evaluated as one indicator of exposure of fish to PAHs. Unlike some metals and chlorinated hydrocarbons, PAHs are readily metabolized by fish and do not bioaccumulate in their tissue. Metabolism of PAHs occurs in the livers of fish and the process produces polar organic compounds that can be found and measured in the bile. These breakdown products or metabolites can be analyzed and can serve as an indication of the fish's recent exposure to PAHs.

A15.3.2. Fish Bile Sampling and Analysis

A total of 253 spotted sand bass were collected using nets and by hook and line in five locations within San Diego Bay. The same fish were used in Finding 20: Fish Histopathology. These five areas are as follows:

- Inside the NASSCO leasehold (50 fish);
- Immediately outside of the NASSCO leasehold (50 fish);
- Inside the BAE Systems leasehold (51 fish);
- Immediately outside of the BAE Systems leasehold (50 fish); and

- A reference area near Station 2240 located across the bay from NASSCO and BAE Systems (52 fish).

As specified by the San Diego Water Board (RWQCB, 2002a), the reference area used for the fish bile evaluation is located near Station 2240 located across the bay from the Shipyard Sediment Site. This reference area was selected because of its similar physical characteristics to the Shipyard Sediment Site (grain size and water depth) and because of its relatively low polychlorinated biphenyl (PCB) and PAH sediment concentrations.

Bile samples were composited to produce up to 10 samples from each of the five sampling locations. The bile samples were analyzed for fluorescent aromatic compounds (FACs) and total proteins. Three groups of FACs were measured, corresponding to the products from the metabolization of naphthalene, phenanthrene, and BAP. Total protein was measured to allow the concentrations of PAH metabolites to be adjusted for differences in the nutritional state of the fish.

PAH metabolites were detected in bile of spotted sand bass captured inside and outside of the NASSCO and BAE Systems leaseholds, and within a reference area located across the bay from the Shipyard Sediment Site (Table A15-7).

A15.3.3. Comparison of the Mean Concentrations in Fish Bile at the Shipyard Sediment Site with Reference Conditions

The mean metabolite concentrations from the reference area and the four areas of the Shipyard Sediment Site were calculated and compared to identify statistical differences. Table A15-7 presents the summary statistics of Shipyard Sediment Site and Reference area samples. Two of the three contaminant-related metabolite products exhibited statistically significant differences in the sand bass collected in the areas immediately outside of the NASSCO and BAE Systems leaseholds when their mean concentrations were compared against reference fish. No bile metabolites were significantly elevated relative to reference conditions for the spotted sand bass collected inside of either shipyard leasehold. The contaminants with significantly elevated metabolite levels include the following:

- Naphthalene – Concentrations in fish bile were greater outside NASSCO leasehold than in the reference area; and

- BAP – Concentrations in fish bile were greater outside NASSCO and BAE Systems leaseholds than in the reference area.

Table A15-7 Summary of PAH Metabolites Measured in Fish Bile

		NASSCO		BAE Systems	
	Reference Area	Inside	Outside	Inside	Outside
Naphthalene Metabolites (μg/mg protein)					
Mean	79	74.5	84.2	68.9	74
Standard Deviation	27.4	45.7	24.8	11.2	25.5
Minimum	58	26	64	55	49
Maximum	150	160	150	96	130
95% Upper Confidence Limit	131.7				
Naphthalene Metabolites (μg/mg protein)					
Mean[1]	12.8	13.6	**26.7**	13.9	18.9
Standard Deviation	4.7	7.4	7.8	1.9	3.1
Minimum	7.1	5.7	20	11	14
Maximum	25	28	46	18	25
95% Upper Confidence Limit	21.9				
Benzo[a]pyrene Matabolites (μg/mg protein)					
Mean[1]	2.1	2.9	**5.3**	1.7	**6.0**
Standard Deviation	1.2	1.6	2.1	0.9	1.6
Minimum	0.7	0.5	2.7	0.7	2.8
Maximum	4.6	6	9.8	3.7	8.5
95% Upper Confidence Limit	4.5				

1. Some or all of the data was qualified as estimates. See Table E-4 from the Shipyard Report (Exponent, 2003).
Note: Boxed and shaded values for shipyard locations are significantly greater relative to reference values.

A15.3.4. Comparison of the Upper Prediction Limit to Replicate Data

The upper prediction limit (UPL) at the 95 percent confidence interval was also calculated for the reference area fish. The field replicate data from the four Shipyard Sediment Site areas was compared against the 95 percent UPL for the reference fish bile samples. Table A15-8, below, provides a summary of the fish bile samples from the Shipyard Sediment Site that exceeded the 95 percent UPL. A summary of the descriptive statistics and ANOVA results is provided in Attachment A. The replicate data can be found in Appendix E of the Shipyard Report (Exponent, 2003).

Table A15-8 Summary of Fish Bile Samples that Exceeded the 95% UPL

	NASSCO		BAE Systems	
	Inside	Outside	Inside	Outside
Naphthalene Metabolites	2	1	0	0
Phenanthrene Metabolites[1]	2	7	0	2
Benzo [a] pyrene Metabolites[1]	2	5	0	9
Sample Size	**10**	**10**	**10**	**10**

1. Some or all of the data was qualified as estimates. See Table E-4 from the Shipyard Report (Exponent, 2003).

Both the inside and outside areas of the NASSCO leasehold had samples that exceeded the 95 percent UPL. The outside area of NASSCO accounted for 13 of the 19 UPL exceedances, which were almost exclusively from phenanthrene and benzo [a] pyrene metabolite samples. The outside area of BAE Systems accounted for all of their UPL exceedances with 9 of the 11 exceedances from benzo [a] pyrene. No exceedances were found from the inside area of BAE Systems for any of the three PAH metabolites.

A15.3.5. Discussion

The fish bile line of evidence was assessed by determining the presence of PAH metabolites and then comparing the PAH bile concentrations to reference conditions in San Diego Bay. The objective was to determine if the fish from the Shipyard Sediment Site were exposed to PAHs and, if so, was this exposure greater than those indicated in the fish from the reference area. Identification of PAH metabolites and comparisons to reference conditions address absolute risk and site-specific relative risk, respectively.

The PAH sediment chemistry data from inside BAE Systems showed the highest levels of sediment contamination but the metabolite levels from fish collected from inside BAE showed no significant differences from reference. Therefore, the FAC concentrations observed in the fish collected cannot be exclusively attributed to contaminant exposure at the Shipyard Sediment Site.

These results are similar to other studies conducted in Southern California, which have found an inconsistent relationship between FACs in fish and sediment contaminated with PAHs (Brown and Steinert, 2004). The variable nature of the sediment contamination found in bays along with mobility of the fish species selected are confounding factors when attempting to correlate fish sampling results with sediment contamination.

Attachment A

Summary of Descriptive Statistics

Naphthalene Meta (ref)	
Mean	79.00
Standard Error	8.67
Median	72.00
Mode	72.00
Standard Deviation	27.41
Sample Variance	751.11
Kurtosis	5.71
Skewness	2.24
Range	92.00
Minimum	58.00
Maximum	150.00
Sum	790.00
Count	10.00
Confidence Level (95.0%)	19.61

Naphthalene Meta (In NAS)	
Mean	74.50
Standard Error	14.46
Median	70.50
Mode	#N/A
Standard Deviation	45.74
Sample Variance	2092.28
Kurtosis	-0.01
Skewness	0.85
Range	134.00
Minimum	26.00
Maximum	160.00
Sum	745.00
Count	10.00
Confidence Level (95.0%)	32.72

Naphthalene Meta (Out NAS)	
Mean	84.20
Standard Error	7.84
Median	81.00
Mode	64.00
Standard Deviation	24.80
Sample Variance	614.84
Kurtosis	6.73
Skewness	2.39
Range	86.00
Minimum	64.00
Maximum	150.00
Sum	842.00
Count	10.00
Confidence Level (95.0%)	17.74

Naphthalene Meta (In SWM)	
Mean	68.9
Standard Error	3.54
Median	65.50
Mode	#N/A
Standard Deviation	11.18
Sample Variance	124.99
Kurtosis	3.82
Skewness	1.64
Range	41.00
Minimum	55.00
Maximum	96.00
Sum	689.00
Count	10.00
Confidence Level (95.0%)	8.00

Naphthalene Meta (Out SWM)	
Mean	74.00
Standard Error	8.06
Median	65.00
Mode	#N/A
Standard Deviation	25.50
Sample Variance	650.22
Kurtosis	1.32
Skewness	1.27
Range	81.00
Minimum	49.00
Maximum	130.00
Sum	740.00
Count	10.00
Confidence Level (95.0%)	18.24

Benzo[a]pyrene Meta (ug/mg protein)	
Mean	2.07
Standard Error	0.39
Median	1.85
Mode	#N/A
Standard Deviation	1.25
Sample Variance	1.56
Kurtosis	0.28
Skewness	0.88
Range	3.90
Minimum	0.70
Maximum	4.60
Sum	20.70
Count	10.00
Confidence Level (95.0%)	0.89

Benzo[a]pyrene Meta In NAS	
Mean	2.92
Standard Error	0.51
Median	2.55
Mode	2.30
Standard Deviation	1.63
Sample Variance	2.65
Kurtosis	0.34
Skewness	0.63
Range	5.50
Minimum	0.50
Maximum	6.00
Sum	29.20
Count	10.00
Confidence Level (95.0%)	1.16

Benzo[a]pyrene Meta Out NAS	
Mean	5.32
Standard Error	0.65
Median	4.85
Mode	#N/A
Standard Deviation	2.06
Sample Variance	4.25
Kurtosis	1.46
Skewness	1.03
Range	7.10
Minimum	2.70
Maximum	9.80
Sum	53.20
Count	10.00
Confidence Level (95.0%)	1.47

Benzo[a]pyrene Meta In SWM	
Mean	1.67
Standard Error	0.27
Median	1.60
Mode	1.90
Standard Deviation	0.87
Sample Variance	0.75
Kurtosis	2.78
Skewness	1.44
Range	3.00
Minimum	0.70

Benzo[a]pyrene Meta Out SWM	
Mean	5.95
Standard Error	0.49
Median	6.15
Mode	#N/A
Standard Deviation	1.55
Sample Variance	2.42
Kurtosis	1.16
Skewness	-0.50
Range	5.70
Minimum	2.80

Phenanthrene Meta ref	
Mean	12.75
Standard Error	1.50
Median	12.00
Mode	11.00
Standard Deviation	4.74
Sample Variance	22.46
Kurtosis	5.91
Skewness	2.10
Range	17.90
Minimum	7.10

Phenanthrene Meta In NAS	
Mean	13.55
Standard Error	2.35
Median	13.00
Mode	#N/A
Standard Deviation	7.44
Sample Variance	55.40
Kurtosis	0.08
Skewness	0.83
Range	22.30
Minimum	5.70

Benzo[a]pyrene Meta In SWM	
Maximum	3.70
Sum	16.70
Count	10.00
Confidence Level (95.0%)	0.62

Benzo[a]pyrene Meta Out SWM	
Maximum	8.50
Sum	59.50
Count	10.00
Confidence Level (95.0%)	1.11

Phenanthrene Meta ref	
Maximum	25.00
Sum	127.50
Count	10.00
Confidence Level (95.0%)	3.39

Phenanthrene Meta In NAS	
Maximum	28.00
Sum	135.50
Count	10.00
Confidence Level (95.0%)	5.32

Phenanthrene Meta Out NAS	
Mean	26.70
Standard Error	2.46
Median	25.50
Mode	20.00
Standard Deviation	7.79
Sample Variance	60.68
Kurtosis	4.29
Skewness	1.88
Range	26.00
Minimum	20.00
Maximum	46.00
Sum	267.00
Count	10.00
Confidence Level (95.0%)	5.57

Phenanthrene Meta In SWM	
Mean	13.90
Standard Error	0.59
Median	14.00
Mode	14.00
Standard Deviation	1.85
Sample Variance	3.43
Kurtosis	2.48
Skewness	0.84
Range	7.00
Minimum	11.00
Maximum	18.00
Sum	139.00
Count	10.00
Confidence Level (95.0%)	1.33

Phenanthrene Meta Out SWM	
Mean	18.90
Standard Error	0.98
Median	18.50
Mode	17.00
Standard Deviation	3.11
Sample Variance	9.66
Kurtosis	0.61
Skewness	0.59
Range	11.00
Minimum	14.00
Maximum	25.00
Sum	189.00
Count	10.00
Confidence Level (95.0%)	2.22

Data Used to Calculate Analysis of Variance

	Reference			Inside NASSCO			Outside NASSCO			Inside SWM			Outside SWM		
	Naphthalene Meta (ug/mg protein)	Benzo[a]pyrene Meta (ug/mg protein)	Phenanthrene Meta (ug/mg protein)	Naphthalene Meta (ug/mg protein)	Benzo[a]pyrene Meta (ug/mg protein)	Phenanthrene Meta (ug/mg protein)	Naphthalene Meta (ug/mg protein)	Benzo[a]pyrene Meta (ug/mg protein)	Phenanthrene Meta (ug/mg protein)	Naphthalene Meta (ug/mg protein)	Benzo[a]pyrene Meta (ug/mg protein)	Phenanthrene Meta (ug/mg protein)	Naphthalene Meta (ug/mg protein)	Benzo[a]pyrene Meta (ug/mg protein)	Phenanthrene Meta (ug/mg protein)
	72	1	9.4	140	6	23	77	4.7	20	72	2.2	15	130	6.2	25
	62	1.9	11	27	3.6	6.2	79	3.2	20	66	1.9	13	57	5.4	17
	58	0.7	7.1	57	2.5	9.8	87	2.7	27	96	1.4	18	95	6.1	19
	150	1.3	25	65	2.3	12	64	5	25	65	1.8	14	54	8.5	18
	86	1.8	13	26	2.3	5.8	86	6.7	27	74	3.7	14	72	5	17
	78	3.3	14	160	1.3	28	150	9.8	46	64	0.9	14	92	6.9	22
	58	4.6	11	79	3.1	14	67	4.3	26	73	1.1	14	49	2.8	14
	91	2.9	13	86	2.6	16	64	4.2	20	61	0.7	12	55	6.4	19
	72	0.8	12	29	0.5	5.7	85	6	24	63	1.1	14	58	7.3	17
	63	2.4	12	76	5	15	83	6.6	32	55	1.9	11	78	4.9	21
Mean	**79**	**2.07**	**12.75**	**74.5**	**2.92**	**13.55**	**84.2**	**5.32**	**26.7**	**68.9**	**1.67**	**13.9**	**74**	**5.95**	**18.9**
SD	**27.4**	**1.2**	**4.7**	**45.7**	**1.6**	**7.4**	**24.8**	**2.1**	**7.8**	**11.2**	**0.9**	**1.9**	**25.5**	**1.6**	**3.1**
SE	**8.7**	**0.4**	**1.5**	**14.5**	**0.5**	**2.4**	**7.8**	**0.7**	**2.5**	**3.5**	**0.3**	**0.6**	**8.1**	**0.5**	**1.0**
Min	**58**	**0.7**	**7.1**	**26**	**0.5**	**5.7**	**64**	**2.7**	**20**	**55**	**0.7**	**11**	**49**	**2.8**	**14**
Max	**150**	**4.6**	**25**	**160**	**6**	**28**	**150**	**9.8**	**46**	**96**	**3.7**	**18**	**130**	**8.5**	**25**

Naphthalene Meta (ref)	Naphthalene Meta (In NAS)	Naphthalene Meta (Out NAS)	Naphthalene Meta (In SWM)	Naphthalene Meta (Out SWM)	Benzo[a]pyrene Meta (ug/mg protein)	Benzo[a]pyrene Meta In NAS	Benzo[a]pyrene Meta Out NAS	Benzo[a]pyrene Meta In SWM	Benzo[a]pyrene Meta Out SWM	Phenanthrene Meta ref	Phenanthrene Meta In NAS	Phenanthrene Meta Out NAS	Phenanthrene Meta In SWM	Phenanthrene Meta Out SWM
72	140	77	72	130	1	6	4.7	2.2	6.2	9.4	23	20	15	25
62	27	79	66	57	1.9	3.6	3.2	1.9	5.4	11	6.2	20	13	17
58	57	87	96	95	0.7	2.5	2.7	1.4	6.1	7.1	9.8	27	18	19
150	65	64	65	54	1.3	2.3	5	1.8	8.5	25	12	25	14	18
86	26	86	74	72	1.8	2.3	6.7	3.7	5	13	5.8	27	14	17
78	160	150	64	92	3.3	1.3	9.8	0.9	6.9	14	28	46	14	22
58	79	67	73	49	4.6	3.1	4.3	1.1	2.8	11	14	26	14	14
91	86	64	61	55	2.9	2.6	4.2	0.7	6.4	13	16	20	12	19
72	29	85	63	58	0.8	0.5	6	1.1	7.3	12	5.7	24	14	17
63	76	83	55	78	2.4	5	6.6	1.9	4.9	12	15	32	11	21

Analysis of Variance Calculations for Naphthalene

Anova: Single Factor

SUMMARY						
Groups	**Count**	**Sum**	**Average**	**Variance**		
Naphthalene Meta (ref)	10	790	79	751.1111		
Naphthalene Meta In NAS)	10	745	74.5	2092.278		
Naphthalene Meta (Out NAS)	10	842	84.2	614.8444		
Naphthalene Meta In SWM)	10	689	68.9	124.9889		
Naphthalene Meta (Out SWM)	10	740	74	650.2222		
ANOVA						
Source of Variation	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	1328.28	4	332.07	0.392198	0.813123	2.578737
Within Groups	38101	45	846.6889			
Total	39429.28	49				

Analysis of Variance Calculations for Benzo[a]pyrene

Anova: Single Factor

SUMMARY						
Groups	**Count**	**Sum**	**Average**	**Variance**		
Benzo[a]pyrene Meta (ug/mg protein)	10	20.7	2.07	1.560111		
Benzo[a]pyrene Meta In NAS	10	29.2	2.92	2.648444		
Benzo[a]pyrene Meta Out NAS	10	53.2	5.32	4.246222		
Benzo[a]pyrene Meta In SWM	10	16.7	1.67	0.753444		
Benzo[a]pyrene Meta Out SWM	10	59.5	5.95	2.416111		
ANOVA						
Source of Variation	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	150.0812	4	37.5203	16.13869	2.88163E-08	2.578737
Within Groups	104.619	45	2.324867			
Total	254.7002	49				

Analysis of Variance Calculations for Phenanthrene

Anova: Single Factor

SUMMARY						
Groups	**Count**	**Sum**	**Average**	**Variance**		
Phenanthrene Meta ref	10	127.5	12.75	22.46055556		
Phenanthrene Meta In NAS	10	135.5	13.55	55.39833333		
Phenanthrene Meta Out NAS	10	267	26.7	60.67777778		
Phenanthrene Meta In SWM	10	139	13.9	3.433333333		
Phenanthrene Meta Out SWM	10	189	18.9	9.655555556		
ANOVA						
Source of Variation	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	1371.47	4	342.8675	11.30638891	1.95658E-06	2.578737224
Within Groups	1364.63	45	30.32511111			
Total	2736.1	49				

Additional Analysis of Variance for Naphthalene With Bonferroni Correction

Pairwise Mean Diff. (row - column)

	Naphthalene Meta (ref)	**Naphthalene Meta (In NAS)**	**Naphthalene Meta (Out NAS)**	**Naphthalene Meta (In SWM)**	**Naphthalene Meta (Out SWM)**
Naphthalene Meta (ref)	0	4.5	-5.2	10.1	5
Naphthalene Meta (In NAS)		0	-9.7	5.6	0.5
Naphthalene Meta (Out NAS)			0	15.3	10.2
Naphthalene Meta (In SWM)				0	-5.1
Naphthalene Meta (Out SWM)					0
MSE = 846.688888888889					
Pairwise Comparison Probabilities (Bonferroni Correction)					
	Naphthalene Meta (ref)	**Naphthalene Meta (In NAS)**	**Naphthalene Meta (Out NAS)**	**Naphthalene Meta (In SWM)**	**Naphthalene Meta (Out SWM)**
Naphthalene Meta (ref)	1.000	1.000	1.000	1.000	1.000
Naphthalene Meta (In NAS)		1.000	1.000	1.000	1.000
Naphthalene Meta (Out NAS)			1.000	1.000	1.000
Naphthalene Meta (In SWM)				1.000	1.000
Naphthalene Meta (Out SWM)					1.000

Additional Analysis of Variance for Benzo[a]pyrene With Bonferroni Correction

Pairwise Mean Diff. (row - column)

	Benzo[a]pyrene Meta (ug/mg protein)	Benzo[a]pyrene Meta In NAS	Benzo[a]pyrene Meta Out NAS	Benzo[a]pyrene Meta In SWM	Benzo[a]pyrene Meta Out SWM
Benzo[a]pyrene Meta (ug/mg protein)	0	-0.85	-3.25	0.4	-3.88
Benzo[a]pyrene Meta In NAS		0	-2.4	1.25	-3.03
Benzo[a]pyrene Meta Out NAS			0	3.65	-0.63
Benzo[a]pyrene Meta In SWM				0	-4.28
Benzo[a]pyrene Meta Out SWM					0
MSE = 2.32486666666667					
Pairwise Comparison Probabilities (Bonferroni Correction)					
	Benzo[a]pyrene Meta (ug/mg protein)	**Benzo[a]pyrene Meta In NAS**	**Benzo[a]pyrene Meta Out NAS**	**Benzo[a]pyrene Meta In SWM**	**Benzo[a]pyrene Meta Out SWM**
Benzo[a]pyrene Meta (ug/mg protein)	1.000	1.000	0.000	1.000	0.000
Benzo[a]pyrene Meta In NAS		1.000	0.010	0.734	0.001
Benzo[a]pyrene Meta Out NAS			1.000	0.000	1.000
Benzo[a]pyrene Meta In SWM				1.000	0.000
Benzo[a]pyrene Meta Out SWM					1.000

Additional Analysis of Variance for Phenanthrene With Bonferroni Correction

Pairwise Mean Diff. (row - column)

	Phenanthrene Meta ref	Phenanthrene Meta In NAS	Phenanthrene Meta Out NAS	Phenanthrene Meta In SWM	Phenanthrene Meta Out SWM
Phenanthrene Meta ref	0	-0.8	-13.95	-1.15	-6.15
Phenanthrene Meta In NAS		0	-13.15	-0.35	-5.35
Phenanthrene Meta Out NAS			0	12.8	7.8
Phenanthrene Meta In SWM				0	-5
Phenanthrene Meta Out SWM					0
MSE = 30.3251111111111					
Pairwise Comparison Probabilities (Bonferroni Correction)					
	Phenanthrene Meta ref	**Phenanthrene Meta In NAS**	**Phenanthrene Meta Out NAS**	**Phenanthrene Meta In SWM**	**Phenanthrene Meta Out SWM**
Phenanthrene Meta ref	1.000	1.000	0.000	1.000	0.162
Phenanthrene Meta In NAS		1.000	0.000	1.000	0.351
Phenanthrene Meta Out NAS			1.000	0.000	0.028
Phenanthrene Meta In SWM				1.000	0.483
Phenanthrene Meta Out SWM					1.000

Additional Analysis of Variance for Naphthalene Without Bonferroni Correction

Pairwise Mean Diff. (row - column)

	Naphthalene Meta (ref)	Naphthalene Meta (In NAS)	Naphthalene Meta (Out NAS)	Naphthalene Meta (In SWM)	Naphthalene Meta (Out SWM)
Naphthalene Meta (ref)	0	4.5	-5.2	10.1	5
Naphthalene Meta In NAS)		0	-9.7	5.6	0.5
Naphthalene Meta (Out NAS)			0	15.3	10.2
Naphthalene Meta In SWM)				0	-5.1
Naphthalene Meta (Out SWM)					0
MSE = 846.688888888889					
Pairwise Comparison Probabilities					
	Naphthalene Meta (ref)	**Naphthalene Meta (In NAS)**	**Naphthalene Meta (Out NAS)**	**Naphthalene Meta (In SWM)**	**Naphthalene Meta (Out SWM)**
Naphthalene Meta (ref)	1.000	0.731	0.691	0.442	0.703
Naphthalene Meta In NAS)		1.000	0.460	0.669	0.970
Naphthalene Meta (Out NAS)			1.000	0.246	0.437
Naphthalene Meta In SWM)				1.000	0.697
Naphthalene Meta (Out SWM)					1.000

Additional Analysis of Variance for Benzo[a]pyrene Without Bonferroni Correction

Pairwise Mean Diff. (row - column)

	Benzo[a]pyrene Meta (ug/mg protein)	Benzo[a]pyrene Meta In NAS	Benzo[a]pyrene Meta Out NAS	Benzo[a]pyrene Meta In SWM	Benzo[a]pyrene Meta Out SWM
Benzo[a]pyrene Meta (ug/mg protein)	0	-0.85	-3.25	0.4	-3.88
Benzo[a]pyrene Meta In NAS		0	-2.4	1.25	-3.03
Benzo[a]pyrene Meta Out NAS			0	3.65	-0.63
Benzo[a]pyrene Meta In SWM				0	-4.28
Benzo[a]pyrene Meta Out SWM					0
MSE = 2.32486666666667					
Pairwise Comparison Probabilities					
	Benzo[a]pyrene Meta (ug/mg protein)	**Benzo[a]pyrene Meta In NAS**	**Benzo[a]pyrene Meta Out NAS**	**Benzo[a]pyrene Meta In SWM**	**Benzo[a]pyrene Meta Out SWM**
Benzo[a]pyrene Meta (ug/mg protein)	1.000	0.219	0.000	0.560	0.000
Benzo[a]pyrene Meta In NAS		1.000	0.001	0.073	0.000
Benzo[a]pyrene Meta Out NAS			1.000	0.000	0.360
Benzo[a]pyrene Meta In SWM				1.000	0.000
Benzo[a]pyrene Meta Out SWM					1.000

Additional Analysis of Variance for Phenanthrene Without Bonferroni Correction

Pairwise Mean Diff. (row - column)

	Phenanthrene Meta ref	Phenanthrene Meta In NAS	Phenanthrene Meta Out NAS	Phenanthrene Meta In SWM	Phenanthrene Meta Out SWM
Phenanthrene Meta ref	0	-0.8	-13.95	-1.15	-6.15
Phenanthrene Meta In NAS		0	-13.15	-0.35	-5.35
Phenanthrene Meta Out NAS			0	12.8	7.8
Phenanthrene Meta In SWM				0	-5
Phenanthrene Meta Out SWM					0
MSE = 30.3251111111111					
Pairwise Comparison Probabilities					
	Phenanthrene Meta ref	**Phenanthrene Meta In NAS**	**Phenanthrene Meta Out NAS**	**Phenanthrene Meta In SWM**	**Phenanthrene Meta Out SWM**
Phenanthrene Meta ref	1.000	0.747	0.000	0.643	0.016
Phenanthrene Meta In NAS		1.000	0.000	0.888	0.035
Phenanthrene Meta Out NAS			1.000	0.000	0.003
Phenanthrene Meta In SWM				1.000	0.048
Phenanthrene Meta Out SWM					1.000

16. Finding 16: Sediment Quality Triad Measures

Finding 16 of CAO No. R9-2012-0024 states:

The San Diego Water Board used lines of evidence organized into a sediment quality triad, to evaluate potential risks to the benthic community from pollutants present in the Shipyard Sediment Site. The sediment quality triad provides a "weight-of-evidence" approach to sediment quality assessment by integrating synoptic measures of sediment chemistry, toxicity, and benthic community composition. All three measures provide a framework of complementary evidence for assessing the degree of pollutant-induced degradation in the benthic community.

16.1. Sediment Quality Triad Measures

The sediment quality triad (Triad) is one of the tools used by the San Diego Water Board to evaluate the potential risks to the benthic community from pollutants present at the Shipyard Sediment Site. These assessments are best performed using a "weight-of-evidence" approach that incorporates sediment chemistry, laboratory studies of toxicity or bioaccumulation, and evaluation of the benthic community. These lines of evidence can be organized into a Triad that provides the framework for a weight-of-evidence approach to sediment quality assessment by integrating results from sampling of the sediment chemistry, sediment toxicity, and benthic community composition within a defined area. All three measures provide complementary evidence for assessing the degree of contamination-induced degradation in the benthic community. Agreement or disagreement among these three measures at each sampling site or among sites may provide different interpretations of the ecological dynamics within an area. The Triad framework is used throughout the United States in sediment quality assessments of contaminated bay sediment and prospective dredge material. The Triad framework is recommended by the United States Environmental Protection Agency (U.S. EPA 2000b and 2000c) and is considered to be a standard method for qualitatively assessing the relationship between chemical concentrations and biological effects. The State Water Board is currently developing criteria for sediment quality based on the use of multiple lines of evidence including the Triad of measurements.

The Triad framework uses three independent lines of data in sediment quality assessment. The strength of using sediment chemistry, toxicity, and benthic community composition information in this approach is that it uses both chemical and biological measures from the same sediment sample to characterize sediment quality (Long, 1989). Sediment chemistry provides direct measurements of the pollutants found in the surficial sediment layer only. Sediment toxicity is the second component of the Triad and toxicity is determined in the laboratory with bioassay tests. If toxicity is observed in the bioassay tests, it can be assumed that there are pollutants in the sediment bioavailable at levels high enough to cause a significant response. Lastly, benthic data on community composition and structure provides evidence of the current condition of the benthic community response to its environment under in situ conditions. This benthic data provides confirmatory evidence concerning the potential impacts that contaminated sediment is having on the resident benthic community.

The data provided by each line of evidence for each sample is compared against pre-determined threshold values in order to rank the level of station impairment. Each line of evidence provided is then integrated into an overall weight-of-evidence evaluation that focuses on identifying the likelihood that the health of the benthic community is adversely impacted at a given station due to the presence of known CoPCs related to the site. Although the sediment chemistry, toxicity, and benthic community data should be complementary, the degree of impairment implied by each line of evidence may not be in complete agreement because they measure different properties of the surficial sediment (Long, 1989). Divergent findings in different lines of evidence may also indicate the presence of other stressors including physical disturbance and other non-chemical stressors.

A detailed description of the Shipyard Sediment Investigation decision matrices, individual station scores, and weight-of-evidence results are presented and summarized in Section 18 of this Technical Report.

17. Finding 17: Reference Sediment Quality Conditions

Finding 17 of CAO No. R9-2012-0024 states:

The San Diego Water Board selected a group of reference stations from three independent sediment quality investigations to contrast pollution conditions at the Shipyard Sediment Site with conditions found in other relatively cleaner areas of San Diego Bay not affected by the Shipyard Sediment Site: (1) Southern California Bight 1998 Regional Monitoring Program (Bight 98), (2) 2001 Mouth of Chollas Creek and Mouth of Paleta Creek TMDL studies, and (3) 2001 NASSCO and BAE Systems Detailed Sediment Investigation. Stations from these studies were selected to represent selected physical, chemical, and biological characteristics of San Diego Bay. Criteria for selecting acceptable reference stations included low levels of anthropogenic pollutant concentrations, locations remote from pollution sources, similar biological habitat to the Shipyard Sediment Site, sediment total organic carbon (TOC) and grain size profiles similar to the Shipyard Sediment Site, adequate sample size for statistical analysis, and sediment quality data comparability. The reference stations selected for the Reference Sediment Quality Conditions are identified below.

Reference Stations Used To Establish Reference Sediment Quality Conditions

2001 Chollas/Paleta Reference Station Identification Number	2001 NASSCO/BAE Systems Reference Station Identification Number	1998 Bight'98 Reference Station Identification Number
2231	2231	2235
2243	2243	2241
2433	2433	2242
2441	2441	2243
2238		2256
		2257
		2258
		2260
		2265

17.1. Guiding Principles for Determination of Reference Sediment Quality Conditions

The evaluation of benthic community impairment using the Triad weight-of-evidence approach requires information on both a contaminated marine sediment site and the general condition of the surrounding water body in terms of sediment chemistry, toxicity, and benthic community structure. This information is used to discriminate between pollution effects[4] at the contaminated marine sediment site with that found in other relatively cleaner areas (referred to as reference sites) of the surrounding water body. When establishing a finding of benthic community impairment using the Triad approach, implicitly the assumption is made that pollution effects, in terms of chemistry, toxicity, and benthic community indices data, are more degraded in the localized contaminated marine sediment area of concern than the surrounding water body. The comparison of pollution conditions is used to identify areas within the contaminated marine sediment area of concern that may require remediation or cleanup to protect or restore aquatic life beneficial uses.

The choice of appropriate reference sites is critical in evaluating benthic community impairment. Reference stations for marine sediment quality investigations are best developed from a population of sites. Multiple reference sites are preferred and the number of background reference stations and the number of sample replicates per reference station depends on the statistical design of the sediment quality investigation. Generally, appropriate background reference stations are positioned in relatively clean areas remote from known pollution sources. The sediment in both reference and contaminated marine sediment sites should have the same gross physical and chemical characteristics, including such parameters as grain size, total organic carbon, and biological parameters (i.e., resident biota, particularly the benthos) should also be broadly similar in terms of the distribution of major taxa (e.g., family level) and biomass.

The term reference conditions (i.e. the sediment quality conditions described by the reference stations) are often used interchangeably with the terms “background reference conditions,” “background conditions,” and “ambient conditions.” Background conditions can be defined in terms of a “pre-industrial background” – the pristine, pre-industrial sediment quality conditions often reflected in deep native marine sediment. Alternatively, background can be defined in terms of an “ambient background” or “contemporary background” – the ambient sediment quality conditions in areas removed from sources of contaminants, recognizing that there may no longer be pristine surface marine sediment in a given geographic area of a waterbody.

The reference stations used to define background conditions also have an important role to play in determining the maximum extent of cleanup at a particular site. Water Code section 13304 authorizes the San Diego Water Boards to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge.) Under the terms of Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*, the San Diego Water Board is obligated to have a presumptive cleanup goal to require cleanup to attain background water quality conditions (SWRCB, 1996). The San Diego Water Board may

4 An effect is defined as being significantly different from the condition at the reference site.

establish a cleanup level above background water quality conditions, only if the Board determines that it is technologically or economically infeasible to achieve background water quality conditions.[5] Resolution No. 92-49 further provides that actions for cleanup and abatement should not be interpreted to require "… cleanup and abatement which achieves water quality conditions that are better than background conditions."[6]

Accordingly current practice in selecting a reference site inevitably requires some degree of compromise to meet the somewhat ambiguous requirements of a reference site "substantially free" of contaminants, yet having physical and chemical characteristics and biological parameters "broadly similar" to the contaminated marine sediment, and reflective of conditions "that existed before the discharge."

17.2. Shipyard Sediment Site Reference Sediment Quality Conditions

On June 9, 2003, the San Diego Water Board issued a letter titled "*Regional Board Final Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations*." The letter specified the "Final Reference Pool" (2003 Final Reference Pool) to be used in the Shipyard Sediment Site investigation for comparisons to determine statistically significant differences between site sediment quality conditions and reference sediment quality conditions (RWQCB, 2003b). Furthermore, this letter also outlined the statistical procedures and prediction limits to be generated with this data.

This pool of reference data, referred to in 2003 as the "Final Reference Pool," (2003 Final Reference Pool) were compiled from three independent sediment quality investigations:

- Southern California Bight 1998 Regional Monitoring Program (Bight 98) (SCCWRP, 2003),
- 2001 Mouth of Chollas Creek and Mouth of Paleta Creek TMDL studies (Chollas/Paleta TMDL study) (SCCWRP and U.S. Navy, 2005b), and
- Shipyard Report (Exponent, 2003).

The 2003 Final Reference Pool consisted of 2 stations from the Chollas/Paleta study, 3 stations from the Shipyard Sediment Site investigation, and 17 stations from the Bight 98 study for a total of 22 reference stations (see Appendix for Section 17). At the direction of the San Diego Water Board, Exponent (consultant for the Shipyards) used the 2003 Final Reference Pool as their basis for evaluating the sediment chemistry, toxicity, and benthic community conditions at the Shipyard Sediment Site. The results of this evaluation can be found in the Exponent report (Exponent, 2003).

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[5] Resolution 92-49, Section III.G.

[6] Resolution 92-49, Section III.F.

The San Diego Water Board also considered two other alternative reference pools developed by NOAA and San Diego Bay Council for the Shipyard Sediment Site (See Appendix for Section 17). The 2003 Final Reference Pool was selected over these two reference pools based on the following considerations:[7]

- The 2003 Final Reference Pool had an adequate sample size (n=22) to improve the power of the statistical procedures for comparing the reference pool to the Shipyard Sediment Site stations. The San Diego Bay Council reference pool consisted of only a number of reference stations from the Bight'98 study (n=7) and thus lacked 1) an adequate sample size to conduct robust statistical analyses; 2) temporal comparability because the Bight 98 stations were sampled in 1998 several years prior to the initiation of the 2001 Shipyard Sediment Site investigation and 3) methodological comparability because the Bight 98 stations did not use the same toxicity tests used in the 2001 Shipyard Sediment Site Investigation.

- The 2003 Final Reference Pool included some reference stations from the two alternative reference pools (13 of 20 NOAA reference stations and 3 of 7 San Diego Bay Council reference stations were included in the 2003 Final Reference Pool).

- The three reference pools were generally not significantly different from one another with respect to the mean values of sediment chemistry, amphipod toxicity, and the Benthic Response Index Embayment (BRI-E) scores (See Appendix for Section 17). Two exceptions included total priority pollutant PAHs (PP-PAHs) for the 2003 Final Reference Pool and the mean BRI-E score for the Bay Council Pool. The San Diego Bay Council and NOAA reference pools were approximately 50% and 30% higher, respectively, in PP-PAH concentrations than the 2003 Final Reference Pool. The San Diego Bay Council reference pool had a lower BRI-E score, as expected, because it only included stations within the BRI-E Reference Level threshold, whereas the 2003 Final Reference Pool included stations within the BRI-E Response Level 1 threshold.

The 2003 Final Reference Pool was selected based in part on the assumption that most contaminants in San Diego bay sediments originate from land-based discharges.[8] Following this assumption, contaminant concentrations in sediments should diminish with distance from land, and eventually reach levels consistent with ambient levels that could be used to approximate the San Diego Bay sediment quality conditions in the absence of the Shipyard Sediment Site discharges. The 2003 Final reference Pool was also selected based on specific thresholds of acceptability for toxicity and benthic community conditions (e.g., amphipod survival >85%) and thus did not reflect the variability in these conditions that can occur from other factors besides sediment contamination. Benthic community composition for example can be affected by stress factors that are not contaminant induced such as natural variations in habitat (e.g. sediment grain size and organic content) environmental factors (e.g. water depth, salinity, and temperature) and

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[7] See October 7, 2003 San Diego Water Board Letter to Ms. Laura Hunter, Environmental Health Coalition et al., SAR068566.

[8] See Distance-from-shore approach to identify Bight98 reference sites in San Diego Bay, Steve Bay and Jeff Brown, January 8, 2003, SAR067944.

physical disturbance (e.g. anchor or prop wash). Measurements of sediment toxicity can also be influenced by variety of factors besides sediment contamination such as test imprecision, and the presence of natural factors such as hydrogen sulfide or ammonia. Sediment toxicity test results may also not have a consistent correlation with biological effects because the toxicity test species and species that compose the benthic communities may have different sensitivities to different contaminants. The 2003 Final Reference Pool did not represent an appropriate ambient background condition for San Diego Bay because it did not reflect the variability in sediment toxicity and benthic community conditions that can occur from factors other than sediment contamination.

The San Diego Water Board reconsidered its decision to use the 2003 Final Reference Pool following the submittal of the Exponent report and conducted a separate analysis of the sediment quality data to more accurately reflect a contemporary ambient background condition of San Diego Bay that excluded the effects of point source discharges, such as the Shipyard Sediment Site discharges and was representative of the typical variability in toxicity and benthic community conditions in San Diego Bay. This analysis led to the selection of a new pool of reference stations referred to as the "2005 Final Reference Pool" for the Shipyard Sediment Site. The 2005 Final Reference Pool was originally developed for the Chollas/Paleta TMDL investigation to establish a "Baseline Condition" for San Diego Bay (SCCWRP and U.S. Navy, 2005b, 2005). The Baseline Condition was defined as:

> *"…the existing ambient condition in the bay. This condition was based on a pool of reference stations selected to meet requirements of remoteness from source and similar habitat to the study sites. This condition acknowledges the potential presence of background contamination as well as natural variability in toxicity and benthic condition. Reference stations were excluded from this pool if there was an indication of contamination or toxicity that appeared to be related to a nearby source. However, stations were not excluded from this pool based on specific biological response thresholds."*

This Baseline Condition definition is consistent with the principles described in Section 17.1 and could be used to establish a reference condition reflective of the current sediment quality condition that would exist at the Shipyard Sediment Site absent the waste discharges. This contemporary ambient background condition is not representative of a pristine pre-industrial background condition as it acknowledges the presence of ambient background contaminant levels in San Diego Bay remote from known point source discharges. This Baseline Condition definition also incorporates the natural variability in toxicity and benthic conditions in San Diego Bay.

Factoring in low levels of pollutants at a reference site is consistent with U.S. EPA and U.S. Department of the Interior guidelines on selecting and establishing reference conditions:

> *"A reference sediment, on the other hand, is collected from a location that may contain low to moderate levels of pollutants resulting from both the global inputs and some localized anthropogenic sources, representing the background levels of pollutants in an area...."* (U.S. EPA, 1992a)

> *"A general guidance is to select reference locations that reflect the overall conditions that can reasonably be expected in the site area given current uses other than those associated with the contamination under investigation."* (U.S. EPA, 1994b)

> *"Baseline data should not reflect conditions that would be expected at the assessment area had the discharge of oil or release of hazardous substances not occurred, taking into account both natural processes and those that are the result of human activities."*[9]

> *"The reference site need not be pristine."* (U.S. EPA, 1997a)

> *"Reference Site Criteria – The overall goal in establishing the reference condition from carefully selected reference sites is to describe the optimal biota that investigators may expect to find at the test sites of interest in the absence of stresses."* (U.S. EPA, 2000c)

The resulting 2005 Final Reference Pool of data consisted of 18 reference stations (Table 17-1). Nine of the reference stations were taken from the Bight 98 study (SCCWRP, 2003). The remaining nine reference stations originated from the Chollas/Paleta TMDL study and Exponent's report. The 2005 Final Reference Pool is appropriate for the Shipyard Sediment Site investigation and was an improvement over the 2003 Final Reference Pool because:

- The 2005 Final Reference Pool most closely represents the current sediment quality condition that would exist at the Shipyard Sediment Site absent the waste discharges;
- The 2005 Final Reference Pool reflects the natural variability in toxicity and benthic conditions in San Diego Bay.
- The 2005 Final Reference Pool provides a better balance of the number of reference stations selected from each study;
- The 2005 Final Reference Pool provides a greater temporal and methodological comparability to the Shipyard Sediment Site data; and
- The 2005 Final Reference Pool provides improved comparability in habitat characteristics such as currents, water temperature, and fines content.

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9 See 43 CFR Section 11.72.

Table 17-1 Reference Stations Used to Establish Reference Sediment Quality Conditions

2001 Chollas/Paleta Creeks Reference Stations	2001 NASSCO/BAE Systems Reference Stations	1998 Bight'98 Reference Stations
2231	2231	2235
2243	2243	2241
2433	2433	2242
2441	2441	2243
2238		2256
		2257
		2258
		2260
		2265

SCCWRP and U.S. Navy, 2005b

Thresholds for sediment toxicity and benthic community health were not used in the selection of stations in the 2005 Final Reference Pool (as was done in the 2003 Final Reference Pool) as representation of the typical variability in toxicity and benthic conditions in San Diego Bay was considered to be an important characteristic in the reference pool (SCCWRP and U.S. Navy, 2005b). To gain a better understanding on the overall effect of these criteria the San Diego Water Board further evaluated each station in the 2005 Final Reference Pool with respect to sediment chemistry, amphipod survival, and BRI scores. As shown in Table 17-2, all of the stations were (1) below the ERM and consensus-based guideline value for sediment chemistry, (2) above 80% amphipod survival (with the exception of 3 stations), and (3) classified as Reference Level or Response Level 1 – Greater than 5% of reference species absent based on the BRI scores (with the exception of 5 stations). The 2005 Final Reference Pool does include some amphipod and benthic community data indicating biological effects which are reflective of the natural variability in toxicity and benthic conditions that can occur from factors other than sediment contamination. The majority of the data in the 2005 Final Reference Pool falls within acceptable chemical and biological response threshold ranges. Additionally, only one station out of the 18 total stations in the 2005 Final Reference Pool assessed under the amphipod and benthic community lines of evidence had both metrics indicating biological effects. The 2005 Final Reference Pool is consistent with the San Diego Water Board's goal of establishing a reference condition that represents contemporary bay-wide ambient background contaminant levels that could be expected to exist in the absence of the Shipyard Sediment Site discharges and some level of natural variability in toxicity and benthic communities that could exist due to factors other than sediment contamination.

Table 17-2 Evaluation of the Reference Stations Used to Establish Reference Sediment Quality Conditions

Study	Station ID	San Diego Water Board Evaluation
Chollas/Paleta (CP) Study	2231	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival:[1] 76% Benthic Community: BRI Score = 39.5 (Response Level 1 – Greater than 5% of reference species absent). Atypical benthos due to high abundance of one species not previously recorded at this station. Location: Mid Bay Comments: Sediment chemistry and control adjusted toxicity data retained but benthic community data not used in the reference pool.
	2243	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival:[1] 84% Benthic Community: BRI Score = 55.1 (Response Level 3 – Greater than 50% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results. Weight of evidence suggests that the high BRI score may be may be caused by factors other than pollution.
	2433	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 84% Benthic Community: BRI Score = 22.8 (Reference Level). Location: Northern Bay Comments: Retain all station data based on Triad results
CP Study	2441	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 82% Benthic Community: BRI Score = 30 (Reference Level). Location: Northern Bay

Study	Station ID	San Diego Water Board Evaluation
		Comments: Retain all station data based on Triad results.
	2238	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 90% Benthic Community: BRI Score = 60.3 (Response Level 3 – Greater than 50% of reference species absent). Location: Southern Bay Comments: Retain all station data based on Triad results. Weight of evidence suggests that the high BRI score may be may be caused by factors other than pollution.
NASSCO/BAE Systems Shipyards (SY Investigation)	2231	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 84% Benthic Community: BRI Score = 31 (Reference Level). Atypical benthos due to high abundance of one species not previously recorded at this station. The non-native species, Kalliapseudes crassus, accounted for 85 to 90 percent of the total in this sample. Location: Mid Bay Comments: Sediment chemistry and control adjusted toxicity data retained but benthic community data not used in the reference pool.
SY Investigation	2243	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 92% Benthic Community: BRI Score = 45.1 (Response Level 2 – Greater than 25% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results.
	2433	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 96%

Study	Station ID	San Diego Water Board Evaluation
		Benthic Community: BRI Score = 16.8 (Reference Level) Location: Northern Bay Comments: Retain all station data based on Triad results.
	2441	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 95% Benthic Community: BRI Score = 19.9 (Reference Level). Location: Northern Bay Comments: Retain all station data based on Triad results.
Bight 98	2235	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 71% Benthic Community: BRI Score = 42.1 (Response Level 2 – Greater than 25% of reference species absent). Location: Southern Bay Comments: Retain all station data based on Triad results. Weight of evidence suggests that the high BRI score may be may be caused by factors other than pollution.
	2241	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 98% Benthic Community: BRI Score = 34.7 (Response Level 1 – Greater than 5% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results.
	2242	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value.

Study	Station ID	San Diego Water Board Evaluation
		Amphipod Survival: 92% Benthic Community: BRI Score = 36.6 (Response Level 1 – Greater than 5% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results.
Bight 98	2243	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 96% Benthic Community: BRI Score = 36.4 (Response Level 1 – Greater than 5% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results.
	2256	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 100% Benthic Community: BRI Score = 37.9 (Response Level 1 – Greater than 5% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results.
	2257	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 91% Benthic Community: BRI Score = 38.1 (Response Level 1 – Greater than 5% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results.
Bight 98	2258	Sediment Chemistry: No chemical exceeded its ERM or consensus

Study	Station ID	San Diego Water Board Evaluation
		based guideline value. Amphipod Survival: 92% Benthic Community: BRI Score = 43.3 (Response Level 2 – Greater than 25% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results. Weight of evidence suggests that the high BRI score may be may be caused by factors other than pollution.
	2260	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 73% Benthic Community: BRI Score = 39.1 (Response Level 1 – Greater than 5% of reference species absent). Location: Mid Bay Comments: Retain all station data based on Triad results.
	2265	Sediment Chemistry: No chemical exceeded its ERM or consensus based guideline value. Amphipod Survival: 85% Benthic Community: BRI Score = 26.7 (Reference Level) Location: Mid Bay Comments: Retain all station data based on Triad results.

Notes: Amphipod percent survival is control adjusted.

1. Potential outliers removed from data set and control adjusted.

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APPENDIX FOR SECTION 17

ALTERNATIVE REFERENCE POOLS

March 14, 2012

List of Tables

Table A17-1 2003 Final Reference Pool

Regional Board Recommended Final Reference Pool for NASSCO and BAE Systems (formerly Southwest Marine) Sediment Investigation[1]

Study	Station
2001 Chollas/Paleta	2238
	2433
2001 NASSCO/ BAE Systems (formerly Southwest Marine)	2441
	2433
	2243
Bight'98	2231
	2233
	2238
	2240
	2241
	2242
	2243
	2244
	2247
	2252
	2256
	2257
	2265
	2433
	2435
	2436
	2440

1. Regional Water Quality Control Board – San Diego. "Regional Board Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and Seventh Street Channel Sediment Investigations. June 9, 2003."

Table A17-2 San Diego Bay Council Reference Pool

San Diego Bay Council Recommended Reference Pool for NASSCO and BAE Systems (formerly Southwest Marine) Sediment Investigation[2]

Study	Station
Bight'98	2227
	2229
	2252
	2433
	2434
	2435
	2441

2. San Diego Bay Council – Elaine M. Carlin, Scientific Consultant. "Selecting a Pool of Reference Stations for San Diego Bay - April 28, 2003."

Table A17-3 NOAA Reference Pool

NOAA Recommended Reference Pool for NASSCO and BAE Systems (formerly Southwest Marine) Sediment Investigation[3]

Study	Station
2001 Chollas/Paleta	2243
	2433
	2243
2001 NASSCO/ BAE Systems (formerly Southwest Marine)	2441
	2433
	2243
Bight'98	2224
	2227
	2228
	2229
	2231
	2233
	2239
	2242
	2243
	2433
	2434
	2435
	2436
	2440

3. NOAA - Donald MacDonald and Denise Klimas. "An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations - January 16, 2003."

Table A17-4 Comparison of Mean Values Between the 2003 Final Reference Pool, San Diego Bay Council Reference Pool, and NOAA Reference Pool

Sediment Chemistry[2]	Units	Mean Values[1]		
		2003 Final Pool	Bay Council Pool	NOAA Pool
		n = 22	n = 7	n = 20
Arsenic	mg/kg	5.45	6.76	5.45
Cadmium	mg/kg	0.14	0.16	0.15
Chromium	mg/kg	30.8	31.8	32.3
Copper	mg/kg	56.7	54.9	54.9
Lead	mg/kg	23.5	19.7	23.1
Mercury	mg/kg	0.26	0.18	0.28
Nickel	mg/kg	9.37	11.1	9.87
Silver	mg/kg	0.52	0.56	0.50
Zinc	mg/kg	112	103	109
Total PP-PAHs[3]	**µg/kg**	**346**	**803**	**513**
Total PCBs	µg/kg	43.3	51.3	42.0
Toxicity				
Amphipod Survival (control-adjusted)	%	95	98	95
Benthic Community				
BRI-E[4]	**unitless**	**27.6**	**15.1**	**26.0**

1. Sediment quality data taken from April 10,2003 document produced by SCCWRP, Navy, and Exponent (Bay et. al., 2003).
2. One-half of the method detection limit was substituted for nondetect values, except for the Shipyard data, where one-half of the reporting was used (Bay et. al., 2003).
3. Total PP-PAHs = Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz[a]anthracene, Chrysene, Benzo[b]fluoranthene, Benzo [klfluoranthene, Benzo [a] pyrene, Indeno [1,2,3-cdlpyrene, Dibenz[a,h]anthracene, and Benzo[ghi]perylene.
4. BRI-E = Benthic Response Index – Embayments

18. Finding 18: Sediment Quality Triad Results

Finding 18 of CAO No. R9-2012-0024 states:

The San Diego Water Board categorized 6 of 30 sediment quality triad sampling stations at the Shipyard Sediment Site as having sediment pollutant levels "Likely" to adversely affect the health of the benthic community. The remaining triad stations were classified as "Possible" (13) and "Unlikely" (11). These results are based on the synoptic measures of sediment chemistry, toxicity, and benthic community structure at the Shipyard Sediment Site.

18.1. Sediment Quality Triad Results

Based on the results of the Triad lines of evidence, 6 of 30 stations sampled at the Shipyard Sediment Site are categorized as "Likely" impacted, which means it is likely that the CoPCs are adversely impacting the health of the benthic community (Table 18-1). The process used to assign the "Low," "Moderate," and "High" classifications to each line of evidence, and the "Unlikely," "Possible," and "Likely" categories for the weight-of-evidence conclusions are described below.

The results presented in Table 18-1 are based on a comparative analysis using a set of reference stations that characterize the Reference Sediment Quality Conditions described in Section 17 of this Technical Report. This reference condition can be used to represent contemporary background chemical and biological characteristics of San Diego Bay and is reflective of conditions that would exist in the marine sediment in the absence of the Shipyard Sediment Site discharges. This condition reflects the presence of existing background anthropogenic levels of pollutants from non-shipyard related discharges (e.g., urban watershed loading in San Diego Bay), as well as natural variability in marine sediment toxicity and benthic community condition. A description of the Reference Sediment Quality Conditions, including a list of the reference stations, is provided in Section 17 of this Technical Report.

Table 18-1 Results of the Sediment Quality Triad Lines-of-Evidence

Site	Station	Sediment Chemistry[1]	Toxicity[2]	Benthic Community[3]	Weight-of-Evidence Category[4]
NASSCO	NA01	Moderate	Low	Low	Unlikely
	NA03	Moderate	Low	Low	Unlikely
	NA04	Moderate	Low	Low	Unlikely
	NA05	Moderate	Low	Low	Unlikely
	NA06	Moderate	Low	Low	Unlikely
	NA07	Moderate	Low	Low	Unlikely
	NA09	Moderate	Moderate	Low	Possible

Site	Station	Sediment Chemistry[1]	Toxicity[2]	Benthic Community[3]	Weight-of-Evidence Category[4]
	NA11	Moderate	Moderate	Low	Possible
	NA12	Moderate	Moderate	Low	Possible
	NA15	Moderate	Low	Low	Unlikely
	NA16	Moderate	Moderate	Low	Possible
	NA17	High	Low	Low	Possible
	NA19	High	Moderate	Low	Likely
	NA20	Low	Low	Moderate	Unlikely
	NA22[5]	Moderate	Moderate	Moderate	Likely
BAE Systems	SW02	High	Low	Low	Possible
	SW03	Moderate	Low	Low	Unlikely
	SW04	High	Low	Moderate	Likely
	SW08	High	Low	Low	Possible
	SW09	High	Low	Low	Possible
	SW11	Moderate	Low	Low	Unlikely
	SW13	High	Moderate	Low	Likely
	SW15	Moderate	Moderate	Low	Possible
	SW17	Moderate	Moderate	Low	Possible
	SW18	Moderate	Low	Low	Unlikely
	SW21	High	Low	Low	Possible
	SW22	High	Moderate	Low	Likely
	SW23	High	Moderate	Low	Likely
	SW25	Moderate	Moderate	Low	Possible
	SW27	Moderate	Moderate	Low	Possible

1. Relative likelihood that the chemicals present in the sediment is adversely impacting organisms living in or on the sediment (i.e., benthic community).
2. Relative likelihood of toxic effects based on the combined toxic response from three tests: amphipod survival, sea urchin fertilization, and bivalve development.
3. Relative likelihood of benthic community degradation based on four metrics: total abundance, total number of species, Shannon-Wiener Diversity Index, and the Benthic Response Index.
4. Relative likelihood (Likely, Possible, or Unlikely) that the health of the benthic community is adversely impacted based on the three lines of evidence: sediment chemistry, toxicity, and benthic community.
5. NA22 was omitted from this analysis because it falls within an area that is being evaluated as part of the TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas Creek TMDL and is not considered part of the Shipyard Sediment Site for purposes of the CAO.

18.2. Sediment Chemistry Ranking Criteria

The low, moderate, and high classifications assigned to the sediment chemistry line-of-evidence are determined by comparing the bulk sediment chemical concentrations from each site station to sediment quality guidelines (SQGs) and to Reference Condition as follows:

- **Sediment Quality Guidelines** – Sediment quality guidelines (SQGs) are reference values above which sediment pollutant concentrations could pose a significant threat to aquatic life and can be used to evaluate sediment chemistry data. SQGs are considered one of the most effective methods for attempting to relate sediment chemistry to observed toxic effects and determine whether contaminants are present in amounts that could cause or contribute to adverse effects (Long et al., 1995; Long et al., 1998). SQGs have been used by regulatory agencies, research institutions, and environmental organizations throughout the United States to identify contamination hot spots, characterize the suitability of dredge material for disposal, and establish goals for sediment cleanup and source control (Vidal and Bay, 2005). SQGs are often used as a tool to interpret chemical data from analyses of sediment, identify data gaps, and screen CoPCs. SQGs are helpful in determining whether marine sediment contaminants warrant further assessment or are at a level that requires no further evaluation.

  Several different approaches, based on empirical or causal correlative methodologies, have been developed for deriving SQG screening levels. Each of these approaches attempts to predict pollutant concentration levels that could result in adverse effects to benthic species, which are extrapolated to represent the entire aquatic community. Examples of empirical SQGs include the ERL and ERM values, which are concentrations corresponding to the 10th and 50th percentiles of the distribution observed in toxic samples, respectively (Vidal and Bay, 2005). Examples of causal SQGs include the equilibrium partitioning (EqP) approach which uses partitioning theory to relate the dry-weight sediment concentration of a particular chemical that causes an adverse biological effect to the equivalent free chemical concentration in pore water and to the concentration sorbed to sediment organic carbon or bound to sulfide. The theoretical causal resolution of chemical bioavailability in relation to chemical toxicity in different sediments differentiates equilibrium partitioning approaches from purely empirical correlative assessment methods (U.S. EPA 1998d). Causal SQGs have a greater ability relative to empirical SQGs to determine the specific contaminants responsible for toxicity. However causal SQGs require more extensive data sets and published values are not available for many contaminants relative to empirical SQGs. By comparison, empirical SQGs can be calculated for a large number of contaminants and only require routine chemical analyses (Vidal and Bay, 2005).

It is important to note that SQGs are not promulgated as regulatory sediment quality criteria or standards in California nor are they intended as cleanup or remediation targets (Buchman, 1999). The SQGs used to classify the Shipyard Sediment Site stations include:

- ERM for metals (Long et al., 1998),
- Consensus midrange effects concentration for PAHs and PCBs (Swartz, 1999; MacDonald et al., 2000), and
- Sediment Quality Guideline Quotient (SQGQ) for chemical mixtures (Fairey et al., 2001).

- **Reference Sediment Quality Conditions** – A key step to evaluating each line-of-evidence comprising the Triad of data is to determine if there are statistically significant differences between a contaminated marine sediment site and reference station sites. To accomplish this it is necessary to specify the appropriate statistical procedure to estimate the level of confidence obtained when differentiating between reference and the contaminated marine sediment site conditions. The statistical procedure used by the San Diego Water Board in the Shipyard Sediment Site investigation to identify stations where conditions are significantly different from the Reference Sediment Quality Conditions consisted of identifying station sample values outside boundaries established by the 95% upper predictive limit reference pool of data for each contaminant of concern. The 95% upper predictive limit allows a one-to-one comparison to be performed between a single Shipyard Sediment Site station and the pool of reference stations used to establish "Reference Sediment Quality Conditions" for the Shipyard Sediment Site (Reference Pool). Although multiple comparisons are made to the Reference Pool prediction limits, the San Diego Water Board made a decision to not correct for multiple comparisons so that the Shipyard Site/Reference comparisons would remain conservative and more protective. Metals characteristics and summary statistics for the Reference Pool are shown in Table 18-2. The 95% upper predictive limit for metals was dependent on the fines content at each station to help identify concentrations of metals that were enriched at the Shipyard Sediment Site (Table 18-3). In general, this means that stations with higher fines content will have a higher 95% upper predictive limit. For example, the 95% upper predictive limit for copper ranged from 85.9 mg/kg for a fines content of 25% to 159.5 mg/kg for a fines content of 75%. Summary statistics and the 95% upper predictive limits for organic contaminants and the SQGQ1 for the Reference Pool are shown in Tables 18-4 and 18-5, respectively.

- **Tributyltin (TBT) Considerations -** TBT is not specifically considered in the sediment chemistry line of evidence (LOE) analysis because 1) it is not incorporated in the combination of chemicals used in the SQGQ1 calculation and 2) there are no published empirical SQGs or consensus MEC values for TBT effects on benthic community health. The SQGQ1 metric, documented in Fairey et. Al., (2001) and used in the analysis, is a central tendency indicator of the potential for adverse biological effects from chemical mixtures in a complex sediment matrix. Under the Fairey et. Al., (2001) methodology, the SQGQ1 value for a sediment is calculated by dividing concentrations of cadmium, copper, lead, silver, zinc, total chlordane, dieldrin, total PAHs (normalized by sediment organic carbon content), and total PCBs (sum of 18 congeners) in sediment by each chemical's empirical SQG and subsequently averaging the individual quotients. The combination of chemicals used in the SQGQ1 calculation, which does not include TBT, are assumed to be representative of, or the surrogates of, the toxicologically significant chemical mixture regardless of which chemicals were quantified in the sediment chemistry analyses. This is not only a well-accepted, but also a reasonable approach given the seemingly infinite number of chemicals present in marine sediment and for this reason it is not at all uncommon to exclude a specific chemical(s), such as TBT, in the chemistry LOE analysis for determining the likelihood of benthic community impairment. Furthermore, there is ample site specific data to evaluate the potential effects of tributyltin (TBT) on benthic community health. A site specific Lowest Apparent Effects Threshold ("LAET") chemical threshold value for TBT described in DTR Section 32 was derived and applied at Site stations with only chemistry data to identify areas where benthic community impairment is likely. In addition the use of other chemicals as a surrogate for TBT is further supported by reference to the chemical correlation coefficients for TBT described in Table 29-4. TBT exhibits a particularly strong positive correlation with copper, HPAH, and total PCB as indicated by their correlation coefficients of 0.89, 0.80, and 0.79 respectively which are among the highest correlations observed at the Shipyard Sediment Site. These strong positive correlations indicate that decisions on the likelihood of benthic community impairment based on SQGQ1 values will address areas of the Site with elevated TBT values.

Table 18-2 Individual Station Characteristics and Summary Statistics for Physical Properties (%) and Metals (mg/kg) in the Reference Pool

Station	% Fines	%TOC	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
CP 2231	41.2	1.0	0.288	7.78	0.025	46.6	71.1	0.364	11.5	40.3	129
CP 2238	69.0	1.0	0.510	7.8	0.133	59.2	71.0	0.262	16.5	28.8	214
CP 2243	30.3	0.6	0.651	5.94	0.143	40.2	56.4	0.332	10.2	30.7	125
CP 2433	38.4	0.5	0.385	5.55	0.288	42.2	43.3	0.251	11.2	23.3	115
CP 2441	82.8	1.8	0.388	8.82	0.411	54.0	78.4	0.238	17.5	26.7	143
SY 2231	45.0	1.3	0.260	8.3	0.100	37.0	82.0	0.430	10.0	42.0	120
SY 2243	28.0	0.5	0.560	4.3	0.120	23.0	47.0	0.250	5.6	21.0	93.0
SY 2433	41.0	0.7	0.390	4.6	0.290	24.0	40.0	0.210	7.4	19.0	92.0
SY 2441	41.0	1.1	0.240	5.4	0.290	22.0	37.0	0.160	9.9	13.0	80.0
2235	45.0	0.6	0.476	6.4	0.095	37.5	58.2	0.239	10.7	21.3	136
2241	18.0	0.5	0.538	4.53	0.088	27.5	59.2	0.213	7.3	26.3	104
2242	31.0	0.7	0.493	4.27	0.096	25.4	42.0	0.300	6.8	17.8	89.8
2243	35.0	0.5	0.504	3.66	0.101	20.8	38.8	0.239	5.1	19.9	81.2
2256	67.0	1.3	1.29	7.47	0.200	54.3	128	0.632	14.3	54.1	197
2257	77.0	1.6	1.25	9.08	0.175	66.7	157	0.511	18.7	64.1	233
2258	71.0	1.4	0.954	7.75	0.161	60.0	143	0.664	16.4	53.0	211
2260	27.0	0.5	0.452	4.06	0.092	23.9	50.8	0.216	7.1	20.4	87.5
2265	13.0	0.4	0.192	2.48	0.069		18.0	0.065	1.5	12.0	43.2
N	18	18	18	18	18	18	18	18	18	18	18
Minimum	13.0	0.4	0.192	2.48	0.025	20.8	18.0	0.065	1.5	12	43.2
Maximum	82.8	1.8	1.29	9.08	0.411	66.7	157	0.664	18.7	64.1	233
Mean	44.5	0.9	0.546	6.01	0.160	39.1	67.8	0.310	10.4	29.6	127.4
Std Dev	20.5	0.4	0.315	1.98	0.100	15.4	38.3	0.158	4.7	15.0	53.4
RSD	46.1%	49.6%	57.8%	33.0%	62.5%	39.4%	56.4%	50.9%	45.5%	50.6%	41.9%
ERM	NA	NA	3.7	70	9.6	370	270	0.71	51.6	218	410

SCCWRP and U.S. Navy, 2005b

Table 18-3 Metal Threshold Values (mg/kg) Derived from the Fines-Metals Regression as a Function of Percent Fines for the Reference Pool

% Fines	Ag[1]	As[1]	Cd[1]	Cr[1]	Cu[1]	Hg[1]	Ni[1]	Pb[1]	Zn[1]
0	0.73	3.4	0.23	25.2	54.4	0.36	4.4	31.7	87.6
5	0.76	3.8	0.24	28.1	60.4	0.38	5.4	33.6	97.3
10	0.79	4.2	0.25	31.1	66.6	0.39	6.4	35.5	107.2
15	0.82	4.6	0.26	34.1	72.9	0.41	7.4	37.5	117.2
20	0.85	5	0.27	37.1	79.4	0.43	8.4	39.6	127.4
25	0.89	5.4	0.28	40.2	85.9	0.45	9.5	41.7	137.7
30	0.92	5.8	0.29	43.4	92.6	0.47	10.5	43.9	148.2
35	0.96	6.2	0.3	46.6	99.5	0.5	11.6	46.1	158.8
40	1	6.6	0.31	49.8	106.5	0.52	12.6	48.4	169.6
45	1.04	7.1	0.32	53.2	113.6	0.54	13.7	50.8	180.6
50	1.08	7.5	0.33	56.5	120.9	0.57	14.8	53.2	191.8
55	1.13	7.9	0.35	60	128.3	0.59	15.9	55.8	203.1
60	1.17	8.3	0.36	63.5	135.9	0.62	17	58.3	214.6
65	1.22	8.8	0.37	67	143.6	0.64	18.1	61	226.2
70	1.27	9.2	0.39	70.6	151.5	0.67	19.2	63.7	238.1
75	1.32	9.7	0.4	74.3	159.5	0.7	20.3	66.5	250
80	1.37	10.1	0.42	78	167.6	0.72	21.5	69.3	262.1
85	1.42	10.6	0.43	81.7	175.9	0.75	22.6	72.2	274.4
90	1.48	11	0.45	85.5	184.2	0.78	23.8	75.1	286.8
95	1.53	11.5	0.46	89.3	192.7	0.81	24.9	78.1	299.3
100	1.59	11.9	0.48	93.2	201.2	0.84	26.1	81.1	311.9

SCCWRP and U.S. Navy, 2005b

1. Sediment metal concentrations exceeding these thresholds are considered enriched.

Table 18-4 Individual Station Characteristics, Summary Statistics, and 95% Upper Predictive Limits for Organic Contaminants in the Reference Pool

Station	PP-PAHs[1] μg/kg	PCBs[2] μg/kg	HPAHs[3] μg/kg	TBT[4] μg/kg
CP 2231	1,063	42.7	536.0	
CP 2238	199	11.4	199.0	
CP 2243	267	20.7	118.0	
CP 2433	780	27.1	415.0	
CP 2441	2,143	33.5	1,210.0	
SY 2231	687	77.1	235.0	15.0
SY 2243	204	22.4	56.0	2.6
SY 2433	486	20.8	169.5	3.3
SY 2441	343	10.5	117.2	3.7
2235	234	49.8	76.5	
2241	234	49.8	76.5	
2242	359	49.8	126.8	
2243	234	49.8	76.5	
2256	424	49.8	174.4	
2257	505	50.9	215.9	
2258	463	49.8	197.9	
2260	234	49.8	76.5	
2265	234	49.8	76.5	
N	18	9	18	4
Minimum	199	10.5	56	2.60
Maximum	2,143	77.1	1,210	15.00
Mean	505	29.6	231	6.15
Std Dev	471	20.5	275	5.92
RSD	93%	69%	119%	96%
95% PL[5]	**1,264**	**84**	**663**	**21.7**

1. PP-PAHs = Priority Pollutant Polynuclear Aromatic Hydrocarbons, sum of 16 PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, anthracene, phenanthrene, fluoranthene, pyrene, benz[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, indeno[123-cd]pyrene, dibenz[ah]anthracene, and benzo[ghi]perylene.
2. PCBs = Polychlorinated Biphenyls. "PCBs" is the sum of 41 congeners unless otherwise stated: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.
3. HPAHs = High Molecular Weight Polynuclear Aromatic Hydrocarbons, sum of 6 PAHs: Fluoranthene, Perylene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenzo(a,h)anthracene.
4. TBT = Tributyltin

5. The 95% upper predictive limits are calculated using the same methodology described in SCCWRP and U.S. Navy, 2005b. The supporting calculations are provided in the Appendix for Section 18.

Table 18-5 Calculated SQGQ1, Summary Statistics and 95% Upper Predictive Limit for the Reference Pool

Station	SQGQ1[1]
CP 2231	0.18
CP 2238	0.20
CP 2243	0.18
CP 2433	0.15
CP 2441	0.19
SY 2231	0.21
SY 2243	0.15
SY 2433	0.13
SY 2441	0.10
2235	0.16
2241	0.16
2242	0.13
2243	0.13
2256	0.33
2257	0.37
2258	0.31
2260	0.14
2265	0.07
N	18
Minimum	0.07
Maximum	0.37
Mean	0.18
Std Dev	0.08
RSD	42%
95% PL[2]	**0.35**

1. SQGQ1 = Sediment Quality Guideline Quotient 1. The SQGQ1 value for a sediment is calculated by dividing concentrations of cadmium, copper, lead, silver, zinc, total chlordane, dieldrin, total PAHs (normalized by sediment organic carbon content), and total PCBs (sum of 18 congeners) in sediment by each chemical's empirical SQG and subsequently averaging the individual quotients. Individual quotients for total chlordane and dieldrin quotients are excluded in the SQGQ1 supporting calculations because these constituents were not included in the list of minimum analytes required to assess exposure at the Shipyard Sediment Site.
2. The 95% upper predictive limit is calculated using the same methodology described in SCCWRP and U.S. Navy, 2005b. The supporting calculations are provided in the Appendix for Section 18.

The relative potential for adverse effects attributable to sediment chemistry is classified as low, moderate, or high based on comparisons made to published sediment quality guidelines where increasing weight is given by the number and magnitude of chemicals exceeding a threshold, similar to the method used by Long et al. (1998). The breakpoints in the ranking levels are established using best professional judgment (BPJ) and followed Long et al. (1998) and Fairey et al., (2001). The San Diego Water Board's decision process for sediment chemistry evaluation is outlined in Figure 18-1 and the supporting calculations are provided in the Appendix for Section 18. The sediment chemistry line-of-evidence results for each Shipyard Sediment Site stations are shown in Table 18-6 and the supporting calculations are provided in the Appendix for Section 18.

Figure 18-1 Flow Diagram for the Sediment Chemistry Ranking Criteria (Low, Moderate, and High)

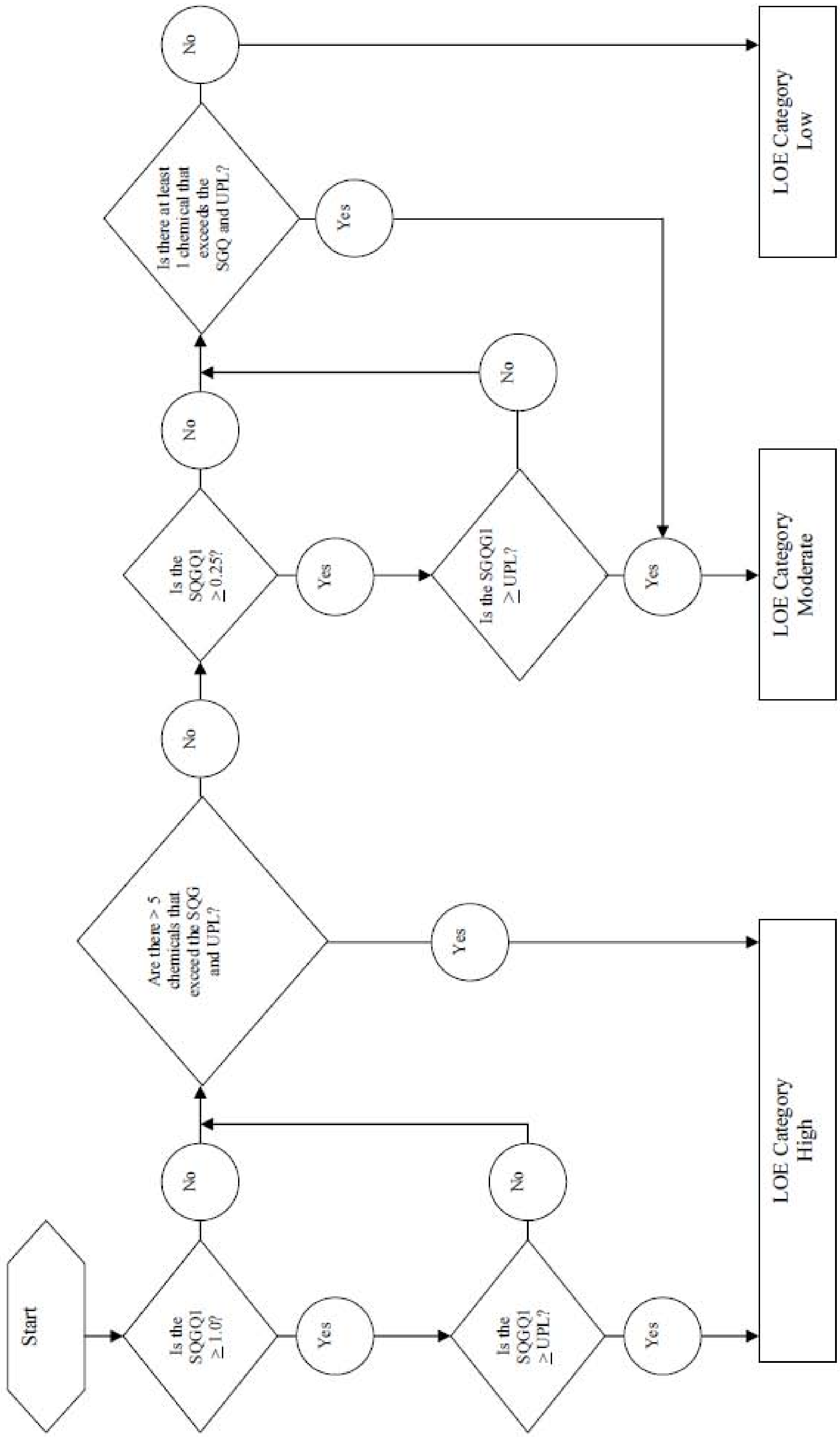

Table 18-6 Sediment Chemistry Line-of-Evidence Results

Site	Station	SQGQ1[1]			SQGQ1 ≥ UPL	# Chemicals > SQG and UPL	LOE Category[2]
		< 0.25	0.25 to 1.0	≥1.0			
NASSCO	NA01		X		Yes	2	**Moderate**
	NA03		X		Yes	2	**Moderate**
	NA04		X		Yes	1	**Moderate**
	NA05		X		Yes	0	**Moderate**
	NA06		X		Yes	3	**Moderate**
	NA07		X		Yes	2	**Moderate**
	NA09		X		Yes	2	**Moderate**
	NA11		X		Yes	1	**Moderate**
	NA12		X		Yes	0	**Moderate**
	NA15		X		Yes	2	**Moderate**
	NA16		X		Yes	2	**Moderate**
	NA17			X	Yes	4	**High**
	NA19			X	Yes	4	**High**
	NA20		X		No	0	**Low**
	NA22[3]		X		Yes	0	**Moderate**
BAE Systems	SW02			X	Yes	6	**High**
	SW03		X		Yes	2	**Moderate**
	SW04			X	Yes	6	**High**
	SW08			X	Yes	5	**High**
	SW09			X	Yes	5	**High**
	SW11		X		Yes	1	**Moderate**
	SW13			X	Yes	4	**High**
	SW15		X		Yes	2	**Moderate**
	SW17		X		Yes	3	**Moderate**
	SW18		X		Yes	2	**Moderate**
	SW21			X	Yes	2	**High**
	SW22			X	Yes	2	**High**
	SW23			X	Yes	3	**High**
	SW25		X		Yes	2	**Moderate**
	SW27		X		Yes	0	**Moderate**

1. SQGQ1 = Sediment Quality Guideline Quotient 1 (Fairey et al., 2001)
2. The supporting calculations are provided in the Appendix for Section 18.
3. NA22 was omitted from this analysis because it falls within an area that is being evaluated as part of the TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas Creek TMDL and is not considered part of the Shipyard Sediment Site for purposes of the CAO.

The sediment chemistry ranking criteria was originally developed for the sediment quality site assessment work for the mouth of Chollas Creek and Paleta Creek TMDLs (SCCWRP and U.S. Navy, 2005b). The criteria were developed by SCCWRP, U.S. Navy, and the San Diego Water

Board with input from DFG, U.S. FWS, DTSC, and NOAA; collectively referred to as the Natural Resource Trustee Agencies (NRTAs), non governmental environmental groups, SDUPD, and the City of San Diego (City).

The low, moderate, and high sediment chemistry ranking criteria are based on the following two key assumptions (SCCWRP and U.S. Navy, 2005b):

1. A Shipyard Sediment Site sample station is ranked as having a low likelihood of impact from sediment CoPCs when all chemicals at a station are less than relatively low SQGs and less than the established Reference Condition; and

2. A Shipyard Sediment Site sample station is ranked as having a high likelihood of impact from sediment CoPCs when many of the chemicals at a station exceed a relatively high SQG, and exceed the Reference Condition sediment chemistry levels.

The specific sediment chemistry line of evidence category ranking from the SCCWRP and U.S. Navy (2005b) report are presented below and in Figure 18-1of this report. The same sediment chemistry ranking criteria from the SCCWRP and U.S. Navy (2005b) report is used to evaluate the sediment chemistry data to the Shipyard Sediment Site sample stations.

Low Potential for Adverse Effects: The mean SQGQ1 is less than 0.25 or all chemicals were less than the 95% predictive limit calculated from the Reference Pool. Additionally, there must not be any single chemical that exceeded either its SQG or Reference Pool predictive limit value whichever was higher. To meet this category, all chemicals present at the site station, either individually or when summed, must be lower than a relatively low SQG and below the Reference Condition.

Moderate Potential for Adverse Effects: The mean SQGQ1 is between 0.25 and 1.0 and greater than the 95% predictive limit calculated from the Reference Pool. Additionally, a station is classified under this category if there are five or less individual chemicals that exceed their respective SQG and Reference Pool predictive limit. To meet this category, some (five or less) chemicals either individually or when summed exceed a moderate level SQG and/or the Reference Condition.

High Potential for Adverse Effects: The mean SQGQ1 for all chemicals is greater than or equal to 1.0 and is greater than the 95% predictive limit calculated from the Reference Pool. This category is also assigned if more than five chemicals exceed their individual SQG or the Reference Condition, whichever is higher. To meet this category, the Reference Condition as well as a relatively high SQG is exceeded when chemicals are considered as a group, or there are at least six individual chemicals exceeding a SQG or Reference Condition.

To determine the likelihood of impairment (Likely, Possible, or Unlikely) in the overall weight of evidence, each line of evidence ranking (Low, Moderate, or High) is put into the Weight-of-Evidence Analysis framework described in Section 18.5 below.

18.3. Toxicity Ranking Criteria

The low, moderate, and high classifications assigned to the toxicity line-of-evidence are determined by comparing the results of the three toxicity tests to their negative controls[10] and to the Reference Pool described in Section 17 of this Technical Report:

- **Negative Controls –** The first key step in the toxicity line-of-evidence is to determine whether there are statistically significant differences between toxicity observed at the Shipyard Sediment Site and toxicity observed in the laboratory control condition. Three types of sediment toxicity tests were conducted at each Shipyard Site station: (1) 10-day amphipod survival test using *Eohaustorius estuarius* exposed to whole sediment, (2) 48-hour bivalve larva development test using the mussel *Mytilus galloprovincialis* exposed to whole sediment at the sediment-water interface, and (3) 40-minute echinoderm egg fertilization test using the purple sea urchin *Strongylocentrotus purpuratus* exposed to sediment pore water. The results of these toxicity tests were compared statistically to their respective negative controls using a one-tailed Student t-test ($\alpha = 0.05$). The supporting calculations are provided in the Appendix for Section 18.

- **Reference Sediment Quality Conditions** – The second key step in the toxicity line-of-evidence is to determine whether there are statistically significant differences between toxicity observed at the Shipyard Site and toxicity observed at the Reference Pool. The statistical procedure used to identify these differences consisted of the 95% lower predictive limit. The 95% lower predictive limit allows a one-to-one comparison to be performed between a single Shipyard Site station and the Reference Pool. The 95% lower predictive limit computes a single threshold value for each toxicity test in the Reference Pool (e.g., amphipod survival) from which each Shipyard Site station toxicity result is compared. Although multiple comparisons are made to the Reference Pool prediction limits, the San Diego Water Board made a decision to not correct for multiple comparisons so that the Shipyard Site/reference comparisons would be more conservative and protective. The 95% lower predictive limits for the three toxicity tests are shown in Table 18-7.

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[10] The term "controls" refers to a treatment in a toxicity test that duplicates all of the conditions of the exposure treatments but contains no test material. The control is used to determine the absence of toxicity of basic test conditions (e.g. health of test organisms, quality of dilution water). "Control sediment" is sediment that is (1) essentially free of contaminants, (2) used routinely to assess the acceptability of a test, and (3) not necessarily collected near the site of concern. Control sediment provides a measure of test acceptability, evidence of test organism health, and a basis for interpreting data obtained from test sediments. "Negative Control" is a type of control used to determine the inherent background effects in the toxicity test, such as effects related to the health of the test organisms and the quality of the dilution water. It provides a baseline and a point of correction for interpreting the sediment toxicity test results.

Table 18-7 Individual Station Characteristics, Summary Statistics, and 95% Lower Predictive Limits for Control Adjusted Amphipod Survival (%), Bivalve Development (% Normal), and Urchin Fertilization (%) in the Reference Pool

Station	Amphipod Survival	Bivalve Development[1]	Urchin Fertilization
CP 2231	76		66
CP 2238	90		36
CP 2243	84		97
CP 2433	84		100
CP 2441	82		102
SY 2231	84	93	99
SY 2243	92	66	92
SY 2433	96	101	79
SY 2441	95	70	90
2235	71		
2241	98		
2242	92		
2243	96		
2256	100		
2257	91		
2258	92		
2260	73		
2265	85		
N	18	4	9
Minimum	71	66	36
Maximum	100	101	102
Mean	88	82.5	85
Std Dev	8.4	17.1	22
RSD	10%	21%	26%
95% PL	72.9	37.4	41.9

SCCWRP and U.S. Navy, 2005b

2. The 95% lower predictive limit for bivalve development is calculated using the same methodology described in SCCWRP and U.S. Navy, 2005b. The supporting calculation is provided in the Appendix to Section 18.

Similar to the chemistry line-of-evidence, the sediment toxicity ranking method employed a semi-quantitative assessment of the data that reflected both the presence and magnitude of toxicity. The category ranking criteria for sediment toxicity are summarized below and depicted in Figure 18-2. A comparison of the toxicity test results at each Shipyard Sediment Site station to the Reference Pool 95% lower prediction limits is shown in Table 18-8.

Figure 18-2 Toxicity Lines of Evidence

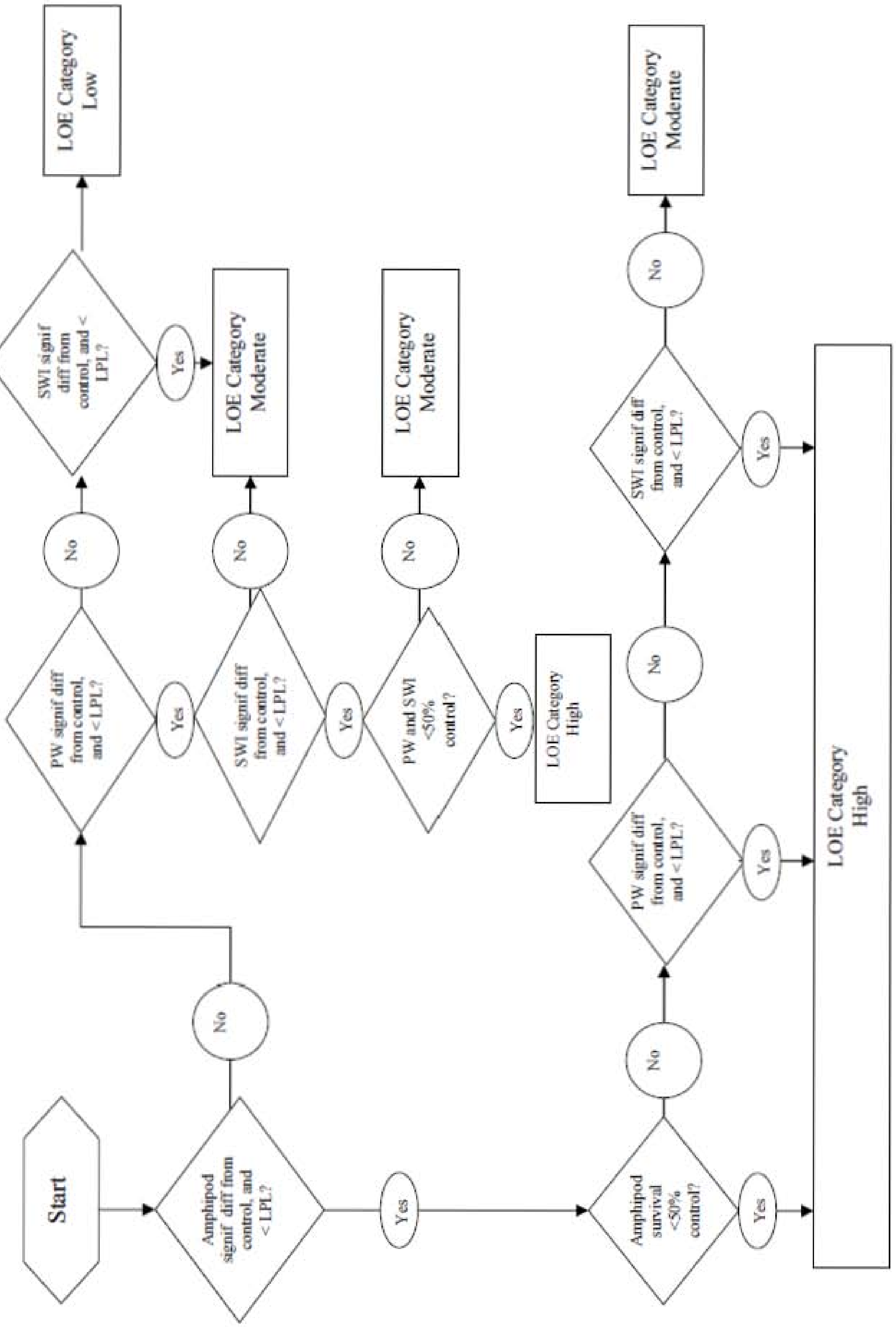

Table 18-8 Comparison of the Toxicity Data from the Shipyard Sediment Site Stations to the Reference Pool 95% Lower Predictive Limit

Site	Station	Amphipod Survival (95% LPL = 73%)[1]	Urchin Fertilization (95% LPL = 42%)	Bivalve Development (95% LPL = 37%)[1]
NASSCO	NA01	80	86	49
	NA03	84	84	94
	NA04	80	88	84
	NA05	89	95	94
	NA06	78	103	74
	NA07	74	102	88
	NA09	88	99	**1**
	NA11	**70**	101	80
	NA12	82	89	**15**
	NA15	97	88	93
	NA16	90	84	**3**
	NA17	95	88	80
	NA19	89	72	**2**
	NA20	90	78	80
	NA22[2]	95	111	**2**
BAE Systems	SW02	88	103	85
	SW03	92	103	88
	SW04	94	108	63
	SW08	91	103	93
	SW09	88	100	85
	SW11	77	89	83
	SW13	92	99	**28**
	SW15	92	103	**9**
	SW17	95	96	**16**
	SW18	74	83	64
	SW21	91	102	67
	SW22	90	104	**1**
	SW23	91	107	**16**
	SW25	86	103	**10**
	SW27	73	91	**22**

1. Toxicity values less than the 95% lower prediction limit values are bold faced and shaded.
2. NA22 was omitted from this analysis because it falls within an area that is being evaluated as part of the TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas Creek TMDL and is not considered part of the Shipyard Sediment Site for purposes of the CAO.

The toxicity ranking criteria was originally developed for the sediment quality site assessment work for the mouth of Chollas Creek and Paleta Creek TMDLs (SCCWRP and U.S. Navy, 2005b). The criteria were developed by SCCWRP, U.S. Navy, and the San Diego Water Board; with input from NRTAs, non-governmental environmental groups, Port, and the City of San Diego.

The low, moderate, and high toxicity ranking criteria are based on the following five key assumptions (SCCWRP and U.S. Navy, 2005b):

1. Toxic effects at Shipyard Sediment Site sample stations are classified as low or none when the results of all three toxicity tests were not significantly different from their controls or they had a statistically lower level of toxicity than observed at the Reference Condition sample stations;

2. The presence of significant toxicity in any one test was sufficient to classify a Shipyard Sediment Site sample station as moderately toxic. The three toxicity tests were given equal weight for classifying a sample station as moderately toxic;

3. If amphipod survival is less than 50 percent and significantly different from the control and Reference, a high rank of sediment toxicity was justified;

4. Toxic effects at Shipyard Sediment Site sample stations are classified as high when both of the sublethal toxicity tests measured a greater level of toxicity than the Reference Condition sample stations; and

5. The amphipod toxicity test result is given greater weight for the high toxicity category because the acute survival endpoint of this test was assumed to have a higher degree of association with ecological impacts than either the urchin fertilization or bivalve development tests. The sea urchin fertilization and bivalve embryo development test results are given less weight because these are sublethal critical life stage tests that are more susceptible to confounding factors, and their association with ecological impacts is less certain.

The toxicity line of evidence category ranking from the SCCWRP and U.S. Navy (2005b) report are presented below and in Figure 18-2. The same toxicity ranking criteria from the SCCWRP and U.S. Navy (2005b) report were used to evaluate the sediment toxicity data from the Shipyard Sediment Site investigation. The toxicity line-of-evidence results for each Shipyard Sediment Site station are depicted in Table 18-9.

Low Toxicity: Toxic effects are classified as low or none when results of all three bioassays were not significantly different from their controls or they have a statistically lower level of toxicity than observed at the Reference Condition sample stations.

Moderate Toxicity: Toxic effects are classified as moderately toxic if any one of the bioassay results is statistically different from its control and was less than the Reference Condition. Additionally, it is required for amphipod survival to have been greater than 50 percent, regardless of the result relative to controls or the Reference Condition.

High Toxicity: Toxic effects are classified as highly toxic when any one of the following criteria is met:

1. If survival of amphipods at a station is less than 50 percent and is statistically different than controls and statistically less than the Reference Condition sample stations.

2. If the amphipod test together with any one of the other bioassays both has a result that is statistically different from control and is statistically less than the Reference Condition sample stations.

3. If both the pore water and sediment-water interface test results are less than 50 percent of the control values and are statistically less than the controls and the Reference Condition sample stations.

To determine the likelihood of impairment (Likely, Possible, or Unlikely) in the overall weight of evidence, each line of evidence ranking (Low, Moderate, or High) is put into the Weight-of-Evidence Analysis framework described in Section 18.5 below.

Table 18-9 Toxicity Line-of-Evidence Results

Station	Amphipod Survival			Urchin Fertilization			Bivalve Development			LOE Category
	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	
NA01	Yes	No	No	Yes	No	No	Yes	No	No	**Low**
NA03	No	No	No	Yes	No	No	No	No	No	**Low**
NA04	Yes	No	No	Yes	No	No	Yes	No	No	**Low**
NA05	Yes	No	No	No	No	No	No	No	No	**Low**
NA06	Yes	No	No	No	No	No	No	No	No	**Low**
NA07	Yes	No	No	No	No	No	No	No	No	**Low**
NA09	Yes	No	No	No	No	No	Yes	Yes	Yes	**Moderate**
NA11	Yes	Yes	No	No	No	No	No	No	No	**Moderate**
NA12	Yes	No	No	Yes	No	No	Yes	Yes	Yes	**Moderate**
NA15	No	No	No	Yes	No	No	No	No	No	**Low**
NA16	Yes	No	No	Yes	No	No	Yes	Yes	Yes	**Moderate**
NA17	No	No	No	Yes	No	No	Yes	No	No	**Low**
NA19	No	No	No	Yes	No	No	Yes	Yes	Yes	**Moderate**
NA20	Yes	No	No	Yes	No	No	Yes	No	No	**Low**
NA22[1]	No	No	No	Yes	No	No	Yes	Yes	Yes	**Moderate**
SW02	Yes	No	No	No	No	No	No	No	No	**Low**
SW03	No	No	No	No	No	No	Yes	No	No	**Low**
SW04	No	No	No	Yes	No	No	Yes	No	No	**Low**
SW08	Yes	No	No	No	No	No	Yes	No	No	**Low**
SW09	No	No	No	No	No	No	Yes	No	No	**Low**
SW11	Yes	No	No	Yes	No	No	No	No	No	**Low**
SW13	Yes	No	No	No	No	No	Yes	Yes	Yes	**Moderate**
SW15	No	No	No	No	No	No	Yes	Yes	Yes	**Moderate**
SW17	No	No	No	Yes	No	No	Yes	Yes	Yes	**Moderate**

Station	Amphipod Survival			Urchin Fertilization			Bivalve Development			LOE Category
	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	Different from Control	< 95% LPL	< 50% Control	
SW18	No	No	No	Yes	No	No	Yes	No	No	**Low**
SW21	Yes	No	No	No	No	No	No	No	No	**Low**
SW22	Yes	No	No	No	No	No	Yes	Yes	Yes	**Moderate**
SW23	No	No	No	Yes	No	No	Yes	Yes	Yes	**Moderate**
SW25	Yes	No	No	No	No	No	Yes	Yes	Yes	**Moderate**
SW27	Yes	No	No	Yes	No	No	Yes	Yes	Yes	**Moderate**

1. NA22 was omitted from this analysis because it falls within an area that is being evaluated as part of the TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas Creek TMDL and is not considered part of the Shipyard Sediment Site for purposes of the CAO.

18.4. Benthic Community Ranking Criteria

The low, moderate, and high potential for benthic community degradation classifications used in the benthic community line-of-evidence were determined by comparing the benthic community structure indices at each Shipyard Sediment Site station to the thresholds developed for the Bight ’98 Benthic Response Index for Embayments (BRI-E) (Ranasinghe et al., 2003) and to the Reference Pool described in Section 17 of this Technical Report:

- Benthic Response Index for Embayments – The BRI-E was developed by SCCWRP as a screening tool to discriminate between disturbed and undisturbed benthic communities in Southern California embayments, such as San Diego Bay. In order to give BRI-E values an ecological context and facilitate their interpretation and use for evaluation of benthic community condition, a reference threshold and four thresholds of response were defined by SCCWRP (Table 18-10). The reference threshold is defined as a value toward the upper end of the range of index values of samples taken at sites that had minimal known anthropogenic influence. The other four thresholds (Response Levels 1, 2, 3 and 4) involved defining levels of deviation from the reference condition. These thresholds are based upon a determination of the index values, above which species, or groups of species, no longer occurred along the pollution gradient.

Table 18-10 Characterization, Definition and BRI-E Thresholds for Levels of Benthic Community Condition

Level	Definition for Bays	BRI-E Threshold
Reference		< 31
Response Level 1	> 5% of reference species absent	31 to 42
Response Level 2	> 25% of reference species absent	42 to 53
Response Level 3	> 50% of reference species absent	53 to 73
Response Level 4	> 80% of reference species absent	> 73

(Ranasinghe et al., 2003)

- **Reference Sediment Quality Conditions** – Four metrics were used to assess the benthic community structure: (1) Total abundance – the total number of individuals identified in each replicate sample, (2) Total taxa richness – the total number of distinct taxa identified in each replicate, (3) Shannon-Weiner Diversity Index – a measure of both the number of species and the distribution of individuals among species; higher values indicate that more species are present or that individuals are more evenly distributed among species, and (4) BRI-E – a quantitative index that measures the condition of marine and estuarine benthic communities by reducing complex biological data to single values. A key step in the benthic community line-of-evidence is to determine whether there are statistically significant differences between the benthic community structures observed at the site and the benthic community structure observed at the Reference Pool using the four metrics described above. The statistical procedure used in the Shipyard Sediment Site investigation to identify these differences consisted of the 95% lower predictive limit for total abundance, # of Taxa, and Shannon-Weiner Diversity index. A 95% upper predictive limit was used for the BRI-E. The 95% predictive limit computes a single threshold value for each benthic community metric in the Reference Pool (e.g., total abundance) from which each site station metric result is compared. Although multiple comparisons are made to the Reference Pool, the San Diego Water Board made a decision to not correct for multiple comparisons so that the Shipyard Site/Reference comparisons would be more conservative and protective. The 95% lower predictive limits for the four benthic community metrics and 95% upper predictive limit for BRI-E are shown in Table 18-11.

Table 18-11 Individual Station Characteristics, Summary Statistics, and 95% Lower Predictive Limits for Abundance, Number of Taxa, Shannon-Weiner Diversity Index and BRI-E in the Reference Pool

Station	Abundance	# Taxa	S-W Diversity	BRI-E	BRI-E Level
CP 2231					
CP 2238	419	32	2.6	60.3	III
CP 2243	691	41	2.3	55.1	III
CP 2433	421	57	2.8	22.8	Reference
CP 2441	476	66	2.9	30.0	Reference
SY 2231					
SY 2243	989	78	2.5	45.1	II
SY 2433	441	77	2.6	16.8	Reference
SY 2441	506	108	2.8	19.9	Reference
2235	551	29	2.1	42.1	II
2241	1526	44	2.3	34.7	I
2242	1117	28	1.8	36.6	I
2243	966	47	2.7	36.4	I
2256	237	28	2.7	37.9	I

Station	Abundance	# Taxa	S-W Diversity	BRI-E	BRI-E Level
2257	503	37	2.3	38.1	I
2258	826	36	2.3	43.2	II
2260	2263	49	1.8	39.1	I
2265	1543	48	2.4	26.7	Reference
N	16	16	16	16	
Minimum	237	28	1.8	17	
Maximum	2263	108	2.9	60	
Mean	842	50	2.4	37	
Std dev	544	22	0.3	12	
RSD	65%	44%	14%	32%	
95% PL	239	22	1.8	57.7	

SCCWRP and U.S. Navy, 2005b

The benthic community ranking criteria was originally developed for the sediment quality site assessment work for the mouth of Chollas Creek and Paleta Creek TMDLs (SCCWRP and U.S. Navy, 2005b). SCCWRP, U.S. Navy, and the San Diego Water Board developed the criteria with input from NRTAs, non-governmental environmental groups, the Port, and the City of San Diego.

The BRI-E threshold scores evidence are weighed higher because: (1) they are a comprehensive measure of benthic community health developed specifically for bays and harbors in Southern California, (2) the indices remove much of the subjectivity associated with interpreting the benthic community structure data, and (3) the indices provide a simple means of communicating complex benthic community structure data to the public and regulatory managers. The category ranking criteria for benthic community composition is depicted in Figure 18-3. A comparison of the benthic community metrics at each Shipyard Sediment Site station to the Reference Pool 95% prediction limits is shown in Table 18-12. The benthic community line-of-evidence results for each Shipyard Sediment Site station using the Reference Pool comparison are shown in Table 18-13 and the supporting calculations are provided in the Appendix for Section 18.

Figure 18-3 Benthic Community Lines of Evidence Characteristics

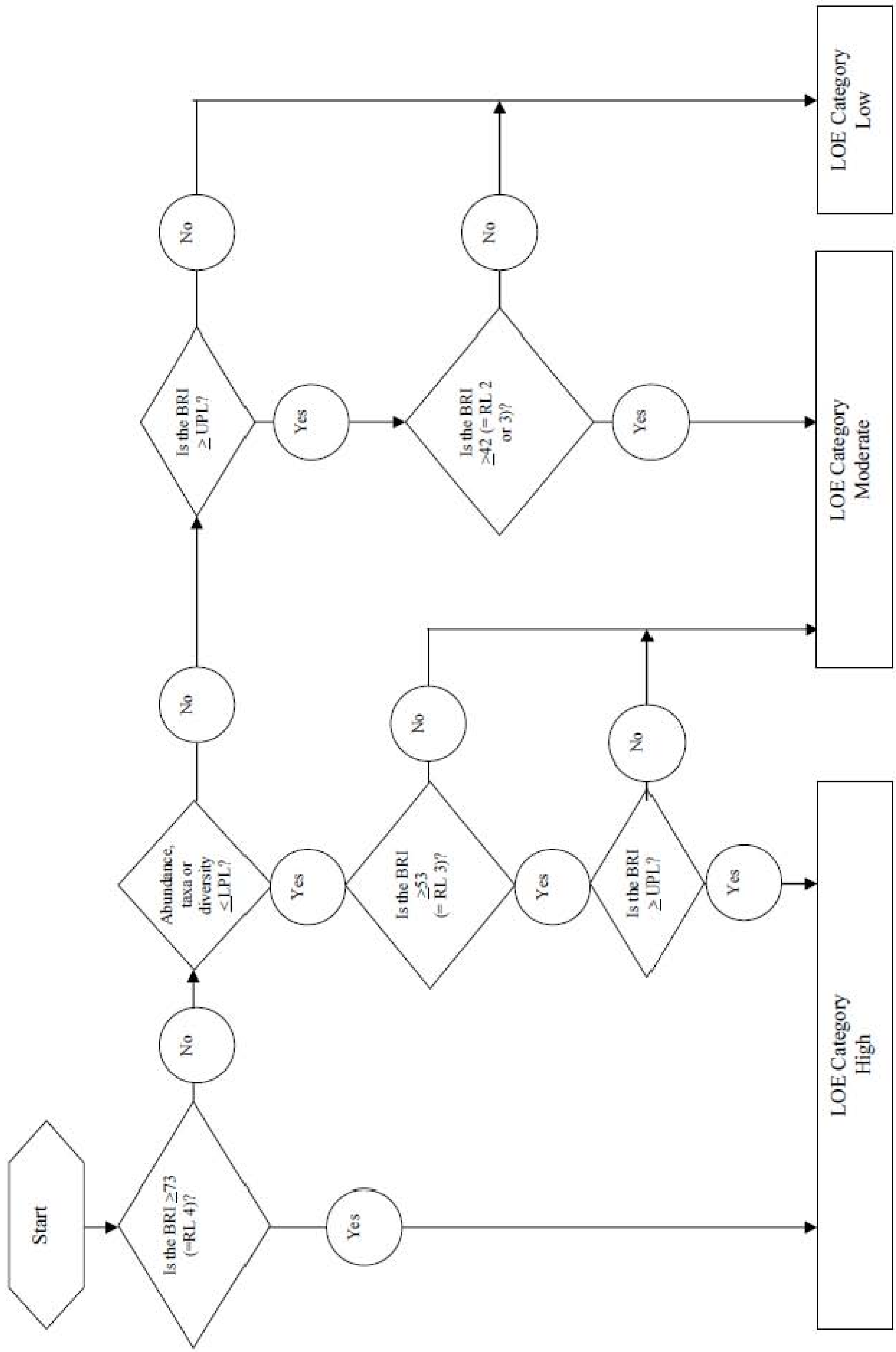

Table 18-12 Comparison of the Benthic Community Metrics Data from the Shipyard Sediment Site Stations to the Reference Pool 95% Predictive Limits

Site	Station	BRI (95% UPL = 57.7)	Abundance[1] (95% LPL = 239)	# Taxa[1] (95% LPL = 22)	S-W Diversity[1] (95% LPL = 1.8)
NASSCO	NA01	42.2	447	33	2.8
	NA03	45.5	492	40	3.0
	NA04	49.6	285	25	2.5
	NA05	44.4	569	35	2.4
	NA06	54.4	611	37	2.7
	NA07	44.6	475	43	3.0
	NA09	51.1	862	44	2.6
	NA11	46.0	604	33	2.4
	NA12	42.6	538	37	2.7
	NA15	51.0	306	26	2.3
	NA16	48.0	522	33	2.6
	NA17	55.3	418	33	2.7
	NA19	46.7	828	43	2.7
	NA20	54.0	412	**22**	2.3
	NA22[2]	51.6	**107**	**15**	2.2
BAE Systems	SW02	52.1	976	39	2.4
	SW03	49.9	361	31	2.8
	SW04	41.1	3,175	36	**1.6**
	SW08	41.5	2,457	41	2.4
	SW09	53.2	572	39	2.7
	SW11	42.4	777	44	2.9
	SW13	43.6	742	53	3.2
	SW15	37.8	806	59	3.1
	SW17	45.7	621	30	2.4
	SW18	39.5	829	42	2.8
	SW21	53.2	315	24	2.4
	SW22	55.1	363	26	2.4
	SW23	50.0	316	27	2.6
	SW25	41.3	611	40	2.8
	SW27	42.9	927	48	2.9

1. For the BRI-E, index scores greater than the 95% upper prediction limit are bold faced and shaded. For the abundance, # taxa, and S-W diversity metrics, metric scores less than or equal to their respective 95% lower prediction limits are bold faced and shaded.
2. NA22 was omitted from this analysis because it falls within an area that is being evaluated as part of the TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas Creek TMDL and is not considered part of the Shipyard Sediment Site for purposes of the CAO.

Table 18-13 Benthic Community Line-of-Evidence Results

Station	Benthic Response Index				Abundance	# Taxa	S-W Diversity	LOE Category
	≥ 73	≥ 53	≥ 42	≥ 95% UPL	≤ 95% LPL	≤ 95% LPL	≤ 95% LPL	
NA01	No	No	Yes	No	No	No	No	**Low**
NA03	No	No	Yes	No	No	No	No	**Low**
NA04	No	No	Yes	No	No	No	No	**Low**
NA05	No	No	Yes	No	No	No	No	**Low**
NA06	No	Yes	Yes	No	No	No	No	**Low**
NA07	No	No	Yes	No	No	No	No	**Low**
NA09	No	No	Yes	No	No	No	No	**Low**
NA11	No	No	Yes	No	No	No	No	**Low**
NA12	No	No	Yes	No	No	No	No	**Low**
NA15	No	Yes	Yes	No	No	No	No	**Low**
NA16	No	No	Yes	No	No	No	No	**Low**
NA17	No	No	Yes	No	No	No	No	**Low**
NA19	No	No	No	No	No	No	No	**Low**
NA20	No	No	Yes	No	No	Yes	No	**Moderate**
NA22[1]	No	No	Yes	No	Yes	Yes	No	**Moderate**
SW02	No	No	Yes	No	No	No	No	**Low**
SW03	No	No	No	No	No	No	No	**Low**
SW04	No	Yes	Yes	No	No	No	Yes	**Moderate**
SW08	No	No	Yes	No	No	No	No	**Low**
SW09	No	No	Yes	No	No	No	No	**Low**
SW11	No	No	No	No	No	No	No	**Low**
SW13	No	No	Yes	No	No	No	No	**Low**
SW15	No	No	No	No	No	No	No	**Low**
SW17	No	No	No	No	No	No	No	**Low**
SW18	No	No	No	No	No	No	No	**Low**
SW21	No	No	Yes	No	No	No	No	**Low**
SW22	No	No	Yes	No	No	No	No	**Low**
SW23	No	No	Yes	No	No	No	No	**Low**
SW25	No	No	Yes	No	No	No	No	**Low**
SW27	No	No	Yes	No	No	No	No	**Low**

1. NA22 was omitted from this analysis because it falls within an area that is being evaluated as part of the TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas Creek TMDL and is not considered part of the Shipyard Sediment Site for purposes of the CAO.

The low, moderate, and high ranking benthic community health classification criteria are based on the following two key assumptions (SCCWRP and U.S. Navy, 2005b):

- The assumption is made that no, or a low degree of benthic community degradation is present when the station BRI is Response Level 1 (< RL 2) or is statistically similar to the Reference Condition; and

- A high degree of benthic community degradation at a station is assumed to be present at BRI Response Levels (RLs) greater than 3 or when other indicators also show benthic community structure impacts.

The benthic community structure line of evidence category ranking from the SCCWRP and U.S. Navy (2005b) report are presented below and in Figure 18-3of this report. The same ranking criteria from the SCCWRP and U.S. Navy (2005b) report are used to evaluate the benthic community indices from the Shipyard Sediment Site investigation.

Low Degree of Benthic Community Degradation: Benthic community degradation at each station is classified as none or a low if the BRI RL is less than 2 and when abundance, number of taxa, and the Shannon-Weiner Diversity Index are all statistically similar to the Reference Condition.

Moderate Degree of Benthic Community Degradation: The benthic community is classified as moderately degraded at stations exhibiting a BRI RL 2 or 3 and is statistically greater degradation than the Reference Condition, or, if any one of the other benthic community metrics is below the 95% PL established by the Reference Condition.

High Degree of Benthic Community Degradation: The benthic community is classified as highly degraded at stations with a BRI greater than RL 3. The benthic community is also classified as highly degraded at stations with BRI RL 2, the results are statistically greater than Reference Condition, and at least one of the other benthic community metrics is below the 95 percent PL established by the Reference Condition.

To determine the likelihood of benthic community impairment (Likely, Possible, or Unlikely), each line of evidence ranking (Low, Moderate, or High) is put into the Weight-of-Evidence Analysis framework described in Section 18.5 below.

18.5. Weight-of-Evidence Criteria

The three line of evidence (LOE) assessments for sediment chemistry, toxicity, and benthic community described in DTR Sections 18.2, 18.3 and 18.4, respectively, were integrated into an overall weight-of-evidence (WOE) assessment to identify the likelihood that the benthic community is adversely impacted at a given Shipyard Sediment Site station due to the presence of CoPCs in the sediment. This WOE assessment follows the general principles of the “Sediment Quality Triad Approach” described in a U.S. EPA compendium of “scientifically valid and accepted methods” used to assess sediment quality (U.S. EPA, 1992a). Potential combinations of the rankings for individual LOE were assessed and assigned a relative overall likelihood of benthic community impairment using three categories "Unlikely", "Possible" and "Likely" similar to the WOE approach described in "Sediment Assessment Study for the Mouth of Chollas and Paleta Creek, Phase 1 Final Report, May 2005" (SCCWRP and U.S. Navy, 2005b).

The WOE framework used to interpret the various combinations is shown in Table 18-14, and is based on the consideration of four key elements:

- Level of confidence or weight given to the individual line of evidence
- Whether the line of evidence indicates there is an effect
- Magnitude or consistency of the effect
- Concurrence among the various lines of evidence.

The three categories of impairment are described below:

Unlikely - A station was classified as "Unlikely" if the individual LOE provided no evidence of biological effects due to elevated CoPCs (relative to the reference condition) at the site. This category was assign***e***d to all stations with a "Low" chemistry LOE ranking, regardless of the presence of biological effects, because there was no evidence that effects were related to site-specific contamination. Similarly, stations having a "Moderate" ranking for chemistry and a "Low" ranking for biological effects were also classified as "Unlikely." The category of "Unlikely" does not mean that there was no impairment, but that the impairment was not clearly linked to site related chemical exposure.

Possible - A station was classified as "Possible" when there was a lack of concurrence among the LOE, which indicates less confidence in the interpretation of the results. This category was assigned to stations with moderate chemistry and a lack of concurrence among the biological effects LOE (i.e., effects present in only one of two LOE). Intermediate chemistry rankings have less certainty for predicting biological effects. The lack of concurrence between the toxicity and benthic community measures indicates a lower degree of confidence that the biological effects observed were due to CoPCs at the site; and that these effects could have been caused by other factors (e.g., physical disturbance or natural variations in sediment characteristics). The category of "Possible" represents situations where impairment was indicated, but there was less confidence in the reliability of the results. Of the three categories listed, stations in this group would be more likely to change their category as a result of natural variability, changes in the composition of the reference stations used for comparison, or to differences in the criteria used to classify each LOE.

Likely - A station was classified as "Likely" if there was a high level of agreement between observed biological effects and elevated CoPCs at the site. Concurrence among the three LOE (i.e., the presence of moderate or high rankings for chemistry, toxicity, and benthic community) always resulted in a classification of likely impairment. This classification was also assigned when the chemistry LOE was "High" and biological effects were present in either the toxicity or benthic community LOE.

For example, a station with a "High" ranking for chemistry, toxicity and benthic community would indicate a "High" likelihood of site-specific aquatic life impairment because each LOE indicates an effect, the magnitude of the effect is consistently high, and there is clear concurrence among the LOE. Alternatively, a station with a "Low" ranking for chemistry, and moderate or high rankings for toxicity and benthic community would indicate unlikely site-specific aquatic life impairment from site CoPCs, because there is no concurrence with site CoPCs. This does not mean that there is no impairment, but that the impairment is not clearly linked to site related chemical exposure.

The WOE framework in Table 18 -14 was used to interpret the MLOE results and is consistent with other published WOE frameworks. The results of the WOE assessment for each Shipyard Sediment Site station are presented in Table 18-1.

Table 18-14 Weight-of-Evidence Analysis Framework for the Aquatic Life Impairment Assessment

Sediment Chemistry[1]	Toxicity[2]	Benthic Community[3]	Relative Likelihood of Benthic Community Impairment[4]
High	High	High	Likely
High	High	Moderate	
High	Moderate	High	
Moderate	High	High	
High	High	Low	
High	Low	High	
High	Moderate	Moderate	
Moderate	High	Moderate	
Moderate	Moderate	High	
Moderate	Moderate	Moderate	
High	Moderate	Low	
High	Low	Moderate	
Moderate	High	Low	
Moderate	Low	High	
Moderate	Moderate	Low	Possible
Moderate	Low	Moderate	
High	Low	Low	
Low	High	High	Unlikely
Low	High	Moderate	
Low	Moderate	High	
Low	Moderate	Moderate	
Low	Low	High	
Low	High	Low	
Low	Low	Moderate	
Low	Moderate	Low	
Moderate	Low	Low	
Low	Low	Low	

1. Relative likelihood that the contaminants present in the sediment is adversely impacting organisms living in or on the sediment (i.e., benthic community).
2. Relative likelihood of toxic effects based on the combined toxic response from three tests: amphipod survival, sea urchin fertilization, and bivalve development.
3. Relative likelihood of benthic community degradation based on four metrics: total abundance, total number of species, Shannon-Wiener Diversity Index, and the Benthic Response Index.
4. Relative likelihood that the health of the benthic community is adversely impacted based on the three lines of evidence: sediment chemistry, toxicity, and benthic community.

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for
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APPENDIX FOR SECTION 18

SUPPORTING CALCULATIONS FOR SEDIMENT QUALITY TRIAD RESULTS

March 14, 2012

APPENDIX FOR SECTION 18

SUPPORTING CALCULATIONS FOR SEDIMENT QUALITY TRIAD RESULTS

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SECTION I

UPL CALCULATIONS FOR TABLES 18-4 AND 18-5

Table A18-1 Surface Sediment UPL Calculations for Tables 18-4 and 18-5

Station	Surface Sediment UPL Calculations																						
	Arsenic[3]	Cadmium[3]	Chromium[3]	Copper[3]	Lead[3]	Mercury[3]	Nickel[3]	Selenium	Silver[3]	Zinc[3]	Total PCB Congeners[4]	Natural Log Total PCB Congeners	Total PAH (PPAH)[4]	Natural Log Total PAH (PPAH)	Fairey TPAH[1]	HPAH[4]	Natural Log HPAH	TOC	Fairey TPAHOC	Fairey Total PCB[2]	MBT	DBT	TBT	TetBT
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg		ug/kg		ug/kg	ug/kg		%	mg/kgOC	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
CP 2231	7.8	0.03	46.6	71.1	40.3	0.36	11.5	NA	0.29	129.0	42.7	3.76	1063	6.97	839.9	536.0	6.28	1.00	84.0	55.8	NA	NA	NA	NA
CP 2238	7.8	0.13	59.2	71.0	28.8	0.26	16.5	NA	0.51	214.3	11.4	2.44	199	5.29	149.9	199.0	5.29	1.01	14.8	13.6	NA	NA	NA	NA
CP 2243	5.9	0.14	40.2	56.4	30.7	0.33	10.2	NA	0.65	125.0	20.7	3.03	267	5.59	197.1	118.0	4.77	0.56	35.2	25.1	NA	NA	NA	NA
CP 2433	5.6	0.29	42.2	43.3	23.3	0.25	11.2	NA	0.38	114.5	27.1	3.30	780	6.66	644.7	415.0	6.03	0.53	121.6	33.9	NA	NA	NA	NA
CP 2441	8.8	0.41	54.0	78.4	26.7	0.24	17.5	NA	0.39	143.0	33.5	3.51	2143	7.67	1912.4	1210.0	7.10	1.82	105.1	39.5	NA	NA	NA	NA
SY 2231	8.3	0.10	37.0	82.0	42.0	0.43	10.0	0.45	0.26	120.0	77.1	4.34	687	6.53	520.0	235.0	5.46	1.30	40.0	113.6	9.6	15.0	15.0	1.2
SY 2243	4.3	0.12	23.0	47.0	21.0	0.25	5.6	0.55	0.56	93.0	22.4	3.11	204	5.32	138.7	56.0	4.02	0.51	27.2	35.1	2.7	5.3	2.6	0.8
SY 2433	4.6	0.29	24.0	40.0	19.0	0.21	7.4	0.55	0.39	92.0	20.8	3.04	486	6.19	380.0	169.5	5.13	0.67	56.7	31.6	3.5	9.4	3.3	0.8
SY 2441	5.4	0.29	22.0	37.0	13.0	0.16	9.9	1	0.24	80.0	10.5	2.36	343	5.84	280.0	117.2	4.76	1.10	25.5	15.9	0.9	5.2	3.7	0.9
2235	6.4	0.10	37.5	58.2	21.3	0.24	10.7	NA	0.48	136.0	49.8	3.91	234	5.46	198.0	76.5	4.34	0.64	30.9	35.2	NA	NA	NA	NA
2241	4.5	0.09	27.5	59.2	26.3	0.21	7.3	NA	0.54	103.7	49.8	3.91	234	5.46	198.0	76.5	4.34	0.52	38.3	35.2	NA	NA	NA	NA
2242	4.3	0.10	25.4	42.0	17.8	0.30	6.8	NA	0.49	89.8	49.8	3.91	359	5.88	292.4	126.8	4.84	0.74	39.4	35.2	NA	NA	NA	NA
2243	3.7	0.10	20.8	38.8	19.9	0.24	5.1	NA	0.50	81.2	49.8	3.91	234	5.46	198.0	76.5	4.34	0.49	40.7	35.2	NA	NA	NA	NA
2256	7.5	0.20	54.3	128.0	54.1	0.63	14.3	NA	1.29	197.0	49.8	3.91	424	6.05	357.6	174.4	5.16	1.26	28.4	35.2	NA	NA	NA	NA
2257	9.1	0.18	66.7	157.0	64.1	0.51	18.7	NA	1.25	233.0	50.9	3.93	505	6.22	428.3	215.9	5.37	1.63	26.2	37.6	NA	NA	NA	NA
2258	7.8	0.16	60.0	143.0	53.0	0.66	16.4	NA	0.95	211.0	49.8	3.91	463	6.14	396.6	197.9	5.29	1.44	27.5	35.2	NA	NA	NA	NA
2260	4.1	0.09	23.9	50.8	20.4	0.22	7.1	NA	0.45	87.5	49.8	3.91	234	5.46	198.0	76.5	4.34	0.51	38.6	35.2	NA	NA	NA	NA
2265	2.5	0.07	1.5	18.0	12.0	0.07	1.5	NA	0.19	43.2	49.8	3.91	234	5.46	198.0	76.5	4.34	0.35	55.9	35.2	NA	NA	NA	NA
N	18	18	18	18	18	18	18	4	18	18	9	9	18	18	18	18	18	18	18.0	18.0	4	4	4	4
Minimum	2.5	0.03	1.5	18.0	12.0	0.07	1.5	0.45	0.19	43.2	10.5	2.36	199	5.29	138.7	56	4.02	0.35	14.8	13.6	0.90	5.20	2.60	0.80
Maximum	9.1	0.41	66.7	157.0	64.1	0.66	18.7	1.00	1.29	233.0	77.1	4.34	2143	7.67	1912.4	1210	7.10	1.82	121.6	113.6	9.60	15.00	15.00	1.20
Mean	6.0	0.16	37.0	67.8	29.6	0.31	10.4	0.64	0.55	127.4	29.6	3.21	505	5.98	418.2	231	5.07	0.89	46.4	38.0	4.18	8.73	6.15	0.93
Std Dev	2.0	0.10	17.4	38.3	15.0	0.16	4.7	0.25	0.32	53.4	20.5	0.62	471	0.65	416.9	275	0.80	0.44	28.9	20.9	3.78	4.62	5.92	0.19
RSD	33%	62%	47%	56%	51%	51%	45%	39%	58%	42%	69%	19%	93%	11%	100%	119%	16%	50%	62%	55%	90%	53%	96%	20%
95% PL	**7.5**	**0.33**	**57**	**121**	**53**	**0.57**	**15**	NA	**1.1**	**192**	**84**	4.4	**1264**	7.1	NA	**663**	6.5	NA	NA	NA	14.1	20.9	21.7	1.4

1. Sum of PAHs in accordance with Fairey et al., 2001
2. Estimated as the sum of 15 congeners increased by 21.2% (Shipyard data) or 9.5% (CP and B98 data) to estimate the sum of 18 congeners and then multiplied by 2 to estimate total PCBs in accordance with Fairey et al., 2001
3. Metal prediction limit values derived from the Chollas/Paleta fines-metals regression at 50% fines
4. Prediction Limit values derived from the natural log transformed reference station data

Table A18-2 SQG Ratios for Tables 18-4 and 18-5

Station	SQG Ratios: Cadmium	Copper	Lead	Silver	Zinc	Fairey TPAHOC	Fairey Total PCB	SUM	SQGQ1[1]	Natural Log SQGQ1[1]
	SQGQ1 SQGs (Same Units as Surface Sediment Chemistry)									
	4.21	270	112.18	1.77	410	1800	400			
CP 2231	0.01	0.26	0.36	0.16	0.31	0.05	0.14	1.29	0.18	-1.690
CP 2238	0.03	0.26	0.26	0.29	0.52	0.01	0.03	1.40	0.20	-1.606
CP 2243	0.03	0.21	0.27	0.37	0.30	0.02	0.06	1.27	0.18	-1.706
CP 2433	0.07	0.16	0.21	0.22	0.28	0.07	0.08	1.08	0.15	-1.864
CP 2441	0.10	0.29	0.24	0.22	0.35	0.06	0.10	1.35	0.19	-1.645
SY 2231	0.02	0.30	0.37	0.15	0.29	0.02	0.28	1.45	0.21	-1.576
SY 2243	0.03	0.17	0.19	0.32	0.23	0.02	0.09	1.04	0.15	-1.911
SY 2433	0.07	0.15	0.17	0.22	0.22	0.03	0.08	0.94	0.13	-2.006
SY 2441	0.07	0.14	0.12	0.14	0.20	0.01	0.04	0.71	0.10	-2.293
2235	0.02	0.22	0.19	0.27	0.33	0.02	0.09	1.13	0.16	-1.820
2241	0.02	0.22	0.23	0.30	0.25	0.02	0.09	1.14	0.16	-1.814
2242	0.02	0.16	0.16	0.28	0.22	0.02	0.09	0.94	0.13	-2.003
2243	0.02	0.14	0.18	0.28	0.20	0.02	0.09	0.94	0.13	-2.009
2256	0.05	0.47	0.48	0.73	0.48	0.02	0.09	2.32	0.33	-1.106
2257	0.04	0.58	0.57	0.71	0.57	0.01	0.09	2.58	0.37	-0.999
2258	0.04	0.53	0.47	0.54	0.51	0.02	0.09	2.20	0.31	-1.159
2260	0.02	0.19	0.18	0.26	0.21	0.02	0.09	0.97	0.14	-1.976
2265	0.02	0.07	0.11	0.11	0.11	0.03	0.09	0.52	0.07	-2.594
									18	18
									0.07	-2.59
									0.37	-1.00
									0.18	-1.77
									0.08	0.40
									42%	-23%
									0.35	-1.05

1. Calculated in accordance with Fairey et al., 2001 but adjusted for only 7 chemicals by dividing by 7 instead of 9

Table A18-3 Data Set Used for Tables A18-1 and A18-2

Station	Reference Station Average Surface Sediment Concentration																						
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH (PPAH)	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	MBT	DBT	TBT	TetBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
CP 2231	7.78	0.025	46.6	71.1	40.3	0.364	11.5	NA	0.288	129.0	536.0	1063.0	839.9	1.00	42.7	2231	25.5	27.9	55.8	NA	NA	NA	NA
CP 2238	7.80	0.133	59.2	71.0	28.8	0.262	16.5	NA	0.510	214.3	199.0	199.0	149.9	1.01	11.4	2238	6.2	6.8	13.6	NA	NA	NA	NA
CP 2243	5.94	0.143	40.2	56.4	30.7	0.332	10.2	NA	0.651	125.0	118.0	267.0	197.1	0.56	20.7	2243	11.4	12.5	25.1	NA	NA	NA	NA
CP 2433	5.55	0.288	42.2	43.3	23.3	0.251	11.2	NA	0.385	114.5	415.0	780.0	644.7	0.53	27.1	2433	15.5	17.0	33.9	NA	NA	NA	NA
CP 2441	8.82	0.411	54.0	78.4	26.7	0.238	17.5	NA	0.388	143.0	1210.0	2143.0	1912.4	1.82	33.5	2441	18.0	19.7	39.5	NA	NA	NA	NA
SY 2231	8.30	0.100	37.0	82.0	42.0	0.430	10.0	0.45	0.260	120.0	235.0	687.0	520.0	1.30	77.1	2231	46.9	56.8	113.6	9.6	15	15	1.2
SY 2243	4.30	0.120	23.0	47.0	21.0	0.250	5.6	0.55	0.560	93.0	56.0	204.0	138.7	0.51	22.4	2243	14.5	17.6	35.1	2.7	5.3	2.6	0.8
SY 2433	4.60	0.290	24.0	40.0	19.0	0.210	7.4	0.55	0.390	92.0	169.5	486.0	380.0	0.67	20.8	2433	13.0	15.8	31.6	3.5	9.4	3.3	0.8
SY 2441	5.40	0.290	22.0	37.0	13.0	0.160	9.9	1	0.240	80.0	117.2	343.0	280.0	1.10	10.5	2441	6.6	7.9	15.9	0.9	5.2	3.7	0.9
2235	6.40	0.095	37.5	58.2	21.3	0.239	10.7	NA	0.476	136.0	76.5	234.0	198.0	0.64	49.8	2235	16.1	17.6	35.2	NA	NA	NA	NA
2241	4.53	0.088	27.5	59.2	26.3	0.213	7.3	NA	0.538	103.7	76.5	234.0	198.0	0.52	49.8	2241	16.1	17.6	35.2	NA	NA	NA	NA
2242	4.27	0.096	25.4	42.0	17.8	0.300	6.8	NA	0.493	89.8	126.8	358.7	292.4	0.74	49.8	2242	16.1	17.6	35.2	NA	NA	NA	NA
2243	3.66	0.101	20.8	38.8	19.9	0.239	5.1	NA	0.504	81.2	76.5	234.0	198.0	0.49	49.8	2243	16.1	17.6	35.2	NA	NA	NA	NA
2256	7.47	0.200	54.3	128.0	54.1	0.632	14.3	NA	1.290	197.0	174.4	424.2	357.6	1.26	49.8	2256	16.1	17.6	35.2	NA	NA	NA	NA
2257	9.08	0.175	66.7	157.0	64.1	0.511	18.7	NA	1.250	233.0	215.9	504.7	428.3	1.63	50.9	2257	17.2	18.8	37.6	NA	NA	NA	NA
2258	7.75	0.161	60.0	143.0	53.0	0.664	16.4	NA	0.954	211.0	197.9	462.9	396.6	1.44	49.8	2258	16.1	17.6	35.2	NA	NA	NA	NA
2260	4.06	0.092	23.9	50.8	20.4	0.216	7.1	NA	0.452	87.5	76.5	234.0	198.0	0.51	49.8	2260	16.1	17.6	35.2	NA	NA	NA	NA
2265	2.48	0.069	1.5	18.0	12.0	0.065	1.5	NA	0.192	43.2	76.5	234.0	198.0	0.35	49.8	2265	16.1	17.6	35.2	NA	NA	NA	NA

Values updated due to averaging or calculation discrepencies identified in the original Chollas/Paleta TMDL analysis

SECTION II

SEDIMENT CHEMISTRY LINE-OF-EVIDENCE RESULTS FOR TABLE 18-6 AND FIGURE 18-1

Table A18-4 Surface Sediment Concentrations for Table 18-6 and Figure 18-1

Station	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc	Total PCB Congeners	Total PAH	Fairey TPAH[1]	TOC	Fairey TPAHOC	Fairey Total PCB[2]
	Surface Sediment Concentrations															
Units	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**%**	**mg/kgOC**	**ug/kg**
UPL	**7.5**	**0.33**	**57**	**121**	**53**	**0.57**	**15**	**NA**	**1.1**	**192**	**84**	**1264**	**NA**	**NA**	**NA**	**NA**
NA01	10.2	0.24	70	253	84	1.06	15	1.1	1.3	298	375	7050	5580	2.18	256	581
NA03	11.0	0.29	69	220	94	1.10	18	1.1	1.4	260	370	6600	5244	2.33	225	575
NA04	12.0	0.27	73	260	93	1.10	19	1.1	1.2	310	250	3700	2819	2.04	138	382
NA05	9.5	0.17	57	170	65	0.61	15	0.4	0.9	210	180	3000	2277	1.60	142	281
NA06	10.5	0.27	62	395	130	2.35	15	1.1	1.0	335	640	4050	3235	2.14	151	970
NA07	13.5	0.27	61	225	100	1.45	16	0.9	1.2	255	495	16500	13734	2.02	682	751
NA09	13.0	0.40	75	260	97	1.20	20	1.2	1.1	330	290	3000	2248	2.26	99	456
NA11	9.3	0.28	59	180	73	0.85	15	1.0	1.1	230	190	3000	2391	1.69	141	294
NA12	9.5	0.18	54	150	59	0.62	15	1.1	0.8	210	150	2200	1700	1.48	115	236
NA15	12.0	0.25	62	250	83	0.98	16	1.0	1.3	310	340	3600	2714	1.95	139	518
NA16	10.5	0.36	70	253	90	1.09	16	1.0	1.4	313	590	3500	2676	2.00	134	891
NA17	14.5	0.41	74	510	115	0.85	18	1.1	1.3	620	550	3200	2496	2.03	123	822
NA19	14.0	0.37	65	270	100	0.78	17	1.0	1.1	450	990	3200	2415	1.84	131	1471
NA20	6.6	0.44	26	96	53	0.24	8	1.0	0.5	190	120	3200	2639	1.42	186	179
NA22	8.5	0.46	39	150	95	0.38	12	1.1	0.9	230	180	4000	3317	1.65	201	271
SW02	13.8	3.18	119	580	170	4.45	106	1.3	3.9	585	5450	21250	19460	5.98	326	8028
SW03	11.0	0.70	52	190	79	1.20	18	0.8	1.2	230	410	7500	6134	3.11	197	622
SW04	73.0	1.95	88	1500	430	1.75	18	1.5	1.6	3450	4000	16000	14109	2.28	619	6002
SW08	24.0	0.73	83	920	225	2.25	21	1.2	1.5	830	2100	28500	24759	3.80	651	3171
SW09	27.0	1.10	56	660	220	0.96	18	0.8	1.3	1200	710	20000	17383	1.94	896	1081
SW11	9.6	0.24	62	170	74	0.75	17	0.4	1.1	240	200	8500	7001	1.81	387	307
SW13	15.0	0.42	72	800	93	0.86	24	1.1	1.4	580	490	14000	12507	2.33	537	755
SW15	11.0	0.45	67	230	90	0.90	19	1.1	1.3	290	380	8400	7137	2.31	309	574
SW17	12.0	0.37	73	270	93	0.98	20	0.4	1.5	310	540	11000	9199	2.53	364	806
SW18	11.0	0.33	74	220	86	0.75	20	0.4	1.3	280	440	8800	7471	2.19	341	669
SW21	11.0	0.51	70	260	120	1.40	14	1.0	1.3	330	2400	10000	8480	2.10	404	3614
SW22	13.0	0.35	70	260	110	1.10	21	1.1	1.3	310	900	13000	10684	2.46	434	1399
SW23	15.0	0.37	89	280	110	1.00	25	1.1	1.3	330	1000	12000	9880	2.52	392	1552
SW25	11.5	0.36	65	230	86	0.78	17	1.0	1.2	345	350	8800	7505	2.15	349	536
SW27	10.0	0.27	63	210	80	0.68	18	0.4	1.1	250	200	14000	12055	2.08	580	311

1. Sum of PAHs in accordance with Fairey et al., 2001
2. Estimated as the sum of 15 congeners increased by 21.2% to estimate the sum of 18 congeners and then multiplied by 2 to estimate total PCBs in accordance with Fairey et al., 2001

Table A18-5 Ratios for Table 18-6 and Figure 18-1

Station	SQG Ratios: Cadmium	Copper	Lead	Silver	Zinc	Fairey TPAHOC	Fairey Total PCB	SUM	SQGQ1 [1]
	SQGQ1 SQGs (Same Units as Surface Sediment Chemistry)								
	4.21	270	112.18	1.77	410	1800	400	UPL=	0.35
NA01	0.06	0.94	0.75	0.75	0.73	0.14	1.45	4.81	0.69
NA03	0.07	0.81	0.84	0.79	0.63	0.13	1.44	4.71	0.67
NA04	0.06	0.96	0.83	0.68	0.76	0.08	0.95	4.32	0.62
NA05	0.04	0.63	0.58	0.50	0.51	0.08	0.70	3.05	0.44
NA06	0.06	1.46	1.16	0.57	0.82	0.08	2.43	6.59	0.94
NA07	0.06	0.83	0.89	0.65	0.62	0.38	1.88	5.32	0.76
NA09	0.10	0.96	0.86	0.62	0.80	0.06	1.14	4.54	0.65
NA11	0.07	0.67	0.65	0.62	0.56	0.08	0.74	3.38	0.48
NA12	0.04	0.56	0.53	0.45	0.51	0.06	0.59	2.74	0.39
NA15	0.06	0.93	0.74	0.73	0.76	0.08	1.30	4.59	0.66
NA16	0.09	0.94	0.80	0.76	0.76	0.07	2.23	5.65	0.81
NA17	0.10	1.89	1.03	0.73	1.51	0.07	2.05	7.38	1.05
NA19	0.09	1.00	0.89	0.62	1.10	0.07	3.68	7.45	1.06
NA20	0.10	0.36	0.47	0.30	0.46	0.10	0.45	2.25	0.32
NA22	0.11	0.56	0.85	0.51	0.56	0.11	0.68	3.38	0.48
SW02	0.75	2.15	1.52	2.20	1.43	0.18	20.07	28.30	4.04
SW03	0.17	0.70	0.70	0.68	0.56	0.11	1.55	4.48	0.64
SW04	0.46	5.56	3.83	0.90	8.41	0.34	15.00	34.52	4.93
SW08	0.17	3.41	2.01	0.82	2.02	0.36	7.93	16.72	2.39
SW09	0.26	2.44	1.96	0.73	2.93	0.50	2.70	11.53	1.65
SW11	0.06	0.63	0.66	0.62	0.59	0.21	0.77	3.54	0.51
SW13	0.10	2.96	0.83	0.79	1.41	0.30	1.89	8.28	1.18
SW15	0.11	0.85	0.80	0.73	0.71	0.17	1.44	4.81	0.69
SW17	0.09	1.00	0.83	0.85	0.76	0.20	2.02	5.74	0.82
SW18	0.08	0.81	0.77	0.73	0.68	0.19	1.67	4.94	0.71
SW21	0.12	0.96	1.07	0.73	0.80	0.22	9.04	12.95	1.85
SW22	0.08	0.96	0.98	0.73	0.76	0.24	3.50	7.26	1.04
SW23	0.09	1.04	0.98	0.73	0.80	0.22	3.88	7.74	1.11
SW25	0.08	0.85	0.76	0.68	0.84	0.19	1.34	4.75	0.68
SW27	0.06	0.78	0.71	0.62	0.61	0.32	0.78	3.89	0.56

Table A18-6 Contaminants Exceeding Individual SQG and UPL for Table 18-6 and Figure 18-1

Station	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	TPAH	TPCB	Number > SQG and UPL
	Contaminants Exceeding Individual SQG and UPL											
	Individual Chemical SQGs (Same Units as Surface Sediment Chemistry)											
	70	9.6	370	270	218	0.71	51.6	3.7	410	1800	400	
NA01	0	0	0	0	0	1	0	0	0	0	1	2
NA03	0	0	0	0	0	1	0	0	0	0	1	2
NA04	0	0	0	0	0	1	0	0	0	0	0	1
NA05	0	0	0	0	0	0	0	0	0	0	0	0
NA06	0	0	0	1	0	1	0	0	0	0	1	3
NA07	0	0	0	0	0	1	0	0	0	0	1	2
NA09	0	0	0	0	0	1	0	0	0	0	1	2
NA11	0	0	0	0	0	1	0	0	0	0	0	1
NA12	0	0	0	0	0	0	0	0	0	0	0	0
NA15	0	0	0	0	0	1	0	0	0	0	1	2
NA16	0	0	0	0	0	1	0	0	0	0	1	2
NA17	0	0	0	1	0	1	0	0	1	0	1	4
NA19	0	0	0	1	0	1	0	0	1	0	1	4
NA20	0	0	0	0	0	0	0	0	0	0	0	0
NA22	0	0	0	0	0	0	0	0	0	0	0	0
SW02	0	0	0	1	0	1	1	1	1	0	1	6
SW03	0	0	0	0	0	1	0	0	0	0	1	2
SW04	1	0	0	1	1	1	0	0	1	0	1	6
SW08	0	0	0	1	1	1	0	0	1	0	1	5
SW09	0	0	0	1	1	1	0	0	1	0	1	5
SW11	0	0	0	0	0	1	0	0	0	0	0	1
SW13	0	0	0	1	0	1	0	0	1	0	1	4
SW15	0	0	0	0	0	1	0	0	0	0	1	2
SW17	0	0	0	1	0	1	0	0	0	0	1	3
SW18	0	0	0	0	0	1	0	0	0	0	1	2
SW21	0	0	0	0	0	1	0	0	0	0	1	2
SW22	0	0	0	0	0	1	0	0	0	0	1	2
SW23	0	0	0	1	0	1	0	0	0	0	1	3
SW25	0	0	0	0	0	1	0	0	0	0	1	2
SW27	0	0	0	0	0	0	0	0	0	0	0	0

Table A18-7 Chemistry Line of Evidence for Table 18-6 and Figure 18-1

Station	Chemistry Line of Evidence				
	SQGQ1>=1 and SQGQ1>=UPL?	SQGQ1<1 and >5 Chems Exceed SQG and UPL?	SQGQ1>=0.25 and SQGQ1>=UPL?	SQGQ1>=0.25 and >=1 Chem Exceeds SQG and UPL?	Chem Class
NA01	no	no	yes	no	Moderate
NA03	no	no	yes	no	Moderate
NA04	no	no	yes	no	Moderate
NA05	no	no	yes	no	Moderate
NA06	no	no	yes	no	Moderate
NA07	no	no	yes	no	Moderate
NA09	no	no	yes	no	Moderate
NA11	no	no	yes	no	Moderate
NA12	no	no	yes	no	Moderate
NA15	no	no	yes	no	Moderate
NA16	no	no	yes	no	Moderate
NA17	yes	no	no	no	High
NA19	yes	no	no	no	High
NA20	no	no	no	no	Low
NA22	no	no	yes	no	Moderate
SW02	yes	no	no	no	High
SW03	no	no	yes	no	Moderate
SW04	yes	no	no	no	High
SW08	yes	no	no	no	High
SW09	yes	no	no	no	High
SW11	no	no	yes	no	Moderate
SW13	yes	no	no	no	High
SW15	no	no	yes	no	Moderate
SW17	no	no	yes	no	Moderate
SW18	no	no	yes	no	Moderate
SW21	yes	no	no	no	High
SW22	yes	no	no	no	High
SW23	yes	no	no	no	High
SW25	no	no	yes	no	Moderate
SW27	no	no	yes	no	Moderate

Table A18-8 Data Set Used for Tables A18-4 through A18-7

Station	Pre-Remedy Average Surface Sediment Concentration																			
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
NA01	10.2	0.24	69.75	252.5	84	1.06	14.75	1.08	1.33	298	6575	7050	5580	2.18	375	533	240	290	580	157
NA02	10.0	0.21	67.00	170	76	0.70	18.00	1.00	1.00	240	2800	3000	2422	2.00	208	299	134	162	324	82
NA03	11.0	0.29	69.00	220	94	1.10	18.00	1.10	1.40	260	6100	6600	5244	2.33	370	520	237	287	574	180
NA04	12.0	0.27	73.00	260	93	1.10	19.00	1.10	1.20	310	3500	3700	2819	2.04	250	350	158	191	381	300
NA05	9.5	0.17	57.00	170	65	0.61	15.00	0.43	0.89	210	2800	3000	2277	1.60	180	250	116	140	280	110
NA06	10.5	0.27	61.50	395	130	2.35	14.50	1.05	1.02	335	3800	4050	3235	2.14	640	935	400	484	969	225
NA07	13.5	0.27	60.50	225	100	1.45	16.00	0.90	1.15	255	15850	16500	13734	2.02	495	710	310	375	749	111
NA08	18.0	0.31	79.00	270	96	0.82	21.00	1.20	1.00	330	3500	3800	2928	2.18	310	430	197	238	476	110
NA09	13.0	0.40	75.00	260	97	1.20	20.00	1.20	1.10	330	2800	3000	2248	2.26	290	410	188	228	455	120
NA10	6.9	0.22	52.00	160	59	0.58	14.00	1.00	0.78	190	1800	1900	1438	1.18	160	230	100	120	241	91
NA11	9.3	0.28	59.00	180	73	0.85	15.00	1.00	1.10	230	2800	3000	2391	1.69	190	270	121	147	294	38
NA12	9.5	0.18	54.00	150	59	0.62	15.00	1.10	0.79	210	2000	2200	1700	1.48	150	220	97	118	235	80
NA13	10.8	0.24	59.00	185	75	0.65	15.50	1.00	0.94	295	1800	1950	1511	1.92	173	265	113	137	273	68
NA14	9.0	0.25	56.00	130	66	0.55	15.00	1.10	0.78	200	1100	1200	963	1.82	128	183	82	99	199	45
NA15	12.0	0.25	62.00	250	83	0.98	16.00	1.00	1.30	310	3300	3600	2714	1.95	340	480	214	259	517	670
NA16	10.5	0.36	70.25	252.5	90	1.09	15.75	1.03	1.35	313	3200	3500	2676	2.00	590	665	368	445	890	175
NA17	14.5	0.41	74.00	510	115	0.85	17.50	1.10	1.30	620	2950	3200	2496	2.03	550	620	339	410	821	1350
NA18	14.0	0.36	67.00	230	97	0.79	17.00	1.00	1.00	380	2400	2600	1957	2.04	350	490	221	268	536	210
NA19	14.0	0.37	65.00	270	100	0.78	17.00	1.00	1.10	450	3000	3200	2415	1.84	990	1400	607	734	1469	570
NA20	6.6	0.44	26.00	96	53	0.24	8.40	1.00	0.53	190	2900	3200	2639	1.42	120	170	74	89	178	280
NA21	11.0	0.39	51.00	150	83	0.51	14.00	1.10	0.88	250	2100	2200	1829	2.15	177	257	114	137	275	410
NA22	8.5	0.46	39	150	95	0.38	12.00	1.10	0.91	230	3600	4000	3317	1.65	180	250	112	135	270	120
NA23	12.0	0.26	77.00	350	120	1.10	18.00	1.30	1.30	430	3400	3700	2988	2.21	510	730	320	387	774	120
NA24	9.6	0.20	60.00	200	88	0.90	11.00	1.10	0.90	280	2100	2300	1812	2.12	290	410	183	222	443	59
NA25	6.0	0.11	33.00	85	41	0.42	8.50	1.10	0.72	130	1100	1100	906	1.24	83	120	55	66	133	25
NA26	6.2	0.11	32.00	80	41	0.48	8.00	1.00	0.66	140	850	910	707	1.22	180	250	115	139	278	37
NA27	13.0	0.29	100.00	390	110	1.20	27.00	1.30	1.50	500	2800	3000	2465	2.01	210	290	137	166	332	100
NA28	10.0	0.31	86.00	290	84	0.89	23.00	1.20	1.40	390	3400	3700	2993	1.87	180	260	118	143	286	90
NA29	6.9	0.14	39.00	110	56	0.55	11.00	1.10	0.86	170	1900	2000	1559	1.70	190	260	119	144	289	58
NA30	7.5	0.22	37.00	140	59	0.71	9.30	1.00	1.00	170	1000	1100	835	1.38	100	150	70	84	168	22
NA31	5.3	0.13	29.00	71	34	0.35	7.50	1.10	0.57	110	530	580	447	0.92	68	96	44	53	107	20
SW01	13.5	0.71	78.50	560	145	1.45	98.00	0.88	1.07	520	7525	8725	7351	2.24	1600	2400	950	1150	2300	450
SW02	13.8	3.18	118.75	580	170	4.45	106.00	1.26	3.90	585	14500	21250	19460	5.98	5450	8325	3312	4008	8015	167

Table A18-8 Data Set Used for Tables A18-4 through A18-7, Continued

Station	Pre-Remedy Average Surface Sediment Concentration																			
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SW03	11.0	0.70	52.00	190	79	1.20	18.00	0.80	1.20	230	6800	7500	6134	3.11	410	580	257	310	621	53
SW04	73.0	1.95	87.50	1500	430	1.75	18.00	1.50	1.60	3450	14000	16000	14109	2.28	4000	5200	2476	2996	5992	3250
SW05	11.0	0.86	53.00	230	120	0.96	19.00	0.75	1.20	280	13000	17000	15067	1.55	1200	1800	769	930	1861	170
SW06	15.0	0.85	56.00	170	81	0.75	20.00	0.83	1.10	280	12000	14000	12641	1.82	380	580	235	284	567	100
SW07	8.1	0.19	43.00	150	57	0.52	13.00	0.81	0.74	170	3800	4100	3450	1.73	170	230	107	129	258	44
SW08	24.0	0.73	82.50	920	225	2.25	21.00	1.20	1.45	830	25500	28500	24759	3.80	2100	2700	1308	1583	3166	1850
SW09	27.0	1.10	56.00	660	220	0.96	18.00	0.84	1.30	1200	17000	20000	17383	1.94	710	1100	446	540	1079	910
SW10	13.0	0.87	45.00	160	79	0.58	17.00	0.84	0.82	360	16000	25000	23410	1.21	610	930	380	459	918	250
SW11	9.6	0.24	62.00	170	74	0.75	17.00	0.39	1.10	240	8000	8500	7001	1.81	200	280	127	153	307	140
SW12	7.4	0.14	39.00	119.5	52	0.53	10.80	0.90	0.76	160	3000	3300	2742	1.47	155	231	100	121	243	36
SW13	15.0	0.42	72.00	800	93	0.86	24.00	1.10	1.40	580	12000	14000	12507	2.33	490	710	312	377	754	790
SW14	10.0	0.31	63.00	280	88	1.00	17.00	1.00	1.20	300	8400	9100	7659	2.13	400	570	257	310	621	450
SW15	11.0	0.45	67.00	230	90	0.90	19.00	1.10	1.30	290	7700	8400	7137	2.31	380	540	237	287	573	170
SW16	12.0	0.66	68.00	430	97	1.00	16.00	1.10	1.90	370	5700	6100	4847	2.24	430	610	273	330	661	1100
SW17	12.0	0.37	73.00	270	93	0.98	20.00	0.44	1.50	310	10000	11000	9199	2.53	540	880	333	403	805	440
SW18	11.0	0.33	74.00	220	86	0.75	20.00	0.44	1.30	280	8100	8800	7471	2.19	440	660	276	334	668	130
SW19	7.1	0.15	42.00	110	51	2.10	12.00	0.70	0.78	150	1100	1200	938	1.15	94	135	61	74	148	37
SW20	14.0	0.41	68.00	290	110	0.99	18.00	1.10	1.10	390	11000	12000	9736	2.14	1600	2600	1023	1238	2476	130
SW21	11.0	0.51	70.00	260	120	1.40	14.00	1.00	1.30	330	9700	10000	8480	2.10	2400	3600	1491	1804	3608	170
SW22	13.0	0.35	70.00	260	110	1.10	21.00	1.10	1.30	310	12000	13000	10684	2.46	900	1400	577	698	1396	190
SW23	15.0	0.37	89.00	280	110	1.00	25.00	1.10	1.30	330	11000	12000	9880	2.52	1000	1500	640	775	1550	210
SW24	10.0	0.33	52.50	300	88	1.90	16.00	0.95	1.15	300	52000	57000	50225	1.75	950	1500	588	711	1423	165
SW25	11.5	0.36	64.50	230	86	0.78	16.50	1.00	1.20	345	8150	8800	7505	2.15	350	500	221	268	535	231
SW26	9.0	0.14	45.00	120	58	0.43	12.00	0.90	0.46	160	1600	1700	1345	1.31	293	418	184	222	444	49
SW27	10.0	0.27	63.00	210	80	0.68	18.00	0.42	1.10	250	12000	14000	12055	2.08	200	320	128	155	311	250
SW28	14.0	0.32	65.50	265	100	0.88	15.00	1.20	1.10	330	17000	19000	16165	2.52	2100	2600	1388	1679	3359	150
SW29	8.3	0.49	44.00	220	72	0.93	37.00	1.10	1.20	230	4600	4900	4142	1.34	820	1200	504	610	1220	190
SW30	8.9	0.23	72.00	240	72	1.10	13.00	1.00	1.20	300	4900	5200	4311	2.05	380	540	240	291	581	200
SW31	4.0	0.06	18.00	54	21	0.23	4.90	1.20	0.36	80	1200	1300	1031	0.66	66	93	42	51	101	36
SW32	9.4	0.06	43.00	92	57	0.51	11.00	1.10	0.33	160	820	900	719	1.56	160	230	101	122	245	30
SW33	10.0	0.07	41.00	100	58	0.53	11.00	1.20	0.24	170	1000	1100	826	2.09	100	150	68	82	164	19
SW34	8.3	0.21	53.00	320	99	0.75	11.00	1.10	0.95	310	1400	1500	1155	1.68	130	180	82	99	198	38
SW36	9.9	0.21	70.00	240	79	0.75	13.00	1.00	1.20	300	4000	4300	3607	2.23	200	282	131	159	318	49

SECTION III

TOXICITY T-TEST RESULTS FOR SECTION 18.3

Table A18-9 to Table A18-26

AMPHIPOD

NASSCO Site		
	Summary	Table A18-9
	t-test	Table A18-10
	Data	Table A18-11
BAE Site		
	Summary	Table A18-12
	t-test	Table A18-13
	Data	Table A18-14

BIVALVE

NASSCO Site		
	Summary	Table A18-15
	t-test	Table A18-16
	Data	Table A18-17
BAE Site		
	Summary	Table A18-18
	t-test	Table A18-19
	Data	Table A18-20

ECHINODERM FERTILIZATION

NASSCO Site		
	Summary	Table A18-21
	t-test	Table A18-22
	Data	Table A18-23
BAE Site		
	Summary	Table A18-24
	t-test	Table A18-25
	Data	Table A18-26

Amphipod Data & Analysis

Table A18-9 Amphipod, NASSCO Site, Summary of T-Test Analysis in Table A18-10

Station	Sample Mean	Control Mean	Sample Response (% of control)	T-Test Significantly Different
NA01	80	100	80	Yes
NA03	84	100	84	No
NA04	80	100	80	Yes
NA05	86	97	89	Yes
NA06	78	100	78	Yes
NA07	73	99	74	Yes
NA09	85	97	88	Yes
NA11	70	100	70	Yes
NA12	82	100	82	Yes
NA15	94	97	97	No
NA16	87	97	90	Yes
NA17	92	97	95	No
NA19	86	97	89	No
NA20	90	100	90	Yes
NA22	92	97	95	No

Table A18-10 Amphipod, NASSCO Site, T-Test Analysis of Data in Table A18-11

t-Test: Two-Sample Assuming Unequal Variances

	NA01		NA03		NA04		NA05	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	80	100	84	100	80	100	86	97
Variance	112.5	0	242.5	0	200	0	42.5	20
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		4		4		7	
t Stat*	-4.216370214		-2.297466108		-3.16227766		-3.111269837	
P(T<=t) one-tail	0.006758441		0.041585293		0.017054712		0.008525428	
t Critical one-tail	2.131846486		2.131846486		2.131846486		1.894577508	
P(T<=t) two-tail	0.013516882		0.083170585		0.034109423		0.017050855	
t Critical two-tail †	2.776450856		2.776450856		2.776450856		2.36462256	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.22 > 2.78 reject null hypothesis (p=0.01), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.30 < 2.78 accept null hypothesis (p=0.08), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.16 > 2.78 reject null hypothesis (p=0.03), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.11 > 2.36 reject null hypothesis (p=0.02), therefore means different	

	NA06		NA07		NA09		NA11	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	78	100	73	99	85	97	70	100
Variance	182.5	0	132.5	5	25	20	37.5	0
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		4		8		4	
t Stat*	-3.64146591		-4.958005464		-4		-10.95445115	
P(T<=t) one-tail	0.010968104		0.00385853		0.001974886		0.000197246	
t Critical one-tail	2.131846486		2.131846486		1.85954832		2.131846486	
P(T<=t) two-tail	0.021936208		0.00771706		0.003949773		0.000394492	
t Critical two-tail †	2.776450856		2.776450856		2.306005626		2.776450856	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.64 > 2.78 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.96 > 2.78 reject null hypothesis (p=0.01), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 4 > 2.3 reject null hypothesis (p=0.004), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 10.9 > 2.78 reject null hypothesis (p=0.0004), therefore means different	

Table A18-10 Amphipod, NASSCO Site, T-Test Analysis of Data in Table A18-11, Continued

t-Test: Two-Sample Assuming Unequal Variances

	NA12		NA15		NA16		NA17	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	82	100	94	97	87	97	92	97
Variance	70	0	42.5	20	20	20	20	20
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		7		8		8	
t Stat*	-4.810702354		-0.848528137		-3.535533906		-1.767766953	
P(T<=t) one-tail	0.004290459		0.212103419		0.003834864		0.057538556	
t Critical one-tail	2.131846486		1.894577508		1.85954832		1.85954832	
P(T<=t) two-tail	0.008580919		0.424206838		0.007669728		0.115077112	
t Critical two-tail †	2.776450856		2.36462256		2.306005626		2.306005626	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.81 > 2.78 reject null hypothesis (p=0.01), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 0.85 < 2.36 accept null hypothesis (p=0.42), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.53 > 2.31 reject null hypothesis (p=0.01), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.77 < 2.31 accept null hypothesis (p=0.11), therefore means not different	

	NA19		NA20		NA22	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	86	97	90	100	92	97
Variance	142.5	20	50	0	95	20
Observations	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0	
Df	5		4		6	
t Stat*	-1.929527642		-3.16227766		-1.04257207	
P(T<=t) one-tail	0.055778898		0.017054712		0.168660547	
t Critical one-tail	2.015049176		2.131846486		1.943180905	
P(T<=t) two-tail	0.111557795		0.034109423		0.337321095	
t Critical two-tail †	2.570577635		2.776450856		2.446913641	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.92 < 2.57 accept null hypothesis (p=0.11), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.16 > 2.78 reject null hypothesis (p=0.03), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.04 < 2.45 accept null hypothesis (p=0.34), therefore means not different	

Table A18-11 Amphipod, NASSCO Site, Toxicity Data

	Batch	Replicates	Sample	Control
NA01	640-2	1	70	100
		2	85	100
		3	95	100
		4	80	100
		5	70	100
NA03	640-2	1	95	100
		2	100	100
		3	70	100
		4	90	100
		5	65	100
NA04	640-2	1	55	100
		2	85	100
		3	90	100
		4	85	100
		5	85	100
NA05	640-3	1	85	100
		2	80	95
		3	80	90
		4	95	100
		5	90	100
NA06	640-2	1	80	100
		2	85	100
		3	60	100
		4	95	100
		5	70	100
NA07	640-1	1	75	100
		2	85	95
		3	55	100
		4	70	100
		5	80	100
NA09	640-3	1	80	100
		2	90	95
		3	90	90
		4	80	100
		5	85	100
NA11	640-2	1	60	100
		2	75	100
		3	75	100
		4	70	100
		5	70	100

	Batch	Replicates	Sample	Control
NA12	640-2	1	75	100
		2	75	100
		3	95	100
		4	80	100
		5	85	100
NA15	640-3	1	95	100
		2	90	95
		3	100	90
		4	100	100
		5	85	100
NA16	640-3	1	90	100
		2	90	95
		3	85	90
		4	90	100
		5	80	100
NA17	640-3	1	85	100
		2	95	95
		3	95	90
		4	90	100
		5	95	100
NA19	640-3	1	70	100
		2	95	95
		3	100	90
		4	85	100
		5	80	100
NA20	640-2	1	100	100
		2	90	100
		3	90	100
		4	90	100
		5	80	100
NA22	640-3	1	95	100
		2	75	95
		3	95	90
		4	100	100
		5	95	100

Table A18-12 Amphipod, BAE Site, Summary of T-Test Analysis in Table A18-13

Station	Sample Mean	Control Mean	Sample Response (% of control)	T-Test Significantly Different
SW02	88	100	88	Yes
SW03	92	100	92	No
SW04	93	99	94	No
SW08	91	100	91	Yes
SW09	88	100	88	No
SW11	75	97	77	Yes
SW13	92	100	92	Yes
SW15	92	100	92	No
SW17	92	97	95	No
SW18	72	97	74	No
SW21	91	100	91	Yes
SW22	87	97	90	Yes
SW23	88	97	91	No
SW25	83	97	86	Yes
SW27	71	97	73	Yes

Table A18-13 Amphipod, BAE Site, T-Test Analysis of Data in Table A18-14

t-Test: Two-Sample Assuming Unequal Variances

	SW02		SW03		SW04		SW08	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	88	100	92	100	93	99	91	100
Variance	57.5	0	45	0	107.5	5	17.5	0
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		4		4		4	
t Stat*	-3.538606948		-2.666666667		-1.264911064		-4.810702354	
P(T<=t) one-tail	0.012021764		0.028		0.137288315		0.004290459	
t Critical one-tail	2.131846486		2.131846486		2.131846486		2.131846486	
P(T<=t) two-tail	0.024043529		0.056		0.274576629		0.008580919	
t Critical two-tail †	2.776450856		2.776450856		2.776450856		2.776450856	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.54 > 2.78 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.67 < 2.78 accept null hypothesis (p=0.06), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.26 < 2.78 accept null hypothesis (p=0.27), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.81 > 2.78 reject null hypothesis (p=0.01), therefore means different	

	SW09		SW11		SW13		SW15	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	88	100	75	97	92	100	92	100
Variance	95	0	37.5	20	20	0	70	0
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		7		4		4	
t Stat*	-2.752988806		-6.487446071		-4		-2.138089935	
P(T<=t) one-tail	0.02560846		0.000169052		0.008065045		0.049650341	
t Critical one-tail	2.131846486		1.894577508		2.131846486		2.131846486	
P(T<=t) two-tail	0.051216921		0.000338104		0.01613009		0.099300683	
t Critical two-tail †	2.776450856		2.36462256		2.776450856		2.776450856	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.75 < 2.78 accept null hypothesis (p=0.05), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 6.49 > 2.36 reject null hypothesis (p=0.0003), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.00 > 2.78 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.14 < 2.78 accept null hypothesis (p=0.10), therefore means not different	

Table A18-13 Amphipod, BAE Site, T-Test Analysis of Data in Table A18-14, Continued

t-Test: Two-Sample Assuming Unequal Variances

	SW17		SW18		SW21		SW22	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	92	97	72	97	91	100	87	97
Variance	20	20	407.5	20	17.5	0	7.5	20
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	8		4		4		7	
t Stat*	-1.767766953		-2.703690352		-4.810702354		-4.264014327	
P(T<=t) one-tail	0.057538556		0.02694399		0.004290459		0.001864042	
t Critical one-tail	1.85954832		2.131846486		2.131846486		1.894577508	
P(T<=t) two-tail	0.115077112		0.053887981		0.008580919		0.003728084	
t Critical two-tail †	2.306005626		2.776450856		2.776450856		2.36462256	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.77 < 2.31 accept null hypothesis (p=0.11), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.70 < 2.78 accept null hypothesis (p=0.05), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.81 > 2.78 reject null hypothesis (p=0.01), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.26 > 2.36 reject null hypothesis (p=0.004), therefore means different	

	SW23		SW25		SW27	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	88	97	83	97	71	97
Variance	57.5	20	70	20	192.5	20
Observations	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0	
Df	6		6		5	
t Stat*	-2.286002286		-3.299831646		-3.988217942	
P(T<=t) one-tail	0.031142332		0.00820566		0.005222484	
t Critical one-tail	1.943180905		1.943180905		2.015049176	
P(T<=t) two-tail	0.062284665		0.01641132		0.010444969	
t Critical two-tail †	2.446913641		2.446913641		2.570577635	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.29 < 2.45 accept null hypothesis (p=0.06), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.30 > 2.45 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.99 > 2.57 reject null hypothesis (p=0.01), therefore means different	

Table A18-14 Amphipod, BAE Site, Toxicity Data

	Batch	Replicates	Sample	Control
SW02	640-2	1	95	100
		2	90	100
		3	90	100
		4	75	100
		5	90	100
SW03	640-2	1	95	100
		2	85	100
		3	95	100
		4	85	100
		5	100	100
SW04	640-1	1	75	100
		2	95	95
		3	100	100
		4	100	100
		5	95	100
SW08	640-2	1	95	100
		2	95	100
		3	85	100
		4	90	100
		5	90	100
SW09	640-2	1	85	100
		2	95	100
		3	85	100
		4	100	100
		5	75	100
SW11	640-3	1	70	100
		2	85	95
		3	75	90
		4	70	100
		5	75	100
SW13	640-2	1	85	100
		2	90	100
		3	95	100
		4	95	100
		5	95	100
SW15	640-2	1	100	100
		2	90	100
		3	90	100
		4	80	100
		5	100	100

	Batch	Replicates	Sample	Control
SW17	640-3	1	85	100
		2	90	95
		3	95	90
		4	95	100
		5	95	100
SW18	640-3	1	75	100
		2	95	95
		3	40	90
		4	80	100
		5	70	100
SW21	640-2	1	85	100
		2	90	100
		3	90	100
		4	95	100
		5	95	100
SW22	640-3	1	85	100
		2	90	95
		3	90	90
		4	85	100
		5	85	100
SW23	640-3	1	80	100
		2	100	95
		3	90	90
		4	85	100
		5	85	100
SW25	640-3	1	90	100
		2	80	95
		3	85	90
		4	70	100
		5	90	100
SW27	640-3	1	60	100
		2	65	95
		3	95	90
		4	65	100
		5	70	100

Bivalve Data & Analysis

Table A18-15 Bivalve, NASSCO Site, Summary of T-Test Analysis in Table A18-16

Station	Sample Mean	Control Mean	Sample Response (% of control)	T-Test Significantly Different
NA01	43	88	49	Yes
NA03	83	88	94	No
NA04	74	88	84	Yes
NA05	83	88	94	No
NA06	68	92	74	No
NA07	81	92	88	No
NA09	1	88	1	Yes
NA11	74	92	80	No
NA12	13	88	15	Yes
NA15	82	88	93	No
NA16	3	88	3	Yes
NA17	70	88	80	Yes
NA19	2	88	2	Yes
NA20	74	92	80	Yes
NA22	2	88	2	Yes

Table A18-16 Bivalve, NASSCO Site, T-Test analysis of Data in Table A18-17

t-Test: Two-Sample Assuming Unequal Variances

	NA01		NA03		NA04		NA05	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	43.4	87.8	83.2	87.8	74.2	87.8	83.4	87.8
Variance	1245.8	16.2	89.7	16.2	82.7	16.2	26.8	16.2
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		5		6		8	
t Stat*	-2.794719948		-0.999527745		-3.057917503		-1.500387547	
P(T<=t) one-tail	0.024537539		0.181712503		0.011142213		0.085952529	
t Critical one-tail	2.131846486		2.015049176		1.943180905		1.85954832	
P(T<=t) two-tail	0.049075079		0.363425007		0.022284425		0.171905058	
t Critical two-tail †	2.776450856		2.570577635		2.446913641		2.306005626	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.79 > 2.78 reject null hypothesis (p=0.05), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.0 < 2.57 accept null hypothesis (p=0.36), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.06 > 2.45 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.50 < 2.31 accept null hypothesis (p=0.17), therefore means not different	

	NA06		NA07		NA09		NA11	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	68.4	92.2	80.8	92.2	1.2	87.8	74.4	92.2
Variance	449.3	2.7	205.2	2.7	4.7	16.2	500.3	2.7
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		4		6		4	
t Stat*	-2.503183813		-1.76792		-42.35744456		-1.77468391	
P(T<=t) one-tail	0.033269908		0.075903719		5.79281E-09		0.075307353	
t Critical one-tail	2.131846486		2.131846486		1.943180905		2.131846486	
P(T<=t) two-tail	0.066539816		0.151807439		1.15856E-08		0.150614705	
t Critical two-tail †	2.776450856		2.776450856		2.446913641		2.776450856	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.50 < 2.78 accept null hypothesis (p=0.07), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.77 < 2.78 accept null hypothesis (p=0.15), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 42.4 > 2.45 reject null hypothesis (p=1.16E-08), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.77 < 2.78 accept null hypothesis (p=0.15), therefore means not different	

Table A18-16 Bivalve, NASSCO Site, T-Test analysis of Data in Table A18-17, Continued

t-Test: Two-Sample Assuming Unequal Variances

	NA12		NA15		NA16		NA17	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	13.4	87.8	82	87.8	3.2	87.8	69.8	87.8
Variance	832.8	16.2	50.5	16.2	25.7	16.2	193.7	16.2
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		6		8		5	
t Stat*	-5.709579081		-1.587998467		-29.22458507		-2.778121836	
P(T<=t) one-tail	0.002326632		0.081692803		1.01771E-09		0.019494313	
t Critical one-tail	2.131846486		1.943180905		1.85954832		2.015049176	
P(T<=t) two-tail	0.004653264		0.163385606		2.03542E-09		0.038988626	
t Critical two-tail †	2.776450856		2.446913641		2.306005626		2.570577635	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.71 > 2.78 reject null hypothesis (p=0.005), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.59 < 2.45 accept null hypothesis (p=0.16), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 29.2 > 2.31 reject null hypothesis (p=2.03E-09), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.78 > 2.57 reject null hypothesis (p=0.04), therefore means different	

	NA19		NA20		NA22	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	1.6	87.8	74.2	92.2	1.8	87.8
Variance	12.8	16.2	111.2	2.7	9.2	16.2
Observations	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0	
Df	8		4		7	
t Stat*	-35.79260182		-3.771339634		-38.1563299	
P(T<=t) one-tail	2.03287E-10		0.009790886		1.10484E-09	
t Critical one-tail	1.85954832		2.131846486		1.894577508	
P(T<=t) two-tail	4.06573E-10		0.019581773		2.20967E-09	
t Critical two-tail †	2.306005626		2.776450856		2.36462256	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 35.8 > 2.31 reject null hypothesis (p=4.07E-10), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.77 > 2.78 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 38.2 > 2.36 reject null hypothesis (p=2.21E-09), therefore means different	

Table A18-17 Bivalve, NASSCO Site, Toxicity Data

	Batch	Replicates	Sample	Control
NA01	2	1	44	83
		2	6	90
		3	10	84
		4	80	92
		5	77	90
NA03	2	1	85	83
		2	90	90
		3	67	84
		4	84	92
		5	90	90
NA04	2	1	60	83
		2	77	90
		3	83	84
		4	80	92
		5	71	90
NA05	2	1	92	83
		2	79	90
		3	82	84
		4	80	92
		5	84	90
NA06	1	1	62	94
		2	38	93
		3	65	91
		4	91	93
		5	86	90
NA07	1	1	81	94
		2	82	93
		3	93	91
		4	57	93
		5	91	90
NA09	2	1	5	83
		2	0	90
		3	1	84
		4	0	92
		5	0	90
NA11	1	1	90	94
		2	84	93
		3	84	91
		4	35	93
		5	79	90
NA12	2	1	65	83
		2	0	90
		3	0	84
		4	0	92
		5	2	90
NA15	2	1	75	83
		2	89	90
		3	74	84
		4	88	92
		5	84	90
NA16	2	1	1	83
		2	12	90
		3	0	84
		4	0	92
		5	3	90
NA17	2	1	66	83
		2	80	90
		3	77	84
		4	47	92
		5	79	90
NA19	2	1	0	83
		2	0	90
		3	0	84
		4	0	92
		5	8	90
NA20	1	1	71	94
		2	65	93
		3	65	91
		4	81	93
		5	89	90
NA22	2	1	0	83
		2	2	90
		3	0	84
		4	7	92
		5	0	90

Table A18-18 Bivalve, BAE Site, Summary of T-Test Analysis in Table A18-19

Station	Sample Mean	Control Mean	Sample Response (% of control)	T-Test Significantly Different
SW02	78	92	85	No
SW03	81	92	88	Yes
SW04	58	92	63	Yes
SW08	86	92	93	Yes
SW09	78	92	85	Yes
SW11	73	88	83	No
SW13	26	92	28	Yes
SW15	8	92	9	Yes
SW17	14	88	16	Yes
SW18	56	88	64	Yes
SW21	62	92	67	No
SW22	1	88	1	Yes
SW23	14	88	16	Yes
SW25	9	88	10	Yes
SW27	19	88	22	Yes

Table A18-19 Bivalve, BAE Site, T-Test Analysis of Data in Table A18-20

t-Test: Two-Sample Assuming Unequal Variances

	SW02		SW03		SW04		SW08	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	77.8	92.2	80.8	92.2	58.2	92.2	85.6	92.2
Variance	144.7	2.7	75.2	2.7	379.7	2.7	4.3	2.7
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		4		4		8	
t Stat*	-2.652154087		-2.888159174		-3.887809507		-5.578018081	
P(T<=t) one-tail	0.028426895		0.022322695		0.008861742		0.000261756	
t Critical one-tail	2.131846486		2.131846486		2.131846486		1.85954832	
P(T<=t) two-tail	0.05685379		0.044645389		0.017723483		0.000523512	
t Critical two-tail †	2.776450856		2.776450856		2.776450856		2.306005626	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.65 < 2.78 accept null hypothesis (p=0.06), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.89 > 2.78 reject null hypothesis (p=0.04), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.89 > 2.78 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.58 > 2.31 reject null hypothesis (p=0.0005), therefore means different	

	SW09		SW11		SW13		SW15	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	77.8	92.2	73.2	87.8	26	92.2	8.2	92.2
Variance	16.2	2.7	233.7	16.2	890.5	2.7	64.2	2.7
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	5		5		4		4	
t Stat*	-7.406560798		-2.065164875		-4.953003495		-22.96419518	
P(T<=t) one-tail	0.000353102		0.046907376		0.003872303		1.06524E-05	
t Critical one-tail	2.015049176		2.015049176		2.131846486		2.131846486	
P(T<=t) two-tail	0.000706204		0.093814751		0.007744607		2.13047E-05	
t Critical two-tail †	2.570577635		2.570577635		2.776450856		2.776450856	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 7.41 > 2.57 reject null hypothesis (p=0.0007), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.06 < 2.57 accept null hypothesis (p=0.09), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.95 > 2.78 reject null hypothesis (p=0.008), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 23.0 > 2.78 reject null hypothesis (p=2.13E-05), therefore means different	

Table A18-19 Bivalve, BAE Site, T-Test Analysis of Data in Table A18-20, Continued

t-Test: Two-Sample Assuming Unequal Variances

	SW17		SW18		SW21		SW22	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	13.8	87.8	56	87.8	61.8	92.2	1.2	87.8
Variance	952.2	16.2	586	16.2	1129.2	2.7	2.7	16.2
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		4		4		5	
t Stat*	-5.317277567		-2.897622108		-2.02048		-44.54223369	
P(T<=t) one-tail	0.003008297		0.022111643		0.056717847		5.38358E-08	
t Critical one-tail	2.131846486		2.131846486		2.131846486		2.015049176	
P(T<=t) two-tail	0.006016594		0.044223286		0.113435694		1.07672E-07	
t Critical two-tail †	2.776450856		2.776450856		2.776450856		2.570577635	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.32 > 2.78 reject null hypothesis (p=0.006), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.90 > 2.78 reject null hypothesis (p=0.04), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.02 < 2.78 accept null hypothesis (p=0.11), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 44.5 > 2.57 reject null hypothesis (p=1.08E-07), therefore means different	

	SW23		SW25		SW27	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	14.4	87.8	8.8	87.8	19.4	87.8
Variance	469.3	16.2	287.7	16.2	880.3	16.2
Observations	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0	
Df	4		4		4	
t Stat*	-7.448802252		-10.13320301		-5.108177231	
P(T<=t) one-tail	0.000867592		0.000266963		0.003471481	
t Critical one-tail	2.131846486		2.131846486		2.131846486	
P(T<=t) two-tail	0.001735184		0.000533926		0.006942962	
t Critical two-tail †	2.776450856		2.776450856		2.776450856	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 7.45 > 2.78 reject null hypothesis (p=0.002), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 10.1 > 2.78 reject null hypothesis (p=0.0005), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.11 > 2.78 reject null hypothesis (p=0.007), therefore means different	

Table A18-20 Bivalve, BAE Site, Toxicity Data

	Batch	Replicates	Sample	Control
SW02	1	1	90	94
		2	67	93
		3	90	91
		4	65	93
		5	77	90
SW03	1	1	82	94
		2	74	93
		3	88	91
		4	90	93
		5	70	90
SW04	1	1	65	94
		2	33	93
		3	84	91
		4	46	93
		5	63	90
SW08	1	1	87	94
		2	84	93
		3	88	91
		4	83	93
		5	86	90
SW09	1	1	78	94
		2	82	93
		3	72	91
		4	76	93
		5	81	90
SW11	2	1	84	83
		2	47	90
		3	74	84
		4	77	92
		5	84	90
SW13	1	1	19	94
		2	0	93
		3	41	91
		4	70	93
		5	0	90
SW15	1	1	0	94
		2	0	93
		3	16	91
		4	16	93
		5	9	90

	Batch	Replicates	Sample	Control
SW17	2	1	0	83
		2	0	90
		3	0	84
		4	0	92
		5	69	90
SW18	2	1	16	83
		2	54	90
		3	74	84
		4	60	92
		5	76	90
SW21	1	1	2	94
		2	71	93
		3	78	91
		4	80	93
		5	78	90
SW22	2	1	1	83
		2	0	90
		3	0	84
		4	4	92
		5	1	90
SW23	2	1	52	83
		2	3	90
		3	14	84
		4	1	92
		5	2	90
SW25	2	1	39	83
		2	4	90
		3	1	84
		4	0	92
		5	0	90
SW27	2	1	72	83
		2	1	90
		3	4	84
		4	11	92
		5	9	90

Echinoderm Fertilization Data & Analysis

Table A18-21 Echinoderm Fertilization, NASSCO Site, Summary of T-Test Analysis in Table A18-22

Station	Sample Mean	Control Mean	Sample Response (% of control)	T-Test Significantly Different
NA01	79	92	86	Yes
NA03	77	92	84	Yes
NA04	81	92	88	Yes
NA05	71	75	95	No
NA06	96	93	103	No
NA07	95	93	102	No
NA09	74	75	99	No
NA11	94	93	101	No
NA12	82	92	89	Yes
NA15	81	92	88	Yes
NA16	77	92	84	Yes
NA17	81	92	88	Yes
NA19	66	92	72	Yes
NA20	72	92	78	Yes
NA22	83	75	111	Yes*

Table A18-22 Echinoderm Fertilization, NASSCO Site, T-Test Analysis of Data in Table A18-23

t-Test: Two-Sample Assuming Unequal Variances

	NA01		NA03		NA04		NA05	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	78.8	92.1	77.2	92.1	80.6	92.1	71.4	75.3
Variance	11.7	1.925	29.2	1.925	9.3	1.925	38.3	5.075
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	5		5		6		5	
t Stat*	-8.056907686		-5.97195588		-7.675199409		-1.324127683	
P(T<=t) one-tail	0.000238394		0.000942617		0.000127946		0.121380081	
t Critical one-tail	2.015049176		2.015049176		1.943180905		2.015049176	
P(T<=t) two-tail	0.000476787		0.001885234		0.000255892		0.242760163	
t Critical two-tail †	2.570577635		2.570577635		2.446913641		2.570577635	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 8.06 > 2.57 reject null hypothesis (p=0.0005), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.97 > 2.57 reject null hypothesis (p=0.002), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 7.67 > 2.45 reject null hypothesis (p=0.0003), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.32 < 2.57 accept null hypothesis (p=0.24), therefore means not different	

	NA06		NA07		NA09		NA11	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	96.4	93.4	95	93.4	74.2	75.3	93.8	93.4
Variance	7.8	4.675	10	4.675	31.7	5.075	5.2	4.675
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	8		7		5		8	
t Stat*	1.899266813		0.933933449		-0.405603176		0.284627227	
P(T<=t) one-tail	0.047037034		0.190712773		0.350903874		0.391579301	
t Critical one-tail	1.85954832		1.894577508		2.015049176		1.85954832	
P(T<=t) two-tail	0.094074068		0.381425545		0.701807748		0.783158602	
t Critical two-tail †	2.306005626		2.36462256		2.570577635		2.306005626	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.90 < 2.31 accept null hypothesis (p=0.09), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 0.93 < 2.36 accept null hypothesis (p=0.38), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 0.41 < 2.57 accept null hypothesis (p=0.70), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 0.28 < 2.31 accept null hypothesis (p=0.78), therefore means not different	

Table A18-22 Echinoderm Fertilization, NASSCO Site, T-Test Analysis of Data in Table A18-23

t-Test: Two-Sample Assuming Unequal Variances

	NA12		NA15		NA16		NA17	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	82.2	92.1	80.8	92.1	76.8	92.1	80.6	92.1
Variance	35.2	1.925	10.7	1.925	34.7	1.925	5.3	1.925
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	4		5		4		7	
t Stat*	-3.633180425		-7.111279563		-5.653112345		-9.566738804	
P(T<=t) one-tail	0.011048787		0.000426245		0.002412122		1.43134E-05	
t Critical one-tail	2.131846486		2.015049176		2.131846486		1.894577508	
P(T<=t) two-tail	0.022097573		0.000852489		0.004824244		2.86269E-05	
t Critical two-tail †	2.776450856		2.570577635		2.776450856		2.36462256	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.63 > 2.78 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 7.11 > 2.57 reject null hypothesis (p=0.0005), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.65 > 2.78 reject null hypothesis (p=0.005), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 9.57 > 2.36 reject null hypothesis (p=0.00003), therefore means different	

	NA19		NA20		NA22	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	65.8	92.1	72.2	92.1	83	75.3
Variance	42.7	1.925	30.2	1.925	3.5	5.075
Observations	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0	
Df	4		5		8	
t Stat*	-8.80342434		-7.850846939		5.879747322	
P(T<=t) one-tail	0.000459251		0.000269161		0.000185054	
t Critical one-tail	2.131846486		2.015049176		1.85954832	
P(T<=t) two-tail	0.000918502		0.000538323		0.000370107	
t Critical two-tail †	2.776450856		2.570577635		2.306005626	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 8.80 > 2.78 reject null hypothesis (p=0.0009), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 7.85 > 2.57 reject null hypothesis (p=0.0006), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.88 > 2.31 reject null hypothesis (p=0.0004), therefore means different	

Table A18-23 Echinoderm Fertilization, NASSCO Site, Toxicity Data

	Batch	Replicates	Sample	Control
NA01	2	1	78	93
		2	77	90
		3	84	93
		4	75	94
		5	80	92
NA03	2	1	78	93
		2	84	90
		3	74	93
		4	80	94
		5	70	92
NA04	2	1	80	93
		2	77	90
		3	85	93
		4	79	94
		5	82	92
NA05	3	1	75	76
		2	74	78
		3	63	77
		4	78	73
		5	67	74
NA06	1	1	99	95
		2	94	90
		3	97	94
		4	99	96
		5	93	93
NA07	1	1	99	95
		2	93	90
		3	91	94
		4	95	96
		5	97	93
NA09	3	1	69	76
		2	70	78
		3	76	77
		4	73	73
		5	83	74
NA11	1	1	93	95
		2	95	90
		3	97	94
		4	93	96
		5	91	93

	Batch	Replicates	Sample	Control
NA12	2	1	86	93
		2	86	90
		3	85	93
		4	72	94
		5	82	92
NA15	2	1	81	93
		2	86	90
		3	78	93
		4	81	94
		5	78	92
NA16	2	1	76	93
		2	85	90
		3	70	93
		4	80	94
		5	73	92
NA17	2	1	77	93
		2	83	90
		3	82	93
		4	81	94
		5	80	92
NA19	2	1	63	93
		2	74	90
		3	57	93
		4	65	94
		5	70	92
NA20	2	1	66	93
		2	81	90
		3	72	93
		4	70	94
		5	72	92
NA22	3	1	83	76
		2	84	78
		3	80	77
		4	85	73
		5	83	74

Table A18-24 Echinoderm Fertilization, BAE SITE, Summary of T-Test Analysis in Table A18-25

Station	Sample Mean	Control Mean	Sample Response (% of control)	T-Test Significantly Different
SW02	96	93	103	No
SW03	96	93	103	No
SW04	81	75	108	Yes*
SW08	96	93	103	No
SW09	93	93	100	No
SW11	67	75	89	Yes
SW13	92	93	99	No
SW15	96	93	103	No
SW17	72	75	96	Yes
SW18	62	75	83	Yes
SW21	95	93	102	No
SW22	78	75	104	No
SW23	80	75	107	Yes*
SW25	77	75	103	No
SW27	68	75	91	Yes

Table A18-25 Echinoderm Fertilization, BAE Site, T-Test Analysis of Data in Table A18-26

t-Test: Two-Sample Assuming Unequal Variances

	SW02		SW03		SW04		SW08	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	95.8	93.4	95.8	93.4	81.4	75.3	95.6	93.4
Variance	1.7	4.675	2.2	4.675	6.3	5.075	3.3	4.675
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	7		7		8		8	
t Stat*	2.125475725		2.046726877		4.044260619		1.741976681	
P(T<=t) one-tail	0.035571957		0.039957765		0.001856847		0.059842119	
t Critical one-tail	1.894577508		1.894577508		1.85954832		1.85954832	
P(T<=t) two-tail	0.071143913		0.079915531		0.003713695		0.119684237	
t Critical two-tail †	2.36462256		2.36462256		2.306005626		2.306005626	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.12 < 2.36 accept null hypothesis (p=0.07), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.05 < 2.36 accept null hypothesis (p=0.08), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 4.04 > 2.31 reject null hypothesis (p=0.004), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.74 < 2.31 accept null hypothesis (p=0.12), therefore means not different	

	SW09		SW11		SW13		SW15	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	93	93.4	67.2	75.3	92.4	93.4	95.8	93.4
Variance	2	4.675	31.7	5.075	0.8	4.675	9.2	4.675
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	7		5		5		7	
t Stat*	-0.346193858		-2.986714293		-0.955636965		1.44072054	
P(T<=t) one-tail	0.369684686		0.015281342		0.191571571		0.096427272	
t Critical one-tail	1.894577508		2.015049176		2.015049176		1.894577508	
P(T<=t) two-tail	0.739369371		0.030562685		0.383143142		0.192854544	
t Critical two-tail †	2.36462256		2.570577635		2.570577635		2.36462256	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 0.35 < 2.36 accept null hypothesis (p=0.74), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 2.99 > 2.57 reject null hypothesis (p=0.03), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 0.96 < 2.57 accept null hypothesis (p=0.38), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.44 < 2.36 accept null hypothesis (p=0.19), therefore means not different	

Table A18-25 Echinoderm Fertilization, BAE Site, T-Test Analysis of Data in Table A18-26, Continued

t-Test: Two-Sample Assuming Unequal Variances

	SW17		SW18		SW21		SW22	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	71.8	75.3	62	75.3	95.2	93.4	78.2	75.3
Variance	1.2	5.075	23.5	5.075	0.7	4.675	17.7	5.075
Observations	5	5	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0		0	
Df	6		6		5		6	
t Stat*	-3.124252899		-5.563441472		1.73607416		1.358794584	
P(T<=t) one-tail	0.010236884		0.000714112		0.071533502		0.111535068	
t Critical one-tail	1.943180905		1.943180905		2.015049176		1.943180905	
P(T<=t) two-tail	0.020473768		0.001428224		0.143067004		0.223070137	
t Critical two-tail †	2.446913641		2.446913641		2.570577635		2.446913641	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.12 > 2.45 reject null hypothesis (p=0.02), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.56 > 2.45 reject null hypothesis (p=0.001), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.74 < 2.57 accept null hypothesis (p=0.14), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 1.36 < 2.45 accept null hypothesis (p=0.22), therefore means not different	

	SW23		SW25		SW27	
	Sample	*Control*	*Sample*	*Control*	*Sample*	*Control*
Mean	80.6	75.3	77	75.3	67.8	75.3
Variance	7.8	5.075	20	5.075	13.7	5.075
Observations	5	5	5	5	5	5
Hypothesized Mean Difference	0		0		0	
Df	8		6		7	
t Stat*	3.30283785		0.759125277		-3.870403936	
P(T<=t) one-tail	0.005406504		0.238265951		0.003064242	
t Critical one-tail	1.85954832		1.943180905		1.894577508	
P(T<=t) two-tail	0.010813007		0.476531902		0.006128484	
t Critical two-tail †	2.306005626		2.446913641		2.36462256	
* absolute value † critical value	null hypothesis = means not different absolute value > critical value, reject null hypothesis 3.30 > 2.31 reject null hypothesis (p=0.01), therefore means different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 0.76 < 2.45 accept null hypothesis (p=0.48), therefore means not different		null hypothesis = means not different absolute value > critical value, reject null hypothesis 5.11 > 2.78 reject null hypothesis (p=0.007), therefore means different	

Table A18-26 Echinoderm Fertilization, BAE Site, Toxicity Data

	Batch	Replicates	Sample	Control
SW02	1	1	95	95
		2	96	90
		3	97	94
		4	97	96
		5	94	93
SW03	1	1	96	95
		2	95	90
		3	94	94
		4	96	96
		5	98	93
SW04	3	1	85	76
		2	79	78
		3	79	77
		4	82	73
		5	82	74
SW08	1	1	94	95
		2	94	90
		3	95	94
		4	97	96
		5	98	93
SW09	1	1	94	95
		2	92	90
		3	92	94
		4	95	96
		5	92	93
SW11	3	1	76	76
		2	62	78
		3	66	77
		4	69	73
		5	63	74
SW13	1	1	91	95
		2	93	90
		3	93	94
		4	92	96
		5	93	93
SW15	1	1	94	95
		2	100	90
		3	96	94
		4	97	96
		5	92	93

	Batch	Replicates	Sample	Control
SW17	3	1	70	76
		2	72	78
		3	72	77
		4	73	73
		5	72	74
SW18	3	1	67	76
		2	60	78
		3	55	77
		4	66	73
		5	62	74
SW21	1	1	96	95
		2	95	90
		3	95	94
		4	96	96
		5	94	93
SW22	3	1	74	76
		2	85	78
		3	77	77
		4	76	73
		5	79	74
SW23	3	1	82	76
		2	80	78
		3	76	77
		4	83	73
		5	82	74
SW25	3	1	74	76
		2	78	78
		3	82	77
		4	71	73
		5	80	74
SW27	3	1	72	76
		2	66	78
		3	67	77
		4	71	73
		5	63	74

SECTION IV

SUPPORTING CALCULATION FOR BIVALVE DEVELOPMENT IN TABLE 18-7

Table A18-27 Bivalve Combined Survival and Normality

Station	Batch	Bivalve Combined Survival and Normality (%)						
		Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Average	Control Adjusted Average
2441	2	69	77	60	64	59	66	93
2433	2	24	58	66	39	47	47	66
2231	1	88	86	80	77	80	82	101
2243	2	62	24	75	8	79	50	70
Control	1	85	86	81	88	87	85	
Control	1	77	79	71	75	81	77	
Batch 1 Duplicate Control verage							81	
Control	2	70	75	65	15	83	62	
Control	2	82	80	74	76	89	80	
Batch 2 Duplicate Control verage							71	

N	4
Minimum	66
Maximum	101
Mean	82.5
Stdev	17.1
RSD	21%
95% PL	37.4

Notes
All data is from Exponent (2003)

19. Finding 19: Bioaccumulation

Finding 19 of CAO No. R9-2012-0024 states:

The San Diego Water Board evaluated initial laboratory bioaccumulation test data to ascertain the bioaccumulation potential of the sediment chemical pollutants at the Shipyard Sediment Site. Examination of laboratory test data on the chemical pollutant concentrations in tissue of the clam *Macoma nasuta* relative to the pollutant concentrations in sediment indicates that bioaccumulation of chemical pollutants is occurring at the Shipyard Sediment Site. The data indicates for several chemical pollutants that concentrations in *Macoma nasuta* tissue increase proportionally as chemical pollutant concentrations in sediment increase. Statistically significant relationships were found for arsenic, copper, lead, mercury, zinc, tributyltin (TBT), PCBs, and high molecular weight polynuclear aromatic hydrocarbons (HPAHs). These chemical pollutants have a bioaccumulation potential at the Shipyard Sediment Site and are therefore considered bioavailable to benthic organisms. No statistically significant relationships were found for cadmium, chromium, nickel, selenium, silver, or PCTs.

19.1. Bioaccumulation Analyses

Sediment bioaccumulation tests were conducted to evaluate the bioaccumulation potential of the chemical pollutants present in sediment at the Shipyard Sediment Site and the degree to which these chemicals may enter the aquatic food web (Exponent, 2001a, 2002). The bioaccumulation tests involved the exposure of the clam *Macoma nasuta* to site and reference sediment for 28 days using the protocols specified by ASTM (2000). *Macoma* was selected as the test species for the bioaccumulation tests because it is native to the West Coast and actively ingests surface sediment (likely to be the most direct route of exposure to contaminants that accumulate in tissues). Bioaccumulation tests were conducted using sediment collected from four stations in the NASSCO leasehold (NA06, NA11, NA12, NA20), five stations in the BAE Systems leasehold (SW04, SW08, SW13, SW21, and SW28) and at five reference stations located in San Diego Bay (2441, 2433, 2440, 2231, and 2243). The site stations were positioned along a gradient of expected sediment concentrations of potentially bioaccumulative substances.

Evaluation of the chemical pollutant concentrations in *Macoma* tissue relative to the chemical pollutant concentrations in the sediment indicates that bioaccumulation of chemicals is occurring at the Shipyard Sediment Site (Exponent, 2003). For many chemical pollutants, concentrations in tissue increase as chemical pollutant concentrations in sediment increases, as shown in the regression plots provided in the Appendix for Section 19 of this Technical Report. Statistically significant tissue: sediment relationships (at $p = 0.05$) were found for arsenic, copper, lead, mercury, zinc, tributyltin (TBT), PCBs, HPAHs (Exponent, 2003). These chemical pollutants have a bioaccumulation potential at the Shipyard Sediment Site and are therefore considered bioavailable to benthic organisms. Bioavailability does not necessarily indicate the presence of adverse effects. It should be noted, however, that the relationships for arsenic and zinc, although statistically significant, are subject to some uncertainty because each are controlled by a single data point. No statistically significant relationships (at $p = 0.05$) were found for cadmium, chromium, nickel, selenium, silver, or polychlorinated terphenyls (PCTs).

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APPENDIX FOR SECTION 19

BIOACCUMULATION

March 14, 2012

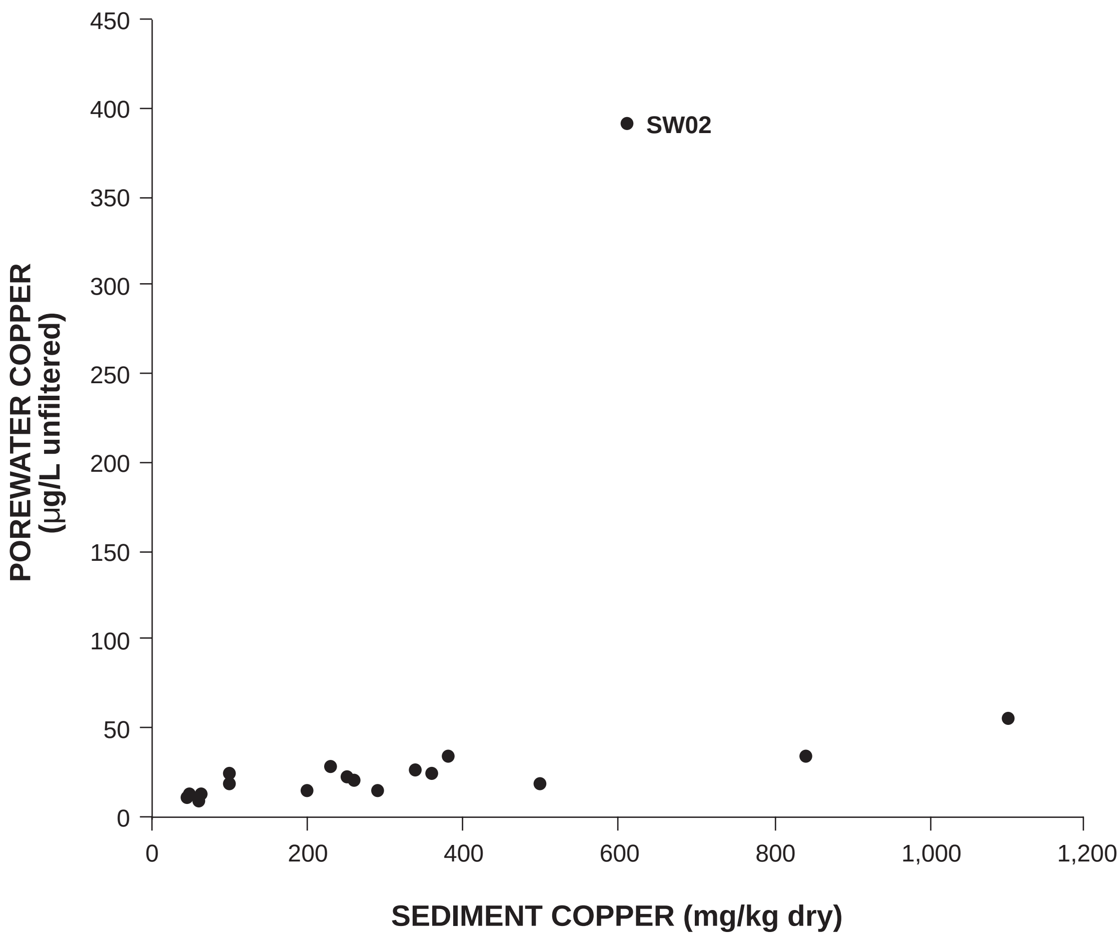


Figure 4-23. Copper concentrations in sediment and associated pore water

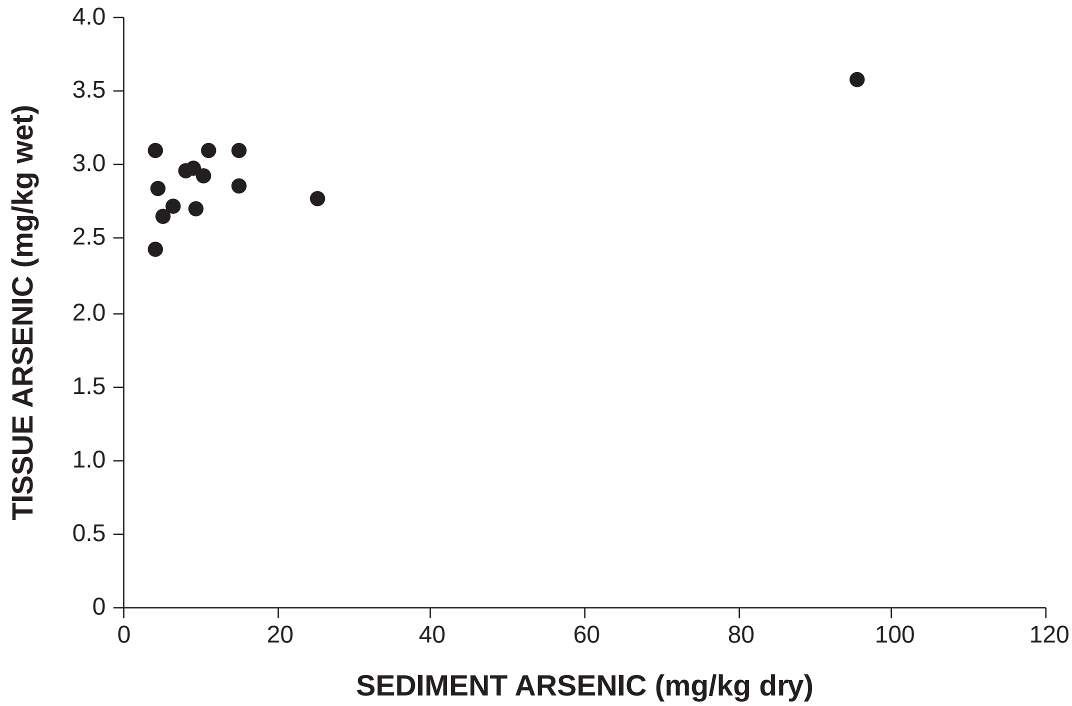


Figure 7-1. Tissue and sediment data for arsenic

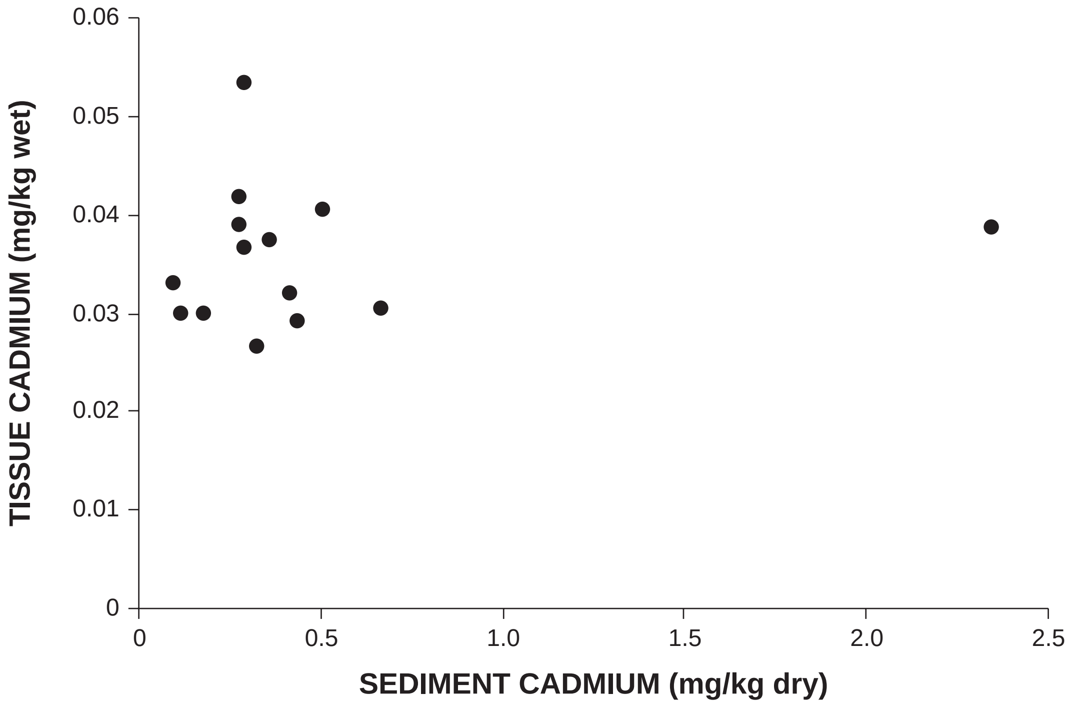


Figure 7-2. Tissue and sediment data for cadmium

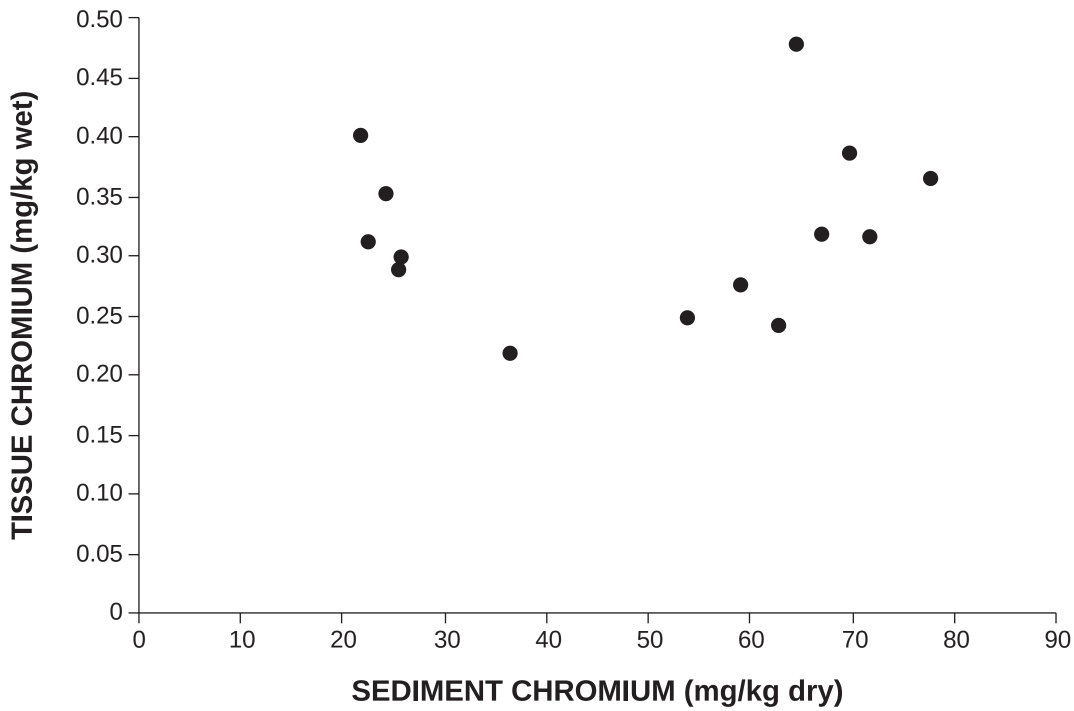


Figure 7-3. Tissue and sediment data for chromium

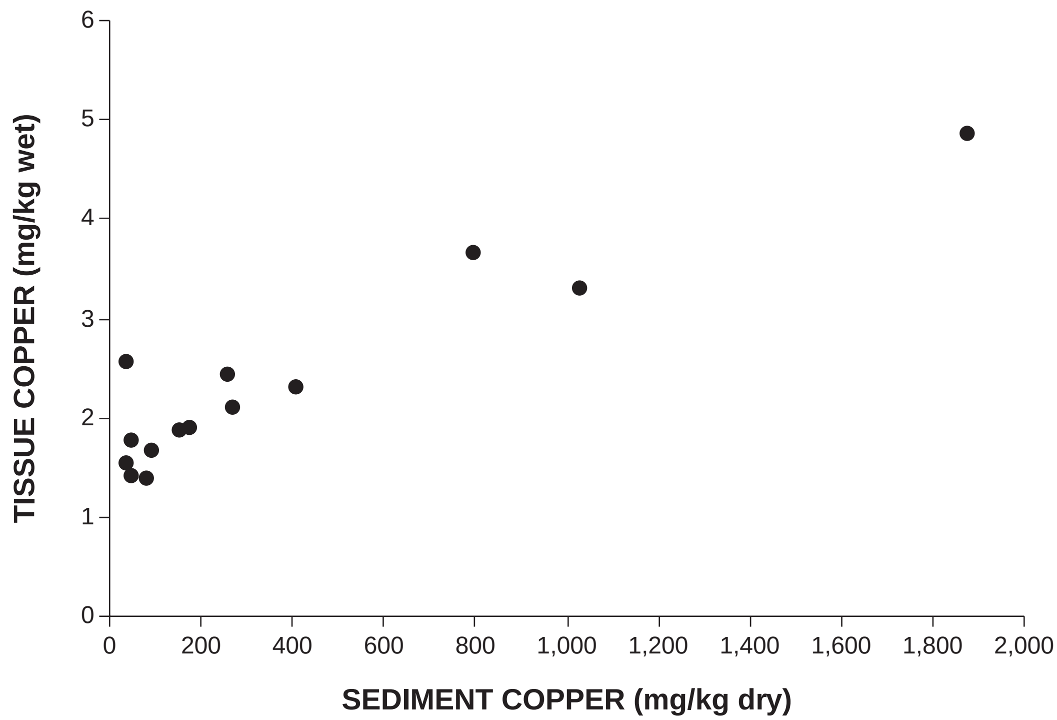


Figure 7-4. Tissue and sediment data for copper

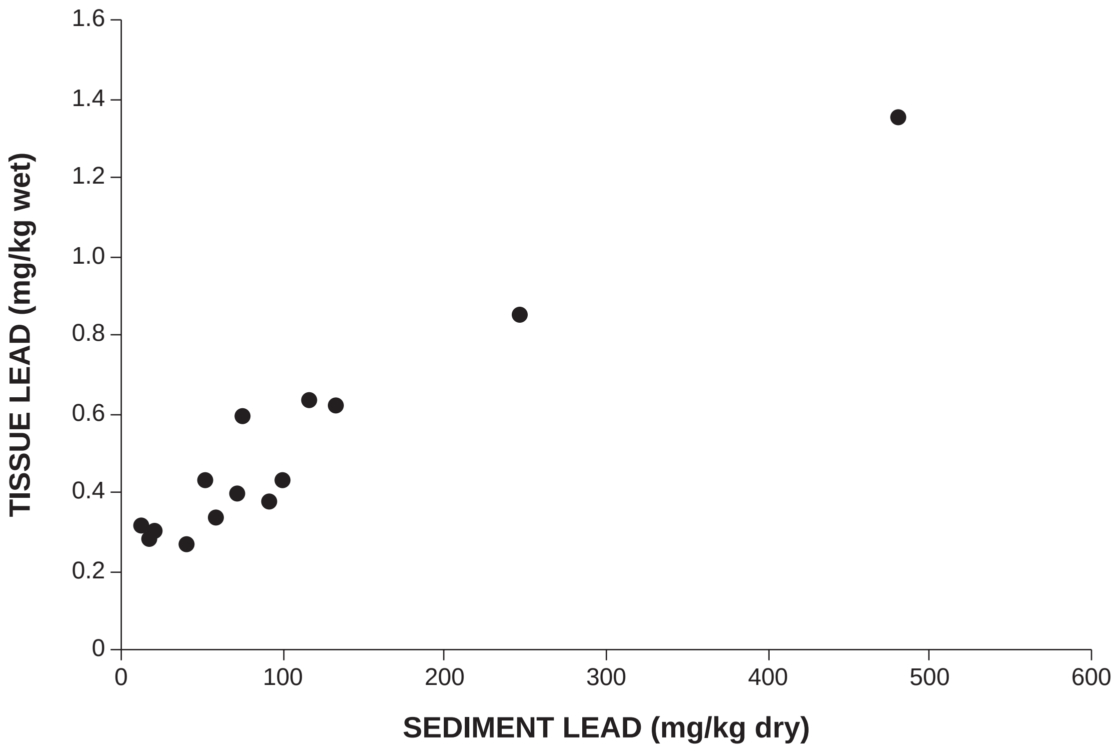


Figure 7-5. Tissue and sediment data for lead

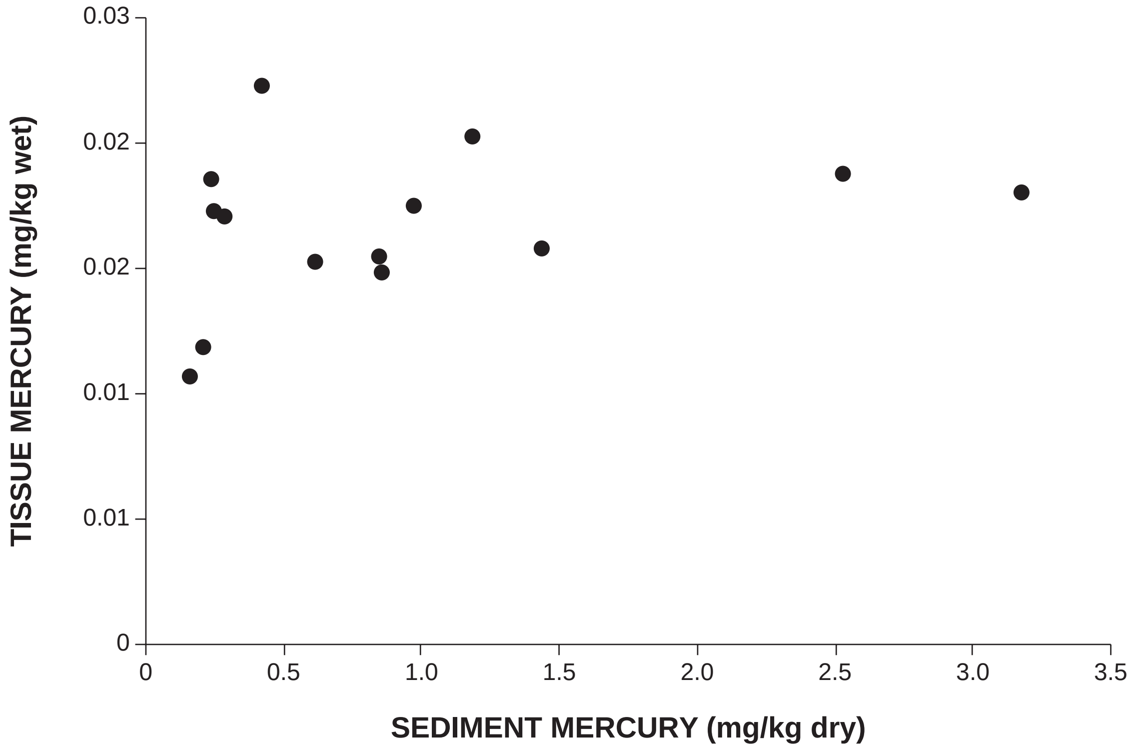


Figure 7-6. Tissue and sediment data for mercury

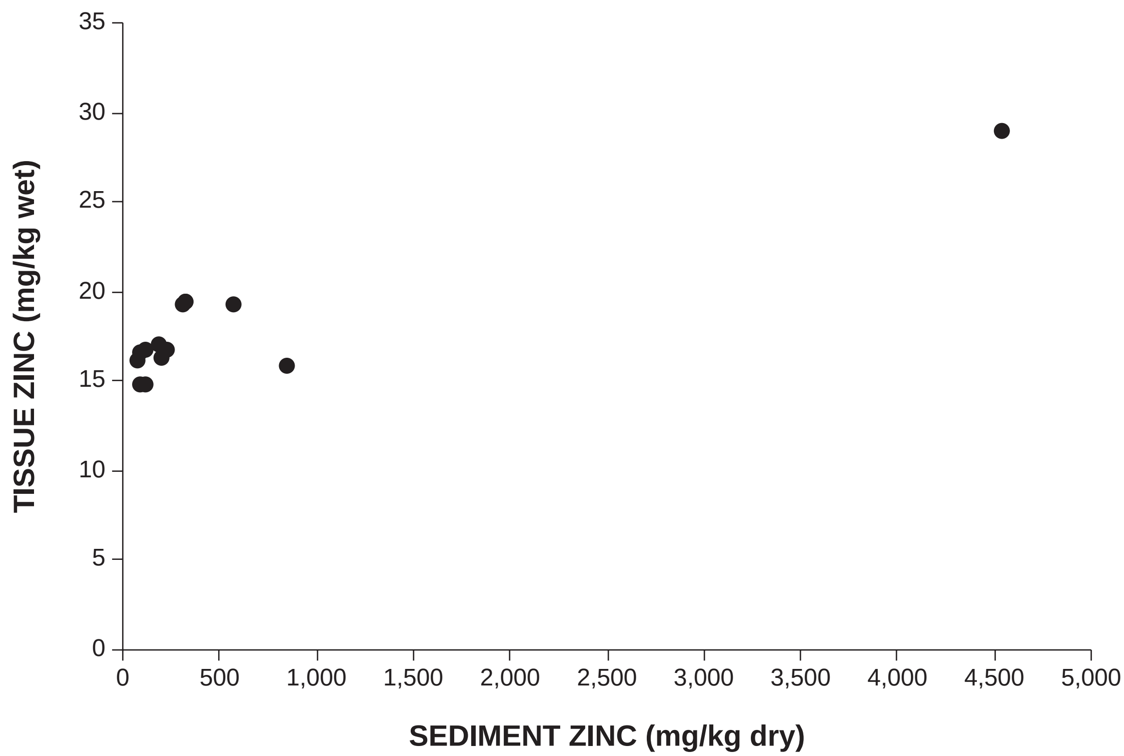


Figure 7-7. Tissue and sediment data for zinc

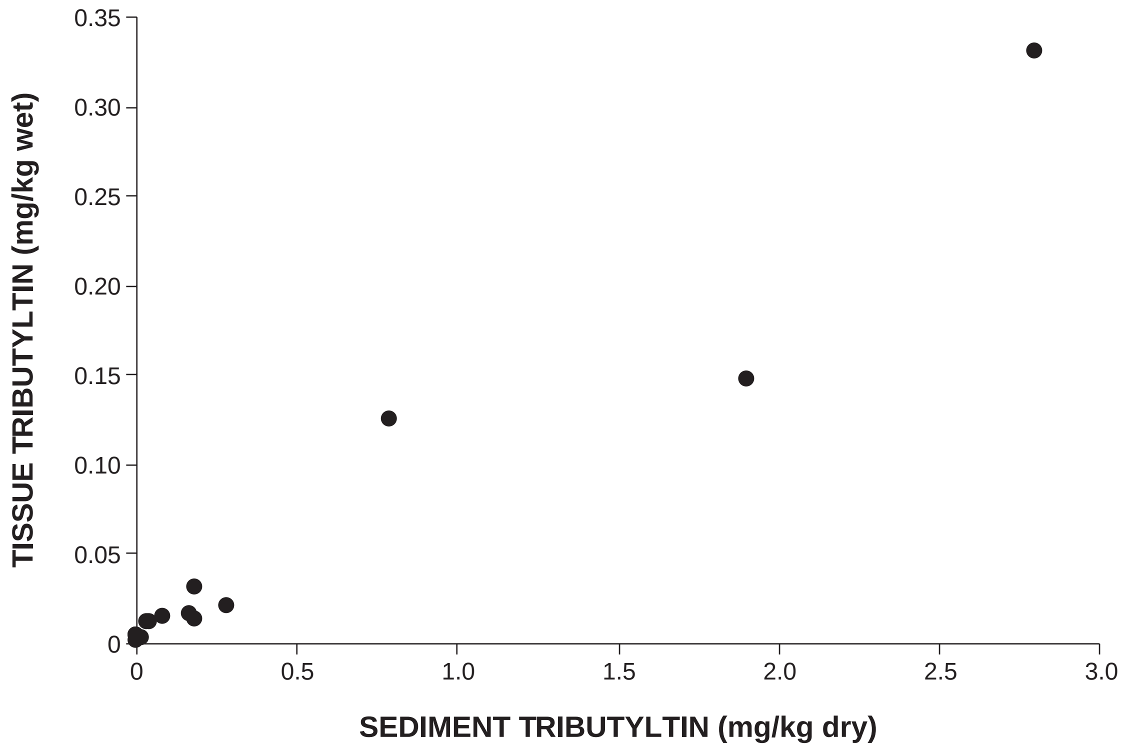


Figure 7-8. Tissue and sediment data for tributyltin

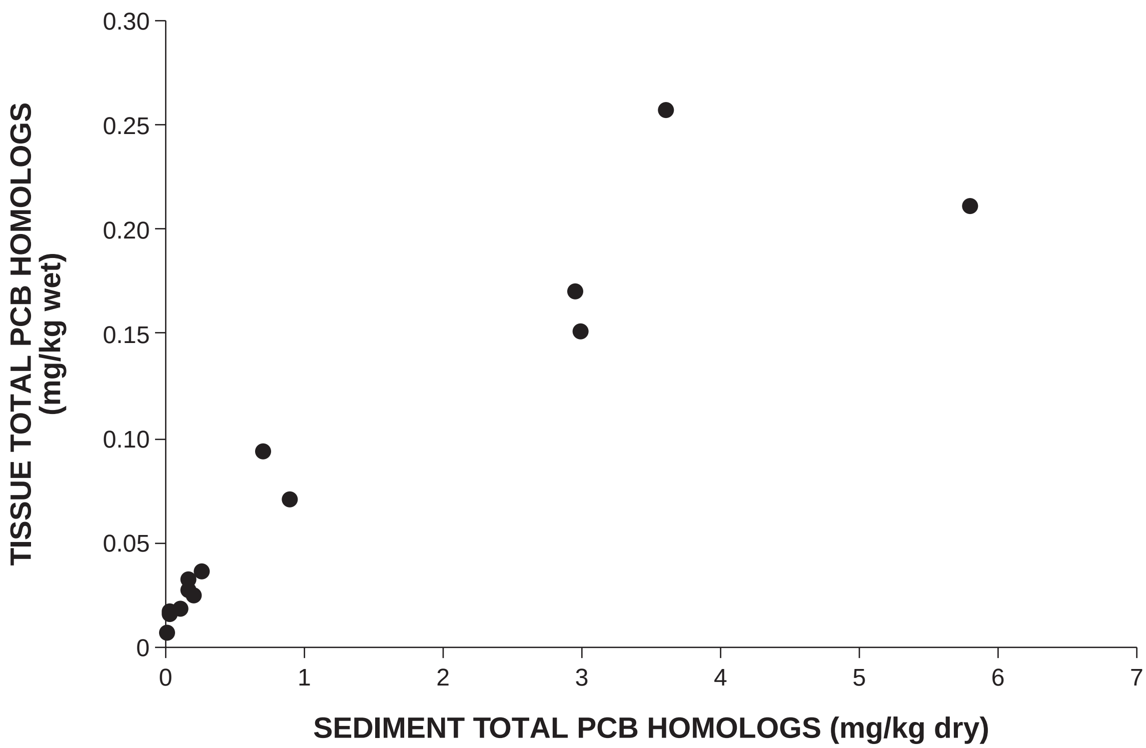


Figure 7-9. Tissue and sediment data for total PCB homologs

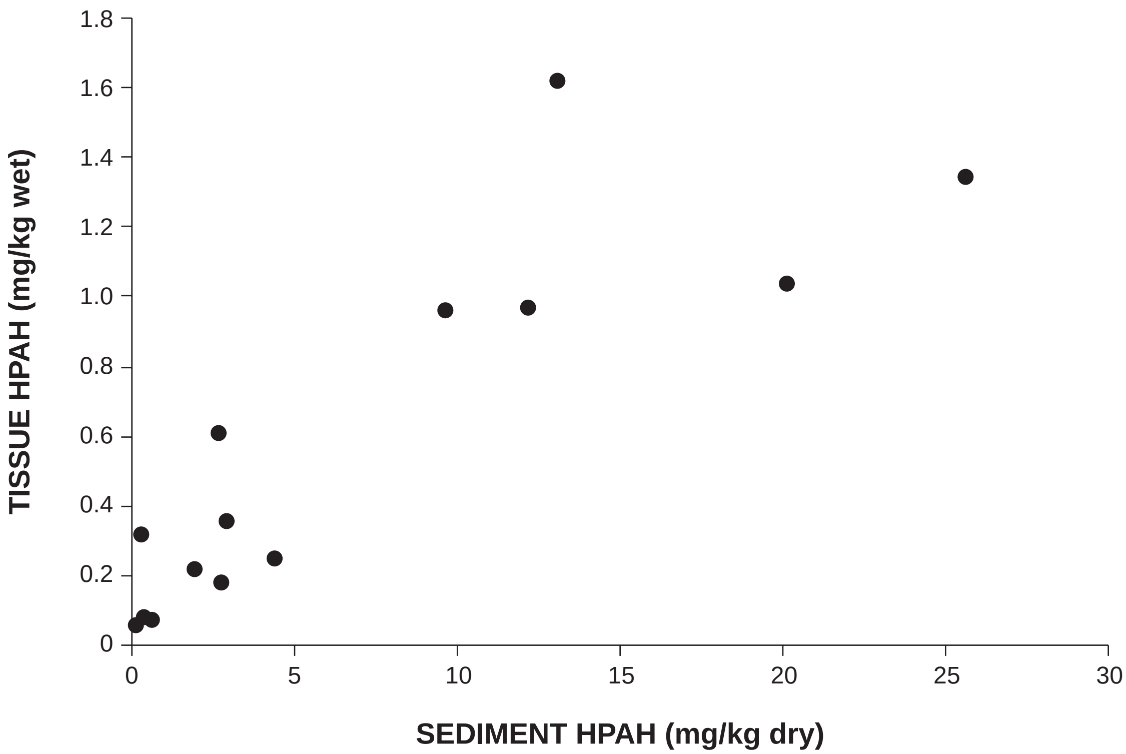


Figure 7-10. Tissue and sediment data for high-molecular-weight polycyclic aromatic hydrocarbons (HPAHs)

20. Finding 20: Indicator Sediment Chemicals

Finding 20 of CAO No. R9-2012-0024 states:

The San Diego Water Board evaluated the relationships between sediment chemical pollutants and biological responses to identify indicator chemical pollutants that may be impacting aquatic life and would therefore be candidates for assignment of cleanup levels or remediation goals. A two-step process was conducted. The first step in the selection of indicator chemicals was to identify chemicals representative of the major classes of sediment pollutants: metals, butyltins, PCBs and PCTs, PAHs, and petroleum hydrocarbons. The second step was the evaluation of relationships between these chemicals and biological responses. Results of the three toxicity tests, benthic community assessment, and bioaccumulation testing conducted in Phase 1 of the Shipyard study were all used to evaluate the potential of such relationships. Chemical pollutants were selected as indicator chemicals if they had any statistically significant relationship with amphipod mortality, echinoderm fertilization, bivalve development, total benthic macroinvertebrate abundance, total benthic macroinvertebrate richness, or tissue chemical concentrations in *Macoma nasuta*. Chemical pollutants selected as indicator chemicals include arsenic, copper, lead, mercury, zinc, TBT, total PCB homologs, diesel range organics (DRO), and residual range organics (RRO).

20.1. Indicator Sediment Chemical Pollutants

A two-step approach was used to identify indicator chemical pollutants that may be impacting aquatic life beneficial uses as identified in Section 18 – Sediment Quality Triad Results. The first step consisted of selecting chemical pollutants representative of the major classes of sediment pollutants at the Shipyard Sediment Site and the second step evaluated those chemicals with observed relationships to biological responses.

The major classes of sediment chemical pollutants identified in Step 1 were metals, butyltins, polychlorinated biphenyls (PCB) and polychlorinated terphenyls (PCT), PAH, and petroleum hydrocarbons. Specific chemical pollutants were selected to represent each of these classes:

- **Metals** – All metals except for selenium were selected as indicator chemical pollutants. Selenium was excluded due to it relatively low detection frequency and because the detected values were equal to the quantitation limit;
- **Butyltins** – Tributyltin (TBT) was selected as an indicator chemical pollutant because it is commonly used in marine antifouling paints;
- **PCBs and PCTs** – The sum of PCB homologs was used because it more accurately represents total PCBs as opposed to the sum of congeners (not all congeners were measured) and the sum of Aroclors. The sum of PCT Aroclors measured was used to represent total PCTs;
- **PAH** – The sum of all high-molecular-weight PAHs (HPAH) was used to represent PAH compounds. The sum of low-molecular-weight PAHs (LPAH) and the sum of all PAH compounds were not used because most LPAH compounds were undetected; and

- **Petroleum Hydrocarbons** – Diesel-range organics (DRO) and residual-range organics (RRO) were used to represent petroleum hydrocarbons. Gasoline-range organics (GRO) was not used because it was undetected. Petroleum hydrocarbons, including TPH, RRO, DRO, and other PAHs, including BAP, were eliminated as indicator chemicals because HPAHs are considered to be the most recalcitrant, bioavailable, and toxic compounds present in the complex mixture of petroleum hydrocarbons.

In Step 2, the chemical pollutants identified above were selected as indicator chemical pollutants if they had any statistically significant relationship with any of the biological effects indicators. Amphipod mortality, echinoderm fertilization, bivalve development, total benthic macroinvertebrate abundance, total benthic macroinvertebrate richness, and tissue chemical concentrations in *Macoma nasuta* were used to evaluate the potential of such relationships. Based on the chemical and biological response comparisons (Table 20-1), the chemicals selected as indicator chemicals included arsenic, copper, lead, mercury, zinc, TBT, total PCB homologs, DRO, and RRO (Exponent, 2003). All of these indicator chemicals, except for DRO and RRO, are considered to have possible impacts on aquatic-dependent wildlife or human health because of their statistical relationship with the *Macoma* tissue bioaccumulation results. DRO and RRO are considered to have possible impacts on aquatic life because of their statistical relationship with the benthic community results as reported in the Shipyard Report. As noted above, potential impacts from DRO and RRO are assumed to be represented and addressed via HPAH risk evaluation.

Table 20-1 Relationships of Sediment Chemical Pollutants to Biological Effects

Chemical	Statistical Relationship to:						Selected as Indicator Chemical?
	Amphipod Toxicity	Echinoderm Toxicity	Bivalve Toxicity	Benthic Macroinvertebrate Total Abundance	Benthic Macroinvertebrate Total Richness	Macoma Tissue Bioaccumulation	
Arsenic	No	No	No	No	No	Yes[1]	Yes
Cadmium	No	No	No	No	No	No	No
Chromium	No	No	No	No	No	No	No
Copper	No	No	No	No	No	Yes	Yes
Lead	No	No	No	No	No	Yes	Yes
Mercury	No	No	No	No	No	Yes	Yes
Nickel	No	No	No	No	No	No	No
Silver	No	No	No	No	No	No	No
Zinc	No	No	No	No	No	Yes	Yes
TBT	No	No	No	No	No	Yes	Yes
HPAH	No	No	No	No	No	Yes	Yes
Total PCB homologs	No	No	No	No	No	Yes	Yes
PCTs	No	No	No	No	No	No	No
DRO	No	No	No	No	Yes	--[2]	Yes
RRO	No	No	No	Yes	Yes	--[2]	Yes

1. The relationship is controlled by a single point
2. Not evaluated

21. Finding 21: Aquatic-Dependent Wildlife Impairment

Finding 21 of CAO No. R9-2012-0024 states:

Aquatic-dependent wildlife beneficial uses designated for San Diego Bay are impaired due to the elevated levels of pollutants present in the marine sediment at the Shipyard Sediment Site. Aquatic-dependent wildlife beneficial uses include: Wildlife Habitat (WILD), Preservation of Biological Habitats of Special Significance (BIOL), and Rare, Threatened, or Endangered Species (RARE). This finding is based on the considerations described below in the *Impairment of Aquatic-Dependent Wildlife Beneficial* Uses section of this CAO.

21.1. Aquatic-Dependent Wildlife Beneficial Uses

There are three beneficial uses designated in the Basin Plan for San Diego Bay (RWQCB, 1994), which must be fully protected in order to provide for the protection of aquatic-dependent wildlife:

- **Wildlife Habitat (WILD)** – Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources;

- **Preservation of Biological Habitats of Special Significance (BIOL)** – Includes uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection; and

- **Rare, Threatened, or Endangered Species (RARE)** – Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

The concentrations of the pollutants present in the marine sediment within and adjacent to the Shipyard Sediment Site cause or threaten to cause a condition of pollution or contamination that adversely impacts these three beneficial uses and thereby constitute a threat to the aquatic-dependent wildlife. Information supporting this conclusion is contained in Sections 22 through 24 of this report.

22. Finding 22: Risk Assessment Approach for Aquatic-Dependent Wildlife

Finding 22 of CAO No. R9-2012-0024 states:

The San Diego Water Board evaluated potential risks to aquatic-dependent wildlife from chemical pollutants present in the sediment at the Shipyard Sediment Site based on a two-tier approach. The Tier I screening level risk assessment was based on tissue data derived from the exposure of the clam *Macoma nasuta* to site sediments for 28 days using the protocols specified by American Society of Testing Material (ASTM). The Tier II baseline comprehensive risk assessment was based on tissue data derived from resident fish and shellfish caught within and adjacent to the Shipyard Sediment Site.

22.1. Two-Tiered Risk Assessment Approach

A two-tiered approach was used to evaluate potential risks to aquatic-dependent wildlife from chemical pollutants present at the Shipyard Sediment Site. Tier I was a screening level risk assessment that uses conservative exposure and effects assumptions to support risk management decisions. Tier II was a comprehensive risk assessment (i.e., baseline risk assessment) that more accurately characterizes potential risk to receptors of concern primarily by replacing the conservative assumptions required by Tier I with site-specific exposure parameters.

The approach used in Tiers I and II was conducted in accordance with U.S. EPA's "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (Interim Final)" (U.S. EPA, 1997a) and with DTSC's "Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities" (DTSC, 1996). The approach consists of the following key elements:

- Selection of Receptors of Concern
- Exposure Characterization
- Effects Characterization
- Risk Characterization
- Risk Management
- Uncertainties Related to Risk Estimates

These elements are discussed in more detail in Section 23 – Tier I Screening Level Risk Assessment and Section 24 – Tier II Comprehensive Risk Assessment of this report.

23. Finding 23: Tier I Screening Level Risk Assessment for Aquatic-Dependent Wildlife

Finding 23 of CAO No. R9-2012-0024 states:

The Tier I risk assessment objectives were to determine whether or not Shipyard Sediment Site conditions pose a potential unacceptable risk to aquatic-dependent wildlife receptors of concern and to identify whether a comprehensive, site-specific risk assessment was warranted (i.e., Tier II baseline risk assessment). The receptors of concern selected for the assessment include: California least tern (*Sterna antillarum brownie*), California brown pelican (*Pelecanus occidentalis californicus*), Western grebe (*Aechmophorus occidentalis*), Surf scoter (*Melanitta perspicillata*), California sea lion (*Zalophus californianus*), and East Pacific green turtle (*Chelonia mydas agassizii*). Chemical pollutant concentrations measured in clam tissue derived from laboratory bioaccumulation tests were used to estimate chemical exposure to these receptors of concern. Based on the Tier I screening level risk assessment results, there is a potential risk to all receptors of concern ingesting prey caught at the Shipyard Sediment Site. The chemical pollutants in *Macoma* tissue posing a potential risk include arsenic, copper, lead, zinc, benzo[a]pyrene (BAP), and total PCBs. The results of the Tier I risk assessment indicated that a Tier II baseline comprehensive risk assessment was warranted.

23.1. Tier I Results

For the Tier I screening level risk assessment, six aquatic-dependent wildlife species were identified as potential receptors that could be at risk due to exposure to chemicals in prey caught at the Shipyard Sediment Site. The six receptors include: California least tern (*Sterna antillarum brownie*), California brown pelican (*Pelecanus occidentalis californicus*), Western grebe (*Aechmophorus occidentalis*), Surf scoter (*Melanitta perspicillata*), California sea lion (*Zalophus californianus*), and East Pacific green turtle (*Chelonia mydas agassizii*). Chemical concentrations measured in *Macoma nasuta* tissue derived from laboratory bioaccumulation tests were used to estimate chemical exposure for these receptors of concern.

Based on the Tier I results, as summarized in Table 23-1 below, the San Diego Water Board determined that there is a potential risk to all receptors of concern ingesting prey caught at the Shipyard Sediment Site and that a comprehensive, site specific risk assessment was warranted (i.e., Tier II baseline risk assessment). The chemical pollutants in *Macoma* tissue posing a potential risk include arsenic, copper, lead, zinc, BAP, and PCBs. The Tier I risk calculations and results are provided in the Appendix for Section 23.

Table 23-1 Summary of Tier I Aquatic-Dependent Wildlife Risk Assessment Results

Station	Receptor	Site Chemicals in *Macoma* Tissue Posing a Potential Risk[1]	Site Chemicals in *Macoma* Tissue Not Posing a Potential Risk [2]
NA06	Brown Pelican	Lead	Benzo[a]pyrene (BAP), total polychlorinated biphenyls (PCBs), tributyltin (TBT), arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Least Tern	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Western Grebe	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Green Turtle	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
NA11	Brown Pelican	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Least Tern	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Western Grebe	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Green Turtle	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc

Station	Receptor	Site Chemicals in *Macoma* Tissue Posing a Potential Risk[1]	Site Chemicals in *Macoma* Tissue Not Posing a Potential Risk [2]
NA12	Brown Pelican	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Least Tern	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Western Grebe	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Green Turtle	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
NA20	Brown Pelican	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Least Tern	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Western Grebe	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Green Turtle	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc

Station	Receptor	Site Chemicals in *Macoma* Tissue Posing a Potential Risk[1]	Site Chemicals in *Macoma* Tissue Not Posing a Potential Risk [2]
SW04	Brown Pelican	Copper, lead, zinc	BAP, PCBs, TBT, arsenic, chromium, mercury, nickel, selenium
	Least Tern	Copper, lead, zinc, BAP	PCBs, TBT, arsenic, chromium, mercury, nickel, selenium
	Sea Lion	Arsenic, zinc	BAP, PCBs, TBT, chromium, copper, lead, mercury, nickel, selenium
	Surf Scoter	Copper, lead, zinc	BAP, PCBs, TBT, arsenic, chromium, mercury, nickel, selenium
	Western Grebe	Copper, lead, zinc	BAP, PCBs, TBT, arsenic, chromium, mercury, nickel, selenium
	Green Turtle	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
SW08	Brown Pelican	Copper, lead	BAP, PCBs, TBT, arsenic, chromium, mercury, nickel, selenium, zinc
	Least Tern	Copper, lead, zinc, BAP	PCBs, TBT, arsenic, chromium, mercury, nickel, selenium
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	Copper, lead	BAP, PCBs, TBT, arsenic, chromium, mercury, nickel, selenium, zinc
	Western Grebe	Copper, lead	BAP, PCBs, TBT, arsenic, chromium, mercury, nickel, selenium, zinc
	Green Turtle	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
SW13	Brown Pelican	Copper, total PCBs	BAP, TBT, arsenic, chromium, lead, mercury, nickel, selenium, zinc
	Least Tern	Copper, zinc, total PCBs	BAP, TBT, arsenic, chromium, lead, mercury, nickel, selenium
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	Copper, lead	BAP, PCBs, TBT, arsenic, chromium, mercury, nickel, selenium, zinc

Station	Receptor	Site Chemicals in *Macoma* Tissue Posing a Potential Risk[1]	Site Chemicals in *Macoma* Tissue Not Posing a Potential Risk [2]
	Western Grebe	Copper	BAP, PCBs, TBT, arsenic, chromium, lead, mercury, nickel, selenium, zinc
	Green Turtle	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
SW21	Brown Pelican	Lead, total PCBs	BAP, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Least Tern	Lead, zinc, BAP, total PCBs	TBT, arsenic, chromium, copper, mercury, nickel, selenium
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Western Grebe	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Green Turtle	Lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
SW28	Brown Pelican	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Least Tern	Zinc, total PCBs	BAP, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Western Grebe	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Green Turtle	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc

1. A potential risk is defined if the hazard quotient (HQ) is greater than 1.0 **AND** greater than the reference 95% upper prediction limit *Macoma* tissue concentration.
2. Not posing a potential risk is indicated if the HQ is less than 1.0 **OR** if the HQ is greater than 1.0 **AND** less than the reference 95% upper prediction limit *Macoma* tissue concentration.

23.2. Tier I Approach

The San Diego Water Board conducted a Tier I screening level risk assessment to determine whether or not the current conditions at the Shipyard Sediment Site pose a potential unacceptable risk to aquatic-dependent wildlife receptors of concern and to identify whether a comprehensive, site-specific risk assessment was warranted (i.e., Tier II baseline risk assessment). Potential risks were characterized by: (1) quantifying the risks at the site using the hazard quotient (HQ) approach, and (2) comparing clam tissue concentrations exposed to site sediment to clam tissue concentrations exposed to reference sediment.

The approach used in the Tier I screening level risk assessment was conducted in accordance with U.S. EPA's "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final" (U.S. EPA, 1997a), U.S. EPA's "Guidelines for Ecological Risk Assessment (EPA/630/R-95/002F)" (U.S. EPA, 1998b), and with DTSC's "Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities" (DTSC, 1996). The approach consists of the following key elements:

- Selection of Receptors of Concern
- Exposure Characterization
- Effects Characterization
- Risk Characterization
- Risk Management
- Uncertainties Related to Risk Estimates

These key elements are discussed in more detail below.

23.2.1. Selection of Receptors of Concern

For Tier I, fish-eating marine birds and mammals, mollusk-eating birds, and sea grass-eating reptiles were identified as important groups of aquatic-dependent wildlife that may be at risk due to exposure to chemicals in prey species at the Shipyard Sediment Site (Exponent, 2002). Six species were identified as suitable representative receptors for assessing potential risk to these groups as reviewed and approved by U.S. FWS, DFG, and NOAA (collectively known as the "Natural Resource Trustee Agencies"). The six species are shown in Table 23-2 below. These receptors were selected based on characteristics such as their presence at the site, feeding habits, known adverse effects from exposure to bioaccumulative chemical pollutants, the availability of ample life history information in the literature, and federal or state listings of species as threatened or endangered.

Table 23-2 Receptors Selected for the Tier II Risk Assessment

Receptor	Scientific Name	Representative of	Comments
California least tern	*Sterna antillarum brownie*	Marine birds that may feed on small fish	Federal and California listed endangered species
California brown pelican	*Pelecanus occidentalis californicus*	Marine birds that may feed on small- to medium-sized fish	Federal and California listed endangered species
Western grebe	*Aechmophorus occidentalis*	Diving marine birds that may feed on small fish	
Surf scoter	*Melanitta perspicillata*	Diving marine birds that may feed on mollusks	
California sea lion	*Zalophus californianus*	Marine mammals that may feed on medium-sized fish	
East Pacific green turtle	*Chelonia mydas agassizii*	Marine reptiles that may feed on sea grasses	Listed as threatened wherever found and listed as endangered in Florida and on the Pacific coast of Mexico

23.2.2. Exposure Characterization

The primary routes of exposure to chemical pollutants at the Shipyard Sediment Site are through the ingestion of prey items and the incidental ingestion of sediment during foraging (Exponent, 2003). Separate chemical pollutant exposure estimates were developed for each receptor at each of the Shipyard Sediment Site stations where bioaccumulation tests were conducted. For Tier I, bioaccumulation tests were conducted using sediment from four stations in the NASSCO leasehold (NA06, NA11, NA12, and NA20) and five stations in the BAE Systems leasehold (SW04, SW08, SW13, SW21, and SW28). These stations were positioned along an expected gradient of sediment concentrations of potentially bioaccumulative substances at each shipyard leasehold. The bioaccumulation tests involved the exposure of the clam *Macoma nasuta* to bay sediment at the Shipyard Sediment Site for 28 days using the protocols specified by ASTM (2001). The tissue concentrations derived from these tests were used as the surrogate for prey tissue data, even though mollusks are not a major component of the diet for most of the receptors of concern selected for this risk analysis. Because *Macoma* actively ingests surface sediment (likely to be the most direct route of exposure to pollutants that accumulate in tissues), use of *Macoma* tissue data for all receptors of concern including those that exclusively feed on fish is considered a relatively conservative approach.

Exposure estimates for the six receptors were developed using the following general intake equation (DTSC, 1996):

$$\textbf{Daily Intake}_{\textbf{chemical}}\ \textbf{(in mg/kg - day)} = \frac{(\textbf{CM} * \textbf{CR} * \textbf{FI} * \textbf{AF})}{\textbf{BW}}$$

where:

CM	=	concentration of the chemical in a given dietary component or inert medium (mg/kg)
CR	=	contact rate (i.e., ingestion rate) of dietary component or inert medium (kg/day)
FI	=	fraction of the daily intake of a given dietary component or inert medium derived from the site (unitless area-use factor)
AF	=	relative gastrointestinal absorption efficiency for the chemical in a given dietary component or inert medium (fraction)
BW	=	body weight of receptor species (kg)

The intake equation was further expanded to account for the ingestion of prey items and the incidental ingestion of sediment:

$$\textbf{Daily Intake}_{\textbf{chemical}}\ \textbf{(in mg/kg - day)} = \frac{\left[(\mathbf{CM} * \mathbf{CR} * \mathbf{FI} * \mathbf{AF})_{\mathbf{prey}} + (\mathbf{CM} * \mathbf{CR} * \mathbf{FI} * \mathbf{AF})_{\mathbf{sediment}}\right]}{\mathbf{BW}}$$

The assumptions used by the San Diego Water Board in the expanded equation to estimate receptor exposure at each site stations are shown in Table 23-3 below and the exposure estimate calculations using these assumptions are provided in the Appendix for Section 23.

Table 23-3 Exposure Parameters for Tier I Screening Level Risk Assessment

Receptor	Prey Tissue Concentration (mg/kg dry wt)	Sediment Chemical Concentration (mg/kg dry wt)	Body Weight[1] (kg)	Food Ingestion Rate[1] (kg/day dry wt)	Sediment Ingestion Rate[2] (kg/day dry wt)	Area Use Factor	Absorption Efficiency
California brown pelican	Maximum Detected Value	Maximum Detected Value	2.845	0.23	0.005	1	1
California least tern	Maximum Detected Value	Maximum Detected Value	0.036	0.044	0.0011	1	1
Western grebe	Maximum Detected Value	Maximum Detected Value	0.808	0.046	0.0031	1	1
Surf scoter	Maximum Detected Value	Maximum Detected Value	0.859	0.048	0.0028	1	1
California sea lion	Maximum Detected Value	Maximum Detected Value	45.0	0.99	0.0308	1	1
East Pacific green turtle	Maximum Detected Value	Maximum Detected Value	95	0.31	0.0186	1	1

1. Exponent, 2003
2. Exponent, 2002

23.2.3. Effects Characterization

Characterizing potential adverse effects to the receptors of concern requires a comparison of the receptor-specific exposure estimates to an appropriate toxicity reference value (TRV). As recommended by the Natural Resource Trustee Agencies, exposure estimates for the Tier I screening level risk assessment were compared to TRVs developed by the U.S. Navy/U.S. EPA Region 9 Biological Technical Assistance Group (BTAG) (DTSC, 2000). The BTAG TRVs were developed jointly by the U.S. Navy, Navy consultants, and regulatory agencies, including the U.S. EPA, DTSC – Human and Ecological Risk Division, San Diego Water Board, NOAA, U.S. FWS, Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA), and DFG. The U.S. EPA, DTSC, and the other agencies endorse and recommend the use of the BTAG TRVs for ecological risk assessments conducted in California and in U.S. EPA Region IX.

The BTAG TRVs are presented as an upper and lower estimate of effects thresholds. The low-TRV is based on no-adverse-effects-levels (NOAELs) and represents a threshold below which no adverse effects are expected. The high-TRV is based on an approximate midpoint of the range of effects levels and represents a threshold above which adverse effects are likely to occur. The BTAG low and high TRVs for birds and mammals (site CoPCs only) are shown in Table 23-4 below. Because BTAG TRVs are not available for BAP for birds and chromium for birds and mammals, the NOAELs and low-adverse-effects-levels (LOAELs) identified by Exponent (2003) were used (Table 23-5). It should be noted that suitable reptilian TRVs were not found in the literature (Exponent, 2003). Therefore, avian TRVs were used to estimate potential adverse effects to the East Pacific green turtle.

Table 23-4 U.S. Navy/U.S. EPA Region 9 BTAG Toxicity Reference Values for Birds and Mammals (Shipyard Chemicals of Potential Concern Only)

	Birds		Mammals	
Chemical	Low TRV (mg/kg-day)	High TRV (mg/kg-day)	Low TRV (mg/kg-day)	High TRV (mg/kg-day)
Arsenic	5.5	22.0	0.32	4.7
Benzo[a]pyrene	Not Available	Not Available	1.31	32.8
Butyltins	0.73	45.9	0.25	15
Cadmium	0.08	10.4	0.06	2.64
Chromium	Not Available	Not Available	Not Available	Not Available
Copper	2.3	52.3	2.67	632
Lead	0.014	8.75	1.0	241
Mercury	0.039	0.18	0.027	0.27
	Not Available	Not Available	0.25	4.0
Nickel	1.38	56.3	0.133	31.6
PCBs	0.09	1.27	0.36	1.28
Selenium	0.23	0.93	0.05	1.21
Zinc	17.2	172	9.6	411

Table 23-5 NOAELs and LOAELs for Benzo[a]pyrene and Chromium Identified by Exponent

Chemical	Birds		Mammals	
	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)
Benzo[a]pyrene	014	1.4	Not Used	Not Used
Chromium	0.86	4.3	3.3	69

(Exponent, 2003)

23.2.4. Risk Characterization

For the Tier I screening level risk assessment, the San Diego Water Board characterized potential risks of adverse effects to the receptors of concern by quantifying the risks at each of the site stations. Risks were estimated by integrating the exposure and effects assessments in Section 23.2.2 and 23.2.3 above using the hazard quotient approach:

$$\mathbf{HQ}_{\mathbf{low}} = \mathbf{IR}_{\mathbf{chemical}} / \mathbf{TRV}_{\mathbf{low}}$$

$$\mathbf{HQ}_{\mathbf{high}} = \mathbf{IR}_{\mathbf{chemical}} / \mathbf{TRV}_{\mathbf{high}}$$

where:

HQ = hazard quotient (unitless)
$IR_{chemical}$ = total ingestion rate of the chemical (mg/kg body weight-day)
TRV = BTAG low or high toxicity reference value (mg/kg body weight-day)

An HQ value less than 1.0 indicates that the chemical is unlikely to cause adverse ecological effects to the receptor of concern. An HQ value greater than 1.0 indicates that the receptor's exposure to the chemical has exceeded the TRV, which could indicate that there is a potential that some fraction of the population may experience an adverse effect (Exponent, 2003). The HQ calculations and results for each receptor of concern at each assessment unit are provided in the Appendix for Section 23.

In addition to characterizing the risks at the Shipyard Sediment Site, the *Macoma* tissue concentrations at each site station were compared to the *Macoma* tissue concentrations derived from the reference station pool described in Section 17 of this Technical Report. The objective of this comparison was to determine whether or not the current Shipyard Sediment Site conditions pose a greater risk to the receptors of concern than the current reference conditions in San Diego Bay.

The 95% upper prediction limit (UPL) was calculated for the reference pool *Macoma* tissue concentrations. The 95% UPL allows a one-to-one comparison to be performed between a single Shipyard Sediment Site station (i.e., each of the nine bioaccumulation site stations) and a pool of

"Reference Condition" stations (i.e., Reference Pool). Although multiple comparisons were made to the reference pool prediction limits, the San Diego Water Board made a decision to not correct for multiple comparisons so that the site/reference *Macoma* tissue comparisons would remain conservative and more protective. The 95% UPL for the reference pool *Macoma* tissue concentrations are provided in Table 23-6 below and the comparison results are provided in the Appendix for Section 23.

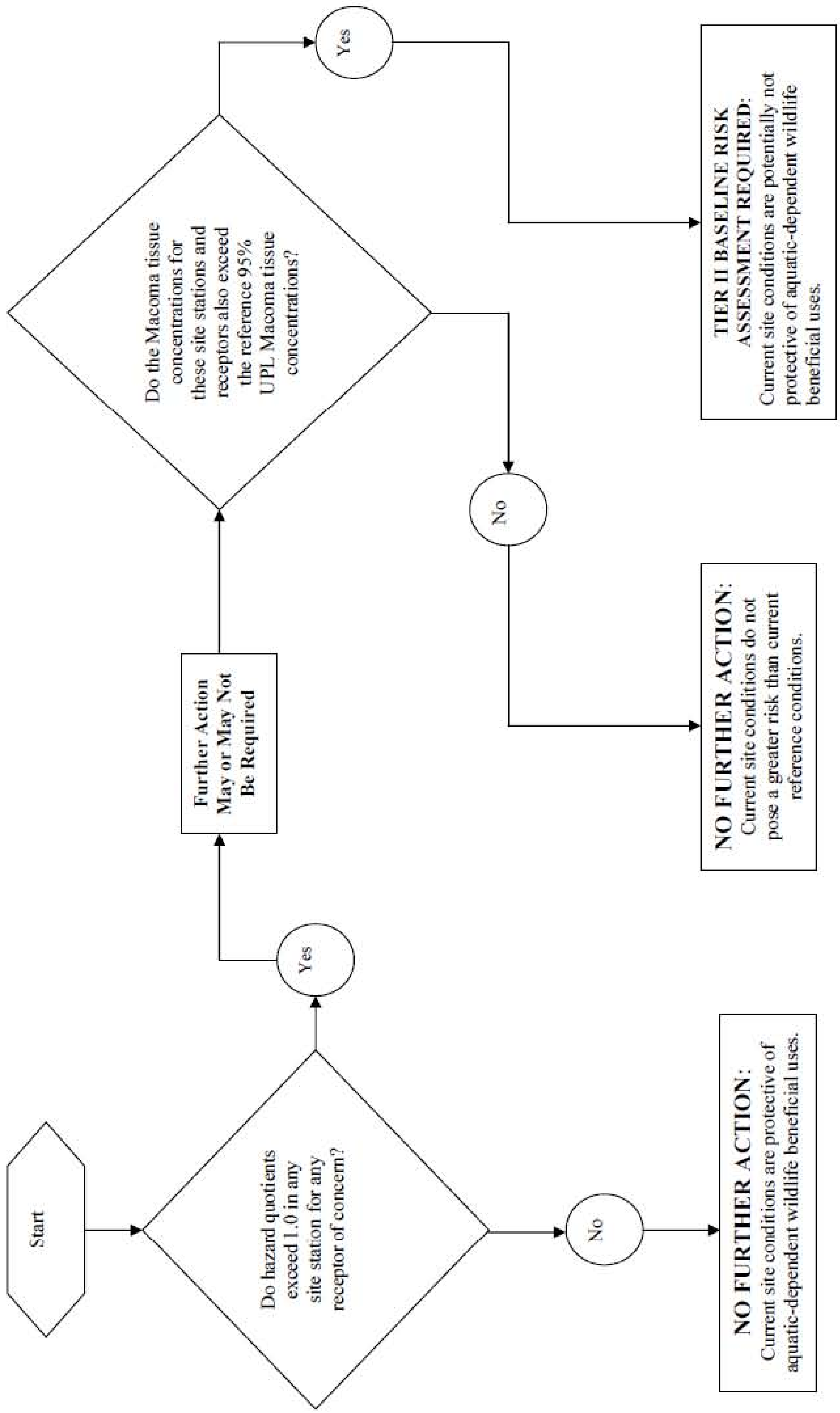
Table 23-6 Reference Pool 95% Upper Prediction Limits for *Macoma nasuta* Tissue Concentrations

Macoma Tissue Chemicals	95% Upper Prediction Limits
Metals	
Arsenic	22.8 mg/kg
Arsenic	22.8 mg/kg
Cadmium	0.39 mg/kg
Chromium	3.9 mg/kg
Copper	19.2 mg/kg
Lead	3.3 mg/kg
Mercury	0.15 mg/kg
Nickel	4.4 mg/kg
Selenium	4.9 mg/kg
Silver	0.57 mg/kg
Zinc	85.7 mg/kg
Organometallic Compounds	
Tributyltin	12 µg/kg
Organics	
Benzo[a]pyrene	132 µg/kg
Total Polychlorinated Biphenyls (PCB), as congeners	186 µg/kg
Total Polychlorinated Terphenyls (PCT)	All Reference Pool stations undetected

23.2.5. Risk Management

The San Diego Water Board identified two risk management decisions for the Tier I screening level risk assessment: (1) Current Shipyard Sediment Site conditions pose acceptable risks and no further action is warranted, and (2) Current Shipyard Sediment Site conditions pose a potential unacceptable risk that requires additional evaluation with a Tier II baseline risk assessment. These two management decisions are based on the risk characterization results at each Shipyard Sediment Site station and the *Macoma* tissue site/reference comparison results. A flow diagram (Figure 23-1) showing how each management decision is triggered is shown below and the results are presented in Table 23-1 above.

Figure 23-1 Flow Diagram for Tier I Aquatic-Dependent Wildlife Risk Management Decisions



23.2.6. Uncertainties Related to Risk Estimates

The process of evaluating aquatic-dependent wildlife risks involves multiple steps. Inherent in each step of the risk assessment process are uncertainties that ultimately affect the risk estimates. Uncertainties may exist in numerous areas such as estimation of potential site exposures and derivation of toxicity values. The most significant uncertainties in the Tier I risk analysis for the Shipyard Sediment Site are discussed below.

Tissue Chemical Concentrations. For this assessment, a 28-day laboratory bioaccumulation test using the clam *Macoma nasuta* was used to estimate exposure of prey items (fish and shellfish) to chemical pollutants of concern present at the Shipyard Sediment Site. For PCBs, dioxins, furans, PAHs, and metals, 80% of steady state generally occurs using the 28-day bioaccumulation test (U.S. EPA, 1998b; ASTM, 2001). Bioaccumulation testing protocols recommend that the bioaccumulation CoPCs reach approximately 80% of steady state tissue residues for a proper risk assessment. While attaining 100% steady state is ideal but not required in Tier I because it is a screening-level risk assessment, the San Diego Water Board recognizes that the observed tissue chemical concentrations in *Macoma nasuta* may be underestimated. Therefore, this may result in an underestimation of risk.

Surrogate for Fish-Eating Receptors. Chemical concentrations in *Macoma* tissue were used as a surrogate to estimate exposures to chemicals in food for all receptors of concern. Use of *Macoma* tissue for the receptors representing fish-eating marine birds and marine mammals (California least tern, California brown pelican, western grebe, and California sea lion) may result in an overestimation of risk because *Macoma* are more directly exposed to contaminants in the surface sediment than fish. *Macoma* actively ingests surface sediment to feed on detritus and also burrows into the sediment.

Exposure Parameters. The exposure parameters selected for Tier I are considered to be conservative values and therefore may result in an overestimation of risk.

Multiple Comparisons. Because multiple comparisons were made to the Baseline Pool, and each comparison carries with it a low probability (5%) of falsely identifying a statistical difference, there is a significant potential for multiple comparison error (SCCWRP and U.S. Navy, 2005b). This may result in an overestimation of risk.

TRV for Reptiles. For this risk assessment, avian TRVs were used as a surrogate for estimating risk to reptiles (specifically, East Pacific green turtle) because no appropriate reptile TRVs could be found for any site chemical of concern (Exponent, 2003). Avian TRVs were selected because birds are considered to be more taxonomically similar to reptiles than are mammals. This may underestimate or overestimate risks to the East Pacific green turtle.

Technical Report
for
Cleanup and Abatement
Order No. R9-2012-0024

APPENDIX FOR SECTION 23

TIER I SCREENING LEVEL RISK ASSESSMENT FOR AQUATIC-DEPENDENT WILDLIFE

March 14, 2012

SUMMARY OF TIER I AQUATIC-DEPENDENT WILDLIFE RISK ASSESSMENT RESULTS

	Arsenic		Chromium		Copper		Lead		Mercury		Nickel		Selenium	
	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)
NA06														
t-test significantly different	No	--	No	--	Yes	--	Yes	--	No	--	No	--	No	--
> 95% UPL Reference Pool	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Least Tern	--	No	--	No	--	Yes	--	Yes	--	No	--	No	--	Yes
Sea Lion	--	Yes	--	No	--	No	--	No	--	No	--	No	--	Yes
Surf Scoter	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	Yes	--	Yes	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
NA11														
t-test significantly different	No	--	No	--	Yes	--	Yes	--	No	--	No	--	No	--
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Least Tern	--	No	--	No	--	Yes	--	Yes	--	No	--	No	--	Yes
Sea Lion	--	Yes	--	No	--	No	--	No	--	No	--	No	--	Yes
Surf Scoter	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
NA12														
t-test significantly different	No	--	No	--	Yes	--	Yes	--	No	--	No	--	No	--
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	No	--	Yes	--	No	--	No	--	Yes
Least Tern	--	No	--	No	--	Yes	--	Yes	--	No	--	No	--	Yes
Sea Lion	--	Yes	--	No	--	No	--	No	--	No	--	No	--	Yes
Surf Scoter	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
NA20														
t-test significantly different	No	--	No	--	Yes	--	Yes	--	Yes	--	No	--	No	--
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Least Tern	--	No	--	No	--	No	--	Yes	--	No	--	No	--	Yes
Sea Lion	--	Yes	--	No	--	No	--	No	--	No	--	No	--	No
Surf Scoter	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	Yes	--	No	--	No	--	No
SW04														
t-test significantly different	Yes	--	No	--	Yes	--	Yes	--	Yes	--	No	--	No	--
> 95% UPL Reference Pool	--	Yes	--	No	--	Yes	--	Yes	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	Yes	--	Yes	--	No	--	No	--	No
Least Tern	--	No	--	No	--	Yes	--	Yes	--	No	--	No	--	Yes
Sea Lion	--	Yes	--	No	--	No	--	No	--	No	--	No	--	No

SUMMARY OF TIER I AQUATIC-DEPENDENT WILDLIFE RISK ASSESSMENT RESULTS

	Arsenic		Chromium		Copper		Lead		Mercury		Nickel		Selenium	
	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)
Surf Scoter	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
SW08														
t-test significantly different	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No	--
> 95% UPL Reference Pool	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
Least Tern	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	**Yes**
Sea Lion	--	**Yes**	--	No	--	No	--	No	--	No	--	No	--	No
Surf Scoter	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
SW13														
t-test significantly different	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No	--
> 95% UPL Reference Pool	--	No	--	No	--	**Yes**	--	No	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	**Yes**
Least Tern	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	**Yes**
Sea Lion	--	**Yes**	--	No	--	No	--	No	--	No	--	No	--	**Yes**
Surf Scoter	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
SW21														
t-test significantly different	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No	--
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	**Yes**
Least Tern	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	**Yes**
Sea Lion	--	**Yes**	--	No	--	No	--	No	--	No	--	No	--	**Yes**
Surf Scoter	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
SW28														
t-test significantly different	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	No	--
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No	--	No	--	No
HQ > 1														
Brown Pelican	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
Least Tern	--	No	--	No	--	**Yes**	--	**Yes**	--	No	--	No	--	**Yes**
Sea Lion	--	**Yes**	--	No	--	No	--	No	--	No	--	No	--	No
Surf Scoter	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
Western Grebe	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No
Green Turtle	--	No	--	No	--	No	--	**Yes**	--	No	--	No	--	No

SUMMARY OF TIER I AQUATIC-DEPENDENT WILDLIFE RISK ASSESSMENT RESULTS

	Zinc		TBT		Benzo[a]pyrene		Total PCB Congeners	
	(mg/kg wet)	(mg/kg dry)	(ug/kg wet)	(ug/kg dry)	(ug/kg wet)	(ug/kg dry)	(ng/g wet)	(ng/g dry)
NA06								
t-test significantly different	No/Yes	--	**Yes**	--	**Yes**	--	**Yes**	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	**Yes**	--	**Yes**
HQ > 1								
Brown Pelican	--	No	--	No		No	--	No
Least Tern	--	No	--	No		No	--	No
Sea Lion	--	No	--	No		No	--	No
Surf Scoter	--	No	--	No		No	--	No
Western Grebe	--	No	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No
NA11								
t-test significantly different	No	--	**Yes**	--	**Yes**	--	No	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	**Yes**	--	No
HQ > 1								
Brown Pelican	--	No	--	No		No	--	No
Least Tern	--	No	--	No		No	--	No
Sea Lion	--	No	--	No		No	--	No
Surf Scoter	--	No	--	No		No	--	No
Western Grebe	--	No	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No
NA12								
t-test significantly different	No	--	**Yes**	--	**Yes**	--	No	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	No	--	No
HQ > 1								
Brown Pelican	--	No	--	No		No	--	No
Least Tern	--	No	--	No		No	--	No
Sea Lion	--	No	--	No		No	--	No
Surf Scoter	--	No	--	No		No	--	No
Western Grebe	--	No	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No
NA20								
t-test significantly different	No	--	**Yes**	--	**Yes**	--	No	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	**Yes**	--	No
HQ > 1								
Brown Pelican	--	No	--	No		No	--	No
Least Tern	--	No	--	No		No	--	No
Sea Lion	--	No	--	No		No	--	No
Surf Scoter	--	No	--	No		No	--	No
Western Grebe	--	No	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No
SW04								
t-test significantly different	No	--	**Yes**	--	**Yes**	--	**Yes**	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	**Yes**	--	**Yes**
HQ > 1								
Brown Pelican	--	**Yes**	--	No		No	--	No
Least Tern	--	**Yes**	--	No		**Yes**	--	No
Sea Lion	--	**Yes**	--	No		No	--	No

SUMMARY OF TIER I AQUATIC-DEPENDENT WILDLIFE RISK ASSESSMENT RESULTS

	Zinc		TBT		Benzo[a]pyrene		Total PCB Congeners	
	(mg/kg wet)	(mg/kg dry)	(ug/kg wet)	(ug/kg dry)	(ug/kg wet)	(ug/kg dry)	(ng/g wet)	(ng/g dry)
Surf Scoter	--	**Yes**	--	No		No	--	No
Western Grebe	--	**Yes**	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No
SW08								
t-test significantly different	No	--	**Yes**	--	**Yes**	--	**Yes**	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	**Yes**	--	**Yes**
HQ > 1								
Brown Pelican	--	No	--	No		No	--	No
Least Tern	--	**Yes**	--	No		**Yes**	--	**Yes**
Sea Lion	--	No	--	No		No	--	No
Surf Scoter	--	No	--	No		No	--	No
Western Grebe	--	No	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No
SW13								
t-test significantly different	No	--	**Yes**	--	**Yes**	--	No	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	**Yes**	--	**Yes**
HQ > 1								
Brown Pelican	--	No	--	No		No	--	**Yes**
Least Tern	--	**Yes**	--	No		No	--	**Yes**
Sea Lion	--	No	--	No		No	--	No
Surf Scoter	--	No	--	No		No	--	No
Western Grebe	--	No	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No
SW21								
t-test significantly different	**Yes**	--	**Yes**	--	**Yes**	--	**Yes**	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	**Yes**	--	**Yes**
HQ > 1								
Brown Pelican	--	No	--	No		No	--	**Yes**
Least Tern	--	**Yes**	--	No		**Yes**	--	**Yes**
Sea Lion	--	No	--	No		No	--	No
Surf Scoter	--	No	--	No		No	--	No
Western Grebe	--	No	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No
SW28								
t-test significantly different	No	--	**Yes**	--	**Yes**	--	**Yes**	--
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**	--	**Yes**	--	**Yes**
HQ > 1								
Brown Pelican	--	No	--	No		No	--	No
Least Tern	--	**Yes**	--	No		No	--	**Yes**
Sea Lion	--	No	--	No		No	--	No
Surf Scoter	--	No	--	No		No	--	No
Western Grebe	--	No	--	No		No	--	No
Green Turtle	--	No	--	No		No	--	No

[BLANK SHEET]

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Total Solids (decimal wet)	Arsenic (mg/kg wet)	Control	Arsenic (mg/kg dry)	Cadmium (mg/kg wet)	Control	Cadmium (mg/kg dry)	Chromium (mg/kg wet)	Control	Chromium (mg/kg dry)	Copper (mg/kg wet)	Control	Copper (mg/kg dry)	Lead (mg/kg wet)	Control
NA06	0.147	3	3	20.41	0.032	0.031	0.22	0.33	0.78	2.24	2.3	1.5	15.65	0.64	0.1
NA06	0.151	2.6	3.1	17.22	0.033	0.045	0.22	0.34	0.25	2.25	2.1	1.2	13.91	0.82	0.12
NA06	0.128	2.7	2.7	21.09	0.056	0.04	0.44	0.29	0.77	2.27	2.3	0.99	17.97	0.5	0.11
NA06	0.159	3	2.8	18.87	0.037	0.034	0.23	0.38	0.35	2.39	2.4	1.2	15.09	0.53	0.09
NA06	0.167	3.3	3.2	19.76	0.051	0.037	0.31	0.25	0.19	1.50	2.3	0.97	13.77	0.58	0.11
mean	0.1504	2.92	2.96	19.47	0.0418	0.0374	0.28	0.318	0.468	2.13	2.28	1.172	15.28	0.614	0.106
max	0.167	3.3	3.2	21.09	0.056	0.045	0.4375	0.38	0.78	2.39	2.4	1.5	17.97	0.82	0.12
t-test significantly different	--	No	--	--	No	--	--	No	--	--		--	--		--
> 95% UPL Reference Pool	--	--	--	No	--	--	No	--	--	No	--	--	No	--	--
NA11	0.155	3.2	3	20.65	0.036	0.031	0.23	0.26	0.78	1.68	1.6	1.5	10.32	0.37	0.1
NA11	0.148	2.6	3.1	17.57	0.028	0.045	0.19	0.23	0.25	1.55	1.8	1.2	12.16	0.28	0.12
NA11	0.131	2.8	2.7	21.37	0.025	0.04	0.19	0.18	0.77	1.37	1.6	0.99	12.21	0.3	0.11
NA11	0.155	3.7	2.8	23.87	0.052	0.034	0.34	0.34	0.35	2.19	2.6	1.2	16.77	0.53	0.09
NA11	0.147	2.6	3.2	17.69	0.054	0.037	0.37	0.36	0.19	2.45	1.9	0.97	12.93	0.48	0.11
mean	0.1472	2.98	2.96	20.23	0.039	0.0374	0.26	0.274	0.468	1.85	1.9	1.172	12.88	0.392	0.106
max	0.155	3.7	3.2	23.87	0.054	0.045	0.3673469	0.36	0.78	2.45	2.6	1.5	16.77	0.53	0.12
t-test significantly different			--	--		--	--		--	--		--	--		--
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--	No	--	--
NA12	0.14	2.8	3	20.00	0.02	0.031	0.14	0.2	0.78	1.43	1.7	1.5	12.14	0.3	0.1
NA12	0.132	2.6	3.1	19.70	0.036	0.045	0.27	0.26	0.25	1.97	2	1.2	15.15	0.31	0.12
NA12	0.152	2.6	2.7	17.11	0.031	0.04	0.20	0.26	0.77	1.71	1.5	0.99	9.87	0.3	0.11
NA12	0.147	2.9	2.8	19.73	0.035	0.034	0.24	0.32	0.35	2.18	1.7	1.2	11.56	0.37	0.09
NA12	0.142	2.6	3.2	18.31	0.028	0.037	0.20	0.19	0.19	1.34	2.4	0.97	16.90	0.38	0.11
mean	0.1426	2.7	2.96	18.97	0.03	0.0374	0.21	0.246	0.468	1.72	1.86	1.172	13.13	0.332	0.106
max	0.152	2.9	3.2	20.00	0.036	0.045	0.2727273	0.32	0.78	2.18	2.4	1.5	16.90	0.38	0.12
t-test significantly different			--	--		--	--		--	--		--	--		--
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--	No	--	--
NA20	0.162	3	3	18.52	0.029	0.031	0.18	0.25	0.78	1.54	1.7	1.5	10.49	0.41	0.1
NA20	0.136	2.2	3.1	16.18	0.023	0.045	0.17	0.27	0.25	1.99	1.6	1.2	11.76	0.38	0.12
NA20	0.158	3.2	2.7	20.25	0.035	0.04	0.22	0.37	0.77	2.34	2	0.99	12.66	0.55	0.11
NA20	0.158	3.2	2.8	20.25	0.035	0.034	0.22	0.37	0.35	2.34	2	1.2	12.66	0.55	0.09
NA20	0.147	2.5	3.2	17.01	0.029	0.037	0.20	0.3	0.19	2.04	1.4	0.97	9.52	0.37	0.11
mean	0.1522	2.82	2.96	18.44	0.0302	0.0374	0.20	0.312	0.468	2.05	1.74	1.172	11.42	0.452	0.106
max	0.162	3.2	3.2	20.25	0.035	0.045	0.221519	0.37	0.78	2.34	2	1.5	12.66	0.55	0.12
t-test significantly different			--	--		--	--		--	--		--	--		--
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--	No	--	--
SW04	0.146	3.8	3	26.03	0.043	0.031	0.29	0.76	0.78	5.21	8.1	1.5	55.48	1.9	0.1
SW04	0.142	3.8	3.1	26.76	0.055	0.045	0.39	0.49	0.25	3.45	5	1.2	35.21	1.7	0.12
SW04	0.152	3.1	2.7	20.39	0.037	0.04	0.24	0.53	0.77	3.49	4	0.99	26.32	1.3	0.11
SW04	0.153	3.6	2.8	23.53	0.031	0.034	0.20	0.18	0.35	1.18	2.5	1.2	16.34	0.7	0.09
SW04	0.149	3.6	3.2	24.16	0.027	0.037	0.18	0.42	0.19	2.82	4.6	0.97	30.87	1.1	0.11
mean	0.1484	3.58	2.96	24.17	0.0386	0.0374	0.26	0.476	0.468	3.23	4.84	1.172	32.84	1.34	0.106
max	0.153	3.8	3.2	26.76	0.055	0.045	0.3873239	0.76	0.78	5.21	8.1	1.5	55.48	1.9	0.12
t-test significantly different		**Yes**	--	--	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Total Solids (decimal wet)	Arsenic (mg/kg wet)	Control	Arsenic (mg/kg dry)	Cadmium (mg/kg wet)	Control	Cadmium (mg/kg dry)	Chromium (mg/kg wet)	Control	Chromium (mg/kg dry)	Copper (mg/kg wet)	Control	Copper (mg/kg dry)	Lead (mg/kg wet)	Control
> 95% UPL Reference Pool		--	--	**Yes**	--	--	No	--	--	No	--	--	**Yes**	--	--
SW08	0.148	2.6	3	17.57	0.022	0.031	0.15	0.33	0.78	2.23	3.2	1.5	21.62	0.8	0.1
SW08	0.12	2.8	3.1	23.33	0.029	0.045	0.24	0.35	0.25	2.92	3.2	1.2	26.67	1.4	0.12
SW08	0.148	2.8	2.7	18.92	0.035	0.04	0.24	0.53	0.77	3.58	2.6	0.99	17.57	0.6	0.11
SW08	0.157	3	2.8	19.11	0.037	0.034	0.24	0.3	0.35	1.91	3.2	1.2	20.38	0.66	0.09
SW08	0.138	2.6	3.2	18.84	0.03	0.037	0.22	0.31	0.19	2.25	4.3	0.97	31.16	0.75	0.11
mean	0.1422	2.76	2.96	19.55	0.0306	0.0374	0.22	0.364	0.468	2.58	3.3	1.172	23.48	0.842	0.106
max	0.157	3	3.2	23.33	0.037	0.045	0.2416667	0.53	0.78	3.58	4.3	1.5	31.16	1.4	0.12
t-test significantly different		No	--	--	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--	**Yes**	--	--
SW13	0.12	2.5	3	20.83	0.032	0.031	0.27	0.26	0.78	2.17	2.5	1.5	20.83	0.35	0.1
SW13	0.158	3.6	3.1	22.78	0.045	0.045	0.28	0.31	0.25	1.96	5.6	1.2	35.44	0.4	0.12
SW13	0.163	3.1	2.7	19.02	0.031	0.04	0.19	0.3	0.77	1.84	3.1	0.99	19.02	0.43	0.11
SW13	0.14	2.1	2.8	15.00	0.025	0.034	0.18	0.41	0.35	2.93	4.2	1.2	30.00	0.35	0.09
SW13	0.151	2.9	3.2	19.21	0.027	0.037	0.18	0.29	0.19	1.92	2.9	0.97	19.21	0.33	0.11
mean	0.1464	2.84	2.96	19.37	0.032	0.0374	0.22	0.314	0.468	2.16	3.66	1.172	24.90	0.372	0.106
max	0.163	3.6	3.2	22.78	0.045	0.045	0.2848101	0.41	0.78	2.93	5.6	1.5	35.44	0.43	0.12
t-test significantly different		No	--	--	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--	**Yes**	--	--
SW21	0.157	3.1	3	19.75	0.033	0.031	0.21	0.32	0.78	2.04	2.4	1.5	15.29	0.46	0.1
SW21	0.146	3.1	3.1	21.23	0.037	0.045	0.25	0.32	0.25	2.19	2	1.2	13.70	0.53	0.12
SW21	0.164	3.7	2.7	22.56	0.053	0.04	0.32	0.35	0.77	2.13	2.4	0.99	14.63	0.69	0.11
SW21	0.148	2.9	2.8	19.59	0.042	0.034	0.28	0.34	0.35	2.30	2.2	1.2	14.86	0.58	0.09
SW21	0.128	2.6	3.2	20.31	0.038	0.037	0.30	0.6	0.19	4.69	3.1	0.97	24.22	0.9	0.11
mean	0.1486	3.08	2.96	20.69	0.0406	0.0374	0.27	0.386	0.468	2.67	2.42	1.172	16.54	0.632	0.106
max	0.164	3.7	3.2	22.56	0.053	0.045	0.3231707	0.6	0.78	4.69	3.1	1.5	24.22	0.9	0.12
t-test significantly different		No	--	--	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--	No	--	--
SW28	0.157	2.8	3	17.83	0.036	0.031	0.23	0.2	0.78	1.27	1.8	1.5	11.46	0.35	0.1
SW28	0.143	2.7	3.1	18.88	0.028	0.045	0.20	0.18	0.25	1.26	1.6	1.2	11.19	0.39	0.12
SW28	0.155	3.3	2.7	21.29	0.036	0.04	0.23	0.25	0.77	1.61	2.2	0.99	14.19	0.45	0.11
SW28	0.163	3.5	2.8	21.47	0.053	0.034	0.33	0.3	0.35	1.84	2.7	1.2	16.56	0.51	0.09
SW28	0.155	3.1	3.2	20.00	0.034	0.037	0.22	0.27	0.19	1.74	2.2	0.97	14.19	0.45	0.11
mean	0.1546	3.08	2.96	19.90	0.0374	0.0374	0.24	0.24	0.468	1.55	2.1	1.172	13.52	0.43	0.106
max	0.163	3.5	3.2	21.47	0.053	0.045	0.3251534	0.3	0.78	1.84	2.7	1.5	16.56	0.51	0.12
t-test significantly different		No	--	--	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--	No	--	--

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Lead (mg/kg dry)	Mercury (mg/kg wet)	Control	Mercury (mg/kg dry)	Nickel (mg/kg wet)	Control	Nickel (mg/kg dry)	Selenium (mg/kg wet)	Control	Selenium (mg/kg dry)	Silver (mg/kg wet)	Control	Silver (mg/kg dry)	Zinc (mg/kg wet)	Control
NA06	4.35	0.016	0.018	0.109	0.38	0.4	2.59	0.4	0.2	2.72	0.038	0.027	0.259	17	16
NA06	5.43	0.014	0.015	0.093	0.37	0.43	2.45	0.2	0.4	1.32	0.052	0.033	0.344	18	18
NA06	3.91	0.016	0.016	0.125	0.34	0.75	2.66	0.3	0.3	2.34	0.053	0.036	0.414	21	15
NA06	3.33	0.026	0.012	0.164	0.47	0.38	2.96	0.3	0.3	1.89	0.03	0.027	0.189	18	14
NA06	3.47	0.018	0.013	0.108	0.37	0.35	2.22	0.3	0.2	1.80	0.026	0.041	0.156	24	17
mean	4.10	0.018	0.0148	0.120	0.386	0.462	2.57	0.3	0.28	2.01	0.0398	0.0328	0.272	19.6	16
max	5.43	0.026	0.018	0.164	0.47	0.75	2.96	0.4	0.4	2.72	0.053	0.041	0.414	24	18
t-test significantly different	--		--	--		--	--		--	--		--	--		--
> 95% UPL Reference Pool	**Yes**	--	--	No	--	--	No	--	--	No	--	--	No	--	--
NA11	2.39	0.012	0.018	0.077	0.39	0.4	2.52	0.3	0.2	1.94	0.051	0.027	0.329	15	16
NA11	1.89	0.014	0.015	0.095	0.27	0.43	1.82	0.2	0.4	1.35	0.041	0.033	0.277	16	18
NA11	2.29	0.017	0.016	0.130	0.28	0.75	2.14	0.3	0.3	2.29	0.042	0.036	0.321	14	15
NA11	3.42	0.018	0.012	0.116	0.39	0.38	2.52	0.4	0.3	2.58	0.072	0.027	0.465	20	14
NA11	3.27	0.016	0.013	0.109	0.36	0.35	2.45	0.2	0.2	1.36	0.037	0.041	0.252	18	17
mean	2.65	0.0154	0.0148	0.105	0.338	0.462	2.29	0.28	0.28	1.90	0.0486	0.0328	0.329	16.6	16
max	3.42	0.018	0.018	0.130	0.39	0.75	2.52	0.4	0.4	2.58	0.072	0.041	0.465	20	18
t-test significantly different	--		--	--		--	--		--	--		--	--		--
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--	No	--	--
NA12	2.14	0.02	0.018	0.143	0.32	0.4	2.29	0.4	0.2	2.86	0.02	0.027	0.143	12	16
NA12	2.35	0.015	0.015	0.114	0.36	0.43	2.73	0.3	0.4	2.27	0.031	0.033	0.235	17	18
NA12	1.97	0.013	0.016	0.086	0.3	0.75	1.97	0.2	0.3	1.32	0.027	0.036	0.178	17	15
NA12	2.52	0.014	0.012	0.095	0.37	0.38	2.52	0.4	0.3	2.72	0.031	0.027	0.211	17	14
NA12	2.68	0.014	0.013	0.099	0.29	0.35	2.04	0.2	0.2	1.41	0.05	0.041	0.352	18	17
mean	2.33	0.0152	0.0148	0.107	0.328	0.462	2.31	0.3	0.28	2.12	0.0318	0.0328	0.224	16.2	16
max	2.68	0.02	0.018	0.143	0.37	0.75	2.73	0.4	0.4	2.86	0.05	0.041	0.352	18	18
t-test significantly different	--		--	--		--	--		--	--		--	--		--
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--	No	--	--
NA20	2.53	0.017	0.018	0.105	0.42	0.4	2.59	0.3	0.2	1.85	0.022	0.027	0.136	19	16
NA20	2.79	0.017	0.015	0.125	0.34	0.43	2.50	0.2	0.4	1.47	0.019	0.033	0.140	15	18
NA20	3.48	0.023	0.016	0.146	0.5	0.75	3.16	0.2	0.3	1.27	0.022	0.036	0.139	18	15
NA20	3.48	0.023	0.012	0.146	0.5	0.38	3.16	0.2	0.3	1.27	0.022	0.027	0.139	18	14
NA20	2.52	0.017	0.013	0.116	0.38	0.35	2.59	0.2	0.2	1.36	0.022	0.041	0.150	16	17
mean	2.96	0.0194	0.0148	0.127	0.428	0.462	2.80	0.22	0.28	1.44	0.0214	0.0328	0.141	17.2	16
max	3.48	0.023	0.018	0.146	0.5	0.75	3.16	0.3	0.4	1.85	0.022	0.041	0.150	19	18
t-test significantly different	--		--	--		--	--		--	--		--	--		--
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--	No	--	--
SW04	13.01	0.023	0.018	0.158	0.48	0.4	3.29	0.3	0.2	2.05	0.058	0.027	0.397	46	16
SW04	11.97	0.021	0.015	0.148	0.63	0.43	4.44	0.2	0.4	1.41	0.029	0.033	0.204	31	18
SW04	8.55	0.022	0.016	0.145	0.35	0.75	2.30	0.2	0.3	1.32	0.034	0.036	0.224	27	15
SW04	4.58	0.016	0.012	0.105	0.37	0.38	2.42	0.2	0.3	1.31	0.028	0.027	0.183	19	14
SW04	7.38	0.019	0.013	0.128	0.38	0.35	2.55	0.3	0.2	2.01	0.024	0.041	0.161	21	17
mean	9.10	0.0202	0.0148	0.136	0.442	0.462	3.00	0.24	0.28	1.62	0.0346	0.0328	0.234	28.8	16
max	13.01	0.023	0.018	0.158	0.63	0.75	4.44	0.3	0.4	2.05	0.058	0.041	0.397	46	18
t-test significantly different	--	**Yes**	--	--	No	--	--	No	--	--	No	--	--	No	--

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Lead (mg/kg dry)	Mercury (mg/kg wet)	Control	Mercury (mg/kg dry)	Nickel (mg/kg wet)	Control	Nickel (mg/kg dry)	Selenium (mg/kg wet)	Control	Selenium (mg/kg dry)	Silver (mg/kg wet)	Control	Silver (mg/kg dry)	Zinc (mg/kg wet)	Control
> 95% UPL Reference Pool	**Yes**	--	--	No	--	--	No	--	--	No	--	--	No	--	--
SW08	5.41	0.026	0.018	0.176	0.29	0.4	1.96	0.2	0.2	1.35	0.016	0.027	0.108	15	16
SW08	11.67	0.015	0.015	0.125	0.29	0.43	2.42	0.1	0.4	0.83	0.034	0.033	0.283	14	18
SW08	4.05	0.018	0.016	0.122	0.43	0.75	2.91	0.3	0.3	2.03	0.019	0.036	0.128	17	15
SW08	4.20	0.017	0.012	0.108	0.37	0.38	2.36	0.2	0.3	1.27	0.041	0.027	0.261	19	14
SW08	5.43	0.017	0.013	0.123	0.3	0.35	2.17	0.2	0.2	1.45	0.067	0.041	0.486	14	17
mean	6.15	0.0186	0.0148	0.131	0.336	0.462	2.36	0.2	0.28	1.39	0.0354	0.0328	0.253	15.8	16
max	11.67	0.026	0.018	0.176	0.43	0.75	2.91	0.3	0.4	2.03	0.067	0.041	0.486	19	18
t-test significantly different	--	No	--	--	No	--	--	No	--	--	No	--	--	No	--
> 95% UPL Reference Pool	**Yes**	--	--	No	--	--	No	--	--	No	--	--	No	--	--
SW13	2.92	0.013	0.018	0.108	0.35	0.4	2.92	0.2	0.2	1.67	0.043	0.027	0.358	17	16
SW13	2.53	0.014	0.015	0.089	0.44	0.43	2.78	0.5	0.4	3.16	0.077	0.033	0.487	24	18
SW13	2.64	0.018	0.016	0.110	0.41	0.75	2.52	0.3	0.3	1.84	0.028	0.036	0.172	25	15
SW13	2.50	0.013	0.012	0.093	0.34	0.38	2.43	0.2	0.3	1.43	0.027	0.027	0.193	16	14
SW13	2.19	0.016	0.013	0.106	0.34	0.35	2.25	0.2	0.2	1.32	0.038	0.041	0.252	14	17
mean	2.55	0.0148	0.0148	0.101	0.376	0.462	2.58	0.28	0.28	1.88	0.0426	0.0328	0.292	19.2	16
max	2.92	0.018	0.018	0.110	0.44	0.75	2.92	0.5	0.4	3.16	0.077	0.041	0.487	25	18
t-test significantly different	--	No	--	--	No	--	--	No	--	--	No	--	--	No	--
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--	No	--	--
SW21	2.93	0.016	0.018	0.102	0.36	0.4	2.29	0.2	0.2	1.27	0.053	0.027	0.338	18	16
SW21	3.63	0.017	0.015	0.116	0.31	0.43	2.12	0.2	0.4	1.37	0.039	0.033	0.267	18	18
SW21	4.21	0.017	0.016	0.104	0.41	0.75	2.50	0.3	0.3	1.83	0.061	0.036	0.372	24	15
SW21	3.92	0.017	0.012	0.115	0.36	0.38	2.43	0.3	0.3	2.03	0.05	0.027	0.338	18	14
SW21	7.03	0.012	0.013	0.094	0.37	0.35	2.89	0.4	0.2	3.13	0.054	0.041	0.422	19	17
mean	4.34	0.0158	0.0148	0.106	0.362	0.462	2.45	0.28	0.28	1.93	0.0514	0.0328	0.347	19.4	16
max	7.03	0.017	0.018	0.116	0.41	0.75	2.89	0.4	0.4	3.13	0.061	0.041	0.422	24	18
t-test significantly different	--	No	--	--	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--
> 95% UPL Reference Pool	**Yes**	--	--	No	--	--	No	--	--	No	--	--	No	--	--
SW28	2.23	0.019	0.018	0.121	0.4	0.4	2.55	0.2	0.2	1.27	0.028	0.027	0.178	18	16
SW28	2.73	0.017	0.015	0.119	0.32	0.43	2.24	0.15	0.4	1.05	0.02	0.033	0.140	15	18
SW28	2.90	0.02	0.016	0.129	0.38	0.75	2.45	0.4	0.3	2.58	0.038	0.036	0.245	22	15
SW28	3.13	0.015	0.012	0.092	0.48	0.38	2.94	0.3	0.3	1.84	0.052	0.027	0.319	25	14
SW28	2.90	0.016	0.013	0.103	0.35	0.35	2.26	0.2	0.2	1.29	0.039	0.041	0.252	17	17
mean	2.78	0.0174	0.0148	0.113	0.386	0.462	2.49	0.25	0.28	1.61	0.0354	0.0328	0.227	19.4	16
max	3.13	0.02	0.018	0.129	0.48	0.75	2.94	0.4	0.4	2.58	0.052	0.041	0.319	25	18
t-test significantly different	--	No	--	--	No	--	--	No	--	--	No	--	--	No	--
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--	No	--	--

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Zinc (mg/kg dry)	TBT (ug/kg wet)	Control	TBT (ug/kg dry)	Benzo[a]pyrene (ug/kg wet)	Control	Benzo[a]pyrene (ug/kg dry)	Total PCB Congeners (ng/g wet)	Control	Total PCB Congeners (ng/g dry)
NA06	115.65	16	0.495	108.84	27	5	183.67	55	0.47	374.15
NA06	119.21	32	0.5	211.92	26	2.5	172.19	40.1	0.44	265.56
NA06	164.06	31	0.5	242.19	20	2.5	156.25	20.1	0.54	157.03
NA06	113.21	38	1.4	238.99	30	5	188.68	69.2	46	435.22
NA06	143.71	41	0.495	245.51	32	5	191.62	57.9	0.33	346.71
mean	131.17	31.6	0.678	209.49	27	4	178.48	48.46	9.556	315.73
max	164.06	41	1.4	245.51	32	5	191.62	69.2	46	435.22
t-test significantly different	--		--	--		--	--		--	--
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	**Yes**	--	--	**Yes**
NA11	96.77	15	0.495	96.77	23	5	148.39	26.9	0.47	173.55
NA11	108.11	11	0.5	74.32	26	2.5	175.68	23.8	0.44	160.81
NA11	106.87	12	0.5	91.60	19	2.5	145.04	21.6	0.54	164.89
NA11	129.03	19	1.4	122.58	27	5	174.19	28.1	46	181.29
NA11	122.45	12	0.495	81.63	20	5	136.05	26.5	0.33	180.27
mean	112.65	13.8	0.678	93.38	23	4	155.87	25.38	9.556	172.16
max	129.03	19	1.4	122.58	27	5	175.68	28.1	46	181.29
t-test significantly different	--		--	--		--	--		--	--
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	**Yes**	--	--	No
NA12	85.71	18	0.495	128.57	19	5	135.71	16.1	0.47	115.00
NA12	128.79	15	0.5	113.64	19	2.5	143.94	15.2	0.44	115.15
NA12	111.84	13	0.5	85.53	21	2.5	138.16	17.3	0.54	113.82
NA12	115.65	19	1.4	129.25	23	5	156.46	23.4	46	159.18
NA12	126.76	8.8	0.495	61.97	18	5	126.76	17.1	0.33	120.42
mean	113.75	14.76	0.678	103.79	20	4	140.21	17.82	9.556	124.71
max	128.79	19	1.4	129.25	23	5	156.46	23.4	46	159.18
t-test significantly different	--		--	--		--	--		--	--
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	No	--	--	No
NA20	117.28	22	0.495	135.80	46	5	283.95	24.5	0.47	151.23
NA20	110.29	26	0.5	191.18	23	2.5	169.12	16.9	0.44	124.26
NA20	113.92	27	0.5	170.89	35	2.5	221.52	13.2	0.54	83.54
NA20	113.92	27	1.4	170.89	43	5	272.15	13.2	46	83.54
NA20	108.84	16	0.495	108.84	43	5	292.52	21.6	0.33	146.94
mean	112.85	23.6	0.678	155.52	38	4	247.85	17.88	9.556	117.91
max	117.28	27	1.4	191.18	46	5	292.52	24.5	46	151.23
t-test significantly different	--		--	--		--	--		--	--
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	**Yes**	--	--	No
SW04	315.07	330	0.495	2260.27	170	5	1164.38	195	0.47	1335.62
SW04	218.31	740	0.5	5211.27	170	2.5	1197.18	161	0.44	1133.80
SW04	177.63	420	0.5	2763.16	150	2.5	986.84	15	0.54	98.68
SW04	124.18	150	1.4	980.39	180	5	1176.47	136	46	888.89
SW04	140.94	15	0.495	100.67	200	5	1342.28	196	0.33	1315.44
mean	195.23	331	0.678	2263.15	174	4	1173.43	140.6	9.556	954.49
max	315.07	740	1.4	5211.27	200	5	1342.28	196	46	1335.62
t-test significantly different	--	**Yes**	--	--	Need Calc	--	--	**Yes**	--	--

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Zinc (mg/kg dry)	TBT (ug/kg wet)	Control	TBT (ug/kg dry)	Benzo[a]pyrene (ug/kg wet)	Control	Benzo[a]pyrene (ug/kg dry)	Total PCB Congeners (ng/g wet)	Control	Total PCB Congeners (ng/g dry)
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	**Yes**	--	--	**Yes**
SW08	101.35	120	0.495	810.81	170	5	1148.65	103	0.47	695.95
SW08	116.67	210	0.5	1750.00	140	2.5	1166.67	98.2	0.44	818.33
SW08	114.86	110	0.5	743.24	180	2.5	1216.22	86.2	0.54	582.43
SW08	121.02	180	1.4	1146.50	190	5	1210.19	135	46	859.87
SW08	101.45	120	0.495	869.57	150	5	1086.96	90.1	0.33	652.90
mean	111.07	148	0.678	1064.02	166	4	1165.74	102.5	9.556	721.90
max	121.02	210	1.4	1750.00	190	5	1216.22	135	46	859.87
t-test significantly different	--	**Yes**	--	--	Need Calc	--	--	**Yes**	--	--
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	**Yes**	--	--	**Yes**
SW13	141.67	120	0.495	1000.00	79	5	658.33	22.9	0.47	190.83
SW13	151.90	140	0.5	886.08	120	2.5	759.49	27.9	0.44	176.58
SW13	153.37	150	0.5	920.25	100	2.5	613.50	43.2	0.54	265.03
SW13	114.29	93	1.4	664.29	100	5	714.29	181	46	1292.86
SW13	92.72	120	0.495	794.70	130	5	860.93	35.3	0.33	233.77
mean	130.79	124.6	0.678	853.06	105.8	4	721.31	62.06	9.556	431.82
max	153.37	150	1.4	1000.00	130	5	860.93	181	46	1292.86
t-test significantly different	--	**Yes**	--	--	Need Calc	--	--	?No?	--	--
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	**Yes**	--	--	**Yes**
SW21	114.65	13	0.495	82.80	180	5	1146.50	143	0.47	910.83
SW21	123.29	14	0.5	95.89	150	2.5	1027.40	175	0.44	1198.63
SW21	146.34	16	0.5	97.56	120	2.5	731.71	170	0.54	1036.59
SW21	121.62	15	1.4	101.35	130	5	878.38	167	46	1128.38
SW21	148.44	24	0.495	187.50	110	5	859.38	106	0.33	828.13
mean	130.87	16.4	0.678	113.02	138	4	928.67	152.2	9.556	1020.51
max	148.44	24	1.4	187.50	180	5	1146.50	175	46	1198.63
t-test significantly different	--	**Yes**	--	--	Need Calc	--	--	**Yes**	--	--
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	**Yes**	--	--	**Yes**
SW28	114.65	15	0.495	95.54	140	5	891.72	127	0.47	808.92
SW28	104.90	10	0.5	69.93	130	2.5	909.09	120	0.44	839.16
SW28	141.94	16	0.5	103.23	130	2.5	838.71	136	0.54	877.42
SW28	153.37	11	1.4	67.48	140	5	858.90	104	46	638.04
SW28	109.68	13	0.495	83.87	140	5	903.23	121	0.33	780.65
mean	124.91	13	0.678	84.01	136	4	880.33	121.6	9.556	788.84
max	153.37	16	1.4	103.23	140	5	909.09	136	46	877.42
t-test significantly different	--	**Yes**	--	--	Need Calc	--	--	**Yes**	--	--
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	**Yes**	--	--	**Yes**

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

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Tier I - Summary of Hazard Quotients

Receptor: Surf Scoter
Location: NA06

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	8.6E-02	--	--	--	3.9E-01	--	--	--	--	--	--
LOAEL HQ:	8.6E-03	--	--	--	7.8E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.2E-01	1.7E-02	2.0E-01	#VALUE!	9.5E-01	**4.7E+01**	4.4E-01	1.4E-01	5.0E-01	4.9E-01
BTAG High HQ:	#VALUE!	1.6E-02	2.7E-04	5.1E-02	#VALUE!	4.2E-02	7.4E-02	9.5E-02	3.5E-03	1.2E-01	4.9E-02
MAXIMUM											
NOAEL HQ:	9.1E-02	--	--	--	4.1E-01	--	--	--	--	--	--
LOAEL HQ:	9.1E-03	--	--	--	8.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.9E-01	2.0E-02	2.1E-01	#VALUE!	9.5E-01	**5.2E+01**	5.0E-01	1.6E-01	6.8E-01	5.3E-01
BTAG High HQ:	#VALUE!	2.1E-02	3.1E-04	5.2E-02	#VALUE!	4.2E-02	8.3E-02	1.1E-01	3.9E-03	1.7E-01	5.3E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.179521
Maximum detected value (mg/kg, dry weight):	0.191617

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.61
Maximum detected value (mg/kg, dry weight):	0.61

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

NOAEL HQ:	8.6E-02	mean
LOAEL HQ:	8.6E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	9.1E-02	max
LOAEL HQ:	9.1E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.322207
Maximum detected value (mg/kg, dry weight):	0.43522

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.64
Maximum detected value (mg/kg, dry weight):	0.64

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-02	mean
Daily exposure (mg/kg-day)	2.6E-02	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	1.6E-02	mean
BTAG Low HQ:	2.9E-01	max
BTAG High HQ:	2.1E-02	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Tributyltin
Location:	NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210106
Maximum detected value (mg/kg, dry weight):	0.245509

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.4E-02	max

Hazard Quotients

BTAG Low HQ:	1.7E-02	mean
BTAG High HQ:	2.7E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	3.1E-04	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.41489
Maximum detected value (mg/kg, dry weight):	19.76048

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.1E+00	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	5.1E-02	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	5.2E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.277926
Maximum detected value (mg/kg, dry weight):	0.4375

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	2.5E-02	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	1.6E-03	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	2.4E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.114362
Maximum detected value (mg/kg, dry weight):	2.389937

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	67
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-01	mean
Daily exposure (mg/kg-day)	3.5E-01	max

Hazard Quotients

NOAEL HQ:	3.9E-01	mean
LOAEL HQ:	7.8E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.1E-01	max
LOAEL HQ:	8.2E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Copper
Location:	NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	15.15957
Maximum detected value (mg/kg, dry weight):	15.09434

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	410
Maximum detected value (mg/kg, dry weight):	410

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E+00	mean
Daily exposure (mg/kg-day)	2.2E+00	max

Hazard Quotients

BTAG Low HQ:	9.5E-01	mean
BTAG High HQ:	4.2E-02	mean
BTAG Low HQ:	9.5E-01	max
BTAG High HQ:	4.2E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.082447
Maximum detected value (mg/kg, dry weight):	5.430464

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	130
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.5E-01	mean
Daily exposure (mg/kg-day)	7.3E-01	max

Hazard Quotients

BTAG Low HQ:	4.7E+01	mean
BTAG High HQ:	7.4E-02	mean
BTAG Low HQ:	5.2E+01	max
BTAG High HQ:	8.3E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.119681
Maximum detected value (mg/kg, dry weight):	0.163522

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.2
Maximum detected value (mg/kg, dry weight):	3.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG HQ:	4.4E-01	mean
BTAG HQ:	9.5E-02	mean
BTAG Low HQ:	5.0E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.566489
Maximum detected value (mg/kg, dry weight):	2.955975

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-01	mean
Daily exposure (mg/kg-day)	2.2E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.5E-03	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	3.9E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.994681
Maximum detected value (mg/kg, dry weight):	2.721088

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients

BTAG Low HQ:	5.0E-01	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	6.8E-01	max
BTAG High HQ:	1.7E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.3191
Maximum detected value (mg/kg, dry weight):	143.7126

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.4E+00	mean
Daily exposure (mg/kg-day)	9.1E+00	max

Hazard Quotients

BTAG Low HQ:	4.9E-01	mean
BTAG High HQ:	4.9E-02	mean
BTAG Low HQ:	5.3E-01	max
BTAG High HQ:	5.3E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Sea Lion
Location: NA06

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	2.8E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.3E-03	--	--	--	--	--	--
BTAG Low HQ:	3.3E-03	2.1E-02	1.9E-02	**1.4E+00**	#VALUE!	2.3E-01	1.8E-01	1.8E-01	5.1E-01	8.9E-01	3.2E-01
BTAG High HQ:	1.3E-04	5.9E-03	3.2E-04	9.2E-02	#VALUE!	9.7E-04	7.4E-04	1.8E-02	2.2E-03	3.7E-02	7.5E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	3.0E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.4E-03	--	--	--	--	--	--
BTAG Low HQ:	3.5E-03	2.8E-02	2.2E-02	**1.4E+00**	#VALUE!	2.3E-01	2.1E-01	2.1E-01	5.8E-01	**1.2E+00**	3.5E-01
BTAG High HQ:	1.4E-04	7.8E-03	3.7E-04	9.4E-02	#VALUE!	9.7E-04	8.6E-04	2.1E-02	2.4E-03	5.0E-02	8.2E-03

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Benzo[a]pyrene
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.179521
Maximum detected value (mg/kg, dry weight):	0.191617

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.61
Maximum detected value (mg/kg, dry weight):	0.61

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-03	mean
Daily exposure (mg/kg-day)	4.6E-03	max

Hazard Quotients

BTAG Low HQ:	3.3E-03	mean
BTAG High HQ:	1.3E-04	mean
BTAG Low HQ:	3.5E-03	max
BTAG High HQ:	1.4E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.322207
Maximum detected value (mg/kg, dry weight):	0.43522

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.64
Maximum detected value (mg/kg, dry weight):	0.64

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.5E-03	mean
Daily exposure (mg/kg-day)	1.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.1E-02	mean
BTAG High HQ:	5.9E-03	mean
BTAG Low HQ:	2.8E-02	max
BTAG High HQ:	7.8E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Tributyltin
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210106
Maximum detected value (mg/kg, dry weight):	0.245509

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.7E-03	mean
Daily exposure (mg/kg-day)	5.5E-03	max

Hazard Quotients

BTAG Low HQ:	1.9E-02	mean
BTAG High HQ:	3.2E-04	mean
BTAG Low HQ:	2.2E-02	max
BTAG High HQ:	3.7E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Arsenic
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.41489
Maximum detected value (mg/kg, dry weight):	19.76048

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-01	mean
Daily exposure (mg/kg-day)	4.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	9.2E-02	mean
BTAG Low HQ:	1.4E+00	max
BTAG High HQ:	9.4E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.277926
Maximum detected value (mg/kg, dry weight):	0.4375

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.3E-03	mean
Daily exposure (mg/kg-day)	9.8E-03	max

Hazard Quotients

BTAG Low HQ:	1.1E-01	mean
BTAG High HQ:	2.4E-03	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	3.7E-03	max

Hazard Quotient Calculation

Receptor:	Sea Lion
Chemical:	Chromium
Location:	NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.114362
Maximum detected value (mg/kg, dry weight):	2.389937

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	67
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-02	mean
Daily exposure (mg/kg-day)	9.8E-02	max

Hazard Quotients

NOAEL HQ:	2.8E-02	mean
LOAEL HQ:	1.3E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.0E-02	max
LOAEL HQ:	1.4E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	15.15957
Maximum detected value (mg/kg, dry weight):	15.09434

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	410
Maximum detected value (mg/kg, dry weight):	410

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.1E-01	mean
Daily exposure (mg/kg-day)	6.1E-01	max

Hazard Quotients

BTAG Low HQ:	2.3E-01	mean
BTAG High HQ:	9.7E-04	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	9.7E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.082447
Maximum detected value (mg/kg, dry weight):	5.430464

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	130
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	2.1E-01	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	7.4E-04	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	8.6E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total Mercury
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.119681
Maximum detected value (mg/kg, dry weight):	0.163522

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.2
Maximum detected value (mg/kg, dry weight):	3.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.8E-03	mean
Daily exposure (mg/kg-day)	5.8E-03	max

Hazard Quotients

BTAG HQ:	1.8E-01	mean
BTAG HQ:	1.8E-02	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	2.1E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.566489
Maximum detected value (mg/kg, dry weight):	2.955975

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	7.7E-02	max

Hazard Quotients

BTAG Low HQ:	5.1E-01	mean
BTAG High HQ:	2.2E-03	mean
BTAG Low HQ:	5.8E-01	max
BTAG High HQ:	2.4E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.994681
Maximum detected value (mg/kg, dry weight):	2.721088

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.5E-02	mean
Daily exposure (mg/kg-day)	6.1E-02	max

Hazard Quotients

BTAG Low HQ:	8.9E-01	mean
BTAG High HQ:	3.7E-02	mean
BTAG Low HQ:	1.2E+00	max
BTAG High HQ:	5.0E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.3191
Maximum detected value (mg/kg, dry weight):	143.7126

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E+00	mean
Daily exposure (mg/kg-day)	3.4E+00	max

Hazard Quotients

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	7.5E-03	mean
BTAG Low HQ:	3.5E-01	max
BTAG High HQ:	8.2E-03	max

Tier I - Summary of Hazard Quotients

Receptor: CA Least Tern
Location: NA06

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.7E-01	--	--	--	5.4E-01	--	--	--	--	--	--
LOAEL HQ:	1.7E-02	--	--	--	1.1E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.6E-01	3.6E-02	4.4E-01	#VALUE!	**1.4E+00**	**6.4E+01**	6.3E-01	2.6E-01	**1.1E+00**	9.8E-01
BTAG High HQ:	#VALUE!	3.3E-02	5.7E-04	1.1E-01	#VALUE!	5.9E-02	1.0E-01	1.4E-01	6.5E-03	2.7E-01	9.8E-02
MAXIMUM											
NOAEL HQ:	1.8E-01	--	--	--	5.8E-01	--	--	--	--	--	--
LOAEL HQ:	1.8E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	6.1E-01	4.2E-02	4.5E-01	#VALUE!	**1.3E+00**	**7.6E+01**	7.6E-01	3.0E-01	**1.5E+00**	1.1E+00
BTAG High HQ:	#VALUE!	4.3E-02	6.7E-04	1.1E-01	#VALUE!	5.9E-02	1.2E-01	1.7E-01	7.3E-03	3.6E-01	1.1E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.179521
Maximum detected value (mg/kg, dry weight):	0.191617

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.61
Maximum detected value (mg/kg, dry weight):	0.61

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	2.5E-02	max

Hazard Quotients

NOAEL HQ:	1.7E-01	mean
LOAEL HQ:	1.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.8E-01	max
LOAEL HQ:	1.8E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCB Congeners
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.322207
Maximum detected value (mg/kg, dry weight):	0.43522

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.64
Maximum detected value (mg/kg, dry weight):	0.64

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-02	mean
Daily exposure (mg/kg-day)	5.5E-02	max

Hazard Quotients

BTAG Low HQ:	4.6E-01	mean
BTAG High HQ:	3.3E-02	mean
BTAG Low HQ:	6.1E-01	max
BTAG High HQ:	4.3E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210106
Maximum detected value (mg/kg, dry weight):	0.245509

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-02	mean
Daily exposure (mg/kg-day)	3.1E-02	max

Hazard Quotients

BTAG Low HQ:	3.6E-02	mean
BTAG High HQ:	5.7E-04	mean
BTAG Low HQ:	4.2E-02	max
BTAG High HQ:	6.7E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.41489
Maximum detected value (mg/kg, dry weight):	19.76048

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E+00	mean
Daily exposure (mg/kg-day)	2.4E+00	max

Hazard Quotients

BTAG Low HQ:	4.4E-01	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	4.5E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.277926
Maximum detected value (mg/kg, dry weight):	0.4375

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.5E-02	mean
Daily exposure (mg/kg-day)	5.4E-02	max

Hazard Quotients

BTAG Low HQ:	4.4E-01	mean
BTAG High HQ:	3.3E-03	mean
BTAG Low HQ:	6.8E-01	max
BTAG High HQ:	5.2E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.114362
Maximum detected value (mg/kg, dry weight):	2.389937

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	67
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.6E-01	mean
Daily exposure (mg/kg-day)	5.0E-01	max

Hazard Quotients

NOAEL HQ:	5.4E-01	mean
LOAEL HQ:	1.1E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.8E-01	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	15.15957
Maximum detected value (mg/kg, dry weight):	15.09434

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	410
Maximum detected value (mg/kg, dry weight):	410

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E+00	mean
Daily exposure (mg/kg-day)	3.1E+00	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	5.9E-02	mean
BTAG Low HQ:	1.3E+00	max
BTAG High HQ:	5.9E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.082447
Maximum detected value (mg/kg, dry weight):	5.430464

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	130
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.0E-01	mean
Daily exposure (mg/kg-day)	1.1E+00	max

Hazard Quotients

BTAG Low HQ:	6.4E+01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	7.6E+01	max
BTAG High HQ:	1.2E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.119681
Maximum detected value (mg/kg, dry weight):	0.163522

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.2
Maximum detected value (mg/kg, dry weight):	3.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	3.0E-02	max

Hazard Quotients

BTAG HQ:	6.3E-01	mean
BTAG HQ:	1.4E-01	mean
BTAG Low HQ:	7.6E-01	max
BTAG High HQ:	1.7E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.566489
Maximum detected value (mg/kg, dry weight):	2.955975

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-01	mean
Daily exposure (mg/kg-day)	4.1E-01	max

Hazard Quotients

BTAG Low HQ:	2.6E-01	mean
BTAG High HQ:	6.5E-03	mean
BTAG Low HQ:	3.0E-01	max
BTAG High HQ:	7.3E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.994681
Maximum detected value (mg/kg, dry weight):	2.721088

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-01	mean
Daily exposure (mg/kg-day)	3.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.1E+00	mean
BTAG High HQ:	2.7E-01	mean
BTAG Low HQ:	1.5E+00	max
BTAG High HQ:	3.6E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.3191
Maximum detected value (mg/kg, dry weight):	143.7126

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E+01	mean
Daily exposure (mg/kg-day)	1.9E+01	max

Hazard Quotients

BTAG Low HQ:	9.8E-01	mean
BTAG High HQ:	9.8E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	1.1E-01	max

Tier I - Summary of Hazard Quotients

Receptor: **Green Turtle**
Location: **NA06**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	5.0E-03	--	--	--	2.3E-02	--	--	--	--	--	--
LOAEL HQ:	5.0E-04	--	--	--	4.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.3E-02	9.9E-04	1.2E-02	#VALUE!	5.6E-02	**2.8E+00**	2.6E-02	8.5E-03	2.9E-02	2.8E-02
BTAG High HQ:	#VALUE!	9.3E-04	1.6E-05	3.0E-03	#VALUE!	2.5E-03	4.4E-03	5.7E-03	2.1E-04	7.2E-03	2.8E-03
MAXIMUM							`				
NOAEL HQ:	5.3E-03	--	--	--	2.4E-02	--	--	--	--	--	--
LOAEL HQ:	5.3E-04	--	--	--	4.9E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.7E-02	1.1E-03	1.2E-02	#VALUE!	5.6E-02	**3.1E+00**	3.0E-02	9.4E-03	3.9E-02	3.1E-02
BTAG High HQ:	#VALUE!	1.2E-03	1.8E-05	3.0E-03	#VALUE!	2.5E-03	4.9E-03	6.4E-03	2.3E-04	9.8E-03	3.1E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Benzo[a]pyrene
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.179521
Maximum detected value (mg/kg, dry weight):	0.191617

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.61
Maximum detected value (mg/kg, dry weight):	0.61

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.1E-04	mean
Daily exposure (mg/kg-day)	7.4E-04	max

Hazard Quotients

NOAEL HQ:	5.0E-03	mean
LOAEL HQ:	5.0E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.3E-03	max
LOAEL HQ:	5.3E-04	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.322207
Maximum detected value (mg/kg, dry weight):	0.43522

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.64
Maximum detected value (mg/kg, dry weight):	0.64

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-03	mean
Daily exposure (mg/kg-day)	1.5E-03	max

Hazard Quotients

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	9.3E-04	mean
BTAG Low HQ:	1.7E-02	max
BTAG High HQ:	1.2E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210106
Maximum detected value (mg/kg, dry weight):	0.245509

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E-04	mean
Daily exposure (mg/kg-day)	8.4E-04	max

Hazard Quotients

BTAG Low HQ:	9.9E-04	mean
BTAG High HQ:	1.6E-05	mean
BTAG Low HQ:	1.1E-03	max
BTAG High HQ:	1.8E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Arsenic
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.41489
Maximum detected value (mg/kg, dry weight):	19.76048

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.6E-02	mean
Daily exposure (mg/kg-day)	6.7E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	3.0E-03	mean
BTAG Low HQ:	1.2E-02	max
BTAG High HQ:	3.0E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.277926
Maximum detected value (mg/kg, dry weight):	0.4375

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.6E-04	mean
Daily exposure (mg/kg-day)	1.5E-03	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	9.2E-05	mean
BTAG Low HQ:	1.9E-02	max
BTAG High HQ:	1.4E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.114362
Maximum detected value (mg/kg, dry weight):	2.389937

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	67
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-02	mean
Daily exposure (mg/kg-day)	2.1E-02	max

Hazard Quotients

NOAEL HQ:	2.3E-02	mean
LOAEL HQ:	4.7E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	2.4E-02	max
LOAEL HQ:	4.9E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor:	Green Turtle
Chemical:	Copper
Location:	NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	15.15957
Maximum detected value (mg/kg, dry weight):	15.09434

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	410
Maximum detected value (mg/kg, dry weight):	410

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	1.3E-01	max

Hazard Quotients

BTAG Low HQ:	5.6E-02	mean
BTAG High HQ:	2.5E-03	mean
BTAG Low HQ:	5.6E-02	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Lead
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.082447
Maximum detected value (mg/kg, dry weight):	5.430464

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	130
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-02	mean
Daily exposure (mg/kg-day)	4.3E-02	max

Hazard Quotients

BTAG Low HQ:	2.8E+00	mean
BTAG High HQ:	4.4E-03	mean
BTAG Low HQ:	3.1E+00	max
BTAG High HQ:	4.9E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.119681
Maximum detected value (mg/kg, dry weight):	0.163522

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.2
Maximum detected value (mg/kg, dry weight):	3.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-03	mean
Daily exposure (mg/kg-day)	1.2E-03	max

Hazard Quotients

BTAG HQ:	2.6E-02	mean
BTAG HQ:	5.7E-03	mean
BTAG Low HQ:	3.0E-02	max
BTAG High HQ:	6.4E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.566489
Maximum detected value (mg/kg, dry weight):	2.955975

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG Low HQ:	8.5E-03	mean
BTAG High HQ:	2.1E-04	mean
BTAG Low HQ:	9.4E-03	max
BTAG High HQ:	2.3E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Selenium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.994681
Maximum detected value (mg/kg, dry weight):	2.721088

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.7E-03	mean
Daily exposure (mg/kg-day)	9.1E-03	max

Hazard Quotients

BTAG Low HQ:	2.9E-02	mean
BTAG High HQ:	7.2E-03	mean
BTAG Low HQ:	3.9E-02	max
BTAG High HQ:	9.8E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.3191
Maximum detected value (mg/kg, dry weight):	143.7126

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.9E-01	mean
Daily exposure (mg/kg-day)	5.3E-01	max

Hazard Quotients

BTAG Low HQ:	2.8E-02	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	3.1E-02	max
BTAG High HQ:	3.1E-03	max

Tier I - Summary of Hazard Quotients

Receptor: Brown Pelican
Location: NA06

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.1E-01	--	--	--	3.4E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	6.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.0E-01	2.4E-02	2.9E-01	#VALUE!	8.5E-01	**4.0E+01**	3.9E-01	1.7E-01	7.1E-01	6.5E-01
BTAG High HQ:	#VALUE!	2.1E-02	3.8E-04	7.2E-02	#VALUE!	3.7E-02	6.4E-02	8.5E-02	4.2E-03	1.8E-01	6.5E-02
MAXIMUM											
NOAEL HQ:	1.2E-01	--	--	--	3.6E-01	--	--	--	--	--	--
LOAEL HQ:	1.2E-02	--	--	--	7.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.0E-01	2.8E-02	2.9E-01	#VALUE!	8.4E-01	**4.8E+01**	4.8E-01	1.9E-01	9.6E-01	7.1E-01
BTAG High HQ:	#VALUE!	2.9E-02	4.4E-04	7.3E-02	#VALUE!	3.7E-02	7.6E-02	1.0E-01	4.8E-03	2.4E-01	7.1E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Benzo[a]pyrene
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.179521
Maximum detected value (mg/kg, dry weight):	0.191617

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.61
Maximum detected value (mg/kg, dry weight):	0.61

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients

NOAEL HQ:	1.1E-01	mean
LOAEL HQ:	1.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.2E-01	max
LOAEL HQ:	1.2E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Total PAHs	Total Solids			
250	14.7	100	0.147	
270	15.1	100	0.151	
190	12.8	100	0.128	
320	15.9	100	0.159	
320	16.7	100	0.167	
270			**0.1504**	1795.213
BAP				
27	14.7	100	0.147	
26	15.1	100	0.151	
20	12.8	100	0.128	
30	15.9	100	0.159	
32	16.7	100	0.167	
27			**0.1504**	179.5213
191.6167665				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total PCB Congeners
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.322207
Maximum detected value (mg/kg, dry weight):	0.43522

PCB Cong	Total Solids			
55	14.7	100	0.147	
40.1	15.1	100	0.151	
20.1	12.8	100	0.128	
69.2	15.9	100	0.159	
57.9	16.7	100	0.167	
48.46			**0.1504**	**322.2074**
435.22013				

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.64
Maximum detected value (mg/kg, dry weight):	0.64

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-02	mean
Daily exposure (mg/kg-day)	3.6E-02	max

Hazard Quotients

BTAG Low HQ:	3.0E-01	mean
BTAG High HQ:	2.1E-02	mean
BTAG Low HQ:	4.0E-01	max
BTAG High HQ:	2.9E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Tributyltin
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)							
Body weight (kg):	2.845						
Food ingestion rate (kg/day dry wt):	0.23						
Sediment ingestion rate (kg/day dry wt):	0.005						
Area Use Factor (unitless):	1						
Time Use Factor (unitless):	1						
Prey Chemical Concentrations (Macoma)		TBT	Total Solids				
Mean detected value (mg/kg, dry weight):	0.210106	16	14.7	100	0.147		
Maximum detected value (mg/kg, dry weight):	0.245509	32	15.1	100	0.151		
		31	12.8	100	0.128		
Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)		38	15.9	100	0.159		
Mean detected value (mg/kg, dry weight):	0.18	41	16.7	100	0.167		
Maximum detected value (mg/kg, dry weight):	0.18	**31.6**			**0.1504**	**210.1064**	
Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)		245.509					
BTAG Low (mg/kg-day):	0.73						
BTAG High (mg/kg-day):	45.9						

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.4E-02	mean
BTAG High HQ:	3.8E-04	mean
BTAG Low HQ:	2.8E-02	max
BTAG High HQ:	4.4E-04	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Arsenic
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.41489
Maximum detected value (mg/kg, dry weight):	19.76048

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E+00	mean
Daily exposure (mg/kg-day)	1.6E+00	max

Hazard Quotients

BTAG Low HQ:	2.9E-01	mean
BTAG High HQ:	7.2E-02	mean
BTAG Low HQ:	2.9E-01	max
BTAG High HQ:	7.3E-02	max

Arsenic	Total Solids			
3	14.7	100	0.147	
2.6	15.1	100	0.151	
2.7	12.8	100	0.128	
3	15.9	100	0.159	
3.3	16.7	100	0.167	
2.92			**0.1504**	**19.41489**
19.76048				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Cadmium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.277926
Maximum detected value (mg/kg, dry weight):	0.4375

Cadmium	Total Solids			
0.032	14.7	100	0.147	
0.033	15.1	100	0.151	
0.056	12.8	100	0.128	
0.037	15.9	100	0.159	
0.051	16.7	100	0.167	
0.0418			**0.1504**	**0.277926**
0.4375				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-02	mean
Daily exposure (mg/kg-day)	3.6E-02	max

Hazard Quotients

BTAG Low HQ:	2.9E-01	mean
BTAG High HQ:	2.2E-03	mean
BTAG Low HQ:	4.5E-01	max
BTAG High HQ:	3.4E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Chromium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.114362
Maximum detected value (mg/kg, dry weight):	2.389937

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	67
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-01	mean
Daily exposure (mg/kg-day)	3.1E-01	max

Hazard Quotients

NOAEL HQ:	3.4E-01	mean
LOAEL HQ:	6.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.6E-01	max
LOAEL HQ:	7.2E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Chromium	Total Solids			
0.33	14.7	100	0.147	
0.34	15.1	100	0.151	
0.29	12.8	100	0.128	
0.38	15.9	100	0.159	
0.25	16.7	100	0.167	
0.318			**0.1504**	**2.114362**
2.389937				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Copper
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	15.15957
Maximum detected value (mg/kg, dry weight):	15.09434

Copper	Total Solids			
2.3	14.7	100	0.147	
2.1	15.1	100	0.151	
2.3	12.8	100	0.128	
2.4	15.9	100	0.159	
2.3	16.7	100	0.167	
2.28			**0.1504**	**15.15957**
15.09434				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	410
Maximum detected value (mg/kg, dry weight):	410

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E+00	mean
Daily exposure (mg/kg-day)	1.9E+00	max

Hazard Quotients

BTAG Low HQ:	8.5E-01	mean
BTAG High HQ:	3.7E-02	mean
BTAG Low HQ:	8.4E-01	max
BTAG High HQ:	3.7E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Lead
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.082447
Maximum detected value (mg/kg, dry weight):	5.430464

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	130
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.6E-01	mean
Daily exposure (mg/kg-day)	6.7E-01	max

Hazard Quotients

BTAG Low HQ:	4.0E+01	mean
BTAG High HQ:	6.4E-02	mean
BTAG Low HQ:	4.8E+01	max
BTAG High HQ:	7.6E-02	max

Lead	Total Solids			
0.64	14.7	100	0.147	
0.82	15.1	100	0.151	
0.5	12.8	100	0.128	
0.53	15.9	100	0.159	
0.58	16.7	100	0.167	
0.614			**0.1504**	**4.082447**
5.430464				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total Mercury
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.119681
Maximum detected value (mg/kg, dry weight):	0.163522

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.2
Maximum detected value (mg/kg, dry weight):	3.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.9E-02	max

Hazard Quotients

BTAG HQ:	3.9E-01	mean
BTAG HQ:	8.5E-02	mean
BTAG Low HQ:	4.8E-01	max
BTAG High HQ:	1.0E-01	max

Mercury	Total Solids			
0.016	14.7	100	0.147	
0.014	15.1	100	0.151	
0.016	12.8	100	0.128	
0.026	15.9	100	0.159	
0.018	16.7	100	0.167	
0.018			**0.1504**	**0.119681**
0.163522				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Nickel
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.566489
Maximum detected value (mg/kg, dry weight):	2.955975

Nickel	Total Solids			
0.38	14.7	100	0.147	
0.37	15.1	100	0.151	
0.34	12.8	100	0.128	
0.47	15.9	100	0.159	
0.37	16.7	100	0.167	
0.386			**0.1504**	**2.566489**
2.955975				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	2.7E-01	max

Hazard Quotients

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	4.2E-03	mean
BTAG Low HQ:	1.9E-01	max
BTAG High HQ:	4.8E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Selenium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.994681
Maximum detected value (mg/kg, dry weight):	2.721088

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-01	mean
Daily exposure (mg/kg-day)	2.2E-01	max

Hazard Quotients

BTAG Low HQ:	7.1E-01	mean
BTAG High HQ:	1.8E-01	mean
BTAG Low HQ:	9.6E-01	max
BTAG High HQ:	2.4E-01	max

Selenium	Total Solids			
0.4	14.7	100	0.147	
0.2	15.1	100	0.151	
0.3	12.8	100	0.128	
0.3	15.9	100	0.159	
0.3	16.7	100	0.167	
0.3			**0.1504**	**1.994681**
2.721088				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.3191
Maximum detected value (mg/kg, dry weight):	143.7126

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Zinc	Total Solids			
17	14.7	100	0.147	
18	15.1	100	0.151	
21	12.8	100	0.128	
18	15.9	100	0.159	
24	16.7	100	0.167	
19.6			**0.1504**	**130.3191**
143.7126				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+01	mean
Daily exposure (mg/kg-day)	1.2E+01	max

Hazard Quotients

BTAG Low HQ:	6.5E-01	mean
BTAG High HQ:	6.5E-02	mean
BTAG Low HQ:	7.1E-01	max
BTAG High HQ:	7.1E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Western Grebe
Location: NA06

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	9.0E-02	--	--	--	4.4E-01	--	--	--	--	--	--
LOAEL HQ:	9.0E-03	--	--	--	8.8E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.3E-01	1.7E-02	2.1E-01	#VALUE!	**1.1E+00**	**5.2E+01**	4.9E-01	1.5E-01	5.1E-01	5.0E-01
BTAG High HQ:	#VALUE!	1.6E-02	2.8E-04	5.2E-02	#VALUE!	4.7E-02	8.4E-02	1.1E-01	3.8E-03	1.3E-01	5.0E-02
MAXIMUM											
NOAEL HQ:	9.5E-02	--	--	--	4.6E-01	--	--	--	--	--	--
LOAEL HQ:	9.5E-03	--	--	--	9.1E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.0E-01	2.0E-02	2.1E-01	#VALUE!	**1.1E+00**	**5.8E+01**	5.5E-01	1.7E-01	6.9E-01	5.5E-01
BTAG High HQ:	#VALUE!	2.1E-02	3.2E-04	5.3E-02	#VALUE!	4.7E-02	9.2E-02	1.2E-01	4.1E-03	1.7E-01	5.5E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.179521
Maximum detected value (mg/kg, dry weight):	0.191617

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.61
Maximum detected value (mg/kg, dry weight):	0.61

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

NOAEL HQ:	9.0E-02	mean
LOAEL HQ:	9.0E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	9.5E-02	max
LOAEL HQ:	9.5E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.322207
Maximum detected value (mg/kg, dry weight):	0.43522

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.64
Maximum detected value (mg/kg, dry weight):	0.64

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-02	mean
Daily exposure (mg/kg-day)	2.7E-02	max

Hazard Quotients

BTAG Low HQ:	2.3E-01	mean
BTAG High HQ:	1.6E-02	mean
BTAG Low HQ:	3.0E-01	max
BTAG High HQ:	2.1E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210106
Maximum detected value (mg/kg, dry weight):	0.245509

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

BTAG Low HQ:	1.7E-02	mean
BTAG High HQ:	2.8E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	3.2E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.41489
Maximum detected value (mg/kg, dry weight):	19.76048

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	5.2E-02	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	5.3E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.277926
Maximum detected value (mg/kg, dry weight):	0.4375

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	2.6E-02	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	1.6E-03	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.114362
Maximum detected value (mg/kg, dry weight):	2.389937

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	67
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E-01	mean
Daily exposure (mg/kg-day)	3.9E-01	max

Hazard Quotients

NOAEL HQ:	4.4E-01	mean
LOAEL HQ:	8.8E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.6E-01	max
LOAEL HQ:	9.1E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	15.15957
Maximum detected value (mg/kg, dry weight):	15.09434

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	410
Maximum detected value (mg/kg, dry weight):	410

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E+00	mean
Daily exposure (mg/kg-day)	2.4E+00	max

Hazard Quotients

BTAG Low HQ:	1.1E+00	mean
BTAG High HQ:	4.7E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	4.7E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.082447
Maximum detected value (mg/kg, dry weight):	5.430464

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	130
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E-01	mean
Daily exposure (mg/kg-day)	8.1E-01	max

Hazard Quotients

BTAG Low HQ:	5.2E+01	mean
BTAG High HQ:	8.4E-02	mean
BTAG Low HQ:	5.8E+01	max
BTAG High HQ:	9.2E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.119681
Maximum detected value (mg/kg, dry weight):	0.163522

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.2
Maximum detected value (mg/kg, dry weight):	3.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.2E-02	max

Hazard Quotients

BTAG HQ:	4.9E-01	mean
BTAG HQ:	1.1E-01	mean
BTAG Low HQ:	5.5E-01	max
BTAG High HQ:	1.2E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.566489
Maximum detected value (mg/kg, dry weight):	2.955975

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.8E-03	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	4.1E-03	max

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Selenium
Location:	NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.994681
Maximum detected value (mg/kg, dry weight):	2.721088

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients

BTAG Low HQ:	5.1E-01	mean
BTAG High HQ:	1.3E-01	mean
BTAG Low HQ:	6.9E-01	max
BTAG High HQ:	1.7E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: NA06

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.3191
Maximum detected value (mg/kg, dry weight):	143.7126

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.7E+00	mean
Daily exposure (mg/kg-day)	9.4E+00	max

Hazard Quotients

BTAG Low HQ:	5.0E-01	mean
BTAG High HQ:	5.0E-02	mean
BTAG Low HQ:	5.5E-01	max
BTAG High HQ:	5.5E-02	max

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Tier I - Summary of Hazard Quotients

Receptor: Surf Scoter
Location: NA11

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	7.2E-02	--	--	--	3.4E-01	--	--	--	--	--	--
LOAEL HQ:	7.2E-03	--	--	--	6.9E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.1E-01	7.3E-03	2.1E-01	#VALUE!	5.7E-01	**2.8E+01**	2.2E-01	1.3E-01	4.8E-01	4.1E-01
BTAG High HQ:	#VALUE!	8.1E-03	1.2E-04	5.3E-02	#VALUE!	2.5E-02	4.4E-02	4.8E-02	3.1E-03	1.2E-01	4.1E-02
MAXIMUM											
NOAEL HQ:	7.9E-02	--	--	--	3.8E-01	--	--	--	--	--	--
LOAEL HQ:	7.9E-03	--	--	--	7.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.2E-01	9.6E-03	2.5E-01	#VALUE!	6.6E-01	**3.1E+01**	2.4E-01	1.4E-01	6.4E-01	4.6E-01
BTAG High HQ:	#VALUE!	8.5E-03	1.5E-04	6.2E-02	#VALUE!	2.9E-02	4.9E-02	5.1E-02	3.4E-03	1.6E-01	4.6E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.15625
Maximum detected value (mg/kg, dry weight):	0.174194

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.4
Maximum detected value (mg/kg, dry weight):	0.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

NOAEL HQ:	7.2E-02	mean
LOAEL HQ:	7.2E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	7.9E-02	max
LOAEL HQ:	7.9E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.19
Maximum detected value (mg/kg, dry weight):	0.19

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	1.1E-01	mean
BTAG High HQ:	8.1E-03	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	8.5E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.09375
Maximum detected value (mg/kg, dry weight):	0.122581

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.038
Maximum detected value (mg/kg, dry weight):	0.038

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.4E-03	mean
Daily exposure (mg/kg-day)	7.0E-03	max

Hazard Quotients

BTAG Low HQ:	7.3E-03	mean
BTAG High HQ:	1.2E-04	mean
BTAG Low HQ:	9.6E-03	max
BTAG High HQ:	1.5E-04	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.24457
Maximum detected value (mg/kg, dry weight):	23.87097

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.3
Maximum detected value (mg/kg, dry weight):	9.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	5.3E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	6.2E-02	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Cadmium
Location:	NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.264946
Maximum detected value (mg/kg, dry weight):	0.367347

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	2.1E-02	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	1.5E-03	mean
BTAG Low HQ:	2.7E-01	max
BTAG High HQ:	2.1E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.861413
Maximum detected value (mg/kg, dry weight):	2.44898

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E-01	mean
Daily exposure (mg/kg-day)	3.3E-01	max

Hazard Quotients

NOAEL HQ:	3.4E-01	mean
LOAEL HQ:	6.9E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.8E-01	max
LOAEL HQ:	7.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Copper
Location:	NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	12.90761
Maximum detected value (mg/kg, dry weight):	16.77419

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	180
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E+00	mean
Daily exposure (mg/kg-day)	1.5E+00	max

Hazard Quotients

BTAG Low HQ:	5.7E-01	mean
BTAG High HQ:	2.5E-02	mean
BTAG Low HQ:	6.6E-01	max
BTAG High HQ:	2.9E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.663043
Maximum detected value (mg/kg, dry weight):	3.419355

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	73
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-01	mean
Daily exposure (mg/kg-day)	4.3E-01	max

Hazard Quotients

BTAG Low HQ:	2.8E+01	mean
BTAG High HQ:	4.4E-02	mean
BTAG Low HQ:	3.1E+01	max
BTAG High HQ:	4.9E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.10462
Maximum detected value (mg/kg, dry weight):	0.116129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.85
Maximum detected value (mg/kg, dry weight):	0.85

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.6E-03	mean
Daily exposure (mg/kg-day)	9.3E-03	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	4.8E-02	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	5.1E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.296196
Maximum detected value (mg/kg, dry weight):	2.516129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients

BTAG Low HQ:	1.3E-01	mean
BTAG High HQ:	3.1E-03	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	3.4E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.902174
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.5E-01	max

Hazard Quotients

BTAG Low HQ:	4.8E-01	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	6.4E-01	max
BTAG High HQ:	1.6E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	112.7717
Maximum detected value (mg/kg, dry weight):	129.0323

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	230
Maximum detected value (mg/kg, dry weight):	230

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.1E+00	mean
Daily exposure (mg/kg-day)	8.0E+00	max

Hazard Quotients

BTAG Low HQ:	4.1E-01	mean
BTAG High HQ:	4.1E-02	mean
BTAG Low HQ:	4.6E-01	max
BTAG High HQ:	4.6E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Sea Lion
Location: NA11

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	2.5E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.2E-03	--	--	--	--	--	--
BTAG Low HQ:	2.8E-03	1.1E-02	8.4E-03	**1.4E+00**	#VALUE!	1.5E-01	1.1E-01	1.1E-01	4.6E-01	8.5E-01	2.7E-01
BTAG High HQ:	1.1E-04	3.1E-03	1.4E-04	9.6E-02	#VALUE!	6.4E-04	4.5E-04	1.1E-02	1.9E-03	3.5E-02	6.4E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	2.9E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.4E-03	--	--	--	--	--	--
BTAG Low HQ:	3.1E-03	1.1E-02	1.1E-02	**1.7E+00**	#VALUE!	1.8E-01	1.3E-01	1.2E-01	4.9E-01	**1.1E+00**	3.1E-01
BTAG High HQ:	1.3E-04	3.2E-03	1.8E-04	1.1E-01	#VALUE!	7.8E-04	5.2E-04	1.2E-02	2.1E-03	4.7E-02	7.3E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Benzo[a]pyrene
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.15625
Maximum detected value (mg/kg, dry weight):	0.174194

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.4
Maximum detected value (mg/kg, dry weight):	0.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-03	mean
Daily exposure (mg/kg-day)	4.1E-03	max

Hazard Quotients

BTAG Low HQ:	2.8E-03	mean
BTAG High HQ:	1.1E-04	mean
BTAG Low HQ:	3.1E-03	max
BTAG High HQ:	1.3E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.19
Maximum detected value (mg/kg, dry weight):	0.19

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-03	mean
Daily exposure (mg/kg-day)	4.1E-03	max

Hazard Quotients

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	3.1E-03	mean
BTAG Low HQ:	1.1E-02	max
BTAG High HQ:	3.2E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Tributyltin
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.09375
Maximum detected value (mg/kg, dry weight):	0.122581

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.038
Maximum detected value (mg/kg, dry weight):	0.038

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-03	mean
Daily exposure (mg/kg-day)	2.7E-03	max

Hazard Quotients

BTAG Low HQ:	8.4E-03	mean
BTAG High HQ:	1.4E-04	mean
BTAG Low HQ:	1.1E-02	max
BTAG High HQ:	1.8E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Arsenic
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.24457
Maximum detected value (mg/kg, dry weight):	23.87097

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.3
Maximum detected value (mg/kg, dry weight):	9.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.5E-01	mean
Daily exposure (mg/kg-day)	5.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	9.6E-02	mean
BTAG Low HQ:	1.7E+00	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.264946
Maximum detected value (mg/kg, dry weight):	0.367347

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.0E-03	mean
Daily exposure (mg/kg-day)	8.3E-03	max

Hazard Quotients

BTAG Low HQ:	1.0E-01	mean
BTAG High HQ:	2.3E-03	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	3.1E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Chromium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.861413
Maximum detected value (mg/kg, dry weight):	2.44898

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.1E-02	mean
Daily exposure (mg/kg-day)	9.4E-02	max

Hazard Quotients

NOAEL HQ:	2.5E-02	mean
LOAEL HQ:	1.2E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.9E-02	max
LOAEL HQ:	1.4E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	12.90761
Maximum detected value (mg/kg, dry weight):	16.77419

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	180
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-01	mean
Daily exposure (mg/kg-day)	4.9E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	6.4E-04	mean
BTAG Low HQ:	1.8E-01	max
BTAG High HQ:	7.8E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.663043
Maximum detected value (mg/kg, dry weight):	3.419355

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	73
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.1E-01	mean
BTAG High HQ:	4.5E-04	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	5.2E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total Mercury
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.10462
Maximum detected value (mg/kg, dry weight):	0.116129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.85
Maximum detected value (mg/kg, dry weight):	0.85

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-03	mean
Daily exposure (mg/kg-day)	3.1E-03	max

Hazard Quotients

BTAG HQ:	1.1E-01	mean
BTAG HQ:	1.1E-02	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	1.2E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.296196
Maximum detected value (mg/kg, dry weight):	2.516129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.1E-02	mean
Daily exposure (mg/kg-day)	6.6E-02	max

Hazard Quotients

BTAG Low HQ:	4.6E-01	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	4.9E-01	max
BTAG High HQ:	2.1E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.902174
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-02	mean
Daily exposure (mg/kg-day)	5.7E-02	max

Hazard Quotients

BTAG Low HQ:	8.5E-01	mean
BTAG High HQ:	3.5E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	4.7E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	112.7717
Maximum detected value (mg/kg, dry weight):	129.0323

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	230
Maximum detected value (mg/kg, dry weight):	230

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E+00	mean
Daily exposure (mg/kg-day)	3.0E+00	max

Hazard Quotients

BTAG Low HQ:	2.7E-01	mean
BTAG High HQ:	6.4E-03	mean
BTAG Low HQ:	3.1E-01	max
BTAG High HQ:	7.3E-03	max

Tier I - Summary of Hazard Quotients

Receptor: CA Least Tern
Location: NA11

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.5E-01	--	--	--	4.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.5E-02	--	--	--	9.5E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.4E-01	1.6E-02	4.6E-01	#VALUE!	9.3E-01	**3.9E+01**	3.9E-01	2.4E-01	**1.0E+00**	8.4E-01
BTAG High HQ:	#VALUE!	1.7E-02	2.5E-04	1.1E-01	#VALUE!	4.1E-02	6.3E-02	8.5E-02	5.8E-03	2.5E-01	8.4E-02
MAXIMUM											
NOAEL HQ:	1.6E-01	--	--	--	5.6E-01	--	--	--	--	--	--
LOAEL HQ:	1.6E-02	--	--	--	1.1E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.5E-01	2.1E-02	5.4E-01	#VALUE!	**1.1E+00**	**4.6E+01**	4.3E-01	2.6E-01	**1.4E+00**	9.6E-01
BTAG High HQ:	#VALUE!	1.8E-02	3.3E-04	1.3E-01	#VALUE!	5.0E-02	7.3E-02	9.3E-02	6.3E-03	3.4E-01	9.6E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.15625
Maximum detected value (mg/kg, dry weight):	0.174194

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.4
Maximum detected value (mg/kg, dry weight):	0.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-02	mean
Daily exposure (mg/kg-day)	2.3E-02	max

Hazard Quotients

NOAEL HQ:	1.5E-01	mean
LOAEL HQ:	1.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.6E-01	max
LOAEL HQ:	1.6E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCB Congeners
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.19
Maximum detected value (mg/kg, dry weight):	0.19

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-02	mean
Daily exposure (mg/kg-day)	2.3E-02	max

Hazard Quotients

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	1.7E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	1.8E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.09375
Maximum detected value (mg/kg, dry weight):	0.122581

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.038
Maximum detected value (mg/kg, dry weight):	0.038

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

BTAG Low HQ:	1.6E-02	mean
BTAG High HQ:	2.5E-04	mean
BTAG Low HQ:	2.1E-02	max
BTAG High HQ:	3.3E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.24457
Maximum detected value (mg/kg, dry weight):	23.87097

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.3
Maximum detected value (mg/kg, dry weight):	9.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E+00	mean
Daily exposure (mg/kg-day)	2.9E+00	max

Hazard Quotients

BTAG Low HQ:	4.6E-01	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	5.4E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036	
Food ingestion rate (kg/day dry wt):	0.0044	
Sediment ingestion rate (kg/day dry wt):	0.00011	
Area Use Factor (unitless):	1	0.003
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.264946
Maximum detected value (mg/kg, dry weight):	0.367347

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-02	mean
Daily exposure (mg/kg-day)	4.6E-02	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	3.2E-03	mean
BTAG Low HQ:	5.7E-01	max
BTAG High HQ:	4.4E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.861413
Maximum detected value (mg/kg, dry weight):	2.44898

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-01	mean
Daily exposure (mg/kg-day)	4.8E-01	max

Hazard Quotients

NOAEL HQ:	4.7E-01	mean
LOAEL HQ:	9.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	5.6E-01	max
LOAEL HQ:	1.1E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	12.90761
Maximum detected value (mg/kg, dry weight):	16.77419

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	180
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E+00	mean
Daily exposure (mg/kg-day)	2.6E+00	max

Hazard Quotients

BTAG Low HQ:	9.3E-01	mean
BTAG High HQ:	4.1E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	5.0E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.663043
Maximum detected value (mg/kg, dry weight):	3.419355

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	73
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-01	mean
Daily exposure (mg/kg-day)	6.4E-01	max

Hazard Quotients

BTAG Low HQ:	3.9E+01	mean
BTAG High HQ:	6.3E-02	mean
BTAG Low HQ:	4.6E+01	max
BTAG High HQ:	7.3E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.10462
Maximum detected value (mg/kg, dry weight):	0.116129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.85
Maximum detected value (mg/kg, dry weight):	0.85

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients

BTAG HQ:	3.9E-01	mean
BTAG HQ:	8.5E-02	mean
BTAG Low HQ:	4.3E-01	max
BTAG High HQ:	9.3E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.296196
Maximum detected value (mg/kg, dry weight):	2.516129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-01	mean
Daily exposure (mg/kg-day)	3.5E-01	max

Hazard Quotients

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	5.8E-03	mean
BTAG Low HQ:	2.6E-01	max
BTAG High HQ:	6.3E-03	max

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Selenium
Location:	NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.902174
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	3.2E-01	max

Hazard Quotients

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	2.5E-01	mean
BTAG Low HQ:	1.4E+00	max
BTAG High HQ:	3.4E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	112.7717
Maximum detected value (mg/kg, dry weight):	129.0323

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	230
Maximum detected value (mg/kg, dry weight):	230

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E+01	mean
Daily exposure (mg/kg-day)	1.6E+01	max

Hazard Quotients

BTAG Low HQ:	8.4E-01	mean
BTAG High HQ:	8.4E-02	mean
BTAG Low HQ:	9.6E-01	max
BTAG High HQ:	9.6E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Green Turtle
Location: NA11

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	4.2E-03	--	--	--	2.0E-02	--	--	--	--	--	--
LOAEL HQ:	4.2E-04	--	--	--	4.1E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	6.7E-03	4.3E-04	1.2E-02	#VALUE!	3.4E-02	**1.6E+00**	1.3E-02	7.6E-03	2.8E-02	2.4E-02
BTAG High HQ:	#VALUE!	4.7E-04	6.8E-06	3.1E-03	#VALUE!	1.5E-03	2.6E-03	2.8E-03	1.9E-04	6.9E-03	2.4E-03
MAXIMUM											
NOAEL HQ:	4.6E-03	--	--	--	2.3E-02	--	--	--	--	--	--
LOAEL HQ:	4.6E-04	--	--	--	4.5E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	7.0E-03	5.6E-04	1.4E-02	#VALUE!	3.9E-02	**1.8E+00**	1.4E-02	8.1E-03	3.7E-02	2.7E-02
BTAG High HQ:	#VALUE!	5.0E-04	8.9E-06	3.6E-03	#VALUE!	1.7E-03	2.9E-03	3.0E-03	2.0E-04	9.3E-03	2.7E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor:	Green Turtle
Chemical:	Benzo[a]pyrene
Location:	NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.15625
Maximum detected value (mg/kg, dry weight):	0.174194

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.4
Maximum detected value (mg/kg, dry weight):	0.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.9E-04	mean
Daily exposure (mg/kg-day)	6.5E-04	max

Hazard Quotients

NOAEL HQ:	4.2E-03	mean
LOAEL HQ:	4.2E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.6E-03	max
LOAEL HQ:	4.6E-04	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.19
Maximum detected value (mg/kg, dry weight):	0.19

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.0E-04	mean
Daily exposure (mg/kg-day)	6.3E-04	max

Hazard Quotients

BTAG Low HQ:	6.7E-03	mean
BTAG High HQ:	4.7E-04	mean
BTAG Low HQ:	7.0E-03	max
BTAG High HQ:	5.0E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.09375
Maximum detected value (mg/kg, dry weight):	0.122581

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.038
Maximum detected value (mg/kg, dry weight):	0.038

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E-04	mean
Daily exposure (mg/kg-day)	4.1E-04	max

Hazard Quotients

BTAG Low HQ:	4.3E-04	mean
BTAG High HQ:	6.8E-06	mean
BTAG Low HQ:	5.6E-04	max
BTAG High HQ:	8.9E-06	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Arsenic
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.24457
Maximum detected value (mg/kg, dry weight):	23.87097

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.3
Maximum detected value (mg/kg, dry weight):	9.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	8.0E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	3.1E-03	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	3.6E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.264946
Maximum detected value (mg/kg, dry weight):	0.367347

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-04	mean
Daily exposure (mg/kg-day)	1.3E-03	max

Hazard Quotients

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	8.8E-05	mean
BTAG Low HQ:	1.6E-02	max
BTAG High HQ:	1.2E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.861413
Maximum detected value (mg/kg, dry weight):	2.44898

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

NOAEL HQ:	2.0E-02	mean
LOAEL HQ:	4.1E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.3E-02	max
LOAEL HQ:	4.5E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Copper
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	12.90761
Maximum detected value (mg/kg, dry weight):	16.77419

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	180
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.7E-02	mean
Daily exposure (mg/kg-day)	9.0E-02	max

Hazard Quotients

BTAG Low HQ:	3.4E-02	mean
BTAG High HQ:	1.5E-03	mean
BTAG Low HQ:	3.9E-02	max
BTAG High HQ:	1.7E-03	max

Hazard Quotient Calculation

Receptor:	Green Turtle
Chemical:	Lead
Location:	NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.663043
Maximum detected value (mg/kg, dry weight):	3.419355

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	73
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-02	mean
Daily exposure (mg/kg-day)	2.5E-02	max

Hazard Quotients

BTAG Low HQ:	1.6E+00	mean
BTAG High HQ:	2.6E-03	mean
BTAG Low HQ:	1.8E+00	max
BTAG High HQ:	2.9E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.10462
Maximum detected value (mg/kg, dry weight):	0.116129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.85
Maximum detected value (mg/kg, dry weight):	0.85

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.1E-04	mean
Daily exposure (mg/kg-day)	5.5E-04	max

Hazard Quotients

BTAG HQ:	1.3E-02	mean
BTAG HQ:	2.8E-03	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	3.0E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.296196
Maximum detected value (mg/kg, dry weight):	2.516129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	7.6E-03	mean
BTAG High HQ:	1.9E-04	mean
BTAG Low HQ:	8.1E-03	max
BTAG High HQ:	2.0E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Selenium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.902174
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.4E-03	mean
Daily exposure (mg/kg-day)	8.6E-03	max

Hazard Quotients

BTAG Low HQ:	2.8E-02	mean
BTAG High HQ:	6.9E-03	mean
BTAG Low HQ:	3.7E-02	max
BTAG High HQ:	9.3E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	112.7717
Maximum detected value (mg/kg, dry weight):	129.0323

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	230
Maximum detected value (mg/kg, dry weight):	230

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-01	mean
Daily exposure (mg/kg-day)	4.7E-01	max

Hazard Quotients

BTAG Low HQ:	2.4E-02	mean
BTAG High HQ:	2.4E-03	mean
BTAG Low HQ:	2.7E-02	max
BTAG High HQ:	2.7E-03	max

Tier I - Summary of Hazard Quotients

Receptor: Brown Pelican
Location: NA11

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	9.5E-02	--	--	--	3.0E-01	--	--	--	--	--	--
LOAEL HQ:	9.5E-03	--	--	--	5.9E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.6E-01	1.0E-02	3.0E-01	#VALUE!	5.9E-01	**2.5E+01**	2.6E-01	1.5E-01	6.8E-01	5.5E-01
BTAG High HQ:	#VALUE!	1.1E-02	1.7E-04	7.5E-02	#VALUE!	2.6E-02	3.9E-02	5.5E-02	3.8E-03	1.7E-01	5.5E-02
MAXIMUM											
NOAEL HQ:	1.1E-01	--	--	--	3.5E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	7.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.7E-01	1.4E-02	3.5E-01	#VALUE!	7.3E-01	**2.9E+01**	2.8E-01	1.7E-01	9.1E-01	6.3E-01
BTAG High HQ:	#VALUE!	1.2E-02	2.2E-04	8.8E-02	#VALUE!	3.2E-02	4.6E-02	6.0E-02	4.1E-03	2.3E-01	6.3E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Benzo[a]pyrene
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.15625
Maximum detected value (mg/kg, dry weight):	0.174194

BAP					
	23	15.5	100	0.155	
	26	14.8	100	0.148	
	19	13.1	100	0.131	
	27	15.5	100	0.155	
	20	14.7	100	0.147	
	23			**0.1472**	156.25
	174.1935484				

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.4
Maximum detected value (mg/kg, dry weight):	0.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

NOAEL HQ:	9.5E-02	mean
LOAEL HQ:	9.5E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.1E-01	max
LOAEL HQ:	1.1E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total PCB Congeners
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.19
Maximum detected value (mg/kg, dry weight):	0.19

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	1.1E-02	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	1.2E-02	max

PCB Cong	Total Solids			
26.9	15.5	100	0.155	
23.8	14.8	100	0.148	
21.6	13.1	100	0.131	
28.1	15.5	100	0.155	
26.5	14.7	100	0.147	
25.38			**0.1472**	**172.4185**
181.2903				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Tributyltin
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

TBT	Total Solids		
15	15.5	100	0.155
11	14.8	100	0.148
12	13.1	100	0.131
19	15.5	100	0.155
12	14.7	100	0.147
13.8			**0.1472**
122.5806			

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.09375
Maximum detected value (mg/kg, dry weight):	0.122581

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.038
Maximum detected value (mg/kg, dry weight):	0.038

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.6E-03	mean
Daily exposure (mg/kg-day)	1.0E-02	max

Hazard Quotients

BTAG Low HQ:	1.0E-02	mean
BTAG High HQ:	1.7E-04	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	2.2E-04	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Arsenic
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.24457
Maximum detected value (mg/kg, dry weight):	23.87097

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.3
Maximum detected value (mg/kg, dry weight):	9.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E+00	mean
Daily exposure (mg/kg-day)	1.9E+00	max

Hazard Quotients

BTAG Low HQ:	3.0E-01	mean
BTAG High HQ:	7.5E-02	mean
BTAG Low HQ:	3.5E-01	max
BTAG High HQ:	8.8E-02	max

Arsenic	Total Solids			
3.2	15.5	100	0.155	
2.6	14.8	100	0.148	
2.8	13.1	100	0.131	
3.7	15.5	100	0.155	
2.6	14.7	100	0.147	
2.98			**0.1472**	**20.24457**
23.87097				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Cadmium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.264946
Maximum detected value (mg/kg, dry weight):	0.367347

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Cadmium	Total Solids			
0.036	15.5	100	0.155	
0.028	14.8	100	0.148	
0.025	13.1	100	0.131	
0.052	15.5	100	0.155	
0.054	14.7	100	0.147	
0.039			**0.1472**	**0.264946**
0.367347				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-02	mean
Daily exposure (mg/kg-day)	3.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.7E-01	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	3.8E-01	max
BTAG High HQ:	2.9E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Chromium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.861413
Maximum detected value (mg/kg, dry weight):	2.44898

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Chromium	Total Solids			
0.26	15.5	100	0.155	
0.23	14.8	100	0.148	
0.18	13.1	100	0.131	
0.34	15.5	100	0.155	
0.36	14.7	100	0.147	
0.274			**0.1472**	**1.861413**
2.44898				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients

NOAEL HQ:	3.0E-01	mean
LOAEL HQ:	5.9E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	3.5E-01	max
LOAEL HQ:	7.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Copper
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	12.90761
Maximum detected value (mg/kg, dry weight):	16.77419

Copper	Total Solids			
1.6	15.5	100	0.155	
1.8	14.8	100	0.148	
1.6	13.1	100	0.131	
2.6	15.5	100	0.155	
1.9	14.7	100	0.147	
1.9			**0.1472**	**12.90761**
16.77419				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	180
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E+00	mean
Daily exposure (mg/kg-day)	1.7E+00	max

Hazard Quotients

BTAG Low HQ:	5.9E-01	mean
BTAG High HQ:	2.6E-02	mean
BTAG Low HQ:	7.3E-01	max
BTAG High HQ:	3.2E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Lead
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.663043
Maximum detected value (mg/kg, dry weight):	3.419355

Lead	Total Solids			
0.37	15.5	100	0.155	
0.28	14.8	100	0.148	
0.3	13.1	100	0.131	
0.53	15.5	100	0.155	
0.48	14.7	100	0.147	
0.392			**0.1472**	**2.663043**
3.419355				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	73
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-01	mean
Daily exposure (mg/kg-day)	4.0E-01	max

Hazard Quotients

BTAG Low HQ:	2.5E+01	mean
BTAG High HQ:	3.9E-02	mean
BTAG Low HQ:	2.9E+01	max
BTAG High HQ:	4.6E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total Mercury
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845	
Food ingestion rate (kg/day dry wt):	0.23	
Sediment ingestion rate (kg/day dry wt):	0.005	
Area Use Factor (unitless):	1	0.004
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.10462
Maximum detected value (mg/kg, dry weight):	0.116129

Mercury	Total Solids			
0.012	15.5	100	0.155	
0.014	14.8	100	0.148	
0.017	13.1	100	0.131	
0.018	15.5	100	0.155	
0.016	14.7	100	0.147	
0.0154			**0.1472**	**0.10462**
0.116129				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.85
Maximum detected value (mg/kg, dry weight):	0.85

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG HQ:	2.6E-01	mean
BTAG HQ:	5.5E-02	mean
BTAG Low HQ:	2.8E-01	max
BTAG High HQ:	6.0E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Nickel
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.296196
Maximum detected value (mg/kg, dry weight):	2.516129

Nickel	Total Solids			
0.39	15.5	100	0.155	
0.27	14.8	100	0.148	
0.28	13.1	100	0.131	
0.39	15.5	100	0.155	
0.36	14.7	100	0.147	
0.338			**0.1472**	**2.296196**
2.516129				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.8E-03	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	4.1E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Selenium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.902174
Maximum detected value (mg/kg, dry weight):	2.580645

Selenium	Total Solids			
0.3	15.5	100	0.155	
0.2	14.8	100	0.148	
0.3	13.1	100	0.131	
0.4	15.5	100	0.155	
0.2	14.7	100	0.147	
0.28			**0.1472**	**1.902174**
2.580645				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-01	mean
Daily exposure (mg/kg-day)	2.1E-01	max

Hazard Quotients

BTAG Low HQ:	6.8E-01	mean
BTAG High HQ:	1.7E-01	mean
BTAG Low HQ:	9.1E-01	max
BTAG High HQ:	2.3E-01	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	112.7717
Maximum detected value (mg/kg, dry weight):	129.0323

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	230
Maximum detected value (mg/kg, dry weight):	230

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.5E+00	mean
Daily exposure (mg/kg-day)	1.1E+01	max

Hazard Quotients

BTAG Low HQ:	5.5E-01	mean
BTAG High HQ:	5.5E-02	mean
BTAG Low HQ:	6.3E-01	max
BTAG High HQ:	6.3E-02	max

Zinc	Total Solids			
15	15.5	100	0.155	
16	14.8	100	0.148	
14	13.1	100	0.131	
20	15.5	100	0.155	
18	14.7	100	0.147	
16.6			**0.1472**	**112.7717**
129.0323				

Tier I - Summary of Hazard Quotients

Receptor: **Western Grebe**
Location: **NA11**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	7.5E-02	--	--	--	3.9E-01	--	--	--	--	--	--
LOAEL HQ:	7.5E-03	--	--	--	7.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.2E-01	7.5E-03	2.2E-01	#VALUE!	6.2E-01	**3.1E+01**	2.4E-01	1.4E-01	4.9E-01	4.2E-01
BTAG High HQ:	#VALUE!	8.3E-03	1.2E-04	5.4E-02	#VALUE!	2.7E-02	4.9E-02	5.1E-02	3.3E-03	1.2E-01	4.2E-02
MAXIMUM											
NOAEL HQ:	8.2E-02	--	--	--	4.3E-01	--	--	--	--	--	--
LOAEL HQ:	8.2E-03	--	--	--	8.5E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.2E-01	9.8E-03	2.5E-01	#VALUE!	7.2E-01	**3.4E+01**	2.5E-01	1.5E-01	6.6E-01	4.8E-01
BTAG High HQ:	#VALUE!	8.7E-03	1.6E-04	6.3E-02	#VALUE!	3.1E-02	5.4E-02	5.5E-02	3.6E-03	1.6E-01	4.8E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.15625
Maximum detected value (mg/kg, dry weight):	0.174194

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.4
Maximum detected value (mg/kg, dry weight):	0.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

NOAEL HQ:	7.5E-02	mean
LOAEL HQ:	7.5E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	8.2E-02	max
LOAEL HQ:	8.2E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.19
Maximum detected value (mg/kg, dry weight):	0.19

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	8.3E-03	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	8.7E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.09375
Maximum detected value (mg/kg, dry weight):	0.122581

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.038
Maximum detected value (mg/kg, dry weight):	0.038

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-03	mean
Daily exposure (mg/kg-day)	7.1E-03	max

Hazard Quotients

BTAG Low HQ:	7.5E-03	mean
BTAG High HQ:	1.2E-04	mean
BTAG Low HQ:	9.8E-03	max
BTAG High HQ:	1.6E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.24457
Maximum detected value (mg/kg, dry weight):	23.87097

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.3
Maximum detected value (mg/kg, dry weight):	9.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	5.4E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	6.3E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.264946
Maximum detected value (mg/kg, dry weight):	0.367347

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	2.2E-02	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	1.6E-03	mean
BTAG Low HQ:	2.7E-01	max
BTAG High HQ:	2.1E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.861413
Maximum detected value (mg/kg, dry weight):	2.44898

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-01	mean
Daily exposure (mg/kg-day)	3.7E-01	max

Hazard Quotients

NOAEL HQ:	3.9E-01	mean
LOAEL HQ:	7.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.3E-01	max
LOAEL HQ:	8.5E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	12.90761
Maximum detected value (mg/kg, dry weight):	16.77419

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	180
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E+00	mean
Daily exposure (mg/kg-day)	1.6E+00	max

Hazard Quotients

BTAG Low HQ:	6.2E-01	mean
BTAG High HQ:	2.7E-02	mean
BTAG Low HQ:	7.2E-01	max
BTAG High HQ:	3.1E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.663043
Maximum detected value (mg/kg, dry weight):	3.419355

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	73
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-01	mean
Daily exposure (mg/kg-day)	4.7E-01	max

Hazard Quotients

BTAG Low HQ:	3.1E+01	mean
BTAG High HQ:	4.9E-02	mean
BTAG Low HQ:	3.4E+01	max
BTAG High HQ:	5.4E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.10462
Maximum detected value (mg/kg, dry weight):	0.116129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.85
Maximum detected value (mg/kg, dry weight):	0.85

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-03	mean
Daily exposure (mg/kg-day)	9.9E-03	max

Hazard Quotients

BTAG HQ:	2.4E-01	mean
BTAG HQ:	5.1E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	5.5E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.296196
Maximum detected value (mg/kg, dry weight):	2.516129

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	2.0E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.3E-03	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	3.6E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.902174
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.5E-01	max

Hazard Quotients

BTAG Low HQ:	4.9E-01	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	6.6E-01	max
BTAG High HQ:	1.6E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: NA11

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	112.7717
Maximum detected value (mg/kg, dry weight):	129.0323

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	230
Maximum detected value (mg/kg, dry weight):	230

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E+00	mean
Daily exposure (mg/kg-day)	8.2E+00	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	4.2E-02	mean
BTAG Low HQ:	4.8E-01	max
BTAG High HQ:	4.8E-02	max

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Tier I - Summary of Hazard Quotients

Receptor: Surf Scoter
Location: NA12

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	8.6E-02	--	--	--	3.2E-01	--	--	--	--	--	--
LOAEL HQ:	8.6E-03	--	--	--	6.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.3E-02	8.3E-03	2.0E-01	#VALUE!	5.3E-01	**2.3E+01**	2.0E-01	1.3E-01	5.3E-01	4.1E-01
BTAG High HQ:	#VALUE!	5.9E-03	1.3E-04	4.9E-02	#VALUE!	2.3E-02	3.7E-02	4.4E-02	3.2E-03	1.3E-01	4.1E-02
MAXIMUM											
NOAEL HQ:	9.0E-02	--	--	--	3.5E-01	--	--	--	--	--	--
LOAEL HQ:	9.0E-03	--	--	--	6.9E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.0E-01	1.0E-02	2.1E-01	#VALUE!	6.2E-01	**2.4E+01**	2.6E-01	1.4E-01	7.1E-01	4.5E-01
BTAG High HQ:	#VALUE!	7.4E-03	1.6E-04	5.2E-02	#VALUE!	2.7E-02	3.9E-02	5.6E-02	3.4E-03	1.8E-01	4.5E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.199158
Maximum detected value (mg/kg, dry weight):	0.210884

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.26
Maximum detected value (mg/kg, dry weight):	0.26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

NOAEL HQ:	8.6E-02	mean
LOAEL HQ:	8.6E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	9.0E-02	max
LOAEL HQ:	9.0E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.124965
Maximum detected value (mg/kg, dry weight):	0.159184

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.15
Maximum detected value (mg/kg, dry weight):	0.15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.5E-03	mean
Daily exposure (mg/kg-day)	9.4E-03	max

Hazard Quotients

BTAG Low HQ:	8.3E-02	mean
BTAG High HQ:	5.9E-03	mean
BTAG Low HQ:	1.0E-01	max
BTAG High HQ:	7.4E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.103506
Maximum detected value (mg/kg, dry weight):	0.129252

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.08
Maximum detected value (mg/kg, dry weight):	0.08

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.0E-03	mean
Daily exposure (mg/kg-day)	7.5E-03	max

Hazard Quotients

BTAG Low HQ:	8.3E-03	mean
BTAG High HQ:	1.3E-04	mean
BTAG Low HQ:	1.0E-02	max
BTAG High HQ:	1.6E-04	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.93408
Maximum detected value (mg/kg, dry weight):	19.72789

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.5
Maximum detected value (mg/kg, dry weight):	9.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.1E+00	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	4.9E-02	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	5.2E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210379
Maximum detected value (mg/kg, dry weight):	0.272727

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	1.2E-03	mean
BTAG Low HQ:	2.0E-01	max
BTAG High HQ:	1.5E-03	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Chromium
Location:	NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.725105
Maximum detected value (mg/kg, dry weight):	2.176871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	54
Maximum detected value (mg/kg, dry weight):	54

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients

NOAEL HQ:	3.2E-01	mean
LOAEL HQ:	6.3E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.5E-01	max
LOAEL HQ:	6.9E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.04348
Maximum detected value (mg/kg, dry weight):	16.90141

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	150
Maximum detected value (mg/kg, dry weight):	150

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients

BTAG Low HQ:	5.3E-01	mean
BTAG High HQ:	2.3E-02	mean
BTAG Low HQ:	6.2E-01	max
BTAG High HQ:	2.7E-02	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Lead
Location:	NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.328191
Maximum detected value (mg/kg, dry weight):	2.676056

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.2E-01	mean
Daily exposure (mg/kg-day)	3.4E-01	max

Hazard Quotients

BTAG Low HQ:	2.3E+01	mean
BTAG High HQ:	3.7E-02	mean
BTAG Low HQ:	2.4E+01	max
BTAG High HQ:	3.9E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106592
Maximum detected value (mg/kg, dry weight):	0.142857

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.62
Maximum detected value (mg/kg, dry weight):	0.62

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.0E-03	mean
Daily exposure (mg/kg-day)	1.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	4.4E-02	mean
BTAG Low HQ:	2.6E-01	max
BTAG High HQ:	5.6E-02	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Nickel
Location:	NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.30014
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients

BTAG Low HQ:	1.3E-01	mean
BTAG High HQ:	3.2E-03	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	3.4E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.103787
Maximum detected value (mg/kg, dry weight):	2.857143

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients

BTAG Low HQ:	5.3E-01	mean
BTAG High HQ:	1.3E-01	mean
BTAG Low HQ:	7.1E-01	max
BTAG High HQ:	1.8E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.6045
Maximum detected value (mg/kg, dry weight):	126.7606

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	210
Maximum detected value (mg/kg, dry weight):	210

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.0E+00	mean
Daily exposure (mg/kg-day)	7.8E+00	max

Hazard Quotients

BTAG Low HQ:	4.1E-01	mean
BTAG High HQ:	4.1E-02	mean
BTAG Low HQ:	4.5E-01	max
BTAG High HQ:	4.5E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Sea Lion
Location: NA12

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	2.3E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.1E-03	--	--	--	--	--	--
BTAG Low HQ:	3.5E-03	7.9E-03	9.3E-03	**1.3E+00**	#VALUE!	1.5E-01	9.2E-02	1.0E-01	4.6E-01	9.4E-01	2.8E-01
BTAG High HQ:	1.4E-04	2.2E-03	1.6E-04	9.0E-02	#VALUE!	6.2E-04	3.8E-04	1.0E-02	1.9E-03	3.9E-02	6.4E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	2.6E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.2E-03	--	--	--	--	--	--
BTAG Low HQ:	3.7E-03	1.0E-02	1.2E-02	**1.4E+00**	#VALUE!	1.8E-01	9.9E-02	1.3E-01	4.9E-01	**1.3E+00**	3.1E-01
BTAG High HQ:	1.5E-04	2.8E-03	1.9E-04	9.4E-02	#VALUE!	7.5E-04	4.1E-04	1.3E-02	2.1E-03	5.3E-02	7.1E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Benzo[a]pyrene
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.199158
Maximum detected value (mg/kg, dry weight):	0.210884

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.26
Maximum detected value (mg/kg, dry weight):	0.26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.6E-03	mean
Daily exposure (mg/kg-day)	4.8E-03	max

Hazard Quotients

BTAG Low HQ:	3.5E-03	mean
BTAG High HQ:	1.4E-04	mean
BTAG Low HQ:	3.7E-03	max
BTAG High HQ:	1.5E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.124965
Maximum detected value (mg/kg, dry weight):	0.159184

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.15
Maximum detected value (mg/kg, dry weight):	0.15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-03	mean
Daily exposure (mg/kg-day)	3.6E-03	max

Hazard Quotients

BTAG Low HQ:	7.9E-03	mean
BTAG High HQ:	2.2E-03	mean
BTAG Low HQ:	1.0E-02	max
BTAG High HQ:	2.8E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Tributyltin
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.103506
Maximum detected value (mg/kg, dry weight):	0.129252

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.08
Maximum detected value (mg/kg, dry weight):	0.08

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-03	mean
Daily exposure (mg/kg-day)	2.9E-03	max

Hazard Quotients

BTAG Low HQ:	9.3E-03	mean
BTAG High HQ:	1.6E-04	mean
BTAG Low HQ:	1.2E-02	max
BTAG High HQ:	1.9E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Arsenic
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.93408
Maximum detected value (mg/kg, dry weight):	19.72789

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.5
Maximum detected value (mg/kg, dry weight):	9.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.2E-01	mean
Daily exposure (mg/kg-day)	4.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.3E+00	mean
BTAG High HQ:	9.0E-02	mean
BTAG Low HQ:	1.4E+00	max
BTAG High HQ:	9.4E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210379
Maximum detected value (mg/kg, dry weight):	0.272727

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.8E-03	mean
Daily exposure (mg/kg-day)	6.1E-03	max

Hazard Quotients

BTAG Low HQ:	7.9E-02	mean
BTAG High HQ:	1.8E-03	mean
BTAG Low HQ:	1.0E-01	max
BTAG High HQ:	2.3E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Chromium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.725105
Maximum detected value (mg/kg, dry weight):	2.176871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	54
Maximum detected value (mg/kg, dry weight):	54

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.5E-02	mean
Daily exposure (mg/kg-day)	8.5E-02	max

Hazard Quotients

NOAEL HQ:	2.3E-02	mean
LOAEL HQ:	1.1E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.6E-02	max
LOAEL HQ:	1.2E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.04348
Maximum detected value (mg/kg, dry weight):	16.90141

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	150
Maximum detected value (mg/kg, dry weight):	150

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-01	mean
Daily exposure (mg/kg-day)	4.7E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	6.2E-04	mean
BTAG Low HQ:	1.8E-01	max
BTAG High HQ:	7.5E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.328191
Maximum detected value (mg/kg, dry weight):	2.676056

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-02	mean
Daily exposure (mg/kg-day)	9.9E-02	max

Hazard Quotients

BTAG Low HQ:	9.2E-02	mean
BTAG High HQ:	3.8E-04	mean
BTAG Low HQ:	9.9E-02	max
BTAG High HQ:	4.1E-04	max

Hazard Quotient Calculation

Receptor:	Sea Lion
Chemical:	Total Mercury
Location:	NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106592
Maximum detected value (mg/kg, dry weight):	0.142857

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.62
Maximum detected value (mg/kg, dry weight):	0.62

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-03	mean
Daily exposure (mg/kg-day)	3.6E-03	max

Hazard Quotients

BTAG HQ:	1.0E-01	mean
BTAG HQ:	1.0E-02	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	1.3E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.30014
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.1E-02	mean
Daily exposure (mg/kg-day)	6.6E-02	max

Hazard Quotients

BTAG Low HQ:	4.6E-01	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	4.9E-01	max
BTAG High HQ:	2.1E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.103787
Maximum detected value (mg/kg, dry weight):	2.857143

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.7E-02	mean
Daily exposure (mg/kg-day)	6.4E-02	max

Hazard Quotients

BTAG Low HQ:	9.4E-01	mean
BTAG High HQ:	3.9E-02	mean
BTAG Low HQ:	1.3E+00	max
BTAG High HQ:	5.3E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.6045
Maximum detected value (mg/kg, dry weight):	126.7606

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	210
Maximum detected value (mg/kg, dry weight):	210

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E+00	mean
Daily exposure (mg/kg-day)	2.9E+00	max

Hazard Quotients

BTAG Low HQ:	2.8E-01	mean
BTAG High HQ:	6.4E-03	mean
BTAG Low HQ:	3.1E-01	max
BTAG High HQ:	7.1E-03	max

Tier I - Summary of Hazard Quotients

Receptor: CA Least Tern
Location: NA12

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.8E-01	--	--	--	4.4E-01	--	--	--	--	--	--
LOAEL HQ:	#VALUE!	--	--	--	8.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.7E-01	1.8E-02	4.3E-01	#VALUE!	8.9E-01	**3.3E+01**	3.8E-01	2.4E-01	**1.1E+00**	8.4E-01
BTAG High HQ:	#DIV/0!	1.2E-02	2.8E-04	1.1E-01	#VALUE!	3.9E-02	5.3E-02	8.3E-02	5.8E-03	2.8E-01	8.4E-02
MAXIMUM											
NOAEL HQ:	1.9E-01	--	--	--	5.0E-01	--	--	--	--	--	--
LOAEL HQ:	#VALUE!	--	--	--	1.0E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.2E-01	2.2E-02	4.4E-01	#VALUE!	**1.1E+00**	**3.6E+01**	5.0E-01	2.6E-01	**1.5E+00**	9.4E-01
BTAG High HQ:	#DIV/0!	1.6E-02	3.5E-04	1.1E-01	#VALUE!	4.8E-02	5.8E-02	1.1E-01	6.3E-03	3.8E-01	9.4E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Benzo[a]pyrene
Location:	NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.199158
Maximum detected value (mg/kg, dry weight):	0.210884

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.26
Maximum detected value (mg/kg, dry weight):	0.26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	Not Available
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-02	mean
Daily exposure (mg/kg-day)	2.7E-02	max

Hazard Quotients

NOAEL HQ:	1.8E-01	mean
LOAEL HQ:	#VALUE!	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#DIV/0!	mean
NOAEL HQ:	1.9E-01	max
LOAEL HQ:	#VALUE!	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#DIV/0!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCB Congeners
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.124965
Maximum detected value (mg/kg, dry weight):	0.159184

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.15
Maximum detected value (mg/kg, dry weight):	0.15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	1.2E-02	mean
BTAG Low HQ:	2.2E-01	max
BTAG High HQ:	1.6E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.103506
Maximum detected value (mg/kg, dry weight):	0.129252

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.08
Maximum detected value (mg/kg, dry weight):	0.08

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients

BTAG Low HQ:	1.8E-02	mean
BTAG High HQ:	2.8E-04	mean
BTAG Low HQ:	2.2E-02	max
BTAG High HQ:	3.5E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.93408
Maximum detected value (mg/kg, dry weight):	19.72789

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.5
Maximum detected value (mg/kg, dry weight):	9.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E+00	mean
Daily exposure (mg/kg-day)	2.4E+00	max

Hazard Quotients

BTAG Low HQ:	4.3E-01	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	4.4E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210379
Maximum detected value (mg/kg, dry weight):	0.272727

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-02	mean
Daily exposure (mg/kg-day)	3.4E-02	max

Hazard Quotients

BTAG Low HQ:	3.3E-01	mean
BTAG High HQ:	2.5E-03	mean
BTAG Low HQ:	4.2E-01	max
BTAG High HQ:	3.3E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.725105
Maximum detected value (mg/kg, dry weight):	2.176871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	54
Maximum detected value (mg/kg, dry weight):	54

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E-01	mean
Daily exposure (mg/kg-day)	4.3E-01	max

Hazard Quotients

NOAEL HQ:	4.4E-01	mean
LOAEL HQ:	8.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.0E-01	max
LOAEL HQ:	1.0E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.04348
Maximum detected value (mg/kg, dry weight):	16.90141

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	150
Maximum detected value (mg/kg, dry weight):	150

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E+00	mean
Daily exposure (mg/kg-day)	2.5E+00	max

Hazard Quotients

BTAG Low HQ:	8.9E-01	mean
BTAG High HQ:	3.9E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	4.8E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.328191
Maximum detected value (mg/kg, dry weight):	2.676056

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.6E-01	mean
Daily exposure (mg/kg-day)	5.1E-01	max

Hazard Quotients

BTAG Low HQ:	3.3E+01	mean
BTAG High HQ:	5.3E-02	mean
BTAG Low HQ:	3.6E+01	max
BTAG High HQ:	5.8E-02	max

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Total Mercury
Location:	NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106592
Maximum detected value (mg/kg, dry weight):	0.142857

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.62
Maximum detected value (mg/kg, dry weight):	0.62

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.9E-02	max

Hazard Quotients

BTAG HQ:	3.8E-01	mean
BTAG HQ:	8.3E-02	mean
BTAG Low HQ:	5.0E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.30014
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-01	mean
Daily exposure (mg/kg-day)	3.5E-01	max

Hazard Quotients

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	5.8E-03	mean
BTAG Low HQ:	2.6E-01	max
BTAG High HQ:	6.3E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.103787
Maximum detected value (mg/kg, dry weight):	2.857143

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-01	mean
Daily exposure (mg/kg-day)	3.5E-01	max

Hazard Quotients

BTAG Low HQ:	1.1E+00	mean
BTAG High HQ:	2.8E-01	mean
BTAG Low HQ:	1.5E+00	max
BTAG High HQ:	3.8E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.6045
Maximum detected value (mg/kg, dry weight):	126.7606

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	210
Maximum detected value (mg/kg, dry weight):	210

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E+01	mean
Daily exposure (mg/kg-day)	1.6E+01	max

Hazard Quotients

BTAG Low HQ:	8.4E-01	mean
BTAG High HQ:	8.4E-02	mean
BTAG Low HQ:	9.4E-01	max
BTAG High HQ:	9.4E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Green Turtle
Location: NA12

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	5.0E-03	--	--	--	1.9E-02	--	--	--	--	--	--
LOAEL HQ:	5.0E-04	--	--	--	3.8E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.9E-03	4.8E-04	1.2E-02	#VALUE!	3.1E-02	**1.4E+00**	1.2E-02	7.6E-03	3.1E-02	2.4E-02
BTAG High HQ:	#VALUE!	3.4E-04	7.7E-06	2.9E-03	#VALUE!	1.4E-03	2.2E-03	2.6E-03	1.9E-04	7.6E-03	2.4E-03
MAXIMUM											
NOAEL HQ:	5.3E-03	--	--	--	2.1E-02	--	--	--	--	--	--
LOAEL HQ:	5.3E-04	--	--	--	4.1E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	6.1E-03	6.0E-04	1.2E-02	#VALUE!	3.7E-02	**1.4E+00**	1.5E-02	8.1E-03	4.1E-02	2.6E-02
BTAG High HQ:	#VALUE!	4.3E-04	9.5E-06	3.0E-03	#VALUE!	1.6E-03	2.3E-03	3.3E-03	2.0E-04	1.0E-02	2.6E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor:	Green Turtle
Chemical:	Benzo[a]pyrene
Location:	NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.199158
Maximum detected value (mg/kg, dry weight):	0.210884

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.26
Maximum detected value (mg/kg, dry weight):	0.26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.0E-04	mean
Daily exposure (mg/kg-day)	7.4E-04	max

Hazard Quotients

NOAEL HQ:	5.0E-03	mean
LOAEL HQ:	5.0E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.3E-03	max
LOAEL HQ:	5.3E-04	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.124965
Maximum detected value (mg/kg, dry weight):	0.159184

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.15
Maximum detected value (mg/kg, dry weight):	0.15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-04	mean
Daily exposure (mg/kg-day)	5.5E-04	max

Hazard Quotients

BTAG Low HQ:	4.9E-03	mean
BTAG High HQ:	3.4E-04	mean
BTAG Low HQ:	6.1E-03	max
BTAG High HQ:	4.3E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.103506
Maximum detected value (mg/kg, dry weight):	0.129252

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.08
Maximum detected value (mg/kg, dry weight):	0.08

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.5E-04	mean
Daily exposure (mg/kg-day)	4.4E-04	max

Hazard Quotients

BTAG Low HQ:	4.8E-04	mean
BTAG High HQ:	7.7E-06	mean
BTAG Low HQ:	6.0E-04	max
BTAG High HQ:	9.5E-06	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Arsenic
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.93408
Maximum detected value (mg/kg, dry weight):	19.72789

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.5
Maximum detected value (mg/kg, dry weight):	9.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.4E-02	mean
Daily exposure (mg/kg-day)	6.6E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	2.9E-03	mean
BTAG Low HQ:	1.2E-02	max
BTAG High HQ:	3.0E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210379
Maximum detected value (mg/kg, dry weight):	0.272727

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E-04	mean
Daily exposure (mg/kg-day)	9.3E-04	max

Hazard Quotients

BTAG Low HQ:	9.0E-03	mean
BTAG High HQ:	6.9E-05	mean
BTAG Low HQ:	1.2E-02	max
BTAG High HQ:	8.9E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.725105
Maximum detected value (mg/kg, dry weight):	2.176871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	54
Maximum detected value (mg/kg, dry weight):	54

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

NOAEL HQ:	1.9E-02	mean
LOAEL HQ:	3.8E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	2.1E-02	max
LOAEL HQ:	4.1E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Copper
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.04348
Maximum detected value (mg/kg, dry weight):	16.90141

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	150
Maximum detected value (mg/kg, dry weight):	150

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E-02	mean
Daily exposure (mg/kg-day)	8.5E-02	max

Hazard Quotients

BTAG Low HQ:	3.1E-02	mean
BTAG High HQ:	1.4E-03	mean
BTAG Low HQ:	3.7E-02	max
BTAG High HQ:	1.6E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Lead
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.328191
Maximum detected value (mg/kg, dry weight):	2.676056

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	2.2E-03	mean
BTAG Low HQ:	1.4E+00	max
BTAG High HQ:	2.3E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106592
Maximum detected value (mg/kg, dry weight):	0.142857

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.62
Maximum detected value (mg/kg, dry weight):	0.62

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.7E-04	mean
Daily exposure (mg/kg-day)	5.9E-04	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	2.6E-03	mean
BTAG Low HQ:	1.5E-02	max
BTAG High HQ:	3.3E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.30014
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	7.6E-03	mean
BTAG High HQ:	1.9E-04	mean
BTAG Low HQ:	8.1E-03	max
BTAG High HQ:	2.0E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Selenium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.103787
Maximum detected value (mg/kg, dry weight):	2.857143

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.1E-03	mean
Daily exposure (mg/kg-day)	9.5E-03	max

Hazard Quotients

BTAG Low HQ:	3.1E-02	mean
BTAG High HQ:	7.6E-03	mean
BTAG Low HQ:	4.1E-02	max
BTAG High HQ:	1.0E-02	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.6045
Maximum detected value (mg/kg, dry weight):	126.7606

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	210
Maximum detected value (mg/kg, dry weight):	210

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-01	mean
Daily exposure (mg/kg-day)	4.5E-01	max

Hazard Quotients

BTAG Low HQ:	2.4E-02	mean
BTAG High HQ:	2.4E-03	mean
BTAG Low HQ:	2.6E-02	max
BTAG High HQ:	2.6E-03	max

Tier I - Summary of Hazard Quotients

Receptor: **Brown Pelican**
Location: **NA12**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.2E-01	--	--	--	2.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.2E-02	--	--	--	5.5E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.2E-01	1.2E-02	2.8E-01	#VALUE!	5.7E-01	**2.1E+01**	2.5E-01	1.5E-01	7.5E-01	5.6E-01
BTAG High HQ:	#VALUE!	8.2E-03	1.9E-04	7.0E-02	#VALUE!	2.5E-02	3.3E-02	5.4E-02	3.8E-03	1.8E-01	5.6E-02
MAXIMUM											
NOAEL HQ:	1.3E-01	--	--	--	3.1E-01	--	--	--	--	--	--
LOAEL HQ:	1.3E-02	--	--	--	6.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.5E-01	1.5E-02	2.9E-01	#VALUE!	7.1E-01	**2.3E+01**	3.2E-01	1.7E-01	**1.0E+00**	6.2E-01
BTAG High HQ:	#VALUE!	1.0E-02	2.3E-04	7.3E-02	#VALUE!	3.1E-02	3.7E-02	7.0E-02	4.1E-03	2.5E-01	6.2E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Benzo[a]pyrene
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.199158
Maximum detected value (mg/kg, dry weight):	0.210884

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.26
Maximum detected value (mg/kg, dry weight):	0.26

BAP				
28	14	100	0.14	
26	13.2	100	0.132	
30	15.2	100	0.152	
31	14.7	100	0.147	
27	14.2	100	0.142	
28.4			**0.1426**	199.1585
210.8844				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

NOAEL HQ:	1.2E-01	mean
LOAEL HQ:	1.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.3E-01	max
LOAEL HQ:	1.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total PCB Congeners
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.124965
Maximum detected value (mg/kg, dry weight):	0.159184

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.15
Maximum detected value (mg/kg, dry weight):	0.15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	8.2E-03	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	1.0E-02	max

PCB Cong	Total Solids			
16.1	14	100	0.14	
15.2	13.2	100	0.132	
17.3	15.2	100	0.152	
23.4	14.7	100	0.147	
17.1	14.2	100	0.142	
17.82			**0.1426**	**124.9649**
159.1837				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Tributyltin
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.103506
Maximum detected value (mg/kg, dry weight):	0.129252

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.08
Maximum detected value (mg/kg, dry weight):	0.08

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.5E-03	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	1.9E-04	mean
BTAG Low HQ:	1.5E-02	max
BTAG High HQ:	2.3E-04	max

TBT	Total Solids			
18	14	100	0.14	
15	13.2	100	0.132	
13	15.2	100	0.152	
19	14.7	100	0.147	
8.8	14.2	100	0.142	
14.76			**0.1426**	**103.5063**
129.2517				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Arsenic
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.93408
Maximum detected value (mg/kg, dry weight):	19.72789

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.5
Maximum detected value (mg/kg, dry weight):	9.5

Arsenic	Total Solids			
2.8	14	100	0.14	
2.6	13.2	100	0.132	
2.6	15.2	100	0.152	
2.9	14.7	100	0.147	
2.6	14.2	100	0.142	
2.7			**0.1426**	**18.93408**
19.72789				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E+00	mean
Daily exposure (mg/kg-day)	1.6E+00	max

Hazard Quotients

BTAG Low HQ:	2.8E-01	mean
BTAG High HQ:	7.0E-02	mean
BTAG Low HQ:	2.9E-01	max
BTAG High HQ:	7.3E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Cadmium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210379
Maximum detected value (mg/kg, dry weight):	0.272727

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Cadmium	Total Solids			
0.02	14	100	0.14	
0.036	13.2	100	0.132	
0.031	15.2	100	0.152	
0.035	14.7	100	0.147	
0.028	14.2	100	0.142	
0.03			**0.1426**	**0.210379**
0.272727				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	2.2E-02	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	1.7E-03	mean
BTAG Low HQ:	2.8E-01	max
BTAG High HQ:	2.2E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Chromium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.725105
Maximum detected value (mg/kg, dry weight):	2.176871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	54
Maximum detected value (mg/kg, dry weight):	54

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-01	mean
Daily exposure (mg/kg-day)	2.7E-01	max

Hazard Quotients

NOAEL HQ:	2.7E-01	mean
LOAEL HQ:	5.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.1E-01	max
LOAEL HQ:	6.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Chromium	Total Solids			
0.2	14	100	0.14	
0.26	13.2	100	0.132	
0.26	15.2	100	0.152	
0.32	14.7	100	0.147	
0.19	14.2	100	0.142	
0.246			**0.1426**	**1.725105**
2.176871				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Copper
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.04348
Maximum detected value (mg/kg, dry weight):	16.90141

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	150
Maximum detected value (mg/kg, dry weight):	150

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E+00	mean
Daily exposure (mg/kg-day)	1.6E+00	max

Hazard Quotients

BTAG Low HQ:	5.7E-01	mean
BTAG High HQ:	2.5E-02	mean
BTAG Low HQ:	7.1E-01	max
BTAG High HQ:	3.1E-02	max

Copper	Total Solids			
1.7	14	100	0.14	
2	13.2	100	0.132	
1.5	15.2	100	0.152	
1.7	14.7	100	0.147	
2.4	14.2	100	0.142	
1.86			**0.1426**	**13.04348**
16.90141				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Lead
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.328191
Maximum detected value (mg/kg, dry weight):	2.676056

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Lead	Total Solids			
0.3	14	100	0.14	
0.31	13.2	100	0.132	
0.3	15.2	100	0.152	
0.37	14.7	100	0.147	
0.38	14.2	100	0.142	
0.332			**0.1426**	**2.328191**
2.676056				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-01	mean
Daily exposure (mg/kg-day)	3.2E-01	max

Hazard Quotients

BTAG Low HQ:	2.1E+01	mean
BTAG High HQ:	3.3E-02	mean
BTAG Low HQ:	2.3E+01	max
BTAG High HQ:	3.7E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total Mercury
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106592
Maximum detected value (mg/kg, dry weight):	0.142857

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.62
Maximum detected value (mg/kg, dry weight):	0.62

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.7E-03	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG HQ:	2.5E-01	mean
BTAG HQ:	5.4E-02	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	7.0E-02	max

Mercury	Total Solids			
0.02	14	100	0.14	
0.015	13.2	100	0.132	
0.013	15.2	100	0.152	
0.014	14.7	100	0.147	
0.014	14.2	100	0.142	
0.0152			**0.1426**	**0.106592**
0.142857				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Nickel
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.30014
Maximum detected value (mg/kg, dry weight):	2.517007

Nickel	Total Solids			
0.32	14	100	0.14	
0.36	13.2	100	0.132	
0.3	15.2	100	0.152	
0.37	14.7	100	0.147	
0.29	14.2	100	0.142	
0.328			**0.1426**	**2.30014**
2.517007				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.8E-03	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	4.1E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Selenium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.103787
Maximum detected value (mg/kg, dry weight):	2.857143

Selenium	Total Solids		
0.4	14	100	0.14
0.3	13.2	100	0.132
0.2	15.2	100	0.152
0.4	14.7	100	0.147
0.2	14.2	100	0.142
0.3			**0.1426**
2.857143			

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	7.5E-01	mean
BTAG High HQ:	1.8E-01	mean
BTAG Low HQ:	1.0E+00	max
BTAG High HQ:	2.5E-01	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.6045
Maximum detected value (mg/kg, dry weight):	126.7606

Zinc	Total Solids			
12	14	100	0.14	
17	13.2	100	0.132	
17	15.2	100	0.152	
17	14.7	100	0.147	
18	14.2	100	0.142	
16.2			**0.1426**	**113.6045**
126.7606				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	210
Maximum detected value (mg/kg, dry weight):	210

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.6E+00	mean
Daily exposure (mg/kg-day)	1.1E+01	max

Hazard Quotients

BTAG Low HQ:	5.6E-01	mean
BTAG High HQ:	5.6E-02	mean
BTAG Low HQ:	6.2E-01	max
BTAG High HQ:	6.2E-02	max

Tier I - Summary of Hazard Quotients

Receptor: **Western Grebe**
Location: **NA12**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	8.8E-02	--	--	--	3.6E-01	--	--	--	--	--	--
LOAEL HQ:	8.8E-03	--	--	--	7.1E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.5E-02	8.5E-03	2.0E-01	#VALUE!	5.7E-01	**2.6E+01**	2.2E-01	1.4E-01	5.4E-01	4.2E-01
BTAG High HQ:	#VALUE!	6.1E-03	1.4E-04	5.1E-02	#VALUE!	2.5E-02	4.1E-02	4.7E-02	3.3E-03	1.3E-01	4.2E-02
MAXIMUM											
NOAEL HQ:	9.3E-02	--	--	--	3.9E-01	--	--	--	--	--	--
LOAEL HQ:	9.3E-03	--	--	--	7.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.1E-01	1.1E-02	2.1E-01	#VALUE!	6.7E-01	**2.7E+01**	2.7E-01	1.5E-01	7.3E-01	4.7E-01
BTAG High HQ:	#VALUE!	7.6E-03	1.7E-04	5.3E-02	#VALUE!	2.9E-02	4.3E-02	5.8E-02	3.6E-03	1.8E-01	4.7E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.199158
Maximum detected value (mg/kg, dry weight):	0.210884

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.26
Maximum detected value (mg/kg, dry weight):	0.26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

NOAEL HQ:	8.8E-02	mean
LOAEL HQ:	8.8E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	9.3E-02	max
LOAEL HQ:	9.3E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.124965
Maximum detected value (mg/kg, dry weight):	0.159184

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.15
Maximum detected value (mg/kg, dry weight):	0.15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.7E-03	mean
Daily exposure (mg/kg-day)	9.6E-03	max

Hazard Quotients

BTAG Low HQ:	8.5E-02	mean
BTAG High HQ:	6.1E-03	mean
BTAG Low HQ:	1.1E-01	max
BTAG High HQ:	7.6E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.103506
Maximum detected value (mg/kg, dry weight):	0.129252

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.08
Maximum detected value (mg/kg, dry weight):	0.08

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.2E-03	mean
Daily exposure (mg/kg-day)	7.7E-03	max

Hazard Quotients

BTAG Low HQ:	8.5E-03	mean
BTAG High HQ:	1.4E-04	mean
BTAG Low HQ:	1.1E-02	max
BTAG High HQ:	1.7E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.93408
Maximum detected value (mg/kg, dry weight):	19.72789

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	9.5
Maximum detected value (mg/kg, dry weight):	9.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	5.1E-02	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	5.3E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.210379
Maximum detected value (mg/kg, dry weight):	0.272727

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	1.2E-03	mean
BTAG Low HQ:	2.0E-01	max
BTAG High HQ:	1.6E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.725105
Maximum detected value (mg/kg, dry weight):	2.176871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	54
Maximum detected value (mg/kg, dry weight):	54

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E-01	mean
Daily exposure (mg/kg-day)	3.3E-01	max

Hazard Quotients

NOAEL HQ:	3.6E-01	mean
LOAEL HQ:	7.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	3.9E-01	max
LOAEL HQ:	7.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.04348
Maximum detected value (mg/kg, dry weight):	16.90141

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	150
Maximum detected value (mg/kg, dry weight):	150

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E+00	mean
Daily exposure (mg/kg-day)	1.5E+00	max

Hazard Quotients

BTAG Low HQ:	5.7E-01	mean
BTAG High HQ:	2.5E-02	mean
BTAG Low HQ:	6.7E-01	max
BTAG High HQ:	2.9E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.328191
Maximum detected value (mg/kg, dry weight):	2.676056

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.6E-01	mean
Daily exposure (mg/kg-day)	3.8E-01	max

Hazard Quotients

BTAG Low HQ:	2.6E+01	mean
BTAG High HQ:	4.1E-02	mean
BTAG Low HQ:	2.7E+01	max
BTAG High HQ:	4.3E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106592
Maximum detected value (mg/kg, dry weight):	0.142857

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.62
Maximum detected value (mg/kg, dry weight):	0.62

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.4E-03	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	4.7E-02	mean
BTAG Low HQ:	2.7E-01	max
BTAG High HQ:	5.8E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.30014
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	2.0E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.3E-03	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	3.6E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.103787
Maximum detected value (mg/kg, dry weight):	2.857143

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.7E-01	max

Hazard Quotients

BTAG Low HQ:	5.4E-01	mean
BTAG High HQ:	1.3E-01	mean
BTAG Low HQ:	7.3E-01	max
BTAG High HQ:	1.8E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: NA12

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.6045
Maximum detected value (mg/kg, dry weight):	126.7606

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	210
Maximum detected value (mg/kg, dry weight):	210

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E+00	mean
Daily exposure (mg/kg-day)	8.0E+00	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	4.2E-02	mean
BTAG Low HQ:	4.7E-01	max
BTAG High HQ:	4.7E-02	max

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Tier I - Summary of Hazard Quotients

Receptor: Surf Scoter
Location: NA20

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.1E-01	--	--	--	2.3E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	4.6E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.0E-02	1.3E-02	1.9E-01	#VALUE!	4.1E-01	**2.4E+01**	2.0E-01	1.3E-01	3.7E-01	4.0E-01
BTAG High HQ:	#VALUE!	5.7E-03	2.1E-04	4.8E-02	#VALUE!	1.8E-02	3.9E-02	4.4E-02	3.3E-03	9.0E-02	4.0E-02
MAXIMUM											
NOAEL HQ:	1.2E-01	--	--	--	2.6E-01	--	--	--	--	--	--
LOAEL HQ:	1.2E-02	--	--	--	5.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.0E-01	1.4E-02	2.3E-01	#VALUE!	4.7E-01	**2.7E+01**	2.4E-01	1.6E-01	4.6E-01	4.2E-01
BTAG High HQ:	#VALUE!	7.2E-03	2.3E-04	5.6E-02	#VALUE!	2.1E-02	4.4E-02	5.3E-02	3.9E-03	1.1E-01	4.2E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.249671
Maximum detected value (mg/kg, dry weight):	0.283951

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.39
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients

NOAEL HQ:	1.1E-01	mean
LOAEL HQ:	1.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.2E-01	max
LOAEL HQ:	1.2E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.117477
Maximum detected value (mg/kg, dry weight):	0.151235

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E-03	mean
Daily exposure (mg/kg-day)	9.1E-03	max

Hazard Quotients

BTAG Low HQ:	8.0E-02	mean
BTAG High HQ:	5.7E-03	mean
BTAG Low HQ:	1.0E-01	max
BTAG High HQ:	7.2E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.155059
Maximum detected value (mg/kg, dry weight):	0.170886

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.6E-03	mean
Daily exposure (mg/kg-day)	1.0E-02	max

Hazard Quotients

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	2.1E-04	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	2.3E-04	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Arsenic
Location:	NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.52825
Maximum detected value (mg/kg, dry weight):	21.76871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	6.6
Maximum detected value (mg/kg, dry weight):	6.6

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients

BTAG Low HQ:	1.9E-01	mean
BTAG High HQ:	4.8E-02	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	5.6E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.198423
Maximum detected value (mg/kg, dry weight):	0.238095

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.44
Maximum detected value (mg/kg, dry weight):	0.44

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	1.2E-03	mean
BTAG Low HQ:	1.8E-01	max
BTAG High HQ:	1.4E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.049934
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

NOAEL HQ:	2.3E-01	mean
LOAEL HQ:	4.6E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.6E-01	max
LOAEL HQ:	5.2E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	11.43233
Maximum detected value (mg/kg, dry weight):	13.60544

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.5E-01	mean
Daily exposure (mg/kg-day)	1.1E+00	max

Hazard Quotients

BTAG Low HQ:	4.1E-01	mean
BTAG High HQ:	1.8E-02	mean
BTAG Low HQ:	4.7E-01	max
BTAG High HQ:	2.1E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.969777
Maximum detected value (mg/kg, dry weight):	3.741497

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	53
Maximum detected value (mg/kg, dry weight):	53

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-01	mean
Daily exposure (mg/kg-day)	3.8E-01	max

Hazard Quotients

BTAG Low HQ:	2.4E+01	mean
BTAG High HQ:	3.9E-02	mean
BTAG Low HQ:	2.7E+01	max
BTAG High HQ:	4.4E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.127464
Maximum detected value (mg/kg, dry weight):	0.156463

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.24
Maximum detected value (mg/kg, dry weight):	0.24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.9E-03	mean
Daily exposure (mg/kg-day)	9.5E-03	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	4.4E-02	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	5.3E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.812089
Maximum detected value (mg/kg, dry weight):	3.401361

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	8.4
Maximum detected value (mg/kg, dry weight):	8.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	2.2E-01	max

Hazard Quotients

BTAG Low HQ:	1.3E-01	mean
BTAG High HQ:	3.3E-03	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	3.9E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.445466
Maximum detected value (mg/kg, dry weight):	1.851852

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.4E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

BTAG Low HQ:	3.7E-01	mean
BTAG High HQ:	9.0E-02	mean
BTAG Low HQ:	4.6E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.0092
Maximum detected value (mg/kg, dry weight):	117.284

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	190

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.9E+00	mean
Daily exposure (mg/kg-day)	7.2E+00	max

Hazard Quotients

BTAG Low HQ:	4.0E-01	mean
BTAG High HQ:	4.0E-02	mean
BTAG Low HQ:	4.2E-01	max
BTAG High HQ:	4.2E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Sea Lion
Location: NA20

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	1.9E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	9.1E-04	--	--	--	--	--	--
BTAG Low HQ:	4.4E-03	7.6E-03	1.4E-02	**1.3E+00**	#VALUE!	1.2E-01	1.0E-01	1.1E-01	5.1E-01	6.5E-01	2.7E-01
BTAG High HQ:	1.8E-04	2.1E-03	2.4E-04	8.8E-02	#VALUE!	5.0E-04	4.2E-04	1.1E-02	2.1E-03	2.7E-02	6.4E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	2.2E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.1E-03	--	--	--	--	--	--
BTAG Low HQ:	5.0E-03	9.6E-03	1.6E-02	**1.5E+00**	#VALUE!	1.4E-01	1.2E-01	1.3E-01	6.1E-01	8.3E-01	2.8E-01
BTAG High HQ:	2.0E-04	2.7E-03	2.6E-04	1.0E-01	#VALUE!	5.8E-04	4.9E-04	1.3E-02	2.5E-03	3.4E-02	6.6E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Benzo[a]pyrene
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.249671
Maximum detected value (mg/kg, dry weight):	0.283951

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.39
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.8E-03	mean
Daily exposure (mg/kg-day)	6.5E-03	max

Hazard Quotients

BTAG Low HQ:	4.4E-03	mean
BTAG High HQ:	1.8E-04	mean
BTAG Low HQ:	5.0E-03	max
BTAG High HQ:	2.0E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.117477
Maximum detected value (mg/kg, dry weight):	0.151235

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-03	mean
Daily exposure (mg/kg-day)	3.5E-03	max

Hazard Quotients

BTAG Low HQ:	7.6E-03	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	9.6E-03	max
BTAG High HQ:	2.7E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Tributyltin
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.155059
Maximum detected value (mg/kg, dry weight):	0.170886

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.6E-03	mean
Daily exposure (mg/kg-day)	4.0E-03	max

Hazard Quotients

BTAG Low HQ:	1.4E-02	mean
BTAG High HQ:	2.4E-04	mean
BTAG Low HQ:	1.6E-02	max
BTAG High HQ:	2.6E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Arsenic
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.52825
Maximum detected value (mg/kg, dry weight):	21.76871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	6.6
Maximum detected value (mg/kg, dry weight):	6.6

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-01	mean
Daily exposure (mg/kg-day)	4.8E-01	max

Hazard Quotients

BTAG Low HQ:	1.3E+00	mean
BTAG High HQ:	8.8E-02	mean
BTAG Low HQ:	1.5E+00	max
BTAG High HQ:	1.0E-01	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.198423
Maximum detected value (mg/kg, dry weight):	0.238095

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.44
Maximum detected value (mg/kg, dry weight):	0.44

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.7E-03	mean
Daily exposure (mg/kg-day)	5.5E-03	max

Hazard Quotients

BTAG Low HQ:	7.8E-02	mean
BTAG High HQ:	1.8E-03	mean
BTAG Low HQ:	9.2E-02	max
BTAG High HQ:	2.1E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Chromium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.049934
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.3E-02	mean
Daily exposure (mg/kg-day)	7.3E-02	max

Hazard Quotients

NOAEL HQ:	1.9E-02	mean
LOAEL HQ:	9.1E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.2E-02	max
LOAEL HQ:	1.1E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	11.43233
Maximum detected value (mg/kg, dry weight):	13.60544

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.2E-01	mean
Daily exposure (mg/kg-day)	3.7E-01	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	5.0E-04	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	5.8E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.969777
Maximum detected value (mg/kg, dry weight):	3.741497

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	53
Maximum detected value (mg/kg, dry weight):	53

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-01	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients

BTAG Low HQ:	1.0E-01	mean
BTAG High HQ:	4.2E-04	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	4.9E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total Mercury
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.127464
Maximum detected value (mg/kg, dry weight):	0.156463

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.24
Maximum detected value (mg/kg, dry weight):	0.24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E-03	mean
Daily exposure (mg/kg-day)	3.6E-03	max

Hazard Quotients

BTAG Low HQ:	1.1E-01	mean
BTAG High HQ:	1.1E-02	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	1.3E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.812089
Maximum detected value (mg/kg, dry weight):	3.401361

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	8.4
Maximum detected value (mg/kg, dry weight):	8.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	8.1E-02	max

Hazard Quotients

BTAG Low HQ:	5.1E-01	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	6.1E-01	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.445466
Maximum detected value (mg/kg, dry weight):	1.851852

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.2E-02	mean
Daily exposure (mg/kg-day)	4.1E-02	max

Hazard Quotients

BTAG Low HQ:	6.5E-01	mean
BTAG High HQ:	2.7E-02	mean
BTAG Low HQ:	8.3E-01	max
BTAG High HQ:	3.4E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.0092
Maximum detected value (mg/kg, dry weight):	117.284

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	190

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E+00	mean
Daily exposure (mg/kg-day)	2.7E+00	max

Hazard Quotients

BTAG Low HQ:	2.7E-01	mean
BTAG High HQ:	6.4E-03	mean
BTAG Low HQ:	2.8E-01	max
BTAG High HQ:	6.6E-03	max

Tier I - Summary of Hazard Quotients

Receptor: **CA Least Tern**
Location: **NA20**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.3E-01	--	--	--	3.8E-01	--	--	--	--	--	--
LOAEL HQ:	2.3E-02	--	--	--	7.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.7E-01	2.7E-02	4.2E-01	#VALUE!	7.4E-01	**3.7E+01**	4.2E-01	2.7E-01	7.8E-01	8.4E-01
BTAG High HQ:	#VALUE!	1.2E-02	4.3E-04	1.0E-01	#VALUE!	3.2E-02	6.0E-02	9.1E-02	6.6E-03	1.9E-01	8.4E-02
MAXIMUM											
NOAEL HQ:	2.6E-01	--	--	--	4.5E-01	--	--	--	--	--	--
LOAEL HQ:	2.6E-02	--	--	--	9.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.1E-01	3.0E-02	4.9E-01	#VALUE!	8.5E-01	**4.4E+01**	5.1E-01	3.2E-01	**1.0E+00**	8.7E-01
BTAG High HQ:	#VALUE!	1.5E-02	4.7E-04	1.2E-01	#VALUE!	3.7E-02	7.1E-02	1.1E-01	7.8E-03	2.5E-01	8.7E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.249671
Maximum detected value (mg/kg, dry weight):	0.283951

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.39
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.2E-02	mean
Daily exposure (mg/kg-day)	3.6E-02	max

Hazard Quotients

NOAEL HQ:	2.3E-01	mean
LOAEL HQ:	2.3E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.6E-01	max
LOAEL HQ:	2.6E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCB Congeners
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.117477
Maximum detected value (mg/kg, dry weight):	0.151235

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.9E-02	max

Hazard Quotients

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	1.2E-02	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	1.5E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.155059
Maximum detected value (mg/kg, dry weight):	0.170886

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-02	mean
Daily exposure (mg/kg-day)	2.2E-02	max

Hazard Quotients

BTAG Low HQ:	2.7E-02	mean
BTAG High HQ:	4.3E-04	mean
BTAG Low HQ:	3.0E-02	max
BTAG High HQ:	4.7E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.52825
Maximum detected value (mg/kg, dry weight):	21.76871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	6.6
Maximum detected value (mg/kg, dry weight):	6.6

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E+00	mean
Daily exposure (mg/kg-day)	2.7E+00	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	4.9E-01	max
BTAG High HQ:	1.2E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.198423
Maximum detected value (mg/kg, dry weight):	0.238095

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.44
Maximum detected value (mg/kg, dry weight):	0.44

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-02	mean
Daily exposure (mg/kg-day)	3.0E-02	max

Hazard Quotients

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	2.5E-03	mean
BTAG Low HQ:	3.8E-01	max
BTAG High HQ:	2.9E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.049934
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-01	mean
Daily exposure (mg/kg-day)	3.9E-01	max

Hazard Quotients

NOAEL HQ:	3.8E-01	mean
LOAEL HQ:	7.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.5E-01	max
LOAEL HQ:	9.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	11.43233
Maximum detected value (mg/kg, dry weight):	13.60544

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E+00	mean
Daily exposure (mg/kg-day)	2.0E+00	max

Hazard Quotients

BTAG Low HQ:	7.4E-01	mean
BTAG High HQ:	3.2E-02	mean
BTAG Low HQ:	8.5E-01	max
BTAG High HQ:	3.7E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.969777
Maximum detected value (mg/kg, dry weight):	3.741497

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	53
Maximum detected value (mg/kg, dry weight):	53

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E-01	mean
Daily exposure (mg/kg-day)	6.2E-01	max

Hazard Quotients

BTAG Low HQ:	3.7E+01	mean
BTAG High HQ:	6.0E-02	mean
BTAG Low HQ:	4.4E+01	max
BTAG High HQ:	7.1E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.127464
Maximum detected value (mg/kg, dry weight):	0.156463

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.24
Maximum detected value (mg/kg, dry weight):	0.24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	9.1E-02	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Nickel
Location:	NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.812089
Maximum detected value (mg/kg, dry weight):	3.401361

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	8.4
Maximum detected value (mg/kg, dry weight):	8.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-01	mean
Daily exposure (mg/kg-day)	4.4E-01	max

Hazard Quotients

BTAG Low HQ:	2.7E-01	mean
BTAG High HQ:	6.6E-03	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	7.8E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.445466
Maximum detected value (mg/kg, dry weight):	1.851852

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	7.8E-01	mean
BTAG High HQ:	1.9E-01	mean
BTAG Low HQ:	1.0E+00	max
BTAG High HQ:	2.5E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.0092
Maximum detected value (mg/kg, dry weight):	117.284

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	190

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E+01	mean
Daily exposure (mg/kg-day)	1.5E+01	max

Hazard Quotients

BTAG Low HQ:	8.4E-01	mean
BTAG High HQ:	8.4E-02	mean
BTAG Low HQ:	8.7E-01	max
BTAG High HQ:	8.7E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Green Turtle
Location: NA20

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	6.4E-03	--	--	--	1.4E-02	--	--	--	--	--	--
LOAEL HQ:	6.4E-04	--	--	--	2.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.7E-03	7.7E-04	1.1E-02	#VALUE!	2.4E-02	**1.4E+00**	1.2E-02	7.8E-03	2.1E-02	2.4E-02
BTAG High HQ:	#VALUE!	3.3E-04	1.2E-05	2.8E-03	#VALUE!	1.1E-03	2.3E-03	2.6E-03	1.9E-04	5.3E-03	2.4E-03
MAXIMUM											
NOAEL HQ:	7.2E-03	--	--	--	1.5E-02	--	--	--	--	--	--
LOAEL HQ:	7.2E-04	--	--	--	3.1E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.9E-03	8.4E-04	1.3E-02	#VALUE!	2.7E-02	**1.6E+00**	1.4E-02	9.2E-03	2.7E-02	2.4E-02
BTAG High HQ:	#VALUE!	4.2E-04	1.3E-05	3.3E-03	#VALUE!	1.2E-03	2.6E-03	3.1E-03	2.3E-04	6.7E-03	2.4E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Benzo[a]pyrene
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.249671
Maximum detected value (mg/kg, dry weight):	0.283951

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.39
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.9E-04	mean
Daily exposure (mg/kg-day)	1.0E-03	max

Hazard Quotients

NOAEL HQ:	6.4E-03	mean
LOAEL HQ:	6.4E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	7.2E-03	max
LOAEL HQ:	7.2E-04	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.117477
Maximum detected value (mg/kg, dry weight):	0.151235

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.2E-04	mean
Daily exposure (mg/kg-day)	5.3E-04	max

Hazard Quotients

BTAG Low HQ:	4.7E-03	mean
BTAG High HQ:	3.3E-04	mean
BTAG Low HQ:	5.9E-03	max
BTAG High HQ:	4.2E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.155059
Maximum detected value (mg/kg, dry weight):	0.170886

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.6E-04	mean
Daily exposure (mg/kg-day)	6.1E-04	max

Hazard Quotients

BTAG Low HQ:	7.7E-04	mean
BTAG High HQ:	1.2E-05	mean
BTAG Low HQ:	8.4E-04	max
BTAG High HQ:	1.3E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Arsenic
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.52825
Maximum detected value (mg/kg, dry weight):	21.76871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	6.6
Maximum detected value (mg/kg, dry weight):	6.6

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.2E-02	mean
Daily exposure (mg/kg-day)	7.2E-02	max

Hazard Quotients

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	1.3E-02	max
BTAG High HQ:	3.3E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.198423
Maximum detected value (mg/kg, dry weight):	0.238095

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.44
Maximum detected value (mg/kg, dry weight):	0.44

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E-04	mean
Daily exposure (mg/kg-day)	8.6E-04	max

Hazard Quotients

BTAG Low HQ:	9.2E-03	mean
BTAG High HQ:	7.1E-05	mean
BTAG Low HQ:	1.1E-02	max
BTAG High HQ:	8.3E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.049934
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

NOAEL HQ:	1.4E-02	mean
LOAEL HQ:	2.7E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	1.5E-02	max
LOAEL HQ:	3.1E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Copper
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	11.43233
Maximum detected value (mg/kg, dry weight):	13.60544

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.6E-02	mean
Daily exposure (mg/kg-day)	6.3E-02	max

Hazard Quotients

BTAG Low HQ:	2.4E-02	mean
BTAG High HQ:	1.1E-03	mean
BTAG Low HQ:	2.7E-02	max
BTAG High HQ:	1.2E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Lead
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.969777
Maximum detected value (mg/kg, dry weight):	3.741497

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	53
Maximum detected value (mg/kg, dry weight):	53

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-02	mean
Daily exposure (mg/kg-day)	2.3E-02	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	2.3E-03	mean
BTAG Low HQ:	1.6E+00	max
BTAG High HQ:	2.6E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.127464
Maximum detected value (mg/kg, dry weight):	0.156463

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.24
Maximum detected value (mg/kg, dry weight):	0.24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.6E-04	mean
Daily exposure (mg/kg-day)	5.6E-04	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	2.6E-03	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	3.1E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.812089
Maximum detected value (mg/kg, dry weight):	3.401361

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	8.4
Maximum detected value (mg/kg, dry weight):	8.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG Low HQ:	7.8E-03	mean
BTAG High HQ:	1.9E-04	mean
BTAG Low HQ:	9.2E-03	max
BTAG High HQ:	2.3E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Selenium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.445466
Maximum detected value (mg/kg, dry weight):	1.851852

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.9E-03	mean
Daily exposure (mg/kg-day)	6.2E-03	max

Hazard Quotients

BTAG Low HQ:	2.1E-02	mean
BTAG High HQ:	5.3E-03	mean
BTAG Low HQ:	2.7E-02	max
BTAG High HQ:	6.7E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.0092
Maximum detected value (mg/kg, dry weight):	117.284

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	190

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-01	mean
Daily exposure (mg/kg-day)	4.2E-01	max

Hazard Quotients

BTAG Low HQ:	2.4E-02	mean
BTAG High HQ:	2.4E-03	mean
BTAG Low HQ:	2.4E-02	max
BTAG High HQ:	2.4E-03	max

Tier I - Summary of Hazard Quotients

Receptor: Brown Pelican
Location: NA20

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.5E-01	--	--	--	2.5E-01	--	--	--	--	--	--
LOAEL HQ:	1.5E-02	--	--	--	4.9E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.1E-01	1.8E-02	2.7E-01	#VALUE!	4.8E-01	**2.4E+01**	2.8E-01	1.8E-01	5.2E-01	5.5E-01
BTAG High HQ:	#VALUE!	7.8E-03	2.8E-04	6.9E-02	#VALUE!	2.1E-02	3.8E-02	6.0E-02	4.3E-03	1.3E-01	5.5E-02
MAXIMUM											
NOAEL HQ:	1.7E-01	--	--	--	2.9E-01	--	--	--	--	--	--
LOAEL HQ:	1.7E-02	--	--	--	5.8E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.4E-01	2.0E-02	3.2E-01	#VALUE!	5.5E-01	**2.8E+01**	3.4E-01	2.1E-01	6.6E-01	5.7E-01
BTAG High HQ:	#VALUE!	9.9E-03	3.1E-04	8.1E-02	#VALUE!	2.4E-02	4.5E-02	7.3E-02	5.1E-03	1.6E-01	5.7E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Benzo[a]pyrene
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.249671
Maximum detected value (mg/kg, dry weight):	0.283951

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.39
Maximum detected value (mg/kg, dry weight):	0.39

BAP				
46	16.2	100	0.162	
23	13.6	100	0.136	
35	14.7	100	0.147	
43	15.8	100	0.158	
43	15.8	100	0.158	
38			**0.1522**	249.6715
283.9506				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-02	mean
Daily exposure (mg/kg-day)	2.4E-02	max

Hazard Quotients

NOAEL HQ:	1.5E-01	mean
LOAEL HQ:	1.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.7E-01	max
LOAEL HQ:	1.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total PCB Congeners
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

PCB Cong	Total Solids			
24.5	16.2	100	0.162	
16.9	13.6	100	0.136	
13.2	14.7	100	0.147	
13.2	15.8	100	0.158	
21.6	15.8	100	0.158	
17.88			**0.1522**	**117.477**
151.2346				

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.117477
Maximum detected value (mg/kg, dry weight):	0.151235

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.8E-03	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG Low HQ:	1.1E-01	mean
BTAG High HQ:	7.8E-03	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	9.9E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Tributyltin
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.155059
Maximum detected value (mg/kg, dry weight):	0.170886

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.4E-02	max

Hazard Quotients

BTAG Low HQ:	1.8E-02	mean
BTAG High HQ:	2.8E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	3.1E-04	max

TBT	Total Solids			
22	16.2	100	0.162	
26	13.6	100	0.136	
27	14.7	100	0.147	
27	15.8	100	0.158	
16	15.8	100	0.158	
23.6			**0.1522**	**155.0591**
170.8861				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Arsenic
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.52825
Maximum detected value (mg/kg, dry weight):	21.76871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	6.6
Maximum detected value (mg/kg, dry weight):	6.6

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E+00	mean
Daily exposure (mg/kg-day)	1.8E+00	max

Hazard Quotients

BTAG Low HQ:	2.7E-01	mean
BTAG High HQ:	6.9E-02	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	8.1E-02	max

Arsenic	Total Solids			
3	16.2	100	0.162	
2.2	13.6	100	0.136	
3.2	14.7	100	0.147	
3.2	15.8	100	0.158	
2.5	15.8	100	0.158	
2.82			**0.1522**	**18.52825**
21.76871				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Cadmium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.198423
Maximum detected value (mg/kg, dry weight):	0.238095

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.44
Maximum detected value (mg/kg, dry weight):	0.44

Cadmium	Total Solids			
0.029	16.2	100	0.162	
0.023	13.6	100	0.136	
0.035	14.7	100	0.147	
0.035	15.8	100	0.158	
0.029	15.8	100	0.158	
0.0302			**0.1522**	**0.198423**
0.238095				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	1.6E-03	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	1.9E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Chromium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.049934
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.5E-01	max

Hazard Quotients

NOAEL HQ:	2.5E-01	mean
LOAEL HQ:	4.9E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.9E-01	max
LOAEL HQ:	5.8E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Chromium	Total Solids			
0.25	16.2	100	0.162	
0.27	13.6	100	0.136	
0.37	14.7	100	0.147	
0.37	15.8	100	0.158	
0.3	15.8	100	0.158	
0.312			**0.1522**	**2.049934**
2.517007				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Copper
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	11.43233
Maximum detected value (mg/kg, dry weight):	13.60544

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.3E+00	max

Hazard Quotients

BTAG Low HQ:	4.8E-01	mean
BTAG High HQ:	2.1E-02	mean
BTAG Low HQ:	5.5E-01	max
BTAG High HQ:	2.4E-02	max

Copper	Total Solids			
1.7	16.2	100	0.162	
1.6	13.6	100	0.136	
2	14.7	100	0.147	
2	15.8	100	0.158	
1.4	15.8	100	0.158	
1.74			**0.1522**	**11.43233**
13.60544				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Lead
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.969777
Maximum detected value (mg/kg, dry weight):	3.741497

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	53
Maximum detected value (mg/kg, dry weight):	53

Lead	Total Solids		
0.41	16.2	100	0.162
0.38	13.6	100	0.136
0.55	14.7	100	0.147
0.55	15.8	100	0.158
0.37	15.8	100	0.158
0.452			**0.1522**
3.741497			

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-01	mean
Daily exposure (mg/kg-day)	4.0E-01	max

Hazard Quotients

BTAG Low HQ:	2.4E+01	mean
BTAG High HQ:	3.8E-02	mean
BTAG Low HQ:	2.8E+01	max
BTAG High HQ:	4.5E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total Mercury
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.127464
Maximum detected value (mg/kg, dry weight):	0.156463

Mercury	Total Solids		
0.017	16.2	100	0.162
0.017	13.6	100	0.136
0.023	14.7	100	0.147
0.023	15.8	100	0.158
0.017	15.8	100	0.158
0.0194			**0.1522**
0.156463			

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.24
Maximum detected value (mg/kg, dry weight):	0.24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG HQ:	2.8E-01	mean
BTAG HQ:	6.0E-02	mean
BTAG Low HQ:	3.4E-01	max
BTAG High HQ:	7.3E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Nickel
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.812089
Maximum detected value (mg/kg, dry weight):	3.401361

Nickel	Total Solids			
0.42	16.2	100	0.162	
0.34	13.6	100	0.136	
0.5	14.7	100	0.147	
0.5	15.8	100	0.158	
0.38	15.8	100	0.158	
0.428			**0.1522**	**2.812089**
3.401361				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	8.4
Maximum detected value (mg/kg, dry weight):	8.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	2.9E-01	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	4.3E-03	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	5.1E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Selenium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.445466
Maximum detected value (mg/kg, dry weight):	1.851852

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.5E-01	max

Hazard Quotients

BTAG Low HQ:	5.2E-01	mean
BTAG High HQ:	1.3E-01	mean
BTAG Low HQ:	6.6E-01	max
BTAG High HQ:	1.6E-01	max

Selenium	Total Solids			
0.3	16.2	100	0.162	
0.2	13.6	100	0.136	
0.2	14.7	100	0.147	
0.2	15.8	100	0.158	
0.2	15.8	100	0.158	
0.22			**0.1522**	**1.445466**
1.851852				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.0092
Maximum detected value (mg/kg, dry weight):	117.284

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	190

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.5E+00	mean
Daily exposure (mg/kg-day)	9.8E+00	max

Hazard Quotients

BTAG Low HQ:	5.5E-01	mean
BTAG High HQ:	5.5E-02	mean
BTAG Low HQ:	5.7E-01	max
BTAG High HQ:	5.7E-02	max

Zinc	Total Solids			
19	16.2	100	0.162	
15	13.6	100	0.136	
18	14.7	100	0.147	
18	15.8	100	0.158	
16	15.8	100	0.158	
17.2			**0.1522**	**113.0092**
117.284				

Tier I - Summary of Hazard Quotients

Receptor: Western Grebe
Location: NA20

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.1E-01	--	--	--	2.5E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	5.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.3E-02	1.4E-02	2.0E-01	#VALUE!	4.4E-01	**2.7E+01**	2.1E-01	1.4E-01	3.7E-01	4.2E-01
BTAG High HQ:	#VALUE!	5.9E-03	2.2E-04	4.9E-02	#VALUE!	1.9E-02	4.3E-02	4.5E-02	3.4E-03	9.3E-02	4.2E-02
MAXIMUM											
NOAEL HQ:	1.3E-01	--	--	--	2.8E-01	--	--	--	--	--	--
LOAEL HQ:	1.3E-02	--	--	--	5.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.0E-01	1.5E-02	2.3E-01	#VALUE!	5.0E-01	**3.0E+01**	2.5E-01	1.6E-01	4.8E-01	4.3E-01
BTAG High HQ:	#VALUE!	7.4E-03	2.4E-04	5.7E-02	#VALUE!	2.2E-02	4.8E-02	5.5E-02	4.0E-03	1.2E-01	4.3E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.249671
Maximum detected value (mg/kg, dry weight):	0.283951

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.39
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

NOAEL HQ:	1.1E-01	mean
LOAEL HQ:	1.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.3E-01	max
LOAEL HQ:	1.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.117477
Maximum detected value (mg/kg, dry weight):	0.151235

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.5E-03	mean
Daily exposure (mg/kg-day)	9.4E-03	max

Hazard Quotients

BTAG Low HQ:	8.3E-02	mean
BTAG High HQ:	5.9E-03	mean
BTAG Low HQ:	1.0E-01	max
BTAG High HQ:	7.4E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.155059
Maximum detected value (mg/kg, dry weight):	0.170886

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.9E-03	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	1.4E-02	mean
BTAG High HQ:	2.2E-04	mean
BTAG Low HQ:	1.5E-02	max
BTAG High HQ:	2.4E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	18.52825
Maximum detected value (mg/kg, dry weight):	21.76871

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	6.6
Maximum detected value (mg/kg, dry weight):	6.6

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.3E+00	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	4.9E-02	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	5.7E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.198423
Maximum detected value (mg/kg, dry weight):	0.238095

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.44
Maximum detected value (mg/kg, dry weight):	0.44

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	1.2E-03	mean
BTAG Low HQ:	1.9E-01	max
BTAG High HQ:	1.5E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.049934
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-01	mean
Daily exposure (mg/kg-day)	2.4E-01	max

Hazard Quotients

NOAEL HQ:	2.5E-01	mean
LOAEL HQ:	5.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.8E-01	max
LOAEL HQ:	5.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	11.43233
Maximum detected value (mg/kg, dry weight):	13.60544

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E+00	mean
Daily exposure (mg/kg-day)	1.1E+00	max

Hazard Quotients

BTAG Low HQ:	4.4E-01	mean
BTAG High HQ:	1.9E-02	mean
BTAG Low HQ:	5.0E-01	max
BTAG High HQ:	2.2E-02	max

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Lead
Location:	NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.969777
Maximum detected value (mg/kg, dry weight):	3.741497

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	53
Maximum detected value (mg/kg, dry weight):	53

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-01	mean
Daily exposure (mg/kg-day)	4.2E-01	max

Hazard Quotients

BTAG Low HQ:	2.7E+01	mean
BTAG High HQ:	4.3E-02	mean
BTAG Low HQ:	3.0E+01	max
BTAG High HQ:	4.8E-02	max

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Total Mercury
Location:	NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.127464
Maximum detected value (mg/kg, dry weight):	0.156463

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.24
Maximum detected value (mg/kg, dry weight):	0.24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.2E-03	mean
Daily exposure (mg/kg-day)	9.8E-03	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	4.5E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	5.5E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.812089
Maximum detected value (mg/kg, dry weight):	3.401361

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	8.4
Maximum detected value (mg/kg, dry weight):	8.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.4E-03	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	4.0E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.445466
Maximum detected value (mg/kg, dry weight):	1.851852

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.6E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

BTAG Low HQ:	3.7E-01	mean
BTAG High HQ:	9.3E-02	mean
BTAG Low HQ:	4.8E-01	max
BTAG High HQ:	1.2E-01	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.155059
Maximum detected value (mg/kg, dry weight):	0.170886

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.28
Maximum detected value (mg/kg, dry weight):	0.28

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.6E-04	mean
Daily exposure (mg/kg-day)	6.1E-04	max

Hazard Quotients

BTAG Low HQ:	7.7E-04	mean
BTAG High HQ:	1.2E-05	mean
BTAG Low HQ:	8.4E-04	max
BTAG High HQ:	1.3E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.198423
Maximum detected value (mg/kg, dry weight):	0.238095

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.44
Maximum detected value (mg/kg, dry weight):	0.44

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E-04	mean
Daily exposure (mg/kg-day)	8.6E-04	max

Hazard Quotients

BTAG Low HQ:	9.2E-03	mean
BTAG High HQ:	7.1E-05	mean
BTAG Low HQ:	1.1E-02	max
BTAG High HQ:	8.3E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.049934
Maximum detected value (mg/kg, dry weight):	2.517007

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

NOAEL HQ:	1.4E-02	mean
LOAEL HQ:	2.7E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	1.5E-02	max
LOAEL HQ:	3.1E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.249671
Maximum detected value (mg/kg, dry weight):	0.283951

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.39
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

NOAEL HQ:	1.1E-01	mean
LOAEL HQ:	1.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.3E-01	max
LOAEL HQ:	1.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.117477
Maximum detected value (mg/kg, dry weight):	0.151235

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.5E-03	mean
Daily exposure (mg/kg-day)	9.4E-03	max

Hazard Quotients

BTAG Low HQ:	8.3E-02	mean
BTAG High HQ:	5.9E-03	mean
BTAG Low HQ:	1.0E-01	max
BTAG High HQ:	7.4E-03	max

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Selenium
Location:	NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.445466
Maximum detected value (mg/kg, dry weight):	1.851852

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.6E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

BTAG Low HQ:	3.7E-01	mean
BTAG High HQ:	9.3E-02	mean
BTAG Low HQ:	4.8E-01	max
BTAG High HQ:	1.2E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.0092
Maximum detected value (mg/kg, dry weight):	117.284

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	190

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E+00	mean
Daily exposure (mg/kg-day)	7.4E+00	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	4.2E-02	mean
BTAG Low HQ:	4.3E-01	max
BTAG High HQ:	4.3E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: NA20

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	113.0092
Maximum detected value (mg/kg, dry weight):	117.284

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	190

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E+00	mean
Daily exposure (mg/kg-day)	7.4E+00	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	4.2E-02	mean
BTAG Low HQ:	4.3E-01	max
BTAG High HQ:	4.3E-02	max

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Tier I - Summary of Hazard Quotients

Receptor: **Surf Scoter**
Location: **SW04**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	5.0E-01	--	--	--	4.5E-01	--	--	--	--	--	--
LOAEL HQ:	5.0E-02	--	--	--	9.1E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.2E-01	1.8E-01	3.0E-01	#VALUE!	**3.5E+00**	**1.5E+02**	3.0E-01	1.7E-01	4.1E-01	**1.5E+00**
BTAG High HQ:	#VALUE!	1.5E-02	2.9E-03	7.5E-02	#VALUE!	1.5E-01	2.4E-01	6.4E-02	4.1E-03	1.0E-01	1.5E-01
MAXIMUM											
NOAEL HQ:	5.7E-01	--	--	--	5.8E-01	--	--	--	--	--	--
LOAEL HQ:	5.7E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.2E-01	4.1E-01	3.2E-01	#VALUE!	**4.0E+00**	**1.6E+02**	3.3E-01	2.3E-01	5.2E-01	**1.9E+00**
BTAG High HQ:	#VALUE!	1.6E-02	6.5E-03	8.0E-02	#VALUE!	1.8E-01	2.6E-01	7.1E-02	5.6E-03	1.3E-01	1.9E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.172507
Maximum detected value (mg/kg, dry weight):	1.342282

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.0E-02	mean
Daily exposure (mg/kg-day)	8.0E-02	max

Hazard Quotients

NOAEL HQ:	5.0E-01	mean
LOAEL HQ:	5.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	5.7E-01	max
LOAEL HQ:	5.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	1.5E-02	mean
BTAG Low HQ:	2.2E-01	max
BTAG High HQ:	1.6E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.230458
Maximum detected value (mg/kg, dry weight):	5.211268

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.8
Maximum detected value (mg/kg, dry weight):	2.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	2.9E-03	mean
BTAG Low HQ:	4.1E-01	max
BTAG High HQ:	6.5E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	24.12399
Maximum detected value (mg/kg, dry weight):	26.0274

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E+00	mean
Daily exposure (mg/kg-day)	1.8E+00	max

Hazard Quotients

BTAG Low HQ:	3.0E-01	mean
BTAG High HQ:	7.5E-02	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	8.0E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.260108
Maximum detected value (mg/kg, dry weight):	0.387324

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-02	mean
Daily exposure (mg/kg-day)	2.9E-02	max

Hazard Quotients

BTAG Low HQ:	2.8E-01	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	3.7E-01	max
BTAG High HQ:	2.8E-03	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Chromium
Location:	SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	3.207547
Maximum detected value (mg/kg, dry weight):	5.205479

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	65
Maximum detected value (mg/kg, dry weight):	65

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-01	mean
Daily exposure (mg/kg-day)	5.0E-01	max

Hazard Quotients

NOAEL HQ:	4.5E-01	mean
LOAEL HQ:	9.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.8E-01	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	32.61456
Maximum detected value (mg/kg, dry weight):	55.47945

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1900
Maximum detected value (mg/kg, dry weight):	1900

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.0E+00	mean
Daily exposure (mg/kg-day)	9.3E+00	max

Hazard Quotients

BTAG Low HQ:	3.5E+00	mean
BTAG High HQ:	1.5E-01	mean
BTAG Low HQ:	4.0E+00	max
BTAG High HQ:	1.8E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	9.02965
Maximum detected value (mg/kg, dry weight):	13.0137

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	480
Maximum detected value (mg/kg, dry weight):	480

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E+00	mean
Daily exposure (mg/kg-day)	2.3E+00	max

Hazard Quotients

BTAG Low HQ:	1.5E+02	mean
BTAG High HQ:	2.4E-01	mean
BTAG Low HQ:	1.6E+02	max
BTAG High HQ:	2.6E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.136119
Maximum detected value (mg/kg, dry weight):	0.157534

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG HQ:	3.0E-01	mean
BTAG HQ:	6.4E-02	mean
BTAG Low HQ:	3.3E-01	max
BTAG High HQ:	7.1E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.978437
Maximum detected value (mg/kg, dry weight):	4.43662

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	20

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-01	mean
Daily exposure (mg/kg-day)	3.1E-01	max

Hazard Quotients

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	4.1E-03	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	5.6E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617251
Maximum detected value (mg/kg, dry weight):	2.054795

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.4E-02	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients

BTAG Low HQ:	4.1E-01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	5.2E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	194.0701
Maximum detected value (mg/kg, dry weight):	315.0685

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4600
Maximum detected value (mg/kg, dry weight):	4600

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E+01	mean
Daily exposure (mg/kg-day)	3.3E+01	max

Hazard Quotients

BTAG Low HQ:	1.5E+00	mean
BTAG High HQ:	1.5E-01	mean
BTAG Low HQ:	1.9E+00	max
BTAG High HQ:	1.9E-01	max

Tier I - Summary of Hazard Quotients

Receptor: **Sea Lion**
Location: **SW04**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	3.5E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.7E-03	--	--	--	--	--	--
BTAG Low HQ:	2.0E-02	1.6E-02	2.0E-01	**1.9E+00**	#VALUE!	7.6E-01	5.3E-01	1.4E-01	6.0E-01	7.3E-01	7.7E-01
BTAG High HQ:	8.2E-04	4.6E-03	3.4E-03	1.3E-01	#VALUE!	3.2E-03	2.2E-03	1.4E-02	2.5E-03	3.0E-02	1.8E-02
MAXIMUM											
NOAEL HQ:	--	--	--	--	4.8E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	2.3E-03	--	--	--	--	--	--
BTAG Low HQ:	2.3E-02	1.7E-02	4.7E-01	**2.0E+00**	#VALUE!	9.4E-01	6.1E-01	1.6E-01	8.4E-01	9.2E-01	**1.0E+00**
BTAG High HQ:	9.3E-04	4.7E-03	7.8E-03	1.4E-01	#VALUE!	4.0E-03	2.6E-03	1.6E-02	3.5E-03	3.8E-02	2.5E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Benzo[a]pyrene
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.172507
Maximum detected value (mg/kg, dry weight):	1.342282

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-02	mean
Daily exposure (mg/kg-day)	3.1E-02	max

Hazard Quotients

BTAG Low HQ:	2.0E-02	mean
BTAG High HQ:	8.2E-04	mean
BTAG Low HQ:	2.3E-02	max
BTAG High HQ:	9.3E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.8E-03	mean
Daily exposure (mg/kg-day)	6.0E-03	max

Hazard Quotients

BTAG Low HQ:	1.6E-02	mean
BTAG High HQ:	4.6E-03	mean
BTAG Low HQ:	1.7E-02	max
BTAG High HQ:	4.7E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Tributyltin
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.230458
Maximum detected value (mg/kg, dry weight):	5.211268

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.8
Maximum detected value (mg/kg, dry weight):	2.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.1E-02	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	3.4E-03	mean
BTAG Low HQ:	4.7E-01	max
BTAG High HQ:	7.8E-03	max

Hazard Quotient Calculation

Receptor:	Sea Lion
Chemical:	Arsenic
Location:	SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	24.12399
Maximum detected value (mg/kg, dry weight):	26.0274

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.0E-01	mean
Daily exposure (mg/kg-day)	6.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.9E+00	mean
BTAG High HQ:	1.3E-01	mean
BTAG Low HQ:	2.0E+00	max
BTAG High HQ:	1.4E-01	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.260108
Maximum detected value (mg/kg, dry weight):	0.387324

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.4E-03	mean
Daily exposure (mg/kg-day)	1.0E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	3.8E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Chromium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	3.207547
Maximum detected value (mg/kg, dry weight):	5.205479

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	65
Maximum detected value (mg/kg, dry weight):	65

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients

NOAEL HQ:	3.5E-02	mean
LOAEL HQ:	1.7E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	4.8E-02	max
LOAEL HQ:	2.3E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	32.61456
Maximum detected value (mg/kg, dry weight):	55.47945

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1900
Maximum detected value (mg/kg, dry weight):	1900

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E+00	mean
Daily exposure (mg/kg-day)	2.5E+00	max

Hazard Quotients

BTAG Low HQ:	7.6E-01	mean
BTAG High HQ:	3.2E-03	mean
BTAG Low HQ:	9.4E-01	max
BTAG High HQ:	4.0E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	9.02965
Maximum detected value (mg/kg, dry weight):	13.0137

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	480
Maximum detected value (mg/kg, dry weight):	480

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

LOAEL (mg/kg-day):	90
BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-01	mean
Daily exposure (mg/kg-day)	6.1E-01	max

Hazard Quotients

BTAG Low HQ:	5.3E-01	mean
BTAG High HQ:	2.2E-03	mean
BTAG Low HQ:	6.1E-01	max
BTAG High HQ:	2.6E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total Mercury
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.136119
Maximum detected value (mg/kg, dry weight):	0.157534

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E-03	mean
Daily exposure (mg/kg-day)	4.3E-03	max

Hazard Quotients

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	1.4E-02	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	1.6E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.978437
Maximum detected value (mg/kg, dry weight):	4.43662

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	20

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.9E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

BTAG Low HQ:	6.0E-01	mean
BTAG High HQ:	2.5E-03	mean
BTAG Low HQ:	8.4E-01	max
BTAG High HQ:	3.5E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617251
Maximum detected value (mg/kg, dry weight):	2.054795

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.6E-02	mean
Daily exposure (mg/kg-day)	4.6E-02	max

Hazard Quotients

BTAG Low HQ:	7.3E-01	mean
BTAG High HQ:	3.0E-02	mean
BTAG Low HQ:	9.2E-01	max
BTAG High HQ:	3.8E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	194.0701
Maximum detected value (mg/kg, dry weight):	315.0685

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4600
Maximum detected value (mg/kg, dry weight):	4600

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.4E+00	mean
Daily exposure (mg/kg-day)	1.0E+01	max

Hazard Quotients

BTAG Low HQ:	7.7E-01	mean
BTAG High HQ:	1.8E-02	mean
BTAG Low HQ:	1.0E+00	max
BTAG High HQ:	2.5E-02	max

Tier I - Summary of Hazard Quotients

Receptor: CA Least Tern
Location: SW04

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	**1.1E+00**	--	--	--	6.9E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-01	--	--	--	1.4E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.4E-01	3.9E-01	5.9E-01	#VALUE!	**4.3E+00**	**1.8E+02**	5.2E-01	3.1E-01	8.8E-01	**2.2E+00**
BTAG High HQ:	#VALUE!	2.4E-02	6.1E-03	1.5E-01	#VALUE!	1.9E-01	2.9E-01	1.1E-01	7.6E-03	2.2E-01	2.2E-01
MAXIMUM											
NOAEL HQ:	**1.2E+00**	--	--	--	9.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.2E-01	--	--	--	1.9E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.5E-01	8.8E-01	6.3E-01	#VALUE!	**5.5E+00**	**2.2E+02**	5.9E-01	4.4E-01	**1.1E+00**	**3.1E+00**
BTAG High HQ:	#VALUE!	2.5E-02	1.4E-02	1.6E-01	#VALUE!	2.4E-01	3.5E-01	1.3E-01	1.1E-02	2.7E-01	3.1E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Benzo[a]pyrene
Location:	SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.172507
Maximum detected value (mg/kg, dry weight):	1.342282

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-01	mean
Daily exposure (mg/kg-day)	1.7E-01	max

Hazard Quotients

NOAEL HQ:	1.1E+00	mean
LOAEL HQ:	1.1E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	1.2E+00	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCB Congeners
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E-02	mean
Daily exposure (mg/kg-day)	3.1E-02	max

Hazard Quotients

BTAG Low HQ:	3.4E-01	mean
BTAG High HQ:	2.4E-02	mean
BTAG Low HQ:	3.5E-01	max
BTAG High HQ:	2.5E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.230458
Maximum detected value (mg/kg, dry weight):	5.211268

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.8
Maximum detected value (mg/kg, dry weight):	2.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-01	mean
Daily exposure (mg/kg-day)	6.5E-01	max

Hazard Quotients

BTAG Low HQ:	3.9E-01	mean
BTAG High HQ:	6.1E-03	mean
BTAG Low HQ:	8.8E-01	max
BTAG High HQ:	1.4E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	24.12399
Maximum detected value (mg/kg, dry weight):	26.0274

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.2E+00	mean
Daily exposure (mg/kg-day)	3.5E+00	max

Hazard Quotients

BTAG Low HQ:	5.9E-01	mean
BTAG High HQ:	1.5E-01	mean
BTAG Low HQ:	6.3E-01	max
BTAG High HQ:	1.6E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.260108
Maximum detected value (mg/kg, dry weight):	0.387324

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-02	mean
Daily exposure (mg/kg-day)	5.5E-02	max

Hazard Quotients

BTAG Low HQ:	4.9E-01	mean
BTAG High HQ:	3.8E-03	mean
BTAG Low HQ:	6.8E-01	max
BTAG High HQ:	5.3E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	3.207547
Maximum detected value (mg/kg, dry weight):	5.205479

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	65
Maximum detected value (mg/kg, dry weight):	65

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.9E-01	mean
Daily exposure (mg/kg-day)	8.3E-01	max

Hazard Quotients

NOAEL HQ:	6.9E-01	mean
LOAEL HQ:	1.4E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	9.7E-01	max
LOAEL HQ:	1.9E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	32.61456
Maximum detected value (mg/kg, dry weight):	55.47945

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1900
Maximum detected value (mg/kg, dry weight):	1900

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.8E+00	mean
Daily exposure (mg/kg-day)	1.3E+01	max

Hazard Quotients

BTAG Low HQ:	4.3E+00	mean
BTAG High HQ:	1.9E-01	mean
BTAG Low HQ:	5.5E+00	max
BTAG High HQ:	2.4E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	9.02965
Maximum detected value (mg/kg, dry weight):	13.0137

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	480
Maximum detected value (mg/kg, dry weight):	480

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E+00	mean
Daily exposure (mg/kg-day)	3.1E+00	max

Hazard Quotients

BTAG Low HQ:	1.8E+02	mean
BTAG High HQ:	2.9E-01	mean
BTAG Low HQ:	2.2E+02	max
BTAG High HQ:	3.5E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.136119
Maximum detected value (mg/kg, dry weight):	0.157534

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-02	mean
Daily exposure (mg/kg-day)	2.3E-02	max

Hazard Quotients

BTAG Low HQ:	5.2E-01	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	5.9E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.978437
Maximum detected value (mg/kg, dry weight):	4.43662

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	20

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-01	mean
Daily exposure (mg/kg-day)	6.0E-01	max

Hazard Quotients

BTAG Low HQ:	3.1E-01	mean
BTAG High HQ:	7.6E-03	mean
BTAG Low HQ:	4.4E-01	max
BTAG High HQ:	1.1E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617251
Maximum detected value (mg/kg, dry weight):	2.054795

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-01	mean
Daily exposure (mg/kg-day)	2.5E-01	max

Hazard Quotients

BTAG Low HQ:	8.8E-01	mean
BTAG High HQ:	2.2E-01	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	2.7E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	194.0701
Maximum detected value (mg/kg, dry weight):	315.0685

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4600
Maximum detected value (mg/kg, dry weight):	4600

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E+01	mean
Daily exposure (mg/kg-day)	5.3E+01	max

Hazard Quotients

BTAG Low HQ:	2.2E+00	mean
BTAG High HQ:	2.2E-01	mean
BTAG Low HQ:	3.1E+00	max
BTAG High HQ:	3.1E-01	max

Tier I - Summary of Hazard Quotients

Receptor: **Green Turtle**
Location: **SW04**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.9E-02	--	--	--	2.7E-02	--	--	--	--	--	--
LOAEL HQ:	2.9E-03	--	--	--	5.4E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.3E-02	1.1E-02	1.8E-02	#VALUE!	2.1E-01	**8.8E+00**	1.7E-02	9.9E-03	2.4E-02	8.9E-02
BTAG High HQ:	#VALUE!	9.1E-04	1.7E-04	4.4E-03	#VALUE!	9.1E-03	1.4E-02	3.8E-03	2.4E-04	5.9E-03	8.9E-03
MAXIMUM											
NOAEL HQ:	3.3E-02	--	--	--	3.5E-02	--	--	--	--	--	--
LOAEL HQ:	3.3E-03	--	--	--	6.9E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.3E-02	2.4E-02	1.9E-02	#VALUE!	2.4E-01	**9.7E+00**	1.9E-02	1.3E-02	3.0E-02	1.1E-01
BTAG High HQ:	#VALUE!	9.3E-04	3.8E-04	4.7E-03	#VALUE!	1.1E-02	1.6E-02	4.2E-03	3.3E-04	7.5E-03	1.1E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Benzo[a]pyrene
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.172507
Maximum detected value (mg/kg, dry weight):	1.342282

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-03	mean
Daily exposure (mg/kg-day)	4.7E-03	max

Hazard Quotients

NOAEL HQ:	2.9E-02	mean
LOAEL HQ:	2.9E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.3E-02	max
LOAEL HQ:	3.3E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-03	mean
Daily exposure (mg/kg-day)	1.2E-03	max

Hazard Quotients

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	9.1E-04	mean
BTAG Low HQ:	1.3E-02	max
BTAG High HQ:	9.3E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.230458
Maximum detected value (mg/kg, dry weight):	5.211268

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.8
Maximum detected value (mg/kg, dry weight):	2.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.8E-03	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	1.7E-04	mean
BTAG Low HQ:	2.4E-02	max
BTAG High HQ:	3.8E-04	max

Hazard Quotient Calculation

Receptor:	Green Turtle
Chemical:	Arsenic
Location:	SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	24.12399
Maximum detected value (mg/kg, dry weight):	26.0274

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.8E-02	mean
Daily exposure (mg/kg-day)	1.0E-01	max

Hazard Quotients

BTAG Low HQ:	1.8E-02	mean
BTAG High HQ:	4.4E-03	mean
BTAG Low HQ:	1.9E-02	max
BTAG High HQ:	4.7E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.260108
Maximum detected value (mg/kg, dry weight):	0.387324

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-03	mean
Daily exposure (mg/kg-day)	1.7E-03	max

Hazard Quotients

BTAG Low HQ:	1.6E-02	mean
BTAG High HQ:	1.3E-04	mean
BTAG Low HQ:	2.2E-02	max
BTAG High HQ:	1.7E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	3.207547
Maximum detected value (mg/kg, dry weight):	5.205479

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	65
Maximum detected value (mg/kg, dry weight):	65

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-02	mean
Daily exposure (mg/kg-day)	3.0E-02	max

Hazard Quotients

NOAEL HQ:	2.7E-02	mean
LOAEL HQ:	5.4E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	3.5E-02	max
LOAEL HQ:	6.9E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor:	Green Turtle
Chemical:	Copper
Location:	SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	32.61456
Maximum detected value (mg/kg, dry weight):	55.47945

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1900
Maximum detected value (mg/kg, dry weight):	1900

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.8E-01	mean
Daily exposure (mg/kg-day)	5.5E-01	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	9.1E-03	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	1.1E-02	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Lead
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	9.02965
Maximum detected value (mg/kg, dry weight):	13.0137

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	480
Maximum detected value (mg/kg, dry weight):	480

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients

BTAG Low HQ:	8.8E+00	mean
BTAG High HQ:	1.4E-02	mean
BTAG Low HQ:	9.7E+00	max
BTAG High HQ:	1.6E-02	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.136119
Maximum detected value (mg/kg, dry weight):	0.157534

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-04	mean
Daily exposure (mg/kg-day)	7.5E-04	max

Hazard Quotients

BTAG Low HQ:	1.7E-02	mean
BTAG High HQ:	3.8E-03	mean
BTAG Low HQ:	1.9E-02	max
BTAG High HQ:	4.2E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.978437
Maximum detected value (mg/kg, dry weight):	4.43662

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	20

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

BTAG Low HQ:	9.9E-03	mean
BTAG High HQ:	2.4E-04	mean
BTAG Low HQ:	1.3E-02	max
BTAG High HQ:	3.3E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Selenium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617251
Maximum detected value (mg/kg, dry weight):	2.054795

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-03	mean
Daily exposure (mg/kg-day)	6.9E-03	max

Hazard Quotients

BTAG Low HQ:	2.4E-02	mean
BTAG High HQ:	5.9E-03	mean
BTAG Low HQ:	3.0E-02	max
BTAG High HQ:	7.5E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	194.0701
Maximum detected value (mg/kg, dry weight):	315.0685

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4600
Maximum detected value (mg/kg, dry weight):	4600

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E+00	mean
Daily exposure (mg/kg-day)	1.9E+00	max

Hazard Quotients

BTAG Low HQ:	8.9E-02	mean
BTAG High HQ:	8.9E-03	mean
BTAG Low HQ:	1.1E-01	max
BTAG High HQ:	1.1E-02	max

Tier I - Summary of Hazard Quotients

Receptor: **Brown Pelican**
Location: **SW04**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	7.0E-01	--	--	--	4.3E-01	--	--	--	--	--	--
LOAEL HQ:	7.0E-02	--	--	--	8.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.1E-01	2.5E-01	3.9E-01	#VALUE!	**2.6E+00**	**1.1E+02**	3.4E-01	2.0E-01	5.8E-01	**1.4E+00**
BTAG High HQ:	#VALUE!	1.5E-02	4.0E-03	9.6E-02	#VALUE!	1.1E-01	1.8E-01	7.3E-02	4.9E-03	1.4E-01	1.4E-01
MAXIMUM											
NOAEL HQ:	7.9E-01	--	--	--	6.2E-01	--	--	--	--	--	--
LOAEL HQ:	7.9E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.2E-01	5.8E-01	4.1E-01	#VALUE!	**3.4E+00**	**1.4E+02**	3.8E-01	2.9E-01	7.3E-01	**2.0E+00**
BTAG High HQ:	#VALUE!	1.6E-02	9.3E-03	1.0E-01	#VALUE!	1.5E-01	2.2E-01	8.2E-02	7.0E-03	1.8E-01	2.0E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Benzo[a]pyrene
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.172507
Maximum detected value (mg/kg, dry weight):	1.342282

BAP				
170	14.6	100	0.146	
170	14.2	100	0.142	
150	15.2	100	0.152	
180	15.3	100	0.153	
200	14.9	100	0.149	
174			**0.1484**	1172.507
1342.282				

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.7E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

NOAEL HQ:	7.0E-01	mean
LOAEL HQ:	7.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	7.9E-01	max
LOAEL HQ:	7.9E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total PCB Congeners
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3
Maximum detected value (mg/kg, dry weight):	3

PCB Cong	Total Solids			
195	14.6	100	0.155	
161	14.2	100	0.148	
15	15.2	100	0.131	
136	15.3	100	0.155	
196	14.9	100	0.147	
25.38			0.1472	**172.4185**
181.2903				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	1.5E-02	mean
BTAG Low HQ:	2.2E-01	max
BTAG High HQ:	1.6E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Tributyltin
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)	
Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)	
Mean detected value (mg/kg, dry weight):	2.230458
Maximum detected value (mg/kg, dry weight):	5.211268

TBT	Total Solids			
330	14.6	100	0.146	
740	14.2	100	0.142	
420	15.2	100	0.152	
150	15.3	100	0.153	
15	14.9	100	0.149	
331			**0.1484**	**2230.458**
5211.268				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)	
Mean detected value (mg/kg, dry weight):	2.8
Maximum detected value (mg/kg, dry weight):	2.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)	
BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors		
Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	4.3E-01	max

Hazard Quotients		
BTAG Low HQ:	2.5E-01	mean
BTAG High HQ:	4.0E-03	mean
BTAG Low HQ:	5.8E-01	max
BTAG High HQ:	9.3E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Arsenic
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	24.12399
Maximum detected value (mg/kg, dry weight):	26.0274

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E+00	mean
Daily exposure (mg/kg-day)	2.3E+00	max

Hazard Quotients

BTAG Low HQ:	3.9E-01	mean
BTAG High HQ:	9.6E-02	mean
BTAG Low HQ:	4.1E-01	max
BTAG High HQ:	1.0E-01	max

Arsenic	Total Solids			
3.8	14.6	100	0.146	
3.8	14.2	100	0.142	
3.1	15.2	100	0.152	
3.6	15.3	100	0.153	
3.6	14.9	100	0.149	
3.58			**0.1484**	**24.12399**
26.0274				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Cadmium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.260108
Maximum detected value (mg/kg, dry weight):	0.387324

Cadmium	Total Solids			
0.043	14.6	100	0.146	
0.055	14.2	100	0.142	
0.037	15.2	100	0.152	
0.031	15.3	100	0.153	
0.027	14.9	100	0.149	
0.0386			**0.1484**	**0.260108**
0.387324				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-02	mean
Daily exposure (mg/kg-day)	3.6E-02	max

Hazard Quotients

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	2.4E-03	mean
BTAG Low HQ:	4.4E-01	max
BTAG High HQ:	3.4E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Chromium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	3.207547
Maximum detected value (mg/kg, dry weight):	5.205479

Chromium	Total Solids		
0.76	14.6	100	0.146
0.49	14.2	100	0.142
0.53	15.2	100	0.152
0.18	15.3	100	0.153
0.42	14.9	100	0.149
0.476			**0.1484**
5.205479			

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	65
Maximum detected value (mg/kg, dry weight):	65

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-01	mean
Daily exposure (mg/kg-day)	5.4E-01	max

Hazard Quotients

NOAEL HQ:	4.3E-01	mean
LOAEL HQ:	8.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	6.2E-01	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Copper
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	32.61456
Maximum detected value (mg/kg, dry weight):	55.47945

Copper	Total Solids			
8.1	14.6	100	0.146	
5	14.2	100	0.142	
4	15.2	100	0.152	
2.5	15.3	100	0.153	
4.6	14.9	100	0.149	
4.84			**0.1484**	**32.61456**
55.47945				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1900
Maximum detected value (mg/kg, dry weight):	1900

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.0E+00	mean
Daily exposure (mg/kg-day)	7.8E+00	max

Hazard Quotients

BTAG Low HQ:	2.6E+00	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	3.4E+00	max
BTAG High HQ:	1.5E-01	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Lead
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	9.02965
Maximum detected value (mg/kg, dry weight):	13.0137

Lead	Total Solids			
1.9	14.6	100	0.146	
1.7	14.2	100	0.142	
1.3	15.2	100	0.152	
0.7	15.3	100	0.153	
1.1	14.9	100	0.149	
1.34			**0.1484**	**9.02965**
13.0137				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	480
Maximum detected value (mg/kg, dry weight):	480

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E+00	mean
Daily exposure (mg/kg-day)	1.9E+00	max

Hazard Quotients

BTAG Low HQ:	1.1E+02	mean
BTAG High HQ:	1.8E-01	mean
BTAG Low HQ:	1.4E+02	max
BTAG High HQ:	2.2E-01	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total Mercury
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.136119
Maximum detected value (mg/kg, dry weight):	0.157534

Mercury	Total Solids		
0.023	14.6	100	0.146
0.021	14.2	100	0.142
0.022	15.2	100	0.152
0.016	15.3	100	0.153
0.019	14.9	100	0.149
0.0202			**0.1484**
0.157534			

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

BTAG Low HQ:	3.4E-01	mean
BTAG High HQ:	7.3E-02	mean
BTAG Low HQ:	3.8E-01	max
BTAG High HQ:	8.2E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Nickel
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.978437
Maximum detected value (mg/kg, dry weight):	4.43662

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	20

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-01	mean
Daily exposure (mg/kg-day)	3.9E-01	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	4.9E-03	mean
BTAG Low HQ:	2.9E-01	max
BTAG High HQ:	7.0E-03	max

Nickel	Total Solids			
0.48	14.6	100	0.146	
0.63	14.2	100	0.142	
0.35	15.2	100	0.152	
0.37	15.3	100	0.153	
0.38	14.9	100	0.149	
0.442			**0.1484**	**2.978437**
4.43662				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Selenium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617251
Maximum detected value (mg/kg, dry weight):	2.054795

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	1.7E-01	max

Hazard Quotients

BTAG Low HQ:	5.8E-01	mean
BTAG High HQ:	1.4E-01	mean
BTAG Low HQ:	7.3E-01	max
BTAG High HQ:	1.8E-01	max

Selenium	Total Solids			
0.3	14.6	100	0.146	
0.2	14.2	100	0.142	
0.2	15.2	100	0.152	
0.2	15.3	100	0.153	
0.3	14.9	100	0.149	
0.24			**0.1484**	**1.617251**
2.054795				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	194.0701
Maximum detected value (mg/kg, dry weight):	315.0685

Zinc	Total Solids			
46	14.6	100	0.146	
31	14.2	100	0.142	
27	15.2	100	0.152	
19	15.3	100	0.153	
21	14.9	100	0.149	
28.8			**0.1484**	**194.0701**
315.0685				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4600
Maximum detected value (mg/kg, dry weight):	4600

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E+01	mean
Daily exposure (mg/kg-day)	3.4E+01	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	1.4E-01	mean
BTAG Low HQ:	2.0E+00	max
BTAG High HQ:	2.0E-01	max

Tier I - Summary of Hazard Quotients

Receptor: Western Grebe
Location: SW04

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	5.2E-01	--	--	--	5.0E-01	--	--	--	--	--	--
LOAEL HQ:	5.2E-02	--	--	--	1.0E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.4E-01	1.9E-01	3.2E-01	#VALUE!	**4.0E+00**	**1.7E+02**	3.2E-01	1.8E-01	4.2E-01	**1.7E+00**
BTAG High HQ:	#VALUE!	1.7E-02	3.0E-03	7.9E-02	#VALUE!	1.7E-01	2.7E-01	6.9E-02	4.4E-03	1.0E-01	1.7E-01
MAXIMUM											
NOAEL HQ:	5.9E-01	--	--	--	6.3E-01	--	--	--	--	--	--
LOAEL HQ:	5.9E-02	--	--	--	1.3E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.4E-01	4.2E-01	3.4E-01	#VALUE!	**4.5E+00**	**1.8E+02**	3.5E-01	2.4E-01	5.3E-01	**2.1E+00**
BTAG High HQ:	#VALUE!	1.7E-02	6.7E-03	8.4E-02	#VALUE!	2.0E-01	3.0E-01	7.5E-02	5.8E-03	1.3E-01	2.1E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.172507
Maximum detected value (mg/kg, dry weight):	1.342282

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E-02	mean
Daily exposure (mg/kg-day)	8.2E-02	max

Hazard Quotients

NOAEL HQ:	5.2E-01	mean
LOAEL HQ:	5.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.9E-01	max
LOAEL HQ:	5.9E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.172418
Maximum detected value (mg/kg, dry weight):	0.18129

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-02	mean
Daily exposure (mg/kg-day)	2.2E-02	max

Hazard Quotients

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	1.7E-02	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	1.7E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.230458
Maximum detected value (mg/kg, dry weight):	5.211268

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.8
Maximum detected value (mg/kg, dry weight):	2.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-01	mean
Daily exposure (mg/kg-day)	3.1E-01	max

Hazard Quotients

BTAG Low HQ:	1.9E-01	mean
BTAG High HQ:	3.0E-03	mean
BTAG Low HQ:	4.2E-01	max
BTAG High HQ:	6.7E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	24.12399
Maximum detected value (mg/kg, dry weight):	26.0274

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	96
Maximum detected value (mg/kg, dry weight):	96

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E+00	mean
Daily exposure (mg/kg-day)	1.9E+00	max

Hazard Quotients

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	7.9E-02	mean
BTAG Low HQ:	3.4E-01	max
BTAG High HQ:	8.4E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.260108
Maximum detected value (mg/kg, dry weight):	0.387324

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	3.1E-02	max

Hazard Quotients

BTAG Low HQ:	3.0E-01	mean
BTAG High HQ:	2.3E-03	mean
BTAG Low HQ:	3.9E-01	max
BTAG High HQ:	3.0E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	3.207547
Maximum detected value (mg/kg, dry weight):	5.205479

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	65
Maximum detected value (mg/kg, dry weight):	65

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-01	mean
Daily exposure (mg/kg-day)	5.5E-01	max

Hazard Quotients

NOAEL HQ:	5.0E-01	mean
LOAEL HQ:	1.0E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	6.3E-01	max
LOAEL HQ:	1.3E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Copper
Location:	SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	32.61456
Maximum detected value (mg/kg, dry weight):	55.47945

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1900
Maximum detected value (mg/kg, dry weight):	1900

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.1E+00	mean
Daily exposure (mg/kg-day)	1.0E+01	max

Hazard Quotients

BTAG Low HQ:	4.0E+00	mean
BTAG High HQ:	1.7E-01	mean
BTAG Low HQ:	4.5E+00	max
BTAG High HQ:	2.0E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	9.02965
Maximum detected value (mg/kg, dry weight):	13.0137

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	480
Maximum detected value (mg/kg, dry weight):	480

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E+00	mean
Daily exposure (mg/kg-day)	2.6E+00	max

Hazard Quotients

BTAG Low HQ:	1.7E+02	mean
BTAG High HQ:	2.7E-01	mean
BTAG Low HQ:	1.8E+02	max
BTAG High HQ:	3.0E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.136119
Maximum detected value (mg/kg, dry weight):	0.157534

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.4E-02	max

Hazard Quotients

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	6.9E-02	mean
BTAG Low HQ:	3.5E-01	max
BTAG High HQ:	7.5E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.978437
Maximum detected value (mg/kg, dry weight):	4.43662

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	20

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-01	mean
Daily exposure (mg/kg-day)	3.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	4.4E-03	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	5.8E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617251
Maximum detected value (mg/kg, dry weight):	2.054795

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.7E-02	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	5.3E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: SW04

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	194.0701
Maximum detected value (mg/kg, dry weight):	315.0685

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4600
Maximum detected value (mg/kg, dry weight):	4600

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E+01	mean
Daily exposure (mg/kg-day)	3.6E+01	max

Hazard Quotients

BTAG Low HQ:	1.7E+00	mean
BTAG High HQ:	1.7E-01	mean
BTAG Low HQ:	2.1E+00	max
BTAG High HQ:	2.1E-01	max

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Tier I - Summary of Hazard Quotients

Receptor: Surf Scoter
Location: SW08

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	5.3E-01	--	--	--	4.6E-01	--	--	--	--	--	--
LOAEL HQ:	5.3E-02	--	--	--	9.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.9E-01	8.8E-02	2.1E-01	#VALUE!	**2.0E+00**	**8.2E+01**	4.0E-01	1.5E-01	3.9E-01	5.2E-01
BTAG High HQ:	#VALUE!	4.2E-02	1.4E-03	5.3E-02	#VALUE!	8.7E-02	1.3E-01	8.6E-02	3.7E-03	9.6E-02	5.2E-02
MAXIMUM											
NOAEL HQ:	5.5E-01	--	--	--	5.3E-01	--	--	--	--	--	--
LOAEL HQ:	5.5E-02	--	--	--	1.1E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	6.8E-01	1.4E-01	2.1E-01	#VALUE!	**2.2E+00**	**1.0E+02**	4.6E-01	1.7E-01	5.1E-01	5.6E-01
BTAG High HQ:	#VALUE!	4.8E-02	2.3E-03	5.2E-02	#VALUE!	9.6E-02	1.7E-01	1.0E-01	4.2E-03	1.3E-01	5.6E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Benzo[a]pyrene
Location:	SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.16737
Maximum detected value (mg/kg, dry weight):	1.210191

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.5E-02	mean
Daily exposure (mg/kg-day)	7.7E-02	max

Hazard Quotients

NOAEL HQ:	5.3E-01	mean
LOAEL HQ:	5.3E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.5E-01	max
LOAEL HQ:	5.5E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.720816
Maximum detected value (mg/kg, dry weight):	0.859873

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-02	mean
Daily exposure (mg/kg-day)	6.1E-02	max

Hazard Quotients

BTAG Low HQ:	5.9E-01	mean
BTAG High HQ:	4.2E-02	mean
BTAG Low HQ:	6.8E-01	max
BTAG High HQ:	4.8E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.040788
Maximum detected value (mg/kg, dry weight):	1.75

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	1.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.4E-02	mean
Daily exposure (mg/kg-day)	1.0E-01	max

Hazard Quotients

BTAG Low HQ:	8.8E-02	mean
BTAG High HQ:	1.4E-03	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	2.3E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.40928
Maximum detected value (mg/kg, dry weight):	19.10828

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	5.3E-02	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	5.2E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.21519
Maximum detected value (mg/kg, dry weight):	0.235669

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	1.4E-03	mean
BTAG Low HQ:	1.9E-01	max
BTAG High HQ:	1.5E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.559775
Maximum detected value (mg/kg, dry weight):	3.581081

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	78
Maximum detected value (mg/kg, dry weight):	78

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.0E-01	mean
Daily exposure (mg/kg-day)	4.5E-01	max

Hazard Quotients

NOAEL HQ:	4.6E-01	mean
LOAEL HQ:	9.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.3E-01	max
LOAEL HQ:	1.1E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	23.20675
Maximum detected value (mg/kg, dry weight):	31.15942

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1000
Maximum detected value (mg/kg, dry weight):	1000

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.6E+00	mean
Daily exposure (mg/kg-day)	5.0E+00	max

Hazard Quotients

BTAG Low HQ:	2.0E+00	mean
BTAG High HQ:	8.7E-02	mean
BTAG Low HQ:	2.2E+00	max
BTAG High HQ:	9.6E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	5.921238
Maximum detected value (mg/kg, dry weight):	11.66667

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	250

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.5E+00	max

Hazard Quotients

BTAG Low HQ:	8.2E+01	mean
BTAG High HQ:	1.3E-01	mean
BTAG Low HQ:	1.0E+02	max
BTAG High HQ:	1.7E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.130802
Maximum detected value (mg/kg, dry weight):	0.175676

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	2.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

BTAG Low HQ:	4.0E-01	mean
BTAG High HQ:	8.6E-02	mean
BTAG Low HQ:	4.6E-01	max
BTAG High HQ:	1.0E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.362869
Maximum detected value (mg/kg, dry weight):	2.905405

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	23
Maximum detected value (mg/kg, dry weight):	23

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.7E-03	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	4.2E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.547117
Maximum detected value (mg/kg, dry weight):	2.027027

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.0E-02	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients

BTAG Low HQ:	3.9E-01	mean
BTAG High HQ:	9.6E-02	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	111.1111
Maximum detected value (mg/kg, dry weight):	121.0191

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	860
Maximum detected value (mg/kg, dry weight):	860

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.0E+00	mean
Daily exposure (mg/kg-day)	9.6E+00	max

Hazard Quotients

BTAG Low HQ:	5.2E-01	mean
BTAG High HQ:	5.2E-02	mean
BTAG Low HQ:	5.6E-01	max
BTAG High HQ:	5.6E-02	max

Tier I - Summary of Hazard Quotients

Receptor: **Sea Lion**
Location: **SW08**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	3.3E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.6E-03	--	--	--	--	--	--
BTAG Low HQ:	2.1E-02	5.2E-02	9.7E-02	**1.4E+00**	#VALUE!	4.5E-01	3.0E-01	1.7E-01	5.1E-01	6.9E-01	3.2E-01
BTAG High HQ:	8.4E-04	1.5E-02	1.6E-03	9.5E-02	#VALUE!	1.9E-03	1.3E-03	1.7E-02	2.1E-03	2.9E-02	7.4E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	4.0E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.9E-03	--	--	--	--	--	--
BTAG Low HQ:	2.2E-02	6.0E-02	1.6E-01	**1.4E+00**	#VALUE!	5.1E-01	4.3E-01	2.1E-01	6.0E-01	9.1E-01	3.4E-01
BTAG High HQ:	8.7E-04	1.7E-02	2.7E-03	9.3E-02	#VALUE!	2.2E-03	1.8E-03	2.1E-02	2.5E-03	3.7E-02	7.9E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor:	Sea Lion
Chemical:	Benzo[a]pyrene
Location:	SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45	
Food ingestion rate (kg/day dry wt):	0.99	
Sediment ingestion rate (kg/day dry wt):	0.0308	
Area Use Factor (unitless):	1	0.004
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.16737
Maximum detected value (mg/kg, dry weight):	1.210191

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-02	mean
Daily exposure (mg/kg-day)	2.9E-02	max

Hazard Quotients

BTAG Low HQ:	2.1E-02	mean
BTAG High HQ:	8.4E-04	mean
BTAG Low HQ:	2.2E-02	max
BTAG High HQ:	8.7E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.720816
Maximum detected value (mg/kg, dry weight):	0.859873

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.2E-02	max

Hazard Quotients

BTAG Low HQ:	5.2E-02	mean
BTAG High HQ:	1.5E-02	mean
BTAG Low HQ:	6.0E-02	max
BTAG High HQ:	1.7E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Tributyltin
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.040788
Maximum detected value (mg/kg, dry weight):	1.75

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	1.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	4.0E-02	max

Hazard Quotients

BTAG Low HQ:	9.7E-02	mean
BTAG High HQ:	1.6E-03	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	2.7E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Arsenic
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.40928
Maximum detected value (mg/kg, dry weight):	19.10828

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-01	mean
Daily exposure (mg/kg-day)	4.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	9.5E-02	mean
BTAG Low HQ:	1.4E+00	max
BTAG High HQ:	9.3E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.21519
Maximum detected value (mg/kg, dry weight):	0.235669

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E-03	mean
Daily exposure (mg/kg-day)	5.6E-03	max

Hazard Quotients

BTAG Low HQ:	8.7E-02	mean
BTAG High HQ:	2.0E-03	mean
BTAG Low HQ:	9.4E-02	max
BTAG High HQ:	2.1E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Chromium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.559775
Maximum detected value (mg/kg, dry weight):	3.581081

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	78
Maximum detected value (mg/kg, dry weight):	78

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.3E-01	max

Hazard Quotients

NOAEL HQ:	3.3E-02	mean
LOAEL HQ:	1.6E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.0E-02	max
LOAEL HQ:	1.9E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	23.20675
Maximum detected value (mg/kg, dry weight):	31.15942

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1000
Maximum detected value (mg/kg, dry weight):	1000

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients

BTAG Low HQ:	4.5E-01	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	2.2E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	5.921238
Maximum detected value (mg/kg, dry weight):	11.66667

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	250

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E-01	mean
Daily exposure (mg/kg-day)	4.3E-01	max

Hazard Quotients

BTAG Low HQ:	3.0E-01	mean
BTAG High HQ:	1.3E-03	mean
BTAG Low HQ:	4.3E-01	max
BTAG High HQ:	1.8E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total Mercury
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.130802
Maximum detected value (mg/kg, dry weight):	0.175676

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	2.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.6E-03	mean
Daily exposure (mg/kg-day)	5.6E-03	max

Hazard Quotients

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	1.7E-02	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	2.1E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.362869
Maximum detected value (mg/kg, dry weight):	2.905405

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	23
Maximum detected value (mg/kg, dry weight):	23

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	8.0E-02	max

Hazard Quotients

BTAG Low HQ:	5.1E-01	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	6.0E-01	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.547117
Maximum detected value (mg/kg, dry weight):	2.027027

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.5E-02	mean
Daily exposure (mg/kg-day)	4.5E-02	max

Hazard Quotients

BTAG Low HQ:	6.9E-01	mean
BTAG High HQ:	2.9E-02	mean
BTAG Low HQ:	9.1E-01	max
BTAG High HQ:	3.7E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	111.1111
Maximum detected value (mg/kg, dry weight):	121.0191

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	860
Maximum detected value (mg/kg, dry weight):	860

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E+00	mean
Daily exposure (mg/kg-day)	3.3E+00	max

Hazard Quotients

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	7.4E-03	mean
BTAG Low HQ:	3.4E-01	max
BTAG High HQ:	7.9E-03	max

Tier I - Summary of Hazard Quotients

Receptor: CA Least Tern
Location: SW08

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	**1.1E+00**	--	--	--	6.4E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-01	--	--	--	1.3E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.1E+00**	1.8E-01	4.5E-01	#VALUE!	**2.6E+00**	**1.1E+02**	6.1E-01	2.6E-01	8.4E-01	9.4E-01
BTAG High HQ:	#VALUE!	7.9E-02	2.9E-03	1.1E-01	#VALUE!	1.1E-01	1.7E-01	1.3E-01	6.4E-03	2.1E-01	9.4E-02
MAXIMUM											
NOAEL HQ:	**1.1E+00**	--	--	--	7.9E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-01	--	--	--	1.6E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.3E+00**	3.0E-01	4.4E-01	#VALUE!	**3.0E+00**	**1.6E+02**	7.5E-01	3.1E-01	**1.1E+00**	**1.0E+00**
BTAG High HQ:	#VALUE!	9.2E-02	4.8E-03	1.1E-01	#VALUE!	1.3E-01	2.5E-01	1.6E-01	7.6E-03	2.7E-01	1.0E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.16737
Maximum detected value (mg/kg, dry weight):	1.210191

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients

NOAEL HQ:	1.1E+00	mean
LOAEL HQ:	1.1E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.1E+00	max
LOAEL HQ:	1.1E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Total PCB Congeners
Location:	SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.720816
Maximum detected value (mg/kg, dry weight):	0.859873

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-01	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients

BTAG Low HQ:	1.1E+00	mean
BTAG High HQ:	7.9E-02	mean
BTAG Low HQ:	1.3E+00	max
BTAG High HQ:	9.2E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.040788
Maximum detected value (mg/kg, dry weight):	1.75

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	1.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	2.2E-01	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	2.9E-03	mean
BTAG Low HQ:	3.0E-01	max
BTAG High HQ:	4.8E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.40928
Maximum detected value (mg/kg, dry weight):	19.10828

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E+00	mean
Daily exposure (mg/kg-day)	2.4E+00	max

Hazard Quotients

BTAG Low HQ:	4.5E-01	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	4.4E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.21519
Maximum detected value (mg/kg, dry weight):	0.235669

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-02	mean
Daily exposure (mg/kg-day)	3.1E-02	max

Hazard Quotients

BTAG Low HQ:	3.5E-01	mean
BTAG High HQ:	2.7E-03	mean
BTAG Low HQ:	3.9E-01	max
BTAG High HQ:	3.0E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.559775
Maximum detected value (mg/kg, dry weight):	3.581081

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	78
Maximum detected value (mg/kg, dry weight):	78

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-01	mean
Daily exposure (mg/kg-day)	6.8E-01	max

Hazard Quotients

NOAEL HQ:	6.4E-01	mean
LOAEL HQ:	1.3E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	7.9E-01	max
LOAEL HQ:	1.6E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	23.20675
Maximum detected value (mg/kg, dry weight):	31.15942

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1000
Maximum detected value (mg/kg, dry weight):	1000

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.9E+00	mean
Daily exposure (mg/kg-day)	6.9E+00	max

Hazard Quotients

BTAG Low HQ:	2.6E+00	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	3.0E+00	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	5.921238
Maximum detected value (mg/kg, dry weight):	11.66667

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	250

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E+00	mean
Daily exposure (mg/kg-day)	2.2E+00	max

Hazard Quotients

BTAG Low HQ:	1.1E+02	mean
BTAG High HQ:	1.7E-01	mean
BTAG Low HQ:	1.6E+02	max
BTAG High HQ:	2.5E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.130802
Maximum detected value (mg/kg, dry weight):	0.175676

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	2.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	2.9E-02	max

Hazard Quotients

BTAG Low HQ:	6.1E-01	mean
BTAG High HQ:	1.3E-01	mean
BTAG Low HQ:	7.5E-01	max
BTAG High HQ:	1.6E-01	max

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Nickel
Location:	SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.362869
Maximum detected value (mg/kg, dry weight):	2.905405

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	23
Maximum detected value (mg/kg, dry weight):	23

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.6E-01	mean
Daily exposure (mg/kg-day)	4.3E-01	max

Hazard Quotients

BTAG Low HQ:	2.6E-01	mean
BTAG High HQ:	6.4E-03	mean
BTAG Low HQ:	3.1E-01	max
BTAG High HQ:	7.6E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.547117
Maximum detected value (mg/kg, dry weight):	2.027027

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	2.5E-01	max

Hazard Quotients

BTAG Low HQ:	8.4E-01	mean
BTAG High HQ:	2.1E-01	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	2.7E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	111.1111
Maximum detected value (mg/kg, dry weight):	121.0191

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	860
Maximum detected value (mg/kg, dry weight):	860

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E+01	mean
Daily exposure (mg/kg-day)	1.7E+01	max

Hazard Quotients

BTAG Low HQ:	9.4E-01	mean
BTAG High HQ:	9.4E-02	mean
BTAG Low HQ:	1.0E+00	max
BTAG High HQ:	1.0E-01	max

Tier I - Summary of Hazard Quotients

Receptor: **Green Turtle**
Location: **SW08**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.1E-02	--	--	--	2.7E-02	--	--	--	--	--	--
LOAEL HQ:	3.1E-03	--	--	--	5.5E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.5E-02	5.2E-03	1.2E-02	#VALUE!	1.2E-01	**4.9E+00**	2.3E-02	8.9E-03	2.3E-02	3.1E-02
BTAG High HQ:	#VALUE!	2.5E-03	8.2E-05	3.1E-03	#VALUE!	5.2E-03	7.8E-03	5.1E-03	2.2E-04	5.6E-03	3.1E-03
MAXIMUM											
NOAEL HQ:	3.2E-02	--	--	--	3.1E-02	--	--	--	--	--	--
LOAEL HQ:	3.2E-03	--	--	--	6.3E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.0E-02	8.3E-03	1.2E-02	#VALUE!	1.3E-01	**6.2E+00**	2.7E-02	1.0E-02	3.0E-02	3.3E-02
BTAG High HQ:	#VALUE!	2.8E-03	1.3E-04	3.1E-03	#VALUE!	5.7E-03	9.9E-03	5.9E-03	2.5E-04	7.3E-03	3.3E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Benzo[a]pyrene
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.16737
Maximum detected value (mg/kg, dry weight):	1.210191

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-03	mean
Daily exposure (mg/kg-day)	4.5E-03	max

Hazard Quotients

NOAEL HQ:	3.1E-02	mean
LOAEL HQ:	3.1E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.2E-02	max
LOAEL HQ:	3.2E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.720816
Maximum detected value (mg/kg, dry weight):	0.859873

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E-03	mean
Daily exposure (mg/kg-day)	3.6E-03	max

Hazard Quotients

BTAG Low HQ:	3.5E-02	mean
BTAG High HQ:	2.5E-03	mean
BTAG Low HQ:	4.0E-02	max
BTAG High HQ:	2.8E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.040788
Maximum detected value (mg/kg, dry weight):	1.75

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	1.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E-03	mean
Daily exposure (mg/kg-day)	6.1E-03	max

Hazard Quotients

BTAG Low HQ:	5.2E-03	mean
BTAG High HQ:	8.2E-05	mean
BTAG Low HQ:	8.3E-03	max
BTAG High HQ:	1.3E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Arsenic
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.40928
Maximum detected value (mg/kg, dry weight):	19.10828

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	6.7E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	3.1E-03	mean
BTAG Low HQ:	1.2E-02	max
BTAG High HQ:	3.1E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.21519
Maximum detected value (mg/kg, dry weight):	0.235669

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.3E-04	mean
Daily exposure (mg/kg-day)	9.0E-04	max

Hazard Quotients

BTAG Low HQ:	1.0E-02	mean
BTAG High HQ:	8.0E-05	mean
BTAG Low HQ:	1.1E-02	max
BTAG High HQ:	8.7E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.559775
Maximum detected value (mg/kg, dry weight):	3.581081

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	78
Maximum detected value (mg/kg, dry weight):	78

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	2.7E-02	max

Hazard Quotients

NOAEL HQ:	2.7E-02	mean
LOAEL HQ:	5.5E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.1E-02	max
LOAEL HQ:	6.3E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Copper
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	23.20675
Maximum detected value (mg/kg, dry weight):	31.15942

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1000
Maximum detected value (mg/kg, dry weight):	1000

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	5.2E-03	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	5.7E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Lead
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	5.921238
Maximum detected value (mg/kg, dry weight):	11.66667

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	250

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	8.7E-02	max

Hazard Quotients

BTAG Low HQ:	4.9E+00	mean
BTAG High HQ:	7.8E-03	mean
BTAG Low HQ:	6.2E+00	max
BTAG High HQ:	9.9E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.130802
Maximum detected value (mg/kg, dry weight):	0.175676

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	2.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-04	mean
Daily exposure (mg/kg-day)	1.1E-03	max

Hazard Quotients

BTAG Low HQ:	2.3E-02	mean
BTAG High HQ:	5.1E-03	mean
BTAG Low HQ:	2.7E-02	max
BTAG High HQ:	5.9E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.362869
Maximum detected value (mg/kg, dry weight):	2.905405

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	23
Maximum detected value (mg/kg, dry weight):	23

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.4E-02	max

Hazard Quotients

BTAG Low HQ:	8.9E-03	mean
BTAG High HQ:	2.2E-04	mean
BTAG Low HQ:	1.0E-02	max
BTAG High HQ:	2.5E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Selenium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.547117
Maximum detected value (mg/kg, dry weight):	2.027027

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E-03	mean
Daily exposure (mg/kg-day)	6.8E-03	max

Hazard Quotients

BTAG Low HQ:	2.3E-02	mean
BTAG High HQ:	5.6E-03	mean
BTAG Low HQ:	3.0E-02	max
BTAG High HQ:	7.3E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	111.1111
Maximum detected value (mg/kg, dry weight):	121.0191

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	860
Maximum detected value (mg/kg, dry weight):	860

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-01	mean
Daily exposure (mg/kg-day)	5.6E-01	max

Hazard Quotients

BTAG Low HQ:	3.1E-02	mean
BTAG High HQ:	3.1E-03	mean
BTAG Low HQ:	3.3E-02	max
BTAG High HQ:	3.3E-03	max

Tier I - Summary of Hazard Quotients

Receptor: **Brown Pelican**
Location: **SW08**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	7.1E-01	--	--	--	4.0E-01	--	--	--	--	--	--
LOAEL HQ:	7.1E-02	--	--	--	8.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	7.3E-01	1.2E-01	2.9E-01	#VALUE!	**1.6E+00**	**6.6E+01**	3.8E-01	1.7E-01	5.5E-01	6.1E-01
BTAG High HQ:	#VALUE!	5.1E-02	1.9E-03	7.3E-02	#VALUE!	6.9E-02	1.0E-01	8.3E-02	4.1E-03	1.4E-01	6.1E-02
MAXIMUM											
NOAEL HQ:	7.4E-01	--	--	--	5.0E-01	--	--	--	--	--	--
LOAEL HQ:	7.4E-02	--	--	--	9.9E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.5E-01	2.0E-01	2.9E-01	#VALUE!	**1.9E+00**	**9.9E+01**	4.8E-01	2.0E-01	7.2E-01	6.6E-01
BTAG High HQ:	#VALUE!	6.0E-02	3.2E-03	7.2E-02	#VALUE!	8.2E-02	1.6E-01	1.0E-01	4.9E-03	1.8E-01	6.6E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Benzo[a]pyrene
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.16737
Maximum detected value (mg/kg, dry weight):	1.210191

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	2.9

BAP				
170	14.8	100	0.148	
140	12	100	0.12	
180	14.8	100	0.148	
190	15.7	100	0.157	
150	13.8	100	0.138	
166			**0.1422**	1167.37
1210.191				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.9E-02	mean
Daily exposure (mg/kg-day)	1.0E-01	max

Hazard Quotients

NOAEL HQ:	7.1E-01	mean
LOAEL HQ:	7.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	7.4E-01	max
LOAEL HQ:	7.4E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total PCB Congeners
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.720816
Maximum detected value (mg/kg, dry weight):	0.859873

PCB Cong	Total Solids			
103	14.8	100	0.148	
98.2	12	100	0.12	
86.2	14.8	100	0.148	
135	15.7	100	0.157	
90.1	13.8	100	0.138	
102.5			**0.1422**	**720.8158**
859.8726				

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.5E-02	mean
Daily exposure (mg/kg-day)	7.7E-02	max

Hazard Quotients

BTAG Low HQ:	7.3E-01	mean
BTAG High HQ:	5.1E-02	mean
LOAEL HQ:	4.3E-02	max
BTAG Low HQ:	8.5E-01	max
BTAG High HQ:	6.0E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Tributyltin
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.040788
Maximum detected value (mg/kg, dry weight):	1.75

TBT	Total Solids		
120	14.8	100	0.148
210	12	100	0.12
110	14.8	100	0.148
180	15.7	100	0.157
120	13.8	100	0.138
148			**0.1422**
1750			

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	1.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.7E-02	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	2.0E-01	max
BTAG High HQ:	3.2E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Arsenic
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.40928
Maximum detected value (mg/kg, dry weight):	19.10828

Arsenic	Total Solids			
2.6	14.8	100	0.148	
2.8	12	100	0.12	
2.8	14.8	100	0.148	
3	15.7	100	0.157	
2.6	13.8	100	0.138	
2.76			**0.1422**	**19.40928**
19.10828				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E+00	mean
Daily exposure (mg/kg-day)	1.6E+00	max

Hazard Quotients

BTAG Low HQ:	2.9E-01	mean
BTAG High HQ:	7.3E-02	mean
BTAG Low HQ:	2.9E-01	max
BTAG High HQ:	7.2E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Cadmium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.21519
Maximum detected value (mg/kg, dry weight):	0.235669

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.67

Cadmium	Total Solids		
0.022	14.8	100	0.148
0.029	12	100	0.12
0.035	14.8	100	0.148
0.037	15.7	100	0.157
0.03	13.8	100	0.138
0.0306			**0.1422**
0.235669			

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.3E-01	mean
BTAG High HQ:	1.8E-03	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	1.9E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Chromium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.559775
Maximum detected value (mg/kg, dry weight):	3.581081

Chromium	Total Solids			
0.33	14.8	100	0.148	
0.35	12	100	0.12	
0.53	14.8	100	0.148	
0.3	15.7	100	0.157	
0.31	13.8	100	0.138	
0.364			**0.1422**	**2.559775**
3.581081				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	78
Maximum detected value (mg/kg, dry weight):	78

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-01	mean
Daily exposure (mg/kg-day)	4.3E-01	max

Hazard Quotients

NOAEL HQ:	4.0E-01	mean
LOAEL HQ:	8.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.0E-01	max
LOAEL HQ:	9.9E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Copper
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	23.20675
Maximum detected value (mg/kg, dry weight):	31.15942

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1000
Maximum detected value (mg/kg, dry weight):	1000

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.6E+00	mean
Daily exposure (mg/kg-day)	4.3E+00	max

Hazard Quotients

BTAG Low HQ:	1.6E+00	mean
BTAG High HQ:	6.9E-02	mean
BTAG Low HQ:	1.9E+00	max
BTAG High HQ:	8.2E-02	max

Copper	Total Solids			
3.2	14.8	100	0.148	
3.2	12	100	0.12	
2.6	14.8	100	0.148	
3.2	15.7	100	0.157	
4.3	13.8	100	0.138	
3.3			**0.1422**	**23.20675**
31.15942				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Lead
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	5.921238
Maximum detected value (mg/kg, dry weight):	11.66667

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	250

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-01	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients

BTAG Low HQ:	6.6E+01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	9.9E+01	max
BTAG High HQ:	1.6E-01	max

Lead	Total Solids			
0.8	14.8	100	0.148	
1.4	12	100	0.12	
0.6	14.8	100	0.148	
0.66	15.7	100	0.157	
0.75	13.8	100	0.138	
0.842			**0.1422**	**5.921238**
11.66667				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total Mercury
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.130802
Maximum detected value (mg/kg, dry weight):	0.175676

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	2.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.9E-02	max

Hazard Quotients

BTAG HQ:	3.8E-01	mean
BTAG HQ:	8.3E-02	mean
BTAG Low HQ:	4.8E-01	max
BTAG High HQ:	1.0E-01	max

Mercury	Total Solids			
0.026	14.8	100	0.148	
0.015	12	100	0.12	
0.018	14.8	100	0.148	
0.017	15.7	100	0.157	
0.017	13.8	100	0.138	
0.0186			**0.1422**	**0.130802**
0.175676				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Nickel
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.362869
Maximum detected value (mg/kg, dry weight):	2.905405

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	23
Maximum detected value (mg/kg, dry weight):	23

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-01	mean
Daily exposure (mg/kg-day)	2.8E-01	max

Hazard Quotients

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	4.1E-03	mean
BTAG Low HQ:	2.0E-01	max
BTAG High HQ:	4.9E-03	max

Nickel	Total Solids			
0.29	14.8	100	0.148	
0.29	12	100	0.12	
0.43	14.8	100	0.148	
0.37	15.7	100	0.157	
0.3	13.8	100	0.138	
0.336			**0.1422**	**2.362869**
2.905405				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Selenium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.547117
Maximum detected value (mg/kg, dry weight):	2.027027

Selenium	Total Solids			
0.2	14.8	100	0.148	
0.2	12	100	0.12	
0.3	14.8	100	0.148	
0.2	15.7	100	0.157	
0.2	13.8	100	0.138	
0.22			**0.1422**	**1.547117**
2.027027				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	1.7E-01	max

Hazard Quotients

BTAG Low HQ:	5.5E-01	mean
BTAG High HQ:	1.4E-01	mean
BTAG Low HQ:	7.2E-01	max
BTAG High HQ:	1.8E-01	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	111.1111
Maximum detected value (mg/kg, dry weight):	121.0191

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	860
Maximum detected value (mg/kg, dry weight):	860

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E+01	mean
Daily exposure (mg/kg-day)	1.1E+01	max

Hazard Quotients

BTAG Low HQ:	6.1E-01	mean
BTAG High HQ:	6.1E-02	mean
BTAG Low HQ:	6.6E-01	max
BTAG High HQ:	6.6E-02	max

Zinc	Total Solids			
15	14.8	100	0.148	
14	12	100	0.12	
17	14.8	100	0.148	
19	15.7	100	0.157	
14	13.8	100	0.138	
15.8			**0.1422**	**111.1111**
121.0191				

Tier I - Summary of Hazard Quotients

Receptor: Western Grebe
Location: SW08

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	5.5E-01	--	--	--	5.2E-01	--	--	--	--	--	--
LOAEL HQ:	5.5E-02	--	--	--	1.0E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	6.3E-01	9.1E-02	2.2E-01	#VALUE!	**2.2E+00**	**9.3E+01**	4.4E-01	1.6E-01	4.0E-01	5.6E-01
BTAG High HQ:	#VALUE!	4.4E-02	1.4E-03	5.5E-02	#VALUE!	9.9E-02	1.5E-01	9.5E-02	4.0E-03	9.9E-02	5.6E-02
MAXIMUM											
NOAEL HQ:	5.7E-01	--	--	--	5.9E-01	--	--	--	--	--	--
LOAEL HQ:	5.7E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	7.1E-01	1.5E-01	2.2E-01	#VALUE!	**2.4E+00**	**1.2E+02**	5.0E-01	1.8E-01	5.2E-01	5.9E-01
BTAG High HQ:	#VALUE!	5.1E-02	2.3E-03	5.4E-02	#VALUE!	1.1E-01	1.9E-01	1.1E-01	4.5E-03	1.3E-01	5.9E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.16737
Maximum detected value (mg/kg, dry weight):	1.210191

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.8E-02	mean
Daily exposure (mg/kg-day)	8.0E-02	max

Hazard Quotients

NOAEL HQ:	5.5E-01	mean
LOAEL HQ:	5.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.7E-01	max
LOAEL HQ:	5.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.720816
Maximum detected value (mg/kg, dry weight):	0.859873

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.6E-02	mean
Daily exposure (mg/kg-day)	6.4E-02	max

Hazard Quotients

BTAG Low HQ:	6.3E-01	mean
BTAG High HQ:	4.4E-02	mean
BTAG Low HQ:	7.1E-01	max
BTAG High HQ:	5.1E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.040788
Maximum detected value (mg/kg, dry weight):	1.75

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	1.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.7E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

BTAG Low HQ:	9.1E-02	mean
BTAG High HQ:	1.4E-03	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	2.3E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.40928
Maximum detected value (mg/kg, dry weight):	19.10828

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	26
Maximum detected value (mg/kg, dry weight):	26

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	5.5E-02	mean
BTAG Low HQ:	2.2E-01	max
BTAG High HQ:	5.4E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.21519
Maximum detected value (mg/kg, dry weight):	0.235669

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients

BTAG Low HQ:	1.9E-01	mean
BTAG High HQ:	1.4E-03	mean
BTAG Low HQ:	2.0E-01	max
BTAG High HQ:	1.5E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.559775
Maximum detected value (mg/kg, dry weight):	3.581081

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	78
Maximum detected value (mg/kg, dry weight):	78

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-01	mean
Daily exposure (mg/kg-day)	5.0E-01	max

Hazard Quotients

NOAEL HQ:	5.2E-01	mean
LOAEL HQ:	1.0E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.9E-01	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	23.20675
Maximum detected value (mg/kg, dry weight):	31.15942

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1000
Maximum detected value (mg/kg, dry weight):	1000

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E+00	mean
Daily exposure (mg/kg-day)	5.6E+00	max

Hazard Quotients

BTAG Low HQ:	2.2E+00	mean
BTAG High HQ:	9.9E-02	mean
BTAG Low HQ:	2.4E+00	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	5.921238
Maximum detected value (mg/kg, dry weight):	11.66667

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	250

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E+00	mean
Daily exposure (mg/kg-day)	1.6E+00	max

Hazard Quotients

BTAG Low HQ:	9.3E+01	mean
BTAG High HQ:	1.5E-01	mean
BTAG Low HQ:	1.2E+02	max
BTAG High HQ:	1.9E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.130802
Maximum detected value (mg/kg, dry weight):	0.175676

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	2.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	4.4E-01	mean
BTAG High HQ:	9.5E-02	mean
BTAG Low HQ:	5.0E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.362869
Maximum detected value (mg/kg, dry weight):	2.905405

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	23
Maximum detected value (mg/kg, dry weight):	23

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-01	mean
Daily exposure (mg/kg-day)	2.5E-01	max

Hazard Quotients

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	4.0E-03	mean
BTAG Low HQ:	1.8E-01	max
BTAG High HQ:	4.5E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.547117
Maximum detected value (mg/kg, dry weight):	2.027027

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-02	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients

BTAG Low HQ:	4.0E-01	mean
BTAG High HQ:	9.9E-02	mean
BTAG Low HQ:	5.2E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: SW08

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	111.1111
Maximum detected value (mg/kg, dry weight):	121.0191

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	860
Maximum detected value (mg/kg, dry weight):	860

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.6E+00	mean
Daily exposure (mg/kg-day)	1.0E+01	max

Hazard Quotients

BTAG Low HQ:	5.6E-01	mean
BTAG High HQ:	5.6E-02	mean
BTAG Low HQ:	5.9E-01	max
BTAG High HQ:	5.9E-02	max

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Tier I - Summary of Hazard Quotients

Receptor: **Surf Scoter**
Location: **SW13**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.2E-01	--	--	--	4.1E-01	--	--	--	--	--	--
LOAEL HQ:	3.2E-02	--	--	--	8.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.8E-01	6.9E-02	2.1E-01	#VALUE!	**1.7E+00**	**3.2E+01**	2.2E-01	1.6E-01	4.8E-01	5.4E-01
BTAG High HQ:	#VALUE!	2.0E-02	1.1E-03	5.1E-02	#VALUE!	7.7E-02	5.1E-02	4.7E-02	3.9E-03	1.2E-01	5.4E-02
MAXIMUM											
NOAEL HQ:	3.8E-01	--	--	--	4.6E-01	--	--	--	--	--	--
LOAEL HQ:	3.8E-02	--	--	--	9.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.2E-01	7.4E-02	2.4E-01	#VALUE!	**2.0E+00**	**3.2E+01**	2.3E-01	1.7E-01	7.8E-01	6.1E-01
BTAG High HQ:	#VALUE!	5.8E-02	1.2E-03	6.0E-02	#VALUE!	8.8E-02	5.1E-02	5.0E-02	4.2E-03	1.9E-01	6.1E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.722678
Maximum detected value (mg/kg, dry weight):	0.860927

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.5E-02	mean
Daily exposure (mg/kg-day)	5.3E-02	max

Hazard Quotients

NOAEL HQ:	3.2E-01	mean
LOAEL HQ:	3.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.8E-01	max
LOAEL HQ:	3.8E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.423907
Maximum detected value (mg/kg, dry weight):	1.292857

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.52

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-02	mean
Daily exposure (mg/kg-day)	7.4E-02	max

Hazard Quotients

BTAG Low HQ:	2.8E-01	mean
BTAG High HQ:	2.0E-02	mean
BTAG Low HQ:	8.2E-01	max
BTAG High HQ:	5.8E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.851093
Maximum detected value (mg/kg, dry weight):	0.920245

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.79
Maximum detected value (mg/kg, dry weight):	0.79

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.0E-02	mean
Daily exposure (mg/kg-day)	5.4E-02	max

Hazard Quotients

BTAG Low HQ:	6.9E-02	mean
BTAG High HQ:	1.1E-03	mean
BTAG Low HQ:	7.4E-02	max
BTAG High HQ:	1.2E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.39891
Maximum detected value (mg/kg, dry weight):	22.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.3E+00	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	5.1E-02	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	6.0E-02	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Cadmium
Location:	SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.218579
Maximum detected value (mg/kg, dry weight):	0.28481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.42
Maximum detected value (mg/kg, dry weight):	0.42

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-02	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	1.3E-03	mean
BTAG Low HQ:	2.2E-01	max
BTAG High HQ:	1.7E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.144809
Maximum detected value (mg/kg, dry weight):	2.928571

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	72
Maximum detected value (mg/kg, dry weight):	72

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.5E-01	mean
Daily exposure (mg/kg-day)	4.0E-01	max

Hazard Quotients

NOAEL HQ:	4.1E-01	mean
LOAEL HQ:	8.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.6E-01	max
LOAEL HQ:	9.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	25
Maximum detected value (mg/kg, dry weight):	35.44304

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	800
Maximum detected value (mg/kg, dry weight):	800

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.0E+00	mean
Daily exposure (mg/kg-day)	4.6E+00	max

Hazard Quotients

BTAG Low HQ:	1.7E+00	mean
BTAG High HQ:	7.7E-02	mean
BTAG Low HQ:	2.0E+00	max
BTAG High HQ:	8.8E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.540984
Maximum detected value (mg/kg, dry weight):	2.638037

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	93
Maximum detected value (mg/kg, dry weight):	93

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.5E-01	mean
Daily exposure (mg/kg-day)	4.5E-01	max

Hazard Quotients

BTAG Low HQ:	3.2E+01	mean
BTAG High HQ:	5.1E-02	mean
BTAG Low HQ:	3.2E+01	max
BTAG High HQ:	5.1E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.101093
Maximum detected value (mg/kg, dry weight):	0.110429

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.86
Maximum detected value (mg/kg, dry weight):	0.86

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.5E-03	mean
Daily exposure (mg/kg-day)	9.0E-03	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	4.7E-02	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	5.0E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.568306
Maximum detected value (mg/kg, dry weight):	2.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	24
Maximum detected value (mg/kg, dry weight):	24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	3.9E-03	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	4.2E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.912568
Maximum detected value (mg/kg, dry weight):	3.164557

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients

BTAG Low HQ:	4.8E-01	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	7.8E-01	max
BTAG High HQ:	1.9E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	131.1475
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	580
Maximum detected value (mg/kg, dry weight):	580

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E+00	mean
Daily exposure (mg/kg-day)	1.0E+01	max

Hazard Quotients

BTAG Low HQ:	5.4E-01	mean
BTAG High HQ:	5.4E-02	mean
BTAG Low HQ:	6.1E-01	max
BTAG High HQ:	6.1E-02	max

Hazard Quotient Calculations Using Macoma Tissue

Receptor: Sea Lion
Location: SW13

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	2.9E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.4E-03	--	--	--	--	--	--
BTAG Low HQ:	1.3E-02	2.7E-02	7.7E-02	**1.4E+00**	#VALUE!	4.1E-01	1.2E-01	1.0E-01	5.5E-01	8.6E-01	3.4E-01
BTAG High HQ:	5.1E-04	7.6E-03	1.3E-03	9.3E-02	#VALUE!	1.7E-03	5.0E-04	1.0E-02	2.3E-03	3.5E-02	8.0E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	3.4E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.6E-03	--	--	--	--	--	--
BTAG Low HQ:	1.5E-02	8.0E-02	8.3E-02	1.6E+00	#VALUE!	5.0E-01	1.2E-01	1.1E-01	5.8E-01	1.4E+00	3.9E-01
BTAG High HQ:	6.1E-04	2.2E-02	1.4E-03	1.1E-01	#VALUE!	2.1E-03	5.0E-04	1.1E-02	2.5E-03	5.8E-02	9.2E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Benzo[a]pyrene
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.722678
Maximum detected value (mg/kg, dry weight):	0.860927

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	5.1E-04	mean
BTAG Low HQ:	1.5E-02	max
BTAG High HQ:	6.1E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.423907
Maximum detected value (mg/kg, dry weight):	1.292857

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.52

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.7E-03	mean
Daily exposure (mg/kg-day)	2.9E-02	max

Hazard Quotients

BTAG Low HQ:	2.7E-02	mean
BTAG High HQ:	7.6E-03	mean
BTAG Low HQ:	8.0E-02	max
BTAG High HQ:	2.2E-02	max

Hazard Quotient Calculation

Receptor:	Sea Lion
Chemical:	Tributyltin
Location:	SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.851093
Maximum detected value (mg/kg, dry weight):	0.920245

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.79
Maximum detected value (mg/kg, dry weight):	0.79

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.1E-02	max

Hazard Quotients

BTAG Low HQ:	7.7E-02	mean
BTAG High HQ:	1.3E-03	mean
BTAG Low HQ:	8.3E-02	max
BTAG High HQ:	1.4E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Arsenic
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.39891
Maximum detected value (mg/kg, dry weight):	22.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-01	mean
Daily exposure (mg/kg-day)	5.1E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	9.3E-02	mean
BTAG Low HQ:	1.6E+00	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.218579
Maximum detected value (mg/kg, dry weight):	0.28481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.42
Maximum detected value (mg/kg, dry weight):	0.42

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.1E-03	mean
Daily exposure (mg/kg-day)	6.6E-03	max

Hazard Quotients

BTAG Low HQ:	8.5E-02	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	1.1E-01	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Chromium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.144809
Maximum detected value (mg/kg, dry weight):	2.928571

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	72
Maximum detected value (mg/kg, dry weight):	72

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.6E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

NOAEL HQ:	2.9E-02	mean
LOAEL HQ:	1.4E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.4E-02	max
LOAEL HQ:	1.6E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	25
Maximum detected value (mg/kg, dry weight):	35.44304

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	800
Maximum detected value (mg/kg, dry weight):	800

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.3E+00	max

Hazard Quotients

BTAG Low HQ:	4.1E-01	mean
BTAG High HQ:	1.7E-03	mean
BTAG Low HQ:	5.0E-01	max
BTAG High HQ:	2.1E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.540984
Maximum detected value (mg/kg, dry weight):	2.638037

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	93
Maximum detected value (mg/kg, dry weight):	93

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	5.0E-04	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	5.0E-04	max

Hazard Quotient Calculation

Receptor:	Sea Lion
Chemical:	Total Mercury
Location:	SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.101093
Maximum detected value (mg/kg, dry weight):	0.110429

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.86
Maximum detected value (mg/kg, dry weight):	0.86

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-03	mean
Daily exposure (mg/kg-day)	3.0E-03	max

Hazard Quotients

BTAG Low HQ:	1.0E-01	mean
BTAG High HQ:	1.0E-02	mean
BTAG Low HQ:	1.1E-01	max
BTAG High HQ:	1.1E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.568306
Maximum detected value (mg/kg, dry weight):	2.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	24
Maximum detected value (mg/kg, dry weight):	24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E-02	mean
Daily exposure (mg/kg-day)	7.8E-02	max

Hazard Quotients

BTAG Low HQ:	5.5E-01	mean
BTAG High HQ:	2.3E-03	mean
BTAG Low HQ:	5.8E-01	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.912568
Maximum detected value (mg/kg, dry weight):	3.164557

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-02	mean
Daily exposure (mg/kg-day)	7.0E-02	max

Hazard Quotients

BTAG Low HQ:	8.6E-01	mean
BTAG High HQ:	3.5E-02	mean
BTAG Low HQ:	1.4E+00	max
BTAG High HQ:	5.8E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	131.1475
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	580
Maximum detected value (mg/kg, dry weight):	580

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E+00	mean
Daily exposure (mg/kg-day)	3.8E+00	max

Hazard Quotients

BTAG Low HQ:	3.4E-01	mean
BTAG High HQ:	8.0E-03	mean
BTAG Low HQ:	3.9E-01	max
BTAG High HQ:	9.2E-03	max

Tier I - Summary of Hazard Quotients

Receptor: CA Least Tern
Location: SW13

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	6.6E-01	--	--	--	5.6E-01	--	--	--	--	--	--
LOAEL HQ:	6.6E-02	--	--	--	1.1E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.9E-01	1.5E-01	4.4E-01	#VALUE!	**2.4E+00**	**4.2E+01**	3.8E-01	2.8E-01	**1.0E+00**	**1.0E+00**
BTAG High HQ:	#VALUE!	4.2E-02	2.3E-03	1.1E-01	#VALUE!	1.1E-01	6.8E-02	8.3E-02	6.9E-03	2.5E-01	1.0E-01
MAXIMUM											
NOAEL HQ:	7.8E-01	--	--	--	6.7E-01	--	--	--	--	--	--
LOAEL HQ:	7.8E-02	--	--	--	1.3E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.8E+00**	1.6E-01	5.1E-01	#VALUE!	**2.9E+00**	**4.3E+01**	4.1E-01	3.0E-01	**1.7E+00**	**1.2E+00**
BTAG High HQ:	#VALUE!	1.3E-01	2.5E-03	1.3E-01	#VALUE!	1.3E-01	6.9E-02	9.0E-02	7.3E-03	4.2E-01	1.2E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.722678
Maximum detected value (mg/kg, dry weight):	0.860927

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.3E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

NOAEL HQ:	6.6E-01	mean
LOAEL HQ:	6.6E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	7.8E-01	max
LOAEL HQ:	7.8E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCB Congeners
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.423907
Maximum detected value (mg/kg, dry weight):	1.292857

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.52

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-02	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients

BTAG Low HQ:	5.9E-01	mean
BTAG High HQ:	4.2E-02	mean
BTAG Low HQ:	1.8E+00	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.851093
Maximum detected value (mg/kg, dry weight):	0.920245

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.79
Maximum detected value (mg/kg, dry weight):	0.79

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	2.3E-03	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.39891
Maximum detected value (mg/kg, dry weight):	22.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E+00	mean
Daily exposure (mg/kg-day)	2.8E+00	max

Hazard Quotients

BTAG Low HQ:	4.4E-01	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.218579
Maximum detected value (mg/kg, dry weight):	0.28481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.42
Maximum detected value (mg/kg, dry weight):	0.42

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-02	mean
Daily exposure (mg/kg-day)	3.6E-02	max

Hazard Quotients

BTAG Low HQ:	3.5E-01	mean
BTAG High HQ:	2.7E-03	mean
BTAG Low HQ:	4.5E-01	max
BTAG High HQ:	3.5E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.144809
Maximum detected value (mg/kg, dry weight):	2.928571

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	72
Maximum detected value (mg/kg, dry weight):	72

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.8E-01	mean
Daily exposure (mg/kg-day)	5.8E-01	max

Hazard Quotients

NOAEL HQ:	5.6E-01	mean
LOAEL HQ:	1.1E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	6.7E-01	max
LOAEL HQ:	1.3E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	25
Maximum detected value (mg/kg, dry weight):	35.44304

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	800
Maximum detected value (mg/kg, dry weight):	800

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E+00	mean
Daily exposure (mg/kg-day)	6.8E+00	max

Hazard Quotients

BTAG Low HQ:	2.4E+00	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	2.9E+00	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.540984
Maximum detected value (mg/kg, dry weight):	2.638037

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	93
Maximum detected value (mg/kg, dry weight):	93

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.9E-01	mean
Daily exposure (mg/kg-day)	6.1E-01	max

Hazard Quotients

BTAG Low HQ:	4.2E+01	mean
BTAG High HQ:	6.8E-02	mean
BTAG Low HQ:	4.3E+01	max
BTAG High HQ:	6.9E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.101093
Maximum detected value (mg/kg, dry weight):	0.110429

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.86
Maximum detected value (mg/kg, dry weight):	0.86

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients

BTAG Low HQ:	3.8E-01	mean
BTAG High HQ:	8.3E-02	mean
BTAG Low HQ:	4.1E-01	max
BTAG High HQ:	9.0E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.568306
Maximum detected value (mg/kg, dry weight):	2.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	24
Maximum detected value (mg/kg, dry weight):	24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-01	mean
Daily exposure (mg/kg-day)	4.1E-01	max

Hazard Quotients

BTAG Low HQ:	2.8E-01	mean
BTAG High HQ:	6.9E-03	mean
BTAG Low HQ:	3.0E-01	max
BTAG High HQ:	7.3E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.912568
Maximum detected value (mg/kg, dry weight):	3.164557

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	3.9E-01	max

Hazard Quotients

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	2.5E-01	mean
BTAG Low HQ:	1.7E+00	max
BTAG High HQ:	4.2E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	131.1475
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	580
Maximum detected value (mg/kg, dry weight):	580

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E+01	mean
Daily exposure (mg/kg-day)	2.1E+01	max

Hazard Quotients

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	1.2E+00	max
BTAG High HQ:	1.2E-01	max

Tier I - Summary of Hazard Quotients

Receptor: **Green Turtle**
Location: **SW13**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.9E-02	--	--	--	2.5E-02	--	--	--	--	--	--
LOAEL HQ:	1.9E-03	--	--	--	4.9E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.7E-02	4.0E-03	1.2E-02	#VALUE!	1.0E-01	**1.9E+00**	1.3E-02	9.5E-03	2.8E-02	3.1E-02
BTAG High HQ:	#VALUE!	1.2E-03	6.4E-05	3.0E-03	#VALUE!	4.6E-03	3.0E-03	2.8E-03	2.3E-04	6.9E-03	3.1E-03
MAXIMUM											
NOAEL HQ:	2.2E-02	--	--	--	2.8E-02	--	--	--	--	--	--
LOAEL HQ:	2.2E-03	--	--	--	5.5E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.8E-02	4.3E-03	1.4E-02	#VALUE!	1.2E-01	**1.9E+00**	1.4E-02	1.0E-02	4.6E-02	3.6E-02
BTAG High HQ:	#VALUE!	3.4E-03	6.9E-05	3.5E-03	#VALUE!	5.2E-03	3.1E-03	2.9E-03	2.4E-04	1.1E-02	3.6E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Benzo[a]pyrene
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.722678
Maximum detected value (mg/kg, dry weight):	0.860927

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-03	mean
Daily exposure (mg/kg-day)	3.1E-03	max

Hazard Quotients

NOAEL HQ:	1.9E-02	mean
LOAEL HQ:	1.9E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.2E-02	max
LOAEL HQ:	2.2E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.423907
Maximum detected value (mg/kg, dry weight):	1.292857

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.52

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-03	mean
Daily exposure (mg/kg-day)	4.3E-03	max

Hazard Quotients

BTAG Low HQ:	1.7E-02	mean
BTAG High HQ:	1.2E-03	mean
BTAG Low HQ:	4.8E-02	max
BTAG High HQ:	3.4E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.851093
Maximum detected value (mg/kg, dry weight):	0.920245

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.79
Maximum detected value (mg/kg, dry weight):	0.79

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-03	mean
Daily exposure (mg/kg-day)	3.2E-03	max

Hazard Quotients

BTAG Low HQ:	4.0E-03	mean
BTAG High HQ:	6.4E-05	mean
BTAG Low HQ:	4.3E-03	max
BTAG High HQ:	6.9E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Arsenic
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.39891
Maximum detected value (mg/kg, dry weight):	22.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.6E-02	mean
Daily exposure (mg/kg-day)	7.7E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	3.0E-03	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	3.5E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.218579
Maximum detected value (mg/kg, dry weight):	0.28481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.42
Maximum detected value (mg/kg, dry weight):	0.42

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.0E-04	mean
Daily exposure (mg/kg-day)	1.0E-03	max

Hazard Quotients

BTAG Low HQ:	9.9E-03	mean
BTAG High HQ:	7.6E-05	mean
BTAG Low HQ:	1.3E-02	max
BTAG High HQ:	9.7E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.144809
Maximum detected value (mg/kg, dry weight):	2.928571

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	72
Maximum detected value (mg/kg, dry weight):	72

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-02	mean
Daily exposure (mg/kg-day)	2.4E-02	max

Hazard Quotients

NOAEL HQ:	2.5E-02	mean
LOAEL HQ:	4.9E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	2.8E-02	max
LOAEL HQ:	5.5E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Copper
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	25
Maximum detected value (mg/kg, dry weight):	35.44304

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	800
Maximum detected value (mg/kg, dry weight):	800

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	2.7E-01	max

Hazard Quotients

BTAG Low HQ:	1.0E-01	mean
BTAG High HQ:	4.6E-03	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	5.2E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Lead
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.540984
Maximum detected value (mg/kg, dry weight):	2.638037

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	93
Maximum detected value (mg/kg, dry weight):	93

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-02	mean
Daily exposure (mg/kg-day)	2.7E-02	max

Hazard Quotients

BTAG Low HQ:	1.9E+00	mean
BTAG High HQ:	3.0E-03	mean
BTAG Low HQ:	1.9E+00	max
BTAG High HQ:	3.1E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.101093
Maximum detected value (mg/kg, dry weight):	0.110429

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.86
Maximum detected value (mg/kg, dry weight):	0.86

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.0E-04	mean
Daily exposure (mg/kg-day)	5.3E-04	max

Hazard Quotients

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	2.9E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.568306
Maximum detected value (mg/kg, dry weight):	2.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	24
Maximum detected value (mg/kg, dry weight):	24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.4E-02	max

Hazard Quotients

BTAG Low HQ:	9.5E-03	mean
BTAG High HQ:	2.3E-04	mean
BTAG Low HQ:	1.0E-02	max
BTAG High HQ:	2.4E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Selenium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.912568
Maximum detected value (mg/kg, dry weight):	3.164557

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.5E-03	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	2.8E-02	mean
BTAG High HQ:	6.9E-03	mean
BTAG Low HQ:	4.6E-02	max
BTAG High HQ:	1.1E-02	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	131.1475
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	580
Maximum detected value (mg/kg, dry weight):	580

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.4E-01	mean
Daily exposure (mg/kg-day)	6.1E-01	max

Hazard Quotients

BTAG Low HQ:	3.1E-02	mean
BTAG High HQ:	3.1E-03	mean
BTAG Low HQ:	3.6E-02	max
BTAG High HQ:	3.6E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	131.1475
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	580
Maximum detected value (mg/kg, dry weight):	580

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+01	mean
Daily exposure (mg/kg-day)	1.3E+01	max

Hazard Quotients

BTAG Low HQ:	6.8E-01	mean
BTAG High HQ:	6.8E-02	mean
BTAG Low HQ:	7.8E-01	max
BTAG High HQ:	7.8E-02	max

Zinc	Total Solids			
17	12	100	0.12	
24	15.8	100	0.158	
25	16.3	100	0.163	
16	14	100	0.14	
14	15.1	100	0.151	
19.2			**0.1464**	**131.1475**
153.3742				

Tier I - Summary of Hazard Quotients

Receptor: Western Grebe
Location: SW13

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.3E-01	--	--	--	4.6E-01	--	--	--	--	--	--
LOAEL HQ:	3.3E-02	--	--	--	9.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.9E-01	7.1E-02	2.1E-01	#VALUE!	**2.0E+00**	**3.6E+01**	2.3E-01	1.7E-01	4.9E-01	5.6E-01
BTAG High HQ:	#VALUE!	2.1E-02	1.1E-03	5.3E-02	#VALUE!	8.6E-02	5.7E-02	5.0E-02	4.2E-03	1.2E-01	5.6E-02
MAXIMUM											
NOAEL HQ:	3.9E-01	--	--	--	5.2E-01	--	--	--	--	--	--
LOAEL HQ:	3.9E-02	--	--	--	1.0E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.4E-01	7.6E-02	2.5E-01	#VALUE!	**2.2E+00**	**3.6E+01**	2.5E-01	1.8E-01	8.0E-01	6.4E-01
BTAG High HQ:	#VALUE!	6.0E-02	1.2E-03	6.2E-02	#VALUE!	9.7E-02	5.8E-02	5.3E-02	4.5E-03	2.0E-01	6.4E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Benzo[a]pyrene
Location:	SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.722678
Maximum detected value (mg/kg, dry weight):	0.860927

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.7E-02	mean
Daily exposure (mg/kg-day)	5.4E-02	max

Hazard Quotients

NOAEL HQ:	3.3E-01	mean
LOAEL HQ:	3.3E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.9E-01	max
LOAEL HQ:	3.9E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.423907
Maximum detected value (mg/kg, dry weight):	1.292857

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.52

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-02	mean
Daily exposure (mg/kg-day)	7.6E-02	max

Hazard Quotients

BTAG Low HQ:	2.9E-01	mean
BTAG High HQ:	2.1E-02	mean
BTAG Low HQ:	8.4E-01	max
BTAG High HQ:	6.0E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.851093
Maximum detected value (mg/kg, dry weight):	0.920245

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.79
Maximum detected value (mg/kg, dry weight):	0.79

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.1E-02	mean
Daily exposure (mg/kg-day)	5.5E-02	max

Hazard Quotients

BTAG Low HQ:	7.1E-02	mean
BTAG High HQ:	1.1E-03	mean
BTAG Low HQ:	7.6E-02	max
BTAG High HQ:	1.2E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.39891
Maximum detected value (mg/kg, dry weight):	22.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	5.3E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	6.2E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.218579
Maximum detected value (mg/kg, dry weight):	0.28481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.42
Maximum detected value (mg/kg, dry weight):	0.42

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	1.4E-03	mean
BTAG Low HQ:	2.2E-01	max
BTAG High HQ:	1.7E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.144809
Maximum detected value (mg/kg, dry weight):	2.928571

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	72
Maximum detected value (mg/kg, dry weight):	72

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.0E-01	mean
Daily exposure (mg/kg-day)	4.4E-01	max

Hazard Quotients

NOAEL HQ:	4.6E-01	mean
LOAEL HQ:	9.3E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.2E-01	max
LOAEL HQ:	1.0E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	25
Maximum detected value (mg/kg, dry weight):	35.44304

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	800
Maximum detected value (mg/kg, dry weight):	800

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.5E+00	mean
Daily exposure (mg/kg-day)	5.1E+00	max

Hazard Quotients

BTAG Low HQ:	2.0E+00	mean
BTAG High HQ:	8.6E-02	mean
BTAG Low HQ:	2.2E+00	max
BTAG High HQ:	9.7E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.540984
Maximum detected value (mg/kg, dry weight):	2.638037

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	93
Maximum detected value (mg/kg, dry weight):	93

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.0E-01	mean
Daily exposure (mg/kg-day)	5.1E-01	max

Hazard Quotients

BTAG Low HQ:	3.6E+01	mean
BTAG High HQ:	5.7E-02	mean
BTAG Low HQ:	3.6E+01	max
BTAG High HQ:	5.8E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.101093
Maximum detected value (mg/kg, dry weight):	0.110429

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.86
Maximum detected value (mg/kg, dry weight):	0.86

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.1E-03	mean
Daily exposure (mg/kg-day)	9.6E-03	max

Hazard Quotients

BTAG Low HQ:	2.3E-01	mean
BTAG High HQ:	5.0E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	5.3E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.568306
Maximum detected value (mg/kg, dry weight):	2.78481

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	24
Maximum detected value (mg/kg, dry weight):	24

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	2.5E-01	max

Hazard Quotients

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	4.2E-03	mean
BTAG Low HQ:	1.8E-01	max
BTAG High HQ:	4.5E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.912568
Maximum detected value (mg/kg, dry weight):	3.164557

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients

BTAG Low HQ:	4.9E-01	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	8.0E-01	max
BTAG High HQ:	2.0E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: SW13

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	131.1475
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	580
Maximum detected value (mg/kg, dry weight):	580

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.7E+00	mean
Daily exposure (mg/kg-day)	1.1E+01	max

Hazard Quotients

BTAG Low HQ:	5.6E-01	mean
BTAG High HQ:	5.6E-02	mean
BTAG Low HQ:	6.4E-01	max
BTAG High HQ:	6.4E-02	max

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Tier I - Summary of Hazard Quotients

Receptor: Surf Scoter
Location: SW21

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	4.1E-01	--	--	--	4.3E-01	--	--	--	--	--	--
LOAEL HQ:	4.1E-02	--	--	--	8.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	7.6E-01	9.2E-03	2.2E-01	#VALUE!	7.6E-01	**4.5E+01**	2.7E-01	1.3E-01	4.7E-01	4.9E-01
BTAG High HQ:	#VALUE!	5.4E-02	1.5E-04	5.4E-02	#VALUE!	3.4E-02	7.2E-02	5.8E-02	3.2E-03	1.2E-01	4.9E-02
MAXIMUM											
NOAEL HQ:	4.9E-01	--	--	--	5.7E-01	--	--	--	--	--	--
LOAEL HQ:	4.9E-02	--	--	--	1.1E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.7E-01	1.5E-02	2.4E-01	#VALUE!	9.6E-01	**5.6E+01**	2.8E-01	1.3E-01	7.7E-01	5.4E-01
BTAG High HQ:	#VALUE!	6.1E-02	2.4E-04	5.9E-02	#VALUE!	4.2E-02	9.0E-02	6.1E-02	3.3E-03	1.9E-01	5.4E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.928668
Maximum detected value (mg/kg, dry weight):	1.146497

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.7E-02	mean
Daily exposure (mg/kg-day)	6.9E-02	max

Hazard Quotients

NOAEL HQ:	4.1E-01	mean
LOAEL HQ:	4.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	4.9E-01	max
LOAEL HQ:	4.9E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.024226
Maximum detected value (mg/kg, dry weight):	1.19863

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.4
Maximum detected value (mg/kg, dry weight):	3.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	7.8E-02	max

Hazard Quotients

BTAG Low HQ:	7.6E-01	mean
BTAG High HQ:	5.4E-02	mean
BTAG Low HQ:	8.7E-01	max
BTAG High HQ:	6.1E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.110363
Maximum detected value (mg/kg, dry weight):	0.1875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.17
Maximum detected value (mg/kg, dry weight):	0.17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.7E-03	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	9.2E-03	mean
BTAG High HQ:	1.5E-04	mean
BTAG Low HQ:	1.5E-02	max
BTAG High HQ:	2.4E-04	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.72678
Maximum detected value (mg/kg, dry weight):	22.56098

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.3E+00	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	5.4E-02	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	5.9E-02	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Cadmium
Location:	SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.273217
Maximum detected value (mg/kg, dry weight):	0.323171

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.51

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	1.6E-03	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	1.9E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.597577
Maximum detected value (mg/kg, dry weight):	4.6875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-01	mean
Daily exposure (mg/kg-day)	4.9E-01	max

Hazard Quotients

NOAEL HQ:	4.3E-01	mean
LOAEL HQ:	8.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.7E-01	max
LOAEL HQ:	1.1E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	16.28533
Maximum detected value (mg/kg, dry weight):	24.21875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	260
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E+00	mean
Daily exposure (mg/kg-day)	2.2E+00	max

Hazard Quotients

BTAG Low HQ:	7.6E-01	mean
BTAG High HQ:	3.4E-02	mean
BTAG Low HQ:	9.6E-01	max
BTAG High HQ:	4.2E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.253028
Maximum detected value (mg/kg, dry weight):	7.03125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	120

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.3E-01	mean
Daily exposure (mg/kg-day)	7.8E-01	max

Hazard Quotients

BTAG Low HQ:	4.5E+01	mean
BTAG High HQ:	7.2E-02	mean
BTAG Low HQ:	5.6E+01	max
BTAG High HQ:	9.0E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106326
Maximum detected value (mg/kg, dry weight):	0.116438

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	2.7E-01	mean
BTAG High HQ:	5.8E-02	mean
BTAG Low HQ:	2.8E-01	max
BTAG High HQ:	6.1E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.43607
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	14

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients

BTAG Low HQ:	1.3E-01	mean
BTAG High HQ:	3.2E-03	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	3.3E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.884253
Maximum detected value (mg/kg, dry weight):	3.125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients

BTAG Low HQ:	4.7E-01	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	7.7E-01	max
BTAG High HQ:	1.9E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.5518
Maximum detected value (mg/kg, dry weight):	146.3415

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.4E+00	mean
Daily exposure (mg/kg-day)	9.3E+00	max

Hazard Quotients

BTAG Low HQ:	4.9E-01	mean
BTAG High HQ:	4.9E-02	mean
BTAG Low HQ:	5.4E-01	max
BTAG High HQ:	5.4E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Sea Lion
Location: SW21

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	3.2E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.5E-03	--	--	--	--	--	--
BTAG Low HQ:	1.6E-02	6.9E-02	1.0E-02	**1.4E+00**	#VALUE!	2.0E-01	1.8E-01	1.2E-01	4.8E-01	8.4E-01	3.2E-01
BTAG High HQ:	6.5E-04	1.9E-02	1.7E-04	9.9E-02	#VALUE!	8.5E-04	7.3E-04	1.2E-02	2.0E-03	3.5E-02	7.5E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	4.6E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	2.2E-03	--	--	--	--	--	--
BTAG Low HQ:	2.0E-02	8.0E-02	1.7E-02	**1.6E+00**	#VALUE!	2.7E-01	2.4E-01	1.3E-01	4.9E-01	**1.4E+00**	3.6E-01
BTAG High HQ:	8.0E-04	2.2E-02	2.8E-04	1.1E-01	#VALUE!	1.1E-03	9.8E-04	1.3E-02	2.0E-03	5.7E-02	8.4E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Benzo[a]pyrene
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.928668
Maximum detected value (mg/kg, dry weight):	1.146497

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-02	mean
Daily exposure (mg/kg-day)	2.6E-02	max

Hazard Quotients

BTAG Low HQ:	1.6E-02	mean
BTAG High HQ:	6.5E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	8.0E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.024226
Maximum detected value (mg/kg, dry weight):	1.19863

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.4
Maximum detected value (mg/kg, dry weight):	3.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-02	mean
Daily exposure (mg/kg-day)	2.9E-02	max

Hazard Quotients

BTAG Low HQ:	6.9E-02	mean
BTAG High HQ:	1.9E-02	mean
BTAG Low HQ:	8.0E-02	max
BTAG High HQ:	2.2E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Tributyltin
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.110363
Maximum detected value (mg/kg, dry weight):	0.1875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.17
Maximum detected value (mg/kg, dry weight):	0.17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-03	mean
Daily exposure (mg/kg-day)	4.2E-03	max

Hazard Quotients

BTAG Low HQ:	1.0E-02	mean
BTAG High HQ:	1.7E-04	mean
BTAG Low HQ:	1.7E-02	max
BTAG High HQ:	2.8E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Arsenic
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.72678
Maximum detected value (mg/kg, dry weight):	22.56098

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.6E-01	mean
Daily exposure (mg/kg-day)	5.0E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	9.9E-02	mean
BTAG Low HQ:	1.6E+00	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.273217
Maximum detected value (mg/kg, dry weight):	0.323171

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.51

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.4E-03	mean
Daily exposure (mg/kg-day)	7.5E-03	max

Hazard Quotients

BTAG Low HQ:	1.1E-01	mean
BTAG High HQ:	2.4E-03	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	2.8E-03	max

Hazard Quotient Calculation

Receptor:	Sea Lion
Chemical:	Chromium
Location:	SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.597577
Maximum detected value (mg/kg, dry weight):	4.6875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.5E-01	max

Hazard Quotients

NOAEL HQ:	3.2E-02	mean
LOAEL HQ:	1.5E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.6E-02	max
LOAEL HQ:	2.2E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	16.28533
Maximum detected value (mg/kg, dry weight):	24.21875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	260
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.4E-01	mean
Daily exposure (mg/kg-day)	7.1E-01	max

Hazard Quotients

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	8.5E-04	mean
BTAG Low HQ:	2.7E-01	max
BTAG High HQ:	1.1E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.253028
Maximum detected value (mg/kg, dry weight):	7.03125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	120

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	2.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	7.3E-04	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	9.8E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total Mercury
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106326
Maximum detected value (mg/kg, dry weight):	0.116438

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-03	mean
Daily exposure (mg/kg-day)	3.5E-03	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	1.2E-02	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	1.3E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.43607
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	14

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.3E-02	mean
Daily exposure (mg/kg-day)	6.5E-02	max

Hazard Quotients

BTAG Low HQ:	4.8E-01	mean
BTAG High HQ:	2.0E-03	mean
BTAG Low HQ:	4.9E-01	max
BTAG High HQ:	2.0E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.884253
Maximum detected value (mg/kg, dry weight):	3.125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.2E-02	mean
Daily exposure (mg/kg-day)	6.9E-02	max

Hazard Quotients

BTAG Low HQ:	8.4E-01	mean
BTAG High HQ:	3.5E-02	mean
BTAG Low HQ:	1.4E+00	max
BTAG High HQ:	5.7E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.5518
Maximum detected value (mg/kg, dry weight):	146.3415

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E+00	mean
Daily exposure (mg/kg-day)	3.4E+00	max

Hazard Quotients

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	7.5E-03	mean
BTAG Low HQ:	3.6E-01	max
BTAG High HQ:	8.4E-03	max

Tier I - Summary of Hazard Quotients

Receptor: CA Least Tern
Location: SW21

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	8.4E-01	--	--	--	6.2E-01	--	--	--	--	--	--
LOAEL HQ:	8.4E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.5E+00**	1.9E-02	4.7E-01	#VALUE!	**1.2E+00**	**6.3E+01**	4.4E-01	2.5E-01	**1.0E+00**	9.9E-01
BTAG High HQ:	#VALUE!	1.1E-01	3.1E-04	1.2E-01	#VALUE!	5.3E-02	1.0E-01	9.6E-02	6.0E-03	2.5E-01	9.9E-02
MAXIMUM											
NOAEL HQ:	**1.0E+00**	--	--	--	9.1E-01	--	--	--	--	--	--
LOAEL HQ:	1.0E-01	--	--	--	1.8E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.7E+00**	3.2E-02	5.1E-01	#VALUE!	**1.6E+00**	**8.8E+01**	4.7E-01	2.5E-01	**1.7E+00**	**1.1E+00**
BTAG High HQ:	#VALUE!	1.2E-01	5.1E-04	1.3E-01	#VALUE!	7.2E-02	1.4E-01	1.0E-01	6.2E-03	4.1E-01	1.1E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.928668
Maximum detected value (mg/kg, dry weight):	1.146497

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients

NOAEL HQ:	8.4E-01	mean
LOAEL HQ:	8.4E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.0E+00	max
LOAEL HQ:	1.0E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCB Congeners
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.024226
Maximum detected value (mg/kg, dry weight):	1.19863

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.4
Maximum detected value (mg/kg, dry weight):	3.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E+00	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	1.7E+00	max
BTAG High HQ:	1.2E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.110363
Maximum detected value (mg/kg, dry weight):	0.1875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.17
Maximum detected value (mg/kg, dry weight):	0.17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-02	mean
Daily exposure (mg/kg-day)	2.3E-02	max

Hazard Quotients

BTAG Low HQ:	1.9E-02	mean
BTAG High HQ:	3.1E-04	mean
BTAG Low HQ:	3.2E-02	max
BTAG High HQ:	5.1E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.72678
Maximum detected value (mg/kg, dry weight):	22.56098

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E+00	mean
Daily exposure (mg/kg-day)	2.8E+00	max

Hazard Quotients

BTAG Low HQ:	4.7E-01	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.273217
Maximum detected value (mg/kg, dry weight):	0.323171

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.51

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.5E-02	mean
Daily exposure (mg/kg-day)	4.1E-02	max

Hazard Quotients

BTAG Low HQ:	4.4E-01	mean
BTAG High HQ:	3.4E-03	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	3.9E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.597577
Maximum detected value (mg/kg, dry weight):	4.6875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-01	mean
Daily exposure (mg/kg-day)	7.9E-01	max

Hazard Quotients

NOAEL HQ:	6.2E-01	mean
LOAEL HQ:	1.2E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	9.1E-01	max
LOAEL HQ:	1.8E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	16.28533
Maximum detected value (mg/kg, dry weight):	24.21875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	260
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E+00	mean
Daily exposure (mg/kg-day)	3.8E+00	max

Hazard Quotients

BTAG Low HQ:	1.2E+00	mean
BTAG High HQ:	5.3E-02	mean
BTAG Low HQ:	1.6E+00	max
BTAG High HQ:	7.2E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.253028
Maximum detected value (mg/kg, dry weight):	7.03125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	120

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.9E-01	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients

BTAG Low HQ:	6.3E+01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	8.8E+01	max
BTAG High HQ:	1.4E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106326
Maximum detected value (mg/kg, dry weight):	0.116438

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	1.9E-02	max

Hazard Quotients

BTAG Low HQ:	4.4E-01	mean
BTAG High HQ:	9.6E-02	mean
BTAG Low HQ:	4.7E-01	max
BTAG High HQ:	1.0E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.43607
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	14

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-01	mean
Daily exposure (mg/kg-day)	3.5E-01	max

Hazard Quotients

BTAG Low HQ:	2.5E-01	mean
BTAG High HQ:	6.0E-03	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	6.2E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.884253
Maximum detected value (mg/kg, dry weight):	3.125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-01	mean
Daily exposure (mg/kg-day)	3.9E-01	max

Hazard Quotients

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	2.5E-01	mean
BTAG Low HQ:	1.7E+00	max
BTAG High HQ:	4.1E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.036
Food ingestion rate (kg/day dry wt):	0.0044
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.5518
Maximum detected value (mg/kg, dry weight):	146.3415

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E+01	mean
Daily exposure (mg/kg-day)	1.9E+01	max

Hazard Quotients

BTAG Low HQ:	9.9E-01	mean
BTAG High HQ:	9.9E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	1.1E-01	max

Tier I - Summary of Hazard Quotients

Receptor: Green Turtle
Location: SW21

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.4E-02	--	--	--	2.6E-02	--	--	--	--	--	--
LOAEL HQ:	2.4E-03	--	--	--	5.2E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.5E-02	5.4E-04	1.3E-02	#VALUE!	4.5E-02	**2.7E+00**	1.6E-02	7.7E-03	2.8E-02	2.9E-02
BTAG High HQ:	#VALUE!	3.2E-03	8.6E-06	3.2E-03	#VALUE!	2.0E-03	4.3E-03	3.5E-03	1.9E-04	6.8E-03	2.9E-03
MAXIMUM											
NOAEL HQ:	2.9E-02	--	--	--	3.4E-02	--	--	--	--	--	--
LOAEL HQ:	2.9E-03	--	--	--	6.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.1E-02	8.8E-04	1.4E-02	#VALUE!	5.6E-02	**3.3E+00**	1.7E-02	7.9E-03	4.5E-02	3.2E-02
BTAG High HQ:	#VALUE!	3.6E-03	1.4E-05	3.4E-03	#VALUE!	2.5E-03	5.3E-03	3.6E-03	1.9E-04	1.1E-02	3.2E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Benzo[a]pyrene
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.928668
Maximum detected value (mg/kg, dry weight):	1.146497

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-03	mean
Daily exposure (mg/kg-day)	4.0E-03	max

Hazard Quotients

NOAEL HQ:	2.4E-02	mean
LOAEL HQ:	2.4E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.9E-02	max
LOAEL HQ:	2.9E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.024226
Maximum detected value (mg/kg, dry weight):	1.19863

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.4
Maximum detected value (mg/kg, dry weight):	3.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.0E-03	mean
Daily exposure (mg/kg-day)	4.6E-03	max

Hazard Quotients

BTAG Low HQ:	4.5E-02	mean
BTAG High HQ:	3.2E-03	mean
BTAG Low HQ:	5.1E-02	max
BTAG High HQ:	3.6E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.110363
Maximum detected value (mg/kg, dry weight):	0.1875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.17
Maximum detected value (mg/kg, dry weight):	0.17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-04	mean
Daily exposure (mg/kg-day)	6.5E-04	max

Hazard Quotients

BTAG Low HQ:	5.4E-04	mean
BTAG High HQ:	8.6E-06	mean
BTAG Low HQ:	8.8E-04	max
BTAG High HQ:	1.4E-05	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Arsenic
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.72678
Maximum detected value (mg/kg, dry weight):	22.56098

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.0E-02	mean
Daily exposure (mg/kg-day)	7.6E-02	max

Hazard Quotients

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	3.2E-03	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	3.4E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.273217
Maximum detected value (mg/kg, dry weight):	0.323171

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.51

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.9E-04	mean
Daily exposure (mg/kg-day)	1.2E-03	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	9.5E-05	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	1.1E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.597577
Maximum detected value (mg/kg, dry weight):	4.6875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-02	mean
Daily exposure (mg/kg-day)	2.9E-02	max

Hazard Quotients

NOAEL HQ:	2.6E-02	mean
LOAEL HQ:	5.2E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	3.4E-02	max
LOAEL HQ:	6.7E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Copper
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	16.28533
Maximum detected value (mg/kg, dry weight):	24.21875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	260
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-01	mean
Daily exposure (mg/kg-day)	1.3E-01	max

Hazard Quotients

BTAG Low HQ:	4.5E-02	mean
BTAG High HQ:	2.0E-03	mean
BTAG Low HQ:	5.6E-02	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Lead
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.253028
Maximum detected value (mg/kg, dry weight):	7.03125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	120

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-02	mean
Daily exposure (mg/kg-day)	4.6E-02	max

Hazard Quotients

BTAG Low HQ:	2.7E+00	mean
BTAG High HQ:	4.3E-03	mean
BTAG Low HQ:	3.3E+00	max
BTAG High HQ:	5.3E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106326
Maximum detected value (mg/kg, dry weight):	0.116438

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.2E-04	mean
Daily exposure (mg/kg-day)	6.5E-04	max

Hazard Quotients

BTAG Low HQ:	1.6E-02	mean
BTAG High HQ:	3.5E-03	mean
BTAG Low HQ:	1.7E-02	max
BTAG High HQ:	3.6E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.43607
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	14

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	7.7E-03	mean
BTAG High HQ:	1.9E-04	mean
BTAG Low HQ:	7.9E-03	max
BTAG High HQ:	1.9E-04	max

Hazard Quotient Calculation

Receptor:	Green Turtle
Chemical:	Selenium
Location:	SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.884253
Maximum detected value (mg/kg, dry weight):	3.125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.3E-03	mean
Daily exposure (mg/kg-day)	1.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.8E-02	mean
BTAG High HQ:	6.8E-03	mean
BTAG Low HQ:	4.5E-02	max
BTAG High HQ:	1.1E-02	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.5518
Maximum detected value (mg/kg, dry weight):	146.3415

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.9E-01	mean
Daily exposure (mg/kg-day)	5.4E-01	max

Hazard Quotients

BTAG Low HQ:	2.9E-02	mean
BTAG High HQ:	2.9E-03	mean
BTAG Low HQ:	3.2E-02	max
BTAG High HQ:	3.2E-03	max

Tier I - Summary of Hazard Quotients

Receptor: **Brown Pelican**
Location: **SW21**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	5.6E-01	--	--	--	3.9E-01	--	--	--	--	--	--
LOAEL HQ:	5.6E-02	--	--	--	7.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	9.9E-01	1.3E-02	3.1E-01	#VALUE!	7.7E-01	**4.0E+01**	2.8E-01	1.6E-01	6.7E-01	6.5E-01
BTAG High HQ:	#VALUE!	7.0E-02	2.0E-04	7.7E-02	#VALUE!	3.4E-02	6.3E-02	6.1E-02	3.9E-03	1.7E-01	6.5E-02
MAXIMUM											
NOAEL HQ:	6.8E-01	--	--	--	5.8E-01	--	--	--	--	--	--
LOAEL HQ:	6.8E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.1E+00**	2.1E-02	3.4E-01	#VALUE!	**1.0E+00**	**5.6E+01**	3.0E-01	1.6E-01	**1.1E+00**	7.2E-01
BTAG High HQ:	#VALUE!	8.1E-02	3.4E-04	8.4E-02	#VALUE!	4.6E-02	8.9E-02	6.6E-02	4.0E-03	2.7E-01	7.2E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Benzo[a]pyrene
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.928668
Maximum detected value (mg/kg, dry weight):	1.146497

BAP				
180	15.7	100	0.157	
150	14.6	100	0.146	
120	16.4	100	0.164	
130	14.8	100	0.148	
110	12.8	100	0.128	
138			**0.1486**	928.6676
1146.497				

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.8E-02	mean
Daily exposure (mg/kg-day)	9.5E-02	max

Hazard Quotients

NOAEL HQ:	5.6E-01	mean
LOAEL HQ:	5.6E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	6.8E-01	max
LOAEL HQ:	6.8E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total PCB Congeners
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.024226
Maximum detected value (mg/kg, dry weight):	1.19863

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.4
Maximum detected value (mg/kg, dry weight):	3.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.9E-02	mean
Daily exposure (mg/kg-day)	1.0E-01	max

Hazard Quotients

BTAG Low HQ:	9.9E-01	mean
BTAG High HQ:	7.0E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	8.1E-02	max

PCB Cong	Total Solids			
143	15.7	100	0.157	
175	14.6	100	0.146	
170	16.4	100	0.164	
167	14.8	100	0.148	
106	12.8	100	0.128	
152.2			**0.1486**	**1024.226**
1198.63				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Tributyltin
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.110363
Maximum detected value (mg/kg, dry weight):	0.1875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.17
Maximum detected value (mg/kg, dry weight):	0.17

TBT	Total Solids			
13	15.7	100	0.157	
14	14.6	100	0.146	
16	16.4	100	0.164	
15	14.8	100	0.148	
24	12.8	100	0.128	
16.4			**0.1486**	**110.3634**
187.5				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-03	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	2.0E-04	mean
BTAG Low HQ:	2.1E-02	max
BTAG High HQ:	3.4E-04	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Arsenic
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.72678
Maximum detected value (mg/kg, dry weight):	22.56098

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E+00	mean
Daily exposure (mg/kg-day)	1.8E+00	max

Hazard Quotients

BTAG Low HQ:	3.1E-01	mean
BTAG High HQ:	7.7E-02	mean
BTAG Low HQ:	3.4E-01	max
BTAG High HQ:	8.4E-02	max

Arsenic	Total Solids			
3.1	15.7	100	0.157	
3.1	14.6	100	0.146	
3.7	16.4	100	0.164	
2.9	14.8	100	0.148	
2.6	12.8	100	0.128	
3.08			**0.1486**	**20.72678**
22.56098				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Cadmium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.273217
Maximum detected value (mg/kg, dry weight):	0.323171

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.51

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-02	mean
Daily exposure (mg/kg-day)	2.7E-02	max

Hazard Quotients

BTAG Low HQ:	2.9E-01	mean
BTAG High HQ:	2.2E-03	mean
BTAG Low HQ:	3.4E-01	max
BTAG High HQ:	2.6E-03	max

Cadmium	Total Solids			
0.033	15.7	100	0.157	
0.037	14.6	100	0.146	
0.053	16.4	100	0.164	
0.042	14.8	100	0.148	
0.038	12.8	100	0.128	
0.0406			**0.1486**	**0.273217**
0.323171				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Chromium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.597577
Maximum detected value (mg/kg, dry weight):	4.6875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-01	mean
Daily exposure (mg/kg-day)	5.0E-01	max

Hazard Quotients

NOAEL HQ:	3.9E-01	mean
LOAEL HQ:	7.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.8E-01	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Chromium	Total Solids			
0.32	15.7	100	0.157	
0.32	14.6	100	0.146	
0.35	16.4	100	0.164	
0.34	14.8	100	0.148	
0.6	12.8	100	0.128	
0.386			**0.1486**	**2.597577**
4.6875				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Copper
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	16.28533
Maximum detected value (mg/kg, dry weight):	24.21875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	260
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E+00	mean
Daily exposure (mg/kg-day)	2.4E+00	max

Hazard Quotients

BTAG Low HQ:	7.7E-01	mean
BTAG High HQ:	3.4E-02	mean
BTAG Low HQ:	1.0E+00	max
BTAG High HQ:	4.6E-02	max

Copper	Total Solids			
2.4	15.7	100	0.157	
2	14.6	100	0.146	
2.4	16.4	100	0.164	
2.2	14.8	100	0.148	
3.1	12.8	100	0.128	
2.42			**0.1486**	**16.28533**
24.21875				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Lead
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.253028
Maximum detected value (mg/kg, dry weight):	7.03125

Lead	Total Solids			
0.46	15.7	100	0.157	
0.53	14.6	100	0.146	
0.69	16.4	100	0.164	
0.58	14.8	100	0.148	
0.9	12.8	100	0.128	
0.632			**0.1486**	**4.253028**
7.03125				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	120

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-01	mean
Daily exposure (mg/kg-day)	7.8E-01	max

Hazard Quotients

BTAG Low HQ:	4.0E+01	mean
BTAG High HQ:	6.3E-02	mean
BTAG Low HQ:	5.6E+01	max
BTAG High HQ:	8.9E-02	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Total Mercury
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106326
Maximum detected value (mg/kg, dry weight):	0.116438

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.2E-02	max

Hazard Quotients

BTAG HQ:	2.8E-01	mean
BTAG HQ:	6.1E-02	mean
BTAG Low HQ:	3.0E-01	max
BTAG High HQ:	6.6E-02	max

Mercury	Total Solids			
0.016	15.7	100	0.157	
0.017	14.6	100	0.146	
0.017	16.4	100	0.164	
0.017	14.8	100	0.148	
0.012	12.8	100	0.128	
0.0158			**0.1486**	**0.106326**
0.116438				

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Nickel
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.43607
Maximum detected value (mg/kg, dry weight):	2.5

Nickel	Total Solids			
0.36	15.7	100	0.157	
0.31	14.6	100	0.146	
0.41	16.4	100	0.164	
0.36	14.8	100	0.148	
0.37	12.8	100	0.128	
0.362			**0.1486**	**2.43607**
2.5				

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	14

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	3.9E-03	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	4.0E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Selenium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845	
Food ingestion rate (kg/day dry wt):	0.23	
Sediment ingestion rate (kg/day dry wt):	0.005	
Area Use Factor (unitless):	1	0.004
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.884253
Maximum detected value (mg/kg, dry weight):	3.125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Selenium	Total Solids			
0.2	15.7	100	0.157	
0.2	14.6	100	0.146	
0.3	16.4	100	0.164	
0.3	14.8	100	0.148	
0.4	12.8	100	0.128	
0.28			**0.1486**	**1.884253**
3.125				

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-01	mean
Daily exposure (mg/kg-day)	2.5E-01	max

Hazard Quotients

BTAG Low HQ:	6.7E-01	mean
BTAG High HQ:	1.7E-01	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	2.7E-01	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.5518
Maximum detected value (mg/kg, dry weight):	146.3415

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+01	mean
Daily exposure (mg/kg-day)	1.2E+01	max

Hazard Quotients

BTAG Low HQ:	6.5E-01	mean
BTAG High HQ:	6.5E-02	mean
BTAG Low HQ:	7.2E-01	max
BTAG High HQ:	7.2E-02	max

Zinc	Total Solids			
18	15.7	100	0.157	
18	14.6	100	0.146	
24	16.4	100	0.164	
18	14.8	100	0.148	
19	12.8	100	0.128	
19.4			**0.1486**	**130.5518**
146.3415				

Tier I - Summary of Hazard Quotients

Receptor: Western Grebe
Location: SW21

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	4.2E-01	--	--	--	4.8E-01	--	--	--	--	--	--
LOAEL HQ:	4.2E-02	--	--	--	9.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	7.9E-01	9.5E-03	2.2E-01	#VALUE!	8.4E-01	**5.0E+01**	2.9E-01	1.4E-01	4.8E-01	5.1E-01
BTAG High HQ:	#VALUE!	5.6E-02	1.5E-04	5.6E-02	#VALUE!	3.7E-02	8.0E-02	6.3E-02	3.4E-03	1.2E-01	5.1E-02
MAXIMUM											
NOAEL HQ:	5.1E-01	--	--	--	6.2E-01	--	--	--	--	--	--
LOAEL HQ:	5.1E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	9.0E-01	1.6E-02	2.4E-01	#VALUE!	**1.0E+00**	**6.1E+01**	3.1E-01	1.4E-01	7.9E-01	5.6E-01
BTAG High HQ:	#VALUE!	6.4E-02	2.5E-04	6.0E-02	#VALUE!	4.5E-02	9.8E-02	6.7E-02	3.5E-03	2.0E-01	5.6E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.928668
Maximum detected value (mg/kg, dry weight):	1.146497

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.5
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.9E-02	mean
Daily exposure (mg/kg-day)	7.1E-02	max

Hazard Quotients

NOAEL HQ:	4.2E-01	mean
LOAEL HQ:	4.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.1E-01	max
LOAEL HQ:	5.1E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.024226
Maximum detected value (mg/kg, dry weight):	1.19863

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.4
Maximum detected value (mg/kg, dry weight):	3.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.1E-02	mean
Daily exposure (mg/kg-day)	8.1E-02	max

Hazard Quotients

BTAG Low HQ:	7.9E-01	mean
BTAG High HQ:	5.6E-02	mean
BTAG Low HQ:	9.0E-01	max
BTAG High HQ:	6.4E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.110363
Maximum detected value (mg/kg, dry weight):	0.1875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.17
Maximum detected value (mg/kg, dry weight):	0.17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.9E-03	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	9.5E-03	mean
BTAG High HQ:	1.5E-04	mean
BTAG Low HQ:	1.6E-02	max
BTAG High HQ:	2.5E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	20.72678
Maximum detected value (mg/kg, dry weight):	22.56098

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.3E+00	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	5.6E-02	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	6.0E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.273217
Maximum detected value (mg/kg, dry weight):	0.323171

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.51

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	1.7E-03	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	2.0E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.597577
Maximum detected value (mg/kg, dry weight):	4.6875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.2E-01	mean
Daily exposure (mg/kg-day)	5.4E-01	max

Hazard Quotients

NOAEL HQ:	4.8E-01	mean
LOAEL HQ:	9.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	6.2E-01	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	16.28533
Maximum detected value (mg/kg, dry weight):	24.21875

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	260
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E+00	mean
Daily exposure (mg/kg-day)	2.4E+00	max

Hazard Quotients

BTAG Low HQ:	8.4E-01	mean
BTAG High HQ:	3.7E-02	mean
BTAG Low HQ:	1.0E+00	max
BTAG High HQ:	4.5E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	4.253028
Maximum detected value (mg/kg, dry weight):	7.03125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	120

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.0E-01	mean
Daily exposure (mg/kg-day)	8.6E-01	max

Hazard Quotients

BTAG Low HQ:	5.0E+01	mean
BTAG High HQ:	8.0E-02	mean
BTAG Low HQ:	6.1E+01	max
BTAG High HQ:	9.8E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.106326
Maximum detected value (mg/kg, dry weight):	0.116438

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.2E-02	max

Hazard Quotients

BTAG Low HQ:	2.9E-01	mean
BTAG High HQ:	6.3E-02	mean
BTAG Low HQ:	3.1E-01	max
BTAG High HQ:	6.7E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.43607
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	14

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	2.0E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.4E-03	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	3.5E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.884253
Maximum detected value (mg/kg, dry weight):	3.125

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients

BTAG Low HQ:	4.8E-01	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	7.9E-01	max
BTAG High HQ:	2.0E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: SW21

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	130.5518
Maximum detected value (mg/kg, dry weight):	146.3415

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	330
Maximum detected value (mg/kg, dry weight):	330

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.7E+00	mean
Daily exposure (mg/kg-day)	9.6E+00	max

Hazard Quotients

BTAG Low HQ:	5.1E-01	mean
BTAG High HQ:	5.1E-02	mean
BTAG Low HQ:	5.6E-01	max
BTAG High HQ:	5.6E-02	max

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Tier I - Summary of Hazard Quotients

Receptor: **Surf Scoter**
Location: **SW28**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	4.2E-01	--	--	--	3.4E-01	--	--	--	--	--	--
LOAEL HQ:	4.2E-02	--	--	--	6.8E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.6E-01	7.2E-03	2.1E-01	#VALUE!	7.1E-01	**3.4E+01**	2.4E-01	1.4E-01	4.1E-01	4.7E-01
BTAG High HQ:	#VALUE!	4.0E-02	1.2E-04	5.3E-02	#VALUE!	3.1E-02	5.5E-02	5.3E-02	3.5E-03	1.0E-01	4.7E-02
MAXIMUM											
NOAEL HQ:	4.1E-01	--	--	--	3.6E-01	--	--	--	--	--	--
LOAEL HQ:	4.1E-02	--	--	--	7.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	6.2E-01	8.7E-03	2.3E-01	#VALUE!	7.9E-01	**3.6E+01**	2.7E-01	1.6E-01	6.4E-01	5.6E-01
BTAG High HQ:	#VALUE!	4.4E-02	1.4E-04	5.7E-02	#VALUE!	3.5E-02	5.7E-02	5.8E-02	3.9E-03	1.6E-01	5.6E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.87969
Maximum detected value (mg/kg, dry weight):	0.858896

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.1
Maximum detected value (mg/kg, dry weight):	3.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.9E-02	mean
Daily exposure (mg/kg-day)	5.8E-02	max

Hazard Quotients

NOAEL HQ:	4.2E-01	mean
LOAEL HQ:	4.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.1E-01	max
LOAEL HQ:	4.1E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCB Congeners
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.786546
Maximum detected value (mg/kg, dry weight):	0.877419

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.1
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.1E-02	mean
Daily exposure (mg/kg-day)	5.6E-02	max

Hazard Quotients

BTAG Low HQ:	5.6E-01	mean
BTAG High HQ:	4.0E-02	mean
BTAG Low HQ:	6.2E-01	max
BTAG High HQ:	4.4E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.084088
Maximum detected value (mg/kg, dry weight):	0.103226

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-03	mean
Daily exposure (mg/kg-day)	6.4E-03	max

Hazard Quotients

BTAG Low HQ:	7.2E-03	mean
BTAG High HQ:	1.2E-04	mean
BTAG Low HQ:	8.7E-03	max
BTAG High HQ:	1.4E-04	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.92238
Maximum detected value (mg/kg, dry weight):	21.47239

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	5.3E-02	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	5.7E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.241915
Maximum detected value (mg/kg, dry weight):	0.325153

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.9E-02	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	1.4E-03	mean
BTAG Low HQ:	2.4E-01	max
BTAG High HQ:	1.9E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.552393
Maximum detected value (mg/kg, dry weight):	1.840491

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	63
Maximum detected value (mg/kg, dry weight):	63

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-01	mean
Daily exposure (mg/kg-day)	3.1E-01	max

Hazard Quotients

NOAEL HQ:	3.4E-01	mean
LOAEL HQ:	6.8E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.6E-01	max
LOAEL HQ:	7.2E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.58344
Maximum detected value (mg/kg, dry weight):	16.56442

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	270
Maximum detected value (mg/kg, dry weight):	270

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E+00	mean
Daily exposure (mg/kg-day)	1.8E+00	max

Hazard Quotients

BTAG Low HQ:	7.1E-01	mean
BTAG High HQ:	3.1E-02	mean
BTAG Low HQ:	7.9E-01	max
BTAG High HQ:	3.5E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.781371
Maximum detected value (mg/kg, dry weight):	3.128834

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	100
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.8E-01	mean
Daily exposure (mg/kg-day)	5.0E-01	max

Hazard Quotients

BTAG Low HQ:	3.4E+01	mean
BTAG High HQ:	5.5E-02	mean
BTAG Low HQ:	3.6E+01	max
BTAG High HQ:	5.7E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.112549
Maximum detected value (mg/kg, dry weight):	0.129032

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.98
Maximum detected value (mg/kg, dry weight):	0.98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.5E-03	mean
Daily exposure (mg/kg-day)	1.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	5.3E-02	mean
BTAG Low HQ:	2.7E-01	max
BTAG High HQ:	5.8E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.496766
Maximum detected value (mg/kg, dry weight):	2.944785

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	2.2E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.5E-03	mean
BTAG Low HQ:	1.6E-01	max
BTAG High HQ:	3.9E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617076
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.4E-02	mean
Daily exposure (mg/kg-day)	1.5E-01	max

Hazard Quotients

BTAG Low HQ:	4.1E-01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	6.4E-01	max
BTAG High HQ:	1.6E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.859
Food ingestion rate (kg/day dry wt):	0.048
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	125.4851
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	310
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.0E+00	mean
Daily exposure (mg/kg-day)	9.6E+00	max

Hazard Quotients

BTAG Low HQ:	4.7E-01	mean
BTAG High HQ:	4.7E-02	mean
BTAG Low HQ:	5.6E-01	max
BTAG High HQ:	5.6E-02	max

Tier I - Summary of Hazard Quotients

Receptor: Sea Lion
Location: SW28

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	2.3E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.1E-03	--	--	--	--	--	--
BTAG Low HQ:	1.6E-02	5.2E-02	7.9E-03	**1.4E+00**	#VALUE!	1.8E-01	1.3E-01	1.2E-01	5.0E-01	7.3E-01	3.1E-01
BTAG High HQ:	6.5E-04	1.5E-02	1.3E-04	9.5E-02	#VALUE!	7.7E-04	5.4E-04	1.2E-02	2.1E-03	3.0E-02	7.2E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	2.5E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.2E-03	--	--	--	--	--	--
BTAG Low HQ:	1.6E-02	5.8E-02	9.6E-03	**1.5E+00**	#VALUE!	2.1E-01	1.4E-01	1.3E-01	5.7E-01	1.2E+00	3.7E-01
BTAG High HQ:	6.4E-04	1.6E-02	1.6E-04	1.0E-01	#VALUE!	8.7E-04	5.7E-04	1.3E-02	2.4E-03	4.8E-02	8.7E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Benzo[a]pyrene
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.87969
Maximum detected value (mg/kg, dry weight):	0.858896

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.1
Maximum detected value (mg/kg, dry weight):	3.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-02	mean
Daily exposure (mg/kg-day)	2.1E-02	max

Hazard Quotients

BTAG Low HQ:	1.6E-02	mean
BTAG High HQ:	6.5E-04	mean
BTAG Low HQ:	1.6E-02	max
BTAG High HQ:	6.4E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total PCB Congeners
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.786546
Maximum detected value (mg/kg, dry weight):	0.877419

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.1
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.1E-02	max

Hazard Quotients

BTAG Low HQ:	5.2E-02	mean
BTAG High HQ:	1.5E-02	mean
BTAG Low HQ:	5.8E-02	max
BTAG High HQ:	1.6E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Tributyltin
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.084088
Maximum detected value (mg/kg, dry weight):	0.103226

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-03	mean
Daily exposure (mg/kg-day)	2.4E-03	max

Hazard Quotients

BTAG Low HQ:	7.9E-03	mean
BTAG High HQ:	1.3E-04	mean
BTAG Low HQ:	9.6E-03	max
BTAG High HQ:	1.6E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Arsenic
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.92238
Maximum detected value (mg/kg, dry weight):	21.47239

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.5E-01	mean
Daily exposure (mg/kg-day)	4.8E-01	max

Hazard Quotients

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	9.5E-02	mean
BTAG Low HQ:	1.5E+00	max
BTAG High HQ:	1.0E-01	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Cadmium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.241915
Maximum detected value (mg/kg, dry weight):	0.325153

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.6E-03	mean
Daily exposure (mg/kg-day)	7.4E-03	max

Hazard Quotients

BTAG Low HQ:	9.3E-02	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	2.8E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Chromium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.552393
Maximum detected value (mg/kg, dry weight):	1.840491

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	63
Maximum detected value (mg/kg, dry weight):	63

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.7E-02	mean
Daily exposure (mg/kg-day)	8.4E-02	max

Hazard Quotients

NOAEL HQ:	2.3E-02	mean
LOAEL HQ:	1.1E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.5E-02	max
LOAEL HQ:	1.2E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Copper
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.58344
Maximum detected value (mg/kg, dry weight):	16.56442

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	270
Maximum detected value (mg/kg, dry weight):	270

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.8E-01	mean
Daily exposure (mg/kg-day)	5.5E-01	max

Hazard Quotients

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	7.7E-04	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	8.7E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Lead
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.781371
Maximum detected value (mg/kg, dry weight):	3.128834

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	100
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients

BTAG Low HQ:	1.3E-01	mean
BTAG High HQ:	5.4E-04	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	5.7E-04	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Total Mercury
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.112549
Maximum detected value (mg/kg, dry weight):	0.129032

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.98
Maximum detected value (mg/kg, dry weight):	0.98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E-03	mean
Daily exposure (mg/kg-day)	3.5E-03	max

Hazard Quotients

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	1.2E-02	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	1.3E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Nickel
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.496766
Maximum detected value (mg/kg, dry weight):	2.944785

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.7E-02	mean
Daily exposure (mg/kg-day)	7.6E-02	max

Hazard Quotients

BTAG Low HQ:	5.0E-01	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	5.7E-01	max
BTAG High HQ:	2.4E-03	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Selenium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617076
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.6E-02	mean
Daily exposure (mg/kg-day)	5.8E-02	max

Hazard Quotients

BTAG Low HQ:	7.3E-01	mean
BTAG High HQ:	3.0E-02	mean
BTAG Low HQ:	1.2E+00	max
BTAG High HQ:	4.8E-02	max

Hazard Quotient Calculation

Receptor: Sea Lion
Chemical: Zinc
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	45
Food ingestion rate (kg/day dry wt):	0.99
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	125.4851
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	310
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E+00	mean
Daily exposure (mg/kg-day)	3.6E+00	max

Hazard Quotients

BTAG Low HQ:	3.1E-01	mean
BTAG High HQ:	7.2E-03	mean
BTAG Low HQ:	3.7E-01	max
BTAG High HQ:	8.7E-03	max

Tier I - Summary of Hazard Quotients

Receptor: CA Least Tern
Location: SW28

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	7.9E-01	--	--	--	3.9E-01	--	--	--	--	--	--
LOAEL HQ:	7.9E-02	--	--	--	7.8E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.1E+00**	1.4E-02	4.3E-01	#VALUE!	9.8E-01	**4.1E+01**	4.0E-01	2.4E-01	8.4E-01	9.0E-01
BTAG High HQ:	#VALUE!	7.7E-02	2.3E-04	1.1E-01	#VALUE!	4.3E-02	6.5E-02	8.7E-02	6.0E-03	2.1E-01	9.0E-02
MAXIMUM											
NOAEL HQ:	7.8E-01	--	--	--	4.3E-01	--	--	--	--	--	--
LOAEL HQ:	7.8E-02	--	--	--	8.6E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.2E+00**	1.7E-02	4.7E-01	#VALUE!	**1.1E+00**	**4.4E+01**	4.5E-01	2.8E-01	**1.3E+00**	**1.1E+00**
BTAG High HQ:	#VALUE!	8.5E-02	2.7E-04	1.2E-01	#VALUE!	5.0E-02	7.0E-02	9.8E-02	6.9E-03	3.3E-01	1.1E-01

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Benzo[a]pyrene
Location:	SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.87969
Maximum detected value (mg/kg, dry weight):	0.858896

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.1
Maximum detected value (mg/kg, dry weight):	3.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

NOAEL HQ:	7.9E-01	mean
LOAEL HQ:	7.9E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	7.8E-01	max
LOAEL HQ:	7.8E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCB Congeners
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.786546
Maximum detected value (mg/kg, dry weight):	0.877419

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.1
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.8E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

BTAG Low HQ:	1.1E+00	mean
BTAG High HQ:	7.7E-02	mean
BTAG Low HQ:	1.2E+00	max
BTAG High HQ:	8.5E-02	max

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Tributyltin
Location:	SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.084088
Maximum detected value (mg/kg, dry weight):	0.103226

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG Low HQ:	1.4E-02	mean
BTAG High HQ:	2.3E-04	mean
BTAG Low HQ:	1.7E-02	max
BTAG High HQ:	2.7E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.92238
Maximum detected value (mg/kg, dry weight):	21.47239

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E+00	mean
Daily exposure (mg/kg-day)	2.6E+00	max

Hazard Quotients

BTAG Low HQ:	4.3E-01	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	4.7E-01	max
BTAG High HQ:	1.2E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.241915
Maximum detected value (mg/kg, dry weight):	0.325153

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-02	mean
Daily exposure (mg/kg-day)	3.9E-02	max

Hazard Quotients

BTAG Low HQ:	3.7E-01	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	4.9E-01	max
BTAG High HQ:	3.8E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.552393
Maximum detected value (mg/kg, dry weight):	1.840491

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	63
Maximum detected value (mg/kg, dry weight):	63

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-01	mean
Daily exposure (mg/kg-day)	3.7E-01	max

Hazard Quotients

NOAEL HQ:	3.9E-01	mean
LOAEL HQ:	7.8E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.3E-01	max
LOAEL HQ:	8.6E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.58344
Maximum detected value (mg/kg, dry weight):	16.56442

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	270
Maximum detected value (mg/kg, dry weight):	270

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E+00	mean
Daily exposure (mg/kg-day)	2.6E+00	max

Hazard Quotients

BTAG Low HQ:	9.8E-01	mean
BTAG High HQ:	4.3E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	5.0E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.781371
Maximum detected value (mg/kg, dry weight):	3.128834

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	100
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.7E-01	mean
Daily exposure (mg/kg-day)	6.1E-01	max

Hazard Quotients

BTAG Low HQ:	4.1E+01	mean
BTAG High HQ:	6.5E-02	mean
BTAG Low HQ:	4.4E+01	max
BTAG High HQ:	7.0E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.112549
Maximum detected value (mg/kg, dry weight):	0.129032

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.98
Maximum detected value (mg/kg, dry weight):	0.98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

BTAG Low HQ:	4.0E-01	mean
BTAG High HQ:	8.7E-02	mean
BTAG Low HQ:	4.5E-01	max
BTAG High HQ:	9.8E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.496766
Maximum detected value (mg/kg, dry weight):	2.944785

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-01	mean
Daily exposure (mg/kg-day)	3.9E-01	max

Hazard Quotients

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	6.0E-03	mean
BTAG Low HQ:	2.8E-01	max
BTAG High HQ:	6.9E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617076
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	3.1E-01	max

Hazard Quotients

BTAG Low HQ:	8.4E-01	mean
BTAG High HQ:	2.1E-01	mean
BTAG Low HQ:	1.3E+00	max
BTAG High HQ:	3.3E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	125.4851
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	310
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E+01	mean
Daily exposure (mg/kg-day)	1.9E+01	max

Hazard Quotients

BTAG Low HQ:	9.0E-01	mean
BTAG High HQ:	9.0E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	1.1E-01	max

Tier I - Summary of Hazard Quotients

Receptor: **Green Turtle**
Location: **SW28**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.5E-02	--	--	--	2.0E-02	--	--	--	--	--	--
LOAEL HQ:	2.5E-03	--	--	--	4.0E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.3E-02	4.2E-04	1.2E-02	#VALUE!	4.2E-02	**2.0E+00**	1.4E-02	8.3E-03	2.4E-02	2.7E-02
BTAG High HQ:	#VALUE!	2.3E-03	6.7E-06	3.1E-03	#VALUE!	1.9E-03	3.3E-03	3.1E-03	2.0E-04	5.9E-03	2.7E-03
MAXIMUM											
NOAEL HQ:	2.4E-02	--	--	--	2.1E-02	--	--	--	--	--	--
LOAEL HQ:	2.4E-03	--	--	--	4.3E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.6E-02	5.1E-04	1.3E-02	#VALUE!	4.6E-02	**2.1E+00**	1.6E-02	9.4E-03	3.8E-02	3.3E-02
BTAG High HQ:	#VALUE!	2.6E-03	8.1E-06	3.3E-03	#VALUE!	2.0E-03	3.4E-03	3.4E-03	2.3E-04	9.3E-03	3.3E-03

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Benzo[a]pyrene
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.87969
Maximum detected value (mg/kg, dry weight):	0.858896

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.1
Maximum detected value (mg/kg, dry weight):	3.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.5E-03	mean
Daily exposure (mg/kg-day)	3.4E-03	max

Hazard Quotients

NOAEL HQ:	2.5E-02	mean
LOAEL HQ:	2.5E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.4E-02	max
LOAEL HQ:	2.4E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total PCB Congeners
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.786546
Maximum detected value (mg/kg, dry weight):	0.877419

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.1
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E-03	mean
Daily exposure (mg/kg-day)	3.3E-03	max

Hazard Quotients

BTAG Low HQ:	3.3E-02	mean
BTAG High HQ:	2.3E-03	mean
BTAG Low HQ:	3.6E-02	max
BTAG High HQ:	2.6E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Tributyltin
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.084088
Maximum detected value (mg/kg, dry weight):	0.103226

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E-04	mean
Daily exposure (mg/kg-day)	3.7E-04	max

Hazard Quotients

BTAG Low HQ:	4.2E-04	mean
BTAG High HQ:	6.7E-06	mean
BTAG Low HQ:	5.1E-04	max
BTAG High HQ:	8.1E-06	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Arsenic
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.92238
Maximum detected value (mg/kg, dry weight):	21.47239

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	7.3E-02	max

Hazard Quotients

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	3.1E-03	mean
BTAG Low HQ:	1.3E-02	max
BTAG High HQ:	3.3E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Cadmium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.241915
Maximum detected value (mg/kg, dry weight):	0.325153

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.6E-04	mean
Daily exposure (mg/kg-day)	1.1E-03	max

Hazard Quotients

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	8.3E-05	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	1.1E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Chromium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.552393
Maximum detected value (mg/kg, dry weight):	1.840491

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	63
Maximum detected value (mg/kg, dry weight):	63

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients

NOAEL HQ:	2.0E-02	mean
LOAEL HQ:	4.0E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.1E-02	max
LOAEL HQ:	4.3E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Copper
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.58344
Maximum detected value (mg/kg, dry weight):	16.56442

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	270
Maximum detected value (mg/kg, dry weight):	270

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.7E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients

BTAG Low HQ:	4.2E-02	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	4.6E-02	max
BTAG High HQ:	2.0E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Lead
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.781371
Maximum detected value (mg/kg, dry weight):	3.128834

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	100
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-02	mean
Daily exposure (mg/kg-day)	3.0E-02	max

Hazard Quotients

BTAG Low HQ:	2.0E+00	mean
BTAG High HQ:	3.3E-03	mean
BTAG Low HQ:	2.1E+00	max
BTAG High HQ:	3.4E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Total Mercury
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.112549
Maximum detected value (mg/kg, dry weight):	0.129032

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.98
Maximum detected value (mg/kg, dry weight):	0.98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.6E-04	mean
Daily exposure (mg/kg-day)	6.1E-04	max

Hazard Quotients

BTAG Low HQ:	1.4E-02	mean
BTAG High HQ:	3.1E-03	mean
BTAG Low HQ:	1.6E-02	max
BTAG High HQ:	3.4E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Nickel
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.496766
Maximum detected value (mg/kg, dry weight):	2.944785

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients

BTAG Low HQ:	8.3E-03	mean
BTAG High HQ:	2.0E-04	mean
BTAG Low HQ:	9.4E-03	max
BTAG High HQ:	2.3E-04	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Selenium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617076
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-03	mean
Daily exposure (mg/kg-day)	8.6E-03	max

Hazard Quotients

BTAG Low HQ:	2.4E-02	mean
BTAG High HQ:	5.9E-03	mean
BTAG Low HQ:	3.8E-02	max
BTAG High HQ:	9.3E-03	max

Hazard Quotient Calculation

Receptor: Green Turtle
Chemical: Zinc
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.31
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	125.4851
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	310
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.7E-01	mean
Daily exposure (mg/kg-day)	5.6E-01	max

Hazard Quotients

BTAG Low HQ:	2.7E-02	mean
BTAG High HQ:	2.7E-03	mean
BTAG Low HQ:	3.3E-02	max
BTAG High HQ:	3.3E-03	max

Hazard Quotient Calculation

Receptor: Brown Pelican
Chemical: Zinc
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	2.845
Food ingestion rate (kg/day dry wt):	0.23
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	125.4851
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	310
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+01	mean
Daily exposure (mg/kg-day)	1.3E+01	max

Hazard Quotients

BTAG Low HQ:	6.2E-01	mean
BTAG High HQ:	6.2E-02	mean
BTAG Low HQ:	7.5E-01	max
BTAG High HQ:	7.5E-02	max

Zinc	Total Solids			
18	15.7	100	0.157	
15	14.3	100	0.143	
22	15.5	100	0.155	
25	16.3	100	0.163	
17	15.5	100	0.155	
19.4			**0.1546**	**125.4851**
153.3742				

Tier I - Summary of Hazard Quotients

Receptor: **Western Grebe**
Location: **SW28**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	4.4E-01	--	--	--	3.8E-01	--	--	--	--	--	--
LOAEL HQ:	4.4E-02	--	--	--	7.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.9E-01	7.5E-03	2.2E-01	#VALUE!	7.9E-01	**3.9E+01**	2.6E-01	1.5E-01	4.2E-01	4.8E-01
BTAG High HQ:	#VALUE!	4.2E-02	1.2E-04	5.4E-02	#VALUE!	3.5E-02	6.2E-02	5.6E-02	3.7E-03	1.0E-01	4.8E-02
MAXIMUM											
NOAEL HQ:	4.3E-01	--	--	--	4.0E-01	--	--	--	--	--	--
LOAEL HQ:	4.3E-02	--	--	--	8.1E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	6.4E-01	9.0E-03	2.3E-01	#VALUE!	8.6E-01	**4.0E+01**	2.8E-01	1.7E-01	6.6E-01	5.8E-01
BTAG High HQ:	#VALUE!	4.6E-02	1.4E-04	5.8E-02	#VALUE!	3.8E-02	6.4E-02	6.2E-02	4.1E-03	1.6E-01	5.8E-02

NOTE:

HQ values bold faced and shaded are greater than an HQ threshold value of 1.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.87969
Maximum detected value (mg/kg, dry weight):	0.858896

Sediment Chemical Concentrations (from Table B1-5 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	3.1
Maximum detected value (mg/kg, dry weight):	3.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.2E-02	mean
Daily exposure (mg/kg-day)	6.1E-02	max

Hazard Quotients

NOAEL HQ:	4.4E-01	mean
LOAEL HQ:	4.4E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.3E-01	max
LOAEL HQ:	4.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCB Congeners
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.786546
Maximum detected value (mg/kg, dry weight):	0.877419

Sediment Chemical Concentrations (from Table B1-7 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	2.1
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-02	mean
Daily exposure (mg/kg-day)	5.8E-02	max

Hazard Quotients

BTAG Low HQ:	5.9E-01	mean
BTAG High HQ:	4.2E-02	mean
BTAG Low HQ:	6.4E-01	max
BTAG High HQ:	4.6E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.084088
Maximum detected value (mg/kg, dry weight):	0.103226

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.18
Maximum detected value (mg/kg, dry weight):	0.18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-03	mean
Daily exposure (mg/kg-day)	6.6E-03	max

Hazard Quotients

BTAG Low HQ:	7.5E-03	mean
BTAG High HQ:	1.2E-04	mean
BTAG Low HQ:	9.0E-03	max
BTAG High HQ:	1.4E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	19.92238
Maximum detected value (mg/kg, dry weight):	21.47239

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.3E+00	max

Hazard Quotients

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	5.4E-02	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	5.8E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.241915
Maximum detected value (mg/kg, dry weight):	0.325153

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients

BTAG Low HQ:	1.9E-01	mean
BTAG High HQ:	1.5E-03	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	1.9E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.552393
Maximum detected value (mg/kg, dry weight):	1.840491

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	63
Maximum detected value (mg/kg, dry weight):	63

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-01	mean
Daily exposure (mg/kg-day)	3.5E-01	max

Hazard Quotients

NOAEL HQ:	3.8E-01	mean
LOAEL HQ:	7.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.0E-01	max
LOAEL HQ:	8.1E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	13.58344
Maximum detected value (mg/kg, dry weight):	16.56442

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	270
Maximum detected value (mg/kg, dry weight):	270

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E+00	mean
Daily exposure (mg/kg-day)	2.0E+00	max

Hazard Quotients

BTAG Low HQ:	7.9E-01	mean
BTAG High HQ:	3.5E-02	mean
BTAG Low HQ:	8.6E-01	max
BTAG High HQ:	3.8E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.781371
Maximum detected value (mg/kg, dry weight):	3.128834

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	100
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.4E-01	mean
Daily exposure (mg/kg-day)	5.6E-01	max

Hazard Quotients

BTAG Low HQ:	3.9E+01	mean
BTAG High HQ:	6.2E-02	mean
BTAG Low HQ:	4.0E+01	max
BTAG High HQ:	6.4E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	0.112549
Maximum detected value (mg/kg, dry weight):	0.129032

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	0.98
Maximum detected value (mg/kg, dry weight):	0.98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients

BTAG Low HQ:	2.6E-01	mean
BTAG High HQ:	5.6E-02	mean
BTAG Low HQ:	2.8E-01	max
BTAG High HQ:	6.2E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	2.496766
Maximum detected value (mg/kg, dry weight):	2.944785

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	17

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.7E-03	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	4.1E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	1.617076
Maximum detected value (mg/kg, dry weight):	2.580645

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.6E-02	mean
Daily exposure (mg/kg-day)	1.5E-01	max

Hazard Quotients

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	6.6E-01	max
BTAG High HQ:	1.6E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: SW28

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.808
Food ingestion rate (kg/day dry wt):	0.046
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (Macoma)

Mean detected value (mg/kg, dry weight):	125.4851
Maximum detected value (mg/kg, dry weight):	153.3742

Sediment Chemical Concentrations (from Table B1-3 of NASSCO/SWM DSI Volume II)

Mean detected value (mg/kg, dry weight):	310
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.3E+00	mean
Daily exposure (mg/kg-day)	9.9E+00	max

Hazard Quotients

BTAG Low HQ:	4.8E-01	mean
BTAG High HQ:	4.8E-02	mean
BTAG Low HQ:	5.8E-01	max
BTAG High HQ:	5.8E-02	max

24. Finding 24: Tier II Baseline Comprehensive Risk Assessment for Aquatic-Dependent Wildlife

Finding 24 of CAO No. R9-2012-0024 states:

The Tier II risk assessment objective was to more conclusively determine whether or not Shipyard Sediment Site conditions pose an unacceptable risk to aquatic-dependent wildlife receptors of concern. The receptors of concern selected for the assessment include: California least tern (*Sterna antillarum brownie*), California brown pelican (*Pelecanus occidentalis californicus*), Western grebe (*Aechmophorus occidentalis*), Surf scoter (*Melanitta perspicillata*), California sea lion (*Zalophus californianus*), and East Pacific green turtle (*Chelonia mydas agassizii*). Based on the Tier I screening level risk assessment results, there is a potential risk to all receptors of concern ingesting prey caught at the Shipyard Sediment Site and so a Tier II assessment was conducted. To focus the risk assessment, prey items were collected within four assessment units at the Shipyard Sediment Site and from a reference area located across the bay from the site. Chemical concentrations measured in fish were used to estimate chemical exposure for the least tern, western grebe, brown pelican, and sea lion and chemical concentrations in benthic mussels and eelgrass were used to estimate chemical pollutant exposure for the surf scoter and green turtle, respectively. Based on the Tier II risk assessment results, ingestion of prey items caught within all four assessment units at the Shipyard Sediment Site poses an increased risk above reference to all receptors of concern (excluding the sea lion). The chemicals in prey tissue posing a risk include BAP, PCBs, copper, lead, mercury, and zinc.

24.1. Tier II Results

For the Tier II risk assessment, six aquatic-dependent wildlife species were identified as potential receptors that could be at risk due to exposure to chemicals in prey caught at the Shipyard Sediment Site. The six receptors include: California least tern (*Sterna antillarum brownie*), California brown pelican (*Pelecanus occidentalis californicus*), Western grebe (*Aechmophorus occidentalis*), Surf scoter (*Melanitta perspicillata*), California sea lion (*Zalophus californianus*), and East Pacific green turtle (*Chelonia mydas agassizii*). Chemical concentrations measured in fish were used to estimate chemical pollutant exposure for the least tern, western grebe, brown pelican, and sea lion and chemical concentrations in benthic mussels and eelgrass were used to estimate chemical pollutant exposure for the surf scoter and green turtle, respectively.

Based on the Tier II results, as summarized in Table 24-1 and Table 24-2 below, the San Diego Water Board determined that ingestion of prey caught within all four assessment units at the Shipyard Sediment Site poses a risk to all aquatic-dependent wildlife receptors of concern (excluding the sea lion). The chemicals in prey tissue posing a risk include BAP, total polychlorinated biphenyls (PCBs), copper, lead, mercury, and zinc. NOAEL HQs exceeded 1.0 for some chemicals and receptors and there were no LOAEL HQs that exceeded 1.0 for any receptor or chemical (see Section 24.2.4 and Table 24-3). The Tier II risk calculations and results are provided in the Appendix for Section 24.

Table 24-1 Summary of Tier II Aquatic-Dependent Wildlife Risk Assessment Results for NASSCO Leasehold for NOAEL TRVs

Assessment Unit	Receptor	Site Chemicals in Prey Tissue Posing Risk [1]	Site Chemicals in Prey Tissue Not Posing Risk[2]
Inside NASSCO Leasehold	Brown Pelican	PCBs, lead, mercury	BAP, tributyltin (TBT), arsenic, chromium, copper, nickel, selenium, zinc
	Least Tern	PCBs, lead, zinc	BAP, TBT, arsenic, chromium, copper, mercury, nickel, selenium
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	copper, lead	BAP, PCBs, TBT, arsenic, chromium, mercury, nickel, selenium, zinc
	Western Grebe	lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Green Turtle	lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
Outside NASSCO Leasehold	Brown Pelican	PCBs, lead, mercury	BAP, TBT, arsenic, chromium, copper, nickel, selenium, zinc
	Least Tern	PCBs, lead, zinc	BAP, TBT, arsenic, chromium, copper, mercury nickel, selenium
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Western Grebe	PCBs, lead	BAP, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc

1. NOAEL HQ is greater than 1.0 and greater than the reference hazard quotient.
2. NOAEL HQ is less than 1.0 and less than the reference hazard quotient.

Table 24-2 Summary of Tier II Aquatic-Dependent Wildlife Risk Assessment Results for BAE Systems Leasehold for NOAEL TRVs

Assessment Unit	Receptor	Site Chemicals in Prey Tissue Posing Risk[1]	Site Chemicals in Prey Tissue Not Posing Risk[2]
Inside BAE Systems Leasehold	Brown Pelican	PCBs, lead, mercury	BAP, TBT, arsenic, chromium, copper, nickel, selenium, zinc
	Least Tern	PCBs, lead, zinc	BAP, TBT, arsenic, chromium, copper, mercury, nickel, selenium
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Surf Scoter	BAP, copper, lead	PCBs, TBT, arsenic, chromium, mercury, nickel, selenium, zinc
	Western Grebe	PCBs, lead	BAP, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
	Green Turtle	lead	BAP, PCBs, TBT, arsenic, chromium, copper, mercury, nickel, selenium, zinc
Outside BAE Systems Leasehold	Brown Pelican	PCBs, lead, mercury	BAP, TBT, arsenic, chromium, copper, nickel, selenium, zinc
	Least Tern	PCBs, lead, zinc	BAP, TBT, arsenic, chromium, copper, mercury, nickel, selenium
	Sea Lion	NONE	BAP, PCBs, TBT, arsenic, chromium, copper, lead, mercury, nickel, selenium, zinc
	Western Grebe	PCBs, lead	BAP, TBT, arsenic, chromium, copper, mercury nickel, selenium, zinc

1. NOAEL HQ is greater than 1.0 and greater than the reference hazard quotient.
2. NOAEL HQ is less than 1.0 and less than the reference hazard quotient.

Table 24-3 Summary of Tier II Risk Assessment Hazard Quotients

Receptor Location	Arsenic		Chromium		Copper		Lead	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Brown Pelican								
Inside NASSCO	0.03	0.0076	0.18	0.035	0.3	0.013	**14**	0.023
Outside NASSCO	0.041	0.01	0.33	0.066	0.24	0.011	**11**	0.018
Inside SWM	0.037	0.0093	0.27	0.055	0.58	0.026	**19**	0.031
Outside SWM	0.038	0.0095	0.13	0.025	0.31	0.014	**10**	0.017
Reference	0.026	0.0064	0.1	0.02	0.16	0.0069	**4.2**	0.0068
Green Turtle								
Inside NASSCO	0.003	0.00075	0.057	0.011	0.33	0.015	**6.3**	0.01
Inside SWM	0.0042	0.0011	0.093	0.019	0.37	0.016	**8.3**	0.013
Reference	0.0019	0.00048	0.024	0.0047	0.06	0.0026	**1.7**	0.0028
Least Tern								
Inside NASSCO	0.058	0.015	0.26	0.053	0.48	0.021	**18**	0.028
Outside NASSCO	0.066	0.016	0.2	0.041	0.41	0.018	**13**	0.021
Inside SWM	0.077	0.019	0.27	0.054	0.93	0.041	**33**	0.052
Outside SWM	0.087	0.022	0.21	0.041	0.51	0.022	**17**	0.027
Reference	0.053	0.013	0.6	0.12	0.46	0.02	**9.5**	0.015
Sea Lion								
Inside NASSCO	0.14	0.0093	0.012	0.00057	0.068	0.00029	0.052	0.00022
Outside NASSCO	0.18	0.012	0.022	0.0011	0.054	0.00023	0.041	0.00017
Inside SWM	0.17	0.011	0.019	0.00089	0.13	0.00055	0.07	0.00029
Outside SWM	0.17	0.012	0.0085	0.00041	0.07	0.0003	0.038	0.00016
Reference	0.12	0.0078	0.0069	0.00033	0.035	0.00015	0.015	0.000064
Surf Scoter								
Inside NASSCO	0.15	0.038	0.5	0.099	**1.8**	0.079	**38**	0.061
Inside SWM	0.16	0.041	0.38	0.076	**1.6**	0.069	**39**	0.063
Reference	0.095	0.024	0.45	0.09	0.67	0.029	**19**	0.03
Western Grebe								
Inside NASSCO	0.0072	0.029	0.24	0.048	0.016	0.37	**17**	0.028
Outside NASSCO	0.031	0.0078	0.17	0.034	0.26	0.011	**12**	0.019
Inside SWM	0.038	0.0095	0.24	0.048	0.67	0.03	**27**	0.044
Outside SWM	0.04	0.01	0.17	0.034	0.31	0.014	**14**	0.022
Reference	0.025	0.0062	0.31	0.063	0.24	0.011	**6.6**	0.011

Table 24-3 Summary of Tier II Risk Assessment Hazard Quotients (continued)

Receptor Location	Mercury		Nickel		Selenium		Zinc	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Brown Pelican								
Inside NASSCO	**1.3**	0.28	0.076	0.0019	0.62	0.15	0.28	0.028
Outside NASSCO	**1.2**	0.26	0.076	0.0019	0.55	0.14	0.29	0.029
Inside SWM	**1.1**	0.24	0.086	0.0021	0.86	0.21	0.32	0.032
Outside SWM	**1.1**	0.24	0.067	0.0017	0.42	0.1	0.24	0.024
Reference	0.86	0.19	0.057	0.0014	0.19	0.047	0.25	0.025
Green Turtle								
Inside NASSCO	0.017	0.0036	0.013	0.00031	0.011	0.0028	0.078	0.0078
Inside SWM	0.031	0.0066	0.02	0.00048	0.011	0.0028	0.082	0.0082
Reference	0.0051	0.0011	0.0092	0.00022	0.01	0.0025	0.039	0.0039
Least Tern								
Inside NASSCO	0.32	0.07	0.078	0.0019	0.25	0.062	**1.0**	0.1
Outside NASSCO	0.31	0.068	0.071	0.0017	0.3	0.074	**1.2**	0.12
Inside SWM	0.34	0.074	0.11	0.0026	0.27	0.068	**1.0**	0.1
Outside SWM	0.38	0.081	0.077	0.0019	0.31	0.078	**1.0**	0.1
Reference	0.21	0.045	0.19	0.0047	0.52	0.13	0.82	0.082
Sea Lion								
Inside NASSCO	0.49	0.049	0.21	0.00086	0.75	0.031	0.13	0.003
Outside NASSCO	0.45	0.045	0.21	0.00087	0.67	0.027	0.14	0.0032
Inside SWM	0.41	0.041	0.23	0.00097	**1.0**	0.043	0.15	0.0035
Outside SWM	0.42	0.042	0.18	0.00077	0.5	0.021	0.11	0.0026
Reference	0.32	0.032	0.16	0.00065	0.23	0.0093	0.12	0.0028
Surf Scoter								
Inside NASSCO	0.21	0.046	0.32	0.0079	0.78	0.19	0.33	0.033
Inside SWM	0.22	0.047	0.19	0.0045	0.9	0.22	0.39	0.039
Reference	0.13	0.028	0.15	0.0038	0.84	0.21	0.26	0.026
Western Grebe								
Inside NASSCO	0.038	0.18	0.0013	0.053	0.029	0.12	0.047	0.47
Outside NASSCO	0.16	0.034	0.044	0.0011	0.14	0.034	0.55	0.055
Inside SWM	0.2	0.042	0.069	0.0017	0.13	0.032	0.5	0.05
Outside SWM	0.19	0.042	0.046	0.0011	0.15	0.036	0.48	0.048
Reference	0.1	0.022	0.09	0.0022	0.23	0.057	0.37	0.037

Table 24-3 Summary of Tier II Risk Assessment Hazard Quotients (continued)

Receptor Location	Benzo[a]pyrene		PCBs		TBT	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Brown Pelican						
Inside NASSCO	0.24	0.024	**3.3**	0.23	0.0094	0.00015
Outside NASSCO	0.2	0.02	**1.5**	0.11	0.018	0.00028
Inside SWM	0.35	0.035	**3.5**	0.25	0.015	0.00024
Outside SWM	0.2	0.02	**2.1**	0.15	0.014	0.00022
Reference	0.18	0.018	**1.2**	0.088	0.0044	0.00007
Green Turtle						
Inside NASSCO	0.029	0.0029	0.0033	0.00023	0.00007	1.1E-06
Inside SWM	0.09	0.009	0.0092	0.00065	0.00024	3.7E-06
Reference	0.014	0.0014	0.002	0.00014	0.000017	2.8E-07
Least Tern						
Inside NASSCO	0.29	0.029	**2**	0.14	0.0052	0.000082
Outside NASSCO	0.29	0.029	**2.4**	0.17	0.0069	0.00011
Inside SWM	0.52	0.052	**3**	0.21	0.012	0.00019
Outside SWM	0.32	0.032	**2.3**	0.16	0.02	0.00032
Reference	0.22	0.022	**1.3**	0.093	0.0052	0.000082
Sea Lion						
Inside NASSCO	0.0066	0.00026	0.22	0.061	0.0071	0.00012
Outside NASSCO	0.0055	0.00022	0.098	0.028	0.013	0.00022
Inside SWM	0.0099	0.00039	0.23	0.065	0.011	0.00019
Outside SWM	0.0057	0.00023	0.14	0.039	0.01	0.00017
Reference	0.0049	0.0002	0.081	0.023	0.0034	0.000056
Surf Scoter						
Inside NASSCO	0.75	0.075	0.37	0.026	0.032	0.00051
Inside SWM	**2.1**	0.21	0.57	0.04	0.04	0.00063
Reference	0.3	0.03	0.44	0.031	0.011	0.00017
Western Grebe						
Inside NASSCO	0.17	0.017	0.062	0.88	0.000043	0.0027
Outside NASSCO	0.15	0.015	**1.0**	0.074	0.0032	0.000051
Inside SWM	0.38	0.038	**1.4**	0.096	0.0064	0.0001
Outside SWM	0.16	0.016	**1.0**	0.073	0.0088	0.00014
Reference	0.1	0.01	0.57	0.041	0.0023	0.000036

Note: Reference HQs are based on samples collected in the vicinity of Station 2240.

24.2. Tier II Approach

The San Diego Water Board conducted a Tier II ecological risk assessment (i.e., baseline risk assessment) to more conclusively determine whether or not the current conditions at the Shipyard Sediment Site pose unacceptable risks to aquatic-dependent wildlife receptors of concern and to identify the need for remedial action. Risks were characterized by: (1) quantifying the risks at the site, and (2) comparing the site risks to the risks calculated at the reference areas.

The approach used in the baseline risk assessment was conducted in accordance with U.S. EPA's "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (Interim Final)" (U.S. EPA, 1997a) and with DTSC's "Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities" (DTSC, 1996). The approach consists of the following key elements:

- Selection of Receptors of Concern
- Exposure Characterization
- Effects Characterization
- Risk Characterization
- Risk Management
- Uncertainties Related to Risk Estimates

These key elements are discussed in more detail below.

24.2.1. Selection of Receptors of Concern

For Tier II, fish-eating marine birds and mammals, mollusk-eating birds, and sea grass-eating reptiles were identified as important groups of aquatic-dependent wildlife that could be at risk due to exposure to chemicals in prey species at the Shipyard Sediment Site (Exponent, 2003). Six species were identified as suitable representative receptors for assessing potential risk to these groups as reviewed and approved by U.S. FWS, DFG, and NOAA (collectively known as the "Natural Resource Trustee Agencies"). The six species are shown in Table 24-4 below. These receptors were selected based on characteristics such as their presence at the site, feeding habits, known adverse effects from exposure to bioaccumulative contaminants, the availability of ample life history information in the literature, and federal or state listings of species as threatened or endangered.

Table 24-4 Receptors Selected for the Tier II Risk Assessment

Receptor	Scientific Name	Representative of	Comments
California least tern	*Sterna antillarum brownie*	Marine birds that may feed on small fish	Federal and California listed endangered species
California brown pelican	*Pelecanus occidentalis californicus*	Marine birds that may feed on small- to medium-sized fish	Federal and California listed endangered species
Western grebe	*Aechmophorus occidentalis*	Diving marine birds that may feed on small fish	
Surf scoter	*Melanitta perspicillata*	Diving marine birds that may feed on mollusks	
California sea lion	*Zalophus californianus*	Marine mammals that may feed on medium-sized fish	
East Pacific green turtle	*Chelonia mydas agassizii*	Marine reptiles that may feed on sea grasses	Listed as threatened wherever found and listed as endangered in Florida and on the Pacific coast of Mexico

24.2.2. Exposure Characterization

To focus the baseline risk assessment, the Shipyard Sediment Site was divided into four discrete assessment units to identify areas with a greater likelihood for adverse ecological effects to the receptors of concern (Exponent, 2003):

- Inside NASSCO – the area inside the NASSCO leasehold
- Outside NASSCO – the area between the NASSCO leasehold and the shipping channel
- Inside BAE Systems – the area inside the BAE Systems leasehold
- Outside BAE Systems – the area between the BAE Systems leasehold and the shipping channel.

The primary routes of exposure to pollutants at the Shipyard Sediment Site are through the ingestion of prey items and the incidental ingestion of sediment during foraging (Exponent, 2003). Separate chemical pollutant exposure estimates were developed for each receptor in each of the four assessment units using prey tissue and sediment chemical pollutant data collected at the Shipyard Sediment Site. The following prey items were used to estimate exposure to chemical pollutants in food for the receptors of concern:

Table 24-5 Prey Items Used in the Tier II Risk Assessment

Receptor	Prey Item	Scientific Name	Areas Collected
California least tern	Topsmelt	*Atherinops affinis*	Inside NASSCO
	Anchovies	*Engraulis mordax*	Outside NASSCO Inside/outside SWM
California brown pelican	Spotted sand bass	*Paralabrax masculatofasciatus*	Inside/outside NASSCO Inside/outside SWM
Western grebe	Topsmelt	*Atherinops affinis*	Inside NASSCO
	Anchovies	*Engraulis mordax*	Outside NASSCO Inside/outside SWM
Surf scoter	Benthic Mussels	*Musculista senhousei*	Inside NASSCO Inside SWM
California sea lion	Spotted sand bass	*Paralabrax masculatofasciatus*	Inside/outside NASSCO Inside/outside SWM
East Pacific green turtle	Eelgrass	*Zostera marina*	Inside NASSCO Inside SWM

Exposure estimates for the six receptors were developed using the following general intake equation (DTSC, 1996):

$$\textbf{Daily Intake}_{\textbf{chemical}}\ \textbf{(in mg/kg - day)} = \frac{(\mathbf{CM * CR * FI * AF})}{\mathbf{BW}}$$

where:

CM	=	concentration of the chemical in a given dietary component or inert medium (mg/kg)
CR	=	contact rate (i.e., ingestion rate) of dietary component or inert medium (kg/day)
FI	=	fraction of the daily intake of a given dietary component or inert medium derived from the site (unitless area-use factor)
AF	=	relative gastrointestinal absorption efficiency for the chemical in a given dietary component or inert medium (fraction)
BW	=	body weight of receptor species (kg)

The intake equation was further expanded to account for the ingestion of prey items and the incidental ingestion of sediment:

$$\textbf{Daily Intake}_{\textbf{chemical}}\ \textbf{(in mg/kg - day)} = \frac{\lfloor(\mathbf{CM * CR * FI * AF})_{\mathbf{prey}} + (\mathbf{CM * CR * FI * AF})_{\mathbf{sediment}}\rfloor}{\mathbf{BW}}$$

The assumptions used by the San Diego Water Board in the expanded equation to estimate receptor exposure at each assessment unit are shown in Table 24-6 below and the exposure estimate calculations using these assumptions are provided in the Appendix for Section 24.

Table 24-6 Exposure Parameters for Tier II Baseline Risk Assessment

Receptor	Prey Tissue Concentration (mg/kg dry wt)	Sediment Chemical Concentration (mg/kg dry wt)	Body Weight[1] (kg)	Food Ingestion Rate[1] (kg/day dry wt)	Sediment Ingestion Rate[1] (kg/day dry wt)	Area Use Factor	Absorption Efficiency
California brown pelican	Mean Detected Value	Mean Detected Value	3.174	0.25	0.005	1	1
California least tern	Mean Detected Value	Mean Detected Value	0.045	0.0053	0.00011	1	1
Western grebe	Mean Detected Value	Mean Detected Value	1.2	0.062	0.0031	1	1
Surf scoter	Mean Detected Value	Mean Detected Value	1.05	0.056	0.0028	1	1
California sea lion	Mean Detected Value	Mean Detected Value	75	1.54	0.0308	1	1
East Pacific green turtle	Mean Detected Value	Mean Detected Value	95	0.35	0.0186	1	1

1. Exponent, 2003

24.2.3. Effects Characterization

Characterizing potential adverse effects to the receptors of concern requires a comparison of the receptor-specific exposure estimates to an appropriate toxicity reference value (TRV). As recommended by the Natural Resource Trustee Agencies, exposure estimates for the baseline risk assessment were compared to TRVs developed by BTAG (DTSC, 2000). The BTAG TRVs were developed jointly by the U.S. Navy, Navy consultants, and regulatory agencies, including the U.S. EPA, DTSC – Human and Ecological Risk Division, San Diego Water Board, NOAA, U.S. FWS, Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA), and DFG. The U.S. EPA, DTSC, and the other agencies endorse and recommend the use of the BTAG TRVs for ecological risk assessments conducted in California and in U.S. EPA Region 9.

The BTAG TRVs are presented as an upper and lower estimate of effects thresholds. The low-TRV is based on no-adverse-effects-levels (NOAELs) and represents a threshold below which no adverse effects are expected. The high-TRV is based on an approximate midpoint of the range of effects levels and represents a threshold above which adverse effects are likely to occur. The BTAG low and high TRVs for birds and mammals (site CoPCs only) are shown in Table 24-7 below. Because BTAG TRVs are not available for BAP for birds and chromium for birds and mammals, the NOAELs and low-adverse-effects-levels (LOAELs) identified by Exponent (2003) were used (Table 24-8). It should be noted that suitable reptilian TRVs were not found in the literature (Exponent, 2003). Therefore, avian TRVs were used to estimate potential adverse effects to the East Pacific green turtle.

Table 24-7 U.S. Navy/U.S. EPA Region 9 BTAG Toxicity Reference Values for Birds and Mammals (Shipyard Chemicals of Potential Concern Only)

Chemical	Birds		Mammals	
	Low TRV (mg/kg-day)	High TRV (mg/kg-day)	Low TRV (mg/kg-day)	High TRV (mg/kg-day)
Arsenic	5.5	22.0	0.32	4.7
Benzo[a]pyrene	Not Available	Not Available	1.31	32.8
Butyltins	0.73	45.9	0.25	15
Cadmium	0.08	10.4	0.06	2.64
Chromium	Not Available	Not Available	Not Available	Not Available
Copper	2.3	52.3	2.67	632
Lead	0.014	8.75	1.0	241
Mercury	0.039	0.18	0.027	0.27
	Not Available	Not Available	0.25	4.0
Nickel	1.38	56.3	0.133	31.6
PCBs	0.09	1.27	0.36	1.28
Selenium	0.23	0.93	0.05	1.21
Zinc	17.2	172	9.6	411

Table 24-8 NOAELs and LOAELs for Benzo[a]pyrene and Chromium Identified by Exponent

Chemical	Birds		Mammals	
	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)
Benzo[a]pyrene	014	1.4	Not Used	Not Used
Chromium	0.86	4.3	3.3	69

(Exponent, 2003)

24.2.4. Risk Characterization

For the baseline risk assessment, the San Diego Water Board characterized potential risks of adverse effects to the receptors of concern by quantifying the risks at each of the four assessments. Risks were estimated by integrating the exposure and effects assessments in Sections 24.2.2 and 24.2.3 above using the hazard quotient approach:

$$\mathbf{HQ}_{\mathbf{low}} = \mathbf{IR}_{\mathbf{chemical}} / \mathbf{TRV}_{\mathbf{low}}$$

$$\mathbf{HQ}_{\mathbf{high}} = \mathbf{IR}_{\mathbf{chemical}} / \mathbf{TRV}_{\mathbf{high}}$$

HQ	=	hazard quotient (unitless)
$IR_{chemical}$	=	total ingestion rate of the chemical (mg/kg body weight-day)
TRV	=	BTAG low or high toxicity reference value (mg/kg body weight-day)

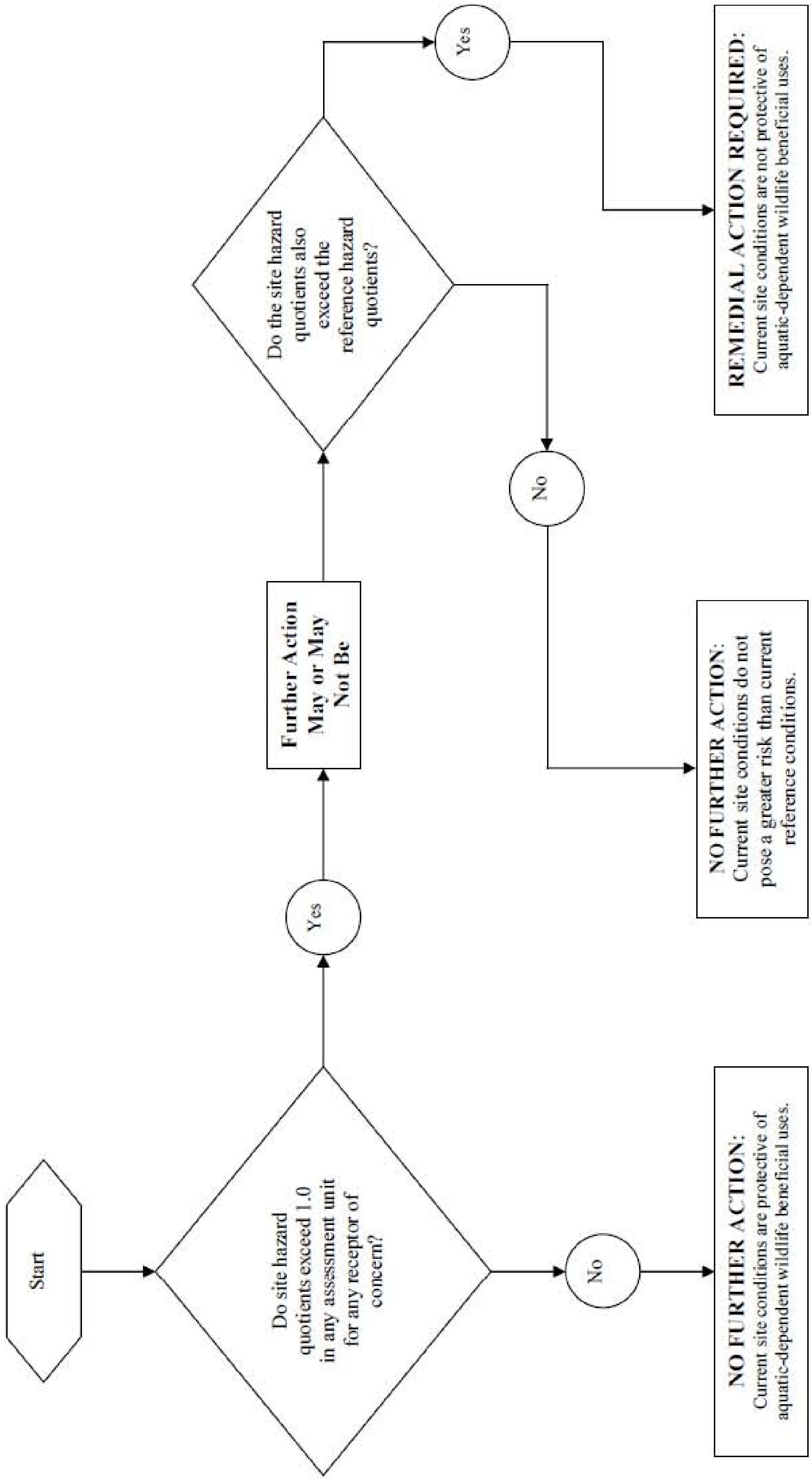
An HQ value less than 1.0 indicates that the chemical is unlikely to exceed the TRV for the receptor of concern. An HQ value greater than 1.0 indicates that the receptor's exposure to the chemical pollutant is predicted to exceeded the TRV, which could indicate that there is a potential that some fraction of the population may experience an adverse effect (Exponent, 2003). The significance of any HQ greater than 1.0 depends in large part on the relevance of the TRV. In this assessment, HQs were calculated for two risk thresholds. The TRV_{low} is a no-effect level (i.e., a level at which no effects are predicted). The TRV_{high} is a demonstrated effect level. The actual threshold of adverse effects is predicted to lie somewhere between these two thresholds. The HQ calculations and risk characterization results for each receptor of concern at each assessment unit are provided in the Appendix for Section 24 and summarized in Table 24-3.

In addition to characterizing the risks at the Shipyard Sediment Site, risks were also characterized at a reference area to determine whether or not the site poses a greater risk to the receptors of concern than reference conditions in San Diego Bay. The reference area, located in the vicinity of Reference Station 2240, is located across the bay from the Shipyard Sediment Site (Exponent, 2003). Spotted sand bass, topsmelt, anchovies, benthic mussels, and eelgrass were collected from this reference area and the chemical concentrations from these prey items were used to estimate exposure to the receptors of concern. Risks at the reference area were calculated using the same CoPCs, exposure assumptions, and TRVs as those identified above for the Shipyard Sediment Site. The HQ calculations and risk characterization results for the reference area are provided in the Appendix for Section 24.

24.2.5. Risk Management

The San Diego Water Board identified two risk management decisions: (1) Current site conditions pose acceptable risks and no further action is warranted, and (2) Current site conditions pose unacceptable risks that require remedial action. These two management decisions are based on the risk characterization results at the Shipyard Sediment Site and at the reference area. A flow diagram showing how each management decision is triggered is shown below in Figure 24-1.

Figure 24-1 Flow Diagram for Tier II Aquatic-Dependent Wildlife Risk Management Decisions



24.2.6. Uncertainties Related to Risk Estimates

The process of evaluating aquatic-dependent wildlife risk involves multiple steps. Inherent in each step of the risk assessment process are uncertainties that ultimately affect the risk estimates. Uncertainties may exist in numerous areas such as estimation of potential site exposures and derivation of toxicity values. The most significant uncertainties in the Tier II risk analysis for the Shipyard Sediment Site are discussed below.

Area Use Factor. In the Shipyard Report, Exponent used area use factors for the aquatic-dependent wildlife risk assessment based on an analysis of the fraction of theoretical suitable foraging habitat represented by the Shipyard Site relative to San Diego Bay. This approach assumes that the Shipyards are equally attractive to foraging receptors as other potential foraging habitats throughout the Bay.

TRV for Reptiles. For this risk assessment, avian TRVs were used as a surrogate for estimating risk to reptiles (specifically, East Pacific green turtle) because no appropriate reptile TRVs could be found for any site chemical of concern (Exponent, 2003). Avian TRVs were selected because birds are considered to be more taxonomically similar to reptiles than are mammals. This may underestimate or overestimate risks to the East Pacific green turtle.

Fish Home Range. Spotted sand bass, topsmelt, and anchovies were collected in four discrete assessment units at the Shipyard Sediment Site: inside NASSCO leasehold, outside NASSCO leasehold, inside BAE Systems leasehold, and outside BAE Systems leasehold. It is assumed that the assessment units bound the home range for these fish and that the observed tissue chemical concentrations are based exclusively from exposure within these areas. This may, however, not be indicative of their actual exposures because these fish may feed beyond the assessment unit boundaries. Therefore, the estimated risk to the receptors of concern ingesting the fish may not characterize actual exposures to the Shipyard Sediment Site.

Composite Prey Samples. Forage fish and mussel samples were composited within each assessment unit to provide an adequate sample size for analytical purposes (Exponent, 2003). This is considered to be representative of the actual exposure received by the receptors of concern because they would typically catch and consume a wide range of prey across each unit. However, compositing may reduce the contribution of the most highly contaminated prey items ingested in the exposure assessment.

Mean Chemical Concentrations. The exposure estimates in this risk assessment are based on mean chemical concentrations in prey items and incidentally ingested sediment. This reflects spatial variation in chemical concentrations across each assessment unit and represents the actual exposure received by the receptors of concern utilizing the entire assessment unit while foraging for prey. This may, however, reduce the contribution of the most highly contaminated prey items ingested in the exposure assessment.

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for
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Order No. R9-2012-0024

APPENDIX FOR SECTION 24

TIER II BASELINE RISK ASSESSMENT FOR AQUATIC-DEPENDENT WILDLIFE

March 14, 2012

Tier II - Summary of Hazard Quotients

Receptor: Surf Scoter

Location: Inside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	7.5E-01	--	--	--	5.0E-01	--	--	--	--	--	--
LOAEL HQ:	7.5E-02	--	--	--	9.9E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.7E-01	3.2E-02	1.5E-01	#VALUE!	**1.8E+00**	**3.8E+01**	2.1E-01	3.2E-01	7.8E-01	3.3E-01
BTAG High HQ:	#VALUE!	2.6E-02	5.1E-04	3.8E-02	#VALUE!	7.9E-02	6.1E-02	4.6E-02	7.9E-03	1.9E-01	3.3E-02
MAXIMUM											
NOAEL HQ:	**1.2E+00**	--	--	--	6.8E-01	--	--	--	--	--	--
LOAEL HQ:	1.2E-01	--	--	--	1.4E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.7E-01	3.9E-02	1.5E-01	#VALUE!	**2.4E+00**	**5.0E+01**	3.2E-01	4.2E-01	8.3E-01	4.1E-01
BTAG High HQ:	#VALUE!	3.3E-02	6.3E-04	3.9E-02	#VALUE!	1.1E-01	7.9E-02	7.0E-02	1.0E-02	2.0E-01	4.1E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.0E-01	--	--	--	4.5E-01	--	--	--	--	--	--
LOAEL HQ:	3.0E-02	--	--	--	9.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	4.4E-01	1.1E-02	9.5E-02	#DIV/0!	6.7E-01	1.9E+01	1.3E-01	1.5E-01	8.4E-01	2.6E-01
BTAG High HQ:	#DIV/0!	3.1E-02	1.7E-04	2.4E-02	#DIV/0!	2.9E-02	3.0E-02	2.8E-02	3.8E-03	2.1E-01	2.6E-02
MAXIMUM											
NOAEL HQ:	3.0E-01	--	--	--	4.5E-01	--	--	--	--	--	--
LOAEL HQ:	3.0E-02	--	--	--	9.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	4.4E-01	1.1E-02	9.5E-02	#DIV/0!	6.7E-01	1.9E+01	1.3E-01	1.5E-01	8.4E-01	2.6E-01
BTAG High HQ:	#DIV/0!	3.1E-02	1.7E-04	2.4E-02	#DIV/0!	2.9E-02	3.0E-02	2.8E-02	3.8E-03	2.1E-01	2.6E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.775
Maximum detected value (mg/kg, dry weight):	2.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	16

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.7E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	7.5E-01	mean
LOAEL HQ:	7.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.2E+00	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	0.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	1.7

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-02	mean
Daily exposure (mg/kg-day)	4.2E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.7E-01	mean
BTAG High HQ:	2.6E-02	mean
BTAG Low HQ:	4.7E-01	max
BTAG High HQ:	3.3E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05	
Food ingestion rate (kg/day dry wt):	0.056	
Sediment ingestion rate (kg/day dry wt):	0.0028	
Area Use Factor (unitless):	1	0.004
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.425
Maximum detected value (mg/kg, dry weight):	0.47

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-02	mean
Daily exposure (mg/kg-day)	2.9E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.2E-02	mean
BTAG High HQ:	5.1E-04	mean
BTAG Low HQ:	3.9E-02	max
BTAG High HQ:	6.3E-04	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	15

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.3E-01	mean
Daily exposure (mg/kg-day)	8.5E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.8E-02	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	3.9E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.34
Maximum detected value (mg/kg, dry weight):	0.37

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.31
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-02	mean
Daily exposure (mg/kg-day)	2.1E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	1.8E-03	mean
BTAG Low HQ:	2.6E-01	max
BTAG High HQ:	2.0E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.5
Maximum detected value (mg/kg, dry weight):	6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-01	mean
Daily exposure (mg/kg-day)	5.9E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	5.0E-01	mean
LOAEL HQ:	9.9E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	6.8E-01	max
LOAEL HQ:	1.4E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	65
Maximum detected value (mg/kg, dry weight):	80

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	510

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E+00	mean
Daily exposure (mg/kg-day)	5.6E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.8E+00	mean
BTAG High HQ:	7.9E-02	mean
BTAG Low HQ:	2.4E+00	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	5.5
Maximum detected value (mg/kg, dry weight):	6.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	90
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-01	mean
Daily exposure (mg/kg-day)	6.9E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.8E+01	mean
BTAG High HQ:	6.1E-02	mean
BTAG Low HQ:	5.0E+01	max
BTAG High HQ:	7.9E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.11
Maximum detected value (mg/kg, dry weight):	0.12

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.9
Maximum detected value (mg/kg, dry weight):	2.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.3E-03	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	2.1E-01	mean
BTAG HQ:	4.6E-02	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	7.0E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	7.5
Maximum detected value (mg/kg, dry weight):	9.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	27

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.5E-01	mean
Daily exposure (mg/kg-day)	5.8E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	7.9E-03	mean
BTAG Low HQ:	4.2E-01	max
BTAG High HQ:	1.0E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.3
Maximum detected value (mg/kg, dry weight):	3.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.8E-01	mean
BTAG High HQ:	1.9E-01	mean
BTAG Low HQ:	8.3E-01	max
BTAG High HQ:	2.0E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	90
Maximum detected value (mg/kg, dry weight):	100

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	320
Maximum detected value (mg/kg, dry weight):	620

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.7E+00	mean
Daily exposure (mg/kg-day)	7.0E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.3E-01	mean
BTAG High HQ:	3.3E-02	mean
BTAG Low HQ:	4.1E-01	max
BTAG High HQ:	4.1E-02	max

Tier II - Summary of Hazard Quotients

Receptor: **Sea Lion**

Location: Inside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	1.2E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	5.7E-04	--	--	--	--	--	--
BTAG Low HQ:	6.6E-03	2.2E-01	7.1E-03	1.4E-01	#VALUE!	6.8E-02	5.2E-02	4.9E-01	2.1E-01	7.5E-01	1.3E-01
BTAG High HQ:	2.6E-04	6.1E-02	1.2E-04	9.3E-03	#VALUE!	2.9E-04	2.2E-04	4.9E-02	8.6E-04	3.1E-02	3.0E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	1.6E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	7.7E-04	--	--	--	--	--	--
BTAG Low HQ:	1.1E-02	4.6E-01	1.5E-02	1.8E-01	#VALUE!	1.5E-01	7.4E-02	6.1E-01	2.7E-01	**1.0E+00**	1.7E-01
BTAG High HQ:	4.2E-04	1.3E-01	2.6E-04	1.2E-02	#VALUE!	6.1E-04	3.1E-04	6.1E-02	1.1E-03	4.1E-02	3.9E-03

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	6.9E-03	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	3.3E-04	--	--	--	--	--	--
BTAG Low HQ:	4.9E-03	8.1E-02	3.4E-03	1.2E-01	#DIV/0!	3.5E-02	1.5E-02	3.2E-01	1.6E-01	2.3E-01	1.2E-01
BTAG High HQ:	2.0E-04	2.3E-02	5.6E-05	7.8E-03	#DIV/0!	1.5E-04	6.4E-05	3.2E-02	6.5E-04	9.3E-03	2.8E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	1.1E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	5.3E-04	--	--	--	--	--	--
BTAG Low HQ:	5.4E-03	1.1E-01	6.7E-03	1.4E-01	#DIV/0!	7.0E-02	2.7E-02	4.8E-01	1.8E-01	2.5E-01	1.4E-01
BTAG High HQ:	2.1E-04	3.1E-02	1.1E-04	9.5E-03	#DIV/0!	2.9E-04	1.1E-04	4.8E-02	7.5E-04	1.0E-02	3.2E-03

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.34
Maximum detected value (mg/kg, dry weight):	0.357

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	16

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.6E-03	mean
Daily exposure (mg/kg-day)	1.4E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.6E-03	mean
BTAG High HQ:	2.6E-04	mean
BTAG Low HQ:	1.1E-02	max
BTAG High HQ:	4.2E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.763
Maximum detected value (mg/kg, dry weight):	8.108

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	1.7

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.8E-02	mean
Daily exposure (mg/kg-day)	1.7E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.2E-01	mean
BTAG High HQ:	6.1E-02	mean
BTAG Low HQ:	4.6E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.083
Maximum detected value (mg/kg, dry weight):	0.16

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-03	mean
Daily exposure (mg/kg-day)	3.9E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.1E-03	mean
BTAG High HQ:	1.2E-04	mean
BTAG Low HQ:	1.5E-02	max
BTAG High HQ:	2.6E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-02	mean
Daily exposure (mg/kg-day)	5.9E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	9.3E-03	mean
BTAG Low HQ:	1.8E-01	max
BTAG High HQ:	1.2E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.084
Maximum detected value (mg/kg, dry weight):	0.084

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.31
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-03	mean
Daily exposure (mg/kg-day)	1.9E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.1E-02	mean
BTAG High HQ:	7.0E-04	mean
BTAG Low HQ:	3.2E-02	max
BTAG High HQ:	7.2E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75	
Food ingestion rate (kg/day dry wt):	1.54	
Sediment ingestion rate (kg/day dry wt):	0.0308	
Area Use Factor (unitless):	1	0.004
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.59

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-02	mean
Daily exposure (mg/kg-day)	5.3E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.2E-02	mean
LOAEL HQ:	5.7E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.6E-02	max
LOAEL HQ:	7.7E-04	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.9
Maximum detected value (mg/kg, dry weight):	8.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	510

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	3.9E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.8E-02	mean
BTAG High HQ:	2.9E-04	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	6.1E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.74
Maximum detected value (mg/kg, dry weight):	1

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	90
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E-02	mean
Daily exposure (mg/kg-day)	7.4E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.2E-02	mean
BTAG High HQ:	2.2E-04	mean
BTAG Low HQ:	7.4E-02	max
BTAG High HQ:	3.1E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.62
Maximum detected value (mg/kg, dry weight):	0.75

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.9
Maximum detected value (mg/kg, dry weight):	2.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027	0.25
BTAG High (mg/kg-day):	0.27	4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	4.9E-01	mean
BTAG HQ:	4.9E-02	mean
BTAG Low HQ:	6.1E-01	max
BTAG High HQ:	6.1E-02	max

Hazard Quotient Calculation

Receptor:	CA Sea Lion
Chemical:	Nickel
Location:	Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.99
Maximum detected value (mg/kg, dry weight):	1.2

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	27

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-02	mean
Daily exposure (mg/kg-day)	3.6E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	8.6E-04	mean
BTAG Low HQ:	2.7E-01	max
BTAG High HQ:	1.1E-03	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.8
Maximum detected value (mg/kg, dry weight):	2.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-02	mean
Daily exposure (mg/kg-day)	5.0E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.5E-01	mean
BTAG High HQ:	3.1E-02	mean
BTAG Low HQ:	1.0E+00	max
BTAG High HQ:	4.1E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	54
Maximum detected value (mg/kg, dry weight):	66

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	320
Maximum detected value (mg/kg, dry weight):	620

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.6E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.3E-01	mean
BTAG High HQ:	3.0E-03	mean
BTAG Low HQ:	1.7E-01	max
BTAG High HQ:	3.9E-03	max

Tier II - Summary of Hazard Quotients

Receptor: **Least Tern**

Location: Inside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.9E-01	--	--	--	2.6E-01	--	--	--	--	--	--
LOAEL HQ:	2.9E-02	--	--	--	5.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**<u>2.0E+00</u>**	5.2E-03	5.8E-02	#VALUE!	4.8E-01	**<u>1.8E+01</u>**	3.2E-01	7.8E-02	2.5E-01	**<u>1.0E+00</u>**
BTAG High HQ:	#VALUE!	1.4E-01	8.2E-05	1.5E-02	#VALUE!	2.1E-02	2.8E-02	7.0E-02	1.9E-03	6.2E-02	1.0E-01
MAXIMUM											
NOAEL HQ:	5.0E-01	--	--	--	3.5E-01	--	--	--	--	--	--
LOAEL HQ:	5.0E-02	--	--	--	7.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**<u>2.0E+00</u>**	9.2E-03	6.2E-02	#VALUE!	7.5E-01	**<u>2.5E+01</u>**	4.1E-01	9.6E-02	2.5E-01	**<u>1.1E+00</u>**
BTAG High HQ:	#VALUE!	1.4E-01	1.5E-04	1.5E-02	#VALUE!	3.3E-02	4.0E-02	8.9E-02	2.3E-03	6.3E-02	1.1E-01

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.2E-01	--	--	--	6.0E-01	--	--	--	--	--	--
LOAEL HQ:	2.2E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.3E+00	5.2E-03	5.3E-02	#DIV/0!	4.6E-01	9.5E+00	2.1E-01	1.9E-01	5.2E-01	8.2E-01
BTAG High HQ:	#DIV/0!	9.3E-02	8.2E-05	1.3E-02	#DIV/0!	2.0E-02	1.5E-02	4.5E-02	4.7E-03	1.3E-01	8.2E-02
MAXIMUM											
NOAEL HQ:	2.3E-01	--	--	--	6.0E-01	--	--	--	--	--	--
LOAEL HQ:	2.3E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.4E+00	6.6E-03	5.7E-02	#DIV/0!	5.1E-01	1.3E+01	2.5E-01	2.3E-01	6.7E-01	8.8E-01
BTAG High HQ:	#DIV/0!	1.0E-01	1.1E-04	1.4E-02	#DIV/0!	2.3E-02	2.0E-02	5.5E-02	5.8E-03	1.7E-01	8.8E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.266
Maximum detected value (mg/kg, dry weight):	0.266

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	16

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-02	mean
Daily exposure (mg/kg-day)	7.0E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.9E-01	mean
LOAEL HQ:	2.9E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.0E-01	max
LOAEL HQ:	5.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.505
Maximum detected value (mg/kg, dry weight):	1.505

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	1.7

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.0E+00	mean
BTAG High HQ:	1.4E-01	mean
BTAG Low HQ:	2.0E+00	max
BTAG High HQ:	1.4E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.028
Maximum detected value (mg/kg, dry weight):	0.028

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E-03	mean
Daily exposure (mg/kg-day)	6.7E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.2E-03	mean
BTAG High HQ:	8.2E-05	mean
BTAG Low HQ:	9.2E-03	max
BTAG High HQ:	1.5E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.2E-01	mean
Daily exposure (mg/kg-day)	3.4E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.8E-02	mean
BTAG High HQ:	1.5E-02	mean

BTAG Low HQ:	6.2E-02	max
BTAG High HQ:	1.5E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.031
Maximum detected value (mg/kg, dry weight):	0.031

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.31
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-03	mean
Daily exposure (mg/kg-day)	4.8E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.5E-02	mean
BTAG High HQ:	4.2E-04	mean
BTAG Low HQ:	6.0E-02	max
BTAG High HQ:	4.6E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.47
Maximum detected value (mg/kg, dry weight):	0.47

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.6E-01	mean
LOAEL HQ:	5.3E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.5E-01	max
LOAEL HQ:	7.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.1
Maximum detected value (mg/kg, dry weight):	4.1

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	510

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.7E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.8E-01	mean
BTAG High HQ:	2.1E-02	mean
BTAG Low HQ:	7.5E-01	max
BTAG High HQ:	3.3E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.24
Maximum detected value (mg/kg, dry weight):	0.24

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	90
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-01	mean
Daily exposure (mg/kg-day)	3.5E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.8E+01	mean
BTAG High HQ:	2.8E-02	mean
BTAG Low HQ:	2.5E+01	max
BTAG High HQ:	4.0E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045	
Food ingestion rate (kg/day dry wt):	0.0053	
Sediment ingestion rate (kg/day dry wt):	0.00011	
Area Use Factor (unitless):	1	0.003
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.088
Maximum detected value (mg/kg, dry weight):	0.088

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.9
Maximum detected value (mg/kg, dry weight):	2.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	3.2E-01	mean
BTAG HQ:	7.0E-02	mean
BTAG Low HQ:	4.1E-01	max
BTAG High HQ:	8.9E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.56
Maximum detected value (mg/kg, dry weight):	0.56

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	27

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.3E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.8E-02	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	9.6E-02	max
BTAG High HQ:	2.3E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.47
Maximum detected value (mg/kg, dry weight):	0.47

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.8E-02	mean
Daily exposure (mg/kg-day)	5.9E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.5E-01	mean
BTAG High HQ:	6.2E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	6.3E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	141
Maximum detected value (mg/kg, dry weight):	141

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	320
Maximum detected value (mg/kg, dry weight):	620

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E+01	mean
Daily exposure (mg/kg-day)	1.8E+01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	1.1E-01	max

Tier II - Summary of Hazard Quotients

Receptor: Green Turtle

Location: Inside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.9E-02	--	--	--	5.7E-02	--	--	--	--	--	--
LOAEL HQ:	2.9E-03	--	--	--	1.1E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	3.3E-03	7.0E-05	3.0E-03	#VALUE!	3.3E-01	**6.3E+00**	1.7E-02	1.3E-02	1.1E-02	7.8E-02
BTAG High HQ:	#VALUE!	2.3E-04	1.1E-06	7.5E-04	#VALUE!	1.5E-02	1.0E-02	3.6E-03	3.1E-04	2.8E-03	7.8E-03
MAXIMUM											
NOAEL HQ:	4.5E-02	--	--	--	6.4E-02	--	--	--	--	--	--
LOAEL HQ:	4.5E-03	--	--	--	1.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.7E-03	3.9E-04	3.3E-03	#VALUE!	3.6E-01	**6.8E+00**	2.4E-02	1.4E-02	1.2E-02	8.1E-02
BTAG High HQ:	#VALUE!	4.0E-04	6.2E-06	8.1E-04	#VALUE!	1.6E-02	1.1E-02	5.2E-03	3.5E-04	2.8E-03	8.1E-03

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.4E-02	--	--	--	2.4E-02	--	--	--	--	--	--
LOAEL HQ:	1.4E-03	--	--	--	4.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.0E-03	1.7E-05	1.9E-03	#VALUE!	6.0E-02	1.7E+00	5.1E-03	9.2E-03	1.0E-02	3.9E-02
BTAG High HQ:	#VALUE!	1.4E-04	2.8E-07	4.8E-04	#VALUE!	2.6E-03	2.8E-03	1.1E-03	2.2E-04	2.5E-03	3.9E-03
MAXIMUM											
NOAEL HQ:	1.4E-02	--	--	--	2.4E-02	--	--	--	--	--	--
LOAEL HQ:	1.4E-03	--	--	--	4.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.0E-03	1.7E-05	1.9E-03	#VALUE!	6.0E-02	1.7E+00	5.1E-03	9.2E-03	1.0E-02	3.9E-02
BTAG High HQ:	#VALUE!	1.4E-04	2.8E-07	4.8E-04	#VALUE!	2.6E-03	2.8E-03	1.1E-03	2.2E-04	2.5E-03	3.9E-03

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.877
Maximum detected value (mg/kg, dry weight):	0.877

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	16

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.0E-03	mean
Daily exposure (mg/kg-day)	6.4E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.9E-02	mean
LOAEL HQ:	2.9E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.5E-02	max
LOAEL HQ:	4.5E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.048
Maximum detected value (mg/kg, dry weight):	0.048

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	1.7

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-04	mean
Daily exposure (mg/kg-day)	5.1E-04	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.3E-03	mean
BTAG High HQ:	2.3E-04	mean
BTAG Low HQ:	5.7E-03	max
BTAG High HQ:	4.0E-04	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.0032
Maximum detected value (mg/kg, dry weight):	0.0032

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.1E-05	mean
Daily exposure (mg/kg-day)	2.9E-04	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.0E-05	mean
BTAG High HQ:	1.1E-06	mean
BTAG Low HQ:	3.9E-04	max
BTAG High HQ:	6.2E-06	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.9
Maximum detected value (mg/kg, dry weight):	3.9

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.0E-03	mean
BTAG High HQ:	7.5E-04	mean
BTAG Low HQ:	3.3E-03	max
BTAG High HQ:	8.1E-04	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.75
Maximum detected value (mg/kg, dry weight):	0.75

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.31
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-03	mean
Daily exposure (mg/kg-day)	2.9E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.5E-02	mean
BTAG High HQ:	2.7E-04	mean
BTAG Low HQ:	3.6E-02	max
BTAG High HQ:	2.7E-04	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	9.7
Maximum detected value (mg/kg, dry weight):	9.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	--
BTAG High (mg/kg-day):	--

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.9E-02	mean
Daily exposure (mg/kg-day)	5.5E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	5.7E-02	mean
LOAEL HQ:	1.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	6.4E-02	max
LOAEL HQ:	1.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	195
Maximum detected value (mg/kg, dry weight):	195

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	510

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.7E-01	mean
Daily exposure (mg/kg-day)	8.2E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.3E-01	mean
BTAG High HQ:	1.5E-02	mean
BTAG Low HQ:	3.6E-01	max
BTAG High HQ:	1.6E-02	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	19
Maximum detected value (mg/kg, dry weight):	19

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	90
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.8E-02	mean
Daily exposure (mg/kg-day)	9.5E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.3E+00	mean
BTAG High HQ:	1.0E-02	mean
BTAG Low HQ:	6.8E+00	max
BTAG High HQ:	1.1E-02	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.13

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.9
Maximum detected value (mg/kg, dry weight):	2.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.6E-04	mean
Daily exposure (mg/kg-day)	9.3E-04	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.7E-02	mean
BTAG HQ:	3.6E-03	mean
BTAG Low HQ:	2.4E-02	max
BTAG High HQ:	5.2E-03	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.9
Maximum detected value (mg/kg, dry weight):	3.9

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	27

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	3.1E-04	mean
BTAG Low HQ:	1.4E-02	max
BTAG High HQ:	3.5E-04	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.65
Maximum detected value (mg/kg, dry weight):	0.65

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-03	mean
Daily exposure (mg/kg-day)	2.6E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	1.2E-02	max
BTAG High HQ:	2.8E-03	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	346
Maximum detected value (mg/kg, dry weight):	346

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	320
Maximum detected value (mg/kg, dry weight):	620

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E+00	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.8E-02	mean
BTAG High HQ:	7.8E-03	mean
BTAG Low HQ:	8.1E-02	max
BTAG High HQ:	8.1E-03	max

Tier II - Summary of Hazard Quotients

Receptor: Brown Pelican

Location: Inside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.4E-01	--	--	--	1.8E-01	--	--	--	--	--	--
LOAEL HQ:	2.4E-02	--	--	--	3.5E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**3.3E+00**	9.4E-03	3.0E-02	#VALUE!	3.0E-01	**1.4E+01**	**1.3E+00**	7.6E-02	6.2E-01	2.8E-01
BTAG High HQ:	#VALUE!	2.3E-01	1.5E-04	7.6E-03	#VALUE!	1.3E-02	2.3E-02	2.8E-01	1.9E-03	1.5E-01	2.8E-02
MAXIMUM											
NOAEL HQ:	3.8E-01	--	--	--	2.4E-01	--	--	--	--	--	--
LOAEL HQ:	3.8E-02	--	--	--	4.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**7.1E+00**	2.0E-02	4.1E-02	#VALUE!	6.5E-01	**2.0E+01**	**1.6E+00**	9.9E-02	8.3E-01	3.6E-01
BTAG High HQ:	#VALUE!	5.0E-01	3.2E-04	1.0E-02	#VALUE!	2.8E-02	3.2E-02	3.5E-01	2.4E-03	2.1E-01	3.6E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.8E-01	--	--	--	1.0E-01	--	--	--	--	--	--
LOAEL HQ:	1.8E-02	--	--	--	2.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.2E+00	4.4E-03	2.6E-02	#DIV/0!	1.6E-01	4.2E+00	8.6E-01	5.7E-02	1.9E-01	2.5E-01
BTAG High HQ:	#DIV/0!	8.8E-02	7.0E-05	6.4E-03	#DIV/0!	6.9E-03	6.8E-03	1.9E-01	1.4E-03	4.7E-02	2.5E-02
MAXIMUM											
NOAEL HQ:	1.9E-01	--	--	--	1.6E-01	--	--	--	--	--	--
LOAEL HQ:	1.9E-02	--	--	--	3.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.7E+00	8.9E-03	3.1E-02	#DIV/0!	3.1E-01	7.4E+00	1.3E+00	6.6E-02	2.1E-01	2.9E-01
BTAG High HQ:	#DIV/0!	1.2E-01	1.4E-04	7.8E-03	#DIV/0!	1.4E-02	1.2E-02	2.8E-01	1.6E-03	5.1E-02	2.9E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.34
Maximum detected value (mg/kg, dry weight):	0.357

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	16

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-02	mean
Daily exposure (mg/kg-day)	5.3E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.4E-01	mean
LOAEL HQ:	2.4E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.8E-01	max
LOAEL HQ:	3.8E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.763
Maximum detected value (mg/kg, dry weight):	8.108

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	1.7

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E-01	mean
Daily exposure (mg/kg-day)	6.4E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.3E+00	mean
BTAG High HQ:	2.3E-01	mean
BTAG Low HQ:	7.1E+00	max
BTAG High HQ:	5.0E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.083
Maximum detected value (mg/kg, dry weight):	0.16

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.9E-03	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.4E-03	mean
BTAG High HQ:	1.5E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	3.2E-04	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.0E-02	mean
BTAG High HQ:	7.6E-03	mean
BTAG Low HQ:	4.1E-02	max
BTAG High HQ:	1.0E-02	max

Hazard Quotient Calculation

Receptor:	American Brown Pelican
Chemical:	Cadmium
Location:	Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.084
Maximum detected value (mg/kg, dry weight):	0.084

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.31
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.1E-03	mean
Daily exposure (mg/kg-day)	7.3E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.9E-02	mean
BTAG High HQ:	6.8E-04	mean
BTAG Low HQ:	9.2E-02	max
BTAG High HQ:	7.1E-04	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.59

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-01	mean
Daily exposure (mg/kg-day)	2.0E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.8E-01	mean
LOAEL HQ:	3.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.4E-01	max
LOAEL HQ:	4.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.9
Maximum detected value (mg/kg, dry weight):	8.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	510

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.0E-01	mean
Daily exposure (mg/kg-day)	1.5E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.0E-01	mean
BTAG High HQ:	1.3E-02	mean
BTAG Low HQ:	6.5E-01	max
BTAG High HQ:	2.8E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.74
Maximum detected value (mg/kg, dry weight):	1

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	90
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-01	mean
Daily exposure (mg/kg-day)	2.8E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.4E+01	mean
BTAG High HQ:	2.3E-02	mean
BTAG Low HQ:	2.0E+01	max
BTAG High HQ:	3.2E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.62
Maximum detected value (mg/kg, dry weight):	0.75

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.9
Maximum detected value (mg/kg, dry weight):	2.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.0E-02	mean
Daily exposure (mg/kg-day)	6.3E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.3E+00	mean
BTAG HQ:	2.8E-01	mean
BTAG Low HQ:	1.6E+00	max
BTAG High HQ:	3.5E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.99
Maximum detected value (mg/kg, dry weight):	1.2

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	27

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-01	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.6E-02	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	9.9E-02	max
BTAG High HQ:	2.4E-03	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.8
Maximum detected value (mg/kg, dry weight):	2.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-01	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.2E-01	mean
BTAG High HQ:	1.5E-01	mean
BTAG Low HQ:	8.3E-01	max
BTAG High HQ:	2.1E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	54
Maximum detected value (mg/kg, dry weight):	66

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	320
Maximum detected value (mg/kg, dry weight):	620

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.8E+00	mean
Daily exposure (mg/kg-day)	6.2E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.8E-01	mean
BTAG High HQ:	2.8E-02	mean
BTAG Low HQ:	3.6E-01	max
BTAG High HQ:	3.6E-02	max

Tier II - Summary of Hazard Quotients and Primary Drivers

Receptor: **Western Grebe**

Location: Inside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
LOAEL HQ:	1.7E-02	4.4E-02	1.2E-04	3.2E-03	4.8E-02	1.4E-02	#DIV/0!	1.1E-01	6.6E-04	3.4E-02	#DIV/0!
NOAEL HQ:	1.7E-01	--	--	--	2.4E-01	--	--	--	--	--	--
LOAEL HQ:	1.7E-02	--	--	--	4.8E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	8.8E-01	2.7E-03	2.9E-02	#VALUE!	3.7E-01	**<u>1.7E+01</u>**	1.8E-01	5.3E-02	1.2E-01	4.7E-01
BTAG High HQ:	#VALUE!	6.2E-02	4.3E-05	7.2E-03	#VALUE!	1.6E-02	2.8E-02	3.8E-02	1.3E-03	2.9E-02	4.7E-02
MAXIMUM											
NOAEL HQ:	3.9E-01	--	--	--	3.3E-01	--	--	--	--	--	--
LOAEL HQ:	3.9E-02	--	--	--	6.6E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	9.1E-01	6.9E-03	3.2E-02	#VALUE!	6.6E-01	**<u>2.5E+01</u>**	2.7E-01	7.2E-02	1.2E-01	5.2E-01
BTAG High HQ:	#VALUE!	6.5E-02	1.1E-04	8.0E-03	#VALUE!	2.9E-02	4.0E-02	5.8E-02	1.8E-03	3.0E-02	5.2E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.0E-01	--	--	--	3.1E-01	--	--	--	--	--	--
LOAEL HQ:	1.0E-02	--	--	--	6.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	5.7E-01	2.3E-03	2.5E-02	#DIV/0!	2.4E-01	6.6E+00	1.0E-01	9.0E-02	2.3E-01	3.7E-01
BTAG High HQ:	#DIV/0!	4.1E-02	3.6E-05	6.2E-03	#DIV/0!	1.1E-02	1.1E-02	2.2E-02	2.2E-03	5.7E-02	3.7E-02
MAXIMUM											
NOAEL HQ:	1.1E-01	--	--	--	4.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	9.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	6.2E-01	2.9E-03	2.8E-02	#DIV/0!	2.9E-01	9.9E+00	1.3E-01	1.2E-01	3.0E-01	4.1E-01
BTAG High HQ:	#DIV/0!	4.4E-02	4.6E-05	6.9E-03	#DIV/0!	1.3E-02	1.6E-02	2.8E-02	2.8E-03	7.4E-02	4.1E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.266
Maximum detected value (mg/kg, dry weight):	0.266

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4
Maximum detected value (mg/kg, dry weight):	16

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	5.5E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.7E-01	mean
LOAEL HQ:	1.7E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.9E-01	max
LOAEL HQ:	3.9E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.505
Maximum detected value (mg/kg, dry weight):	1.505

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	1.7

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.9E-02	mean
Daily exposure (mg/kg-day)	8.2E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.8E-01	mean
BTAG High HQ:	6.2E-02	mean
BTAG Low HQ:	9.1E-01	max
BTAG High HQ:	6.5E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.028
Maximum detected value (mg/kg, dry weight):	0.028

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	1.4

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-03	mean
Daily exposure (mg/kg-day)	5.1E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.7E-03	mean
BTAG High HQ:	4.3E-05	mean
BTAG Low HQ:	6.9E-03	max
BTAG High HQ:	1.1E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.9E-02	mean
BTAG High HQ:	7.2E-03	mean
BTAG Low HQ:	3.2E-02	max
BTAG High HQ:	8.0E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.031
Maximum detected value (mg/kg, dry weight):	0.031

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.31
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-03	mean
Daily exposure (mg/kg-day)	2.8E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.0E-02	mean
BTAG High HQ:	2.3E-04	mean
BTAG Low HQ:	3.5E-02	max
BTAG High HQ:	2.7E-04	max

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Chromium
Location:	Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.47
Maximum detected value (mg/kg, dry weight):	0.47

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.8E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.4E-01	mean
LOAEL HQ:	4.8E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.3E-01	max
LOAEL HQ:	6.6E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.1
Maximum detected value (mg/kg, dry weight):	4.1

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	250
Maximum detected value (mg/kg, dry weight):	510

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.6E-01	mean
Daily exposure (mg/kg-day)	1.5E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.7E-01	mean
BTAG High HQ:	1.6E-02	mean
BTAG Low HQ:	6.6E-01	max
BTAG High HQ:	2.9E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.24
Maximum detected value (mg/kg, dry weight):	0.24

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	90
Maximum detected value (mg/kg, dry weight):	130

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	3.5E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.7E+01	mean
BTAG High HQ:	2.8E-02	mean
BTAG Low HQ:	2.5E+01	max
BTAG High HQ:	4.0E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.088
Maximum detected value (mg/kg, dry weight):	0.088

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.9
Maximum detected value (mg/kg, dry weight):	2.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.9E-03	mean
Daily exposure (mg/kg-day)	1.0E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.8E-01	mean
BTAG HQ:	3.8E-02	mean
BTAG Low HQ:	2.7E-01	max
BTAG High HQ:	5.8E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.56
Maximum detected value (mg/kg, dry weight):	0.56

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	17
Maximum detected value (mg/kg, dry weight):	27

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E-02	mean
Daily exposure (mg/kg-day)	9.9E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.3E-02	mean
BTAG High HQ:	1.3E-03	mean
BTAG Low HQ:	7.2E-02	max
BTAG High HQ:	1.8E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.47
Maximum detected value (mg/kg, dry weight):	0.47

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-02	mean
Daily exposure (mg/kg-day)	2.8E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	2.9E-02	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	3.0E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	141
Maximum detected value (mg/kg, dry weight):	141

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	320
Maximum detected value (mg/kg, dry weight):	620

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.1E+00	mean
Daily exposure (mg/kg-day)	8.9E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.7E-01	mean
BTAG High HQ:	4.7E-02	mean
BTAG Low HQ:	5.2E-01	max
BTAG High HQ:	5.2E-02	max

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Tier II - Summary of Hazard Quotients

Receptor: Sea Lion

Location: Outside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	2.2E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.1E-03	--	--	--	--	--	--
BTAG Low HQ:	5.5E-03	9.8E-02	1.3E-02	1.8E-01	#VALUE!	5.4E-02	4.1E-02	4.5E-01	2.1E-01	6.7E-01	1.4E-01
BTAG High HQ:	2.2E-04	2.8E-02	2.2E-04	1.2E-02	#VALUE!	2.3E-04	1.7E-04	4.5E-02	8.7E-04	2.7E-02	3.2E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	2.5E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.2E-03	--	--	--	--	--	--
BTAG Low HQ:	6.3E-03	1.2E-01	1.8E-02	2.5E-01	#VALUE!	1.0E-01	7.1E-02	6.3E-01	3.2E-01	9.9E-01	1.9E-01
BTAG High HQ:	2.5E-04	3.4E-02	3.0E-04	1.7E-02	#VALUE!	4.2E-04	2.9E-04	6.3E-02	1.3E-03	4.1E-02	4.5E-03

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	6.9E-03	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	3.3E-04	--	--	--	--	--	--
BTAG Low HQ:	4.9E-03	8.1E-02	3.4E-03	1.2E-01	#DIV/0!	3.5E-02	1.5E-02	3.2E-01	1.6E-01	2.3E-01	1.2E-01
BTAG High HQ:	2.0E-04	2.3E-02	5.6E-05	7.8E-03	#DIV/0!	1.5E-04	6.4E-05	3.2E-02	6.5E-04	9.3E-03	2.8E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	6.9E-03	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	3.3E-04	--	--	--	--	--	--
BTAG Low HQ:	5.4E-03	1.1E-01	6.7E-03	1.4E-01	#DIV/0!	7.0E-02	2.7E-02	4.8E-01	1.8E-01	2.5E-01	1.4E-01
BTAG High HQ:	2.1E-04	3.1E-02	1.1E-04	9.5E-03	#DIV/0!	2.9E-04	1.1E-04	4.8E-02	7.5E-04	1.0E-02	3.2E-03

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Benzo[a]pyrene
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.321
Maximum detected value (mg/kg, dry weight):	0.34

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.6
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E-03	mean
Daily exposure (mg/kg-day)	8.2E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.5E-03	mean
BTAG High HQ:	2.2E-04	mean
BTAG Low HQ:	6.3E-03	max
BTAG High HQ:	2.5E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total PCBs
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.711
Maximum detected value (mg/kg, dry weight):	2.129

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.25
Maximum detected value (mg/kg, dry weight):	0.38

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.5E-02	mean
Daily exposure (mg/kg-day)	4.4E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.8E-02	mean
BTAG High HQ:	2.8E-02	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	3.4E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Tributyltin
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.161
Maximum detected value (mg/kg, dry weight):	0.213

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.09
Maximum detected value (mg/kg, dry weight):	0.41

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-03	mean
Daily exposure (mg/kg-day)	4.5E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.3E-02	mean
BTAG High HQ:	2.2E-04	mean
BTAG Low HQ:	1.8E-02	max
BTAG High HQ:	3.0E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Arsenic
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.7
Maximum detected value (mg/kg, dry weight):	3.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	8
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.9E-02	mean
Daily exposure (mg/kg-day)	7.8E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	1.2E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	1.7E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Cadmium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.074
Maximum detected value (mg/kg, dry weight):	0.08

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-03	mean
Daily exposure (mg/kg-day)	1.8E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.7E-02	mean
BTAG High HQ:	6.1E-04	mean
BTAG Low HQ:	3.0E-02	max
BTAG High HQ:	6.8E-04	max

Hazard Quotient Calculation

Receptor:	CA Sea Lion
Chemical:	Chromium
Location:	Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.7
Maximum detected value (mg/kg, dry weight):	2.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	45
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.4E-02	mean
Daily exposure (mg/kg-day)	8.3E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.2E-02	mean
LOAEL HQ:	1.1E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.5E-02	max
LOAEL HQ:	1.2E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Copper
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.6
Maximum detected value (mg/kg, dry weight):	9.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-01	mean
Daily exposure (mg/kg-day)	2.7E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.4E-02	mean
BTAG High HQ:	2.3E-04	mean
BTAG Low HQ:	1.0E-01	max
BTAG High HQ:	4.2E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Lead
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.84
Maximum detected value (mg/kg, dry weight):	1.8

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	83

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-02	mean
Daily exposure (mg/kg-day)	7.1E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.1E-02	mean
BTAG High HQ:	1.7E-04	mean
BTAG Low HQ:	7.1E-02	max
BTAG High HQ:	2.9E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total Mercury
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.58
Maximum detected value (mg/kg, dry weight):	0.81

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.55
Maximum detected value (mg/kg, dry weight):	0.71

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	4.5E-01	mean
BTAG HQ:	4.5E-02	mean
BTAG Low HQ:	6.3E-01	max
BTAG High HQ:	6.3E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Nickel
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	12
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-02	mean
Daily exposure (mg/kg-day)	4.2E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.1E-01	mean
BTAG High HQ:	8.7E-04	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	1.3E-03	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Selenium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.6
Maximum detected value (mg/kg, dry weight):	2.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-02	mean
Daily exposure (mg/kg-day)	5.0E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.7E-01	mean
BTAG High HQ:	2.7E-02	mean
BTAG Low HQ:	9.9E-01	max
BTAG High HQ:	4.1E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Zinc
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	60
Maximum detected value (mg/kg, dry weight):	85

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	290

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E+00	mean
Daily exposure (mg/kg-day)	1.9E+00	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.2E-03	mean
BTAG Low HQ:	1.9E-01	max
BTAG High HQ:	4.5E-03	max

Tier II - Summary of Hazard Quotients

Receptor: Least Tern

Location: Outside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.9E-01	--	--	--	2.0E-01	--	--	--	--	--	--
LOAEL HQ:	2.9E-02	--	--	--	4.1E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**2.4E+00**	6.9E-03	6.6E-02	#VALUE!	4.1E-01	**1.3E+01**	3.1E-01	7.1E-02	3.0E-01	**1.2E+00**
BTAG High HQ:	#VALUE!	1.7E-01	1.1E-04	1.6E-02	#VALUE!	1.8E-02	2.1E-02	6.8E-02	1.7E-03	7.4E-02	1.2E-01
MAXIMUM											
NOAEL HQ:	3.4E-01	--	--	--	2.7E-01	--	--	--	--	--	--
LOAEL HQ:	3.4E-02	--	--	--	5.5E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**2.7E+00**	9.6E-03	7.3E-02	#VALUE!	4.9E-01	**1.8E+01**	3.4E-01	1.0E-01	3.2E-01	**1.3E+00**
BTAG High HQ:	#VALUE!	1.9E-01	1.5E-04	1.8E-02	#VALUE!	2.1E-02	2.9E-02	7.4E-02	2.5E-03	7.9E-02	1.3E-01

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.2E-01	--	--	--	6.0E-01	--	--	--	--	--	--
LOAEL HQ:	2.2E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.3E+00	5.2E-03	5.3E-02	#DIV/0!	4.6E-01	9.5E+00	2.1E-01	1.9E-01	5.2E-01	8.2E-01
BTAG High HQ:	#DIV/0!	9.3E-02	8.2E-05	1.3E-02	#DIV/0!	2.0E-02	1.5E-02	4.5E-02	4.7E-03	1.3E-01	8.2E-02
MAXIMUM											
NOAEL HQ:	2.3E-01	--	--	--	8.4E-01	--	--	--	--	--	--
LOAEL HQ:	2.3E-02	--	--	--	1.7E-01	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.4E+00	6.6E-03	5.7E-02	#DIV/0!	5.1E-01	1.3E+01	2.5E-01	2.3E-01	6.7E-01	8.8E-01
BTAG High HQ:	#DIV/0!	1.0E-01	1.1E-04	1.4E-02	#DIV/0!	2.3E-02	2.0E-02	5.5E-02	5.8E-03	1.7E-01	8.8E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.317
Maximum detected value (mg/kg, dry weight):	0.337

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.6
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-02	mean
Daily exposure (mg/kg-day)	4.7E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.9E-01	mean
LOAEL HQ:	2.9E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.4E-01	max
LOAEL HQ:	3.4E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCBs
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.797
Maximum detected value (mg/kg, dry weight):	2.024

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.25
Maximum detected value (mg/kg, dry weight):	0.38

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.4E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.4E+00	mean
BTAG High HQ:	1.7E-01	mean
BTAG Low HQ:	2.7E+00	max
BTAG High HQ:	1.9E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.041
Maximum detected value (mg/kg, dry weight):	0.051

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.09
Maximum detected value (mg/kg, dry weight):	0.41

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.0E-03	mean
Daily exposure (mg/kg-day)	7.0E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.9E-03	mean
BTAG High HQ:	1.1E-04	mean
BTAG Low HQ:	9.6E-03	max
BTAG High HQ:	1.5E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	3.2

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	8
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.6E-01	mean
Daily exposure (mg/kg-day)	4.0E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.6E-02	mean
BTAG High HQ:	1.6E-02	mean
BTAG Low HQ:	7.3E-02	max
BTAG High HQ:	1.8E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.019
Maximum detected value (mg/kg, dry weight):	0.02

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-03	mean
Daily exposure (mg/kg-day)	3.3E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.4E-02	mean
BTAG High HQ:	2.6E-04	mean
BTAG Low HQ:	4.1E-02	max
BTAG High HQ:	3.2E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.56
Maximum detected value (mg/kg, dry weight):	0.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	45
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.0E-01	mean
LOAEL HQ:	4.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.7E-01	max
LOAEL HQ:	5.5E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	5.5
Maximum detected value (mg/kg, dry weight):	5.8

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.4E-01	mean
Daily exposure (mg/kg-day)	1.1E+00	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.1E-01	mean
BTAG High HQ:	1.8E-02	mean
BTAG Low HQ:	4.9E-01	max
BTAG High HQ:	2.1E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.34
Maximum detected value (mg/kg, dry weight):	0.42

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	83

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	2.5E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.3E+01	mean
BTAG High HQ:	2.1E-02	mean
BTAG Low HQ:	1.8E+01	max
BTAG High HQ:	2.9E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.092
Maximum detected value (mg/kg, dry weight):	0.099

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.55
Maximum detected value (mg/kg, dry weight):	0.71

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	3.1E-01	mean
BTAG HQ:	6.8E-02	mean
LOAEL HQ:	2.1E-01	max
BTAG Low HQ:	3.4E-01	max
BTAG High HQ:	7.4E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.58
Maximum detected value (mg/kg, dry weight):	0.83

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	12
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.8E-02	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.1E-02	mean
BTAG High HQ:	1.7E-03	mean
BTAG Low HQ:	1.0E-01	max
BTAG High HQ:	2.5E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.56
Maximum detected value (mg/kg, dry weight):	0.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-02	mean
Daily exposure (mg/kg-day)	7.3E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.0E-01	mean
BTAG High HQ:	7.4E-02	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	7.9E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	175
Maximum detected value (mg/kg, dry weight):	188

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	290

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E+01	mean
Daily exposure (mg/kg-day)	2.3E+01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.2E+00	mean
BTAG High HQ:	1.2E-01	mean
BTAG Low HQ:	1.3E+00	max
BTAG High HQ:	1.3E-01	max

Tier II - Summary of Hazard Quotients

Receptor: **Brown Pelican**

Location: Outside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.0E-01	--	--	--	3.3E-01	--	--	--	--	--	--
LOAEL HQ:	2.0E-02	--	--	--	6.6E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**<u>1.5E+00</u>**	1.8E-02	4.1E-02	#VALUE!	2.4E-01	**<u>1.1E+01</u>**	**<u>1.2E+00</u>**	7.6E-02	5.5E-01	2.9E-01
BTAG High HQ:	#VALUE!	1.1E-01	2.8E-04	1.0E-02	#VALUE!	1.1E-02	1.8E-02	2.6E-01	1.9E-03	1.4E-01	2.9E-02
MAXIMUM											
NOAEL HQ:	2.3E-01	--	--	--	3.7E-01	--	--	--	--	--	--
LOAEL HQ:	2.3E-02	--	--	--	7.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**<u>1.9E+00</u>**	2.4E-02	5.5E-02	#VALUE!	4.5E-01	**<u>1.9E+01</u>**	**<u>1.7E+00</u>**	1.2E-01	8.3E-01	4.2E-01
BTAG High HQ:	#VALUE!	1.3E-01	3.8E-04	1.4E-02	#VALUE!	2.0E-02	3.1E-02	3.6E-01	2.9E-03	2.0E-01	4.2E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.8E-01	--	--	--	1.0E-01	--	--	--	--	--	--
LOAEL HQ:	1.8E-02	--	--	--	2.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.2E+00	4.4E-03	2.6E-02	#DIV/0!	1.6E-01	4.2E+00	8.6E-01	5.7E-02	1.9E-01	2.5E-01
BTAG High HQ:	#DIV/0!	8.8E-02	7.0E-05	6.4E-03	#DIV/0!	6.9E-03	6.8E-03	1.9E-01	1.4E-03	4.7E-02	2.5E-02
MAXIMUM											
NOAEL HQ:	1.9E-01	--	--	--	1.6E-01	--	--	--	--	--	--
LOAEL HQ:	1.9E-02	--	--	--	3.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.7E+00	8.9E-03	3.1E-02	#DIV/0!	3.1E-01	7.4E+00	1.3E+00	6.6E-02	2.1E-01	2.9E-01
BTAG High HQ:	#DIV/0!	1.2E-01	1.4E-04	7.8E-03	#DIV/0!	1.4E-02	1.2E-02	2.8E-01	1.6E-03	5.1E-02	2.9E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Benzo[a]pyrene
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174	
Food ingestion rate (kg/day dry wt):	0.25	
Sediment ingestion rate (kg/day dry wt):	0.005	
Area Use Factor (unitless):	1	0.005
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.321
Maximum detected value (mg/kg, dry weight):	0.34

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.6
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-02	mean
Daily exposure (mg/kg-day)	3.2E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.0E-01	mean
LOAEL HQ:	2.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.3E-01	max
LOAEL HQ:	2.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Total PCBs
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.711
Maximum detected value (mg/kg, dry weight):	2.129

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.25
Maximum detected value (mg/kg, dry weight):	0.38

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-01	mean
Daily exposure (mg/kg-day)	1.7E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.5E+00	mean
BTAG High HQ:	1.1E-01	mean
BTAG Low HQ:	1.9E+00	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Tributyltin
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.161
Maximum detected value (mg/kg, dry weight):	0.213

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.09
Maximum detected value (mg/kg, dry weight):	0.41

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.8E-02	mean
BTAG High HQ:	2.8E-04	mean
BTAG Low HQ:	2.4E-02	max
BTAG High HQ:	3.8E-04	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Arsenic
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.7
Maximum detected value (mg/kg, dry weight):	3.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	8
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.1E-02	mean
BTAG High HQ:	1.0E-02	mean
BTAG Low HQ:	5.5E-02	max
BTAG High HQ:	1.4E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Cadmium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.074
Maximum detected value (mg/kg, dry weight):	0.08

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.1E-03	mean
Daily exposure (mg/kg-day)	6.9E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.7E-02	mean
BTAG High HQ:	5.9E-04	mean
BTAG Low HQ:	8.6E-02	max
BTAG High HQ:	6.6E-04	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Chromium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.7
Maximum detected value (mg/kg, dry weight):	2.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	45
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-01	mean
Daily exposure (mg/kg-day)	3.2E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	3.3E-01	mean
LOAEL HQ:	6.6E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.7E-01	max
LOAEL HQ:	7.4E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Copper
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.6
Maximum detected value (mg/kg, dry weight):	9.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-01	mean
Daily exposure (mg/kg-day)	1.0E+00	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	1.1E-02	mean
BTAG Low HQ:	4.5E-01	max
BTAG High HQ:	2.0E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Lead
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.84
Maximum detected value (mg/kg, dry weight):	1.8

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	83

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-01	mean
Daily exposure (mg/kg-day)	2.7E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.1E+01	mean
BTAG High HQ:	1.8E-02	mean
BTAG Low HQ:	1.9E+01	max
BTAG High HQ:	3.1E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Total Mercury
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.58
Maximum detected value (mg/kg, dry weight):	0.81

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.55
Maximum detected value (mg/kg, dry weight):	0.71

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.7E-02	mean
Daily exposure (mg/kg-day)	6.5E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.2E+00	mean
BTAG HQ:	2.6E-01	mean
BTAG Low HQ:	1.7E+00	max
BTAG High HQ:	3.6E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Nickel
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	12
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.6E-02	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	2.9E-03	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Selenium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.6
Maximum detected value (mg/kg, dry weight):	2.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.5E-01	mean
BTAG High HQ:	1.4E-01	mean

BTAG Low HQ:	8.3E-01	max
BTAG High HQ:	2.0E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Zinc
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	60
Maximum detected value (mg/kg, dry weight):	85

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	290

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.0E+00	mean
Daily exposure (mg/kg-day)	7.2E+00	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.9E-01	mean
BTAG High HQ:	2.9E-02	mean
BTAG Low HQ:	4.2E-01	max
BTAG High HQ:	4.2E-02	max

Tier II - Summary of Hazard Quotients

Receptor: Western Grebe

Location: Outside NASSCO

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.5E-01	--	--	--	1.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.5E-02	--	--	--	3.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.0E+00**	3.2E-03	3.1E-02	#VALUE!	2.6E-01	**1.2E+01**	1.6E-01	4.4E-02	1.4E-01	5.5E-01
BTAG High HQ:	#VALUE!	7.4E-02	5.1E-05	7.8E-03	#VALUE!	1.1E-02	1.9E-02	3.4E-02	1.1E-03	3.4E-02	5.5E-02
MAXIMUM											
NOAEL HQ:	1.8E-01	--	--	--	2.4E-01	--	--	--	--	--	--
LOAEL HQ:	1.8E-02	--	--	--	4.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.2E+00**	5.1E-03	3.5E-02	#VALUE!	3.3E-01	**1.7E+01**	1.8E-01	6.5E-02	1.5E-01	6.1E-01
BTAG High HQ:	#VALUE!	8.3E-02	8.0E-05	8.8E-03	#VALUE!	1.5E-02	2.7E-02	3.9E-02	1.6E-03	3.6E-02	6.1E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.0E-01	--	--	--	3.1E-01	--	--	--	--	--	--
LOAEL HQ:	1.0E-02	--	--	--	6.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	5.7E-01	2.3E-03	2.5E-02	#DIV/0!	2.4E-01	6.6E+00	1.0E-01	9.0E-02	2.3E-01	3.7E-01
BTAG High HQ:	#DIV/0!	4.1E-02	3.6E-05	6.2E-03	#DIV/0!	1.1E-02	1.1E-02	2.2E-02	2.2E-03	5.7E-02	3.7E-02
MAXIMUM											
NOAEL HQ:	1.1E-01	--	--	--	4.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	9.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	6.2E-01	2.9E-03	2.8E-02	#DIV/0!	2.9E-01	9.9E+00	1.3E-01	1.2E-01	3.0E-01	4.1E-01
BTAG High HQ:	#DIV/0!	4.4E-02	4.6E-05	6.9E-03	#DIV/0!	1.3E-02	1.6E-02	2.8E-02	2.8E-03	7.4E-02	4.1E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.317
Maximum detected value (mg/kg, dry weight):	0.337

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.6
Maximum detected value (mg/kg, dry weight):	3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-02	mean
Daily exposure (mg/kg-day)	2.5E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.5E-01	mean
LOAEL HQ:	1.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.8E-01	max
LOAEL HQ:	1.8E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCBs
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.797
Maximum detected value (mg/kg, dry weight):	2.024

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.25
Maximum detected value (mg/kg, dry weight):	0.38

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.3E-02	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	7.4E-02	mean
BTAG Low HQ:	1.2E+00	max
BTAG High HQ:	8.3E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.041
Maximum detected value (mg/kg, dry weight):	0.051

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.09
Maximum detected value (mg/kg, dry weight):	0.41

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-03	mean
Daily exposure (mg/kg-day)	3.7E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.2E-03	mean
BTAG High HQ:	5.1E-05	mean
BTAG Low HQ:	5.1E-03	max
BTAG High HQ:	8.0E-05	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	3.2

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	8
Maximum detected value (mg/kg, dry weight):	11

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-01	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.1E-02	mean
BTAG High HQ:	7.8E-03	mean
BTAG Low HQ:	3.5E-02	max
BTAG High HQ:	8.8E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.019
Maximum detected value (mg/kg, dry weight):	0.02

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.2
Maximum detected value (mg/kg, dry weight):	0.39

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-03	mean
Daily exposure (mg/kg-day)	2.0E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.9E-02	mean
BTAG High HQ:	1.4E-04	mean
BTAG Low HQ:	2.6E-02	max
BTAG High HQ:	2.0E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.56
Maximum detected value (mg/kg, dry weight):	0.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	45
Maximum detected value (mg/kg, dry weight):	67

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-01	mean
Daily exposure (mg/kg-day)	2.0E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.7E-01	mean
LOAEL HQ:	3.4E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.4E-01	max
LOAEL HQ:	4.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	5.5
Maximum detected value (mg/kg, dry weight):	5.8

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	180

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.9E-01	mean
Daily exposure (mg/kg-day)	7.6E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.6E-01	mean
BTAG High HQ:	1.1E-02	mean
BTAG Low HQ:	3.3E-01	max
BTAG High HQ:	1.5E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.34
Maximum detected value (mg/kg, dry weight):	0.42

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	83

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-01	mean
Daily exposure (mg/kg-day)	2.4E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.2E+01	mean
BTAG High HQ:	1.9E-02	mean
BTAG Low HQ:	1.7E+01	max
BTAG High HQ:	2.7E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.092
Maximum detected value (mg/kg, dry weight):	0.099

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.55
Maximum detected value (mg/kg, dry weight):	0.71

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.2E-03	mean
Daily exposure (mg/kg-day)	6.9E-03	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.6E-01	mean
BTAG HQ:	3.4E-02	mean
BTAG Low HQ:	1.8E-01	max
BTAG High HQ:	3.9E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.58
Maximum detected value (mg/kg, dry weight):	0.83

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	12
Maximum detected value (mg/kg, dry weight):	18

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.1E-02	mean
Daily exposure (mg/kg-day)	8.9E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.4E-02	mean
BTAG High HQ:	1.1E-03	mean
LOAEL HQ:	8.1E-04	max
BTAG Low HQ:	6.5E-02	max
BTAG High HQ:	1.6E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.56
Maximum detected value (mg/kg, dry weight):	0.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.2E-02	mean
Daily exposure (mg/kg-day)	3.4E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.4E-02	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	3.6E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: Outside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	175
Maximum detected value (mg/kg, dry weight):	188

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	290

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.5E+00	mean
Daily exposure (mg/kg-day)	1.0E+01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.5E-01	mean
BTAG High HQ:	5.5E-02	mean
BTAG Low HQ:	6.1E-01	max
BTAG High HQ:	6.1E-02	max

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Tier II - Summary of Hazard Quotients and Primary Drivers

Receptor: Surf Scoter

Location: Inside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	**2.1E+00**	--	--	--	3.8E-01	--	--	--	--	--	--
LOAEL HQ:	2.1E-01	--	--	--	7.6E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.7E-01	4.0E-02	1.6E-01	#VALUE!	**1.6E+00**	**3.9E+01**	2.2E-01	1.9E-01	9.0E-01	3.9E-01
BTAG High HQ:	#VALUE!	4.0E-02	6.3E-04	4.1E-02	#VALUE!	6.9E-02	6.3E-02	4.7E-02	4.5E-03	2.2E-01	3.9E-02
MAXIMUM											
NOAEL HQ:	**3.0E+00**	--	--	--	5.0E-01	--	--	--	--	--	--
LOAEL HQ:	3.0E-01	--	--	--	1.0E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	7.6E-01	5.2E-02	2.0E-01	#VALUE!	**2.9E+00**	**9.8E+01**	4.4E-01	3.4E-01	9.4E-01	8.6E-01
BTAG High HQ:	#VALUE!	5.4E-02	8.3E-04	5.0E-02	#VALUE!	1.3E-01	1.6E-01	9.5E-02	8.4E-03	2.3E-01	8.6E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.0E-01	--	--	--	4.5E-01	--	--	--	--	--	--
LOAEL HQ:	3.0E-02	--	--	--	9.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	4.4E-01	1.1E-02	9.5E-02	#DIV/0!	6.7E-01	1.9E+01	1.3E-01	1.5E-01	8.4E-01	2.6E-01
BTAG High HQ:	#DIV/0!	3.1E-02	1.7E-04	2.4E-02	#DIV/0!	2.9E-02	3.0E-02	2.8E-02	3.8E-03	2.1E-01	2.6E-02
MAXIMUM											
NOAEL HQ:	3.0E-01	--	--	--	4.5E-01	--	--	--	--	--	--
LOAEL HQ:	3.0E-02	--	--	--	9.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	4.4E-01	1.1E-02	9.5E-02	#DIV/0!	6.7E-01	1.9E+01	1.3E-01	1.5E-01	8.4E-01	2.6E-01
BTAG High HQ:	#DIV/0!	3.1E-02	1.7E-04	2.4E-02	#DIV/0!	2.9E-02	3.0E-02	2.8E-02	3.8E-03	2.1E-01	2.6E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Benzo[a]pyrene
Location:	Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.814
Maximum detected value (mg/kg, dry weight):	4.895

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	57

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-01	mean
Daily exposure (mg/kg-day)	4.1E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.1E+00	mean
LOAEL HQ:	2.1E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.0E+00	max
LOAEL HQ:	3.0E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor:	Surf Scoter
Chemical:	Total PCBs
Location:	Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.861
Maximum detected value (mg/kg, dry weight):	0.933

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	7.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.1E-02	mean
Daily exposure (mg/kg-day)	6.9E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.7E-01	mean
BTAG High HQ:	4.0E-02	mean
BTAG Low HQ:	7.6E-01	max
BTAG High HQ:	5.4E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.521
Maximum detected value (mg/kg, dry weight):	0.547

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.5
Maximum detected value (mg/kg, dry weight):	3.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-02	mean
Daily exposure (mg/kg-day)	3.8E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.0E-02	mean
BTAG High HQ:	6.3E-04	mean
BTAG Low HQ:	5.2E-02	max
BTAG High HQ:	8.3E-04	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	16
Maximum detected value (mg/kg, dry weight):	17

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.9E-01	mean
Daily exposure (mg/kg-day)	1.1E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	4.1E-02	mean
BTAG Low HQ:	2.0E-01	max
BTAG High HQ:	5.0E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.38
Maximum detected value (mg/kg, dry weight):	0.44

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-02	mean
Daily exposure (mg/kg-day)	3.1E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.7E-01	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	3.9E-01	max
BTAG High HQ:	3.0E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.6
Maximum detected value (mg/kg, dry weight):	2.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	110

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.3E-01	mean
Daily exposure (mg/kg-day)	4.3E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	3.8E-01	mean
LOAEL HQ:	7.6E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	5.0E-01	max
LOAEL HQ:	1.0E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	48
Maximum detected value (mg/kg, dry weight):	51

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	400
Maximum detected value (mg/kg, dry weight):	1500

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.6E+00	mean
Daily exposure (mg/kg-day)	6.7E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.6E+00	mean
BTAG High HQ:	6.9E-02	mean
BTAG Low HQ:	2.9E+00	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.3
Maximum detected value (mg/kg, dry weight):	4.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	430

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-01	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.9E+01	mean
BTAG High HQ:	6.3E-02	mean
BTAG Low HQ:	9.8E+01	max
BTAG High HQ:	1.6E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.1
Maximum detected value (mg/kg, dry weight):	0.11

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	4.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.5E-03	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	2.2E-01	mean
BTAG HQ:	4.7E-02	mean
BTAG Low HQ:	4.4E-01	max
BTAG High HQ:	9.5E-02	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.8
Maximum detected value (mg/kg, dry weight):	3.9

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-01	mean
Daily exposure (mg/kg-day)	4.7E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.9E-01	mean
BTAG High HQ:	4.5E-03	mean
BTAG Low HQ:	3.4E-01	max
BTAG High HQ:	8.4E-03	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.8
Maximum detected value (mg/kg, dry weight):	4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.2E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.0E-01	mean
BTAG High HQ:	2.2E-01	mean
BTAG Low HQ:	9.4E-01	max
BTAG High HQ:	2.3E-01	max

Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	101
Maximum detected value (mg/kg, dry weight):	107

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	500
Maximum detected value (mg/kg, dry weight):	3400

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.7E+00	mean
Daily exposure (mg/kg-day)	1.5E+01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.9E-01	mean
BTAG High HQ:	3.9E-02	mean
BTAG Low HQ:	8.6E-01	max
BTAG High HQ:	8.6E-02	max

Tier II - Summary of Hazard Quotients

Receptor: Sea Lion

Location: Inside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	1.9E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	8.9E-04	--	--	--	--	--	--
BTAG Low HQ:	9.9E-03	2.3E-01	1.1E-02	1.7E-01	#VALUE!	1.3E-01	7.0E-02	4.1E-01	2.3E-01	1.0E+00	1.5E-01
BTAG High HQ:	3.9E-04	6.5E-02	1.9E-04	1.1E-02	#VALUE!	5.5E-04	2.9E-04	4.1E-02	9.7E-04	4.3E-02	3.5E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	2.4E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	1.1E-03	--	--	--	--	--	--
BTAG Low HQ:	2.4E-02	4.7E-01	2.7E-02	2.6E-01	#VALUE!	4.4E-01	2.1E-01	5.7E-01	5.1E-01	**1.5E+00**	3.2E-01
BTAG High HQ:	9.5E-04	1.3E-01	4.4E-04	1.8E-02	#VALUE!	1.9E-03	8.5E-04	5.7E-02	2.1E-03	6.3E-02	7.4E-03

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	6.9E-03	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	3.3E-04	--	--	--	--	--	--
BTAG Low HQ:	4.9E-03	8.1E-02	3.4E-03	1.2E-01	#DIV/0!	3.5E-02	1.5E-02	3.2E-01	1.6E-01	2.3E-01	1.2E-01
BTAG High HQ:	2.0E-04	2.3E-02	5.6E-05	7.8E-03	#DIV/0!	1.5E-04	6.4E-05	3.2E-02	6.5E-04	9.3E-03	2.8E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	1.1E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	5.3E-04	--	--	--	--	--	--
BTAG Low HQ:	5.4E-03	1.1E-01	6.7E-03	1.4E-01	#DIV/0!	7.0E-02	2.7E-02	4.8E-01	1.8E-01	2.5E-01	1.4E-01
BTAG High HQ:	2.1E-04	3.1E-02	1.1E-04	9.5E-03	#DIV/0!	2.9E-04	1.1E-04	4.8E-02	7.5E-04	1.0E-02	3.2E-03

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Benzo[a]pyrene
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.349
Maximum detected value (mg/kg, dry weight):	0.379

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	57

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	3.1E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.9E-03	mean
BTAG High HQ:	3.9E-04	mean
BTAG Low HQ:	2.4E-02	max
BTAG High HQ:	9.5E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total PCBs
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.009
Maximum detected value (mg/kg, dry weight):	8.17

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	7.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.3E-02	mean
Daily exposure (mg/kg-day)	1.7E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.3E-01	mean
BTAG High HQ:	6.5E-02	mean
BTAG Low HQ:	4.7E-01	max
BTAG High HQ:	1.3E-01	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Tributyltin
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.129
Maximum detected value (mg/kg, dry weight):	0.258

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.5
Maximum detected value (mg/kg, dry weight):	3.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-03	mean
Daily exposure (mg/kg-day)	6.7E-03	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	1.9E-04	mean
BTAG Low HQ:	2.7E-02	max
BTAG High HQ:	4.4E-04	max

Hazard Quotient Calculation

Receptor:	CA Sea Lion
Chemical:	Arsenic
Location:	Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.3
Maximum detected value (mg/kg, dry weight):	2.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-02	mean
Daily exposure (mg/kg-day)	8.3E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	1.1E-02	mean
BTAG Low HQ:	2.6E-01	max
BTAG High HQ:	1.8E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Cadmium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.11
Maximum detected value (mg/kg, dry weight):	0.16

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-03	mean
Daily exposure (mg/kg-day)	4.5E-03	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.2E-02	mean
BTAG High HQ:	9.5E-04	mean
BTAG Low HQ:	7.5E-02	max
BTAG High HQ:	1.7E-03	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Chromium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.6
Maximum detected value (mg/kg, dry weight):	1.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	110

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.2E-02	mean
Daily exposure (mg/kg-day)	7.8E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.9E-02	mean
LOAEL HQ:	8.9E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.4E-02	max
LOAEL HQ:	1.1E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Copper
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	9
Maximum detected value (mg/kg, dry weight):	27

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	400
Maximum detected value (mg/kg, dry weight):	1500

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.5E-01	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.3E-01	mean
BTAG High HQ:	5.5E-04	mean
BTAG Low HQ:	4.4E-01	max
BTAG High HQ:	1.9E-03	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Lead
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.99
Maximum detected value (mg/kg, dry weight):	1.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	430

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.0E-02	mean
Daily exposure (mg/kg-day)	2.1E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.0E-02	mean
BTAG High HQ:	2.9E-04	mean
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	8.5E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total Mercury
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.66

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	4.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	4.1E-01	mean
BTAG HQ:	4.1E-02	mean
BTAG Low HQ:	5.7E-01	max
BTAG High HQ:	5.7E-02	max

Hazard Quotient Calculation

Receptor:	CA Sea Lion
Chemical:	Nickel
Location:	Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E-02	mean
Daily exposure (mg/kg-day)	6.8E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.3E-01	mean
BTAG High HQ:	9.7E-04	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	2.1E-03	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Selenium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	3.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E-02	mean
Daily exposure (mg/kg-day)	7.7E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	4.3E-02	mean
BTAG Low HQ:	1.5E+00	max
BTAG High HQ:	6.3E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Zinc
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	60
Maximum detected value (mg/kg, dry weight):	81

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	500
Maximum detected value (mg/kg, dry weight):	3400

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E+00	mean
Daily exposure (mg/kg-day)	3.1E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.5E-03	mean
BTAG Low HQ:	3.2E-01	max
BTAG High HQ:	7.4E-03	max

Tier II - Summary of Hazard Quotients

Receptor: Least Tern

Location: Inside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	5.2E-01	--	--	--	2.7E-01	--	--	--	--	--	--
LOAEL HQ:	5.2E-02	--	--	--	5.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**3.0E+00**	1.2E-02	7.7E-02	#VALUE!	9.3E-01	**3.3E+01**	3.4E-01	1.1E-01	2.7E-01	**1.0E+00**
BTAG High HQ:	#VALUE!	2.1E-01	1.9E-04	1.9E-02	#VALUE!	4.1E-02	5.2E-02	7.4E-02	2.6E-03	6.8E-02	1.0E-01
MAXIMUM											
NOAEL HQ:	**1.3E+00**	--	--	--	3.8E-01	--	--	--	--	--	--
LOAEL HQ:	1.3E-01	--	--	--	7.7E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**3.4E+00**	2.3E-02	1.1E-01	#VALUE!	**2.2E+00**	**8.8E+01**	5.7E-01	2.6E-01	2.8E-01	**1.5E+00**
BTAG High HQ:	#VALUE!	2.4E-01	3.7E-04	2.7E-02	#VALUE!	9.5E-02	1.4E-01	1.2E-01	6.4E-03	7.0E-02	1.5E-01

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.2E-01	--	--	--	6.0E-01	--	--	--	--	--	--
LOAEL HQ:	2.2E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.3E+00	5.2E-03	5.3E-02	#DIV/0!	4.6E-01	9.5E+00	2.1E-01	1.9E-01	5.2E-01	8.2E-01
BTAG High HQ:	#DIV/0!	9.3E-02	8.2E-05	1.3E-02	#DIV/0!	2.0E-02	1.5E-02	4.5E-02	4.7E-03	1.3E-01	8.2E-02
MAXIMUM											
NOAEL HQ:	2.3E-01	--	--	--	8.4E-01	--	--	--	--	--	--
LOAEL HQ:	2.3E-02	--	--	--	1.7E-01	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.4E+00	6.6E-03	5.7E-02	#DIV/0!	5.1E-01	1.3E+01	2.5E-01	2.3E-01	6.7E-01	8.8E-01
BTAG High HQ:	#DIV/0!	1.0E-01	1.1E-04	1.4E-02	#DIV/0!	2.3E-02	2.0E-02	5.5E-02	5.8E-03	1.7E-01	8.8E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.326
Maximum detected value (mg/kg, dry weight):	0.331

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	57

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.3E-02	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	5.2E-01	mean
LOAEL HQ:	5.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.3E+00	max
LOAEL HQ:	1.3E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCBs
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.273
Maximum detected value (mg/kg, dry weight):	2.415

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	7.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.0E+00	mean
BTAG High HQ:	2.1E-01	mean
BTAG Low HQ:	3.4E+00	max
BTAG High HQ:	2.4E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.065
Maximum detected value (mg/kg, dry weight):	0.076

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.5
Maximum detected value (mg/kg, dry weight):	3.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.9E-03	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.2E-02	mean
BTAG High HQ:	1.9E-04	mean
BTAG Low HQ:	2.3E-02	max
BTAG High HQ:	3.7E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.3
Maximum detected value (mg/kg, dry weight):	3.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-01	mean
Daily exposure (mg/kg-day)	6.0E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.7E-02	mean
BTAG High HQ:	1.9E-02	mean
BTAG Low HQ:	1.1E-01	max
BTAG High HQ:	2.7E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.022
Maximum detected value (mg/kg, dry weight):	0.033

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E-03	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

LOAEL HQ:	2.0E-04	mean
BTAG Low HQ:	5.1E-02	mean
BTAG High HQ:	3.9E-04	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	1.1E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.52

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	110

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-01	mean
Daily exposure (mg/kg-day)	3.3E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.7E-01	mean
LOAEL HQ:	5.4E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.8E-01	max
LOAEL HQ:	7.7E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	9.9
Maximum detected value (mg/kg, dry weight):	11

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	400
Maximum detected value (mg/kg, dry weight):	1500

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E+00	mean
Daily exposure (mg/kg-day)	5.0E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.3E-01	mean
BTAG High HQ:	4.1E-02	mean
BTAG Low HQ:	2.2E+00	max
BTAG High HQ:	9.5E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	430

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.6E-01	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.3E+01	mean
BTAG High HQ:	5.2E-02	mean
BTAG Low HQ:	8.8E+01	max
BTAG High HQ:	1.4E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.088
Maximum detected value (mg/kg, dry weight):	0.1

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	4.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	2.2E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	3.4E-01	mean
BTAG HQ:	7.4E-02	mean
BTAG Low HQ:	5.7E-01	max
BTAG High HQ:	1.2E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.84
Maximum detected value (mg/kg, dry weight):	0.96

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-01	mean
Daily exposure (mg/kg-day)	3.6E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.1E-01	mean
BTAG High HQ:	2.6E-03	mean
BTAG Low HQ:	2.6E-01	max
BTAG High HQ:	6.4E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.52

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.3E-02	mean
Daily exposure (mg/kg-day)	6.5E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.7E-01	mean
BTAG High HQ:	6.8E-02	mean
BTAG Low HQ:	2.8E-01	max
BTAG High HQ:	7.0E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	142
Maximum detected value (mg/kg, dry weight):	150

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	500
Maximum detected value (mg/kg, dry weight):	3400

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E+01	mean
Daily exposure (mg/kg-day)	2.6E+01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	1.5E+00	max
BTAG High HQ:	1.5E-01	max

Tier II - Summary of Hazard Quotients and Primary Drivers

Receptor: **Green Turtle**

Location: **Inside SWM**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	9.0E-02	--	--	--	9.3E-02	--	--	--	--	--	--
LOAEL HQ:	9.0E-03	--	--	--	1.9E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	9.2E-03	2.4E-04	4.2E-03	#VALUE!	3.7E-01	**8.3E+00**	3.1E-02	2.0E-02	1.1E-02	8.2E-02
BTAG High HQ:	#VALUE!	6.5E-04	3.7E-06	1.1E-03	#VALUE!	1.6E-02	1.3E-02	6.6E-03	4.8E-04	2.8E-03	8.2E-03
MAXIMUM											
NOAEL HQ:	1.5E-01	--	--	--	1.0E-01	--	--	--	--	--	--
LOAEL HQ:	1.5E-02	--	--	--	2.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.0E-02	9.9E-04	6.3E-03	#VALUE!	4.6E-01	**1.3E+01**	4.6E-02	3.1E-02	1.2E-02	1.1E-01
BTAG High HQ:	#VALUE!	1.5E-03	1.6E-05	1.6E-03	#VALUE!	2.0E-02	2.0E-02	9.9E-03	7.6E-04	2.9E-03	1.1E-02

Location: **Reference 2240**

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.4E-02	--	--	--	2.4E-02	--	--	--	--	--	--
LOAEL HQ:	1.4E-03	--	--	--	4.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.0E-03	1.7E-05	1.9E-03	#VALUE!	6.0E-02	1.7E+00	5.1E-03	9.2E-03	1.0E-02	3.9E-02
BTAG High HQ:	#VALUE!	1.4E-04	2.8E-07	4.8E-04	#VALUE!	2.6E-03	2.8E-03	1.1E-03	2.2E-04	2.5E-03	3.9E-03
MAXIMUM											
NOAEL HQ:	1.4E-02	--	--	--	2.4E-02	--	--	--	--	--	--
LOAEL HQ:	1.4E-03	--	--	--	4.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.0E-03	1.7E-05	1.9E-03	#VALUE!	6.0E-02	1.7E+00	5.1E-03	9.2E-03	1.0E-02	3.9E-02
BTAG High HQ:	#VALUE!	1.4E-04	2.8E-07	4.8E-04	#VALUE!	2.6E-03	2.8E-03	1.1E-03	2.2E-04	2.5E-03	3.9E-03

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Benzo[a]pyrene
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.665
Maximum detected value (mg/kg, dry weight):	2.665

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	57

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	2.1E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	9.0E-02	mean
LOAEL HQ:	9.0E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.5E-01	max
LOAEL HQ:	1.5E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Total PCBs
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.123
Maximum detected value (mg/kg, dry weight):	0.123

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	7.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.3E-04	mean
Daily exposure (mg/kg-day)	1.8E-03	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.2E-03	mean
BTAG High HQ:	6.5E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	1.5E-03	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Tributyltin
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.02
Maximum detected value (mg/kg, dry weight):	0.02

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.5
Maximum detected value (mg/kg, dry weight):	3.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-04	mean
Daily exposure (mg/kg-day)	7.2E-04	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

LOAEL HQ:	1.0E-05	mean
BTAG Low HQ:	2.4E-04	mean
BTAG High HQ:	3.7E-06	mean
LOAEL HQ:	4.2E-05	max
BTAG Low HQ:	9.9E-04	max
BTAG High HQ:	1.6E-05	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Arsenic
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	5.5
Maximum detected value (mg/kg, dry weight):	5.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-02	mean
Daily exposure (mg/kg-day)	3.5E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.2E-03	mean
BTAG High HQ:	1.1E-03	mean
BTAG Low HQ:	6.3E-03	max
BTAG High HQ:	1.6E-03	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Cadmium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.77
Maximum detected value (mg/kg, dry weight):	0.77

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.0E-03	mean
Daily exposure (mg/kg-day)	3.4E-03	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.7E-02	mean
BTAG High HQ:	2.8E-04	mean
BTAG Low HQ:	4.3E-02	max
BTAG High HQ:	3.3E-04	max

Hazard Quotient Calculation

Receptor:	East Pacific Green Turtle
Chemical:	Chromium
Location:	Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	18
Maximum detected value (mg/kg, dry weight):	18

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	110

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.0E-02	mean
Daily exposure (mg/kg-day)	8.8E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	9.3E-02	mean
LOAEL HQ:	1.9E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.0E-01	max
LOAEL HQ:	2.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Copper
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	209
Maximum detected value (mg/kg, dry weight):	209

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	400
Maximum detected value (mg/kg, dry weight):	1500

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.5E-01	mean
Daily exposure (mg/kg-day)	1.1E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.7E-01	mean
BTAG High HQ:	1.6E-02	mean
BTAG Low HQ:	4.6E-01	max
BTAG High HQ:	2.0E-02	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Lead
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	25
Maximum detected value (mg/kg, dry weight):	25

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	430

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.3E+00	mean
BTAG High HQ:	1.3E-02	mean
BTAG Low HQ:	1.3E+01	max
BTAG High HQ:	2.0E-02	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Total Mercury
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.26
Maximum detected value (mg/kg, dry weight):	0.26

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	4.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-03	mean
Daily exposure (mg/kg-day)	1.8E-03	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	3.1E-02	mean
BTAG HQ:	6.6E-03	mean
BTAG Low HQ:	4.6E-02	max
BTAG High HQ:	9.9E-03	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Nickel
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	6.3
Maximum detected value (mg/kg, dry weight):	6.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-02	mean
Daily exposure (mg/kg-day)	4.3E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.0E-02	mean
BTAG High HQ:	4.8E-04	mean
BTAG Low HQ:	3.1E-02	max
BTAG High HQ:	7.6E-04	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Selenium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.65
Maximum detected value (mg/kg, dry weight):	0.65

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-03	mean
Daily exposure (mg/kg-day)	2.7E-03	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	1.2E-02	max
BTAG High HQ:	2.9E-03	max

Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Zinc
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	354
Maximum detected value (mg/kg, dry weight):	354

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	500
Maximum detected value (mg/kg, dry weight):	3400

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E+00	mean
Daily exposure (mg/kg-day)	2.0E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.2E-02	mean
BTAG High HQ:	8.2E-03	mean
BTAG Low HQ:	1.1E-01	max
BTAG High HQ:	1.1E-02	max

Tier II - Summary of Hazard Quotients

Receptor: Brown Pelican

Location: Inside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.5E-01	--	--	--	2.7E-01	--	--	--	--	--	--
LOAEL HQ:	3.5E-02	--	--	--	5.5E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**3.5E+00**	1.5E-02	3.7E-02	#VALUE!	5.8E-01	**1.9E+01**	**1.1E+00**	8.6E-02	8.6E-01	3.2E-01
BTAG High HQ:	#VALUE!	2.5E-01	2.4E-04	9.3E-03	#VALUE!	2.6E-02	3.1E-02	2.4E-01	2.1E-03	2.1E-01	3.2E-02
MAXIMUM											
NOAEL HQ:	8.5E-01	--	--	--	3.5E-01	--	--	--	--	--	--
LOAEL HQ:	8.5E-02	--	--	--	7.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**7.3E+00**	3.5E-02	5.8E-02	#VALUE!	**2.0E+00**	**5.6E+01**	**1.5E+00**	1.9E-01	**1.3E+00**	6.8E-01
BTAG High HQ:	#VALUE!	5.2E-01	5.6E-04	1.5E-02	#VALUE!	8.6E-02	9.0E-02	3.3E-01	4.6E-03	3.2E-01	6.8E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.8E-01	--	--	--	1.0E-01	--	--	--	--	--	--
LOAEL HQ:	1.8E-02	--	--	--	2.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.2E+00	4.4E-03	2.6E-02	#DIV/0!	1.6E-01	4.2E+00	8.6E-01	5.7E-02	1.9E-01	2.5E-01
BTAG High HQ:	#DIV/0!	8.8E-02	7.0E-05	6.4E-03	#DIV/0!	6.9E-03	6.8E-03	1.9E-01	1.4E-03	4.7E-02	2.5E-02
MAXIMUM											
NOAEL HQ:	1.9E-01	--	--	--	1.6E-01	--	--	--	--	--	--
LOAEL HQ:	1.9E-02	--	--	--	3.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.7E+00	8.9E-03	3.1E-02	#DIV/0!	3.1E-01	7.4E+00	1.3E+00	6.6E-02	2.1E-01	2.9E-01
BTAG High HQ:	#DIV/0!	1.2E-01	1.4E-04	7.8E-03	#DIV/0!	1.4E-02	1.2E-02	2.8E-01	1.6E-03	5.1E-02	2.9E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Benzo[a]pyrene
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174	
Food ingestion rate (kg/day dry wt):	0.25	
Sediment ingestion rate (kg/day dry wt):	0.005	
Area Use Factor (unitless):	1	0.002
Time Use Factor (unitless):	1	

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.349
Maximum detected value (mg/kg, dry weight):	0.379

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	57

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.0E-02	mean
Daily exposure (mg/kg-day)	1.2E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	3.5E-01	mean
LOAEL HQ:	3.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	8.5E-01	max
LOAEL HQ:	8.5E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Total PCBs
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.009
Maximum detected value (mg/kg, dry weight):	8.17

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	7.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.2E-01	mean
Daily exposure (mg/kg-day)	6.5E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.5E+00	mean
BTAG High HQ:	2.5E-01	mean
BTAG Low HQ:	7.3E+00	max
BTAG High HQ:	5.2E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Tributyltin
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.129
Maximum detected value (mg/kg, dry weight):	0.258

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.5
Maximum detected value (mg/kg, dry weight):	3.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	2.6E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.5E-02	mean
BTAG High HQ:	2.4E-04	mean
LOAEL HQ:	1.5E-03	max
BTAG Low HQ:	3.5E-02	max
BTAG High HQ:	5.6E-04	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Arsenic
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.3
Maximum detected value (mg/kg, dry weight):	2.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-01	mean
Daily exposure (mg/kg-day)	3.2E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.7E-02	mean
BTAG High HQ:	9.3E-03	mean
BTAG Low HQ:	5.8E-02	max
BTAG High HQ:	1.5E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Cadmium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.11
Maximum detected value (mg/kg, dry weight):	0.16

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.6E-03	mean
Daily exposure (mg/kg-day)	1.7E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	9.2E-04	mean
LOAEL HQ:	8.6E-04	max
BTAG Low HQ:	2.1E-01	max
BTAG High HQ:	1.7E-03	max

Hazard Quotient Calculation

Receptor:	American Brown Pelican
Chemical:	Chromium
Location:	Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.6
Maximum detected value (mg/kg, dry weight):	1.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	110

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.7E-01	mean
LOAEL HQ:	5.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.5E-01	max
LOAEL HQ:	7.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Copper
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	9
Maximum detected value (mg/kg, dry weight):	27

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	400
Maximum detected value (mg/kg, dry weight):	1500

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E+00	mean
Daily exposure (mg/kg-day)	4.5E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.8E-01	mean
BTAG High HQ:	2.6E-02	mean
BTAG Low HQ:	2.0E+00	max
BTAG High HQ:	8.6E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Lead
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.99
Maximum detected value (mg/kg, dry weight):	1.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	430

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-01	mean
Daily exposure (mg/kg-day)	7.9E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.9E+01	mean
BTAG High HQ:	3.1E-02	mean
BTAG Low HQ:	5.6E+01	max
BTAG High HQ:	9.0E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Total Mercury
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.52
Maximum detected value (mg/kg, dry weight):	0.66

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	4.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.3E-02	mean
Daily exposure (mg/kg-day)	5.9E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.1E+00	mean
BTAG HQ:	2.4E-01	mean
BTAG Low HQ:	1.5E+00	max
BTAG High HQ:	3.3E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Nickel
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.1
Maximum detected value (mg/kg, dry weight):	1.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	2.6E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.6E-02	mean
BTAG High HQ:	2.1E-03	mean
BTAG Low HQ:	1.9E-01	max
BTAG High HQ:	4.6E-03	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Selenium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	3.7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-01	mean
Daily exposure (mg/kg-day)	2.9E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.6E-01	mean
BTAG High HQ:	2.1E-01	mean
BTAG Low HQ:	1.3E+00	max
BTAG High HQ:	3.2E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Zinc
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	60
Maximum detected value (mg/kg, dry weight):	81

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	500
Maximum detected value (mg/kg, dry weight):	3400

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E+00	mean
Daily exposure (mg/kg-day)	1.2E+01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.2E-01	mean
BTAG High HQ:	3.2E-02	mean
BTAG Low HQ:	6.8E-01	max
BTAG High HQ:	6.8E-02	max

Tier II - Summary of Hazard Quotients

Receptor: Western Grebe

Location: Inside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.8E-01	--	--	--	2.4E-01	--	--	--	--	--	--
LOAEL HQ:	3.8E-02	--	--	--	4.8E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.4E+00**	6.4E-03	3.8E-02	#VALUE!	6.7E-01	**2.7E+01**	2.0E-01	6.9E-02	1.3E-01	5.0E-01
BTAG High HQ:	#VALUE!	9.6E-02	1.0E-04	9.5E-03	#VALUE!	3.0E-02	4.4E-02	4.2E-02	1.7E-03	3.2E-02	5.0E-02
MAXIMUM											
NOAEL HQ:	**1.2E+00**	--	--	--	3.6E-01	--	--	--	--	--	--
LOAEL HQ:	1.2E-01	--	--	--	7.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**1.6E+00**	1.7E-02	6.8E-02	#VALUE!	**1.9E+00**	**8.5E+01**	4.1E-01	2.2E-01	1.3E-01	9.6E-01
BTAG High HQ:	#VALUE!	1.1E-01	2.7E-04	1.7E-02	#VALUE!	8.5E-02	1.4E-01	8.9E-02	5.5E-03	3.3E-02	9.6E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.0E-01	--	--	--	3.1E-01	--	--	--	--	--	--
LOAEL HQ:	1.0E-02	--	--	--	6.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	5.7E-01	2.3E-03	2.5E-02	#DIV/0!	2.4E-01	6.6E+00	1.0E-01	9.0E-02	2.3E-01	3.7E-01
BTAG High HQ:	#DIV/0!	4.1E-02	3.6E-05	6.2E-03	#DIV/0!	1.1E-02	1.1E-02	2.2E-02	2.2E-03	5.7E-02	3.7E-02
MAXIMUM											
NOAEL HQ:	1.1E-01	--	--	--	4.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	9.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	6.2E-01	2.9E-03	2.8E-02	#DIV/0!	2.9E-01	9.9E+00	1.3E-01	1.2E-01	3.0E-01	4.1E-01
BTAG High HQ:	#DIV/0!	4.4E-02	4.6E-05	6.9E-03	#DIV/0!	1.3E-02	1.6E-02	2.8E-02	2.8E-03	7.4E-02	4.1E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Benzo[a]pyrene
Location:	Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.326
Maximum detected value (mg/kg, dry weight):	0.331

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	14
Maximum detected value (mg/kg, dry weight):	57

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-02	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	3.8E-01	mean
LOAEL HQ:	3.8E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.2E+00	max
LOAEL HQ:	1.2E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCBs
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.273
Maximum detected value (mg/kg, dry weight):	2.415

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	7.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.4E+00	mean
BTAG High HQ:	9.6E-02	mean
BTAG Low HQ:	1.6E+00	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Tributyltin
Location:	Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.065
Maximum detected value (mg/kg, dry weight):	0.076

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.5
Maximum detected value (mg/kg, dry weight):	3.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.7E-03	mean
Daily exposure (mg/kg-day)	1.2E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.4E-03	mean
BTAG High HQ:	1.0E-04	mean
BTAG Low HQ:	1.7E-02	max
BTAG High HQ:	2.7E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.3
Maximum detected value (mg/kg, dry weight):	3.6

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	15
Maximum detected value (mg/kg, dry weight):	73

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	3.7E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.8E-02	mean
BTAG High HQ:	9.5E-03	mean
BTAG Low HQ:	6.8E-02	max
BTAG High HQ:	1.7E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.022
Maximum detected value (mg/kg, dry weight):	0.033

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	2.9

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-03	mean
Daily exposure (mg/kg-day)	9.2E-03	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.4E-02	mean
BTAG High HQ:	2.6E-04	mean
BTAG Low HQ:	1.1E-01	max
BTAG High HQ:	8.8E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.52

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	70
Maximum detected value (mg/kg, dry weight):	110

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	3.1E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.4E-01	mean
LOAEL HQ:	4.8E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	3.6E-01	max
LOAEL HQ:	7.2E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	9.9
Maximum detected value (mg/kg, dry weight):	11

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	400
Maximum detected value (mg/kg, dry weight):	1500

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E+00	mean
Daily exposure (mg/kg-day)	4.4E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.7E-01	mean
BTAG High HQ:	3.0E-02	mean
BTAG Low HQ:	1.9E+00	max
BTAG High HQ:	8.5E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.4
Maximum detected value (mg/kg, dry weight):	1.5

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	120
Maximum detected value (mg/kg, dry weight):	430

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E-01	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.7E+01	mean
BTAG High HQ:	4.4E-02	mean
BTAG Low HQ:	8.5E+01	max
BTAG High HQ:	1.4E-01	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.088
Maximum detected value (mg/kg, dry weight):	0.1

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	4.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.6E-03	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	2.0E-01	mean
BTAG HQ:	4.2E-02	mean
BTAG Low HQ:	4.1E-01	max
BTAG High HQ:	8.9E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.84
Maximum detected value (mg/kg, dry weight):	0.96

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	20
Maximum detected value (mg/kg, dry weight):	100

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.5E-02	mean
Daily exposure (mg/kg-day)	3.1E-01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.9E-02	mean
BTAG High HQ:	1.7E-03	mean
BTAG Low HQ:	2.2E-01	max
BTAG High HQ:	5.5E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.51
Maximum detected value (mg/kg, dry weight):	0.52

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.5

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-02	mean
Daily exposure (mg/kg-day)	3.1E-02	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.3E-01	mean
BTAG High HQ:	3.2E-02	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	3.3E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: Inside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	142
Maximum detected value (mg/kg, dry weight):	150

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	500
Maximum detected value (mg/kg, dry weight):	3400

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.6E+00	mean
Daily exposure (mg/kg-day)	1.7E+01	max

Hazard Quotients (values listed in Table 10-13 of NASSCO/SWM DSI Volume 1)

LOAEL HQ:	#DIV/0!	mean
BTAG Low HQ:	5.0E-01	mean
BTAG High HQ:	5.0E-02	mean
BTAG Low HQ:	9.6E-01	max
BTAG High HQ:	9.6E-02	max

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Tier II - Summary of Hazard Quotients

Receptor: Sea Lion

Location: Outside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	8.5E-03	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	4.1E-04	--	--	--	--	--	--
BTAG Low HQ:	5.7E-03	1.4E-01	1.0E-02	1.7E-01	#VALUE!	7.0E-02	3.8E-02	4.2E-01	1.8E-01	5.0E-01	1.1E-01
BTAG High HQ:	2.3E-04	3.9E-02	1.7E-04	1.2E-02	#VALUE!	3.0E-04	1.6E-04	4.2E-02	7.7E-04	2.1E-02	2.6E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	1.2E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	5.9E-04	--	--	--	--	--	--
BTAG Low HQ:	7.0E-03	2.3E-01	1.5E-02	2.3E-01	#VALUE!	1.4E-01	6.7E-02	5.7E-01	2.6E-01	5.4E-01	1.3E-01
BTAG High HQ:	2.8E-04	6.5E-02	2.5E-04	1.6E-02	#VALUE!	6.0E-04	2.8E-04	5.7E-02	1.1E-03	2.2E-02	3.0E-03

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	6.9E-03	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	3.3E-04	--	--	--	--	--	--
BTAG Low HQ:	4.9E-03	8.1E-02	3.4E-03	1.2E-01	#DIV/0!	3.5E-02	1.5E-02	3.2E-01	1.6E-01	2.3E-01	1.2E-01
BTAG High HQ:	2.0E-04	2.3E-02	5.6E-05	7.8E-03	#DIV/0!	1.5E-04	6.4E-05	3.2E-02	6.5E-04	9.3E-03	2.8E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	1.1E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	5.3E-04	--	--	--	--	--	--
BTAG Low HQ:	5.4E-03	1.1E-01	6.7E-03	1.4E-01	#DIV/0!	7.0E-02	2.7E-02	4.8E-01	1.8E-01	2.5E-01	1.4E-01
BTAG High HQ:	2.1E-04	3.1E-02	1.1E-04	9.5E-03	#DIV/0!	2.9E-04	1.1E-04	4.8E-02	7.5E-04	1.0E-02	3.2E-03

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Benzo[a]pyrene
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.325
Maximum detected value (mg/kg, dry weight):	0.359

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	4.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.5E-03	mean
Daily exposure (mg/kg-day)	9.1E-03	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.7E-03	mean
BTAG High HQ:	2.3E-04	mean
BTAG Low HQ:	7.0E-03	max
BTAG High HQ:	2.8E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total PCBs
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.424
Maximum detected value (mg/kg, dry weight):	4.025

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.25
Maximum detected value (mg/kg, dry weight):	0.33

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.0E-02	mean
Daily exposure (mg/kg-day)	8.3E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.4E-01	mean
BTAG High HQ:	3.9E-02	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	6.5E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Tributyltin
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.126
Maximum detected value (mg/kg, dry weight):	0.182

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.037
Maximum detected value (mg/kg, dry weight):	0.049

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-03	mean
Daily exposure (mg/kg-day)	3.8E-03	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E-02	mean
BTAG High HQ:	1.7E-04	mean
BTAG Low HQ:	1.5E-02	max
BTAG High HQ:	2.5E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Arsenic
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	3.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	8
Maximum detected value (mg/kg, dry weight):	10

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-02	mean
Daily exposure (mg/kg-day)	7.4E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.7E-01	mean
BTAG High HQ:	1.2E-02	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	1.6E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Cadmium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.066
Maximum detected value (mg/kg, dry weight):	0.084

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.21

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-03	mean
Daily exposure (mg/kg-day)	1.8E-03	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.3E-02	mean
BTAG High HQ:	5.3E-04	mean
BTAG Low HQ:	3.0E-02	max
BTAG High HQ:	6.9E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Chromium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.49
Maximum detected value (mg/kg, dry weight):	0.57

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	44
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.8E-02	mean
Daily exposure (mg/kg-day)	4.0E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	8.5E-03	mean
LOAEL HQ:	4.1E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.2E-02	max
LOAEL HQ:	5.9E-04	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Copper
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	6.3
Maximum detected value (mg/kg, dry weight):	12

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	140
Maximum detected value (mg/kg, dry weight):	320

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	3.8E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.0E-02	mean
BTAG High HQ:	3.0E-04	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	6.0E-04	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Lead
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.68
Maximum detected value (mg/kg, dry weight):	1.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	99

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E-02	mean
Daily exposure (mg/kg-day)	6.7E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.8E-02	mean
BTAG High HQ:	1.6E-04	mean
BTAG Low HQ:	6.7E-02	max
BTAG High HQ:	2.8E-04	max

Hazard Quotient Calculation

Receptor:	CA Sea Lion
Chemical:	Total Mercury
Location:	Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.54
Maximum detected value (mg/kg, dry weight):	0.71

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.7
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027
BTAG High (mg/kg-day):	0.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	4.2E-01	mean
BTAG HQ:	4.2E-02	mean
BTAG Low HQ:	5.7E-01	max
BTAG High HQ:	5.7E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Nickel
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.96
Maximum detected value (mg/kg, dry weight):	1.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	13

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	3.4E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.8E-01	mean
BTAG High HQ:	7.7E-04	mean
BTAG Low HQ:	2.6E-01	max
BTAG High HQ:	1.1E-03	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Selenium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.5E-02	mean
Daily exposure (mg/kg-day)	2.7E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.0E-01	mean
BTAG High HQ:	2.1E-02	mean
BTAG Low HQ:	5.4E-01	max
BTAG High HQ:	2.2E-02	max

Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Zinc
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	48
Maximum detected value (mg/kg, dry weight):	53

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.1E-01	mean
BTAG High HQ:	2.6E-03	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	3.0E-03	max

Tier II - Summary of Hazard Quotients

Receptor: Least Tern

Location: Outside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.2E-01	--	--	--	2.1E-01	--	--	--	--	--	--
LOAEL HQ:	3.2E-02	--	--	--	4.1E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**2.3E+00**	2.0E-02	8.7E-02	#VALUE!	5.1E-01	**1.7E+01**	3.8E-01	7.7E-02	3.1E-01	**1.0E+00**
BTAG High HQ:	#VALUE!	1.6E-01	3.2E-04	2.2E-02	#VALUE!	2.2E-02	2.7E-02	8.1E-02	1.9E-03	7.8E-02	1.0E-01
MAXIMUM											
NOAEL HQ:	3.6E-01	--	--	--	2.8E-01	--	--	--	--	--	--
LOAEL HQ:	3.6E-02	--	--	--	5.6E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**2.3E+00**	2.0E-02	8.8E-02	#VALUE!	7.0E-01	**2.4E+01**	4.6E-01	8.0E-02	3.1E-01	**1.1E+00**
BTAG High HQ:	#VALUE!	1.6E-01	3.2E-04	2.2E-02	#VALUE!	3.1E-02	3.8E-02	1.0E-01	2.0E-03	7.8E-02	1.1E-01

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.2E-01	--	--	--	6.0E-01	--	--	--	--	--	--
LOAEL HQ:	2.2E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.3E+00	5.2E-03	5.3E-02	#DIV/0!	4.6E-01	9.5E+00	2.1E-01	1.9E-01	5.2E-01	8.2E-01
BTAG High HQ:	#DIV/0!	9.3E-02	8.2E-05	1.3E-02	#DIV/0!	2.0E-02	1.5E-02	4.5E-02	4.7E-03	1.3E-01	8.2E-02
MAXIMUM											
NOAEL HQ:	2.3E-01	--	--	--	8.4E-01	--	--	--	--	--	--
LOAEL HQ:	2.3E-02	--	--	--	1.7E-01	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.4E+00	6.6E-03	5.7E-02	#DIV/0!	5.1E-01	1.3E+01	2.5E-01	2.3E-01	6.7E-01	8.8E-01
BTAG High HQ:	#DIV/0!	1.0E-01	1.1E-04	1.4E-02	#DIV/0!	2.3E-02	2.0E-02	5.5E-02	5.8E-03	1.7E-01	8.8E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.335
Maximum detected value (mg/kg, dry weight):	0.335

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	4.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-02	mean
Daily exposure (mg/kg-day)	5.0E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	3.2E-01	mean
LOAEL HQ:	3.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.6E-01	max
LOAEL HQ:	3.6E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Total PCBs
Location:	Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.772
Maximum detected value (mg/kg, dry weight):	1.772

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.25
Maximum detected value (mg/kg, dry weight):	0.33

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.1E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.3E+00	mean
BTAG High HQ:	1.6E-01	mean
BTAG Low HQ:	2.3E+00	max
BTAG High HQ:	1.6E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.122
Maximum detected value (mg/kg, dry weight):	0.122

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.037
Maximum detected value (mg/kg, dry weight):	0.049

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Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-02	mean
Daily exposure (mg/kg-day)	1.4E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.0E-02	mean
BTAG High HQ:	3.2E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	3.2E-04	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.9
Maximum detected value (mg/kg, dry weight):	3.9

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	8
Maximum detected value (mg/kg, dry weight):	10

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.8E-01	mean
Daily exposure (mg/kg-day)	4.8E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.7E-02	mean
BTAG High HQ:	2.2E-02	mean
BTAG Low HQ:	8.8E-02	max
BTAG High HQ:	2.2E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.02
Maximum detected value (mg/kg, dry weight):	0.02

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.21

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-03	mean
Daily exposure (mg/kg-day)	2.9E-03	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.3E-02	mean
BTAG High HQ:	2.6E-04	mean
BTAG Low HQ:	3.6E-02	max
BTAG High HQ:	2.8E-04	max

Hazard Quotient Calculation

Receptor:	CA Least Tern
Chemical:	Chromium
Location:	Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.59
Maximum detected value (mg/kg, dry weight):	0.59

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	44
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-01	mean
Daily exposure (mg/kg-day)	2.4E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.1E-01	mean
LOAEL HQ:	4.1E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.8E-01	max
LOAEL HQ:	5.6E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	7
Maximum detected value (mg/kg, dry weight):	7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	140
Maximum detected value (mg/kg, dry weight):	320

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E+00	mean
Daily exposure (mg/kg-day)	1.6E+00	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.1E-01	mean
BTAG High HQ:	2.2E-02	mean
BTAG Low HQ:	7.0E-01	max
BTAG High HQ:	3.1E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.8
Maximum detected value (mg/kg, dry weight):	0.8

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	99

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-01	mean
Daily exposure (mg/kg-day)	3.4E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.7E+01	mean
BTAG High HQ:	2.7E-02	mean
BTAG Low HQ:	2.4E+01	max
BTAG High HQ:	3.8E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.11
Maximum detected value (mg/kg, dry weight):	0.11

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.7
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	1.8E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	3.8E-01	mean
BTAG HQ:	8.1E-02	mean
BTAG Low HQ:	4.6E-01	max
BTAG High HQ:	1.0E-01	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.67

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	13

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.1E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	7.7E-02	mean
BTAG High HQ:	1.9E-03	mean
BTAG Low HQ:	8.0E-02	max
BTAG High HQ:	2.0E-03	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.59
Maximum detected value (mg/kg, dry weight):	0.59

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E-02	mean
Daily exposure (mg/kg-day)	7.2E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.1E-01	mean
BTAG High HQ:	7.8E-02	mean
BTAG Low HQ:	3.1E-01	max
BTAG High HQ:	7.8E-02	max

Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	149
Maximum detected value (mg/kg, dry weight):	149

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E+01	mean
Daily exposure (mg/kg-day)	1.8E+01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	1.1E-01	max

Tier II - Summary of Hazard Quotients

Receptor: Brown Pelican

Location: Outside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.0E-01	--	--	--	1.3E-01	--	--	--	--	--	--
LOAEL HQ:	2.0E-02	--	--	--	2.5E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**2.1E+00**	1.4E-02	3.8E-02	#VALUE!	3.1E-01	**1.0E+01**	**1.1E+00**	6.7E-02	4.2E-01	2.4E-01
BTAG High HQ:	#VALUE!	1.5E-01	2.2E-04	9.5E-03	#VALUE!	1.4E-02	1.7E-02	2.4E-01	1.7E-03	1.0E-01	2.4E-02
MAXIMUM											
NOAEL HQ:	2.5E-01	--	--	--	1.8E-01	--	--	--	--	--	--
LOAEL HQ:	2.5E-02	--	--	--	3.6E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**3.5E+00**	2.0E-02	5.2E-02	#VALUE!	6.3E-01	**1.8E+01**	**1.5E+00**	9.5E-02	4.5E-01	2.7E-01
BTAG High HQ:	#VALUE!	2.5E-01	3.1E-04	1.3E-02	#VALUE!	2.8E-02	3.0E-02	3.3E-01	2.3E-03	1.1E-01	2.7E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.8E-01	--	--	--	1.0E-01	--	--	--	--	--	--
LOAEL HQ:	1.8E-02	--	--	--	2.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.2E+00	4.4E-03	2.6E-02	#DIV/0!	1.6E-01	4.2E+00	8.6E-01	5.7E-02	1.9E-01	2.5E-01
BTAG High HQ:	#DIV/0!	8.8E-02	7.0E-05	6.4E-03	#DIV/0!	6.9E-03	6.8E-03	1.9E-01	1.4E-03	4.7E-02	2.5E-02
MAXIMUM											
NOAEL HQ:	1.9E-01	--	--	--	1.6E-01	--	--	--	--	--	--
LOAEL HQ:	1.9E-02	--	--	--	3.2E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	1.7E+00	8.9E-03	3.1E-02	#DIV/0!	3.1E-01	7.4E+00	1.3E+00	6.6E-02	2.1E-01	2.9E-01
BTAG High HQ:	#DIV/0!	1.2E-01	1.4E-04	7.8E-03	#DIV/0!	1.4E-02	1.2E-02	2.8E-01	1.6E-03	5.1E-02	2.9E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Benzo[a]pyrene
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.325
Maximum detected value (mg/kg, dry weight):	0.359

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	4.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-02	mean
Daily exposure (mg/kg-day)	3.5E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.0E-01	mean
LOAEL HQ:	2.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.5E-01	max
LOAEL HQ:	2.5E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Total PCBs
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.424
Maximum detected value (mg/kg, dry weight):	4.025

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.25
Maximum detected value (mg/kg, dry weight):	0.33

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	3.2E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.1E+00	mean
BTAG High HQ:	1.5E-01	mean
BTAG Low HQ:	3.5E+00	max
BTAG High HQ:	2.5E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Tributyltin
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.126
Maximum detected value (mg/kg, dry weight):	0.182

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.037
Maximum detected value (mg/kg, dry weight):	0.049

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.0E-02	mean
Daily exposure (mg/kg-day)	1.4E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.4E-02	mean
BTAG High HQ:	2.2E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	3.1E-04	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Arsenic
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.5
Maximum detected value (mg/kg, dry weight):	3.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	8
Maximum detected value (mg/kg, dry weight):	10

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.8E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.8E-02	mean
BTAG High HQ:	9.5E-03	mean
BTAG Low HQ:	5.2E-02	max
BTAG High HQ:	1.3E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Cadmium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.066
Maximum detected value (mg/kg, dry weight):	0.084

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.21

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.4E-03	mean
Daily exposure (mg/kg-day)	6.9E-03	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.8E-02	mean
BTAG High HQ:	5.2E-04	mean
BTAG Low HQ:	8.7E-02	max
BTAG High HQ:	6.7E-04	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Chromium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.49
Maximum detected value (mg/kg, dry weight):	0.57

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	44
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.3E-01	mean
LOAEL HQ:	2.5E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	1.8E-01	max
LOAEL HQ:	3.6E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Copper
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	6.3
Maximum detected value (mg/kg, dry weight):	12

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	140
Maximum detected value (mg/kg, dry weight):	320

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E-01	mean
Daily exposure (mg/kg-day)	1.4E+00	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.1E-01	mean
BTAG High HQ:	1.4E-02	mean
BTAG Low HQ:	6.3E-01	max
BTAG High HQ:	2.8E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Lead
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.68
Maximum detected value (mg/kg, dry weight):	1.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	99

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-01	mean
Daily exposure (mg/kg-day)	2.6E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E+01	mean
BTAG High HQ:	1.7E-02	mean
BTAG Low HQ:	1.8E+01	max
BTAG High HQ:	3.0E-02	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Total Mercury
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.54
Maximum detected value (mg/kg, dry weight):	0.71

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.7
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E-02	mean
Daily exposure (mg/kg-day)	5.9E-02	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.1E+00	mean
BTAG HQ:	2.4E-01	mean
BTAG Low HQ:	1.5E+00	max
BTAG High HQ:	3.3E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Nickel
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.96
Maximum detected value (mg/kg, dry weight):	1.4

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	13

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.3E-02	mean
Daily exposure (mg/kg-day)	1.3E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.7E-02	mean
BTAG High HQ:	1.7E-03	mean
BTAG Low HQ:	9.5E-02	max
BTAG High HQ:	2.3E-03	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Selenium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.3

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.6E-02	mean
Daily exposure (mg/kg-day)	1.0E-01	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.2E-01	mean
BTAG High HQ:	1.0E-01	mean
BTAG Low HQ:	4.5E-01	max
BTAG High HQ:	1.1E-01	max

Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Zinc
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	48
Maximum detected value (mg/kg, dry weight):	53

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

LOAEL (mg/kg-day):	
BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.1E+00	mean
Daily exposure (mg/kg-day)	4.7E+00	max

Hazard Quotients (values listed in Table 10-12 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	2.4E-02	mean
BTAG Low HQ:	2.7E-01	max
BTAG High HQ:	2.7E-02	max

Tier II - Summary of Hazard Quotients

Receptor: Western Grebe

Location: Outside SWM

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.6E-01	--	--	--	1.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.6E-02	--	--	--	3.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**<u>1.0E+00</u>**	8.8E-03	4.0E-02	#VALUE!	3.1E-01	**<u>1.4E+01</u>**	1.9E-01	4.6E-02	1.5E-01	4.8E-01
BTAG High HQ:	#VALUE!	7.3E-02	1.4E-04	1.0E-02	#VALUE!	1.4E-02	2.2E-02	4.2E-02	1.1E-03	3.6E-02	4.8E-02
MAXIMUM											
NOAEL HQ:	2.0E-01	--	--	--	2.5E-01	--	--	--	--	--	--
LOAEL HQ:	2.0E-02	--	--	--	4.9E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	**<u>1.1E+00</u>**	8.8E-03	4.1E-02	#VALUE!	5.2E-01	**<u>2.1E+01</u>**	2.8E-01	4.9E-02	1.5E-01	4.9E-01
BTAG High HQ:	#VALUE!	7.9E-02	1.4E-04	1.0E-02	#VALUE!	2.3E-02	3.4E-02	6.2E-02	1.2E-03	3.6E-02	4.9E-02

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.0E-01	--	--	--	3.1E-01	--	--	--	--	--	--
LOAEL HQ:	1.0E-02	--	--	--	6.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	5.7E-01	2.3E-03	2.5E-02	#DIV/0!	2.4E-01	6.6E+00	1.0E-01	9.0E-02	2.3E-01	3.7E-01
BTAG High HQ:	#DIV/0!	4.1E-02	3.6E-05	6.2E-03	#DIV/0!	1.1E-02	1.1E-02	2.2E-02	2.2E-03	5.7E-02	3.7E-02
MAXIMUM											
NOAEL HQ:	1.1E-01	--	--	--	4.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	9.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#DIV/0!	6.2E-01	2.9E-03	2.8E-02	#DIV/0!	2.9E-01	9.9E+00	1.3E-01	1.2E-01	3.0E-01	4.1E-01
BTAG High HQ:	#DIV/0!	4.4E-02	4.6E-05	6.9E-03	#DIV/0!	1.3E-02	1.6E-02	2.8E-02	2.8E-03	7.4E-02	4.1E-02

NOTE:

HQ values bold faced, underlined, and shaded are greater than an HQ threshold value of 1 and greater than the reference HQ value.

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.335
Maximum detected value (mg/kg, dry weight):	0.335

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.9
Maximum detected value (mg/kg, dry weight):	4.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-02	mean
Daily exposure (mg/kg-day)	2.8E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.6E-01	mean
LOAEL HQ:	1.6E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.0E-01	max
LOAEL HQ:	2.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCBs
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.772
Maximum detected value (mg/kg, dry weight):	1.772

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.25
Maximum detected value (mg/kg, dry weight):	3.3

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-02	mean
Daily exposure (mg/kg-day)	1.0E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E+00	mean
BTAG High HQ:	7.3E-02	mean
BTAG Low HQ:	1.1E+00	max
BTAG High HQ:	7.9E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.122
Maximum detected value (mg/kg, dry weight):	0.122

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.037
Maximum detected value (mg/kg, dry weight):	0.049

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.4E-03	mean
Daily exposure (mg/kg-day)	6.4E-03	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.8E-03	mean
BTAG High HQ:	1.4E-04	mean
BTAG Low HQ:	8.8E-03	max
BTAG High HQ:	1.4E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.9
Maximum detected value (mg/kg, dry weight):	3.9

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	8
Maximum detected value (mg/kg, dry weight):	10

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.2E-01	mean
Daily exposure (mg/kg-day)	2.3E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.0E-02	mean
BTAG High HQ:	1.0E-02	mean
BTAG Low HQ:	4.1E-02	max
BTAG High HQ:	1.0E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.02
Maximum detected value (mg/kg, dry weight):	0.02

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.21

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-03	mean
Daily exposure (mg/kg-day)	1.6E-03	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.7E-02	mean
BTAG High HQ:	1.3E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	1.5E-04	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.59
Maximum detected value (mg/kg, dry weight):	0.59

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	44
Maximum detected value (mg/kg, dry weight):	70

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-01	mean
Daily exposure (mg/kg-day)	2.1E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.7E-01	mean
LOAEL HQ:	3.4E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	2.5E-01	max
LOAEL HQ:	4.9E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	7
Maximum detected value (mg/kg, dry weight):	7

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	140
Maximum detected value (mg/kg, dry weight):	320

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.2E-01	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.1E-01	mean
BTAG High HQ:	1.4E-02	mean
BTAG Low HQ:	5.2E-01	max
BTAG High HQ:	2.3E-02	max

Hazard Quotient Calculation

Receptor:	Western Grebe
Chemical:	Lead
Location:	Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.8
Maximum detected value (mg/kg, dry weight):	0.8

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	99

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	3.0E-01	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.4E+01	mean
BTAG High HQ:	2.2E-02	mean
BTAG Low HQ:	2.1E+01	max
BTAG High HQ:	3.4E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.11
Maximum detected value (mg/kg, dry weight):	0.11

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.7
Maximum detected value (mg/kg, dry weight):	2.1

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.5E-03	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.9E-01	mean
BTAG HQ:	4.2E-02	mean
BTAG Low HQ:	2.8E-01	max
BTAG High HQ:	6.2E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.67

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	11
Maximum detected value (mg/kg, dry weight):	13

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.3E-02	mean
Daily exposure (mg/kg-day)	6.8E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.6E-02	mean
BTAG High HQ:	1.1E-03	mean
BTAG Low HQ:	4.9E-02	max
BTAG High HQ:	1.2E-03	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.59
Maximum detected value (mg/kg, dry weight):	0.59

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.2
Maximum detected value (mg/kg, dry weight):	1.2

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.4E-02	mean
Daily exposure (mg/kg-day)	3.4E-02	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.6E-02	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	3.6E-02	max

Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: Outside SWM

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	149
Maximum detected value (mg/kg, dry weight):	149

Sediment Chemical Concentrations (from Table 10-5 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	190
Maximum detected value (mg/kg, dry weight):	310

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.2E+00	mean
Daily exposure (mg/kg-day)	8.5E+00	max

Hazard Quotients (values listed in Table 10-14 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.8E-01	mean
BTAG High HQ:	4.8E-02	mean
BTAG Low HQ:	4.9E-01	max
BTAG High HQ:	4.9E-02	max

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Tier II - Summary of Hazard Quotients

Receptor: Surf Scoter

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	3.0E-01	--	--	--	4.5E-01	--	--	--	--	--	--
LOAEL HQ:	3.0E-02	--	--	--	9.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.4E-01	1.1E-02	9.5E-02	#VALUE!	6.7E-01	1.9E+01	1.3E-01	1.5E-01	8.4E-01	2.6E-01
BTAG High HQ:	#VALUE!	3.1E-02	1.7E-04	2.4E-02	#VALUE!	2.9E-02	3.0E-02	2.8E-02	3.8E-03	2.1E-01	2.6E-02
MAXIMUM											
NOAEL HQ:	3.0E-01	--	--	--	4.5E-01	--	--	--	--	--	--
LOAEL HQ:	3.0E-02	--	--	--	9.0E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	4.4E-01	1.1E-02	9.5E-02	#VALUE!	6.7E-01	1.9E+01	1.3E-01	1.5E-01	8.4E-01	2.6E-01
BTAG High HQ:	#VALUE!	3.1E-02	1.7E-04	2.4E-02	#VALUE!	2.9E-02	3.0E-02	2.8E-02	3.8E-03	2.1E-01	2.6E-02

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.778
Maximum detected value (mg/kg, dry weight):	0.778

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.2E-02	mean
Daily exposure (mg/kg-day)	4.2E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	3.0E-01	mean
LOAEL HQ:	3.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	3.0E-01	max
LOAEL HQ:	3.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.722
Maximum detected value (mg/kg, dry weight):	0.722

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-02	mean
Daily exposure (mg/kg-day)	3.9E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.4E-01	mean
BTAG High HQ:	3.1E-02	mean
BTAG Low HQ:	4.4E-01	max
BTAG High HQ:	3.1E-02	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.144
Maximum detected value (mg/kg, dry weight):	0.144

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.0028
Maximum detected value (mg/kg, dry weight):	0.0028

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	7.7E-03	mean
Daily exposure (mg/kg-day)	7.7E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.1E-02	mean
BTAG High HQ:	1.7E-04	mean
BTAG Low HQ:	1.1E-02	max
BTAG High HQ:	1.7E-04	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	9.4
Maximum detected value (mg/kg, dry weight):	9.4

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	8.8
Maximum detected value (mg/kg, dry weight):	8.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E-01	mean
Daily exposure (mg/kg-day)	5.2E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.5E-02	mean
BTAG High HQ:	2.4E-02	mean
BTAG Low HQ:	9.5E-02	max
BTAG High HQ:	2.4E-02	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.29
Maximum detected value (mg/kg, dry weight):	0.29

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.22
Maximum detected value (mg/kg, dry weight):	0.22

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-02	mean
Daily exposure (mg/kg-day)	1.6E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.0E-01	mean
BTAG High HQ:	1.5E-03	mean
BTAG Low HQ:	2.0E-01	max
BTAG High HQ:	1.5E-03	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.3
Maximum detected value (mg/kg, dry weight):	4.3

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-01	mean
Daily exposure (mg/kg-day)	3.9E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	4.5E-01	mean
LOAEL HQ:	9.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.5E-01	max
LOAEL HQ:	9.0E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	24
Maximum detected value (mg/kg, dry weight):	24

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	98
Maximum detected value (mg/kg, dry weight):	98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E+00	mean
Daily exposure (mg/kg-day)	1.5E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.7E-01	mean
BTAG High HQ:	2.9E-02	mean
BTAG Low HQ:	6.7E-01	max
BTAG High HQ:	2.9E-02	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.9
Maximum detected value (mg/kg, dry weight):	2.9

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	40
Maximum detected value (mg/kg, dry weight):	40

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-01	mean
Daily exposure (mg/kg-day)	2.6E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.9E+01	mean
BTAG High HQ:	3.0E-02	mean
BTAG Low HQ:	1.9E+01	max
BTAG High HQ:	3.0E-02	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.072
Maximum detected value (mg/kg, dry weight):	0.072

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.46
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.1E-03	mean
Daily exposure (mg/kg-day)	5.1E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.3E-01	mean
BTAG HQ:	2.8E-02	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	2.8E-02	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.4
Maximum detected value (mg/kg, dry weight):	3.4

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	12
Maximum detected value (mg/kg, dry weight):	12

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-01	mean
Daily exposure (mg/kg-day)	2.1E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.5E-01	mean
BTAG High HQ:	3.8E-03	mean
BTAG Low HQ:	1.5E-01	max
BTAG High HQ:	3.8E-03	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.6
Maximum detected value (mg/kg, dry weight):	3.6

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.55
Maximum detected value (mg/kg, dry weight):	0.55

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-01	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.4E-01	mean
BTAG High HQ:	2.1E-01	mean
BTAG Low HQ:	8.4E-01	max
BTAG High HQ:	2.1E-01	max

Revised Hazard Quotient Calculation

Receptor: Surf Scoter
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.05
Food ingestion rate (kg/day dry wt):	0.056
Sediment ingestion rate (kg/day dry wt):	0.0028
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-4 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	72
Maximum detected value (mg/kg, dry weight):	72

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	260
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.5E+00	mean
Daily exposure (mg/kg-day)	4.5E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.6E-01	mean
BTAG High HQ:	2.6E-02	mean
BTAG Low HQ:	2.6E-01	max
BTAG High HQ:	2.6E-02	max

Tier II - Summary of Hazard Quotients

Receptor: Sea Lion

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	--	--	--	--	6.9E-03	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	3.3E-04	--	--	--	--	--	--
BTAG Low HQ:	4.9E-03	8.1E-02	3.4E-03	1.2E-01	#VALUE!	3.5E-02	1.5E-02	3.2E-01	1.6E-01	2.3E-01	1.2E-01
BTAG High HQ:	2.0E-04	2.3E-02	5.6E-05	7.8E-03	#VALUE!	1.5E-04	6.4E-05	3.2E-02	6.5E-04	9.3E-03	2.8E-03
MAXIMUM											
NOAEL HQ:	--	--	--	--	1.1E-02	--	--	--	--	--	--
LOAEL HQ:	--	--	--	--	5.3E-04	--	--	--	--	--	--
BTAG Low HQ:	5.4E-03	1.1E-01	6.7E-03	1.4E-01	#VALUE!	7.0E-02	2.7E-02	4.8E-01	1.8E-01	2.5E-01	1.4E-01
BTAG High HQ:	2.1E-04	3.1E-02	1.1E-04	9.5E-03	#VALUE!	2.9E-04	1.1E-04	4.8E-02	7.5E-04	1.0E-02	3.2E-03

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.308
Maximum detected value (mg/kg, dry weight):	0.336

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.211667
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.31
BTAG High (mg/kg-day):	32.8

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.4E-03	mean
Daily exposure (mg/kg-day)	7.0E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.9E-03	mean
BTAG High HQ:	2.0E-04	mean
BTAG Low HQ:	5.4E-03	max
BTAG High HQ:	2.1E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.425
Maximum detected value (mg/kg, dry weight):	1.911

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.055
Maximum detected value (mg/kg, dry weight):	0.13

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.36
BTAG High (mg/kg-day):	1.28

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-02	mean
Daily exposure (mg/kg-day)	3.9E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.1E-02	mean
BTAG High HQ:	2.3E-02	mean
BTAG Low HQ:	1.1E-01	max
BTAG High HQ:	3.1E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.041
Maximum detected value (mg/kg, dry weight):	0.082

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.002667
Maximum detected value (mg/kg, dry weight):	0.0035

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.25
BTAG High (mg/kg-day):	15

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.4E-04	mean
Daily exposure (mg/kg-day)	1.7E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.4E-03	mean
BTAG High HQ:	5.6E-05	mean
BTAG Low HQ:	6.7E-03	max
BTAG High HQ:	1.1E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1.7
Maximum detected value (mg/kg, dry weight):	2

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	4.733333
Maximum detected value (mg/kg, dry weight):	8.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.32
BTAG High (mg/kg-day):	4.7

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.7E-02	mean
Daily exposure (mg/kg-day)	4.5E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	7.8E-03	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	9.5E-03	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.09
Maximum detected value (mg/kg, dry weight):	0.12

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.22

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.06
BTAG High (mg/kg-day):	2.64

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-03	mean
Daily exposure (mg/kg-day)	2.6E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.2E-02	mean
BTAG High HQ:	7.2E-04	mean
BTAG Low HQ:	4.3E-02	max
BTAG High HQ:	9.7E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.54
Maximum detected value (mg/kg, dry weight):	0.59

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	28.16667
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	3.3
LOAEL (mg/kg-day):	69
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-02	mean
Daily exposure (mg/kg-day)	3.6E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	6.9E-03	mean
LOAEL HQ:	3.3E-04	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.1E-02	max
LOAEL HQ:	5.3E-04	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.4
Maximum detected value (mg/kg, dry weight):	7.1

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	59.16667
Maximum detected value (mg/kg, dry weight):	98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.67
BTAG High (mg/kg-day):	632

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.4E-02	mean
Daily exposure (mg/kg-day)	1.9E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.5E-02	mean
BTAG High HQ:	1.5E-04	mean
BTAG Low HQ:	7.0E-02	max
BTAG High HQ:	2.9E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.31
Maximum detected value (mg/kg, dry weight):	0.51

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	22.16667
Maximum detected value (mg/kg, dry weight):	40

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1
BTAG High (mg/kg-day):	241

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.5E-02	mean
Daily exposure (mg/kg-day)	2.7E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.5E-02	mean
BTAG High HQ:	6.4E-05	mean
BTAG Low HQ:	2.7E-02	max
BTAG High HQ:	1.1E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.42
Maximum detected value (mg/kg, dry weight):	0.62

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.263333
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.027	0.25
BTAG High (mg/kg-day):	0.27	4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.7E-03	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	3.2E-01	mean
BTAG HQ:	3.2E-02	mean
BTAG Low HQ:	4.8E-01	max
BTAG High HQ:	4.8E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.88
Maximum detected value (mg/kg, dry weight):	0.92

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	6.216667
Maximum detected value (mg/kg, dry weight):	12

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.133
BTAG High (mg/kg-day):	31.6

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.1E-02	mean
Daily exposure (mg/kg-day)	2.4E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.6E-01	mean
BTAG High HQ:	6.5E-04	mean
BTAG Low HQ:	1.8E-01	max
BTAG High HQ:	7.5E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.54
Maximum detected value (mg/kg, dry weight):	0.59

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.508333
Maximum detected value (mg/kg, dry weight):	0.55

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.05
BTAG High (mg/kg-day):	1.21

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.2E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.3E-01	mean
BTAG High HQ:	9.3E-03	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	1.0E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Sea Lion
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	75
Food ingestion rate (kg/day dry wt):	1.54
Sediment ingestion rate (kg/day dry wt):	0.0308
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	53
Maximum detected value (mg/kg, dry weight):	58

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	127.1667
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	9.6
BTAG High (mg/kg-day):	411

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.3E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.2E-01	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	1.4E-01	max
BTAG High HQ:	3.2E-03	max

Tier II - Summary of Hazard Quotients

Receptor: Least Tern

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	2.2E-01	--	--	--	6.0E-01	--	--	--	--	--	--
LOAEL HQ:	2.2E-02	--	--	--	1.2E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.3E+00	5.2E-03	5.3E-02	#VALUE!	4.6E-01	9.5E+00	2.1E-01	1.9E-01	5.2E-01	8.2E-01
BTAG High HQ:	#VALUE!	9.3E-02	8.2E-05	1.3E-02	#VALUE!	2.0E-02	1.5E-02	4.5E-02	4.7E-03	1.3E-01	8.2E-02
MAXIMUM											
NOAEL HQ:	2.3E-01	--	--	--	8.4E-01	--	--	--	--	--	--
LOAEL HQ:	2.3E-02	--	--	--	1.7E-01	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	1.4E+00	6.6E-03	5.7E-02	#VALUE!	5.1E-01	1.3E+01	2.5E-01	2.3E-01	6.7E-01	8.8E-01
BTAG High HQ:	#VALUE!	1.0E-01	1.1E-04	1.4E-02	#VALUE!	2.3E-02	2.0E-02	5.5E-02	5.8E-03	1.7E-01	8.8E-02

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.261
Maximum detected value (mg/kg, dry weight):	0.269

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.211667
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.1E-02	mean
Daily exposure (mg/kg-day)	3.3E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	2.2E-01	mean
LOAEL HQ:	2.2E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean

NOAEL HQ:	2.3E-01	max
LOAEL HQ:	2.3E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.997
Maximum detected value (mg/kg, dry weight):	1.079

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.055
Maximum detected value (mg/kg, dry weight):	0.13

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.3E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.3E+00	mean
BTAG High HQ:	9.3E-02	mean
BTAG Low HQ:	1.4E+00	max
BTAG High HQ:	1.0E-01	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.032
Maximum detected value (mg/kg, dry weight):	0.041

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.002667
Maximum detected value (mg/kg, dry weight):	0.0035

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.8E-03	mean
Daily exposure (mg/kg-day)	4.8E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.2E-03	mean
BTAG High HQ:	8.2E-05	mean
BTAG Low HQ:	6.6E-03	max
BTAG High HQ:	1.1E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	4.733333
Maximum detected value (mg/kg, dry weight):	8.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-01	mean
Daily exposure (mg/kg-day)	3.2E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.3E-02	mean
BTAG High HQ:	1.3E-02	mean
BTAG Low HQ:	5.7E-02	max
BTAG High HQ:	1.4E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.031
Maximum detected value (mg/kg, dry weight):	0.032

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.22

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.0E-03	mean
Daily exposure (mg/kg-day)	4.3E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.0E-02	mean
BTAG High HQ:	3.8E-04	mean
BTAG Low HQ:	5.4E-02	max
BTAG High HQ:	4.1E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.8
Maximum detected value (mg/kg, dry weight):	4.9

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	28.16667
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E-01	mean
Daily exposure (mg/kg-day)	7.2E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	6.0E-01	mean
LOAEL HQ:	1.2E-01	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	8.4E-01	max
LOAEL HQ:	1.7E-01	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	7.7
Maximum detected value (mg/kg, dry weight):	8

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	59.16667
Maximum detected value (mg/kg, dry weight):	98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.6E-01	mean
BTAG High HQ:	2.0E-02	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	2.3E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.68

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	22.16667
Maximum detected value (mg/kg, dry weight):	40

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.5E+00	mean
BTAG High HQ:	1.5E-02	mean
BTAG Low HQ:	1.3E+01	max
BTAG High HQ:	2.0E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	4.733333
Maximum detected value (mg/kg, dry weight):	8.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.9E-01	mean
Daily exposure (mg/kg-day)	3.2E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.3E-02	mean
BTAG High HQ:	1.3E-02	mean
BTAG Low HQ:	5.7E-02	max
BTAG High HQ:	1.4E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.031
Maximum detected value (mg/kg, dry weight):	0.032

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.22

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.0E-03	mean
Daily exposure (mg/kg-day)	4.3E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.0E-02	mean
BTAG High HQ:	3.8E-04	mean
BTAG Low HQ:	5.4E-02	max
BTAG High HQ:	4.1E-04	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	7.7
Maximum detected value (mg/kg, dry weight):	8

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	59.16667
Maximum detected value (mg/kg, dry weight):	98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E+00	mean
Daily exposure (mg/kg-day)	1.2E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	4.6E-01	mean
BTAG High HQ:	2.0E-02	mean
BTAG Low HQ:	5.1E-01	max
BTAG High HQ:	2.3E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.68

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	22.16667
Maximum detected value (mg/kg, dry weight):	40

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-01	mean
Daily exposure (mg/kg-day)	1.8E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.5E+00	mean
BTAG High HQ:	1.5E-02	mean
BTAG Low HQ:	1.3E+01	max
BTAG High HQ:	2.0E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.063
Maximum detected value (mg/kg, dry weight):	0.074

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.263333
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	8.1E-03	mean
Daily exposure (mg/kg-day)	9.8E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	2.1E-01	mean
BTAG HQ:	4.5E-02	mean
BTAG Low HQ:	2.5E-01	max
BTAG High HQ:	5.5E-02	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.1
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	6.216667
Maximum detected value (mg/kg, dry weight):	12

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.6E-01	mean
Daily exposure (mg/kg-day)	3.2E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.9E-01	mean
BTAG High HQ:	4.7E-03	mean
BTAG Low HQ:	2.3E-01	max
BTAG High HQ:	5.8E-03	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1.3

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.508333
Maximum detected value (mg/kg, dry weight):	0.55

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.5E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.2E-01	mean
BTAG High HQ:	1.3E-01	mean
BTAG Low HQ:	6.7E-01	max
BTAG High HQ:	1.7E-01	max

Revised Hazard Quotient Calculation

Receptor: CA Least Tern
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	0.045
Food ingestion rate (kg/day dry wt):	0.0053
Sediment ingestion rate (kg/day dry wt):	0.00011
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	117
Maximum detected value (mg/kg, dry weight):	123

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	127.1667
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E+01	mean
Daily exposure (mg/kg-day)	1.5E+01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	8.2E-01	mean
BTAG High HQ:	8.2E-02	mean
BTAG Low HQ:	8.8E-01	max
BTAG High HQ:	8.8E-02	max

Tier II - Summary of Hazard Quotients

Receptor: Green Turtle

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.4E-02	--	--	--	2.4E-02	--	--	--	--	--	--
LOAEL HQ:	1.4E-03	--	--	--	4.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.0E-03	1.7E-05	1.9E-03	#VALUE!	6.0E-02	1.7E+00	5.1E-03	9.2E-03	1.0E-02	3.9E-02
BTAG High HQ:	#VALUE!	1.4E-04	2.8E-07	4.8E-04	#VALUE!	2.6E-03	2.8E-03	1.1E-03	2.2E-04	2.5E-03	3.9E-03
MAXIMUM											
NOAEL HQ:	1.4E-02	--	--	--	2.4E-02	--	--	--	--	--	--
LOAEL HQ:	1.4E-03	--	--	--	4.7E-03	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	2.0E-03	1.7E-05	1.9E-03	#VALUE!	6.0E-02	1.7E+00	5.1E-03	9.2E-03	1.0E-02	3.9E-02
BTAG High HQ:	#VALUE!	1.4E-04	2.8E-07	4.8E-04	#VALUE!	2.6E-03	2.8E-03	1.1E-03	2.2E-04	2.5E-03	3.9E-03

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.506
Maximum detected value (mg/kg, dry weight):	0.506

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-03	mean
Daily exposure (mg/kg-day)	1.9E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.4E-02	mean
LOAEL HQ:	1.4E-03	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.4E-02	max
LOAEL HQ:	1.4E-03	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.03
Maximum detected value (mg/kg, dry weight):	0.03

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.36
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.8E-04	mean
Daily exposure (mg/kg-day)	1.8E-04	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.0E-03	mean
BTAG High HQ:	1.4E-04	mean
BTAG Low HQ:	2.0E-03	max
BTAG High HQ:	1.4E-04	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.0033
Maximum detected value (mg/kg, dry weight):	0.0033

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.0028
Maximum detected value (mg/kg, dry weight):	0.0028

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-05	mean
Daily exposure (mg/kg-day)	1.3E-05	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.7E-05	mean
BTAG High HQ:	2.8E-07	mean
BTAG Low HQ:	1.7E-05	max
BTAG High HQ:	2.8E-07	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.4

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	8.8
Maximum detected value (mg/kg, dry weight):	8.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.1E-02	mean
Daily exposure (mg/kg-day)	1.1E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.9E-03	mean
BTAG High HQ:	4.8E-04	mean
BTAG Low HQ:	1.9E-03	max
BTAG High HQ:	4.8E-04	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.42
Maximum detected value (mg/kg, dry weight):	0.42

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.22
Maximum detected value (mg/kg, dry weight):	0.22

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.6E-03	mean
Daily exposure (mg/kg-day)	1.6E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.0E-02	mean
BTAG High HQ:	1.5E-04	mean
BTAG Low HQ:	2.0E-02	max
BTAG High HQ:	1.5E-04	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.4

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	59
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-02	mean
Daily exposure (mg/kg-day)	2.0E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	32
Maximum detected value (mg/kg, dry weight):	32

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	98
Maximum detected value (mg/kg, dry weight):	98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-01	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.0E-02	mean
BTAG High HQ:	2.6E-03	mean

BTAG Low HQ:	6.0E-02	max
BTAG High HQ:	2.6E-03	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	4.5
Maximum detected value (mg/kg, dry weight):	4.5

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	40
Maximum detected value (mg/kg, dry weight):	40

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.4E-02	mean
Daily exposure (mg/kg-day)	2.4E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.7E+00	mean
BTAG High HQ:	2.8E-03	mean
BTAG Low HQ:	1.7E+00	max
BTAG High HQ:	2.8E-03	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.03
Maximum detected value (mg/kg, dry weight):	0.03

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.46
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.0E-04	mean
Daily exposure (mg/kg-day)	2.0E-04	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	5.1E-03	mean
BTAG HQ:	1.1E-03	mean
BTAG Low HQ:	5.1E-03	max
BTAG High HQ:	1.1E-03	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.8
Maximum detected value (mg/kg, dry weight):	2.8

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	12
Maximum detected value (mg/kg, dry weight):	12

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.3E-02	mean
Daily exposure (mg/kg-day)	1.3E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.2E-03	mean
BTAG High HQ:	2.2E-04	mean
BTAG Low HQ:	9.2E-03	max
BTAG High HQ:	2.2E-04	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.6
Maximum detected value (mg/kg, dry weight):	0.6

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	0.55
Maximum detected value (mg/kg, dry weight):	0.55

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.3E-03	mean
Daily exposure (mg/kg-day)	2.3E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	1.0E-02	mean
BTAG High HQ:	2.5E-03	mean
BTAG Low HQ:	1.0E-02	max
BTAG High HQ:	2.5E-03	max

Revised Hazard Quotient Calculation

Receptor: East Pacific Green Turtle
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	95
Food ingestion rate (kg/day dry wt):	0.35
Sediment ingestion rate (kg/day dry wt):	0.0186
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-1 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	170
Maximum detected value (mg/kg, dry weight):	170

Sediment Chemical Concentrations (from 2240)

Mean detected value (mg/kg, dry weight):	260
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.8E-01	mean
Daily exposure (mg/kg-day)	6.8E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.9E-02	mean
BTAG High HQ:	3.9E-03	mean
BTAG Low HQ:	3.9E-02	max
BTAG High HQ:	3.9E-03	max

Revised Hazard Quotient Calculation

Receptor: American Brown Pelican
Chemical: Zinc
Location: Reference 2240

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	3.174
Food ingestion rate (kg/day dry wt):	0.25
Sediment ingestion rate (kg/day dry wt):	0.005
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-3 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	53
Maximum detected value (mg/kg, dry weight):	58

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	127.1667
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	4.4E+00	mean
Daily exposure (mg/kg-day)	5.0E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.5E-01	mean
BTAG High HQ:	2.5E-02	mean
BTAG Low HQ:	2.9E-01	max
BTAG High HQ:	2.9E-02	max

Tier II - Summary of Hazard Quotients

Receptor: Western Grebe

Location: Reference 2240

	BAP	PCBs	TBT	Arsenic	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Zinc
MEAN											
NOAEL HQ:	1.0E-01	--	--	--	3.1E-01	--	--	--	--	--	--
LOAEL HQ:	1.0E-02	--	--	--	6.3E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	5.7E-01	2.3E-03	2.5E-02	#VALUE!	2.4E-01	6.6E+00	1.0E-01	9.0E-02	2.3E-01	3.7E-01
BTAG High HQ:	#VALUE!	4.1E-02	3.6E-05	6.2E-03	#VALUE!	1.1E-02	1.1E-02	2.2E-02	2.2E-03	5.7E-02	3.7E-02
MAXIMUM											
NOAEL HQ:	1.1E-01	--	--	--	4.7E-01	--	--	--	--	--	--
LOAEL HQ:	1.1E-02	--	--	--	9.4E-02	--	--	--	--	--	--
BTAG Low HQ:	#VALUE!	6.2E-01	2.9E-03	2.8E-02	#VALUE!	2.9E-01	9.9E+00	1.3E-01	1.2E-01	3.0E-01	4.1E-01
BTAG High HQ:	#VALUE!	4.4E-02	4.6E-05	6.9E-03	#VALUE!	1.3E-02	1.6E-02	2.8E-02	2.8E-03	7.4E-02	4.1E-02

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Benzo[a]pyrene
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.261
Maximum detected value (mg/kg, dry weight):	0.269

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.211667
Maximum detected value (mg/kg, dry weight):	0.36

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.14
LOAEL (mg/kg-day):	1.4
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-02	mean
Daily exposure (mg/kg-day)	1.5E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	1.0E-01	mean
LOAEL HQ:	1.0E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	1.1E-01	max
LOAEL HQ:	1.1E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total PCBs
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.997
Maximum detected value (mg/kg, dry weight):	1.079

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.055
Maximum detected value (mg/kg, dry weight):	0.13

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.09
BTAG High (mg/kg-day):	1.27

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.2E-02	mean
Daily exposure (mg/kg-day)	5.6E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	5.7E-01	mean
BTAG High HQ:	4.1E-02	mean
BTAG Low HQ:	6.2E-01	max
BTAG High HQ:	4.4E-02	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Tributyltin
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.032
Maximum detected value (mg/kg, dry weight):	0.041

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.002667
Maximum detected value (mg/kg, dry weight):	0.0035

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.73
BTAG High (mg/kg-day):	45.9

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.7E-03	mean
Daily exposure (mg/kg-day)	2.1E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.3E-03	mean
BTAG High HQ:	3.6E-05	mean
BTAG Low HQ:	2.9E-03	max
BTAG High HQ:	4.6E-05	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Arsenic
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.4
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	4.733333
Maximum detected value (mg/kg, dry weight):	8.8

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	5.5
BTAG High (mg/kg-day):	22

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.4E-01	mean
Daily exposure (mg/kg-day)	1.5E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.5E-02	mean
BTAG High HQ:	6.2E-03	mean
BTAG Low HQ:	2.8E-02	max
BTAG High HQ:	6.9E-03	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Cadmium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.031
Maximum detected value (mg/kg, dry weight):	0.032

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.13
Maximum detected value (mg/kg, dry weight):	0.22

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.08
BTAG High (mg/kg-day):	10.4

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.9E-03	mean
Daily exposure (mg/kg-day)	2.2E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.4E-02	mean
BTAG High HQ:	1.9E-04	mean
BTAG Low HQ:	2.8E-02	max
BTAG High HQ:	2.1E-04	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Chromium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	3.8
Maximum detected value (mg/kg, dry weight):	4.9

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	28.16667
Maximum detected value (mg/kg, dry weight):	59

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

NOAEL (mg/kg-day):	0.86
LOAEL (mg/kg-day):	4.3
BTAG Low (mg/kg-day):	Not Available
BTAG High (mg/kg-day):	Not Available

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	2.7E-01	mean
Daily exposure (mg/kg-day)	4.1E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

NOAEL HQ:	3.1E-01	mean
LOAEL HQ:	6.3E-02	mean
BTAG Low HQ:	#VALUE!	mean
BTAG High HQ:	#VALUE!	mean
NOAEL HQ:	4.7E-01	max
LOAEL HQ:	9.4E-02	max
BTAG Low HQ:	#VALUE!	max
BTAG High HQ:	#VALUE!	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Copper
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	7.7
Maximum detected value (mg/kg, dry weight):	8

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	59.16667
Maximum detected value (mg/kg, dry weight):	98

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	2.3
BTAG High (mg/kg-day):	52.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.5E-01	mean
Daily exposure (mg/kg-day)	6.7E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.4E-01	mean
BTAG High HQ:	1.1E-02	mean
BTAG Low HQ:	2.9E-01	max
BTAG High HQ:	1.3E-02	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Lead
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.67
Maximum detected value (mg/kg, dry weight):	0.68

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	22.16667
Maximum detected value (mg/kg, dry weight):	40

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.014
BTAG High (mg/kg-day):	8.75

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	9.2E-02	mean
Daily exposure (mg/kg-day)	1.4E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	6.6E+00	mean
BTAG High HQ:	1.1E-02	mean
BTAG Low HQ:	9.9E+00	max
BTAG High HQ:	1.6E-02	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Total Mercury
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	0.063
Maximum detected value (mg/kg, dry weight):	0.074

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.263333
Maximum detected value (mg/kg, dry weight):	0.46

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.039
BTAG High (mg/kg-day):	0.18

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	3.9E-03	mean
Daily exposure (mg/kg-day)	5.0E-03	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG HQ:	1.0E-01	mean
BTAG HQ:	2.2E-02	mean
BTAG Low HQ:	1.3E-01	max
BTAG High HQ:	2.8E-02	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Nickel
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	2.1
Maximum detected value (mg/kg, dry weight):	2.5

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	6.216667
Maximum detected value (mg/kg, dry weight):	12

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	1.38
BTAG High (mg/kg-day):	56.3

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	1.2E-01	mean
Daily exposure (mg/kg-day)	1.6E-01	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	9.0E-02	mean
BTAG High HQ:	2.2E-03	mean
BTAG Low HQ:	1.2E-01	max
BTAG High HQ:	2.8E-03	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Selenium
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	1
Maximum detected value (mg/kg, dry weight):	1.3

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	0.508333
Maximum detected value (mg/kg, dry weight):	0.55

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	0.23
BTAG High (mg/kg-day):	0.93

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	5.3E-02	mean
Daily exposure (mg/kg-day)	6.9E-02	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	2.3E-01	mean
BTAG High HQ:	5.7E-02	mean
BTAG Low HQ:	3.0E-01	max
BTAG High HQ:	7.4E-02	max

Revised Hazard Quotient Calculation

Receptor: Western Grebe
Chemical: Zinc
Location: Inside NASSCO

Exposure Parameters (from Table 10-6 of NASSCO/SWM DSI Volume 1)

Body weight (kg):	1.2
Food ingestion rate (kg/day dry wt):	0.062
Sediment ingestion rate (kg/day dry wt):	0.0031
Area Use Factor (unitless):	1
Time Use Factor (unitless):	1

Prey Chemical Concentrations (from Table 10-2 of NASSCO/SWM DSI Volume 1)

Mean detected value (mg/kg, dry weight):	117
Maximum detected value (mg/kg, dry weight):	123

Sediment Chemical Concentrations (from 2240, 2241, 2243, and 2244)

Mean detected value (mg/kg, dry weight):	127.1667
Maximum detected value (mg/kg, dry weight):	260

Toxicity Reference Values (from Table 10-8 of NASSCO/SWM DSI Volume 1)

BTAG Low (mg/kg-day):	17.2
BTAG High (mg/kg-day):	172

Daily Exposure Rate using average chemical concentrations and area-use-factors

Daily exposure (mg/kg-day)	6.4E+00	mean
Daily exposure (mg/kg-day)	7.0E+00	max

Hazard Quotients (values listed in Table 10-11 of NASSCO/SWM DSI Volume 1)

BTAG Low HQ:	3.7E-01	mean
BTAG High HQ:	3.7E-02	mean
BTAG Low HQ:	4.1E-01	max
BTAG High HQ:	4.1E-02	max

25. Finding 25: Human Health Impairment

Finding 25 of CAO No. R9-2012-0024 states:

Human health beneficial uses for Shellfish Harvesting (SHELL), and Commercial and Sport Fishing (COMM) designated for San Diego Bay are impaired due to the elevated levels of pollutants present in the marine sediment at the Shipyard Sediment Site. This finding is based on the considerations described below in this *Impairment of Human Health Beneficial Uses* section of the CAO.

25.1. Human Health Beneficial Uses

There are four beneficial uses designated in the Basin Plan for San Diego Bay (RWQCB 1994), which must be fully protected in order to provide for the protection of human health:

- **Contact Water Recreation (REC-1)** – Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs;

- **Non-contact Water Recreation (REC-2)** – Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities;

- **Shellfish Harvesting (SHELL)** – Includes uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial, or sport purposes; and

- **Commercial and Sport Fishing (COMM)** – Includes the uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

The concentrations of the pollutants present in the marine sediment within and adjacent to the Shipyard Sediment Site cause or threaten to cause a condition of pollution or contamination that adversely impacts two of these beneficial uses, SHELL and COMM, and thereby constitute a threat to the public health. Information supporting this conclusion is contained in Sections 26 through 28 of this Technical Report.

26. Finding 26: Risk Assessment Approach for Human Health

Finding 26 of CAO No. R9-2012-0024 states:

The San Diego Water Board evaluated potential risks to human health from chemical pollutants present in the sediment at the Shipyard Sediment Site based on a two-tier approach. The Tier I screening level risk assessment was based on tissue data derived from the exposure of the clam *Macoma nasuta* to site sediments for 28 days using ASTM protocols. The Tier II baseline comprehensive risk assessment was based on tissue data derived from resident fish and shellfish caught within and adjacent to the Shipyard Sediment Site. Two types of receptors (i.e., members of the population or individuals at risk) were evaluated:

a. Recreational Anglers – Persons who eat the fish and/or shellfish they catch recreationally; and

b. Subsistence Anglers – Persons who fish for food, for economic and/or cultural reasons, and for whom the fish and/or shellfish caught is a major source of protein in their diet.

26.1. Human Health Risk Assessment Approach

A two-tiered approach was used to evaluate potential risks to human health from chemical pollutants present at the Shipyard Sediment Site. The Tier I screening level risk assessment used conservative exposure and effects assumptions to support risk management decisions. The Tier II comprehensive risk assessment (i.e., baseline risk assessment) more accurately characterized potential risk to receptors of concern primarily by replacing the conservative assumptions required by Tier I with site-specific exposure parameters.

The approach used in Tiers I and II was conducted in accordance with U.S. EPA's "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)" (U.S. EPA, 1989b). The approach consists of the following key elements:

- Identification of Chemicals of Potential Concern;
- Exposure Assessment;
- Toxicity Assessment;
- Risk Characterization;
- Risk Management; and
- Uncertainties Related to Risk Estimates.

These elements are discussed in more detail in Section 27 – Tier I Screening Level Risk Assessment for Human Health and Section 28 – Tier II Baseline Risk Assessment for Human Health of this Technical Report.

27. Finding 27: Tier I Screening Level Risk Assessment for Human Health

Finding 27 of CAO No. R9-2012-0024 states:

The Tier I risk assessment objectives were to determine whether or not Shipyard Sediment Site conditions potentially pose an unacceptable risk to human health and to identify if a comprehensive, site-specific risk assessment was warranted (i.e., Tier II baseline risk assessment). The receptors of concern identified for Tier I are recreational anglers and subsistence anglers. Recreational anglers represent those who eat the fish and/or shellfish they catch recreationally and subsistence anglers represent those who fish for food, for economic and/or cultural reasons, and for whom the fish and/or shellfish caught is a major source of protein in the diet. Chemical concentrations measured in *Macoma nasuta* tissue derived from laboratory bioaccumulation tests were used to estimate chemical exposure for these receptors of concern. Based on the Tier I screening level risk assessment results, there is a potential risk greater than that in reference areas to recreational and subsistence anglers ingesting fish and shellfish caught at the Shipyard Sediment Site. The chemicals in *Macoma* tissue posing a potential risk include arsenic, BAP, PCBs, and TBT.

27.1. Tier I Results

For the Tier I screening level risk assessment, recreational anglers and subsistence anglers were identified as potential receptors that could be at risk due to exposure of chemical pollutants in fish and shellfish caught at the Shipyard Sediment Site. Recreational anglers represent those who eat the fish and/or shellfish they catch recreationally and subsistence anglers represent those who fish for food, for economic and/or cultural reasons, and for whom the fish and/or shellfish caught is a major source of protein in the diet. Chemical concentrations measured in *Macoma nasuta* tissue derived from laboratory bioaccumulation tests were used to estimate chemical pollutant exposure for these receptors of concern.

Based on the Tier I results as summarized in Table 27-1 below, the San Diego Water Board determined that there was a potential risk to recreational and subsistence anglers ingesting fish and shellfish caught at the Shipyard Sediment Site and that a Tier II baseline risk assessment was warranted. The chemicals in *Macoma* tissue posing a potential risk include arsenic, BAP, PCBs, and TBT. The Tier I calculations and results are provided in the Appendix for Section 27.

Table 27-1 Summary of Tier I Human Health Risk Assessment Results.

Station	Receptor	Site Chemicals in *Macoma* Tissue Posing a Potential Risk[1]	Site Chemicals in *Macoma* Tissue Not Posing Risk[2]
NA06	Recreational Angler	BAP, PCBs	TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
NA06	Subsistence Angler	BAP, PCBs	TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
NA11	Recreational Angler	BAP	PCBs, TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
NA11	Subsistence Angler	BAP	PCBs, TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
NA12	Recreational Angler	NONE	BAP, PCBs, TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
NA12	Subsistence Angler	NONE	BAP, PCBs, TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
NA20	Recreational Angler	BAP	PCBs, TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
NA20	Subsistence Angler	BAP	PCBs, TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
SW04	Recreational Angler	BAP, PCBs, arsenic	TBT, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
SW04	Subsistence Angler	BAP, PCBs, TBT, arsenic	Cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
SW13	Recreational Angler	BAP, PCBs	TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
SW13	Subsistence Angler	BAP, PCBs	TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc

Station	Receptor	Site Chemicals in *Macoma* Tissue Posing a Potential Risk[1]	Site Chemicals in *Macoma* Tissue Not Posing Risk[2]
SW21	Recreational Angler	BAP, PCBs	TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
	Subsistence Angler	BAP, PCBs	TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
SW28	Recreational Angler	BAP, PCBs	TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc
	Subsistence Angler	BAP, PCBs	TBT, arsenic, cadmium, chromium, copper, mercury, nickel, selenium, silver, zinc

1. Site *Macoma* tissue concentration greater than risk-based tissue screening level and greater than the reference 95% upper prediction limit *Macoma* tissue concentration.
2. Site *Macoma* tissue concentration less than risk-based tissue screening level and less than the reference 95% upper prediction limit *Macoma* tissue concentration OR site *Macoma* tissue concentration greater than risk-based tissue screening level and less than the reference 95% upper prediction limit *Macoma* tissue concentration

27.2. Tier I Approach

The San Diego Water Board conducted a Tier I screening level risk assessment to determine whether or not the current conditions at the Shipyard Sediment Site pose a potential unacceptable risk to human health and to determine whether or not a comprehensive, site-specific risk assessment was warranted (i.e., Tier II baseline risk assessment). Potential risks were characterized by: (1) comparing clam tissue concentrations exposed to site sediment to tissue screening values published by the California Office of Environmental Health Hazard (OEHHA), and (2) comparing clam tissue concentrations exposed to site sediment to clam tissue concentrations exposed to reference sediment.

The approach used in the Tier I screening level risk assessment was conducted in accordance with U.S. EPA's "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)" (U.S. EPA, 1989b) and in consultation with OEHHA. The approach consists of the following key elements:

- Exposure Assessment;
- Toxicity Assessment;
- Risk Characterization;
- Risk Management; and
- Uncertainties Related to Risk Estimates.

These key elements are discussed in more detail below.

27.2.1. Exposure Assessment

Human exposure to contaminated marine sediment can occur around three principal pathways:

- Direct contact of contaminated marine sediment by swimmers or divers;
- Incidental ingestion of contaminated marine sediment or associated waters by swimmers or divers; and
- Bioaccumulation and food chain transfer of sediment chemical pollutants to human consumers of contaminated fish and shellfish.

The most significant theoretical human health risk associated with contaminated marine sediment is considered to be the ingestion, over time, of fish and shellfish that may have bioaccumulated chemical pollutants either directly from marine sediment or through the food web (Long, 1989). U.S. EPA literature suggests that even when conservative assumptions about direct human exposure are used, risks associated with dermal contact and incidental ingestion of contaminated sediment are minimal and contribute less to the total risk than the fish and shellfish consumption pathway. The human health risks associated with fish and shellfish consumption often constitute the greatest proportion of the total risk, and sometimes drive the human health risk assessment (U.S. EPA, 1992b).

27.2.1.1. Shipyard Sediment Site Exposure Assessment

The most significant potential source of human exposure to chemical pollutants at the Shipyard Sediment Site is through consumption of fish and shellfish that may have bioaccumulated chemicals either directly from site sediment or through the food web (Exponent, 2003). Direct contact with sediment chemical pollutants at the Shipyard Sediment Site is not a likely exposure pathway to humans because the industrial nature of the site and the lack of a beach (shoreline at Shipyard Sediment Site consists almost exclusively of riprap, sheet-pile bulkhead, and piers) make swimming and wading a highly unlikely event. Therefore, two types of receptors (i.e., members of the population or individuals at risk) were identified and further evaluated in the Tier I screening level risk assessment:

1. Recreational Angler – represents those who eat the fish and/or shellfish they catch recreationally.

2. Subsistence Angler – represents those who fish for food, for economic and/or cultural reasons, and for whom the fish and/or shellfish caught is a major source of protein in the diet.

Exponent reported that public fishing and shellfish harvesting are currently unlikely events at the Shipyard Sediment Site due to the current security measures. Under the current site usage, there are security measures in place at both the upland property and the in-water leaseholds of NASSCO and BAE Systems due to the work performed on U.S. Navy ships (Exponent, 2003). Force protection measures, required for U.S. Navy vessels, prohibit non-mission-essential vessels from approaching U.S. Navy ships. A security boom prevents unauthorized vessels from approaching closer than 300 feet in the NASSCO and BAE Systems leaseholds. Furthermore, armed personnel are present at all times to ensure that no trespassing occurs at the site.

Despite these factors the San Diego Water Board, as discussed with OEHHA, required a screening level risk assessment using the two theoretical receptors identified above based on the following recommended considerations (Brodberg, personal communication, 2004):

- Although fishing is currently prohibited, it is possible that NASSCO and BAE Systems employees or U.S. Navy personnel may fish off of the piers, bulkhead, riprap, ships, etc.;

- Although NASSCO and BAE Systems have long-term leases (NASSCO through 2040, BAE through 2034), it is possible that they may not occupy the site in the future and future site usage may allow for fishing. This scenario recently occurred at a former shipyard (Campbell Shipyard) located in San Diego Bay just north of the Shipyard Sediment Site;

- It is possible that sediment chemical pollutants within the NASSCO and BAE Systems leaseholds may migrate to areas outside the leasehold where fishing by boat and fishing at a nearby public pier (Crosby Street Park Pier located approximately ½ mile north of BAE Systems just past the Coronado Bridge) is accessible; and

- The San Diego Water Board's statutory responsibility is to protect the present and reasonably anticipated beneficial uses designated for San Diego Bay. The beneficial uses pertaining to human health are Commercial and Sport Fishing (COMM) and Shellfish Harvesting (SHELL). These beneficial uses are to be protected at all times regardless of the current site-access measures that prevent the uses from occurring.

For Tier I, the tissue concentrations derived from the laboratory bioaccumulation tests were used to represent the chemical pollutant exposures for the recreational and subsistence anglers. The bioaccumulation tests involved the exposure of the clam *Macoma nasuta* to site sediment for 28 days using the protocols specified by ASTM (2001). Sediment was collected from four stations in the NASSCO leasehold (NA06, NA11, NA12, and NA20) and five stations in the BAE Systems leasehold (SW04, SW08, SW13, SW21, and SW28). These stations were positioned along an expected gradient of sediment concentrations of potentially bioaccumulative substances at each shipyard. Because *Macoma* actively ingests surface sediment (likely to be the most direct route of exposure to sediment pollutants that accumulate in tissues), use of *Macoma* tissue data for estimating exposure to the receptors of concern is considered a conservative approach.

The *Macoma* tissue concentrations from each site station were compared to risk-based screening values developed by OEHHA (Brodberg and Pollock, 1999). These screening levels were developed for two California lakes, San Pablo Reservoir and Black Butte Reservoir, to determine whether additional sampling and health evaluations were warranted. While these screening levels were derived for two freshwater bodies, OEHHA (Brodberg, 2004) has indicated that the screening levels are applicable for chemicals in all fish and water bodies (i.e., freshwater, estuarine, and marine). For site chemical pollutants of concern that do not have screening values published by OEHHA, the San Diego Water Board derived screening values for these chemical pollutants using the same equations and assumptions used by OEHHA. Additionally, because the screening value assumptions used by OEHHA were considered more applicable to recreational anglers (specifically due to the consumption rate of 21 g/day), the San Diego Water Board developed a separate set of screening values for subsistence anglers (using a consumption rate of 161 g/day).

For noncarcinogenic chemical pollutants, screening values were derived using the following equation:

$$\mathbf{SV}_{\mathbf{noncarcinogenic}} = \frac{(\mathbf{Rfd} * \mathbf{BW})}{(\mathbf{CR} * \mathbf{FI})}$$

where:

SV	=	tissue screening value for fish/shellfish tissue (µg/kg wet)
RfD	=	reference dose (mg/kg-day)
BW	=	body weight of adult (kg)
CR	=	fish and shellfish consumption rate (g/day)
FI	=	fractional intake of seafood consumed that originates from site (unitless)

For carcinogenic chemicals, screening values were derived using the following:

$$\mathbf{SV}_{\mathbf{carcinogenic}} = \frac{(\mathbf{TRL} * \mathbf{BW})}{(\mathbf{CSF} * \mathbf{CR} * \mathbf{FI} * \mathbf{ABS})}$$

where:

SV	=	tissue screening value for fish/shellfish tissue (µg/kg wet)
TRL	=	target risk level (unitless)
BW	=	body weight of adult (kg)
CSF	=	carcinogenic slope factor (mg/kg-day)-1
CR	=	fish and shellfish consumption rate (g/day)
FI	=	fractional intake of seafood consumed that originates from site (unitless)
ABS	=	fraction absorbed (unitless)

The San Diego Water Board used the following exposure parameters (Table 27-2), in consultation with OEHHA, to develop the noncarcinogenic and carcinogenic screening values presented in the risk characterization section below.

Table 27-2 Exposure Parameters for Screening Level Development in the Tier I Human Health Risk Assessment

	Units	Recreational Angler	Subsistence Angler
Noncarcinogenic Chemicals			
Body Weight of Adult	kg	70	70
Consumption Rate (a)	g/day	21	161[1]
Fractional Intake	kg/day dry wt	1	1
RfD	mg/kg-day	See Toxicity Assessment Section	See Toxicity Assessment Section
Carcinogenic Chemicals			
Target Risk Level	unitless	1 x 10^{-5}	1 x 10^{-5}
Body Weight of Adult	kg	70	70
Consumption Rate	g/day	21	161[1]
Fractional Intake	unitless	1	1
Fraction Absorbed	unitless	1	1
CSF	$(mg/kg\text{-}day)^{-1}$	See Toxicity Assessment Section 27.2.2	See Toxicity Assessment Section 27.2.2

1. SCCWRP and MBC, 1994

27.2.2. Toxicity Assessment

Reference doses (RfDs) for noncarcinogenic chemicals and cancer slope factors (CSFs) for carcinogenic chemicals were used when it was necessary to derive screening values for the Tier I risk analysis. The RfDs and CSFs were selected from U.S. EPA's Integrated Risk Information System (IRIS) with the exception of the carcinogenic PAHs (U.S. EPA, 2003a). For the carcinogenic PAHs, CSFs were used from the California Environmental Protection Agency (OEHHA, 2001). The RfDs and CSFs are listed in Table 27-3 below.

Table 27-3 Toxicity Criteria Used to Develop Human Health Tissue Screening Values

Chemical	CSF (mg/kg-day)	RfD (mg/kg-day)	Source
Metals			

Chemical	CSF (mg/kg-day)	RfD (mg/kg-day)	Source
Arsenic, inorganic	1.5	0.0003	U.S. EPA (2003a)
Cadmium	NA	0.0005	U.S. EPA (2003a)
Chromium	NA	0.003	U.S. EPA (2003a)
Copper	NA	0.037	U.S. EPA (2003a)
Mercury, total	NA	0.0001	U.S. EPA (2003a)
Nickel	NA	0.02	U.S. EPA (2003a)
Selenium	NA	0.005	U.S. EPA (2003a)
Silver	NA	0.005	U.S. EPA (2003a)
Zinc	NA	0.3	U.S. EPA (2003a)
Organometallic Compounds			
Tributyltin	NA	0.0003	U.S. EPA (2003a)
Polynuclear Aromatic Hydrocarbons			
Naphthalene	NA	0.02	U.S. EPA (2003a)
Acenaphthene	NA	0.06	U.S. EPA (2003a)
Fluorene	NA	0.04	U.S. EPA (2003a)
Anthracene	NA	0.3	U.S. EPA (2003a)
Fluoranthene	NA	0.04	U.S. EPA (2003a)
Pyrene	NA	0.02	U.S. EPA (2003a)
Benz[a]anthracene	1.2	NA	OEHHA (2001)
Chrysene	0.12	NA	OEHHA (2001)
Benzo[b]fluoranthene	1.2	NA	OEHHA (2001)
Benzo[k]fluoranthene	1.2	NA	OEHHA (2001)
Benzo[a]pyrene	12	NA	OEHHA (2001)
Indeno[1,2,3-cd]pyrene	1.2	NA	OEHHA (2001)
Dibenz[a,h]anthracene	4.1	NA	OEHHA (2001)

Chemical	CSF (mg/kg-day)	RfD (mg/kg-day)	Source
Polychlorinated Biphenyls			
Total PCBs[1]	2	NA	U.S. EPA (2003a)
Total PCBs (as Aroclor 1254)[2]	NA	0.00002	U.S. EPA (2003a)

Notes: CSF – cancer slope factor, NA – not available, RfD – reference dose

1. To be applied to the sum of Aroclors® 1248, 1254, and 1260, as in Brodberg and Pollock (1999). Aroclors® 1248 and 1254 were not detected in any sample, so the concentration of total PCBs reflects only Aroclor® 1260 in this assessment.
2. RfDs are available only for Aroclors® 1254 and 1016, neither of which were detected in any sample. The RfD for Aroclor® 1254 was used as a surrogate.

27.2.3. Risk Characterization

For the Tier I screening level risk assessment, the San Diego Water Board characterized potential risks of adverse effects to recreational and subsistence anglers by comparing *Macoma nasuta* tissue concentrations from the nine Shipyard Sediment Site stations to tissue screening values published by OEHHA and to those derived by the San Diego Water Board. The tissue screening values are presented in Table 27-4 below. Site *Macoma* tissue pollutant concentrations greater than the screening values are considered to be a potential risk to recreational and/or subsistence anglers.

Table 27-4 Tissue Screening Values for Recreational and Subsistence Anglers

	Chemical	Screening Values for Recreational Angler(µg/kg wet)	Screening Values for Subsistence Angler(µg/kg wet)
Metals	Arsenic, total (non-cancer)	1,000	**130**
	Arsenic, inorganic (cancer)	**22**	**0.29**
	Cadmium	3,000	**217**
	Chromium	**10,000**	**1,300**
	Copper	**120,000**	**16,000**
	Mercury, total	300	**44**
	Nickel	**67,000**	**9,000**
	Selenium	20,000	**2,000**

	Chemical	Screening Values for Recreational Angler(µg/kg wet)	Screening Values for Subsistence Angler(µg/kg wet)
	Silver	**17,000**	**2,174**
	Zinc	**1,000,000**	**130,000**
Organometallic Compounds	Tributyltin	**1,000**	**130**
Polynuclear Aromatic Hydrocarbons	Naphthalene	**67,000**	**9,000**
	Acenaphthene	**200,000**	**26,000**
	Fluorene	**130,000**	**17,000**
	Anthracene	**1,000,000**	**130,000**
	Fluoranthene	**130,000**	**17,000**
	Pyrene	**67,000**	**9,000**
	Benz[a]anthracene	**28**	**0.36**
	Chrysene	**280**	**3.62**
	Benzo[b]fluoranthene	**28**	**0.36**
	Benzo[k]fluoranthene	**28**	**0.36**
	Benzo[a]pyrene	**2.8**	**0.04**
	Indeno[1,2,3-cd]pyrene	**28**	**0.36**
	Dibenz[a,h]anthracene	**8.1**	**0.11**
Polychlorinated Biphenyls	Total PCBs (cancer)	20	**0.22**
	Total PCBs (non-cancer)	**67**	**8.70**

Note: Screening values derived by the San Diego Water Board are bold faced and shaded.

In addition to characterizing the risks at the Shipyard Sediment Site, the *Macoma* tissue concentrations at each site station were compared to the *Macoma* tissue concentrations derived from the reference pool described in Section 17 of this Technical Report. The objective of this comparison was to determine whether or not the current site conditions pose a greater risk to the recreational and subsistence anglers than the current reference conditions in San Diego Bay.

The reference pool *Macoma* tissue concentrations were calculated using the 95% upper prediction limit (UPL). The 95% UPL allows a one-to-one comparison to be performed between a single Shipyard Sediment Site station (i.e., each of the nine bioaccumulation site stations) and a pool of "Reference Condition" stations (i.e., Reference Pool). Although multiple comparisons were made to the reference pool prediction limits, the San Diego Water Board made a decision to not correct for multiple comparisons so that the site/reference *Macoma* tissue comparisons would remain conservative and more protective. The upper 95% UPL for the reference pool *Macoma* tissue concentrations are provided in Table 27-5 below and the comparison results are provided in the Appendix for Section 27.

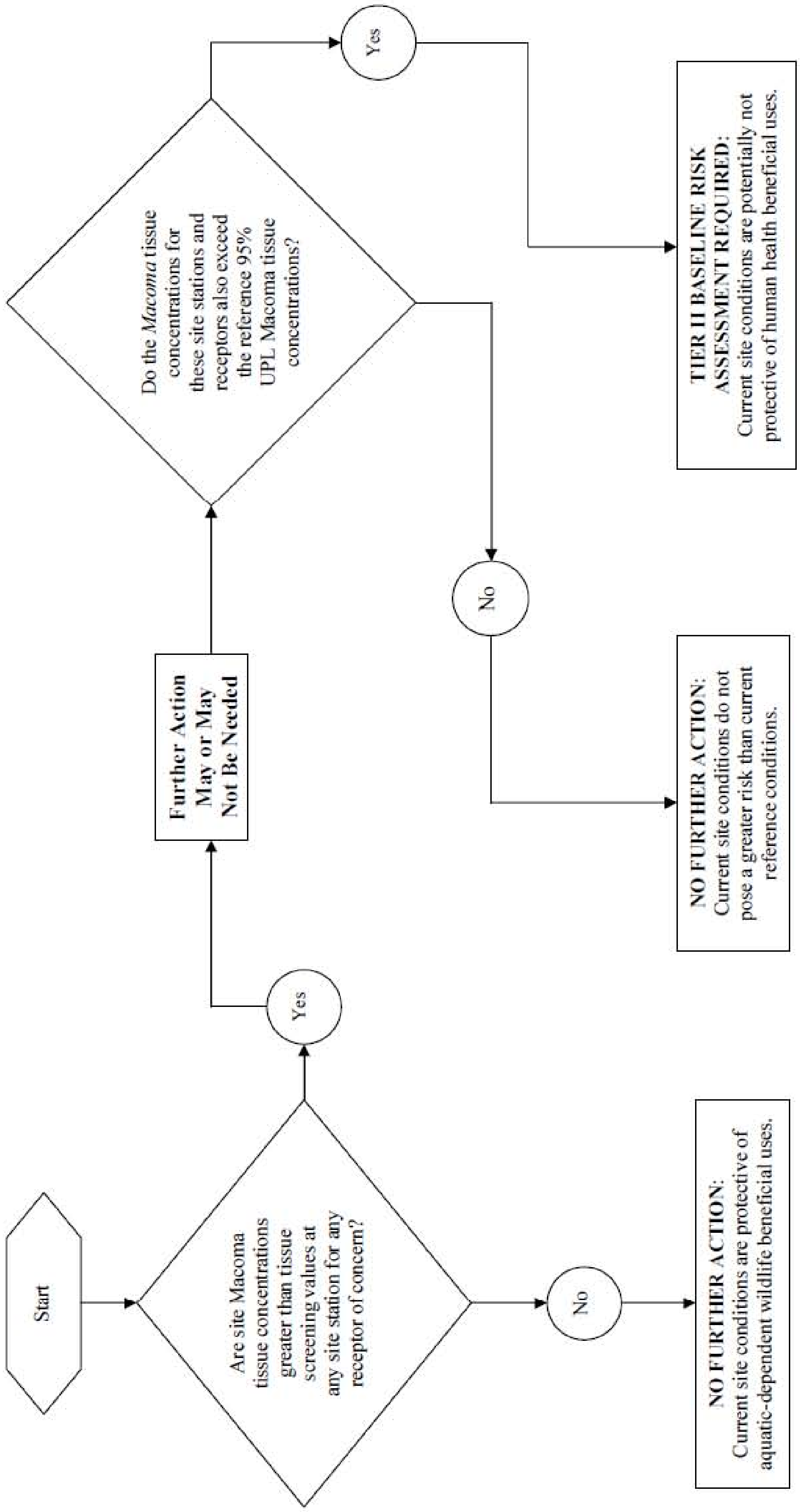
Table 27-5 Reference Pool Upper 95% Prediction Limits for *Macoma nasuta* Tissue Concentrations

Macoma Tissue Chemicals	95% Upper Prediction Limits
Metals	
Arsenic	22.8 mg/kg
Cadmium	0.39 mg/kg
Chromium	3.9 mg/kg
Copper	19.2 mg/kg
Lead	3.3 mg/kg
Mercury	0.15 mg/kg
Nickel	4.4 mg/kg
Selenium	4.9 mg/kg
Silver	0.57 mg/kg
Zinc	85.7 mg/kg
Organometallic Compounds	
Tributyltin	12 µg/kg
Organics	
Benzo[a]pyrene	132 µg/kg
Total Polychlorinated Biphenyls (PCB), as congeners	186 µg/kg
Total Polychlorinated Terphenyls (PCT)	All Reference Pool stations undetected

27.2.4. Risk Management

The San Diego Water Board identified two human health risk management decisions for the Tier I screening level risk assessment: (1) Current Shipyard Sediment Site conditions pose acceptable human health risks and no further action is warranted, and (2) Current site conditions pose a potential unacceptable human health risk that requires additional evaluation with a Tier II baseline risk assessment. These two management decisions are based on the human health risk characterization results at each site station and the *Macoma* tissue site/reference comparison results. A flow diagram showing how each management decision is triggered is shown below in Figure 27-1.

Figure 27-1 Flow Diagram for Tier I Human Health Risk Management Decisions



27.2.5. Uncertainties Related to Human Health Risk Estimates

The process of evaluating human health cancer and non-cancer risks involves multiple steps. Inherent in each step of the risk assessment process are uncertainties that ultimately affect the risk estimates. Uncertainties may exist in numerous areas such as estimation of potential site exposures and derivation of toxicity values. The most significant uncertainties in the Tier I risk analysis for the Shipyard Sediment Site are discussed below.

Tissue Chemical Concentrations. For this assessment, a 28-day laboratory bioaccumulation test using the clam *Macoma nasuta* was used to estimate exposure of fish and shellfish to CoPCs present in site sediment. For PCBs, dioxins, furans, PAHs, and metals, 80% of steady state generally occurs using the 28-day bioaccumulation test (U.S. EPA, 1998a; ASTM, 2001). Bioaccumulation testing protocols recommend that the bioaccumulation CoPCs reach approximately 80% of steady state tissue residues for a proper risk assessment. Attaining 100% steady state is ideal but not required in Tier I because it is a screening-level risk assessment. The San Diego Water Board recognizes that the observed tissue chemical concentrations in *Macoma nasuta* may be underestimated. Therefore, this may result in an underestimation of risk.

Surrogate for Fish and Shellfish. Chemical concentrations in *Macoma* tissue were used as a surrogate to estimate exposures to chemicals in seafood for recreational and subsistence anglers. While *Macoma* is not considered to be the primary seafood harvested from the Shipyard Sediment Site, use of *Macoma* tissue data for the Tier I risk analysis is a considered a conservative approach because *Macoma* are directly exposed to contaminants in the surface sediment. *Macoma* actively ingests surface sediment to feed on detritus and also burrows into the sediment. Therefore, use of *Macoma* tissue may result in an overestimation of risk.

Exposure Parameters. The exposure parameters selected for Tier I are considered to be conservative values and therefore may result in an overestimation of risk.

Multiple Comparisons. Because multiple comparisons were made to the Reference Condition, and each comparison carries with it a low probability (5%) of falsely identifying a statistical difference, there is a significant potential for multiple comparison error (SCCWRP and U.S. Navy, 2005b). This may result in an overestimation of risk.

PCB Cancer Slope Factor. The PCB CSF used in this assessment was based on the upper-bound slope estimates for Aroclors 1254 and 1260 (Exponent, 2003). Use of the upper-end CSFs (i.e., highest) is conservative and may overestimate risks from PCBs.

Non-Cancer Risks from PCBs. Aroclors 1260 and 1254 were the only two Aroclors detected in *Macoma nasuta* tissue at all site and reference stations. U.S. EPA has only published RfDs for Aroclor 1254 (0.00002 mg/kg-day) and Aroclor 1016 (0.00007 mg/kg-day). For this assessment, the more conservative RfD for Aroclor 1254 was used for Aroclor 1260. This may overestimate risks from PCBs.

Inorganic Arsenic as a Percent of Total Arsenic. In order to account for the percentage of arsenic in *Macoma* tissue that is nontoxic, concentrations of inorganic arsenic were assumed to be 4 percent of total arsenic. Use of this percentage is considered to be conservative because some studies have reported much smaller percentages (Exponent, 2003). Therefore, this may result in an overestimation of risk.

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APPENDIX FOR SECTION 27

TIER I SCREENING LEVEL RISK ASSESSMENT FOR HUMAN HEALTH

March 14, 2012

SUMMARY OF TIER I HUMAN HEALTH RISK ASSESSMENT RESULTS
(RECREATIONAL ANGLER)

	Arsenic		Cadmium		Chromium		Copper		Mercury	
	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)
NA06										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**	--	No	--	No	--	No	--	No	--
NA11										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**		No	--	No	--	No	--	No	--
NA12										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**		No	--	No	--	No	--	No	--
NA20										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**		No	--	No	--	No	--	No	--
SW04										
> 95% UPL Reference Pool	--	**Yes**	--	No	--	No	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--
SW08										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--
SW13										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--
SW21										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--
SW28										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--

SUMMARY OF TIER I HUMAN HEALTH RISK ASSESSMENT RESULTS
(RECREATIONAL ANGLER)

	Nickel		Selenium		Silver		Zinc		TBT	
	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(ug/kg wet)	(ug/kg dry)
NA06										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
NA11										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
NA12										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
NA20										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
SW04										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	**--**
SW08										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	**--**
SW13										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
SW21										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
SW28										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--

SUMMARY OF TIER I HUMAN HEALTH RISK ASSESSMENT RESULTS (RECREATIONAL ANGLER)

	Benzo[a]pyrene (ug/kg wet)	Benzo[a]pyrene (ug/kg dry)	Total PCBs (ng/g wet)	Total PCBs (ng/g dry)
NA06				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--
NA11				
> 95% UPL Reference Pool	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--
NA12				
> 95% UPL Reference Pool	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--
NA20				
> 95% UPL Reference Pool	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--
SW04				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--
SW08				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--
SW13				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--
SW21				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--
SW28				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	--	**Yes**	--

SUMMARY OF TIER I HUMAN HEALTH RISK ASSESSMENT RESULTS
(SUBSISTENCE ANGLER)

	Arsenic		Cadmium		Chromium		Copper		Mercury	
	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)
NA06										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**	--	No	--	No	--	No	--	No	--
NA11										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**		No	--	No	--	No	--	No	--
NA12										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**		No	--	No	--	No	--	No	--
NA20										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**		No	--	No	--	No	--	No	--
SW04										
> 95% UPL Reference Pool	--	**Yes**	--	No	--	No	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--
SW08										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--
SW13										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--
SW21										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--
SW28										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	No	--	No	--	No	--	No	--

SUMMARY OF TIER I HUMAN HEALTH RISK ASSESSMENT RESULTS
(SUBSISTENCE ANGLER)

	Nickel		Selenium		Silver		Zinc		TBT	
	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(mg/kg wet)	(mg/kg dry)	(ug/kg wet)	(ug/kg dry)
NA06										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
NA11										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
NA12										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
NA20										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
SW04										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	**Yes**	**--**
SW08										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	**Yes**	**--**
SW13										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
SW21										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--
SW28										
> 95% UPL Reference Pool	--	No	--	No	--	No	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	No	--	No	--	No	--	No	--	No	--

SUMMARY OF TIER I HUMAN HEALTH RISK ASSESSMENT RESULTS
(SUBSISTENCE ANGLER)

	Benzo[a]pyrene		Total PCBs	
	(ug/kg wet)	(ug/kg dry)	(ng/g wet)	(ng/g dry)
NA06				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**
NA11				
> 95% UPL Reference Pool	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**
NA12				
> 95% UPL Reference Pool	--	No	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**
NA20				
> 95% UPL Reference Pool	--	**Yes**	--	No
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**
SW04				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**
SW08				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**
SW13				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**
SW21				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**
SW28				
> 95% UPL Reference Pool	--	**Yes**	--	**Yes**
> HH Tissue Residue Guideline(s)	**Yes**	**--**	**Yes**	**--**

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COMPARISON OF SHIPYARD BIOACCUMULATION STATIONS TO RISK-BASED TISSUE SCREENING LEVELS (RECREATIONAL ANGLER)

	Human Health Tissue Screening Level (ug/kg wet)	Shipyard Stations with *Macoma nasuta* Tissue Data (ug/kg wet)								
		NA06	NA11	NA12	NA20	SW04	SW08	SW13	SW21	SW28
Metals										
Arsenic, inorganic (RfD)	1,000	116.8	119.2	108	112.8	143.2	110.4	113.6	123.2	123.2
Arsenic, inorganic (CSF)	22.22	**116.8**	**119.2**	**108**	**112.8**	**143.2**	**110.4**	**113.6**	**123.2**	**123.2**
Cadmium	3,000	40	40	30	30	40	30	30	40	40
Chromium	10,000	320	270	250	310	480	360	310	390	240
Copper	123,333	2280	1900	1860	1740	4840	3300	3660	2420	2100
Mercury, total (except for Macoma tissue)	300	20	20	20	20	20	20	10	20	20
Nickel	66,667	390	340	330	430	440	340	380	360	390
Selenium	20,000	300	280	300	220	240	200	280	280	250
Silver	16,667	40	50	30	20	30	40	40	50	40
Zinc	1,000,000	19600	16600	16200	17200	28800	15800	19200	19400	19400
Organometallic Compounds										
Tributyltin	1,000	31.6	13.8	14.76	23.6	331	148	124.6	16.4	13
Polycyclic Aromatic Hydrocarbons										
Benzo[a]pyrene	2.78	**27**	**23**	**20**	**38**	**174**	**166**	**105.8**	**138**	**136**
Polychlorinated Biphenyls										
Total PCB Aroclors (CSF)	16.67	**77.8**	**46.8**	**31.8**	**32**	**216**	**160**	**72.2**	**264**	**226**
Total PCB Aroclors (RfD)	66.67	**77.8**	**46.8**	**31.8**	**32**	**216**	**160**	**72.2**	**264**	**226**

<u>NOTE</u>: Tissue concentrations bold faced and shaded are greater than the human health tissue screening levels.

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COMPARISON OF SHIPYARD BIOACCUMULATION STATIONS TO RISK-BASED TISSUE SCREENING LEVELS (SUBSISTENCE ANGLER)

	Human Health Tissue Screening Level (ug/kg wet)	Shipyard Stations with *Macoma nasuta* Tissue Data (ug/kg wet)								
		NA06	NA11	NA12	NA20	SW04	SW08	SW13	SW21	SW28
Metals										
Arsenic, inorganic (RfD)	130	116.8	119.2	108	112.8	**143.2**	110.4	113.6	123.2	123.2
Arsenic, inorganic (CSF)	2.90	**116.8**	**119.2**	**108**	**112.8**	**143.2**	**110.4**	**113.6**	**123.2**	**123.2**
Cadmium	217	40	40	30	30	40	30	30	40	40
Chromium	1,304	320	270	250	310	480	360	310	390	240
Copper	16,087	2280	1900	1860	1740	4840	3300	3660	2420	2100
Mercury, total (except for Macoma tissue)	43	20	20	20	20	20	20	10	20	20
Nickel	8,696	390	340	330	430	440	340	380	360	390
Selenium	2,174	300	280	300	220	240	200	280	280	250
Silver	2,174	40	50	30	20	30	40	40	50	40
Zinc	130,435	19600	16600	16200	17200	28800	15800	19200	19400	19400
Organometallic Compounds										
Tributyltin	130	31.6	13.8	14.76	23.6	**331**	**148**	124.6	16.4	13
Polycyclic Aromatic Hydrocarbons										
Benzo[a]pyrene	0.36	**27**	**23**	**20**	**38**	**174**	**166**	**105.8**	**138**	**136**
Polychlorinated Biphenyls										
Total PCB Aroclors (CSF)	2.17	**77.8**	**46.8**	**31.8**	**32**	**216**	**160**	**72.2**	**264**	**226**
Total PCB Aroclors (RfD)	8.70	**77.8**	**46.8**	**31.8**	**32**	**216**	**160**	**72.2**	**264**	**226**

<u>NOTE</u>: Tissue concentrations bold faced and shaded are greater than the human health tissue screening levels.

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COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Total Solids (decimal wet)	Arsenic (mg/kg wet)	Control	Arsenic (mg/kg dry)	Cadmium (mg/kg wet)	Control	Cadmium (mg/kg dry)	Chromium (mg/kg wet)	Control	Chromium (mg/kg dry)	Copper (mg/kg wet)	Control
NA06	0.147	3	3	20.41	0.032	0.031	0.22	0.33	0.78	2.24	2.3	1.5
NA06	0.151	2.6	3.1	17.22	0.033	0.045	0.22	0.34	0.25	2.25	2.1	1.2
NA06	0.128	2.7	2.7	21.09	0.056	0.04	0.44	0.29	0.77	2.27	2.3	0.99
NA06	0.159	3	2.8	18.87	0.037	0.034	0.23	0.38	0.35	2.39	2.4	1.2
NA06	0.167	3.3	3.2	19.76	0.051	0.037	0.31	0.25	0.19	1.50	2.3	0.97
mean	0.1504	2.92	2.96	19.47	0.0418	0.0374	0.28	0.318	0.468	2.13	2.28	1.172
max	0.167	3.3	3.2	21.09	0.056	0.045	0.4375	0.38	0.78	2.39	2.4	1.5
> 95% UPL Reference Pool	--	--	--	No	--	--	No	--	--	No	--	--
NA11	0.155	3.2	3	20.65	0.036	0.031	0.23	0.26	0.78	1.68	1.6	1.5
NA11	0.148	2.6	3.1	17.57	0.028	0.045	0.19	0.23	0.25	1.55	1.8	1.2
NA11	0.131	2.8	2.7	21.37	0.025	0.04	0.19	0.18	0.77	1.37	1.6	0.99
NA11	0.155	3.7	2.8	23.87	0.052	0.034	0.34	0.34	0.35	2.19	2.6	1.2
NA11	0.147	2.6	3.2	17.69	0.054	0.037	0.37	0.36	0.19	2.45	1.9	0.97
mean	0.1472	2.98	2.96	20.23	0.039	0.0374	0.26	0.274	0.468	1.85	1.9	1.172
max	0.155	3.7	3.2	23.87	0.054	0.045	0.3673469	0.36	0.78	2.45	2.6	1.5
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--
NA12	0.14	2.8	3	20.00	0.02	0.031	0.14	0.2	0.78	1.43	1.7	1.5
NA12	0.132	2.6	3.1	19.70	0.036	0.045	0.27	0.26	0.25	1.97	2	1.2
NA12	0.152	2.6	2.7	17.11	0.031	0.04	0.20	0.26	0.77	1.71	1.5	0.99
NA12	0.147	2.9	2.8	19.73	0.035	0.034	0.24	0.32	0.35	2.18	1.7	1.2
NA12	0.142	2.6	3.2	18.31	0.028	0.037	0.20	0.19	0.19	1.34	2.4	0.97
mean	0.1426	2.7	2.96	18.97	0.03	0.0374	0.21	0.246	0.468	1.72	1.86	1.172
max	0.152	2.9	3.2	20.00	0.036	0.045	0.2727273	0.32	0.78	2.18	2.4	1.5
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--
NA20	0.162	3	3	18.52	0.029	0.031	0.18	0.25	0.78	1.54	1.7	1.5
NA20	0.136	2.2	3.1	16.18	0.023	0.045	0.17	0.27	0.25	1.99	1.6	1.2
NA20	0.158	3.2	2.7	20.25	0.035	0.04	0.22	0.37	0.77	2.34	2	0.99
NA20	0.158	3.2	2.8	20.25	0.035	0.034	0.22	0.37	0.35	2.34	2	1.2
NA20	0.147	2.5	3.2	17.01	0.029	0.037	0.20	0.3	0.19	2.04	1.4	0.97
mean	0.1522	2.82	2.96	18.44	0.0302	0.0374	0.20	0.312	0.468	2.05	1.74	1.172
max	0.162	3.2	3.2	20.25	0.035	0.045	0.221519	0.37	0.78	2.34	2	1.5
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--
SW04	0.146	3.8	3	26.03	0.043	0.031	0.29	0.76	0.78	5.21	8.1	1.5
SW04	0.142	3.8	3.1	26.76	0.055	0.045	0.39	0.49	0.25	3.45	5	1.2
SW04	0.152	3.1	2.7	20.39	0.037	0.04	0.24	0.53	0.77	3.49	4	0.99
SW04	0.153	3.6	2.8	23.53	0.031	0.034	0.20	0.18	0.35	1.18	2.5	1.2
SW04	0.149	3.6	3.2	24.16	0.027	0.037	0.18	0.42	0.19	2.82	4.6	0.97
mean	0.1484	3.58	2.96	24.17	0.0386	0.0374	0.26	0.476	0.468	3.23	4.84	1.172
max	0.153	3.8	3.2	26.76	0.055	0.045	0.3873239	0.76	0.78	5.21	8.1	1.5

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Total Solids (decimal wet)	Arsenic (mg/kg wet)	Control	Arsenic (mg/kg dry)	Cadmium (mg/kg wet)	Control	Cadmium (mg/kg dry)	Chromium (mg/kg wet)	Control	Chromium (mg/kg dry)	Copper (mg/kg wet)	Control
> 95% UPL Reference Pool		--	--	**Yes**	--	--	No	--	--	No	--	--
SW08	0.148	2.6	3	17.57	0.022	0.031	0.15	0.33	0.78	2.23	3.2	1.5
SW08	0.12	2.8	3.1	23.33	0.029	0.045	0.24	0.35	0.25	2.92	3.2	1.2
SW08	0.148	2.8	2.7	18.92	0.035	0.04	0.24	0.53	0.77	3.58	2.6	0.99
SW08	0.157	3	2.8	19.11	0.037	0.034	0.24	0.3	0.35	1.91	3.2	1.2
SW08	0.138	2.6	3.2	18.84	0.03	0.037	0.22	0.31	0.19	2.25	4.3	0.97
mean	0.1422	2.76	2.96	19.55	0.0306	0.0374	0.22	0.364	0.468	2.58	3.3	1.172
max	0.157	3	3.2	23.33	0.037	0.045	0.2416667	0.53	0.78	3.58	4.3	1.5
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--
SW13	0.12	2.5	3	20.83	0.032	0.031	0.27	0.26	0.78	2.17	2.5	1.5
SW13	0.158	3.6	3.1	22.78	0.045	0.045	0.28	0.31	0.25	1.96	5.6	1.2
SW13	0.163	3.1	2.7	19.02	0.031	0.04	0.19	0.3	0.77	1.84	3.1	0.99
SW13	0.14	2.1	2.8	15.00	0.025	0.034	0.18	0.41	0.35	2.93	4.2	1.2
SW13	0.151	2.9	3.2	19.21	0.027	0.037	0.18	0.29	0.19	1.92	2.9	0.97
mean	0.1464	2.84	2.96	19.37	0.032	0.0374	0.22	0.314	0.468	2.16	3.66	1.172
max	0.163	3.6	3.2	22.78	0.045	0.045	0.2848101	0.41	0.78	2.93	5.6	1.5
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--
SW21	0.157	3.1	3	19.75	0.033	0.031	0.21	0.32	0.78	2.04	2.4	1.5
SW21	0.146	3.1	3.1	21.23	0.037	0.045	0.25	0.32	0.25	2.19	2	1.2
SW21	0.164	3.7	2.7	22.56	0.053	0.04	0.32	0.35	0.77	2.13	2.4	0.99
SW21	0.148	2.9	2.8	19.59	0.042	0.034	0.28	0.34	0.35	2.30	2.2	1.2
SW21	0.128	2.6	3.2	20.31	0.038	0.037	0.30	0.6	0.19	4.69	3.1	0.97
mean	0.1486	3.08	2.96	20.69	0.0406	0.0374	0.27	0.386	0.468	2.67	2.42	1.172
max	0.164	3.7	3.2	22.56	0.053	0.045	0.3231707	0.6	0.78	4.69	3.1	1.5
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--
SW28	0.157	2.8	3	17.83	0.036	0.031	0.23	0.2	0.78	1.27	1.8	1.5
SW28	0.143	2.7	3.1	18.88	0.028	0.045	0.20	0.18	0.25	1.26	1.6	1.2
SW28	0.155	3.3	2.7	21.29	0.036	0.04	0.23	0.25	0.77	1.61	2.2	0.99
SW28	0.163	3.5	2.8	21.47	0.053	0.034	0.33	0.3	0.35	1.84	2.7	1.2
SW28	0.155	3.1	3.2	20.00	0.034	0.037	0.22	0.27	0.19	1.74	2.2	0.97
mean	0.1546	3.08	2.96	19.90	0.0374	0.0374	0.24	0.24	0.468	1.55	2.1	1.172
max	0.163	3.5	3.2	21.47	0.053	0.045	0.3251534	0.3	0.78	1.84	2.7	1.5
> 95% UPL Reference Pool		--	--	No	--	--	No	--	--	No	--	--

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Copper (mg/kg dry)	Lead (mg/kg wet)	Control	Lead (mg/kg dry)	Mercury (mg/kg wet)	Control	Mercury (mg/kg dry)	Nickel (mg/kg wet)	Control	Nickel (mg/kg dry)	Selenium (mg/kg wet)	Control
NA06	15.65	0.64	0.1	4.35	0.016	0.018	0.109	0.38	0.4	2.59	0.4	0.2
NA06	13.91	0.82	0.12	5.43	0.014	0.015	0.093	0.37	0.43	2.45	0.2	0.4
NA06	17.97	0.5	0.11	3.91	0.016	0.016	0.125	0.34	0.75	2.66	0.3	0.3
NA06	15.09	0.53	0.09	3.33	0.026	0.012	0.164	0.47	0.38	2.96	0.3	0.3
NA06	13.77	0.58	0.11	3.47	0.018	0.013	0.108	0.37	0.35	2.22	0.3	0.2
mean	15.28	0.614	0.106	4.10	0.018	0.0148	0.120	0.386	0.462	2.57	0.3	0.28
max	17.97	0.82	0.12	5.43	0.026	0.018	0.164	0.47	0.75	2.96	0.4	0.4
> 95% UPL Reference Pool	No	--	--	**Yes**	--	--	No	--	--	No	--	--
NA11	10.32	0.37	0.1	2.39	0.012	0.018	0.077	0.39	0.4	2.52	0.3	0.2
NA11	12.16	0.28	0.12	1.89	0.014	0.015	0.095	0.27	0.43	1.82	0.2	0.4
NA11	12.21	0.3	0.11	2.29	0.017	0.016	0.130	0.28	0.75	2.14	0.3	0.3
NA11	16.77	0.53	0.09	3.42	0.018	0.012	0.116	0.39	0.38	2.52	0.4	0.3
NA11	12.93	0.48	0.11	3.27	0.016	0.013	0.109	0.36	0.35	2.45	0.2	0.2
mean	12.88	0.392	0.106	2.65	0.0154	0.0148	0.105	0.338	0.462	2.29	0.28	0.28
max	16.77	0.53	0.12	3.42	0.018	0.018	0.130	0.39	0.75	2.52	0.4	0.4
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--
NA12	12.14	0.3	0.1	2.14	0.02	0.018	0.143	0.32	0.4	2.29	0.4	0.2
NA12	15.15	0.31	0.12	2.35	0.015	0.015	0.114	0.36	0.43	2.73	0.3	0.4
NA12	9.87	0.3	0.11	1.97	0.013	0.016	0.086	0.3	0.75	1.97	0.2	0.3
NA12	11.56	0.37	0.09	2.52	0.014	0.012	0.095	0.37	0.38	2.52	0.4	0.3
NA12	16.90	0.38	0.11	2.68	0.014	0.013	0.099	0.29	0.35	2.04	0.2	0.2
mean	13.13	0.332	0.106	2.33	0.0152	0.0148	0.107	0.328	0.462	2.31	0.3	0.28
max	16.90	0.38	0.12	2.68	0.02	0.018	0.143	0.37	0.75	2.73	0.4	0.4
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--
NA20	10.49	0.41	0.1	2.53	0.017	0.018	0.105	0.42	0.4	2.59	0.3	0.2
NA20	11.76	0.38	0.12	2.79	0.017	0.015	0.125	0.34	0.43	2.50	0.2	0.4
NA20	12.66	0.55	0.11	3.48	0.023	0.016	0.146	0.5	0.75	3.16	0.2	0.3
NA20	12.66	0.55	0.09	3.48	0.023	0.012	0.146	0.5	0.38	3.16	0.2	0.3
NA20	9.52	0.37	0.11	2.52	0.017	0.013	0.116	0.38	0.35	2.59	0.2	0.2
mean	11.42	0.452	0.106	2.96	0.0194	0.0148	0.127	0.428	0.462	2.80	0.22	0.28
max	12.66	0.55	0.12	3.48	0.023	0.018	0.146	0.5	0.75	3.16	0.3	0.4
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--
SW04	55.48	1.9	0.1	13.01	0.023	0.018	0.158	0.48	0.4	3.29	0.3	0.2
SW04	35.21	1.7	0.12	11.97	0.021	0.015	0.148	0.63	0.43	4.44	0.2	0.4
SW04	26.32	1.3	0.11	8.55	0.022	0.016	0.145	0.35	0.75	2.30	0.2	0.3
SW04	16.34	0.7	0.09	4.58	0.016	0.012	0.105	0.37	0.38	2.42	0.2	0.3
SW04	30.87	1.1	0.11	7.38	0.019	0.013	0.128	0.38	0.35	2.55	0.3	0.2
mean	32.84	1.34	0.106	9.10	0.0202	0.0148	0.136	0.442	0.462	3.00	0.24	0.28
max	55.48	1.9	0.12	13.01	0.023	0.018	0.158	0.63	0.75	4.44	0.3	0.4

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Copper (mg/kg dry)	Lead (mg/kg wet)	Control	Lead (mg/kg dry)	Mercury (mg/kg wet)	Control	Mercury (mg/kg dry)	Nickel (mg/kg wet)	Control	Nickel (mg/kg dry)	Selenium (mg/kg wet)	Control
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	No	--	--	No	--	--
SW08	21.62	0.8	0.1	5.41	0.026	0.018	0.176	0.29	0.4	1.96	0.2	0.2
SW08	26.67	1.4	0.12	11.67	0.015	0.015	0.125	0.29	0.43	2.42	0.1	0.4
SW08	17.57	0.6	0.11	4.05	0.018	0.016	0.122	0.43	0.75	2.91	0.3	0.3
SW08	20.38	0.66	0.09	4.20	0.017	0.012	0.108	0.37	0.38	2.36	0.2	0.3
SW08	31.16	0.75	0.11	5.43	0.017	0.013	0.123	0.3	0.35	2.17	0.2	0.2
mean	23.48	0.842	0.106	6.15	0.0186	0.0148	0.131	0.336	0.462	2.36	0.2	0.28
max	31.16	1.4	0.12	11.67	0.026	0.018	0.176	0.43	0.75	2.91	0.3	0.4
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**	--	--	No	--	--	No	--	--
SW13	20.83	0.35	0.1	2.92	0.013	0.018	0.108	0.35	0.4	2.92	0.2	0.2
SW13	35.44	0.4	0.12	2.53	0.014	0.015	0.089	0.44	0.43	2.78	0.5	0.4
SW13	19.02	0.43	0.11	2.64	0.018	0.016	0.110	0.41	0.75	2.52	0.3	0.3
SW13	30.00	0.35	0.09	2.50	0.013	0.012	0.093	0.34	0.38	2.43	0.2	0.3
SW13	19.21	0.33	0.11	2.19	0.016	0.013	0.106	0.34	0.35	2.25	0.2	0.2
mean	24.90	0.372	0.106	2.55	0.0148	0.0148	0.101	0.376	0.462	2.58	0.28	0.28
max	35.44	0.43	0.12	2.92	0.018	0.018	0.110	0.44	0.75	2.92	0.5	0.4
> 95% UPL Reference Pool	**Yes**	--	--	No	--	--	No	--	--	No	--	--
SW21	15.29	0.46	0.1	2.93	0.016	0.018	0.102	0.36	0.4	2.29	0.2	0.2
SW21	13.70	0.53	0.12	3.63	0.017	0.015	0.116	0.31	0.43	2.12	0.2	0.4
SW21	14.63	0.69	0.11	4.21	0.017	0.016	0.104	0.41	0.75	2.50	0.3	0.3
SW21	14.86	0.58	0.09	3.92	0.017	0.012	0.115	0.36	0.38	2.43	0.3	0.3
SW21	24.22	0.9	0.11	7.03	0.012	0.013	0.094	0.37	0.35	2.89	0.4	0.2
mean	16.54	0.632	0.106	4.34	0.0158	0.0148	0.106	0.362	0.462	2.45	0.28	0.28
max	24.22	0.9	0.12	7.03	0.017	0.018	0.116	0.41	0.75	2.89	0.4	0.4
> 95% UPL Reference Pool	No	--	--	**Yes**	--	--	No	--	--	No	--	--
SW28	11.46	0.35	0.1	2.23	0.019	0.018	0.121	0.4	0.4	2.55	0.2	0.2
SW28	11.19	0.39	0.12	2.73	0.017	0.015	0.119	0.32	0.43	2.24	0.15	0.4
SW28	14.19	0.45	0.11	2.90	0.02	0.016	0.129	0.38	0.75	2.45	0.4	0.3
SW28	16.56	0.51	0.09	3.13	0.015	0.012	0.092	0.48	0.38	2.94	0.3	0.3
SW28	14.19	0.45	0.11	2.90	0.016	0.013	0.103	0.35	0.35	2.26	0.2	0.2
mean	13.52	0.43	0.106	2.78	0.0174	0.0148	0.113	0.386	0.462	2.49	0.25	0.28
max	16.56	0.51	0.12	3.13	0.02	0.018	0.129	0.48	0.75	2.94	0.4	0.4
> 95% UPL Reference Pool	No	--	--	No	--	--	No	--	--	No	--	--

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Selenium (mg/kg dry)	Silver (mg/kg wet)	Control	Silver (mg/kg dry)	Zinc (mg/kg wet)	Control	Zinc (mg/kg dry)	TBT (ug/kg wet)	Control	TBT (ug/kg dry)	Benzo[a]pyrene (ug/kg wet)	Control
NA06	2.72	0.038	0.027	0.259	17	16	115.65	16	0.495	108.84	27	5
NA06	1.32	0.052	0.033	0.344	18	18	119.21	32	0.5	211.92	26	2.5
NA06	2.34	0.053	0.036	0.414	21	15	164.06	31	0.5	242.19	20	2.5
NA06	1.89	0.03	0.027	0.189	18	14	113.21	38	1.4	238.99	30	5
NA06	1.80	0.026	0.041	0.156	24	17	143.71	41	0.495	245.51	32	5
mean	2.01	0.0398	0.0328	0.272	19.6	16	131.17	31.6	0.678	209.49	27	4
max	2.72	0.053	0.041	0.414	24	18	164.06	41	1.4	245.51	32	5
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--
NA11	1.94	0.051	0.027	0.329	15	16	96.77	15	0.495	96.77	23	5
NA11	1.35	0.041	0.033	0.277	16	18	108.11	11	0.5	74.32	26	2.5
NA11	2.29	0.042	0.036	0.321	14	15	106.87	12	0.5	91.60	19	2.5
NA11	2.58	0.072	0.027	0.465	20	14	129.03	19	1.4	122.58	27	5
NA11	1.36	0.037	0.041	0.252	18	17	122.45	12	0.495	81.63	20	5
mean	1.90	0.0486	0.0328	0.329	16.6	16	112.65	13.8	0.678	93.38	23	4
max	2.58	0.072	0.041	0.465	20	18	129.03	19	1.4	122.58	27	5
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--
NA12	2.86	0.02	0.027	0.143	12	16	85.71	18	0.495	128.57	19	5
NA12	2.27	0.031	0.033	0.235	17	18	128.79	15	0.5	113.64	19	2.5
NA12	1.32	0.027	0.036	0.178	17	15	111.84	13	0.5	85.53	21	2.5
NA12	2.72	0.031	0.027	0.211	17	14	115.65	19	1.4	129.25	23	5
NA12	1.41	0.05	0.041	0.352	18	17	126.76	8.8	0.495	61.97	18	5
mean	2.12	0.0318	0.0328	0.224	16.2	16	113.75	14.76	0.678	103.79	20	4
max	2.86	0.05	0.041	0.352	18	18	128.79	19	1.4	129.25	23	5
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--
NA20	1.85	0.022	0.027	0.136	19	16	117.28	22	0.495	135.80	46	5
NA20	1.47	0.019	0.033	0.140	15	18	110.29	26	0.5	191.18	23	2.5
NA20	1.27	0.022	0.036	0.139	18	15	113.92	27	0.5	170.89	35	2.5
NA20	1.27	0.022	0.027	0.139	18	14	113.92	27	1.4	170.89	43	5
NA20	1.36	0.022	0.041	0.150	16	17	108.84	16	0.495	108.84	43	5
mean	1.44	0.0214	0.0328	0.141	17.2	16	112.85	23.6	0.678	155.52	38	4
max	1.85	0.022	0.041	0.150	19	18	117.28	27	1.4	191.18	46	5
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--
SW04	2.05	0.058	0.027	0.397	46	16	315.07	330	0.495	2260.27	170	5
SW04	1.41	0.029	0.033	0.204	31	18	218.31	740	0.5	5211.27	170	2.5
SW04	1.32	0.034	0.036	0.224	27	15	177.63	420	0.5	2763.16	150	2.5
SW04	1.31	0.028	0.027	0.183	19	14	124.18	150	1.4	980.39	180	5
SW04	2.01	0.024	0.041	0.161	21	17	140.94	15	0.495	100.67	200	5
mean	1.62	0.0346	0.0328	0.234	28.8	16	195.23	331	0.678	2263.15	174	4
max	2.05	0.058	0.041	0.397	46	18	315.07	740	1.4	5211.27	200	5

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Selenium (mg/kg dry)	Silver (mg/kg wet)	Control	Silver (mg/kg dry)	Zinc (mg/kg wet)	Control	Zinc (mg/kg dry)	TBT (ug/kg wet)	Control	TBT (ug/kg dry)	Benzo[a]pyrene (ug/kg wet)	Control
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--
SW08	1.35	0.016	0.027	0.108	15	16	101.35	120	0.495	810.81	170	5
SW08	0.83	0.034	0.033	0.283	14	18	116.67	210	0.5	1750.00	140	2.5
SW08	2.03	0.019	0.036	0.128	17	15	114.86	110	0.5	743.24	180	2.5
SW08	1.27	0.041	0.027	0.261	19	14	121.02	180	1.4	1146.50	190	5
SW08	1.45	0.067	0.041	0.486	14	17	101.45	120	0.495	869.57	150	5
mean	1.39	0.0354	0.0328	0.253	15.8	16	111.07	148	0.678	1064.02	166	4
max	2.03	0.067	0.041	0.486	19	18	121.02	210	1.4	1750.00	190	5
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--
SW13	1.67	0.043	0.027	0.358	17	16	141.67	120	0.495	1000.00	79	5
SW13	3.16	0.077	0.033	0.487	24	18	151.90	140	0.5	886.08	120	2.5
SW13	1.84	0.028	0.036	0.172	25	15	153.37	150	0.5	920.25	100	2.5
SW13	1.43	0.027	0.027	0.193	16	14	114.29	93	1.4	664.29	100	5
SW13	1.32	0.038	0.041	0.252	14	17	92.72	120	0.495	794.70	130	5
mean	1.88	0.0426	0.0328	0.292	19.2	16	130.79	124.6	0.678	853.06	105.8	4
max	3.16	0.077	0.041	0.487	25	18	153.37	150	1.4	1000.00	130	5
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--
SW21	1.27	0.053	0.027	0.338	18	16	114.65	13	0.495	82.80	180	5
SW21	1.37	0.039	0.033	0.267	18	18	123.29	14	0.5	95.89	150	2.5
SW21	1.83	0.061	0.036	0.372	24	15	146.34	16	0.5	97.56	120	2.5
SW21	2.03	0.05	0.027	0.338	18	14	121.62	15	1.4	101.35	130	5
SW21	3.13	0.054	0.041	0.422	19	17	148.44	24	0.495	187.50	110	5
mean	1.93	0.0514	0.0328	0.347	19.4	16	130.87	16.4	0.678	113.02	138	4
max	3.13	0.061	0.041	0.422	24	18	148.44	24	1.4	187.50	180	5
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--
SW28	1.27	0.028	0.027	0.178	18	16	114.65	15	0.495	95.54	140	5
SW28	1.05	0.02	0.033	0.140	15	18	104.90	10	0.5	69.93	130	2.5
SW28	2.58	0.038	0.036	0.245	22	15	141.94	16	0.5	103.23	130	2.5
SW28	1.84	0.052	0.027	0.319	25	14	153.37	11	1.4	67.48	140	5
SW28	1.29	0.039	0.041	0.252	17	17	109.68	13	0.495	83.87	140	5
mean	1.61	0.0354	0.0328	0.227	19.4	16	124.91	13	0.678	84.01	136	4
max	2.58	0.052	0.041	0.319	25	18	153.37	16	1.4	103.23	140	5
> 95% UPL Reference Pool	No	--	--	No	--	--	**Yes**	--	--	**Yes**	--	--

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Benzo[a]pyrene (ug/kg dry)	Total PCB Congeners (ng/g wet)	Control	Total PCB Congeners (ng/g dry)
NA06	183.67	55	0.47	374.15
NA06	172.19	40.1	0.44	265.56
NA06	156.25	20.1	0.54	157.03
NA06	188.68	69.2	46	435.22
NA06	191.62	57.9	0.33	346.71
mean	178.48	48.46	9.556	315.73
max	191.62	69.2	46	435.22
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**
NA11	148.39	26.9	0.47	173.55
NA11	175.68	23.8	0.44	160.81
NA11	145.04	21.6	0.54	164.89
NA11	174.19	28.1	46	181.29
NA11	136.05	26.5	0.33	180.27
mean	155.87	25.38	9.556	172.16
max	175.68	28.1	46	181.29
> 95% UPL Reference Pool	**Yes**	--	--	No
NA12	135.71	16.1	0.47	115.00
NA12	143.94	15.2	0.44	115.15
NA12	138.16	17.3	0.54	113.82
NA12	156.46	23.4	46	159.18
NA12	126.76	17.1	0.33	120.42
mean	140.21	17.82	9.556	124.71
max	156.46	23.4	46	159.18
> 95% UPL Reference Pool	No	--	--	No
NA20	283.95	24.5	0.47	151.23
NA20	169.12	16.9	0.44	124.26
NA20	221.52	13.2	0.54	83.54
NA20	272.15	13.2	46	83.54
NA20	292.52	21.6	0.33	146.94
mean	247.85	17.88	9.556	117.91
max	292.52	24.5	46	151.23
> 95% UPL Reference Pool	**Yes**	--	--	No
SW04	1164.38	195	0.47	1335.62
SW04	1197.18	161	0.44	1133.80
SW04	986.84	15	0.54	98.68
SW04	1176.47	136	46	888.89
SW04	1342.28	196	0.33	1315.44
mean	1173.43	140.6	9.556	954.49
max	1342.28	196	46	1335.62

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

COMPARISON OF SITE/REFERENCE *MACOMA* TISSUE CONCENTRATIONS

	Benzo[a]pyrene (ug/kg dry)	Total PCB Congeners (ng/g wet)	Control	Total PCB Congeners (ng/g dry)
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**
SW08	1148.65	103	0.47	695.95
SW08	1166.67	98.2	0.44	818.33
SW08	1216.22	86.2	0.54	582.43
SW08	1210.19	135	46	859.87
SW08	1086.96	90.1	0.33	652.90
mean	1165.74	102.5	9.556	721.90
max	1216.22	135	46	859.87
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**
SW13	658.33	22.9	0.47	190.83
SW13	759.49	27.9	0.44	176.58
SW13	613.50	43.2	0.54	265.03
SW13	714.29	181	46	1292.86
SW13	860.93	35.3	0.33	233.77
mean	721.31	62.06	9.556	431.82
max	860.93	181	46	1292.86
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**
SW21	1146.50	143	0.47	910.83
SW21	1027.40	175	0.44	1198.63
SW21	731.71	170	0.54	1036.59
SW21	878.38	167	46	1128.38
SW21	859.38	106	0.33	828.13
mean	928.67	152.2	9.556	1020.51
max	1146.50	175	46	1198.63
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**
SW28	891.72	127	0.47	808.92
SW28	909.09	120	0.44	839.16
SW28	838.71	136	0.54	877.42
SW28	858.90	104	46	638.04
SW28	903.23	121	0.33	780.65
mean	880.33	121.6	9.556	788.84
max	909.09	136	46	877.42
> 95% UPL Reference Pool	**Yes**	--	--	**Yes**

NOTE: Shaded values indicate undetected at detection limit. Therefore, 1/2 detection limit used in this table.

28. Finding 28: Tier II Baseline Comprehensive Risk Assessment for Human Health

Finding 28 of CAO No. R9-2012-0024 states:

The Tier II risk assessment objective was to more conclusively determine whether Shipyard Sediment Site conditions pose unacceptable cancer and non-cancer health risks to recreational and subsistence anglers. Fish and shellfish were collected within four assessment units at the Shipyard Sediment Site and from two reference areas located across the bay from the Shipyard Site. Chemical concentrations measured in fish fillets and edible shellfish tissue were used to estimate chemical exposure for recreational anglers and chemical concentrations in fish whole bodies and shellfish whole bodies were used to estimate chemical exposure for subsistence anglers. Based on the Tier II risk assessment results, ingestion of fish and shellfish caught within all four assessment units at the Shipyard Sediment Site poses a theoretical increased cancer and non-cancer risk greater than that in reference areas to recreational and subsistence anglers. The chemicals posing theoretical increased cancer risks include inorganic arsenic and PCBs. The chemicals posing theoretical increased non-cancer risks include cadmium, copper, mercury, and PCBs.

28.1. Tier II Results

For the Tier II risk assessment, recreational anglers and subsistence anglers were identified as potential human receptors that could be at risk due to exposure to chemical pollutants in fish and shellfish caught at the Shipyard Sediment Site. Chemical pollutant concentrations measured in spotted sand bass and lobster tissues were used to assess the potential risks. Although the Tier I screening level risk assessment identified only four chemical pollutants as "possible" risks to recreational and subsistence anglers, all chemical pollutants of potential concern were analyzed in the spotted sand bass and lobster tissues and evaluated in the Tier II risk assessment.

Based on the Tier II results as summarized in Tables 28-1 and 28-2 below, the San Diego Water Board determined that human ingestion of seafood caught within all four assessment units at the Shipyard Sediment Site poses a cancer risk greater than 1×10^{-6} and non-cancer risk greater than 1 to both recreational and subsistence anglers. Additionally, the Shipyard Sediment Site poses a greater cancer and non-cancer risk to recreational and subsistence anglers than the risks posed at reference conditions in San Diego Bay. The carcinogenic CoPCs include inorganic arsenic and total polychlorinated biphenyls (PCBs). The non-carcinogenic CoPCs include cadmium, copper, mercury, and total PCBs. The Tier II risk calculations and results are provided in the Appendix for Section 28.

Table 28-1 Summary of Tier II Risk Assessment Results for Recreational and Subsistence Anglers (Cancer Risk)

Assessment Unit	Receptor	Diet	Carcinogenic Chemicals of Potential Concern	Cancer Risk		
				> 1x10^{-6}	> Reference	Risk [1]
Inside NASSCO Leasehold	Recreational Angler	Fillet Sand Bass	Inorganic Arsenic	Yes	No	No
			PCBs	Yes	No	No
		Edible Lobster Tissue	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	No	No
	Subsistence Angler	Whole Body Sand Bass	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
		Whole Body Lobster	Inorganic Arsenic	Yes	No	No
			PCBs	Yes	Yes	**Yes**
Outside NASSCO Leasehold	Recreational Angler	Fillet Sand Bass	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
	Subsistence Angler	Whole Body Sand Bass	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
Inside BAE Systems Leasehold	Recreational Angler	Fillet Sand Bass	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
		Edible Lobster Tissue	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
	Subsistence Angler	Whole Body Sand Bass	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
		Whole Body Lobster	Inorganic Arsenic	Yes	No	No
			PCBs	Yes	Yes	**Yes**
Outside BAE Systems Leasehold	Recreational Angler	Fillet Sand Bass	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
	Subsistence Angler	Whole Body Sand Bass	Inorganic Arsenic	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**

1. A cancer risk exists when the site risk is greater than 1x10-6 and greater than the risk calculated for the reference area.

Table 28-2 Summary of Tier II Risk Assessment Results for Recreational and Subsistence Anglers (Non-Cancer Risk)

Assessment Unit	Receptor	Diet	Non-carcinogenic Chemicals of Potential Concern	Non-cancer Risk		
				> 1	> Reference	Risk[1]
Inside NASSCO Leasehold	Recreational Angler	Fillet Sand Bass	PCBs	No	No	No
		Edible Lobster Tissue	Mercury	Yes	Yes	**Yes**
	Subsistence Angler	Whole Body Sand Bass	Mercury	Yes	Yes	Yes
			PCBs	Yes	Yes	**Yes**
		Whole Body Lobster	Cadmium	No	No	No
			Copper	Yes	Yes	**Yes**
			Mercury	Yes	No	No
			PCBs	Yes	Yes	**Yes**
Outside NASSCO Leasehold	Recreational Angler	Fillet Sand Bass	PCBs	No	Yes	No
	Subsistence Angler	Whole Body Sand Bass	Mercury	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
Inside BAE Systems Leasehold	Recreational Angler	Fillet Sand Bass	PCBs	Yes	Yes	**Yes**
		Edible Lobster Tissue	Mercury	No	No	No
	Subsistence Angler	Whole Body Sand Bass	Mercury	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**
		Whole Body Lobster	Cadmium	Yes	Yes	**Yes**
			Copper	Yes	No	No
			Mercury	Yes	No	No
			PCBs	Yes	Yes	**Yes**
Outside BAE Systems Leasehold	Recreational Angler	Fillet Sand Bass	PCBs	Yes	Yes	**Yes**
	Subsistence Angler	Whole Body Sand Bass	Mercury	Yes	Yes	**Yes**
			PCBs	Yes	Yes	**Yes**

1. A non-cancer risk exists when the site hazard index is greater than 1.0 and greater than the hazard index calculated for the reference area.

28.2. Tier II Approach

The San Diego Water Board conducted a Tier II human health risk assessment (i.e., baseline risk assessment) to more conclusively determine whether or not the current conditions at the Shipyard Sediment Site pose unacceptable risks to human health and to identify the need for remedial action. Risks were characterized by: (1) quantifying the cancer and non-cancer risks at the site, and (2) comparing the site risks to the risks calculated for the reference areas.

The baseline risk assessment was conducted in accordance with U.S. EPA's "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)" (U.S. EPA, 1989b) and in consultation with California Office of Environmental Health Hazard (OEHHA). The approach consists of the following key elements:

- Identification of Chemicals of Potential Concern;
- Exposure Assessment;
- Toxicity Assessment;
- Risk Characterization;
- Risk Management; and
- Uncertainties Related to Risk Estimates.

These key elements are discussed in more detail below.

28.2.1. Identification of Chemicals of Potential Concern

Chemical pollutant concentrations in fish and shellfish caught at the Shipyard Sediment Site were compared with tissue screening concentrations to identify chemical pollutants of potential concern that require further evaluation in the baseline risk assessment. Tissue screening concentrations were developed for carcinogenic and non-carcinogenic chemical pollutants using the same equations as those used in the California Lakes Study by the Office of Environmental Health Hazard Assessment (Brodberg and Pollock, 1999). For carcinogenic chemicals, screening concentrations were derived as follows (Exponent, 2003):

$$\mathrm{TRG}_{\text{carcinogenic}} = \frac{(\mathrm{TRL} * \mathrm{BW})}{(\mathrm{CSF} * \mathrm{CR} * \mathrm{FI} * \mathrm{ABS})}$$

where:

TRG	=	tissue screening level for fish and/or shellfish tissue (µg/kg)
TRL	=	target risk level (unit-less)
BW	=	body weight (kg)
CSF	=	carcinogenic slope factor $(\text{mg/kg-day})^{-1}$
CR	=	fish and shellfish consumption rate (kg/day)
FI	=	fractional intake of seafood consumed that originates from site (unit-less)
ABS	=	fraction absorbed (unit-less)

For non-carcinogenic chemicals, screening concentrations were derived as follows (Exponent, 2003):

$$TRG_{\text{non - carcinogenic}} = \frac{(RfG * BW)}{(CR * FI)}$$

where:

TRG	=	tissue screening level for fish and/or shellfish tissue (µg/kg)
RfD	=	reference dose (mg/kg-day)
BW	=	body weight (kg)
CR	=	fish and shellfish consumption rate (kg/day)
FI	=	fractional intake of seafood consumed that originates from site (unit-less)

As discussed in Section 28.2.2 below, the receptors of concern identified for the baseline risk assessment are recreational anglers and subsistence anglers. Separate screening concentrations were developed for these two anglers using highly conservative assumptions. The assumptions used to derive screening concentrations for carcinogenic and non-carcinogenic chemicals are shown below in Table 28-3 and Table 28-4.

Table 28-3 Assumptions Used to Derive Tissue Screening Concentrations for Carcinogenic Chemicals

Parameter		Units	Recreational Angler	Subsistence Angler
Target risk level	TRL	none	1×10^{-6}	1×10^{-6}
Body Weight	BW	kg	70	70
Carcinogenic slope factor	CSF	$(mg/kg\text{-}day)^{-1}$	See Toxicity Assessment Section 28.2.3	See Toxicity Assessment Section 28.2.3
Fish or shellfish consumption rate	CR	kg/day	0.021[1]	0.161[2]
Fractional intake of seafood consumed from site	FI	none	1	1
Fraction absorbed	ABS	none	1	1

1. OEHHA, 2001
2. SCCWRP and MBC, 1994

Table 28-4 Assumptions Used to Derive Tissue Screening Concentrations for Non-Carcinogenic Chemicals

Parameter		Units	Recreational Angler	Subsistence Angler
Reference dose	RfD	(mg/kg-day)	See Toxicity Assessment Section 28.2.3	See Toxicity Assessment Section 28.2.3
Body Weight	BW	kg	70	70
Fish or shellfish consumption rate	CR	kg/day	0.021[1]	0.161[2]
Fractional intake of seafood consumed from site	FI	none	1	1

1. OEHHA, 2001
2. SCCWRP and MBC, 1994

As a further conservative assumption, the maximum chemical pollutant concentrations in fish (spotted sand bass) and shellfish (spiny lobsters) caught from the Shipyard Sediment Site were compared to the tissue screening concentrations. Maximum chemical pollutant concentrations in fillets of spotted sand bass and in edible tissue portions of spiny lobsters were used to identify CoPCs for the recreational angler. Chemical pollutant concentrations in whole bodies of spotted sand bass and in whole bodies of spiny lobsters were used to identify CoPCs for the subsistence angler. The comparisons are shown below in Table 28-5 and Table 28-6.

Table 28-5 Screening of Chemicals of Potential Concern in Fish and Lobster Tissue for Recreational Angler

Chemical	Maximum Fillet Spotted Sand Bass Concentration (µg/kg)	Maximum Edible Tissue Lobster Concentration (µg/kg)	Human Health Tissue Screening Concentration (µg/kg)
Metals			
Arsenic, inorganic (non-carcinogenic)	28	532	1,000
Arsenic, inorganic (carcinogenic)	**28**	**532**	2.2
Cadmium	2.5 U	50	1,667
Chromium	50 U	50 U	10,000
Copper	460	17,900	123,333

Chemical	Maximum Fillet Spotted Sand Bass Concentration (µg/kg)	Maximum Edible Tissue Lobster Concentration (µg/kg)	Human Health Tissue Screening Concentration (µg/kg)
Mercury, total	224	**521**	333
Nickel	20 U	50 U	66,667
Selenium	500	300	16,667
Silver	2 U	21	16,667
Zinc	4,900	32,400	1,000,000
Organometallic Compounds			
Tributyltin	23	9.6	1,000
Polycyclic Aromatic Hydrocarbons			
Naphthalene	5 U	5 U	66,667
Acenaphthene	5 U	5 U	200,000
Fluorene	5 U	5 U	133,333
Anthracene	5 U	5 U	1,000,000
Fluoranthene	5 U	5 U	133,333
Pyrene	5 U	5 U	66,667
Benz[a]anthracene	5 U	5 U	2.8
Chyrysene	5 U	5 U	28
Benzo[b]fluoranthene	5 U	5 U	2.8
Benzo[k]fluoranthene	5 U	5 U	2.8
Benzo[a]pyrene	5 U	5 U	0.3
Indeno[1,2,3-cd]pyrene	5 U	5 U	2.8
Dibenz[a,h]anthracene	5 U	5 U	0.8
Polychlorinated Biphenyls			
Total PCB Aroclors (carcinogenic)	**400**	**21**	1.7

Chemical	Maximum Fillet Spotted Sand Bass Concentration (µg/kg)	Maximum Edible Tissue Lobster Concentration (µg/kg)	Human Health Tissue Screening Concentration (µg/kg)
Total PCB Aroclors (noncarcinogenic)	**400**	21	67

Notes: Chemical concentrations exceeding a tissue screening concentration are bold faced and shaded. Inorganic arsenic concentration was estimated assuming that 4 percent of total arsenic was inorganic. Chemicals not detected in any sample from a station are qualified with a “U” and one-half the quantitation limit is listed.

Table 28-6 Screening of Chemicals of Potential Concern in Fish and Lobster Tissue for Subsistence Angler

Chemical	Maximum Whole Body Spotted Sand Bass Concentration (µg/kg)	Maximum Whole Body Lobster Concentration (µg/kg)	Human Health Tissue Screening Concentration (µg/kg)
Metals			
Arsenic, inorganic (non-carcinogenic)	36	**260**	130
Arsenic, inorganic (carcinogenic)	**36**	**260**	0.3
Cadmium	40	**230**	217
Chromium	700	200 U	1,304
Copper	6,100	**67,000**	16,087
Mercury, total	**200**	**59**	43
Nickel	440	110	8,696
Selenium	1,000	400	2,174
Silver	41	260	2,174
Zinc	22,000	28,000	130,435
Organometallic Compounds			
Tributyltin	63	27	130
Polycyclic Aromatic Hydrocarbons			
Naphthalene	10 U	10 U	8,696
Acenaphthene	10 U	10 U	26,087
Fluorene	10 U	16	17,391
Anthracene	10 U	18	130,435
Fluoranthene	10 U	13	17,391
Pyrene	10 U	10 U	8,696
Benz[a]anthracene	10 U	10 U	0.4
Chyrysene	10 U	10 U	3.6

Chemical	Maximum Whole Body Spotted Sand Bass Concentration (µg/kg)	Maximum Whole Body Lobster Concentration (µg/kg)	Human Health Tissue Screening Concentration (µg/kg)
Benzo[b]fluoranthene	10 U	10 U	0.4
Benzo[k]fluoranthene	10 U	10 U	0.4
Benzo[a]pyrene	10 U	10 U	0.04
Indeno[1,2,3-cd]pyrene	10 U	10 U	0.4
Dibenz[a,h]anthracene	10 U	10 U	0.1
Polychlorinated Biphenyls			
Total PCB Aroclors (carcinogenic)	**2,100**	**76**	0.2
Total PCB Aroclors (noncarcinogenic)	**2,100**	**76**	8.7

Notes: Chemical concentrations exceeding a tissue screening concentration are bold faced and shaded. Inorganic arsenic concentration was estimated assuming that 4 percent of total arsenic was inorganic. Chemicals not detected in any sample from a station are qualified with a "U" and one-half the quantitation limit is listed.

The following chemical pollutants exceeded their respective tissue screening concentrations for the recreational angler and were further evaluated in the baseline risk assessment:

- Fish Fillet – Inorganic arsenic (carcinogenic) and PCBs (carcinogenic and non-carcinogenic); and
- Edible Lobster Tissue – Inorganic arsenic (carcinogenic), mercury, and PCBs (carcinogenic).

The following chemical pollutants exceeded their respective tissue screening concentrations for the subsistence angler and were further evaluated in the baseline risk assessment:

- **Whole Body Fish** – Inorganic arsenic (carcinogenic), mercury, and PCBs (carcinogenic and non-carcinogenic); and
- **Whole Body Lobster** – Inorganic arsenic (carcinogenic and non-carcinogenic), cadmium, copper, mercury, and PCBs (carcinogenic and non-carcinogenic).

28.2.2. Exposure Assessment

The objective of the exposure assessment is to evaluate the type and magnitude of human exposures to CoPCs that are present at or migrating from the Shipyard Sediment Site (U.S. EPA, 1989b). Human exposure to contaminated marine sediment can occur around the following three principal pathways:

- Direct contact of contaminated marine sediment by swimmers or divers;
- Incidental ingestion of contaminated marine sediment or associated waters by swimmers or divers; and
- Bioaccumulation and food chain transfer of sediment pollutants to human consumers of contaminated fish and shellfish.

The most significant theoretical human health risk associated with contaminated marine sediment is considered to be the ingestion, over time, of fish and shellfish that may have bioaccumulated chemical pollutants either directly from marine sediment or through the food web (Long, 1989). U.S. EPA literature suggests that even when conservative assumptions about direct human exposure are used, risks associated with dermal contact and incidental ingestion of contaminated sediment are minimal and contribute less to the total risk than the fish and shellfish consumption pathway. The human health risks associated with fish and shellfish consumption often constitute the greatest proportion of the total risk, and sometimes drive the human health risk assessment. (U.S. EPA, 1992b)

28.2.2.1. Shipyard Sediment Site Exposure Assessment

The most significant potential source of human exposure to pollutants at the Shipyard Sediment Site is through consumption of fish and shellfish that may have bioaccumulated chemicals either directly from site sediment or through the food web (Exponent, 2003). Direct contact with sediment pollutants at the Shipyard Sediment Site is not a likely exposure pathway to humans because the industrial nature of the site and the lack of a beach (shoreline at Shipyard Sediment Site consists almost exclusively of riprap, sheet-pile bulkhead, and piers) make swimming and wading a highly unlikely event. Therefore, two types of receptors (i.e., members of the population or individuals at risk) were identified and further evaluated in the baseline risk assessment. The two receptor types are as follows:

- **Recreational Angler** – represents those who eat the fish and/or shellfish they catch recreationally; and
- **Subsistence Angler** – represents those who fish for food, for economic and/or cultural reasons, and for whom the fish and/or shellfish caught is a major source of protein in the diet.

Exponent reported that public fishing and shellfish harvesting are currently unlikely events at the Shipyard Sediment Site due to the current security measures. Under the current site usage, there are security measures in place at both the upland property and the in-water leaseholds of NASSCO and BAE Systems due to the work performed on Navy ships (Exponent, 2003). Force protection measures are required for Navy vessels and prohibit non-mission-essential vessels from approaching Navy ships. A security boom prevents unauthorized vessels from approaching closer than 300 feet in the NASSCO and BAE Systems leaseholds. Furthermore, armed personnel are present at all times to ensure that no trespassing occurs at the site.

Despite these factors the San Diego Water Board required a baseline risk assessment using the two theoretical receptors identified above based on the following recommended considerations (Brodberg, personal communication, 2004):

- Although fishing is currently prohibited, it is possible that NASSCO and BAE Systems employees or U.S. Navy personnel may fish off of the piers, bulkhead, riprap, ships, etc.;

- Although NASSCO and BAE Systems have long-term leases (NASSCO through 2040, BAE through 2034), it is possible that they may not occupy the site in the future and future site usage may allow for fishing. This scenario recently occurred at a former shipyard (Campbell Shipyard) located in San Diego Bay just north of the Shipyard Sediment Site;

- It is possible that sediment chemical pollutants within the NASSCO and BAE Systems leaseholds may migrate to areas outside the leasehold where fishing by boat and fishing at a nearby public pier (Crosby Street Park Pier located approximately ½ mile north of BAE Systems just past the Coronado Bridge) is accessible; and

- The San Diego Water Board's statutory responsibility is to protect the current and reasonably anticipated beneficial uses designated for San Diego Bay. The beneficial uses pertaining to human health are Commercial and Sport Fishing (COMM) and Shellfish Harvesting (SHELL). COMM and SHELL are to be protected at all times regardless of the current site-access measures that prevent the uses from occurring.

To focus the baseline risk assessment, the Shipyard Sediment Site was divided into the following four discrete assessment units (Exponent, 2003):

- Inside NASSCO – the area inside the NASSCO leasehold;
- Outside NASSCO – the area between the NASSCO leasehold and the shipping channel;
- Inside BAE Systems – the area inside the BAE Systems leasehold; and
- Outside BAE Systems – the area between the BAE Systems leasehold and the shipping channel.

This was done for the following reasons: (1) chemical pollutant concentrations in sediment vary at the NASSCO and BAE Systems leasehold portion of the Shipyard Sediment Site due to the differences in historical activities/operations conducted at the two shipyards, (2) access restrictions differ inside versus outside the leaseholds, (3) the types of fishing that could occur from piers/shoreline are different from those via boat access, and (4) the relative size of the four assessment units will affect the amount of fish and shellfish that could potentially be consumed from each unit. Therefore, risks to the recreational and subsistence anglers were evaluated separately in each of the four assessment units to identify areas with greater likelihood for adverse health effects.

Separate chemical pollutant exposure estimates were developed for each angler in each of the four assessment units using tissue concentrations from the following two types of fish and shellfish caught at the Shipyard Sediment Site:

- **Spotted Sand Bass (*Paralabrax masculatofasciatus*)** – Chemical concentrations in sand bass fillets and whole bodies were used to estimate exposure to chemicals in food for the recreational angler and subsistence angler, respectively; and

- **Spiny Lobsters (*Panulirus interruptusi*)** – Chemical concentrations in edible tissue (all soft tissue, including hepatopancreas) and the entire organism, including the shell, were used to estimate exposure to chemicals in food for the recreational angler and subsistence angler, respectively.

Human exposure to contaminants in fish and shellfish collected at the Shipyard Sediment Site was estimated using the following simple exposure model consistent with U.S. EPA (1998b) guidance (Exponent, 2003):

$$\text{Intake (in mg/kg - day)} = \frac{(C * CR * FI * ED * EF)}{(BW * AT * CF)}$$

where:

C	=	tissue chemical concentration in spotted sand bass and spiny lobster (µg/kg-wet weight)
CR	=	fish consumption rate (kg/day)
FI	=	fraction ingested from the site (unitless)
ED	=	exposure duration (years)
EF	=	exposure frequency (days/year)
BW	=	body weight (kg)
AT	=	averaging time (days) - non-carcinogens: exposure duration x 365 days - carcinogens: 70-year lifetime x 365 days
CF	=	conversion factor (1,000 µg/mg)

According to U.S. EPA guidance, exposures should be based on an estimate of the reasonable maximum exposure (RME) expected to occur under both current and future conditions at the site. The RME is defined as the highest exposure that is reasonably expected to occur at a site. The assumptions used by the San Diego Water Board to estimate the RME at the Shipyard Sediment Site are shown below in Table 28-7 and the exposure estimate calculations using these assumptions are provided in the Appendix for Section 28.

Table 28-7 Reasonable Maximum Exposure (RME) Assumptions for Recreational and Subsistence Anglers

Parameter		Units	Recreational Angler	Subsistence Angler
Tissue Chemical Concentration	C	µg/kg-wet wt	Maximum	Maximum
Fish or Shellfish Consumption Rate	CR	kg/day	0.021[1]	0.161[2]
Body Weight	BW	kg	70	70
Exposure Duration	ED	years	30	30
Exposure Frequency	EF	days/year	365	365
Fraction Ingested from Site or Reference	FI	unitless	1	1
Averaging Time for Carcinogens	AT_c	days	25,550	25,550
Averaging Time for Noncarcinogens	AT_n	days	10,950	10,950
Conversion Factor	CF	µg/mg	1,000	1,000

1. OEHHA 2001
2. SCCWRP and MBC 1994

28.2.3. Toxicity Assessment

The toxicity assessment identifies toxicity values for each chemical pollutant of concern and discusses their potential adverse effects to humans (U.S. EPA, 1989b). Two types of toxicity values are evaluated: CSFs for carcinogenic chemicals and RfDs for non-carcinogenic chemicals.

CSFs and RfDs from U.S. EPA's Integrated Risk Information System (IRIS) were used in the baseline risk assessment (U.S. EPA, 2003a). The CSFs and RfDs for the CoPCs identified in Section 28.2.1 are listed in Table 28-8 below.

Table 28-8 Cancer Slope Factors and Reference Doses for Chemicals of Potential Concern

Chemical	CSF $(mg/kg\text{-}day)^{-1}$	RfD (mg/kg-day)	Source
Metals			
Arsenic, inorganic	1.5	0.0003	U.S. EPA (2003a)
Cadmium	NA	0.0005	U.S. EPA (2003a)

Chemical	CSF $(mg/kg\text{-}day)^{-1}$	RfD (mg/kg-day)	Source
Copper	NA	0.037	U.S. EPA (2003a)
Mercury, total	NA	0.0001	U.S. EPA (2003a)
Polychlorinated Biphenyls			
Total PCBs	2	NA	U.S. EPA (2003a)
Total PCBs (as Aroclor 1254)	NA	0.00002	U.S. EPA (2003a)

28.2.4. Risk Characterization

Risk characterization is the final step of the baseline risk assessment process, which combines the information from the exposure assessment and toxicity assessment to yield estimated cancer risks and non-cancer health hazards from exposure to the CoPCs (U.S. EPA, 1989b).

For the baseline risk assessment, the San Diego Water Board characterized potential health risks to the recreational and subsistence anglers by quantifying the cancer and non-cancer risks at each of the four assessment units. Risks from exposure to the carcinogenic CoPCs were estimated using the following equation:

$$\text{Risk} = \text{Intake} * \text{CSF}$$

where:

Intake = human exposure to chemical concentrations in fish and shellfish tissue (mg/kg-day)
CSF = cancer slope factor $(mg/kg\text{-}day)^{-1}$

The San Diego Water Board selected a target cancer risk level of $1x10^{-6}$ (one-in-a-million) to screen for potential beneficial use impairment consistent with federal and state water quality criterion that protects human health. The 10^{-6} cancer risk level has historically formed the basis of human health protective numerical water quality objectives in California (RWQCB, 2003a). It is generally recognized by California and U.S. EPA as the *de minimis* or negligible level of risk associated with involuntary exposure to toxic chemicals in environmental media. The 10^{-6} risk level used in water-related health-protective regulatory decision-making in California includes the following:

- CWA water quality criteria promulgated for California waters by U.S. EPA in the *National Toxics Rule and the California Toxics Rule* state that “[t]he human health criteria shall be applied at the State-adopted 10^{-6} risk level.” These criteria, when combined with beneficial use designations in state Water Quality Control Plans (SWRCB, 1997) are water quality standards for California’s inland and estuarine surface waters.

- Functional Equivalent Documents adopted by the State Water Board that provide background and justification for the *California Ocean Plan* (SWRCB, 2001) and the former *California Inland Surface Waters and Enclosed Bays and Estuaries Plans* (SWRCB, 2000) cite the 10^{-6} risk level as the basis for human health protective water quality objectives for carcinogens.

Risks from exposure to non-carcinogenic CoPCs were estimated using the following equation:

$$\text{Hazard Index} = \frac{\text{Intake}}{\text{RfD}}$$

where:

Intake	=	human exposure to chemical concentrations in fish and shellfish tissue (mg/kg-day)
RfD	=	reference dose (mg/kg-day)

A hazard index less than 1.0 indicates that human exposure to chemical pollutant concentrations in fish and shellfish is below the level that is expected to result in a significant health risk. A hazard index greater than 1.0 indicates unacceptable exposures may be occurring, and there may be an increased concern for potential non-cancer effects (TAMS/Gradient Corporation, 2000). However, the relative values of a hazard index greater than 1.0 cannot be used to describe the severity of the risk. The cancer and non-cancer risk calculations for the recreational and subsistence angler at each assessment unit are provided in the Appendix for Section 28.

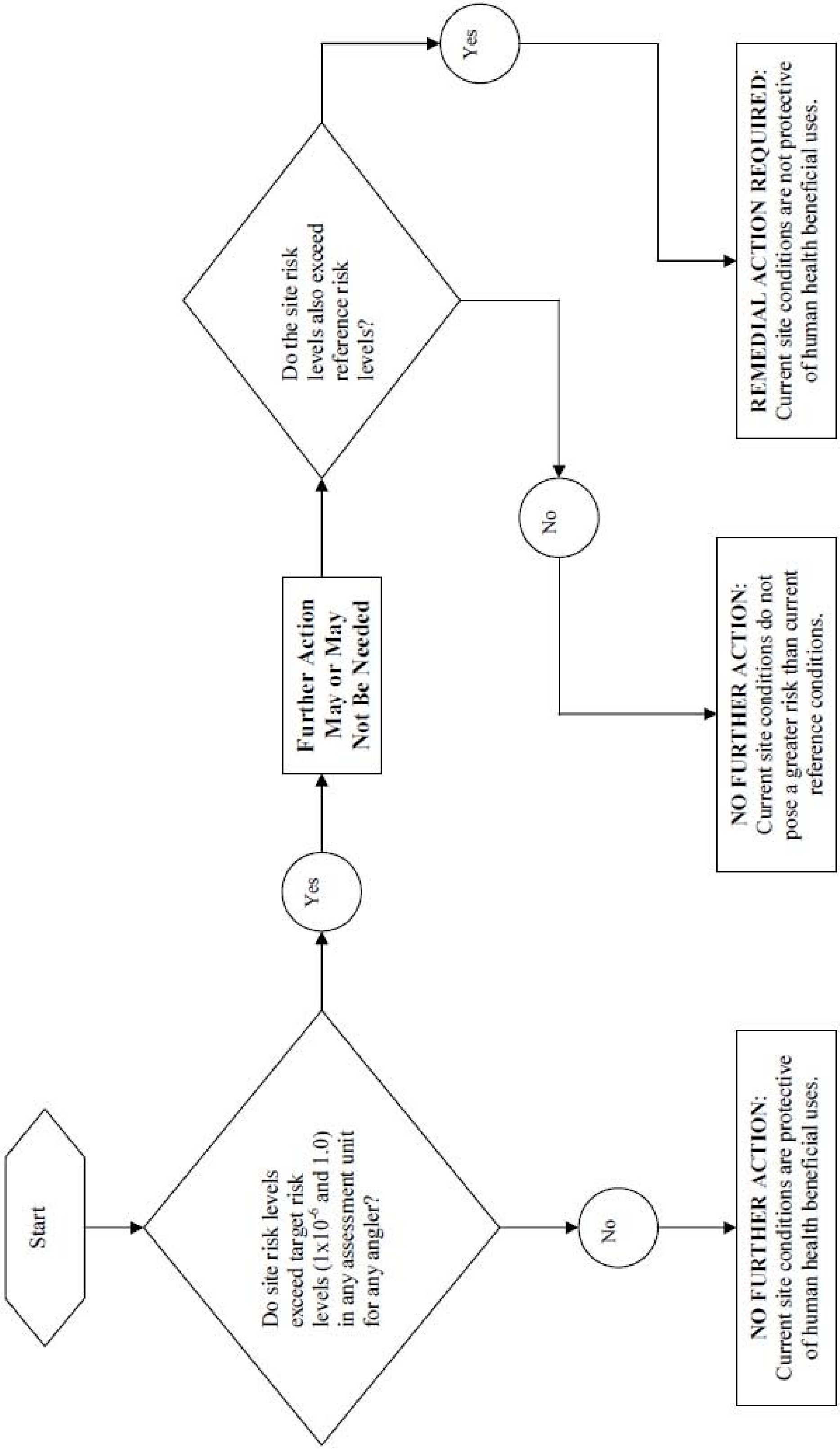
In addition to characterizing the risks at the Shipyard Sediment Site, risks were also characterized at two reference areas to determine whether or not the site poses a greater risk to recreational and subsistence anglers than reference conditions in San Diego Bay. The two reference areas are located across the bay from the Shipyard Sediment Site (Exponent, 2003). Spotted sand bass were collected from a reference area located in the vicinity of Reference Station 2240 and the chemical concentrations in fillets and whole bodies were used to estimate exposure to recreational and subsistence anglers, respectively. Spiny lobsters were collected from a reference area located in the vicinity of Reference Station 2230 and the chemical concentrations in edible tissue and the entire organism were used to estimate exposure to recreational and subsistence anglers, respectively. Carcinogenic and non-carcinogenic risks at the reference areas were calculated using the same chemical pollutant of concern, exposure assumptions, toxicity values, and risk equations as those identified above for the Shipyard Sediment Site. The calculations and risk characterization results for the two reference areas are provided in the Appendix for Section 28.

28.2.5. Risk Management

The San Diego Water Board identified two risk management decisions: (1) Current site conditions pose acceptable cancer and non-cancer risks and no further action is warranted, and (2) Current site conditions pose unacceptable cancer and/or non-cancer risks and remedial action is required. These two management decisions are based on the risk characterization results at the

Shipyard Sediment Site and at the reference locations. A flow diagram showing how each management decision is triggered is shown below in Figure 28-1.

Figure 28-1 Flow Diagram for Human Health Risk Management Decisions



28.2.6. Uncertainties Related to Risk Estimates

The process of evaluating human health cancer risk and non-cancer hazard indices involves multiple steps. Inherent in each step of the risk assessment process are uncertainties that ultimately affect the risk estimates. Uncertainties may exist in numerous areas such as estimation of potential site exposures and derivation of toxicity values. The most significant uncertainties in the Tier II risk analysis for the Shipyard Sediment Site are discussed below.

Fractional Intake. Exponent (2003) used the following fractional intake assumptions for the human health risk assessment: Inside NASSCO = 0.034 (or 3.4 percent), Outside NASSCO = 0.005 (or 0.5 percent), Inside BAE Systems = 0.023 (or 2.3 percent), and Outside BAE Systems = 0.002 (or 0.2 percent). In contrast, the San Diego Water Board initially used a conservative fractional intake of 1 based on the assumption that 100% of the fish and shellfish caught and consumed by recreational and subsistence anglers is from the Shipyard Sediment Site. Since it is likely that anglers catch at least a portion of their seafood from other locations in San Diego Bay and/or the fish caught from the Shipyard Sediment Site comes from elsewhere, the actual site fractional intake is likely to be less than 100 percent.

Exposure Concentration. U.S. EPA guidance recommends that the tissue chemical concentrations used in the intake equation be either the 95 percent upper confidence limit (UCL) on the arithmetic average concentration or the maximum concentration, whichever is lesser (U.S. EPA, 1989b). In order to simplify the risk calculations, the San Diego Water Board only used the maximum concentration observed in spotted sand bass (fillet and whole body) and lobster (edible tissue and whole body) to estimate risks at each of the four assessment units and at the two reference areas. This may result in an under- or overestimation of risks at the Shipyard Sediment Site.

Spotted Sand Bass Home Range. Spotted sand bass were collected in four discrete assessment units at the Shipyard Sediment Site: inside NASSCO leasehold, outside NASSCO leasehold, inside BAE Systems leasehold, and outside BAE Systems leasehold. It is assumed that the assessment units bound the home range for these spotted sand bass and that the observed tissue chemical concentrations are based exclusively from exposure within these areas. This may, however, not be indicative of their actual exposures because these fish may feed beyond the assessment unit boundaries. Therefore, the estimated risk to the recreational and subsistence anglers ingesting the fish is considered conservative and does not characterize actual exposures to the Shipyard Sediment Site.

PCB Cooking Losses. Numerous studies have evaluated the loss of PCBs from fish during preparation and cooking (Exponent, 2003). Reductions of PCBs ranged from 26 to 90 percent using cooking methods such as microwaving, boiling, and frying. For this assessment, a 50 percent reduction factor for PCBs in spotted sand bass fillets was used to assess potential risks to recreational anglers (Brodberg, 2004). A PCB cooking loss factor was not applied to spotted sand bass whole bodies because of the various preparation and cooking methods (such as boiling the entire fish to make a soup) and other related habits (such as consuming pan drippings from frying) potentially used by subsistence anglers. These cooking loss factor assumptions may underestimate or overestimate PCB cancer risks and PCB non-cancer hazards.

PCB Cancer Slope Factor. The PCB CSF used in this assessment was based on the upper-bound slope estimates for Aroclors 1254 and 1260 (Exponent, 2003). Use of the upper-end CSFs (i.e., highest) is conservative and may overestimate risks from PCBs.

Non-Cancer Risks from PCBs. Aroclors 1260 and 1254 were the only two Aroclors detected in spotted sand bass and lobster caught at the Shipyard Sediment Site. Aroclor 1260 was detected in spotted sand bass (whole body and fillet) and lobster (whole body and edible tissue). Aroclor 1254 was detected in spotted sand bass (whole body and fillet). U.S. EPA has only published RfDs for Aroclor 1254 (0.00002 mg/kg-day) and Aroclor 1016 (0.00007 mg/kg-day). For this assessment, the more conservative RfD, Aroclor 1254, was used as a surrogate for Aroclor 1260. This may overestimate risks from PCBs.

Inorganic Arsenic as a Percent of Total Arsenic. In order to account for the percentage of arsenic in fish tissue that is nontoxic, concentrations of inorganic arsenic were assumed to be 4 percent of total arsenic (Exponent, 2003). Use of this percentage is considered to be conservative because some studies have reported much smaller percentages. Therefore, this may result in an overestimation of risk.

28.3. Comparison to Fish Advisories

The U.S. EPA and U.S. Department of Health and Human Services issued an advisory in 2004 for safe consumption of fish (U.S. EPA, 2004a).[11] The 2004 U.S. EPA advisory, recognizing that fish and shellfish are a part of a healthy diet, as well as recognizing that nearly all fish and shellfish contain some amounts of mercury, recommends that women[12] and young children limit their exposure to the harmful effects of mercury by limiting fish consumption

The 2004 U.S. EPA advisory recommends that people avoid eating fish and shellfish with the highest levels of mercury. For example, king mackerel is on the U.S. EPA list of fish with the highest levels of mercury with an average concentration of 0.73 mg/kg.[13] Fish listed as having lower levels of mercury include fresh salmon (0.01 mg/kg), Pacific mackerel (0.09 mg/kg), and light canned tuna (0.12 mg/kg). For comparison, the average mercury concentrations of the fish, both fillets and whole body, from the four shipyard areas and the reference areas ranged from 0.12 to 0.19 mg/kg (Table 28-9).

The 2004 U.S. EPA advisory recommends that "…women and young children will receive the benefits of eating fish and shellfish and be confident that they have reduced their exposure to the harmful effects of mercury… [if they] …eat up to 12 ounces a week of a variety of fish and shellfish that are lower in mercury." For comparison, the consumption rates used in this Technical Report and the Shipyard Report are approximately 5.2 ounces per week (21 g/day) and 39.8 ounces per week (161 g/day) for the recreational and subsistence anglers, respectively. Therefore, assuming that the Shipyard Sediment Site fish fall within the U.S. EPA definition of

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[11] http://www.cfsan.fda.gov/~dms/admehg3.html

[12] Women who might become pregnant, women who are pregnant, nursing mothers, and young children.

[13] http://www.cfsan.fda.gov/~frf/sea-mehg.html

fish lower in mercury, the subsistence angler consumption rate is over three times the recommended levels for women and young children.

A 2004 U.S. EPA Technical Memorandum provides details on the origin of a national advisory for fish consumption based on mercury exposure (U.S. EPA, 2004b). For fish with mercury concentrations in the range of those reported for the shipyards and reference areas (i.e. 0.12 to 0.23 mg/kg), they advise no more than 6 ounces per week. For comparison, the consumption rates used in this Technical Report and the Shipyard Report are approximately 5.2 ounces per week (21 g/day) and 39.8 ounces per week (161 g/day) for the recreational and subsistence anglers, respectively. Therefore, the recreational angler consumption rate is within the recommendation, but the subsistence angler consumption rate is over six times the recommended levels.

Regarding exposure to PCBs from fish consumption, the California Office of Environmental Health Hazard Assessment's (OEHHA) website[14] states, "In certain areas in California, PCBs have been measured in sport-caught fish at levels well above 100 ppb." These elevated levels may pose a health concern. OEHHA advises you to limit how much you eat of fish taken in these locations" (OEHHA, 2005). As indicated in Table 28-9 all four of the shipyard areas reported mean whole body concentrations above 100 ppb[15] and one of the areas reported mean fillet concentrations above 100 ppb with two others very close to 100 ppb.

Table 28-9 Spotted Sand Bass Data – Mean Concentration (Wet Weight)

	Reference	Inside NASSCO	Outside NASSCO	Inside BAE Systems	Outside BAE Systems
Fillet Data					
Mercury (total, mg/kg)	0.19	0.12	0.15	0.18	0.16
PCB Congeners (µg/kg)	67.4	44.4	99.4	193	99.8
Whole Body Data					
Mercury (total, mg/kg)	0.12	0.16	0.15	0.13	0.14
PCB Congeners (µg/kg)	490	760	544	430	544

14 http://www.oehha.ca.gov/fish/pcb/index.html

15 ppb = parts per billion = µg/kg = micrograms per kilogram

Technical Report
for
Cleanup and Abatement
Order No. R9-2012-0024

APPENDIX FOR SECTION 28

TIER II BASELINE RISK ASSESSMENT FOR HUMAN HEALTH

March 14, 2012

CHEMICALS OF POTENTIAL CONCERN IN FISH/SHELLFISH TISSUE FOR THE RECREATIONAL ANGLER

	Recreational Angler		Human Health Tissue Screening Level (ug/kg)
	Fillet Sand Bass Max Concentration (ug/kg)	Edible Tissue Lobster Max Concentration (ug/kg)	CR = 21 g/day, TRL = 10^{-6}
Metals			
Arsenic, inorganic	28	532	1,000
Arsenic, inorganic	**28**	**532**	2.2
Cadmium	2.5 U	50	1,667
Chromium	50 U	50 U	10,000
Copper	460	17,900	123,333
Mercury, total	224	**521**	333
Nickel	20 U	50 U	66,667
Selenium	500	300	16,667
Silver	2 U	21	16,667
Zinc	4,900	32,400	1,000,000
Organometallic Compounds			
Tributyltin	23	9.6	1,000
Polycyclic Aromatic Hydrocarbons			
Naphthalene	5 U	5 U	66,667
Acenaphthene	5 U	5 U	200,000
Fluorene	5 U	5 U	133,333
Anthracene	5 U	5 U	1,000,000
Fluoranthene	5 U	5 U	133,333
Pyrene	5 U	5 U	66,667
Benz[a]anthracene	5 U	5 U	2.8
Chrysene	5 U	5 U	28
Benzo[b]fluoranthene	5 U	5 U	2.8
Benzo[k]fluoranthene	5 U	5 U	2.8
Benzo[a]pyrene	5 U	5 U	0.3
Indeno[1,2,3-cd]pyrene	5 U	5 U	2.8
Dibenz[a,h]anthracene	5 U	5 U	0.8
Polychlorinated Biphenyls			
Total PCBs	**400**	**21**	1.7
Total PCBs (as Aroclor 1254)	**400**	21	67

NOTE: Tissue concentrations bold faced and shaded are greater than the human health tissue screening levels.

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CHEMICALS OF POTENTIAL CONCERN IN FISH/SHELLFISH TISSUE FOR THE SUBSISTENCE ANGLER

	Subsistence Angler		Human Health Tissue Screening Level (ug/kg)
	Whole Body Sand Bass Max Concentration (ug/kg)	Whole Body Lobster Max Concentration (ug/kg)	CR = 161 g/day, TRL = 10^{-6}
Metals			
Arsenic, inorganic	36	**260**	130
Arsenic, inorganic	**36**	**260**	0.3
Cadmium	40	**230**	217
Chromium	700	200 U	1,304
Copper	6,100	**67,000**	16,087
Mercury, total	**200**	**59**	43
Nickel	440	110	8,696
Selenium	1,000	400	2,174
Silver	41	260	2,174
Zinc	22,000	28,000	130,435
Organometallic Compounds			
Tributyltin	63	27	130
Polycyclic Aromatic Hydrocarbons			
Naphthalene	10 U	10 U	8,696
Acenaphthene	10 U	10 U	26,087
Fluorene	10 U	16	17,391
Anthracene	10 U	18	130,435
Fluoranthene	10 U	13	17,391
Pyrene	10 U	10 U	8,696
Benz[a]anthracene	10 U	10 U	0.4
Chrysene	10 U	10 U	3.6
Benzo[b]fluoranthene	10 U	10 U	0.4
Benzo[k]fluoranthene	10 U	10 U	0.4
Benzo[a]pyrene	10 U	10 U	0.04
Indeno[1,2,3-cd]pyrene	10 U	10 U	0.4
Dibenz[a,h]anthracene	10 U	10 U	0.1
Polychlorinated Biphenyls			
Total PCBs	**2,100**	**76**	0.2
Total PCBs (as Aroclor 1254)	**2,100**	**76**	8.7

NOTE: Tissue concentrations bold faced and shaded are greater than the human health tissue screening levels.

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RISKS TO THE RECREATIONAL ANGLER FROM FISH INSIDE THE NASSCO LEASEHOLD

Inside NASSCO
Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	46	0.021	1	30	365	70	25550	1000	5.91E-06	--	2	1.18E-05	--
Total PCBs (noncarcinogenic)	46	0.021	1	30	365	70	10950	1000	1.38E-05	0.00002	--	--	6.90E-01

Reference 2240
Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	55	0.021	1	30	365	70	25550	1000	7.07E-06	--	2	1.41E-05	
Total PCBs (noncarcinogenic)	55	0.021	1	30	365	70	10950	1000	1.65E-05	0.00002	--		8.25E-01

RISKS TO THE RECREATIONAL ANGLER FROM SHELLFISH INSIDE THE NASSCO LEASEHOLD

Inside NASSCO
Edible Tissue Lobster

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	520	0.021	1	30	365	70	25550	1000	6.69E-05	--	1.5	1.00E-04	--
Total Mercury (noncarcinogenic)	520	0.021	1	30	365	70	10950	1000	1.56E-04	0.0001	--	--	1.56E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	2	5.14E-06	

Reference 2230
Edible Tissue Lobster

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	176	0.021	1	30	365	70	25550	1000	2.26E-05	--	1.5	3.39E-05	--
Total Mercury (noncarcinogenic)	110	0.021	1	30	365	70	10950	1000	3.30E-05	0.0001	--	--	3.30E-01
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	2	5.14E-06	

RISKS TO THE SUBSISTENCE ANGLER FROM FISH INSIDE THE NASSCO LEASEHOLD

Inside NASSCO
Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	24	0.161	1	30	365	70	25550	1000	2.37E-05	--	1.5	3.55E-05	--
Total Mercury	180	0.161	1	30	365	70	10950	1000	4.14E-04	0.0001	--	--	4.14E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	2100	0.161	1	30	365	70	25550	1000	2.07E-03	--	2	4.14E-03	--
Total PCBs (noncarcinogenic)	2100	0.161	1	30	365	70	10950	1000	4.83E-03	0.00002	--	--	2.42E+02

Reference 2240
Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.161	1	30	365	70	25550	1000	1.97E-05	--	1.5	2.96E-05	--
Total Mercury	160	0.161	1	30	365	70	10950	1000	3.68E-04	0.0001	--	--	3.68E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	560	0.161	1	30	365	70	25550	1000	5.52E-04	--	2	1.10E-03	
Total PCBs (noncarcinogenic)	560	0.161	1	30	365	70	10950	1000	1.29E-03	0.00002	--		6.44E+01

RISKS TO THE SUBISTENCE ANGLER FROM SHELLFISH INSIDE THE NASSCO LEASEHOLD

Inside NASSCO
Whole Body Lobster

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	188	0.161	1	30	365	70	25550	1000	1.85E-04	--	1.5	2.78E-04	--
Cadmium	180	0.161	1	30	365	70	10950	1000	4.14E-04	0.0005	--	--	8.28E-01
Copper	67000	0.161	1	30	365	70	10950	1000	1.54E-01	0.037	--	--	4.16E+00
Total Mercury (noncarcinogenic)	59	0.161	1	30	365	70	10950	1000	1.36E-04	0.0001	--	--	1.36E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	76	0.161	1	30	365	70	25550	1000	7.49E-05	--	2	1.50E-04	
Total PCBs (noncarcinogenic)	76	0.161	1	30	365	70	10950	1000	1.75E-04	0.00002	--		8.74E+00

Reference 2230
Whole Body Lobster

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	300	0.161	1	30	365	70	25550	1000	2.96E-04	--	1.5	4.44E-04	--
Cadmium	190	0.161	1	30	365	70	10950	1000	4.37E-04	0.0005	--	--	8.74E-01
Copper	66000	0.161	1	30	365	70	10950	1000	1.52E-01	0.037	--	--	4.10E+00
Total Mercury (noncarcinogenic)	86	0.161	1	30	365	70	10950	1000	1.98E-04	0.0001	--	--	1.98E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	41	0.161	1	30	365	70	25550	1000	4.04E-05	--	2	8.08E-05	
Total PCBs (noncarcinogenic)	41	0.161	1	30	365	70	10950	1000	9.43E-05	0.00002	--		4.72E+00

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RISKS TO THE RECREATIONAL ANGLER FROM FISH OUTSIDE THE NASSCO LEASEHOLD

Outside NASSCO
Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg -day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	1.5	3.86E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	57	0.021	1	30	365	70	25550	1000	7.33E-06	--	2	1.47E-05	--
Total PCBs (noncarcinogenic)	57	0.021	1	30	365	70	10950	1000	1.71E-05	0.00002	--	--	8.55E-01

Reference 2240
Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg -day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	55	0.021	1	30	365	70	25550	1000	7.07E-06	--	2	1.41E-05	
Total PCBs (noncarcinogenic)	55	0.021	1	30	365	70	10950	1000	1.65E-05	0.00002	--		8.25E-01

RISKS TO THE SUBSISTENCE ANGLER FROM FISH OUTSIDE THE NASSCO LEASEHOLD

Outside NASSCO
Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	36	0.161	1	30	365	70	25550	1000	3.55E-05	--	1.5	5.32E-05	--
Total Mercury	200	0.161	1	30	365	70	10950	1000	4.60E-04	0.0001	--	--	4.60E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	600	0.161	1	30	365	70	25550	1000	5.91E-04	--	2	1.18E-03	--
Total PCBs (noncarcinogenic)	600	0.161	1	30	365	70	10950	1000	1.38E-03	0.00002	--	--	6.90E+01

Reference 2240
Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.161	1	30	365	70	25550	1000	1.97E-05	--	1.5	2.96E-05	--
Total Mercury	160	0.161	1	30	365	70	10950	1000	3.68E-04	0.0001	--	--	3.68E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	560	0.161	1	30	365	70	25550	1000	5.52E-04	--	2	1.10E-03	
Total PCBs (noncarcinogenic)	560	0.161	1	30	365	70	10950	1000	1.29E-03	0.00002	--		6.44E+01

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RISKS TO THE RECREATIONAL ANGLER FROM FISH INSIDE THE SOUTHWEST MARINE LEASEHOLD

Inside Southwest Marine
Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	28	0.021	1	30	365	70	25550	1000	3.60E-06	--	1.5	5.40E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	400	0.021	1	30	365	70	25550	1000	5.14E-05	--	2	1.03E-04	
Total PCBs (noncarcinogenic)	400	0.021	1	30	365	70	10950	1000	1.20E-04	0.00002	--		6.00E+00

Reference 2240
Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	55	0.021	1	30	365	70	25550	1000	7.07E-06	--	2	1.41E-05	
Total PCBs (noncarcinogenic)	55	0.021	1	30	365	70	10950	1000	1.65E-05	0.00002	--		8.25E-01

RISKS TO THE RECREATIONAL ANGLER FROM SHELLFISH INSIDE THE SOUTHWEST MARINE LEASEHOLD

Inside Southwest Marine
Edible Tissue Lobster

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	264	0.021	1	30	365	70	25550	1000	3.39E-05	--	1.5	5.09E-05	--
Total Mercury (noncarcinogenic)	110	0.021	1	30	365	70	10950	1000	3.30E-05	0.0001	--	--	3.30E-01
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	64	0.021	1	30	365	70	25550	1000	8.23E-06	--	2	1.65E-05	

Reference 2230
Edible Tissue Lobster

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	176	0.021	1	30	365	70	25550	1000	2.26E-05	--	1.5	3.39E-05	--
Total Mercury (noncarcinogenic)	110	0.021	1	30	365	70	10950	1000	3.30E-05	0.0001	--	--	3.30E-01
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	2	5.14E-06	

RISKS TO THE SUBSISTENCE ANGLER FROM FISH INSIDE THE SOUTHWEST MARINE LEASEHOLD

Inside Southwest Marine
Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	24	0.161	1	30	365	70	25550	1000	2.37E-05	--	1.5	3.55E-05	--
Total Mercury	170	0.161	1	30	365	70	10950	1000	3.91E-04	0.0001	--	--	3.91E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	1800	0.161	1	30	365	70	25550	1000	1.77E-03	--	2	3.55E-03	
Total PCBs (noncarcinogenic)	1800	0.161	1	30	365	70	10950	1000	4.14E-03	0.00002	--		2.07E+02

Reference 2240
Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.161	1	30	365	70	25550	1000	1.97E-05	--	1.5	2.96E-05	--
Total Mercury	160	0.161	1	30	365	70	10950	1000	3.68E-04	0.0001	--	--	3.68E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	560	0.161	1	30	365	70	25550	1000	5.52E-04	--	2	1.10E-03	
Total PCBs (noncarcinogenic)	560	0.161	1	30	365	70	10950	1000	1.29E-03	0.00002	--		6.44E+01

RISKS TO THE SUBSISTENCE ANGLER FROM SHELLFISH INSIDE THE SOUTHWEST MARINE LEASEHOLD

Inside Southwest Marine
Whole Body Lobster

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	260	0.161	1	30	365	70	25550	1000	2.56E-04	--	1.5	3.84E-04	--
Cadmium	230	0.161	1	30	365	70	10950	1000	5.29E-04	0.0005	--	--	1.06E+00
Copper	62000	0.161	1	30	365	70	10950	1000	1.43E-01	0.037	--	--	3.85E+00
Total Mercury (noncarcinogenic)	47	0.161	1	30	365	70	10950	1000	1.08E-04	0.0001	--	--	1.08E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	64	0.161	1	30	365	70	25550	1000	6.31E-05	--	2	1.26E-04	
Total PCBs (noncarcinogenic)	64	0.161	1	30	365	70	10950	1000	1.47E-04	0.00002	--		7.36E+00

Reference 2230
Whole Body Lobster

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	300	0.161	1	30	365	70	25550	1000	2.96E-04	--	1.5	4.44E-04	--
Cadmium	190	0.161	1	30	365	70	10950	1000	4.37E-04	0.0005	--	--	8.74E-01
Copper	66000	0.161	1	30	365	70	10950	1000	1.52E-01	0.037	--	--	4.10E+00
Total Mercury (noncarcinogenic)	86	0.161	1	30	365	70	10950	1000	1.98E-04	0.0001	--	--	1.98E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	41	0.161	1	30	365	70	25550	1000	4.04E-05	--	2	8.08E-05	
Total PCBs (noncarcinogenic)	41	0.161	1	30	365	70	10950	1000	9.43E-05	0.00002	--		4.72E+00

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RISKS TO THE RECREATIONAL ANGLER FROM FISH OUTSIDE THE SOUTHWEST MARINE LEASEHOLD

Outside Southwest Marine
Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.021	1	30	365	70	25550	1000	2.57E-06	--	1.5	3.86E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	110	0.021	1	30	365	70	25550	1000	1.41E-05	--	2	2.83E-05	
Total PCBs (noncarcinogenic)	110	0.021	1	30	365	70	10950	1000	3.30E-05	0.00002	--		1.65E+00

Reference 2240
Fillet Sand Bass

Recreational Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	16	0.021	1	30	365	70	25550	1000	2.06E-06	--	1.5	3.09E-06	--
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	55	0.021	1	30	365	70	25550	1000	7.07E-06	--	2	1.41E-05	
Total PCBs (noncarcinogenic)	55	0.021	1	30	365	70	10950	1000	1.65E-05	0.00002	--		8.25E-01

RISKS TO THE SUBSISTENCE ANGLER FROM FISH OUTSIDE THE SOUTHWEST MARINE LEASEHOLD

Outside Southwest Marine
Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	32	0.161	1	30	365	70	25550	1000	3.15E-05	--	1.5	4.73E-05	--
Total Mercury	170	0.161	1	30	365	70	10950	1000	3.91E-04	0.0001	--	--	3.91E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	970	0.161	1	30	365	70	25550	1000	9.56E-04	--	2	1.91E-03	
Total PCBs (noncarcinogenic)	970	0.161	1	30	365	70	10950	1000	2.23E-03	0.00002	--		1.12E+02

Reference 2240
Whole Body Sand Bass

Subsistence Angler:	C	CR	FI	ED	EF	BW	AT	CF	Dose (mg/kg - day)	RfD	CSF	Cancer Risk	Noncancer Risk
Metals													
Inorganic Arsenic (carcinogenic)	20	0.161	1	30	365	70	25550	1000	1.97E-05	--	1.5	2.96E-05	--
Total Mercury	160	0.161	1	30	365	70	10950	1000	3.68E-04	0.0001	--	--	3.68E+00
Polychlorinated Biphenyls													
Total PCBs (carcinogenic)	560	0.161	1	30	365	70	25550	1000	5.52E-04	--	2	1.10E-03	
Total PCBs (noncarcinogenic)	560	0.161	1	30	365	70	10950	1000	1.29E-03	0.00002	--		6.44E+01

29. Finding 29: Chemicals of Concern and Background Sediment Quality

Finding 29 of CAO No. R9-2012-0024 states:

The San Diego Water Board derived sediment chemistry levels for use in evaluating the feasibility of cleanup to background sediment quality conditions from the pool of San Diego Bay reference stations described in Finding 17. The background sediment chemistry levels based on these reference stations are as follows:

Background Sediment Chemistry Levels

Chemicals of Concern	Units (dry weight)	Background Sediment Chemistry Levels[1]
Primary COCs		
Copper	mg/kg	121
Mercury	mg/kg	0.57
HPAHs[2]	μg/kg	663
PCBs[3]	μg/kg	84
Tributyltin	μg/kg	22
Secondary COCs		
Arsenic	mg/kg	7.5
Cadmium	mg/kg	0.33
Lead	mg/kg	53
Zinc	mg/kg	192

1. Equal to the 2005 Reference Pool's 95% upper predictive limits shown in Section 18 of the *Technical Report for Cleanup and Abatement Order No.R9-2012-0024*. The background levels for metals are based on the %fines:metals regression using 50% fines, which is conservative because the mean fine grain sediment at the Shipyard Investigation Site is 70% fines.
2. HPAHs = sum of 6 PAHs: Fluoranthene, Perylene, Benzo[a]anthracene, Chrysene, Benzo[a]pyrene, and Dibenzo[a,h]anthracene.
3. PCBs = sum of 41 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

The San Diego Water Board identified constituents of primary concern (primary COCs), which are associated with the greatest exceedance of background and highest magnitude of potential risk at the Shipyard Sediment Site. A greater concentration relative to background suggests a stronger association with the Shipyard Sediment Site, and a higher potential for exposure reduction via remediation. Secondary contaminants of concern (secondary COCs) are contaminants with lower concentrations relative to background, and are highly correlated with primary COCs and would be addressed in a common remedial footprint. Based on these criteria, the primary COCs for the Shipyard Sediment Site are copper, mercury, HPAHs,[16] PCBs, and TBT, and the secondary COCs are arsenic, cadmium, lead, and zinc.

29.1. Guiding Principles for Designating Background Sediment Quality Conditions

The San Diego Water Board must apply Resolution No. 92-49 when setting cleanup levels for contaminated sediment if such sediment threatens beneficial uses of the waters of the state and the contamination or pollution is the result of a discharge of waste. Contaminated sediment must be cleaned up to background sediment quality unless it would be technologically[17] or economically[18] infeasible to do so.

Background conditions for evaluating the feasibility of cleanup to background in marine sediment remediation projects are defined in terms of sediment chemistry, toxicity, and benthic community structure rather than water column chemical pollutant concentrations. This is because protection of water quality involves far more than just water chemistry considerations. Protection of water quality includes protection of the multiple elements which together make up aquatic systems including the aquatic life, wildlife, wetlands, and other aquatic habitat, vegetation, and hydrology required to maintain the aquatic system. Marine sediment provides habitat for many aquatic organisms and functions as an important component of aquatic ecosystems. Adverse effects on organisms in or near sediment can occur even when chemical pollutant levels in the overlying water are low. Various toxic contaminants found only in barely detectable amounts in the water column can accumulate in sediment to much higher levels. Benthic organisms can be exposed to chemical pollutants in sediment through direct contact, ingestion of sediment particles, or uptake of dissolved contaminants present in the interstitial (pore) water. In addition, natural and human disturbances can release pollutants to the overlying water, where pelagic (open-water) organisms can be exposed. Chemical pollutants in sediment

[16] Petroleum hydrocarbons, including TPH, RRO, DRO, and other PAHs were eliminated as primary and secondary COCs for the following reasons. HPAHs, a primary COC, are considered to be the most recalcitrant, bioavailable, and toxic compounds present in the complex mixture of petroleum hydrocarbons. Other measures of petroleum hydrocarbons are generally correlated with HPAHs such that remedial measures to address HPAHs will also address environmental concerns associated with elevated levels of low molecular weight PAHs (LPAHs), total PAHs, TPH, RRO and DRO.

[17] Technological feasibility is determined by assessing available technologies, which have been shown to be effective in reducing the concentration of the pollutants of concern.

[18] Economic feasibility is an objective balancing of the incremental benefit of attaining further reductions in the concentrations of constituents of concern as compared with the incremental cost of achieving those reductions. The evaluation of economic feasibility includes consideration of current, planned, or future land use, social, and economic impacts to the surrounding community including property owners other than the discharger. Economic feasibility does not refer to the dischargers' ability to finance cleanup. Availability of financial resources is considered in the establishment of reasonable compliance schedules.

can also cause adverse effects either through bioaccumulation and food chain transfer to human and wildlife consumers of fish and shellfish. The accumulation of pollutants in sediment, the toxicity and bioaccumulation of sediment pollutants, and the diversity and composition of the aquatic species are all relevant water quality issues that need to be considered in decisions dealing with contaminated marine sediment cleanup

For the current study, background sediment quality is defined for existing "surface" marine sediment in terms of an "ambient background" or "contemporary background," which means the average surface sediment quality conditions in areas removed from sources of chemical pollutants, recognizing that there may no longer be pristine surface marine sediment in a given geographic area of a waterbody. Ideally, surface sediment station sites used to define "ambient" or "contemporary " background sediment quality conditions should be collected from a field site that is appreciably free of chemical pollutants and has grain size, total organic carbon, sulfide and ammonia levels, and other characteristics similar to the contaminated marine sediment site.

29.2. Background Sediment Quality and the Reference Condition

The San Diego Water Board derived sediment chemistry levels for use in evaluating the feasibility of cleanup to background sediment quality conditions from the pool of San Diego Bay reference stations as described in Section 17. The background sediment chemistry levels at these reference stations are described below.

Table 29-1 Background Sediment Chemistry Levels

Chemicals of Concern	Units (dry weight)	Background Sediment Chemistry Levels[1]
Primary COCs		
Copper	mg/kg	121
Mercury	mg/kg	0.57
HPAHs[2]	μg/kg	663
PCBs[3]	μg/kg	84
Tributyltin	μg/kg	22
Secondary COCs		
Arsenic	mg/kg	7.5
Cadmium	mg/kg	0.33
Lead	mg/kg	53
Zinc	mg/kg	192

1. Equal to the 2005 Reference Pool's 95% upper predictive limits shown in Section 18 of the Technical Report. The background levels for metals are based on the %fines:metals regression using 50% fines, which is conservative because the mean fine grain sediment at the Shipyard Investigation Site is 70% fines.
2. HPAHs = High Molecular Weight Polynuclear Aromatic Hydrocarbons, sum of Fluoranthene, Perylene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenzo(a,h)anthracene.
3. PCBs = Polychlorinated Biphenyls, sum of 41 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

The background sediment quality conditions presented in Table 29-1 provide an appropriate bench mark to evaluate the cleanup to background sediment quality conditions, given the San Diego Water Board's remediation goal for the Shipyard Sediment Site of reducing sediment pollutant levels to attain reasonable protection of beneficial uses.

The background sediment quality condition represents the condition of San Diego Bay away from known sources of chemical pollutants. A detailed description of the reference station selection process is described in the Appendix for Section 17.

The San Diego Water Board believes the background sediment quality conditions presented in this Section will provide reasonable protection of San Diego Bay beneficial uses because:

- From the list of 18 chemicals or combination of chemicals listed in Table 29-1, 11 have published sediment quality guideline values. A comparison of the 11 chemicals to their respective ERMs[19] and ERLs[20] show that all 11 CoPCs are below their ERM and 3 of the 11 are also below the ERL. The ERL and ERM values identify ranges in sediment chemistry that are predicted to be rarely (below ERL), occasionally (above ERL but less than ERM), or frequently (above ERM) associated with adverse effects. The Background Sediment Chemistry concentrations fall into the "rare" or "occasional" categories of predicting effects. See Table 29-2 below.

- Mean survival for the amphipod toxicity test for the stations used to define background conditions (i.e. the Reference Condition) is 88 % control adjusted survival. For the 10-day amphipod test, a 72% survival threshold value (80% of the minimum acceptable control survival (90%)) can be used to detect survival significantly less than control (Thursby et al., 1997). This threshold value is very similar to a later published threshold value of 75% survival for the same test using E. estuarius (Phillips et al., 2001). The mean Reference Condition is significantly greater than the two threshold values and is close to the minimum acceptable control survival.

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[19] Effects Range – Median (ERM) is the median or 50th percentile of effects data for each chemical identified (Long et al., 1995).

[20] Effects Range – Median (ERM) is the median or 50th percentile of effects data for each chemical identified (Long et al., 1995).

- The mean BRI value for the background condition is 37 (RL 1). From the 16 reference stations used, 11 (69%) of the stations have BRI scores that fall into the "Reference" or "RL 1" categories. RL 1 is defined as > 5% of reference species absent and is considered a marginal change in relative abundance of species. RL 2 through RL 4 is considered to show clear evidence of benthic community disturbance (Ranasinghe et al., 2003). See Table 29-3 below.

Table 29-2 Background Sediment Chemistry Levels Compared to Sediment Screening Values

Chemicals of Concern	Units (dry weight)	Background Sediment Chemistry Levels[1]	Effects Range Low[2]	Effects Range Median[2]
Primary COCs				
Copper	mg/kg	121	34	270
Mercury	mg/kg	0.57	0.15	0.71
HPAHs[3]	µg/kg	663	1700	9600
PCBs[4]	µg/kg	84	22.7	180
Secondary COCs				
Arsenic	mg/kg	7.5	8.2	70
Cadmium	mg/kg	0.33	1.2	9.6
Lead	mg/kg	53	46.7	218
Zinc	mg/kg	192	150	410

1. Equal to the 2005 Reference Pool's 95% upper predictive limits shown in Section 18 of the Technical Report. The background levels for metals are based on the %fines:metals regression using 50% fines, which is conservative because the mean fine grain sediment at the Shipyard Investigation Site is 70% fines.
2. From Buchman, 1999
3. HPAHs = High Molecular Weight Polynuclear Aromatic Hydrocarbons, sum of Fluoranthene, Perylene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenzo(a,h)anthracene.
4. PCBs = Polychlorinated Biphenyls, sum of 41 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

Table 29-3 Characterization, Definition and BRI-E Thresholds for Levels of Benthic Community Condition

Level	Definition for Bays	BRI-E Threshold
Reference		< 31

Level	Definition for Bays	BRI-E Threshold
Response Level 1	> 5% of reference species absent	31 to 42
Response Level 2	> 25% of reference species absent	42 to 53
Response Level 3	> 50% of reference species absent	53 to 73
Response Level 4	> 80% of reference species absent	> 73

(Ranasinghe et al., 2003)

Justification for each station used in establishing the Reference Condition is provided in Section 17, Table 17-2 and the data and descriptive statistics are provided in the Appendix for Section 17.

Establishing and applying the reference condition as described in Sections 17 and 18 acknowledges the potential for low levels of contamination that is dispersed throughout San Diego Bay and takes into account the natural variability of sediment toxicity and the benthic community condition. The reference or San Diego Bay background condition establishes the current condition that would exist in San Diego Bay minus the influence from Shipyard Sediment Investigation Site.

Although the Reference Condition recognizes some low level of sediment contamination, the levels should remain protective of the beneficial uses.

29.3. Identification of Chemicals of Concern

The San Diego Water Board identified the following nine COCs with the potential to affect the benthic invertebrate community, aquatic-dependent wildlife, or human health beneficial uses (Sections 18-28): arsenic, cadmium, copper, HPAHs, lead, mercury, PCBs, TBT, and zinc.[21] The nine COCs were separated into two groups, primary COCs and secondary COCs:

- **Primary COCs** were defined as COCs meeting the following criteria:
  - Greatest exceedance of background suggesting a strong association with the Shipyard Sediment Site;
  - Highest magnitude of potential risk at the Shipyard Sediment Site; and
  - Higher potential for exposure reduction via remediation.

[21] Alternative cleanup levels for chromium, nickel, and silver were not included as COCs in this analysis because they did not have a statistically significant relationship with biological effects on benthic invertebrates (Section 20), they did not pose a risk to aquatic dependent wildlife based on the Tier II Baseline Comprehensive Risk Assessment for Aquatic-Dependent Wildlife (Section 24), and they did not pose a cancer or non-cancer human health risk based on the Tier II Baseline Comprehensive Risk Assessment for Human Health (Section 28).

- **Secondary COCs** were defined as COCs meeting the following criteria:
  - Lower concentrations relative to background suggesting a lower degree of association with the Shipyard Sediment Site;[22] and
  - Highly correlated with primary COCs and would be addressed in a common remedial footprint.

COCs with a strong Shipyard Sediment Site association were identified via comparison of current, or pre-remedial, surface-area weighted average concentration (SWAC)[23] values to background concentrations. COCs with a SWAC approximately twice that of background were considered to have a high degree of association with the Shipyard Sediment Site, and included copper, HPAHs, PCBs,[24] and TBT. Correlation coefficients where generated for COC-by-COC comparison to identify the COCs that had strong positive correlations (see Table 29-4). Among the other five COCs, arsenic, cadmium, lead, and zinc exhibited a strong positive correlation with copper, HPAHs, PCBs, and/or TBT, suggesting that areas of the Site exhibiting high concentrations of these COCs also contained high concentrations of the Site-associated COCs. Only mercury was not highly correlated with copper, HPAHs, PCBs and/or TBT.

Table 29-4 Correlation Coefficients (r values) for COC-by-COC Comparisons of Concentrations in Surface Sediment Samples Collected for the Detailed Sediment Investigation)

COC	As	Cd	Cu	Hg	HPAHs	Pb	PCBs	TBT	Zn
As	**1.00**	0.66	**0.92**	0.63	**0.68**	**0.86**	**0.73**	**0.81**	**0.97**
Cd	0.66	**1.00**	0.61	0.42	0.52	0.66	0.64	0.51	**0.71**
Cu	**0.92**	0.61	**1.00**	**0.78**	**0.76**	**0.90**	**0.83**	**0.89**	**0.94**
Hg	0.63	0.42	**0.78**	**1.00**	**0.73**	**0.77**	**0.87**	0.63	0.61
HPAHs	0.68	0.52	**0.76**	**0.73**	**1.00**	**0.84**	**0.87**	**0.80**	0.67
Pb	**0.86**	0.66	**0.90**	**0.77**	**0.84**	**1.00**	**0.92**	**0.87**	**0.89**
PCBs	**0.73**	0.64	**0.83**	**0.87**	**0.87**	**0.92**	**1.00**	**0.79**	**0.75**

[22] Secondary COCs with a low degree of association with the Site are suggestive of COCs derived from watershed or regional sources, rather than dischargers specific to the Site. The San Diego Water Board has limited authority to order Site cleanup of pollution conditions that has a low degree of association with named dischargers.

[23] Surface-area weighted average concentrations (SWACs) are discussed in Section 32.2.

[24] Total PCBs was defined as the sum of 41 congeners.

COC	As	Cd	Cu	Hg	HPAHs	Pb	PCBs	TBT	Zn
TBT	**0.81**	0.51	**0.89**	0.63	**0.80**	**0.87**	**0.79**	**1.00**	**0.85**
Zn	**0.97**	**0.71**	**0.94**	0.61	0.67	**0.89**	**0.75**	**0.85**	**1.00**

Notes: Pearson correlations using ln-transformed data. Correlation is significant if less than -0.433 or greater than 0.433 (correlations > 0.70). Bolded, shaded values indicate a strong correlation between COCs.
Source: Exponent, 2003

The high degree of correlation between Shipyard Sediment Site-associated COCs (copper, TBT, HPAHs, and PCBs) and arsenic, cadmium, lead, and zinc suggests that alternate cleanup levels for Shipyard Sediment Site-associated COCs would also achieve a high degree of exposure reduction for arsenic, cadmium, lead, and zinc. However, an alternate cleanup approach based on copper, TBT, HPAHs, and PCBs would not likely address the highest concentrations of mercury due to the lack of correlation between mercury and any of the four Site-associated COCs. Therefore, mercury was added as a primary COC. The final list of primary COCs includes copper, mercury, TBT, HPAHs, and PCBs, as summarized in Table 29-5. The secondary COCs include arsenic, cadmium, lead, and zinc.

Table 29-5 Identification of Primary Chemicals of Concern

Chemicals of Concern	Units (dry weight)	Pre-Remedial SWAC	Bkgd	Multiple	Site-Associated COCs (Multiple ≥ 2)	Strong Correlation with Site-Associated COCs	Selection as Primary COC
Metals							
Arsenic	mg/kg	9.4	7.5	1.3	No	Yes	No
Cadmium	mg/kg	0.28	0.33	0.8	No	Yes	No
Copper	mg/kg	187	121	1.5	Yes[1]		Yes
Lead	mg/kg	73	53	1.4	No	Yes	No
Mercury	mg/kg	0.75	0.57	1.3	No	No	Yes
Zinc	mg/kg	252	192	1.3	No	Yes	No
Organics							
Tributyltin	µg/kg	162	22	7.3	Yes		Yes
HPAHs	µg/kg	3,509	663	5.2	Yes		Yes

Chemicals of Concern	Units (dry weight)	Pre-Remedial SWAC	Bkgd	Multiple	Site-Associated COCs (Multiple ≥ 2)	Strong Correlation with Site-Associated COCs	Selection as Primary COC
PCBs	µg/kg	308	84	3.6	Yes		Yes

1. The multiple of 1.5 was rounded up to 2 to be conservative.

30. Finding 30: Technological Feasibility Considerations

Finding 30 of CAO No. R9-2012-0024 states:

Although there are complexities and difficulties that would need to be addressed and overcome (e.g. removal and handling of large volume of sediment; obstructions such as piers and ongoing shipyard operations; transportation and disposal of waste), it is technologically feasible to cleanup to the background sediment quality levels utilizing one or more remedial and disposal techniques. Mechanical dredging, subaqueous capping, and natural recovery have been successfully performed at numerous sites, including several in San Diego Bay, and many of these projects have successfully overcome the same types of operational limitations present at the Shipyard Sediment Site, such as piers and other obstructions, ship movements, and limited staging areas. Confined aquatic disposal or near-shore confined disposal facilities have also been employed in San Diego Bay and elsewhere, and may be evaluated as project alternatives for the management of sediment removed from the Shipyard Sediment Site.

30.1. Technological Feasibility to Cleanup to Background Conditions

Technological feasibility is determined by assessing available technologies which have been shown to be implementable and effective in either reducing pollutant levels in contaminated marine sediments or isolating contaminated marine sediment from the marine environment.

The feasibility study in the Shipyard Report (Exponent, 2003) identifies and evaluates natural recovery, subaqueous capping, dredging, and treatment as candidate remedial options. Exponent's screening of these candidate remedial options retains natural recovery and dredging for further evaluation, and does not retain subaqueous capping and in situ treatment. However, the parties subject to the cleanup and abatement order have evaluated other remedial options and determined that those remedial alternatives screened out in the Shipyard Report (Exponent, 2003) may be appropriate for certain areas within the site, especially those areas where piers or other over-water structures prevent or make it difficult to implement traditional remedial measures such as dredging. Note that remedial measures may be used in combination since a given remedial measure may be enhanced by other measures to achieve the desired cleanup goal.

The evaluation of remedial measures must also consider the short and long term impacts associated with its implementation. In this regard, a remedial strategy should include an evaluation of impacts to the local community and beyond. The San Diego Water Board evaluated whether or not it is technologically feasible to cleanup to background using the three readily employable and proven remediation strategies: natural recovery, subaqueous capping, and dredging. Other alternatives that may be available, in whole or in part, for management of the dredge material include confined aquatic disposal (CAD) or near-shore confined disposal facility (CDF). And, while these alternatives may be less desirable than removal of the contaminated sediment from San Diego Bay, these alternatives may mitigate impacts resulting from off-site transportation and disposal.

Natural recovery, subaqueous capping, and dredging alternatives are discussed below.

30.1.1. Monitored Natural Recovery

The National Research Council defines Monitored Natural Recovery (MNR) as a contaminated sediment remedy that depends on un-enhanced natural processes to reduce risk to human and environmental receptors to acceptable levels (NRC 2000). Natural recovery involves leaving the contaminated sediment in place and allowing the ongoing aquatic processes to contain, destroy, or otherwise reduce the bioavailability of the sediment pollutants in order to achieve site specific remedial action objectives (U.S. EPA, 2005a; NRC, 1997; Magar et al., 2009). Underlying MNR processes may include biodegradation, biotransformation, bioturbation, diffusion, dilution, adsorption, volatilization, chemical reaction or destruction, resuspension, and burial by clean sediment. Monitoring is fundamental to the remedy in order to assess whether risk reduction and ecological recovery by natural processes are occurring as expected. Successful implementation of MNR requires that (1) natural recovery processes are actively transforming, immobilizing, isolating, or removing chemical contaminants in sediments to levels that achieve acceptable risk reduction within an acceptable time period, and (2) source control has been achieved or sources are sufficiently minimized such that these natural recovery processes can be effective. Source control is common to all sediment remedies but particularly to MNR because slow rates of recovery could be outpaced by ongoing releases (Magar et al., 2009).

Monitored natural recovery is not a passive, no-action, or no-cost remedy. While it does not require active construction, effective remediation via MNR relies on a fundamental understanding of the underlying natural processes that are occurring at the site. MNR remedies require extensive risk assessment, site characterization, predictive modeling, and monitoring to verify source control, identify natural processes, set expectations for recovery, and confirm that natural processes continue to reduce risk over time as predicted (Magar et al., 2009). The remedial investigation and feasibility study are used to establish lines of evidence to verify acceptable rates and relative permanence of risk reduction measured and/or predicted for MNR.

Natural recovery processes occur at all contaminated sediment sites, and the extent to which these processes can be relied upon to achieve acceptable risk reduction must be determined by the results of the remedial investigation and feasibility study (Magar and Wenning, 2006; U.S. EPA, 2005a; NRC, 2001). The following conditions that are particularly conducive to MNR include (U.S. EPA, 2005a):

- Assessment indicates that natural recovery processes will continue at rates that contain, destroy, or reduce the bioavailability or toxicity of contaminants within an acceptable time frame.
- Short-term exposure can be reasonably limited by institutional controls during the recovery period.
- Contaminant exposures in biota and the biologically active zone of sediment are moving toward risk-based goals.
- For sites relying on natural isolation, the sediment bed is reasonably stable.

Because they are always present to varying degrees, natural recovery processes should be considered in every remedial action, even in cases when MNR is not expected to be the sole or primary remedy for a contaminated site (Magar and Wenning, 2006; U.S. EPA, 2005a; NRC, 2001). Natural recovery processes are often combined with other engineering approaches to increase the overall success of the remedial action (Magar et al., 2009). Many sites utilize hybrid remedies that combine dredging, capping, and MNR. For example, MNR may be used to control risk from areas of widespread, low-level sediment contamination following dredging or capping of more highly contaminated areas where analysis reveals that MNR cannot achieve acceptable risk reduction within targeted time frames, or MNR may be combined with thin-layer placement of clean sediment at sites where the natural rate of sedimentation is insufficient to bury contaminants in a reasonable time frame (U.S. EPA, 2005a).

Based on the available lines of evidence from the assessment (Exponent, 2003) a range of natural recovery processes are active at the Shipyard Sediment Site. Sedimentation rates in the range of 1-2 cm/year suggest that the surface sediment layer will be actively improved by natural deposition (see Section 5.8). Active efforts are underway to control sources. Elevated chemical concentrations are generally restricted to a limited spatial area within the pier areas. Bioavailability of site chemicals to benthic organisms appears to be limited based on lack of observed toxicity or benthic community degradation relative to reference conditions in most areas. Current site use for shipbuilding and repair activities may lead to sediment disturbances due to ship launching and other ship movements. Complete control of site sources has not been fully demonstrated to a level that would assure adequate rates of recovery. While NASSCO and BAE Systems propose that monitored natural recovery or attenuation is an appropriate exclusive remedy, none of the dischargers has demonstrated, and there is insufficient evidence in the record, to support a conclusion that, monitored natural attenuation has a substantial likelihood of achieving compliance with the alternative cleanup levels established in this CAO within a reasonable time frame. Therefore, based on current site use and site characteristics, while natural recovery processes are active at the site, it has not been demonstrated that the remedy has a substantial likelihood of achieving compliance with the CAO within the sediment management Units of the Shipyard Sediment Site. For this reason, as well as the reasons discussed in the San Diego Water Board Cleanup Team's Response to Comments Report[25] (August 23, 2011), monitored natural recovery is not recommended as the primary remedy for the Shipyard Sediment Site, but is likely to provide an additional level of effectiveness and margin of safety in combination with more active remedial measures located within areas designated as sediment management Units.

30.1.2. Subaqueous Capping

Subaqueous capping (i.e., in-place capping) is the placement of clean material on top of the contaminated sediment. Capping effectiveness can be achieved through three primary mechanisms including (1) physical isolation of the contaminated sediment from the benthic environment, (2) stabilization of contaminated sediments, preventing resuspension and transport to other sites, and (3) reduction of the flux of dissolved contaminants into the water column (U.S. EPA, 2005a; U.S. EPA, 1998c). The capping material is typically clean sand, silty to gravelly

[25] Response to Comments Report, August 23, 2011, pp. 1-26 through 1-28 and 30-1 through 30-4 and 32-4 through 32-6.

sand, and/or armoring material, or may involve a more complex design with geotextiles, liners and multiple layers. To achieve these results, an in-situ capping project must be treated as an engineered project with carefully considered design, construction, and monitoring (Palermo et al., 1998). Effective capping requires sufficient cap thickness, careful cap placement to avoid disturbance, and cap integrity maintenance from disturbances. Capping also requires monitoring to ensure integrity and effectiveness. Capping is a procedure that can be used at appropriate sites, and its success depends on careful design and implementation.

Sediment capping, when properly designed, has been demonstrated to be effective in remediating sediment contamination at a broad range of sites (U.S. EPA, 2010). For the Shipyard Sediment Site, available lines of evidence indicate that some areas may be suitable for in-situ capping (Exponent, 2003). In most areas, water depth is adequate to accommodate at least a moderate thickness cap with anticipated uses for navigation and shipbuilding. Naturally driven hydrodynamic conditions in the region, including tidal currents and wind waves, are generally not likely to compromise a properly designed cap. Long-term risk reduction is likely to outweigh habitat disruption, particularly in areas of higher chemical concentrations. Rates of groundwater flow at the site are likely to be low and not likely to create unacceptable contaminant releases. The sediment at the site generally has sufficient strength to support a moderate thickness cap. Elevated levels of contamination generally cover contiguous areas. Other lines of evidence from the site indicate potential limits to the applicability of capping in certain areas of the Site. There is evidence of physical disturbance from ship movements, ship testing, and ship launching activities. These physical disturbances would require a thicker or more physically resistive capping design which could limit water depth at the site or degrade the benthic habitat. Evidence of well developed benthic communities existing at the site may be a concern both due to potential cap failure via burrowing and bioturbation, as well as the impact to these communities that may occur through cap placement. In general, the major limitation of in-situ capping for the site is that the contaminated sediment remains in place where contaminants could become exposed or be dispersed if the cap is significantly disturbed or if contaminants move through the cap in significant amounts. Based on current site use for shipbuilding and repair activities, and the potential for sediment disturbances due to ship launching and other ship movements, portions of the Shipyard Sediment Site are subject to sediment disturbance that potentially limits the applicability of in-situ capping.

For these reasons, while in-situ capping is not recommended as the primary remedy for the site, it will be considered for application in specific areas. These include areas that are shielded to a degree from physical disturbance and where mechanical dredging is not feasible (e.g., under piers or adjacent to structures). In addition, clean, thin-layer backfill will be considered in areas where dredge residual contamination, following one or more dredge passes, does not resolve contaminate concentration at the upper-most surface layer as a result of fall-out from mechanical dredging. Based on current site use, placement of a sand layer is considered technologically feasible for under-structure areas, areas adjacent to structures, and in certain isolated areas near shore where mechanical dredging may undermine structures. Sand layering may also be appropriate to help manage residuals following the dredging process.

30.1.3. Environmental Dredging

Historically, dredging is one of the most common methods employed at contaminated sediment sites. Dredging is the physical removal of sediment from a water body. Environmental dredging, as opposed to navigational or construction dredging, is performed specifically for the removal of contaminated sediment. Environmental dredging is intended to remove sediment contaminated above certain action levels while minimizing the spread of contaminants to the surrounding environment during dredging (NRC, 1997). According to the U.S. EPA, 150 sites on National Priorities List involved contaminated sediment and approximately 30 percent of the sites included a decision that specified dredging or excavation as the sediment cleanup method (U.S. EPA, 2005a). Key design considerations for effective implementation of environmental dredging as a cleanup method include sediment removal, transport, staging, treatment (pretreatment, treatment of water and sediment, if necessary), and disposal of liquids and solids (U.S. EPA, 2005a; U.S. ACE, 2008a).

Because of its extensive use in previous cleanups, a broad range of technologies exist to implement environmental dredging across a range of conditions (U.S. ACE, 2008a). For the Shipyard Sediment Site, available lines of evidence indicate that most areas are suitable for environmental dredging (Exponent, 2003). Water depth at the site is deep enough for dredge equipment, yet not too deep for operations. Contaminated sediment is generally underlain by clean, more resistant sediment to facilitate identification of dredge limits. Suitable disposal sites are available. Long-term risk reduction of sediment removal is likely to outweigh sediment disturbance and habitat disruption in areas of elevated chemical levels.

Other lines of evidence from the site indicate potential limits to the feasibility of environmental dredging. The presence of infrastructure, such as piers and pilings, makes dredging more difficult due to access constraints. Site operations such as ship berthing and ship movements increase the complexity of planning and executing a dredging operation. Technical limitations include the following:

- Ability to effectively contain and remove all of the target material;
- Potential to expose much more highly contaminated material that was previously buried;
- Absence of identified area for staging equipment and handling and transporting dredged materials;
- Potential impacts to the local community related to handling and transportation of dredged material;
- Potential for debris that could impede dredging;
- Potential alteration of habitat and impacts to the existing benthic community; and
- Potential water quality impacts from resuspension of sediment and the associated release of pollutants.

Based on the available data, it appears that the total amount of sediment "lost" to resuspension can be as low as 0.1% to over 5% of the in situ volume (U.S. ACE, 2008b). However, this small percentage does not necessarily mean that sediment resuspension is not a concern. The loss of even 1 percent of certain pollutants could be a substantial problem. However, specialty dredges have been designed to reduce resuspension during dredging operations and are effective in removing sediment with a minimum of resuspension. In addition, field tests indicate that conventional dredges, if operated with care, can also remove sediment with low levels of resuspension (NRC, 1997).

Disposal of dredged material needs to be considered when evaluating dredging as a remedial alternative. Dredged material may be deposited via aquatic disposal (e.g. in-bay or at open ocean disposal sites); transported to inland sites (e.g., landfill); or placed in CDFs, preferably within or near the remediation site.

Suitability for ocean disposal of dredge material is evaluated using effects-based testing as described in the "Green Book" national testing manual (U.S. EPA/Corps, 1991). Although sediment testing of the material at the Shipyard Sediment Site in accordance with the Green Book has not been accomplished, given the nature and extent of chemistry for most of the sediment expected to require remediation, ocean disposal is not retained for further consideration.

Offsite disposal of dredged sediment can be in approved landfills, following chemical screening to ensure compatibility with landfill requirements. If the dredged material is classified as hazardous waste under the Resource Conservation and Recovery Act (42 USC §6901 et seq.) or Title 22 of the California Code of Regulations (Division 4.5, Chapter 11), it may disposed only in Class I waste management units. Offsite disposal is an effective remedial alternative as it permanently removes the waste from the site. Considerations associated with disposal include:

- The identification of an upland sediment management site with sufficient space and access to stockpile, dewater, and ship removed dredge material;
- Potential impacts to the local community near where the sediment is managed; and
- Potential impacts to the community associated with the anticipated numerous truck trips to transport the sediment to the disposal location.

Alternatives to offsite disposal include confinement of sediment within or adjacent to the bay. CAD is a submerged area where dredge material is placed, followed by the placement of capping material. This technique has been employed in San Diego Bay and elsewhere in the country and can simultaneously be enhanced to provide aquatic habitat. A nearshore CDF is similar to a CAD except that it is created adjacent to the shoreline, where the sediment is confined using retaining structures such as sheetpile or dike structures. The use of a CAD or CDF can significantly reduce the potential community impacts associated with offsite disposal, including the need for an on-shore dewatering and sediment management site and the truck trips through the local community.

Given that adequate consideration for the factors described above is applied during the design phase of the remediation, environmental dredging is recommended as the preferred remedial method for the site. Because of the limitations of conducting dredging in all areas targeted for remediation, the design should incorporate targeted application of capping and backfill to supplement the effectiveness of dredging where needed. Natural recovery processes outside the dredge footprint should be considered in the context of overall site recovery. They also provide an additional margin of safety for the protection of beneficial uses that could not be achieved by dredging alone. Exposure scenarios, risk levels, protection of beneficial uses, and economic feasibility for the proposed remedy are discussed in further detail in the following sections.

30.2. Conclusion

Although there are complexities and difficulties that would need to be addressed and overcome (e.g. removal and handling of large volume of sediment; obstructions such as piers and ongoing shipyard operations; transportation and disposal of waste), the San Diego Water Board concludes that it is technologically feasible to cleanup to the background sediment quality levels defined in Section 29 utilizing one or more of the above remedial and disposal techniques. Mechanical dredging, subaqueous capping, and natural recovery have been successfully performed at numerous sites, including several in San Diego Bay, and many of these projects have successfully overcome the same types of operational limitations present at the Shipyard Sediment Site, such as piers and other obstructions, ship movements, and limited staging areas. CAD and near shore CDF have also been employed in San Diego Bay and elsewhere and are considered technically feasible alternatives to be evaluated for the management of sediment removed from the Shipyard Sediment Site.

31. Finding 31: Economic Feasibility Considerations

Finding 31 of CAO No. R9-2012-0024 states:

Under State Water Board Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*, determining “economic feasibility” requires an objective balancing of the incremental benefit of attaining further reduction in the concentrations of primary COCs as compared with the incremental cost of achieving those reductions. Resolution No. 92-49 provides that “[e]conomic feasibility does not refer to the dischargers’ ability to finance cleanup.” When considering appropriate cleanup levels under Resolution No. 92-49, the San Diego Water Board is charged with evaluating “economic feasibility” by estimating the costs to remediate constituents of concern at a site to background and the costs of implementing other alternative remedial levels. An economically feasible alternative cleanup level is one where the incremental cost of further reductions in primary COCs outweighs the incremental benefits.

The San Diego Water Board evaluated a number of criteria to determine risks, costs, and benefits associated with no action, cleanups to background sediment chemistry levels, and alternative cleanup levels greater than background concentrations. The criteria included factors such as total cost, volume of sediment dredged, exposure pathways of receptors to contaminants, short- and long-term effects on beneficial uses (as they fall into the broader categories of aquatic life, aquatic-dependent wildlife, and human health). The San Diego Water Board then compared these cost criteria against the benefits gained by diminishing exposure to the primary COCs to estimate the incremental benefit gained from reducing exposure based on the incremental costs of doing so. As set forth in detail herein, this comparison revealed that the incremental benefit of cleanup diminishes significantly with additional cost beyond a certain cleanup level, and asymptotically approaches zero as remediation approaches background. Based on these considerations, cleaning up to background sediment chemistry levels is not economically feasible.

31.1. Evaluation of Economic Feasibility of Cleaning Up to Background

Economic feasibility is a term of art under Resolution No. 92-49, and refers to the objective balancing of the incremental benefit of attaining more stringent cleanup levels compared with the incremental cost of achieving those levels. Economic feasibility does not refer to the subjective measurement of the discharger’s ability to pay the costs of a cleanup. The benefits of remediation are best expressed as the reduction in exposure of human, aquatic wildlife, and benthic receptors to site-related COCs.

Economic feasibility was assessed by ranking the 66 shipyard sediment stations based on the contaminant levels for the five primary COCs found in surficial sediment samples.[26] A series of cumulative cost scenarios was then evaluated by starting with the six most contaminated stations, then adding the six next most contaminated stations, progressing sequentially down the list until the entire Shipyard Sediment Site was included in the scenario (see Appendix for Section 31). For each scenario, the required dredging volume and associated cost of remediation for the set of Thiessen polygons[27] included in the step was estimated. The estimated post-remedial surface-area weighted average concentrations (SWAC) and exposure reduction for the primary COCs was also estimated for each cost scenario. Exposure reduction was defined for this purpose as the reduction in sediment SWAC for the shipyard site, relative to background, where the pre-remedial SWAC is considered zero reduction and background is considered 100 percent reduction. As chemical concentrations are reduced and mass removed, the SWAC for each COC decreases, which is equivalent to an expected exposure reduction for the target receptors. The following equation represents the relationship of exposure reduction to post-remedy SWAC.

$$\textbf{Exposure Reduction} = \textbf{SWAC}_{\textbf{current}} - \textbf{SWAC}_{\textbf{post-remedy}}$$

To estimate the relative exposure reduction of a cost scenario, it is appropriate to normalize the exposure reduction to background. For example, current conditions represent 0 percent exposure reduction, whereas as post-remedial SWAC equal to background represents 100 percent exposure reduction. This equation is the calculation of the percent of exposure reduction relative to background.

$$\%\ \text{Exposure Reduction} = \frac{\text{SWAC}_{\text{current}} - \text{SWAC}_{\text{post-remedy}}}{\text{SWAC}_{\text{current}} - \text{Background}} \times 100$$

The following equation is an example of quantifying exposure reduction. This example assumes a current SWAC of 10 ppm for COC1 and a final SWAC of 2 ppm. The background concentration used in this example is 1 ppm for COC1.

$$\frac{10\,\textbf{ppm} - 2\,\textbf{ppm}}{1\mathbf{0}\,\textbf{ppm} - 1\,\textbf{ppm}} \times 100 = 89\%$$

In this example, the exposure reduction relative to background when cleaning up a current SWAC of 10 ppm to a post-remedial SWAC of 2 ppm is 89 percent. An average exposure reduction for each cost scenario was calculated by averaging the percent exposure reduction for each primary COC (copper, mercury, HPAHs, PCBs, and TBT; see Appendix for Section 31).

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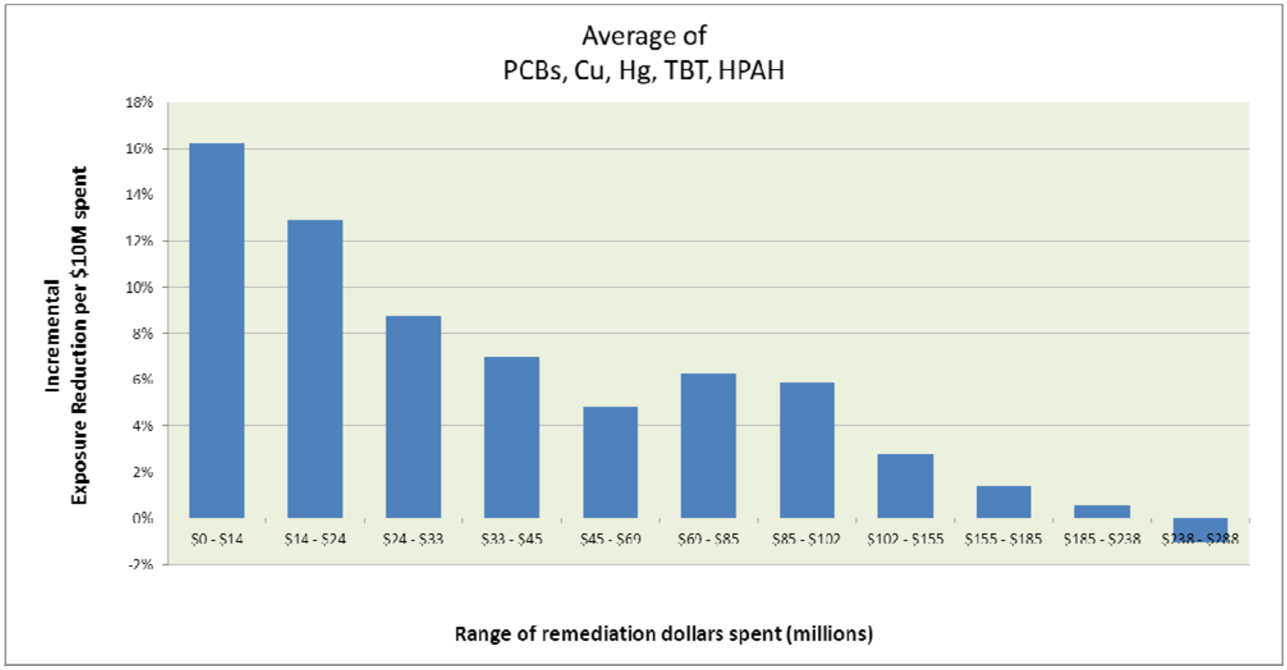
[26] The ranking methodology is discussed in Section 32.2.3.

[27] To calculate surface-area weighted average concentrations for COCs at the Shipyard Sediment Site, a geospatial technique (Thiessen polygons) was used to represent the area represented by each sediment sample. This methodology is discussed in Section 32.2.

31.2. Comparison of Incremental Cost versus Incremental Benefit

A cost-benefit relationship became readily apparent in the San Diego Water Board's analysis. Initial expenditures return a relatively high exposure reduction benefit, but additional expenditures yield progressively lower returns per dollar spent on remediation. Further expenditures eventually reach a point where exposure reduction benefits become negligible. For additional significant sums of money spent, the environmental condition is not substantially improved. Figure 31-1 illustrates this relationship.

Figure 31-1 Percent Exposure Reduction versus Remediation Dollars Spent



Note: See Appendix for Section 31 for supporting calculations

The highest net benefit per remedial dollar spent occurs for the first $24 million (12 polygons), based on the fact that initial exposure reduction is 16 to 13 percent per $10 million spent. Beyond $24 million, however, exposure reduction drops consistently as the cost of remediation increases. Exposure reduction drops to 7 percent or below per $10 million spent after $33 million, and below 3 percent after $102 million. Based on these incremental costs versus incremental benefit comparisons, cleanup to background sediment quality levels is not economically feasible.

Technical Report
for
Cleanup and Abatement
Order No. R9-2012-0024

APPENDIX FOR SECTION 31

ECONOMIC FEASIBILITY CONSIDERATIONS

March 14, 2012

List of Tables

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Scenario	Number of Polygons Dredged*	Cumulative Volume Inside (cy)	Cumulative Volume Outside (cy)	Cumulative Area (sf)	Cumulative Under Pier Areas (sf)
1	6	16,266	8,226	121,907	40,923
2	12	49,660	14,383	302,565	70,030
3	18	81,811	14,383	430,477	115,222
4	24	116,982	24,175	669,166	131,898
5	30	207,058	44,081	1,092,249	139,841
6	36	254,295	51,057	1,434,870	180,359
7	42	288,048	82,215	1,829,641	183,491
8	48	301,962	306,722	2,979,320	210,594
9	54	366,133	349,355	3,700,249	251,828
10	60	464,316	474,903	4,812,792	310,025
11	66	464,316	683,453	6,167,316	313,842

Scenario	Cumulative Shoreline Protection (tons)	Probable Likely Cost
1	5,304	$13,500,000
2	11,278	$24,300,000
3	15,025	$32,900,000
4	20,054	$44,900,000
5	21,600	$69,400,000
6	24,434	$85,200,000
7	26,540	$101,500,000
8	30,924	$155,100,000
9	35,197	$184,800,000
10	45,273	$237,900,000
11	45,817	$288,200,000

Notes:
* Per composite SWAC ranking

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SWAC

Scenario	Construction Seasons Required	PCB	Hg	Cu	TBT	HPAH
1	1	247	0.71	170	136	3086
2	2	208	0.68	160	120	2790
3	2	183	0.67	156	111	2543
4	3	165	0.66	151	101	2306
5	4	149	0.63	141	89	1934
6	5	131	0.60	136	81	1495
7	6	126	0.54	132	77	1382
8	8	109	0.53	116	44	1106
9	10	101	0.52	112	39	962
10	12	89	0.54	112	23	729
11	14	84	0.57	121	22	673

Exposure Reduction

Scenario	Construction Seasons Required	PCB	Hg	Cu	TBT	HPAH	Average
1	1	27.4%	20.3%	25.6%	18.4%	17.9%	21.9%
2	2	44.5%	36.4%	40.3%	30.2%	28.0%	35.9%
3	2	55.6%	42.3%	46.5%	36.4%	36.4%	43.4%
4	3	63.9%	52.3%	54.9%	43.6%	44.4%	51.8%
5	4	70.9%	69.1%	69.1%	52.1%	57.1%	63.7%
6	5	78.9%	81.6%	77.7%	57.9%	72.0%	73.6%
7	6	81.3%	115.9%	82.6%	60.6%	75.9%	83.3%
8	8	89.0%	124.4%	107.1%	84.1%	85.3%	98.0%
9	10	92.6%	125.8%	114.0%	88.2%	90.2%	102.1%
10	12	97.7%	117.4%	113.1%	99.2%	98.1%	105.1%
11	14	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Background	84	0.57	121	22	673	
	Pre-Remedy	308	0.75	187	162	3612	

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Avg. COPC Plot Data

Scenario	Cumulative Exposure Reduction	Incremental Exposure Reduction	Cumulative Cost	Incremental Cost	Cum-ulative Exposure Reduc-tion per $10 million	Inc-remental Exposure Reduc-tion per $10 million	Cost Range
1	21.9%	21.9%	$13,500,000	$13,500,000	16.3%	16.3%	$0 - $14
2	35.9%	13.9%	$24,300,000	$10,800,000	14.8%	12.9%	$14 - $24
3	43.4%	7.6%	$32,900,000	$8,600,000	13.2%	8.8%	$24 - $33
4	51.8%	8.4%	$44,900,000	$12,000,000	11.5%	7.0%	$33 - $45
5	63.7%	11.8%	$69,400,000	$24,500,000	9.2%	4.8%	$45 - $69
6	73.6%	10.0%	$85,200,000	$15,800,000	8.6%	6.3%	$69 - $85
7	83.3%	9.6%	$101,500,000	$16,300,000	8.2%	5.9%	$85 - $102
8	98.0%	14.7%	$155,100,000	$53,600,000	6.3%	2.7%	$102 - $155
9	102.1%	4.2%	$184,800,000	$29,700,000	5.5%	1.4%	$155 - $185
10	105.1%	3.0%	$237,900,000	$53,100,000	4.4%	0.6%	$185 - $238
11	100.0%	-5.1%	$288,200,000	$50,300,000	3.5%	-1.0%	$238 - $288

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Item	Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING								
Additional Pre-Design Site Characterization	1	LUMP SUM	150000	200000	250000	150000	200000	250000
Surveys and Engineering Design	1	LUMP SUM	300000	400000	500000	300000	400000	500000
Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR	1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION								
Mobilization(s) and Demobilization(s)	1	CONSTRUCTION SEASONS	200000	250000	300000	200000	250000	300000
Demolition	1	LUMP SUM	150000	250000	350000	150000	250000	350000
DREDGING								
Unconstrained open-water dredging (outside of leasehold area)	8226	CY	6	7	10	49356	57582	82260
Constrained dredging from inner shipyard (within leasehold area)	16266	CY	10	13	18	162660	211458	292788
Dredging Surface/Subsurface Debris	1224.6	CY	70	89	120	85722	108989.4	146952
Engineering Controls (silt curtain, oil boom)	1	CONSTRUCTION SEASONS	25000	28000	32000	25000	28000	32000
Additional Dredging (if needed)	4500	CY	10	13	18	45000	58500	81000
MARINE STRUCTURES								
Placement of Quarry Run Rock for Protection of Marine Structures	5304	TON	25	35	45	132600	185640	238680
SEDIMENT OFFLOADING AND DISPOSAL								
Acquisition or Several-Year Lease of Sediment Offloading Area	1	CONSTRUCTION SEASONS	200000	250000	300000	200000	250000	300000
Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
Rehandling and Dewatering	28992	CY	10	16	25	289920	463872	724800
Transportation and Disposal at Landfill	43488	TON	50	62.5	75	2174400	2718000	3261600
UNDERPIER REMEDIATION								
Purchase and place 3 feet of clean sand/gravel beneath piers and overwater structures	40923	SF	15	20	30	613845	818460	1227690
PLACEMENT OF CLEAN SAND COVER	6772.61111	CY	20	35	40	135452.2222	237041.3889	270904.4444
SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS						5900000	8000000	10400000
BID MANAGEMENT AND SUPPORT	1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT	1	CONSTRUCTION SEASONS	300000	375000	450000	300000	375000	450000
CONTINGENCY	0.3	percent				1865250	2518500	3262500
MONITORING COSTS								
Water Quality Monitoring during construction	7.898211111	week	11000	15000	18000	86880.32222	118473.1667	142167.8
Post-Dredging Confirmational Sampling	7.276359045	samples	4000	6000	8000	29105.43618	43658.15427	58210.87236
Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS								
Eel Grass Habitat Mitigation (if needed)	0.139929982	ACRES	200000	400000	600000	27985.99633	55971.99265	83957.98898
Eel Grass Land Lease Costs (in perpetuity)	0.139929982	ACRES	500000	1000000	1500000	69964.99082	139929.9816	209894.9725
Internal Shipyard Costs	1	LUMP SUM	150000	200000	250000	150000	200000	250000
RWQCB Oversight Costs	8	years	30000	36000	45000	240000	288000	360000
GRAND TOTAL						10000000	13500000	17600000

VOLUME AND AREA LEDGER	TOTAL
Total volume being dredged (CY)	28992
Total volume being dredged (TONS)	43488
Total area of dredging (sq. ft.)	121907
Total area of dredging (acres)	2.798599633

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		16266	add 10%	17892.6
Dredging, open water, cy		8226	add 10%	9048.6
Rock placement, tons		5304		
Clean sand cover, cy		6772.611111		
Underpier sand, sq.ft.		40923		
Time to dredge inner shipyard, days		35.7852	Daily rate (cy)	500
	Weeks	5.9642	Days per week	6
	Months	1.49105		
Time to dredge outer shipyard, days		7.5405	Daily rate (cy)	1200
	Weeks	1.25675	Days per week	6
	Months	0.3141875		
Time to place rock, days		7.072	Daily rate (tons)	750
	Weeks	1.178666667	Days per week	6
	Months	0.294666667		
Time to place clean sand, days		3.386305556	Daily rate (cy)	2000
	Weeks	0.564384259	Days per week	6
	Months	0.141096065		
Time to place underpier sand, days		0.677261111	Daily rate (sf)	10000
	Weeks	0.112876852	Days per week	6
	Months	0.028219213		
	Total weeks of in-water work	9.076877778		
	Total months of in-water work	2.269219444		
	CONSTRUCTION SEASONS	1	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	150000	200000	250000	150000	200000	250000
	Surveys and Engineering Design	1	LUMP SUM	300000	400000	500000	300000	400000	500000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	2	CONSTRUCTION SEASONS	200000	250000	300000	400000	500000	600000
	Demolition	1	LUMP SUM	150000	250000	350000	150000	250000	350000
DREDGING									
	Unconstrained open-water dredging (outside of leasehold area)	14383	CY	6	7	10	86298	100681	143830
	Constrained dredging from inner shipyard (within leasehold area)	49660	CY	10	13	18	496600	645580	893880
	Dredging Surface/Subsurface Debris	3202.15	CY	70	89	120	224150.5	284991.35	384258
	Engineering Controls (silt curtain, oil boom)	2	CONSTRUCTION SEASONS	25000	28000	32000	50000	56000	64000
	Additional Dredging (if needed)	11200	CY	10	13	18	112000	145600	201600
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Structures	11278	TON	25	35	45	281950	394730	507510
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Area	2	CONSTRUCTION SEASONS	200000	250000	300000	400000	500000	600000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	75243	CY	10	16	25	752430	1203888	1881075
	Transportation and Disposal at Landfill	112864.5	TON	50	62.5	75	5643225	7054031.25	8464837.5
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers and overwater structures	70030	SF	15	20	30	1050450	1400600	2100900
PLACEMENT OF CLEAN SAND COVER		16809.16667	CY	20	35	40	336183.3333	588320.8333	672366.6667
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							11600000	15500000	19900000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		2	CONSTRUCTION SEASONS	300000	375000	450000	600000	750000	900000
CONTINGENCY		0.3	percent				3665250	4881000	6247500
MONITORING COSTS									
	Water Quality Monitoring during construction	22.08698611	week	11000	15000	18000	242956.8472	331304.7917	397565.75
	Post-Dredging Confirmational Sampling	18.05943526	samples	4000	6000	8000	72237.74105	108356.6116	144475.4821
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	0.347296832	ACRES	200000	400000	600000	69459.36639	138918.7328	208378.0992
	Eel Grass Land Lease Costs (in perpetuity)	0.347296832	ACRES	500000	1000000	1500000	173648.416	347296.832	520945.2479
	Internal Shipyard Costs	1	LUMP SUM	150000	200000	250000	150000	200000	250000
	RWQCB Oversight Costs	9	years	30000	36000	45000	270000	324000	405000
GRAND TOTAL							18200000	24300000	31400000

VOLUME AND AREA LEDGER		TOTAL
	Total volume being dredged (CY)	75243
	Total volume being dredged (TONS)	112864.5
	Total area of dredging (sq. ft.)	302565
	Total area of dredging (acres)	6.945936639

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		49660	add 10%	54626
Dredging, open water, cy		14383	add 10%	15821.3
Rock placement, tons		11278		
Clean sand cover, cy		16809.16667		
Underpier sand, sq.ft.		70030		
Time to dredge inner shipyard, days		109.252	Daily rate (cy)	500
	Weeks	18.20866667	Days per week	6
	Months	4.552166667		
Time to dredge outer shipyard, days		13.18441667	Daily rate (cy)	1200
	Weeks	2.197402778	Days per week	6
	Months	0.549350694		
Time to place rock, days		15.03733333	Daily rate (tons)	750
	Weeks	2.506222222	Days per week	6
	Months	0.626555556		
Time to place clean sand, days		8.404583333	Daily rate (cy)	2000
	Weeks	1.400763889	Days per week	6
	Months	0.350190972		
Time to place underpier sand, days		1.680916667	Daily rate (sf)	10000
	Weeks	0.280152778	Days per week	6
	Months	0.070038194		
	Total weeks of in-water work	24.59320833		
	Total months of in-water work	6.148302083		
	CONSTRUCTION SEASONS	2	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	210000	275000	348000	210000	275000	348000
	Surveys and Engineering Design	1	LUMP SUM	400000	500000	675000	400000	500000	675000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	2	CONSTRUCTION SEASONS	200000	250000	300000	400000	500000	600000
	Demolition	1	LUMP SUM	300000	400000	500000	300000	400000	500000
DREDGING									
	Unconstrained open-water dredging (outside of leasehold area)	14383	CY	6	7	10	86298	100681	143830
	Constrained dredging from inner shipyard (within leasehold area)	81811	CY	10	13	18	818110	1063543	1472598
	Dredging Surface/Subsurface Debris	4809.7	CY	70	89	120	336679	428063.3	577164
	Engineering Controls (silt curtain, oil boom)	2	CONSTRUCTION SEASONS	25000	28000	32000	50000	56000	64000
	Additional Dredging (if needed)	15900	CY	10	13	18	159000	206700	286200
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Structures	15025	TON	25	35	45	375625	525875	676125
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Area	2	CONSTRUCTION SEASONS	200000	250000	300000	400000	500000	600000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	112094	CY	10	16	25	1120940	1793504	2802350
	Transportation and Disposal at Landfill	168141	TON	50	62.5	75	8407050	10508812.5	12610575
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers and overwater structures	115222	SF	15	20	30	1728330	2304440	3456660
PLACEMENT OF CLEAN SAND COVER		23915.38889	CY	20	35	40	478307.7778	837038.6111	956615.5556
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							16500000	21800000	28100000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		2	CONSTRUCTION SEASONS	300000	375000	450000	600000	750000	900000
CONTINGENCY		0.3	percent				5135250	6771000	8707500
MONITORING COSTS									
	Water Quality Monitoring during construction	34.58630833	week	11000	15000	18000	380449.3917	518794.625	622553.55
	Post-Dredging Confirmational Sampling	25.69421947	samples	4000	6000	8000	102776.8779	154165.3168	205553.7557
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	0.494119605	ACRES	200000	400000	600000	98823.92103	197647.8421	296471.7631
	Eel Grass Land Lease Costs (in perpetuity)	0.494119605	ACRES	500000	1000000	1500000	247059.8026	494119.6051	741179.4077
	Internal Shipyard Costs	1	LUMP SUM	175000	200000	250000	175000	200000	250000
	RWQCB Oversight Costs	9	years	30000	36000	45000	270000	324000	405000
GRAND TOTAL							24900000	32900000	42600000

VOLUME AND AREA LEDGER		**TOTAL**
	Total volume being dredged (CY)	112094
	Total volume being dredged (TONS)	168141
	Total area of dredging (sq. ft.)	430477
	Total area of dredging (acres)	9.882392103

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		81811	add 10%	89992.1
Dredging, open water, cy		14383	add 10%	15821.3
Rock placement, tons		15025		
Clean sand cover, cy		23915.38889		
Underpier sand, sq.ft.		115222		
Time to dredge inner shipyard, days		179.9842	Daily rate (cy)	500
	Weeks	29.99736667	Days per week	6
	Months	7.499341667		
Time to dredge outer shipyard, days		13.18441667	Daily rate (cy)	1200
	Weeks	2.197402778	Days per week	6
	Months	0.549350694		
Time to place rock, days		20.03333333	Daily rate (tons)	750
	Weeks	3.338888889	Days per week	6
	Months	0.834722222		
Time to place clean sand, days		11.95769444	Daily rate (cy)	2000
	Weeks	1.992949074	Days per week	6
	Months	0.498237269		
Time to place underpier sand, days		2.391538889	Daily rate (sf)	10000
	Weeks	0.398589815	Days per week	6
	Months	0.099647454		
	Total weeks of in-water work	37.92519722		
	Total months of in-water work	9.481299306		
	CONSTRUCTION SEASONS	2	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	210000	275000	348000	210000	275000	348000
	Surveys and Engineering Design	1	LUMP SUM	400000	500000	675000	400000	500000	675000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	3	CONSTRUCTION SEASONS	200000	250000	300000	600000	750000	900000
	Demolition	1	LUMP SUM	300000	400000	500000	300000	400000	500000
DREDGING									
	Unconstrained open-water dredging (outside of leasehold area)	24175	CY	6	7	10	145050	169225	241750
	Constrained dredging from inner shipyard (within leasehold area)	116982	CY	10	13	18	1169820	1520766	2105676
	Dredging Surface/Subsurface Debris	7057.85	CY	70	89	120	494049.5	628148.65	846942
	Engineering Controls (silt curtain, oil boom)	3	CONSTRUCTION SEASONS	25000	28000	32000	75000	84000	96000
	Additional Dredging (if needed)	24800	CY	10	13	18	248000	322400	446400
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Structures	20054	TON	25	35	45	501350	701890	902430
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Area	3	CONSTRUCTION SEASONS	200000	250000	300000	600000	750000	900000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	165957	CY	10	16	25	1659570	2655312	4148925
	Transportation and Disposal at Landfill	248935.5	TON	50	62.5	75	12446775	15558468.75	18670162.5
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers and overwater structures	131898	SF	15	20	30	1978470	2637960	3956940
PLACEMENT OF CLEAN SAND COVER		37175.88889	CY	20	35	40	743517.7778	1301156.111	1487035.556
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							22800000	30100000	38500000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		3	CONSTRUCTION SEASONS	300000	375000	450000	900000	1125000	1350000
CONTINGENCY		0.3	percent				7115250	9373500	11962500
MONITORING COSTS									
	Water Quality Monitoring during construction	50.30439167	week	11000	15000	18000	553348.3083	754565.875	905479.05
	Post-Dredging Confirmational Sampling	39.94103765	samples	4000	6000	8000	159764.1506	239646.2259	319528.3012
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	0.768096878	ACRES	200000	400000	600000	153619.3756	307238.7511	460858.1267
	Eel Grass Land Lease Costs (in perpetuity)	0.768096878	ACRES	500000	1000000	1500000	384048.4389	768096.8779	1152145.317
	Internal Shipyard Costs	1	LUMP SUM	175000	200000	250000	175000	200000	250000
	RWQCB Oversight Costs	10	years	30000	36000	45000	300000	360000	450000
GRAND TOTAL							33900000	44900000	57800000

VOLUME AND AREA LEDGER		**TOTAL**
	Total volume being dredged (CY)	165957
	Total volume being dredged (TONS)	248935.5
	Total area of dredging (sq. ft.)	669166
	Total area of dredging (acres)	15.36193756

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		116982	add 10%	128680.2
Dredging, open water, cy		24175	add 10%	26592.5
Rock placement, tons		20054		
Clean sand cover, cy		37175.88889		
Underpier sand, sq.ft.		131898		
Time to dredge inner shipyard, days		257.3604	Daily rate (cy)	500
	Weeks	42.8934	Days per week	6
	Months	10.72335		
Time to dredge outer shipyard, days		22.16041667	Daily rate (cy)	1200
	Weeks	3.693402778	Days per week	6
	Months	0.923350694		
Time to place rock, days		26.73866667	Daily rate (tons)	750
	Weeks	4.456444444	Days per week	6
	Months	1.114111111		
Time to place clean sand, days		18.58794444	Daily rate (cy)	2000
	Weeks	3.097990741	Days per week	6
	Months	0.774497685		
Time to place underpier sand, days		3.717588889	Daily rate (sf)	10000
	Weeks	0.619598148	Days per week	6
	Months	0.154899537		
	Total weeks of in-water work	54.76083611		
	Total months of in-water work	13.69020903		
	CONSTRUCTION SEASONS	3	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	210000	275000	348000	210000	275000	348000
	Surveys and Engineering Design	1	LUMP SUM	400000	500000	675000	400000	500000	675000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	4	CONSTRUCTION SEASONS	200000	250000	300000	800000	1000000	1200000
	Demolition	1	LUMP SUM	300000	400000	500000	300000	400000	500000
DREDGING									
	Unconstrained open-water dredging (outside of leasehold are	44081	CY	6	7	10	264486	308567	440810
	Constrained dredging from inner shipyard (within leasehold a	207058	CY	10	13	18	2070580	2691754	3727044
	Dredging Surface/Subsurface Debris	12556.95	CY	70	89	120	878986.5	1117568.55	1506834
	Engineering Controls (silt curtain, oil boom)	4	CONSTRUCTION SEASONS	25000	28000	32000	100000	112000	128000
	Additional Dredging (if needed)	40500	CY	10	13	18	405000	526500	729000
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Struct	21600	TON	25	35	45	540000	756000	972000
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Are	4	CONSTRUCTION SEASONS	200000	250000	300000	800000	1000000	1200000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	291639	CY	10	16	25	2916390	4666224	7290975
	Transportation and Disposal at Landfill	437458.5	TON	50	62.5	75	21872925	27341156.25	32809387.5
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers ar	139841	SF	15	20	30	2097615	2796820	4195230
PLACEMENT OF CLEAN SAND COVER		60680.5	CY	20	35	40	1213610	2123817.5	2427220
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							36100000	47400000	60500000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		4	CONSTRUCTION SEASONS	300000	375000	450000	1200000	1500000	1800000
CONTINGENCY		0.3	percent				11195250	14676000	18697500
MONITORING COSTS									
	Water Quality Monitoring during construction	88.72391389	week	11000	15000	18000	975963.0528	1330858.708	1597030.45
	Post-Dredging Confirmational Sampling	65.19392562	samples	4000	6000	8000	260775.7025	391163.5537	521551.405
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	1.253729339	ACRES	200000	400000	600000	250745.8678	501491.7355	752237.6033
	Eel Grass Land Lease Costs (in perpetuity)	1.253729339	ACRES	500000	1000000	1500000	626864.6694	1253729.339	1880594.008
	Internal Shipyard Costs	1	LUMP SUM	175000	200000	250000	175000	200000	250000
	RWQCB Oversight Costs	11	years	30000	36000	45000	330000	396000	495000
GRAND TOTAL							52500000	69400000	88900000

VOLUME AND AREA LEDGER		TOTAL
	Total volume being dredged (CY)	291639
	Total volume being dredged (TONS)	437458.5
	Total area of dredging (sq. ft.)	1092249
	Total area of dredging (acres)	25.07458678

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		207058	add 10%	227763.8
Dredging, open water, cy		44081	add 10%	48489.1
Rock placement, tons		21600		
Clean sand cover, cy		60680.5		
Underpier sand, sq.ft.		139841		
Time to dredge inner shipyard, days		455.5276	Daily rate (cy)	500
	Weeks	75.92126667	Days per week	6
	Months	18.98031667		
Time to dredge outer shipyard, days		40.40758333	Daily rate (cy)	1200
	Weeks	6.734597222	Days per week	6
	Months	1.683649306		
Time to place rock, days		28.8	Daily rate (tons)	750
	Weeks	4.8	Days per week	6
	Months	1.2		
Time to place clean sand, days		30.34025	Daily rate (cy)	2000
	Weeks	5.056708333	Days per week	6
	Months	1.264177083		
Time to place underpier sand, days		6.06805	Daily rate (sf)	10000
	Weeks	1.011341667	Days per week	6
	Months	0.252835417		
	Total weeks of in-water work	93.52391389		
	Total months of in-water work	23.38097847		
	CONSTRUCTION SEASONS	4	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	300000	400000	500000	300000	400000	500000
	Surveys and Engineering Design	1	LUMP SUM	500000	650000	800000	500000	650000	800000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	5	CONSTRUCTION SEASONS	200000	250000	300000	1000000	1250000	1500000
	Demolition	1	LUMP SUM	400000	500000	600000	400000	500000	600000
DREDGING									
	Unconstrained open-water dredging □(outside of leasehold are	51057	CY	6	7	10	306342	357399	510570
	Constrained dredging from inner shipyard □(within leasehold a	254295	CY	10	13	18	2542950	3305835	4577310
	Dredging Surface/Subsurface Debris	15267.6	CY	70	89	120	1068732	1358816.4	1832112
	Engineering Controls (silt curtain, oil boom)	5	CONSTRUCTION SEASONS	25000	28000	32000	125000	140000	160000
	Additional Dredging (if needed)	53100	CY	10	13	18	531000	690300	955800
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Struct	24434	TON	25	35	45	610850	855190	1099530
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Are	5	CONSTRUCTION SEASONS	200000	250000	300000	1000000	1250000	1500000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	358452	CY	10	16	25	3584520	5735232	8961300
	Transportation and Disposal at Landfill	537678	TON	50	62.5	75	26883900	33604875	40325850
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers ar	180359	SF	15	20	30	2705385	3607180	5410770
PLACEMENT OF CLEAN SAND COVER		79715	CY	20	35	40	1594300	2790025	3188600
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							44400000	58300000	74200000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		5	CONSTRUCTION SEASONS	300000	375000	450000	1500000	1875000	2250000
CONTINGENCY		0.3	percent				13775250	18058500	22942500
MONITORING COSTS									
	Water Quality Monitoring during construction	109.013375	week	11000	15000	18000	1199147.125	1635200.625	1962240.75
	Post-Dredging Confirmational Sampling	85.64421488	samples	4000	6000	8000	342576.8595	513865.2893	685153.719
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	1.647004132	ACRES	200000	400000	600000	329400.8264	658801.6529	988202.4793
	Eel Grass Land Lease Costs (in perpetuity)	1.647004132	ACRES	500000	1000000	1500000	823502.0661	1647004.132	2470506.198
	Internal Shipyard Costs	1	LUMP SUM	250000	375000	500000	250000	375000	500000
	RWQCB Oversight Costs	12	years	30000	36000	45000	360000	432000	540000
GRAND TOTAL							64400000	85200000	109000000

VOLUME AND AREA LEDGER		TOTAL
	Total volume being dredged (CY)	358452
	Total volume being dredged (TONS)	537678
	Total area of dredging (sq. ft.)	1434870
	Total area of dredging (acres)	32.94008264

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		254295	add 10%	279724.5
Dredging, open water, cy		51057	add 10%	56162.7
Rock placement, tons		24434		
Clean sand cover, cy		79715		
Underpier sand, sq.ft.		180359		
Time to dredge inner shipyard, days		559.449	Daily rate (cy)	500
	Weeks	93.2415	Days per week	6
	Months	23.310375		
Time to dredge outer shipyard, days		46.80225	Daily rate (cy)	1200
	Weeks	7.800375	Days per week	6
	Months	1.95009375		
Time to place rock, days		32.57866667	Daily rate (tons)	750
	Weeks	5.429777778	Days per week	6
	Months	1.357444444		
Time to place clean sand, days		39.8575	Daily rate (cy)	2000
	Weeks	6.642916667	Days per week	6
	Months	1.660729167		
Time to place underpier sand, days		7.9715	Daily rate (sf)	10000
	Weeks	1.328583333	Days per week	6
	Months	0.332145833		
	Total weeks of in-water work	114.4431528		
	Total months of in-water work	28.61078819		
	CONSTRUCTION SEASONS	5	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	300000	400000	500000	300000	400000	500000
	Surveys and Engineering Design	1	LUMP SUM	500000	650000	800000	500000	650000	800000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	6	CONSTRUCTION SEASONS	200000	250000	300000	1200000	1500000	1800000
	Demolition	1	LUMP SUM	400000	500000	600000	400000	500000	600000
DREDGING									
	Unconstrained open-water dredging (outside of leasehold are	82215	CY	6	7	10	493290	575505	822150
	Constrained dredging from inner shipyard (within leasehold a	288048	CY	10	13	18	2880480	3744624	5184864
	Dredging Surface/Subsurface Debris	18513.15	CY	70	89	120	1295920.5	1647670.35	2221578
	Engineering Controls (silt curtain, oil boom)	6	CONSTRUCTION SEASONS	25000	28000	32000	150000	168000	192000
	Additional Dredging (if needed)	67800	CY	10	13	18	678000	881400	1220400
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Struct	26540	TON	25	35	45	663500	928900	1194300
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Are	6	CONSTRUCTION SEASONS	200000	250000	300000	1200000	1500000	1800000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	438063	CY	10	16	25	4380630	7009008	10951575
	Transportation and Disposal at Landfill	657094.5	TON	50	62.5	75	32854725	41068406.25	49282087.5
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers ar	183491	SF	15	20	30	2752365	3669820	5504730
PLACEMENT OF CLEAN SAND COVER		101646.7222	CY	20	35	40	2032934.444	3557635.278	4065868.889
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							53000000	69600000	88400000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		6	CONSTRUCTION SEASONS	300000	375000	450000	1800000	2250000	2700000
CONTINGENCY		0.3	percent				16445250	21561000	27337500
MONITORING COSTS									
	Water Quality Monitoring during construction	128.3428972	week	11000	15000	18000	1411771.869	1925143.458	2310172.15
	Post-Dredging Confirmational Sampling	109.2072222	samples	4000	6000	8000	436828.8889	655243.3333	873657.7778
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	2.100138889	ACRES	200000	400000	600000	420027.7778	840055.5556	1260083.333
	Eel Grass Land Lease Costs (in perpetuity)	2.100138889	ACRES	500000	1000000	1500000	1050069.444	2100138.889	3150208.333
	Internal Shipyard Costs	1	LUMP SUM	250000	375000	500000	250000	375000	500000
	RWQCB Oversight Costs	13	years	30000	36000	45000	390000	468000	585000
GRAND TOTAL							76600000	101500000	129500000

VOLUME AND AREA LEDGER		TOTAL
	Total volume being dredged (CY)	438063
	Total volume being dredged (TONS)	657094.5
	Total area of dredging (sq. ft.)	1829641
	Total area of dredging (acres)	42.00277778

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		288048	add 10%	316852.8
Dredging, open water, cy		82215	add 10%	90436.5
Rock placement, tons		26540		
Clean sand cover, cy		101646.7222		
Underpier sand, sq.ft.		183491		
Time to dredge inner shipyard, days		633.7056	Daily rate (cy)	500
	Weeks	105.6176	Days per week	6
	Months	26.4044		
Time to dredge outer shipyard, days		75.36375	Daily rate (cy)	1200
	Weeks	12.560625	Days per week	6
	Months	3.14015625		
Time to place rock, days		35.38666667	Daily rate (tons)	750
	Weeks	5.897777778	Days per week	6
	Months	1.474444444		
Time to place clean sand, days		50.82336111	Daily rate (cy)	2000
	Weeks	8.470560185	Days per week	6
	Months	2.117640046		
Time to place underpier sand, days		10.16467222	Daily rate (sf)	10000
	Weeks	1.694112037	Days per week	6
	Months	0.423528009		
	Total weeks of in-water work	134.240675		
	Total months of in-water work	33.56016875		
	CONSTRUCTION SEASONS	6	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	300000	400000	500000	300000	400000	500000
	Surveys and Engineering Design	1	LUMP SUM	500000	650000	800000	500000	650000	800000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	8	CONSTRUCTION SEASONS	200000	250000	300000	1600000	2000000	2400000
	Demolition	1	LUMP SUM	400000	500000	600000	400000	500000	600000
DREDGING									
	Unconstrained open-water dredging (outside of leasehold are	306722	CY	6	7	10	1840332	2147054	3067220
	Constrained dredging from inner shipyard (within leasehold a	301962	CY	10	13	18	3019620	3925506	5435316
	Dredging Surface/Subsurface Debris	30434.2	CY	70	89	120	2130394	2708643.8	3652104
	Engineering Controls (silt curtain, oil boom)	8	CONSTRUCTION SEASONS	25000	28000	32000	200000	224000	256000
	Additional Dredging (if needed)	110300	CY	10	13	18	1103000	1433900	1985400
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Struct	30924	TON	25	35	45	773100	1082340	1391580
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Are	8	CONSTRUCTION SEASONS	200000	250000	300000	1600000	2000000	2400000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	718984	CY	10	16	25	7189840	11503744	17974600
	Transportation and Disposal at Landfill	1078476	TON	50	62.5	75	53923800	67404750	80885700
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers ar	210594	SF	15	20	30	3158910	4211880	6317820
PLACEMENT OF CLEAN SAND COVER		165517.7778	CY	20	35	40	3310355.556	5793122.222	6620711.111
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							82200000	107800000	136600000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		8	CONSTRUCTION SEASONS	300000	375000	450000	2400000	3000000	3600000
CONTINGENCY		0.3	percent				25385250	33246000	42067500
MONITORING COSTS									
	Water Quality Monitoring during construction	174.1314833	week	11000	15000	18000	1915446.317	2611972.25	3134366.7
	Post-Dredging Confirmational Sampling	177.8290174	samples	4000	6000	8000	711316.0698	1066974.105	1422632.14
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	3.419788797	ACRES	200000	400000	600000	683957.7594	1367915.519	2051873.278
	Eel Grass Land Lease Costs (in perpetuity)	3.419788797	ACRES	500000	1000000	1500000	1709894.399	3419788.797	5129683.196
	Internal Shipyard Costs	1	LUMP SUM	250000	375000	500000	250000	375000	500000
	RWQCB Oversight Costs	15	years	30000	36000	45000	450000	540000	675000
GRAND TOTAL							117100000	155100000	197600000

VOLUME AND AREA LEDGER		TOTAL
	Total volume being dredged (CY)	718984
	Total volume being dredged (TONS)	1078476
	Total area of dredging (sq. ft.)	2979320
	Total area of dredging (acres)	68.39577594

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		301962	add 10%	332158.2
Dredging, open water, cy		306722	add 10%	337394.2
Rock placement, tons		30924		
Clean sand cover, cy		165517.7778		
Underpier sand, sq.ft.		210594		
Time to dredge inner shipyard, days		664.3164	Daily rate (cy)	500
	Weeks	110.7194	Days per week	6
	Months	27.67985		
Time to dredge outer shipyard, days		281.1618333	Daily rate (cy)	1200
	Weeks	46.86030556	Days per week	6
	Months	11.71507639		
Time to place rock, days		41.232	Daily rate (tons)	750
	Weeks	6.872	Days per week	6
	Months	1.718		
Time to place clean sand, days		82.75888889	Daily rate (cy)	2000
	Weeks	13.79314815	Days per week	6
	Months	3.448287037		
Time to place underpier sand, days		16.55177778	Daily rate (sf)	10000
	Weeks	2.75862963	Days per week	6
	Months	0.689657407		
	Total weeks of in-water work	181.0034833		
	Total months of in-water work	45.25087083		
	CONSTRUCTION SEASONS	8	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	400000	500000	600000	400000	500000	600000
	Surveys and Engineering Design	1	LUMP SUM	600000	750000	900000	600000	750000	900000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	10	CONSTRUCTION SEASONS	200000	250000	300000	2000000	2500000	3000000
	Demolition	1	LUMP SUM	500000	650000	800000	500000	650000	800000
DREDGING									
	Unconstrained open-water dredging (outside of leasehold are	349355	CY	6	7	10	2096130	2445485	3493550
	Constrained dredging from inner shipyard (within leasehold a	366133	CY	10	13	18	3661330	4759729	6590394
	Dredging Surface/Subsurface Debris	35774.4	CY	70	89	120	2504208	3183921.6	4292928
	Engineering Controls (silt curtain, oil boom)	10	CONSTRUCTION SEASONS	25000	28000	32000	250000	280000	320000
	Additional Dredging (if needed)	137000	CY	10	13	18	1370000	1781000	2466000
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Struct	35197	TON	25	35	45	879925	1231895	1583865
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Are	10	CONSTRUCTION SEASONS	200000	250000	300000	2000000	2500000	3000000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	852488	CY	10	16	25	8524880	13639808	21312200
	Transportation and Disposal at Landfill	1278732	TON	50	62.5	75	63936600	79920750	95904900
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers ar	251828	SF	15	20	30	3777420	5036560	7554840
PLACEMENT OF CLEAN SAND COVER		205569.3889	CY	20	35	40	4111387.778	7194928.611	8222775.556
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							97800000	128200000	162300000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		10	CONSTRUCTION SEASONS	300000	375000	450000	3000000	3750000	4500000
CONTINGENCY		0.3	percent				30245250	39591000	50047500
MONITORING COSTS									
	Water Quality Monitoring during construction	208.1793861	week	11000	15000	18000	2289973.247	3122690.792	3747228.95
	Post-Dredging Confirmational Sampling	220.859674	samples	4000	6000	8000	883438.6961	1325158.044	1766877.392
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	4.247301423	ACRES	200000	400000	600000	849460.2847	1698920.569	2548380.854
	Eel Grass Land Lease Costs (in perpetuity)	4.247301423	ACRES	500000	1000000	1500000	2123650.712	4247301.423	6370952.135
	Internal Shipyard Costs	1	LUMP SUM	300000	500000	700000	300000	500000	700000
	RWQCB Oversight Costs	17	years	30000	36000	45000	510000	612000	765000
GRAND TOTAL							139400000	184800000	235200000

VOLUME AND AREA LEDGER		**TOTAL**
	Total volume being dredged (CY)	852488
	Total volume being dredged (TONS)	1278732
	Total area of dredging (sq. ft.)	3700249
	Total area of dredging (acres)	84.94602847

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		366133	add 10%	402746.3
Dredging, open water, cy		349355	add 10%	384290.5
Rock placement, tons		35197		
Clean sand cover, cy		205569.3889		
Underpier sand, sq.ft.		251828		
Time to dredge inner shipyard, days		805.4926	Daily rate (cy)	500
	Weeks	134.2487667	Days per week	6
	Months	33.56219167		
Time to dredge outer shipyard, days		320.2420833	Daily rate (cy)	1200
	Weeks	53.37368056	Days per week	6
	Months	13.34342014		
Time to place rock, days		46.92933333	Daily rate (tons)	750
	Weeks	7.821555556	Days per week	6
	Months	1.955388889		
Time to place clean sand, days		102.7846944	Daily rate (cy)	2000
	Weeks	17.13078241	Days per week	6
	Months	4.282695602		
Time to place underpier sand, days		20.55693889	Daily rate (sf)	10000
	Weeks	3.426156481	Days per week	6
	Months	0.85653912		
	Total weeks of in-water work	216.0009417		
	Total months of in-water work	54.00023542		
	CONSTRUCTION SEASONS	10	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	400000	500000	600000	400000	500000	600000
	Surveys and Engineering Design	1	LUMP SUM	700000	850000	1000000	700000	850000	1000000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	12	CONSTRUCTION SEASONS	200000	250000	300000	2400000	3000000	3600000
	Demolition	1	LUMP SUM	500000	650000	800000	500000	650000	800000
DREDGING									
	Unconstrained open-water dredging □(outside of leasehold are	474903	CY	6	7	10	2849418	3324321	4749030
	Constrained dredging from inner shipyard □(within leasehold a	464316	CY	10	13	18	4643160	6036108	8357688
	Dredging Surface/Subsurface Debris	46960.95	CY	70	89	120	3287266.5	4179524.55	5635314
	Engineering Controls (silt curtain, oil boom)	12	CONSTRUCTION SEASONS	25000	28000	32000	300000	336000	384000
	Additional Dredging (if needed)	178300	CY	10	13	18	1783000	2317900	3209400
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Struct	45273	TON	25	35	45	1131825	1584555	2037285
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Are	12	CONSTRUCTION SEASONS	200000	250000	300000	2400000	3000000	3600000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	1117519	CY	10	16	25	11175190	17880304	27937975
	Transportation and Disposal at Landfill	1676278.5	TON	50	62.5	75	83813925	104767406.3	125720887.5
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers ar	310025	SF	15	20	30	4650375	6200500	9300750
PLACEMENT OF CLEAN SAND COVER		267377.3333	CY	20	35	40	5347546.667	9358206.667	10695093.33
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							126600000	165800000	209900000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		12	CONSTRUCTION SEASONS	300000	375000	450000	3600000	4500000	5400000
CONTINGENCY		0.3	percent				39065250	51096000	64597500
MONITORING COSTS									
	Water Quality Monitoring during construction	269.5415583	week	11000	15000	18000	2964957.142	4043123.375	4851748.05
	Post-Dredging Confirmational Sampling	287.2649036	samples	4000	6000	8000	1149059.614	1723589.421	2298119.229
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	5.524325069	ACRES	200000	400000	600000	1104865.014	2209730.028	3314595.041
	Eel Grass Land Lease Costs (in perpetuity)	5.524325069	ACRES	500000	1000000	1500000	2762162.534	5524325.069	8286487.603
	Internal Shipyard Costs	1	LUMP SUM	400000	600000	800000	400000	600000	800000
	RWQCB Oversight Costs	19	years	30000	36000	45000	570000	684000	855000
GRAND TOTAL							179600000	237900000	302700000

VOLUME AND AREA LEDGER		TOTAL
	Total volume being dredged (CY)	1117519
	Total volume being dredged (TONS)	1676278.5
	Total area of dredging (sq. ft.)	4812792
	Total area of dredging (acres)	110.4865014

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		464316	add 10%	510747.6
Dredging, open water, cy		474903	add 10%	522393.3
Rock placement, tons		45273		
Clean sand cover, cy		267377.3333		
Underpier sand, sq.ft.		310025		
Time to dredge inner shipyard, days		1021.4952	Daily rate (cy)	500
	Weeks	170.2492	Days per week	6
	Months	42.5623		
Time to dredge outer shipyard, days		435.32775	Daily rate (cy)	1200
	Weeks	72.554625	Days per week	6
	Months	18.13865625		
Time to place rock, days		60.364	Daily rate (tons)	750
	Weeks	10.06066667	Days per week	6
	Months	2.515166667		
Time to place clean sand, days		133.6886667	Daily rate (cy)	2000
	Weeks	22.28144444	Days per week	6
	Months	5.570361111		
Time to place underpier sand, days		26.73773333	Daily rate (sf)	10000
	Weeks	4.456288889	Days per week	6
	Months	1.114072222		
	Total weeks of in-water work	279.602225		
	Total months of in-water work	69.90055625		
	CONSTRUCTION SEASONS	12	Months per season	6

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Item		Probable Quantity	Unit	Probable Minimum Unit Cost	Probable Likely Unit Cost	Probable Maximum Unit Cost	Probable Minimum Cost	Probable Likely Cost	Probable Maximum Cost
DESIGN AND PERMITTING									
	Additional Pre-Design Site Characterization	1	LUMP SUM	400000	500000	600000	400000	500000	600000
	Surveys and Engineering Design	1	LUMP SUM	800000	1000000	1200000	800000	1000000	1200000
	Permitting	1	LUMP SUM	200000	300000	400000	200000	300000	400000
CEQA EIR		1	LUMP SUM	400000	700000	900000	400000	700000	900000
CONSTRUCTION PREPARATION									
	Mobilization(s) and Demobilization(s)	14	CONSTRUCTION SEASONS	200000	250000	300000	2800000	3500000	4200000
	Demolition	1	LUMP SUM	500000	650000	800000	500000	650000	800000
DREDGING									
	Unconstrained open-water dredging □(outside of leasehold are	683453	CY	6	7	10	4100718	4784171	6834530
	Constrained dredging from inner shipyard □(within leasehold a	464316	CY	10	13	18	4643160	6036108	8357688
	Dredging Surface/Subsurface Debris	57388.45	CY	70	89	120	4017191.5	5107572.05	6886614
	Engineering Controls (silt curtain, oil boom)	14	CONSTRUCTION SEASONS	25000	28000	32000	350000	392000	448000
	Additional Dredging (if needed)	228400	CY	10	13	18	2284000	2969200	4111200
MARINE STRUCTURES									
	Placement of Quarry Run Rock for Protection of Marine Struct	45817	TON	25	35	45	1145425	1603595	2061765
SEDIMENT OFFLOADING AND DISPOSAL									
	Acquisition or Several-Year Lease of Sediment Offloading Are	14	CONSTRUCTION SEASONS	200000	250000	300000	2800000	3500000	4200000
	Preparation of Sediment Offloading Area	1	LUMP SUM	100000	200000	300000	100000	200000	300000
	Rehandling and Dewatering	1376169	CY	10	16	25	13761690	22018704	34404225
	Transportation and Disposal at Landfill	2064253.5	TON	50	62.5	75	103212675	129015843.8	154819012.5
UNDERPIER REMEDIATION									
	Purchase and place 3 feet of clean sand/gravel beneath piers ar	313842	SF	15	20	30	4707630	6276840	9415260
PLACEMENT OF CLEAN SAND COVER		342628.6667	CY	20	35	40	6852573.333	11992003.33	13705146.67
	SW04 Cleanout, BMP Installation, Investigation	1	LUMP SUM	500000	600000	703048	500000	600000	703048
TOTAL DIRECT CONSTRUCTION COSTS							153600000	201100000	254300000
BID MANAGEMENT AND SUPPORT		1	LUMP SUM	17500	20000	25000	17500	20000	25000
CONSTRUCTION MANAGEMENT		14	CONSTRUCTION SEASONS	300000	375000	450000	4200000	5250000	6300000
CONTINGENCY		0.3	percent				47345250	61911000	78187500
MONITORING COSTS									
	Water Quality Monitoring during construction	308.9284972	week	11000	15000	18000	3398213.469	4633927.458	5560712.95
	Post-Dredging Confirmational Sampling	368.1134435	samples	4000	6000	8000	1472453.774	2208680.661	2944907.548
	Long-Term Monitoring of Remediated Areas	30	locations	32000	40000	60000	960000	1200000	1800000
	SW04 Long-Term Monitoring	1	LUMP SUM	400000	500000	595437	400000	500000	595437
OTHER (NON-CONSTRUCTION) COSTS									
	Eel Grass Habitat Mitigation (if needed)	7.079104683	ACRES	200000	400000	600000	1415820.937	2831641.873	4247462.81
	Eel Grass Land Lease Costs (in perpetuity)	7.079104683	ACRES	500000	1000000	1500000	3539552.342	7079104.683	10618657.02
	Internal Shipyard Costs	1	LUMP SUM	500000	750000	1000000	500000	750000	1000000
	RWQCB Oversight Costs	21	years	30000	36000	45000	630000	756000	945000
GRAND TOTAL							217500000	288200000	366500000

VOLUME AND AREA LEDGER		**TOTAL**
	Total volume being dredged (CY)	1376169
	Total volume being dredged (TONS)	2064253.5
	Total area of dredging (sq. ft.)	6167316
	Total area of dredging (acres)	141.5820937

ESTIMATION OF CONSTRUCTION DURATION				
Dredging, inner shipyards, cy		464316	add 10%	510747.6
Dredging, open water, cy		683453	add 10%	751798.3
Rock placement, tons		45817		
Clean sand cover, cy		342628.6667		
Underpier sand, sq.ft.		313842		
Time to dredge inner shipyard, days		1021.4952	Daily rate (cy)	500
	Weeks	170.2492	Days per week	6
	Months	42.5623		
Time to dredge outer shipyard, days		626.4985833	Daily rate (cy)	1200
	Weeks	104.4164306	Days per week	6
	Months	26.10410764		
Time to place rock, days		61.08933333	Daily rate (tons)	750
	Weeks	10.18155556	Days per week	6
	Months	2.545388889		
Time to place clean sand, days		171.3143333	Daily rate (cy)	2000
	Weeks	28.55238889	Days per week	6
	Months	7.138097222		
Time to place underpier sand, days		34.26286667	Daily rate (sf)	10000
	Weeks	5.710477778	Days per week	6
	Months	1.427619444		
	Total weeks of in-water work	319.1100528		
	Total months of in-water work	79.77751319		
	CONSTRUCTION SEASONS	14	Months per season	6

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Econ Feas Scenario	Polygon Rank	Station	Area (ft2)	PCBs (µg/kg)	Mercury (mg/kg)	Copper (mg/kg)	TBT (µg/kg)
				Station Concentrations			
Pre-Remedy							
	1	SW04	22,682	4000	1.75	1500	3250
	2	SW08	16,829	2100	2.25	920	1850
	3	SW02	39,162	5450	4.45	580	167
	4	SW24	21,179	950	1.90	300	165
	5	SW09	24,479	710	0.96	660	910
1	6	SW13	38,257	490	0.86	800	790
	7	NA17	36,471	550	0.85	510	1350
	8	SW01	33,394	1600	1.45	560	450
	9	SW16	17,835	430	0.95	430	1100
	10	SW21	11,896	2400	1.40	260	170
	11	SW28	51,554	2100	0.88	265	150
2	12	NA06	61,035	640	2.35	395	225
	13	SW20	28,175	1600	0.99	290	130
	14	SW05	24,163	1200	0.96	230	170
	15	SW23	30,077	1000	1.00	280	210
	16	SW22	3,762	900	1.10	260	190
	17	SW17	55,898	540	0.98	270	440
3	18	NA19	32,043	990	0.78	270	570

Econ Feas Scenario	Polygon Rank	Station	Area (ft2)	Station Concentrations PCBs (µg/kg)	Mercury (mg/kg)	Copper (mg/kg)	TBT (µg/kg)
	19	NA07	30,298	495	1.45	225	110.5
	20	SW14	16,732	400	1.00	280	450
	21	NA15	47,633	340	0.98	250	670
	22	SW10	21,608	610	0.58	160	250
	23	NA23	68,000	510	1.10	350	120
4	24	SW29	62,497	820	0.93	220	190
	25	NA04	72,669	250	1.10	260	300
	26	NA01	99,788	375	1.06	252.5	157
	27	NA27	53,889	210	1.20	390	100
	28	NA16	38,254	590	1.09	252.5	175
	29	SW30	72,231	380	1.10	240	200
5	30	SW27	78,889	200	0.68	210	250
	31	NA03	118,384	370	1.10	220	180
	32	SW25	69,690	350	0.78	230	230.5
	33	SW15	55,766	380	0.90	230	170
	34	SW03	48,811	410	1.20	190	53
	35	SW06	25,751	380	0.75	170	100
6	36	SW18	52,601	440	0.75	220	130

Econ Feas Scenario	Polygon Rank	Station	Area (ft2)	PCBs (µg/kg)	Mercury (mg/kg)	Copper (mg/kg)	TBT (µg/kg)
				Station Concentrations			
	37	NA09	29,521	290	1.20	260	120
	38	SW19	214,747	94	2.10	110	37
	39	NA18	40,452	350	0.79	230	210
	40	NA08	20,352	310	0.82	270	110
	41	NA28	54,262	180	0.89	290	90
7	42	SW11	36,689	200	0.75	170	140
	43	NA21	476,122	180	0.51	150	410
	44	SW36	90,730	200	0.75	240	49
	45	NA24	65,314	290	0.88	200	59
	46	SW34	304,572	130	0.75	320	38
	47	NA11	37,813	190	0.85	180	38
8	48	NA02	164,015	210	0.70	170	82
	49	NA05	112,824	180	0.61	170	110
	50	NA13	255,727	170	0.65	185	68
	51	NA22	54,670	180	0.38	150	120
	52	NA10	29,136	160	0.58	160	91
	53	NA12	91,096	150	0.62	150	80
9	54	SW07	40,947	170	0.52	150	44

				Station Concentrations			
Econ Feas Scenario	**Polygon Rank**	**Station**	**Area (ft2)**	**PCBs (µg/kg)**	**Mercury (mg/kg)**	**Copper (mg/kg)**	**TBT (µg/kg)**
	55	NA20	311,465	120	0.24	96	280
	56	NA30	240,838	100	0.71	140	22
	57	SW12	112,942	150	0.53	119.5	36
	58	NA29	202,964	190	0.55	110	58
	59	SW26	86,923	290	0.43	120	49
10	60	NA14	208,687	130	0.55	130	45
	61	SW32	78,477	160	0.51	92	30
	62	SW33	151,872	100	0.53	100	19
	63	NA26	302,544	180	0.48	80	37
	64	NA25	521,664	83	0.42	85	25
	65	NA31	229,185	68	0.35	71	20
11	66	SW31	83,499	66	0.23	54	36
		Total	**6,232,430**				

Notes:

SWAC values in each row result from remediation of all polygons up to and including that row

Areas include all under pier and technically infeasible areas

Chollas Creek mouth TMDL area not included in poygons NA20, NA21, and NA22

Costs and concentration data from July, 2010

Econ Feas Scenario	Polygon Rank	Station	Station Concentrations HPAH (µg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
Pre-Remedy							
	1	SW04	13000	73.0	1.95	430	3450
	2	SW08	26000	24.0	0.73	225	830
	3	SW02	14000	13.8	3.18	170	585
	4	SW24	58000	10.0	0.33	88	300
	5	SW09	17000	27.0	1.10	220	1200
1	6	SW13	12000	15.0	0.42	93	580
	7	NA17	3900	14.5	0.41	115	620
	8	SW01	10000	13.5	0.71	145	520
	9	SW16	5700	12.0	0.66	97	370
	10	SW21	9700	11.0	0.51	120	330
	11	SW28	20000	14.0	0.32	100	330
2	12	NA06	4400	10.5	0.27	130	335
	13	SW20	11000	14.0	0.41	110	390
	14	SW05	13000	11.0	0.86	120	280
	15	SW23	11000	15.0	0.37	110	330
	16	SW22	12000	13.0	0.35	110	310
	17	SW17	10000	12.0	0.37	93	310
3	18	NA19	3000	14.0	0.37	100	450

			Station Concentrations				
Econ Feas Scenario	**Polygon Rank**	**Station**	**HPAH (µg/kg)**	**Arsenic (mg/kg)**	**Cadmium (mg/kg)**	**Lead (mg/kg)**	**Zinc (mg/kg)**
	19	NA07	15850	13.5	0.27	100	255
	20	SW14	8400	10.0	0.31	88	300
	21	NA15	3300	12.0	0.25	83	310
	22	SW10	16000	13.0	0.87	79	360
	23	NA23	3400	12.0	0.26	120	430
4	24	SW29	4600	8.3	0.49	72	230
	25	NA04	3500	12.0	0.27	93	310
	26	NA01	7550	10.2	0.24	84	297.5
	27	NA27	2800	13.0	0.29	110	500
	28	NA16	3700	10.5	0.36	89.75	312.5
	29	SW30	4900	8.9	0.23	72	300
5	30	SW27	12000	10.0	0.27	80	250
	31	NA03	6100	11.0	0.29	94	260
	32	SW25	11000	11.5	0.36	85.5	345
	33	SW15	7700	11.0	0.45	90	290
	34	SW03	6800	11.0	0.70	79	230
	35	SW06	12000	15.0	0.85	81	280
6	36	SW18	8100	11.0	0.33	86	280

			Station Concentrations				
Econ Feas Scenario	**Polygon Rank**	**Station**	**HPAH (µg/kg)**	**Arsenic (mg/kg)**	**Cadmium (mg/kg)**	**Lead (mg/kg)**	**Zinc (mg/kg)**
	37	NA09	2800	13.0	0.40	97	330
	38	SW19	1100	7.1	0.15	51	150
	39	NA18	2400	14.0	0.36	97	380
	40	NA08	3500	18.0	0.31	96	330
	41	NA28	3400	10.0	0.31	84	390
7	42	SW11	8000	9.6	0.24	74	240
	43	NA21	2100	11.0	0.39	83	250
	44	SW36	4000	9.9	0.21	79	300
	45	NA24	2100	9.6	0.20	88	280
	46	SW34	1400	8.3	0.21	99	310
	47	NA11	2800	9.3	0.28	73	230
8	48	NA02	2800	10.0	0.21	76	240
	49	NA05	2800	9.5	0.17	65	210
	50	NA13	1500	10.8	0.24	75	295
	51	NA22	3600	8.5	0.46	95	230
	52	NA10	1800	6.9	0.22	59	190
	53	NA12	2000	9.5	0.18	59	210
9	54	SW07	3800	8.1	0.19	57	170

Econ Feas Scenario	Polygon Rank	Station	Station Concentrations HPAH (µg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
	55	NA20	2900	6.6	0.44	53	190
	56	NA30	1000	7.5	0.22	59	170
	57	SW12	3000	7.4	0.14	52	160
	58	NA29	1900	6.9	0.14	56	170
	59	SW26	1600	9.0	0.14	58	160
10	60	NA14	1100	9.0	0.25	66	200
	61	SW32	830	9.4	0.06	57	160
	62	SW33	1000	10.0	0.07	58	170
	63	NA26	850	6.2	0.11	41	140
	64	NA25	1100	6.0	0.11	41	130
	65	NA31	530	5.3	0.13	34	110
11	66	SW31	1200	4.0	0.06	21	80
		Total					

PCB SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
Pre-Remedy			308		
	1	SW04	294	90,728,000	1,905,288
	2	SW08	288	35,340,900	1,413,636
	3	SW02	255	213,432,900	3,289,608
	4	SW24	252	20,120,050	1,779,036
	5	SW09	249	17,380,090	2,056,236
1	6	SW13	247	18,745,930	3,213,588
	7	NA17	244	20,059,050	3,063,564
	8	SW01	236	53,429,936	2,805,072
	9	SW16	235	7,669,050	1,498,140
	10	SW21	230	28,551,168	999,291
	11	SW28	214	108,263,400	4,330,536
2	12	NA06	208	39,062,400	5,126,940
	13	SW20	201	45,080,000	2,366,700
	14	SW05	197	28,995,600	2,029,692
	15	SW23	193	30,077,000	2,526,468
	16	SW22	192	3,385,602	315,990
	17	SW17	188	30,184,920	4,695,432
3	18	NA19	183	31,722,570	2,691,612

PCB SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	19	NA07	181	14,997,277	2,544,993
	20	SW14	181	6,692,772	1,405,482
	21	NA15	179	16,195,220	4,001,172
	22	SW10	177	13,180,880	1,815,072
	23	NA23	172	34,680,000	5,712,000
4	24	SW29	165	51,247,540	5,249,748
	25	NA04	163	18,167,250	6,104,196
	26	NA01	158	37,420,500	8,382,192
	27	NA27	157	11,316,690	4,526,676
	28	NA16	154	22,569,860	3,213,336
	29	SW30	151	27,447,765	6,067,401
5	30	SW27	149	15,777,800	6,626,676
	31	NA03	144	43,802,080	9,944,256
	32	SW25	141	24,391,500	5,853,960
	33	SW15	138	21,191,080	4,684,344
	34	SW03	135	20,012,510	4,100,124
	35	SW06	134	9,785,380	2,163,084
6	36	SW18	131	23,144,440	4,418,484

PCB SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	37	NA09	130	8,561,090	2,479,764
	38	SW19	130	20,186,176	18,038,710
	39	NA18	128	14,158,200	3,397,968
	40	NA08	127	6,309,139	1,709,573
	41	NA28	127	9,767,153	4,558,005
7	42	SW11	126	7,337,800	3,081,876
	43	NA21	119	85,701,960	39,994,248
	44	SW36	117	18,146,000	7,621,320
	45	NA24	115	18,941,060	5,486,376
	46	SW34	113	39,594,360	25,584,048
	47	NA11	112	7,184,540	3,176,323
8	48	NA02	109	34,443,150	13,777,260
	49	NA05	107	20,308,320	9,477,216
	50	NA13	103	43,473,607	21,481,076
	51	NA22	102	9,840,600	4,592,280
	52	NA10	102	4,661,755	2,447,421
	53	NA12	101	13,664,400	7,652,064
9	54	SW07	101	6,960,990	3,439,548

PCB SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	55	NA20	99	37,375,800	26,163,060
	56	NA30	98	24,083,772	20,230,368
	57	SW12	97	16,941,300	9,487,128
	58	NA29	94	38,563,160	17,048,976
	59	SW26	91	25,207,670	7,301,532
10	60	NA14	89	27,129,365	17,529,743
	61	SW32	88	12,556,291	6,592,053
	62	SW33	88	15,187,214	12,757,260
	63	NA26	83	54,457,846	25,413,662
	64	NA25	83	43,298,100	43,819,764
	65	NA31	84	15,584,608	19,251,574
11	66	SW31	84	5,510,934	7,013,916
		Total			

Mercury SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (mg/kg)	Conc x Area	[Bkgd] x Area
Pre-Remedy			0.75		
	1	SW04	0.75	39,694	12,929
	2	SW08	0.75	37,865	9,593
	3	SW02	0.72	174,271	22,322
	4	SW24	0.72	40,240	12,072
	5	SW09	0.72	23,500	13,953
1	6	SW13	0.71	32,901	21,806
	7	NA17	0.71	30,818	20,788
	8	SW01	0.71	48,421	19,034
	9	SW16	0.71	16,943	10,166
	10	SW21	0.70	16,655	6,781
	11	SW28	0.70	45,110	29,386
2	12	NA06	0.68	143,432	34,790
	13	SW20	0.68	27,893	16,060
	14	SW05	0.68	23,196	13,773
	15	SW23	0.68	30,077	17,144
	16	SW22	0.68	4,138	2,144
	17	SW17	0.67	54,780	31,862
3	18	NA19	0.67	24,994	18,265

Mercury SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (mg/kg)	Conc x Area	[Bkgd] x Area
	19	NA07	0.67	43,931	17,270
	20	SW14	0.67	16,732	9,537
	21	NA15	0.67	46,680	27,151
	22	SW10	0.67	12,533	12,317
	23	NA23	0.66	74,800	38,760
4	24	SW29	0.66	58,122	35,623
	25	NA04	0.65	79,936	41,421
	26	NA01	0.64	106,025	56,879
	27	NA27	0.64	64,667	30,717
	28	NA16	0.63	41,792	21,805
	29	SW30	0.63	79,454	41,172
5	30	SW27	0.63	53,645	44,967
	31	NA03	0.62	130,222	67,479
	32	SW25	0.61	54,010	39,723
	33	SW15	0.61	50,189	31,787
	34	SW03	0.61	58,573	27,822
	35	SW06	0.60	19,313	14,678
6	36	SW18	0.60	39,451	29,983

Mercury SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (mg/kg)	Conc x Area	[Bkgd] x Area
	37	NA09	0.60	35,425	16,827
	38	SW19	0.55	450,968	122,406
	39	NA18	0.55	31,957	23,058
	40	NA08	0.55	16,689	11,601
	41	NA28	0.54	48,293	30,929
7	42	SW11	0.54	27,517	20,913
	43	NA21	0.55	242,822	271,390
	44	SW36	0.54	68,048	51,716
	45	NA24	0.54	57,476	37,229
	46	SW34	0.53	228,429	173,606
	47	NA11	0.53	32,141	21,554
8	48	NA02	0.53	114,811	93,489
	49	NA05	0.53	68,823	64,310
	50	NA13	0.52	164,944	145,764
	51	NA22	0.52	20,775	31,162
	52	NA10	0.52	16,899	16,608
	53	NA12	0.52	56,480	51,925
9	54	SW07	0.52	21,292	23,340

Mercury SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (mg/kg)	Conc x Area	[Bkgd] x Area
	55	NA20	0.54	74,752	177,535
	56	NA30	0.53	170,995	137,278
	57	SW12	0.54	59,295	64,377
	58	NA29	0.54	111,630	115,689
	59	SW26	0.54	37,377	49,546
10	60	NA14	0.54	114,778	118,952
	61	SW32	0.54	40,023	44,732
	62	SW33	0.54	80,492	86,567
	63	NA26	0.54	145,221	172,450
	64	NA25	0.56	219,099	297,348
	65	NA31	0.57	80,215	130,636
11	66	SW31	0.57	19,205	47,594
		Total			

Copper SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (mg/kg)	Conc x Area	[Bkgd] x Area
Pre-Remedy			187		
	1	SW04	182	34,023,000	2,744,522
	2	SW08	180	15,482,680	2,036,309
	3	SW02	177	22,713,960	4,738,602
	4	SW24	176	6,353,700	2,562,659
	5	SW09	174	16,156,140	2,961,959
1	6	SW13	170	30,605,600	4,629,097
	7	NA17	168	18,600,210	4,412,991
	8	SW01	165	18,700,478	4,040,639
	9	SW16	165	7,669,050	2,158,035
	10	SW21	164	3,093,043	1,439,455
	11	SW28	163	13,661,810	6,238,034
2	12	NA06	160	24,108,825	7,385,235
	13	SW20	160	8,170,750	3,409,175
	14	SW05	159	5,557,490	2,923,723
	15	SW23	158	8,421,560	3,639,317
	16	SW22	158	978,063	455,175
	17	SW17	157	15,092,460	6,763,658
3	18	NA19	156	8,651,610	3,877,203

Copper SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (mg/kg)	Conc x Area	[Bkgd] x Area
	19	NA07	156	6,816,944	3,666,001
	20	SW14	155	4,684,940	2,024,564
	21	NA15	154	11,908,250	5,763,593
	22	SW10	154	3,457,280	2,614,568
	23	NA23	152	23,800,000	8,228,000
4	24	SW29	151	13,749,340	7,562,137
	25	NA04	149	18,893,940	8,792,949
	26	NA01	147	25,196,470	12,074,348
	27	NA27	145	21,016,710	6,520,569
	28	NA16	144	9,659,135	4,628,734
	29	SW30	142	17,335,430	8,739,946
5	30	SW27	141	16,566,690	9,545,569
	31	NA03	139	26,044,480	14,324,464
	32	SW25	138	16,028,700	8,432,490
	33	SW15	137	12,826,180	6,747,686
	34	SW03	137	9,274,090	5,906,131
	35	SW06	137	4,377,670	3,115,871
6	36	SW18	136	11,572,220	6,364,721

Copper SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (mg/kg)	Conc x Area	[Bkgd] x Area
	37	NA09	135	7,675,460	3,572,041
	38	SW19	135	23,622,121	25,984,333
	39	NA18	135	9,303,960	4,894,692
	40	NA08	134	5,495,056	2,462,599
	41	NA28	133	15,735,968	6,565,697
7	42	SW11	132	6,237,130	4,439,369
	43	NA21	130	71,418,300	57,610,762
	44	SW36	129	21,775,200	10,978,330
	45	NA24	128	13,062,800	7,902,994
	46	SW34	118	97,463,040	36,853,212
	47	NA11	118	6,806,407	4,575,418
8	48	NA02	116	27,882,550	19,845,815
	49	NA05	115	19,180,080	13,651,704
	50	NA13	113	47,309,514	30,942,979
	51	NA22	113	8,200,500	6,615,070
	52	NA10	112	4,661,755	3,525,452
	53	NA12	112	13,664,400	11,022,616
9	54	SW07	112	6,142,050	4,954,587

Copper SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (mg/kg)	Conc x Area	[Bkgd] x Area
	55	NA20	113	29,900,640	37,687,265
	56	NA30	112	33,717,281	29,141,364
	57	SW12	112	13,496,569	13,665,982
	58	NA29	113	22,326,040	24,558,644
	59	SW26	113	10,430,760	10,517,683
10	60	NA14	112	27,129,365	25,251,178
	61	SW32	113	7,219,867	9,495,695
	62	SW33	113	15,187,214	18,376,529
	63	NA26	115	24,203,487	36,607,774
	64	NA25	118	44,341,428	63,121,327
	65	NA31	120	16,272,164	27,731,435
11	66	SW31	121	4,508,946	10,103,379
		Total			

TBT SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
Pre-Remedy			162		
	1	SW04	151	73,716,500	499,004
	2	SW08	146	31,133,650	370,238
	3	SW02	145	6,540,054	861,564
	4	SW24	144	3,494,535	465,938
	5	SW09	141	22,275,890	538,538
1	6	SW13	136	30,223,030	841,654
	7	NA17	128	49,235,850	802,362
	8	SW01	126	15,027,170	734,662
	9	SW16	123	19,618,500	392,370
	10	SW21	123	2,022,374	261,719
	11	SW28	122	7,733,100	1,134,188
2	12	NA06	120	13,732,875	1,342,770
	13	SW20	119	3,662,750	619,850
	14	SW05	119	4,107,710	531,586
	15	SW23	118	6,316,170	661,694
	16	SW22	118	714,738	82,759
	17	SW17	114	24,595,120	1,229,756
3	18	NA19	111	18,264,510	704,946

TBT SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	19	NA07	111	3,347,877	666,546
	20	SW14	109	7,529,369	368,102
	21	NA15	105	31,914,110	1,047,926
	22	SW10	104	5,402,000	475,376
	23	NA23	103	8,160,000	1,496,000
4	24	SW29	101	11,874,430	1,374,934
	25	NA04	98	21,800,700	1,598,718
	26	NA01	96	15,666,716	2,195,336
	27	NA27	95	5,388,900	1,185,558
	28	NA16	94	6,694,450	841,588
	29	SW30	92	14,446,192	1,589,081
5	30	SW27	89	19,722,250	1,735,558
	31	NA03	86	21,309,120	2,604,448
	32	SW25	84	16,063,545	1,533,180
	33	SW15	82	9,480,220	1,226,852
	34	SW03	82	2,586,983	1,073,842
	35	SW06	82	2,575,100	566,522
6	36	SW18	81	6,838,130	1,157,222

TBT SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	37	NA09	80	3,542,520	649,462
	38	SW19	80	7,945,622	4,724,424
	39	NA18	79	8,494,920	889,944
	40	NA08	78	2,238,727	447,745
	41	NA28	78	4,883,576	1,193,763
7	42	SW11	77	5,136,460	807,158
	43	NA21	47	195,210,020	10,474,684
	44	SW36	47	4,445,770	1,996,060
	45	NA24	47	3,853,526	1,436,908
	46	SW34	46	11,573,736	6,700,584
	47	NA11	46	1,436,908	831,894
8	48	NA02	44	13,449,230	3,608,330
	49	NA05	43	12,410,640	2,482,128
	50	NA13	41	17,389,443	5,625,996
	51	NA22	40	6,560,400	1,202,740
	52	NA10	40	2,651,373	640,991
	53	NA12	39	7,287,680	2,004,112
9	54	SW07	39	1,801,668	900,834

TBT SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	55	NA20	26	87,210,200	6,852,230
	56	NA30	26	5,298,430	5,298,430
	57	SW12	25	4,065,912	2,484,724
	58	NA29	24	11,771,912	4,465,208
	59	SW26	24	4,259,227	1,912,306
10	60	NA14	23	9,390,934	4,591,123
	61	SW32	23	2,354,305	1,726,490
	62	SW33	23	2,885,571	3,341,187
	63	NA26	22	11,194,113	6,655,959
	64	NA25	22	13,041,597	11,476,605
	65	NA31	22	4,583,708	5,042,079
11	66	SW31	22	3,005,964	1,836,978
		Total			

HPAH SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
Pre-Remedy			3,612		
	1	SW04	3,567	294,866,000	15,264,986
	2	SW08	3,499	437,554,000	11,325,917
	3	SW02	3,415	548,268,000	26,356,026
	4	SW24	3,220	1,228,382,000	14,253,467
	5	SW09	3,156	416,143,000	16,474,367
1	6	SW13	3,086	459,084,000	25,746,961
	7	NA17	3,068	142,236,900	24,544,983
	8	SW01	3,018	333,937,100	22,473,967
	9	SW16	3,003	101,659,500	12,002,955
	10	SW21	2,986	115,394,304	8,006,223
	11	SW28	2,826	1,031,080,000	34,695,842
2	12	NA06	2,790	268,554,000	41,076,555
	13	SW20	2,743	309,925,000	18,961,775
	14	SW05	2,695	314,119,000	16,261,699
	15	SW23	2,645	330,847,000	20,241,821
	16	SW22	2,638	45,141,360	2,531,678
	17	SW17	2,555	558,980,000	37,619,354
3	18	NA19	2,543	96,129,000	21,564,939

HPAH SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	19	NA07	2,469	480,215,851	20,390,238
	20	SW14	2,448	140,548,212	11,260,589
	21	NA15	2,428	157,188,900	32,057,009
	22	SW10	2,375	345,728,000	14,542,184
	23	NA23	2,345	231,200,000	45,764,000
4	24	SW29	2,306	287,486,200	42,060,481
	25	NA04	2,273	254,341,500	48,906,237
	26	NA01	2,163	753,399,400	67,157,324
	27	NA27	2,144	150,889,200	36,267,297
	28	NA16	2,126	141,539,800	25,744,942
	29	SW30	2,077	353,931,704	48,611,436
5	30	SW27	1,934	946,668,000	53,092,297
	31	NA03	1,830	722,142,400	79,672,432
	32	SW25	1,715	766,590,000	46,901,370
	33	SW15	1,652	429,398,200	37,530,518
	34	SW03	1,604	331,914,800	32,849,803
	35	SW06	1,557	309,012,000	17,330,423
6	36	SW18	1,495	426,068,100	35,400,473

HPAH SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	37	NA09	1,485	82,658,800	19,867,633
	38	SW19	1,470	236,221,205	144,524,428
	39	NA18	1,459	97,084,800	27,224,196
	40	NA08	1,449	71,232,210	13,696,936
	41	NA28	1,426	184,490,664	36,518,299
7	42	SW11	1,382	293,512,000	24,691,697
	43	NA21	1,273	999,856,200	320,430,106
	44	SW36	1,225	362,920,000	61,061,290
	45	NA24	1,210	137,159,400	43,956,322
	46	SW34	1,175	426,400,800	204,976,956
	47	NA11	1,162	105,877,436	25,448,398
8	48	NA02	1,106	459,242,000	110,382,095
	49	NA05	1,067	315,907,200	75,930,552
	50	NA13	1,033	383,590,650	172,104,338
	51	NA22	1,008	196,812,000	36,792,910
	52	NA10	1,002	52,444,746	19,608,508
	53	NA12	983	182,192,000	61,307,608
9	54	SW07	962	155,598,600	27,557,331

HPAH SWACs

Econ Feas Scenario	Polygon Rank	Station	SWAC (µg/kg)	Conc x Area	[Bkgd] x Area
	55	NA20	851	903,248,500	209,615,945
	56	NA30	838	240,837,720	162,083,786
	57	SW12	796	338,826,000	76,009,966
	58	NA29	756	385,631,600	136,594,772
	59	SW26	743	139,076,800	58,499,179
10	60	NA14	729	229,556,162	140,446,634
	61	SW32	727	65,135,761	52,814,900
	62	SW33	719	151,872,140	102,209,950
	63	NA26	711	257,162,052	203,611,836
	64	NA25	675	573,830,246	351,079,778
	65	NA31	680	121,468,267	154,241,781
11	66	SW31	673	100,198,800	56,194,827
		Total			

[BLANK SHEET]

Survey station	Arsenic (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Copper (mg/kg dry)	Lead (mg/kg dry)
BACKGRND	7.5	0.33	57	121	53
NA01	10.2	0.24	70	253	84 *J*
NA02	10	0.21	67	170	76 *J*
NA03	11	0.29	69	220	94 *J*
NA04	12	0.27	73	260	93 *J*
NA05	9.5	0.17	57	170	65
NA06	11	0.27	62 *J*	395	130
NA07	14	0.27	61	225 *J*	100
NA08	18	0.31	79	270 *J*	96
NA09	13	0.40	75	260 *J*	97
NA10	6.9	0.22	52	160 *J*	59
NA11	9.3	0.28	59	180	73
NA12	9.5	0.18 *U*	54	150	59 *J*
NA13	10.8 *J*	0.24	59	185	75 *J*
NA14	9.0	0.25	56	130 *J*	66
NA15	12	0.25	62	250	83 *J*
NA16	10.5	0.36	70.3 *J*	252.5	89.8
NA17	15	0.41	74 *J*	510	115 *J*
NA18	14	0.36	67	230 *J*	97
NA19	14	0.37	65	270	100 *J*
NA20	6.6	0.44	26	96	53 *J*
NA21	11	0.39	51	150 *J*	83
NA22	8.5	0.46	39	150 *J*	95
NA23	12	0.26	77 *J*	350	120
NA24	9.6	0.20	60 *J*	200	88
NA25	6.0	0.11	33 *J*	85	41
NA26	6.2 *J*	0.11	32	80	41
NA27	13	0.29	100	390	110
NA28	10	0.31	86	290	84
NA29	6.9 *J*	0.14	39	110	56
NA30	7.5 *J*	0.22	37	140	59
NA31	5.3	0.13	29 *J*	71	34
SW01	14	0.71	79	560 *J*	145
SW02	14	3.2	119	580 *J*	170
SW03	11	0.70	52	190 *J*	79
SW04	73 *J*	2.0	88	1,500 *J*	430
SW05	11	0.86	53	230 *J*	120
SW06	15	0.85	56	170 *J*	81
SW07	8.1	0.19	43	150 *J*	57
SW08	24	0.73	83	920 *J*	225
SW09	27	1.1	56	660 *J*	220
SW10	13	0.87	45	160 *J*	79

Survey station	Arsenic (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Copper (mg/kg dry)	Lead (mg/kg dry)
SW11	9.6	0.24	62	170	74
SW12	7.4 *J*	0.14	39	120 *J*	52
SW13	15	0.42	72	800	93
SW14	10	0.31	63	280	88
SW15	11	0.45	67	230	90
SW16	12	0.66	68	430	97
SW17	12	0.37	73	270	93
SW18	11	0.33	74	220	86
SW19	7.1	0.15	42	110 *J*	51
SW20	14	0.41	68	290 *J*	110
SW21	11	0.51	70	260	120
SW22	13	0.35	70	260 *J*	110
SW23	15	0.37	89	280 *J*	110
SW24	10 *J*	0.33	53	300 *J*	88
SW25	12 *J*	0.36	65	230 *J*	86
SW26	9.0	0.14	45	120 *J*	58
SW27	10	0.27	63	210	80
SW28	14 *J*	0.32	66	265	100 *J*
SW29	8.3	0.49	44 *J*	220	72
SW30	8.9	0.23	72	240	72
SW31	4.0 *J*	0.064	18	54	21
SW32	9.4 *J*	0.064	43 *J*	92	57
SW33	10 *J*	0.065	41	100	58
SW34	8.3 *J*	0.21	53	320	99
SW36	9.9	0.21	70 *J*	240 *J*	79

Survey station	Mercury (mg/kg dry)	Zinc (mg/kg dry)	Tributyltin (µg/kg dry)	Total PCB Congeners, full dl (ng/g dry)	Total HPAH, full dl (µg/kg dry)
BACKGRND	0.57	192	22	84	673
NA01	1.1 *J*	298	157 *J*	375	7,550
NA02	0.70	240	82	210	2,800
NA03	1.1	260	180	370	6,100
NA04	1.1	310	300	250	3,500
NA05	0.61	210 *J*	110	180	2,800
NA06	2 *J*	335 *J*	225 *J*	640	4,400
NA07	1.5	255 *J*	111	495	15,850
NA08	0.82	330 *J*	110	310	3,500
NA09	1.2	330 *J*	120	290	2,800
NA10	0.58	190 *J*	91	160	1,800
NA11	0.85	230 *J*	38 *J*	190	2,800
NA12	0.62	210	80	150	2,000
NA13	0.65	295	68	170	1,500
NA14	0.55	200 *J*	45	130	1,100
NA15	0.98	310	670	340	3,300
NA16	1.1 *J*	313 *J*	175	590	3,700
NA17	0.85 *J*	620 *J*	1,350	550	3,900
NA18	0.79	380 *J*	210	350	2,400
NA19	0.78	450	570	990	3,000
NA20	0.24	190	280	120	2,900
NA21	0.51	250 *J*	410	180	2,100
NA22	0.38	230 *J*	120	180	3,600
NA23	1.1	430 *J*	120	510	3,400
NA24	0.88 *J*	280 *J*	59	290	2,100
NA25	0.42 *J*	130 *J*	25	83	1,100
NA26	0.48	140	37	180	850
NA27	1.2	500	100	210	2,800
NA28	0.89	390	90	180	3,400
NA29	0.55	170	58	190	1,900
NA30	0.71	170	22	100	1,000
NA31	0.35 *J*	110 *J*	20 *J*	68	530
SW01	1.5 *J*	520 *J*	450	1,600	10,000
SW02	4.5 *J*	585 *J*	167 *J*	5,450	14,000
SW03	1.2	230 *J*	53	410	6,800
SW04	1.8	3,450 *J*	3,250 *J*	4,000	13,000
SW05	0.96	280 *J*	170	1,200	13,000
SW06	0.75	280 *J*	100	380	12,000
SW07	0.52	170 *J*	44	170	3,800
SW08	2.3	830 *J*	1,850 *J*	2,100	26,000
SW09	0.96	1,200 *J*	910	710	17,000
SW10	0.58	360 *J*	250	610	16,000

Survey station	Mercury (mg/kg dry)	Zinc (mg/kg dry)	Tributyltin (µg/kg dry)	Total PCB Congeners, full dl (ng/g dry)	Total HPAH, full dl (µg/kg dry)
SW11	0.75	240 *J*	140	200	8,000
SW12	0.53	160 *J*	36	150	3,000
SW13	0.86	580 *J*	790	490	12,000
SW14	1.0	300 *J*	450	400	8,400
SW15	0.90	290 *J*	170	380	7,700
SW16	0.95	370 *J*	1,100	430	5,700
SW17	0.98	310 *J*	440	540	10,000
SW18	0.75	280 *J*	130	440	8,100
SW19	2.1	150 *J*	37	94	1,100
SW20	0.99	390 *J*	130	1,600	11,000
SW21	1.4	330 *J*	170	2,400	9,700
SW22	1.1	310 *J*	190	900	12,000
SW23	1.0	330 *J*	210	1,000	11,000
SW24	1.9	300 *J*	165	950	58,000
SW25	0.78	345 *J*	231 *J*	350	11,000
SW26	0.43	160 *J*	49	290	1,600
SW27	0.68	250 *J*	250	200	12,000
SW28	0.88	330	150 *J*	2,100	20,000
SW29	0.93 *J*	230 *J*	190	820	4,600
SW30	1.1 *J*	300	200	380	4,900
SW31	0.23	80	36 *J*	66	1,200
SW32	0.51 *J*	160 *J*	30	160	830
SW33	0.53	170	19 *J*	100	1,000
SW34	0.75	310	38	130	1,400
SW36	0.75	300 *J*	49	200	4,000

VOLUME III

TECHNICAL REPORT FOR CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

FOR THE SHIPYARD SEDIMENT SITE • SAN DIEGO BAY, SAN DIEGO, CA

March 14, 2012

CALIFORNIA
Water Boards

STATE WATER RESOURCES CONTROL BOARD

REGIONAL WATER QUALITY CONTROL BOARDS

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FOR

VOLUME 3 of 3

OF THE

Technical Report for

CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

March 14, 2012

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SAN DIEGO REGION**

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Technical Report for

CLEANUP AND ABATEMENT ORDER NO. R9-2012-0024

For the Shipyard Sediment Site
San Diego Bay, San Diego, CA

Volume 3 of 3

Adopted by the
California Regional Water Quality Control Board
San Diego Region
on March 14, 2012

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Acronyms & Abbreviations

AET	Apparent Effects Threshold
AFFF	Aqueous Film Forming Foam
ASTM	American Society of Testing Material
ANOVA	Analysis of Variance
AQUA	Aquaculture Beneficial Use
ARCO	Atlantic Richfield Company
ASTs	Aboveground Storage Tanks
AT & SF	Atchison, Topeka, and Santa Fe Railroad
AVS/SEM	Acid Volatile Sulfide / Simultaneously Extracted Metals
BAF	Biota Accumulation Factor
BAP	Benzo[a]pyrene
Bight 98	Southern California Bight 1998 Regional Marine Monitoring Survey
BIOL	Preservation of Biological Habitats of Special Significance
BMPs	Best Management Practices
BPJ	Best Professional Judgment
BRI-E	Benthic Response Index for Embayments
BSAFs	Biota-to-Sediment Accumulation Factors
BTAG	U.S. Navy/U.S. EPA Region 9 Biological Technical Assistance Group
CAD	Confined Aquatic Disposal
CCC	Criterion Continuous Concentration
CCR	California Code of Regulation
CDFs	Confined Disposal Facilities
CEQA	California Environmental Quality Act
CMC	Criterion Maximum Concentration
CNRSW	Commander Navy Region Southwest
COCs	Contaminants of Concern
COMM	Commercial and Sport Fishing Beneficial Use
CoPC	Chemicals of Potential Concern
CSF	Cancer Slope Factor
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
DFG	California Department of Fish and Game
DRO	Diesel Range Organics
DTSC	California Department of Toxic Substances Control
DWQ	Division of Water Quality
EC50	Median Effective Concentration
EMC	Event Mean Concentration
EqP	Equilibrium Partitioning Approach
ERL	Effects Range Low
ERM	Effects Range Medium
EST	Estuarine Habitat Beneficial Use
FACs	Fluorescent Aromatic Compounds
FSP	Field Sampling Plan
GRO	Gasoline Range Organics
HPAH	High Molecular Weight Polynuclear Aromatic Hydrocarbons
HQ	Hazard Quotient
IND	Industrial Service Supply Beneficial Use
IR	Ingestion Rate
IRIS	Integrated Risk Information System
Kp	Partition Coefficients
LAET	Lowest Apparent Effects Threshold
LC50	Median Lethal Concentration
LOAELs	Low-Adverse-Effects-Levels
LOE	Lines of Evidence
LPAH	Low Molecular Weight Polynuclear Aromatic Hydrocarbons
LPL	Lower Prediction Limit
MAR	Marine Habitat Beneficial Use
MARCO	Marine Construction and Design Company
MEK	Methyl Ethyl Ketone
MIGR	Migration of Aquatic Organisms Beneficial Use
MS4	Municipal Separate Storm Sewer System
MTDB	Metropolitan Transit Development Board

NASSCO	National Steel and Shipbuilding Company
NAV	Navigation Beneficial Use
NAVSTA	Naval Station
NOAA	National Oceanic and Atmospheric Administration
NOAELs	No-Adverse-Effects-Levels
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRTAs	Natural Resource Trustees Agencies
NTR	National Toxics Rule
OHHEA	Office of Environmental Health and Hazard Assessment
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCTs	Polychlorinated Terphenyls
PL	Prediction Limit
PPPAH	Priority Pollutant Polynuclear Aromatic Hydrocarbon
PRGs	Preliminary Remediation Goals
PW	Pore Water
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/ Quality Control
RAP	Remedial Action Plan
RARE	Rare, Threatened or Endangered Species Beneficial Use
REC1	Contact Water Recreation Beneficial Use
REC2	Non Contact Water Recreation Beneficial Use
RfD	Reference Dose
RLs	Response Levels
RME	Reasonable Maximum Exposure
RRO	Residual Range Organics
SCCWRP	Southern California Coastal Water Research Project
SDG&E	San Diego Gas and Electric
SDMC	San Diego Marine Construction Company
SDUPD	San Diego Unified Port District
SHELL	Shellfish Harvesting Beneficial Use
SQGs	Sediment Quality Guidelines
SQGQ	Sediment Quality Guideline Quotient
SS-MEQ	Site-Specific Median Effects Quotient
SVOCs	Semi Volatile Organic Compounds
S-W Diversity	Shannon-Weiner Diversity Index
SWAC	Surface-Area Weighted Average Concentration
SWI	Sediment Water Interface
SWM	Southwest Marine, Inc.
SWCS	Storm Water Conveyance System
SWPPP	Storm Water Pollution Prevention Plan
SWPMP	Storm Water Pollution Monitoring Plan
TBT	Tributyltin
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TR	Tissue Residue (biota-water-sediment equilibrium partitioning approach)
TRGs	Tissue Residue Guidelines
TRI	Toxic Release Inventory
Triad	Sediment Quality Triad
TRV	Toxicity Reference Value
TSCA	Toxic Substances Control Act
TSS	Total Suspended Solids
TUc	Toxic Unit Chronic
UPL	Upper Prediction Limit
U.S. EPA	U. S. Environmental Protection Agency
U.S. FWS	U. S. Fish and Wildlife Service
VOCs	Volatile Organic Compounds
WDRs	Waste Discharge Requirements
WILD	Wildlife Habitat Beneficial Use
WOE	Weight of Evidence

Preface

The Technical Report (TR) contained herein is the culmination of revisions over several years to the draft TR first released to support to Tentative Cleanup and Abatement Order (TCAO) No. R9-2005-0126 in January 2005. This Technical Report provides the rationale and factual information supporting the findings of the CAO No. R9-2012-0024. The text of each CAO finding is presented first, followed by a summary of the rationale and factual evidence supporting the finding. A copy of CAO No. R9-2012-0024 and this TR, as well as prior versions are posted on the San Diego Water Board website at http://www.waterboards.ca.gov/sandiego. CAO No. R9-2012-0024 incorporates the Technical Report as a finding in support of CAO No. R9-2012-0024 as if fully set forth therein.

32. Finding 32: Alternative Cleanup Levels

Finding 32 of CAO No. R9-2012-0024 states:

Under State Water Board Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304*, the San Diego Water Board may prescribe alternative cleanup levels less stringent than background sediment chemistry concentrations if attainment of background concentrations is technologically or economically infeasible. Resolution No. 92-49 requires that alternative levels must result in the best water quality which is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on these waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible. Resolution No. 92-49 further requires that any alternative cleanup level shall: (1) be consistent with maximum benefit to the people of the state; (2) not unreasonably affect present and anticipated beneficial uses of such water; and (3) not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards. The San Diego Water Board is prescribing the alternative cleanup levels for sediment summarized in the table below to protect aquatic life, aquatic-dependent wildlife, and human health based beneficial uses consistent with the requirements of Resolution No. 92-49. Compliance with alternative cleanup levels will be determined using the monitoring protocols summarized in Finding 34 and described in detail of Section 34 of the Technical Report.

Alternative Cleanup Levels: Shipyard Sediment Site

Aquatic Life	Aquatic Dependent Wildlife and Human Health	
Remediate all areas determined to have sediment pollutant levels likely to adversely affect the health of the benthic community.	Surface Weighted Average Concentrations (site-wide)	
	Copper	159 mg/kg
	Mercury	0.68 mg/kg
	HPAHs[1]	2,451 µg/kg
	PCBs[2]	194 µg/kg
	Tributyltin	110 µg/kg

1. HPAHs = sum of 10 PAHs: Fluoranthene, Pyrene, Benzo[a]anthracene, Chrysene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Benzo(a)pyrene, indeno[1,2,3-c,d]pyrene, Dibenz[a,h]anthracene, and Benzo[g,h,i]perylene.
2. PCBs = sum of 41 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

In approving alternative cleanup levels less stringent than background the San Diego Water Board has considered the factors contained in Resolution No. 92-49 and the California Code of Regulations, Title 23, section 2550.4, subdivision (d):

Alternative Cleanup Levels are Appropriate. Cleaning up to background sediment quality levels at the Shipyard Sediment Site is economically infeasible. The alternative cleanup levels established for the Shipyard Sediment Site are the lowest levels that are technologically and economically achievable, as required under the California Code of Regulations Title 23 section 2550.4(e).

Alternative Cleanup Levels are Consistent with Water Quality Control Plans and Policies. The alternative cleanup levels provide for the reasonable protection of San Diego Bay beneficial uses and will not result in water quality less than prescribed in water quality control plans and policies adopted by the State Water Board and the San Diego Water Board. While it is impossible to determine the precise level of water quality that will be attained given the residual sediment pollutant constituents that will remain at the Site, compliance with the alternative cleanup levels will markedly improve water quality conditions at the Shipyard Sediment Site and result in attainment of water quality standards at the site.

Alternative Cleanup Levels Will Not Unreasonably Affect Present and Anticipated Beneficial Uses of the Site. The level of water quality that will be attained upon remediation of the required cleanup at the Shipyard Sediment Site will not unreasonably affect San Diego Bay beneficial uses assigned to the Shipyard Sediment Site represented by aquatic life, aquatic-dependent wildlife, and human health.

Alternative Cleanup Levels are Consistent with the Maximum Benefit to the People of the State. The proposed alternative cleanup levels are consistent with maximum benefit to the people of the State based on the San Diego Bay resource protection, mass removal and source control, and economic considerations. The Shipyard Sediment Site pollution is located in San Diego Bay, one of the finest natural harbors in the world. San Diego Bay is an important and valuable resource to San Diego and the Southern California Region. The alternative cleanup levels will result in significant contaminant mass removal and therefore risk reduction from San Diego Bay. Remediated areas will approach reference area sediment concentrations for most contaminants. Compared to cleaning up to background cleanup levels, cleaning up to the alternative cleanup levels will cause less diesel emission, less greenhouse gas emission, less noise, less truck traffic, have a lower potential for accidents, and less disruption to the local community. Achieving the alternative cleanup levels also requires less barge and crane movement on San Diego Bay, has a lower risk of re-suspension of contaminated sediments, and reduces the amount of landfill capacity required to dispose of the sediment wastes. The alternative cleanup levels properly balance reasonable protection of San Diego Bay beneficial uses with the significant economic and service activities provided by the City of San Diego, the NASSCO and BAE Systems Shipyards and the U.S. Navy.

32.1. Regulatory Principles for Setting Alternative Cleanup Levels

Cleaning up to background sediment chemistry levels is not economically feasible at the Shipyard Sediment Site as described in Section 31. Under State Water Board Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*, the San Diego Water Board may prescribe an alternative cleanup level[1] less stringent than background sediment chemistry concentrations if attainment of background concentrations is technologically or economically infeasible – as long as the less stringent cleanup level is protective of beneficial uses.[2]

In prescribing any alternative cleanup levels less stringent than background the San Diego Water Board must apply section 2550.4 of Title 23 of the California Code of Regulations.[3] The San Diego Water Board can only approve cleanup levels less stringent than background if the Board finds that it is technologically or economically infeasible to achieve background.[4] The alternative levels must also not pose a substantial present or potential hazard to human health or the environment as long as the concentration limit above-background is not exceeded. The San Diego Water Board must consider specific factors pertaining to potential adverse effects on surface water quality and beneficial uses including 1) the potential for health risks caused by human exposure to waste constituents; 2) the potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and 3) the persistence and permanence of the potential adverse effects.[5] The ceiling for alternative cleanup levels is set at the lowest levels the discharger demonstrates and the San Diego Water Board finds is technologically and economically achievable.[6] Alternative cleanup levels that exceed the maximum concentrations that would be allowed under other applicable statutes or regulations are not permissible.

As explained in the San Diego Water Board Cleanup Team's Response to Comments Report, the San Diego Water Board considers the "total values involved, beneficial and detrimental, economic and social, tangible and intangible" when setting alternative cleanup levels.[7] Resolution No. 92-49 further requires that any alternative cleanup level shall: (1) be consistent with maximum benefit to the people of the state; (2) not unreasonably affect present and anticipated beneficial uses of such water; and (3) not result in water quality less than that

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1 An "alternative" cleanup level is one that allows wastes to remain in waters of the State at levels above "background."

2 See also State Water Board, Water Quality Enforcement Policy, App. A, § 4, pp. 34-35 which states in part: "CAOs shall require dischargers to clean up the pollution to background levels or the best water quality that is reasonable if background levels of water quality cannot be restored in accordance with Resolution No. 92-49."

3 State Water Board Resolution No. 92-49, Section III.G.

4 Cal. Code Regs., tit. 23, § 2550.4(c).

5 Id., at § 2550.4(d)(2).

6 Id., at § 2550.4(e).

7 See e.g., San Diego Water Board Cleanup Team's Response to Comments Report, August 23, 2011, pp. 31-28 through 31-32.

prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards.[8]

32.1.1. Compliance with Water Quality Standards Related to Sediment Quality

Resolution No. 92-49 requires that alternative cleanup levels should be developed in conformance with Water Quality Control Plans and Policies adopted by the State and Regional Water Boards. The water quality standards and policies contained in these documents provide the basis for sediment cleanup activities, including alternative cleanup levels, under federal and state law.

The State Water Board adopts state policy for water quality control, which is binding on the Regional Water Boards.[9] The State Water Board is also authorized to adopt water quality control plans for waters that require water quality standards under the Clean Water Act and must adopt plans for ocean waters and for enclosed bays and estuaries.[10] The Regional Water Boards are required to adopt water quality control plans, or basin plans, for waters within their respective regions. Water quality control plans designate beneficial uses of water, establish water quality objectives[11] to protect those uses, and contain a program to implement the objectives.[12] The beneficial use designations and water quality objectives (together with an antidegradation policy) constitute water quality standards for purposes of the Clean Water Act.[13]

The San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan) designates beneficial uses for San Diego Bay that must be protected against water quality degradation.[14] The beneficial uses and corresponding target receptors are described in Table 32-1 below. Resolution No. 92-49 requires that alternative cleanup levels provide for the reasonable protection of these beneficial uses.

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[8] See e.g., San Diego Water Board Cleanup Team's Response to Comments Report, August 23, 2011, pp. 31-28 through 31-32.

[9] Wat. Code. § 13140. et seq.

[10] Id. at §§ 13170, 131702, and 13391.

[11] "Water quality objectives" are defined in Water Code section 13050, subdivision (h) as "the limits or levels water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

[12] Wat. Code. § 13050, subd. (j).

[13] Clean Water Act section 303(c)(2)(A); 40 C.F.R. sections 131.3(i), 131.6.

[14] Basin Plan (RWQCB, 1994), Table 2-3, Beneficial Uses of Coastal Waters at page 2-47.

Table 32-1 Target Receptors Associated with San Diego Bay Beneficial Uses

TARGET RECEPTORS	AQUATIC LIFE	AQUATIC-DEPENDENT WILDLIFE	HUMAN HEALTH
BENEFICIAL USES	Estuarine Habitat (EST)	Wildlife Habitat (WILD)	Contact Water Recreation (REC-1)
	Marine Habitat (MAR)	Preservation of Biological Habitats of Special Significance (BIOL)	Non-Contact Water Recreation (REC-2)
	Migration of Aquatic Organisms (MIGR)	Rare, Threatened or Endangered Species (RARE)	Shellfish Harvesting (SHELL)
			Commercial and Sport Fishing (COMM)

The San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan) contains a narrative water quality objective for toxicity[15] that is applicable to San Diego Bay sediment quality. Resolution No. 92-49 requires that alternative cleanup levels be consistent with this toxicity water quality objective. The narrative toxicity objective provides that:

> *"All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.*
>
> *'The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in US EPA, State Water Resources Control Board or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay.*
>
> *'In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged."*

15 Basin Plan, Chapter 3. Water Quality Objectives, Page 3-15.

The State Water Board *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (State Implementation Policy, or "SIP") does not address sediment quality specifically. However Section 1.4.2.2 of the SIP provides that mixing zones shall not result in "objectionable bottom deposits."[16] This term is further defined as "an accumulation of materials or substances on or near the bottom of a water body, which creates conditions that adversely impact aquatic life, human health, beneficial uses, or aesthetics. These conditions include, but are not limited to, the accumulation of pollutants in the sediments and other conditions that result in harm to benthic organisms, production of food chain organisms, or fish egg development."[17]

32.1.2. Risks to Human Health and the Environment

Resolution No. 92-49 also requires that alternative cleanup levels not pose a substantial present or potential hazard to human health or the environment.[18] Alternative cleanup levels should be based upon an evaluation of risks to human health and the environment at the site, and set to reduce the risks to acceptable levels. In order to evaluate existing risks and potential future risks, conceptual models are prepared that identify receptors potentially at risk and the probable exposure pathways. This conceptual model serves as the basis for formulating the human health and ecological risk assessment. At sites where polluted sediments are the primary concern, receptors commonly evaluated include:

- Benthic communities exposed directly to pollutants in sediment,
- Fish exposed directly to pollutants in sediment or indirectly through consumption of pollutants in prey tissue, or
- Birds, marine mammals, and humans also exposed indirectly through consumption of pollutants in prey tissue.

For many receptors, risk is estimated by comparing pollutant concentrations in sediments and prey tissues to calculated risk thresholds developed specifically for those receptors. For other receptors, such as benthic invertebrates, direct measurements such as benthic community metrics, sediment toxicity and chemistry may be applied instead. Typically, those most sensitive receptors identified will become the focus of the remedial effort. Although risk assessments may guide the development of appropriate alternative cleanup levels, the levels must comply with all of the requirements of Resolution No. 92-49.

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[16] SIP at Page 17.

[17] *Id.* at Appendix 1, Page Appendix 1-4.

[18] State Water Board Resolution No. 92-49, Section III.G, CCR 23, section 2550.4.

32.2. Approach for Establishing Alternative Cleanup Levels for Protection of Human Health and Wildlife Beneficial Uses

Due to the spatial heterogeneity associated with concentrations in Shipyard Sediment Site sediment and mobility of aquatic-dependent wildlife and angler-targeted game species such as fish and lobster, an approach using surface area-weighted average concentrations (SWACs) was used to assess potential impacts to human health and aquatic-dependent wildlife, as detailed below. The selected alternative cleanup levels for addressing human health and wildlife beneficial use impairments were those SWACs for the primary COCs determined not to pose an unreasonable health risk to humans or aquatic dependent wildlife, and that were the lowest concentrations that were technologically and economically feasible to achieve. As part of the alternative cleanup level approach, an independent evaluation for protection of aquatic life beneficial uses (that did not consider SWACs) was also conducted, and is presented in Section 32.6.

32.2.1. Basis for the Surface-Area Weighted Average Concentration

The evaluation of risks to aquatic dependent wildlife is based on 6 species known to frequent San Diego Bay. The California Wildlife Biology, Exposure Factor, and Toxicity Database (Cal/Ecotox) is a compilation of physiological and ecological parameters and toxicity data for a number of California fish and wildlife.[19] Table 32-2 shows foraging areas that have been used by Cal/Ecotox for estimating chemical exposure via ecological risk assessment. Where Cal/Ecotox information was not available, notes have been made regarding typical migration or ranging habits.

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[19] The database has been created by the Office of Environmental Health Hazard Assessment, in collaboration with the University of California at Davis, to provide an information resource for risk assessors conducting ecological risk assessments in California.

Table 32-2 Foraging Ranges for Aquatic Dependent Wildlife Receptors

Species	Published Foraging Area (Acres)	Site Area (Acres)	Ratio of Foraging Area to Site Area	Notes
Surf Scoter	NA	143	NA	Migratory waterfowl - foraging range during feeding dependent on food abundance
Western Grebe	NA	143	NA	Migratory waterfowl - foraging range during feeding dependent on food abundance
Least Tern	8,053	143	56	Cal/Ecotox foraging area
Brown Pelican	685,709	143	4,798	Cal/Ecotox foraging area
California Sea Lion	725,906	143	5,080	Cal/Ecotox foraging area
Pacific Green Sea Turtle	NA	143	NA	Migratory species

Notes: N/A = not applicable

Since these species have foraging ranges many times larger than the Shipyard Sediment Site, it is unlikely that they would be exposed to concentrations found at the Shipyard Sediment Site for an extended period of time. Exposure to sediment chemicals at the Site is best estimated as an average across the entire Site. Thus, evaluating risks to aquatic-dependent wildlife based on a SWAC and 100 percent site usage, as described in Section 32.3 is conservative and protective of beneficial uses represented by aquatic dependent wildlife. In fact, based on the foraging ranges in Table 32-2, using SWACs retains conservatism since the amount of time most species are likely to spend foraging at the site is expected to be low.

The same is true of fish and lobster harvested by anglers. Target species consumed by recreational or subsistence anglers are known to forage over areas near or greater than the size of the Site, depending on the species. Fish and lobster do not limit their movement to the small area represented by a single sediment sample, but range among a much larger area and would be exposed to sediments of varying chemical concentrations throughout the Site and greater San Diego Bay. Based on this, a SWAC for sediment is a more appropriate method for evaluating the exposure to chemicals that fish and lobsters incur during foraging. In turn, this approach allows a much more accurate and realistic estimation of the bioaccumulation of chemicals from Site sediments and prey items. Improvements in the ability to quantify bioaccumulation in fish and lobster facilitate an accurate and realistic estimation of chemical exposure for hypothetical anglers consuming species harvested from the Site, and allow the prediction of potential human health risks associated with chemical concentrations in sediment.

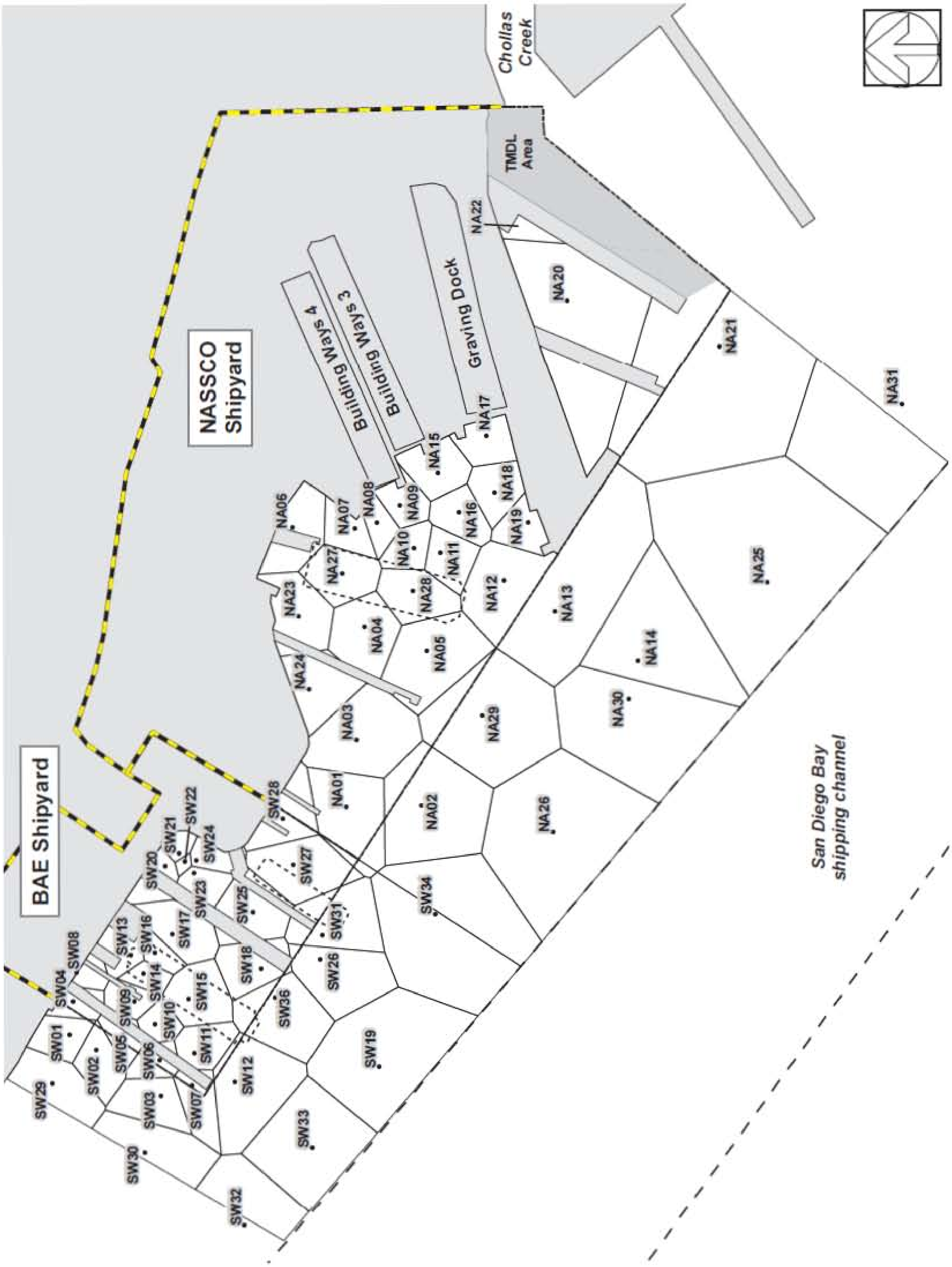
With respect to fish and lobster consumption, the likelihood that anglers will consume fish caught from the same location every day for 30 or more years is low since anglers are likely to utilize different fishing locations from time to time based on fish abundance, which can be seasonal or vary year to year. Therefore, using a SWAC is expected to be conservative with respect to human consumption patterns that would be anticipated.

In conclusion, site-specific SWACs are used to evaluate the remedy protectiveness of beneficial uses represented by aquatic dependent wildlife and human seafood consumption.

32.2.2. Calculation of the Surface-Area Weighted Average Concentration

There are 65 sediment sample stations at the Shipyard Sediment Site. These stations are not equidistant from each other, but were established based on historical activities and the presence of elevated contaminant concentrations detected in earlier phases of investigations. Therefore, some areas of the Site, primarily near the shoreline and toward the north, have a higher density of sampling stations. To calculate the SWAC, a geospatial technique (Thiessen polygons) was used to represent the area represented by each sediment sample. Thiessen polygons are polygons whose boundaries define the area that is closest to each point relative to all other points and are mathematically defined by the perpendicular bisectors of the lines between all points. By defining the area most closely associated with each sampling point, a value for that point (e.g., chemical concentration) can be spatially weighted based on the area it represents. This technique is well established and in use throughout a broad range of sciences, and is being used at many nationally known sediment remedial investigation sites including the Hudson River, Portland Harbor Cleanup, the Duwamish River Cleanup, the Lower Passaic River Cleanup, Fort Ord, and others. Application of this method resulted in 65 polygons of differing sizes as shown in Figure 32-1.

Figure 32-1 Map of Thiessen Polygons at Shipyard Sediment Site Study Area



The concentration of a COC in each polygon was assumed to be the same as the concentration of a COC in the sampling station inside that polygon. This approach allowed for calculating a SWAC for the site. Polygon areas and concentrations were used to calculate the SWAC for the Site, as shown in following equation:

$$\mathbf{SWAC} = \frac{\sum_{i=1}^{i=65} A_i C_i}{\sum_{i=1}^{i=65} A_i}$$

Where:

SWAC	=	surface-area weighted area concentration
Ai	=	area of polygon *i*
Ci	=	concentration of chemical in polygon *i*

Each polygon area is multiplied by the concentration of COC in the sampling station in that polygon. The area concentration products are then summed. This sum is divided by the total Site area (sum of the site's 65 polygons).

32.2.3. Surface-Area Weighted Average Concentration Approach

Once the pre-remedial SWAC was calculated as noted in Section 32.2.2, the development of a remedial footprint protective of human health and aquatic dependent wildlife beneficial uses could be completed. Polygons were identified for inclusion into the remedial footprint sequentially based on the degree of contamination they represented. The degree of contamination was determined by ranking each polygon according to the polygon's concentration of primary COCs (PCBs, HPAHs, TBT, Hg, and Cu), weighted evenly by relative COC concentration. This was accomplished by the following procedure: 1) the relative concentration of each primary COC as compared to the SWAC for that COC was calculated; 2) the five primary pollutants of concern relative concentrations to SWAC ratios were summed for each polygon; and 3) the polygons where ranked from high to low. The calculation is shown in the following equation:

$$\mathbf{Rank} = \sum_{\mathbf{COCs}} \frac{C_{polygon}}{\mathbf{SWAC}}$$

The rank equation is used below to show sample calculations for polygons SW04 and NA17.

$$\begin{array}{lccccc} & \mathbf{Cu} & \mathbf{Hg} & \mathbf{HPAH} & \mathbf{PCB} & \mathbf{TBT} \end{array}$$

$$\mathbf{Rank}_{SW04} = \frac{\mathbf{1500}}{187} + \frac{\mathbf{1.75}}{0.75} + \frac{\mathbf{14000}}{3300} + \frac{\mathbf{4000}}{308} + \frac{\mathbf{3250}}{163} = 47.5$$

$$\mathbf{Rank}_{NA17} = \frac{\mathbf{510}}{187} + \frac{\mathbf{0.85}}{0.75} + \frac{\mathbf{2950}}{3300} + \frac{\mathbf{550}}{308} + \frac{\mathbf{1350}}{163} = 14.8$$

Using this ranking approach, the highest ranked polygons were sequentially considered for inclusion into the remedial footprint.

Protectiveness of the beneficial uses represented by aquatic-dependent wildlife and human health was assessed via estimation of post-remedial SWAC values of the remedial footprint. Post-remedial SWAC calculations were completed with the assumption that the SWAC inside the footprint would be remediated to background concentrations derived in Section 29 of this Technical Report. In reality, the SWAC within the footprint may be less than background levels; however, background concentrations were assumed to incorporate conservatism in the analysis. Protectiveness was evaluated in terms of degree of exposure reduction and comparison to aquatic –dependent wildlife and human health risk assessments (Sections 32.3 and 32.4, respectively). The predicted post-remedial SWACs are shown in Table 32-3.

Table 32-3 Post-Remedial SWACs for the Shipyard Sediment Site

Primary Contaminant of Concern	Post-Remedial SWACs (site-wide)
Copper	159 mg/kg
Mercury	0.68 mg/kg
HPAHs	2,451 µg/kg
PCBs	194 µg/kg
TBT	110 µg/kg

Note: See Appendix for Section 32 for supporting calculations.

32.3. Alternative Cleanup Levels Protect Aquatic-Dependent Wildlife Beneficial Uses

An assessment of risk to wildlife receptors under projected post-remedial conditions was conducted to confirm that the chemicals identified as wildlife risk drivers in Section 24 are adequately protective of aquatic-dependent wildlife beneficial uses. Based on the Tier II risk assessment results, ingestion of prey items caught within all four assessment units at the Shipyard Sediment Site poses an increased risk above reference to wildlife receptors other than the sea lion. The chemicals in prey tissue posing a risk include BAP (surrogate for HPAHs), PCBs, copper, lead, mercury, and zinc. Based on the post-remedial risk assessment results detailed below, post-remedial SWACs for all chemicals identified as wildlife risk drivers are protective of aquatic-dependent wildlife beneficial uses.

Expected improvements in the protection of beneficial uses following remediation were estimated by modeling future exposure conditions (principally ingestion of prey) using the series of equations described below.

Future prey tissue concentrations (Ct) were calculated using the following equation:

$$\mathbf{Ct = BAF \times SWAC}$$

Where:

BAF	=	site-specific bioaccumulation factor
SWAC	=	post remedial surface-area weighted average sediment concentration

Site-specific bioaccumulation factors (BAFs) were estimated using current surface-area weighted average concentrations (SWACs) for sediment and the average COC concentrations in prey species tissue (see Table 32-4 for prey items):

$$BAF = \frac{C}{SWAC}$$

Where:

SWAC	=	current spatially weighted average sediment concentration
C	=	average chemical concentration in a receptors prey tissue based on data reported in Exponent (2003).

Table 32-4 Prey Items Used in Risk Estimates

Receptor of concern	Prey Item(s)
CA Brown Pelican	Spotted sand bass
CA Least Tern	Topsmelt and Anchovies
Western Grebe	Topsmelt and Anchovies
Surf Scoter	Benthic mussels
Green Turtle	Eelgrass

Note: Source of information is Table 24-4.

Predicted post-remedial SWACs used in this analysis have been presented elsewhere in this document and are repeated in Table 32-5 for convenience.

Table 32-5 Current and Post-Remedial SWACs

Primary COC	Units	Pre-remedy SWAC	Post-remedy SWAC
Copper	mg/kg	187	159
Mercury	mg/kg	0.75	0.68
HPAHs	µg/kg	3,509	2,451
PCBs	µg/kg	308	194
TBT	µg/kg	162	110
Secondary COC	**Units**	**Pre-remedy SWAC**	**Post-remedy SWAC**
Lead	mg/kg	73	66
Zinc	mg/kg	252	221

Note: See Appendix for Section 32 for supporting calculations.

Exposure estimates for each of the receptors were developed using the daily intake equation presented in Section 24. The equation accounts for exposure to COCs that may occur through the ingestion of prey as well as through the incidental ingestion of sediment:

$$\textbf{Daily Intake}_{\textbf{chemical}} = \frac{\left[(\mathbf{CM} * \mathbf{IR} * \mathbf{FI} * \mathbf{AE})_{\mathbf{prey}} + (\mathbf{CM} * \mathbf{IR} * \mathbf{FI} * \mathbf{AE})_{\mathbf{sediment}}\right]}{\mathbf{BW}}$$

Where:

CM	=	post-remedial concentration of the chemical in prey tissue or sediment (mg/kg). Prey tissue concentrations used in this equation were derived using the equation described above, while the sediment concentration was based on the predicted post-remediation SWAC for the COC
IR	=	ingestion rate of prey or sediment (kg/day)
FI	=	fraction of the daily intake of prey or sediment derived from the site (unitless area-use factor)
AE	=	relative gastrointestinal absorption efficiency for the chemical in a given prey or sediment (fraction)
BW	=	body weight of receptor species (kg)

Table 32-6 presents the exposure parameters used for this analysis. The parameters are the same ones used to evaluate current conditions, and are more fully discussed in Section 24.

Table 32-6 Exposure Parameters for Aquatic-Dependent Wildlife

Receptor of Concern	Estimated Post Remedial Prey Tissue Concentration (CM) (mg/kg dw)	Estimated Post-Remedial Sediment Chemical Concentration (mg/kg dw)	Body Weight (BW) (kg)[1]	Food Ingestion Rate (IR) (kg/day dw)[1]	Sediment Ingestion Rate (IR) (kg/day dw)[1]	Area Use Factor[1] (FI)	Absorption Efficiency[1] (AE)
CA Brown Pelican	chemical specific	chemical specific SWAC	3.174	0.25	0.005	1	1
CA Least Tern	chemical specific	chemical specific SWAC	0.045	0.0053	0.00011	1	1
Western Grebe	chemical specific	chemical specific SWAC	1.2	0.062	0.0031	1	1
Surf Scoter	chemical specific	chemical specific SWAC	1.05	0.056	0.0028	1	1
Green Turtle	chemical specific	chemical specific SWAC	95	0.35	0.0186	1	1

1. Source of information is Table 24-6.

Finally, post remedial protection of beneficial uses for aquatic-dependent wildlife was evaluated by calculating hazard quotients (HQs):

$$\mathbf{HQ} = \frac{\mathbf{DI_{chemical}}}{\mathbf{TRV}}$$

Where:

DI = total daily intake rate of the chemical (mg/kg body weight-day)
TRV = geometric mean toxicity reference value (mg/kg body weight-day)

The toxicity reference values (TRVs) presented in Table 32-7 are based on the geometric mean of the TRVs (BTAG, NOAELs, and LOAELs) presented in Tables 24-7 and 24-8 of Section 24. The geometric mean addresses the region of uncertainty between the NOAEL and LOAEL. At the NOAEL, no effects are observed. At the LOAEL, effects are observed. Between these two values there is often a significant range over which the effects are uncertain because the data do not exist. The uncertainty is handled by taking an intermediate value that is biased toward the NOAEL by using the geometric mean.

An HQ value less than 1.0 indicates that the chemical is unlikely to cause adverse ecological effects to the receptor of concern. An HQ value greater than 1.0 indicates that the receptor's exposure to the chemical pollutant has exceeded the TRV, which could indicate that there is a potential that some fraction of the population may experience an adverse effect. HQs for all receptors evaluated at the shipyard site had a value less than 1.0 (Table 32-8), indicating that the COCs are unlikely to cause adverse ecological effects and that the post-remedial sediment chemistry conditions are protective of aquatic dependent wildlife and their associated beneficial uses.

Table 32-7 Geometric Mean TRVs for Tier II Risk Drivers

Primary COC	Avian Geometric Mean TRV (mg/kg-day)[1]
Copper	11.0
Mercury	0.084
HPAHs	0.44
PCBs	0.34
TBT[2]	NA
Secondary COC	**Avian Geometric Mean TRV (mg/kg-day)[1]**
Lead[3]	0.35
Zinc	54.4

Note: See Appendix for Section 32 for supporting calculations.

1. Source of TRVs is from Tables 24-7 and 24-8 of Section 24. The benzo[a]pyrene TRV was used as a surrogate for HPAHs.
2. TBT is not a wildlife risk driver and therefore the geometric mean TRV was not calculated.
3. Suitable reptilian TRVs were not found in the literature (Exponent, 2003). Therefore, avian TRVs were used to estimate potential adverse effects to the East Pacific green turtle.

Table 32-8 Post-Remedy Hazard Quotient (HQ) Results

Receptor of Concern[1]	Copper	Mercury	HPAHs[2]	PCBs	TBT[2]	Lead	Zinc
Brown Pelican	0.059	0.496	NA	0.327	NA	NA	NA
Least Tern	0.100	0.138	NA	0.415	NA	NA	0.309
Western Grebe	0.066	0.073	NA	0.183	NA	NA	NA
Surf Scoter	0.272	0.084	0.265	0.059	NA	NA	NA
Green Turtle	NA	NA	NA	NA	NA	0.245	NA

Note: See Appendix for Section 32 for supporting calculations.

1. TBT is not a wildlife Tier II risk driver and therefore HQs were not calculated. Only surf scoter was identified as a wildlife risk driver in the Tier II ecological risk assessment for HPAH, identified as Benzo[a]pyrene (BAP).

32.4. Alternative Cleanup Levels Protect Human Health Beneficial Uses

Recreational and subsistence fish and lobster consumption scenarios were used to evaluate the post-remedy protectiveness of the alternative cleanup levels with respect to theoretical human health beneficial uses. Measured relationships between sediment concentrations, fish and lobster tissue concentrations, and human health risk were used to estimate post-remedial tissue concentrations from the projected post-remedial SWAC. Both tissue and sediment concentrations associated with human health threshold exposure levels were also calculated for comparison. The details of these calculations are described below.

- BAFs in fish and/or lobster tissue were calculated for all scenarios identified as potential risk drivers in the Tier II human health risk assessment (see Section 28). These include:

  Copper – Subsistence angler exposure to whole lobster (non-cancer risk)

  Mercury – Recreational angler exposure to lobster tail (non-cancer risk), and subsistence angler exposure to whole fish (non-cancer risk)

  PCBs – Recreational angler exposure to fish fillet (cancer and non-cancer risks) and lobster tail (cancer risk), and subsistence angler exposure to whole fish (cancer and non-cancer risks) and lobster (cancer and non-cancer risks)

- BAFs were calculated from pre-remedial data as the ratio of average site-wide tissue concentration (C) to SWAC for a given COC and tissue type:

$$\mathrm{BAF} = \frac{\mathrm{C}}{\mathrm{SWAC}}$$

  These BAFs are assumed to be constant over the concentration range between pre-remedial and post-remedial conditions.

- These BAFs were then used to estimate the post-remedial concentration of COCs in the relevant tissue types (C_{PR}) by multiplying the predicted post-remedial SWAC ($SWAC_{PR}$) and the BAF:

$$\mathrm{C_{PR}} = SWAC_{PR} \times BAF$$

- Once the predicted post-remedial tissue concentration was calculated, the exposure models developed for the Tier II human health risk assessment were used to calculate residual post-remedial exposure, using the estimated C_{PR} values:

$$\mathrm{Exposure\,(in\,mg/kg\text{-}day)} = \frac{(\mathrm{C_{PR}} * \mathrm{CR} * \mathrm{FI} * \mathrm{ED})}{(\mathrm{BW} * \mathrm{AT} * \mathrm{CF})}$$

  where:

C_{PR}	=	post-remedial tissue concentration in spotted sand bass or spiny lobster (µg/kg-wet weight)
CR	=	fish or lobster consumption rate (kg/day)
FI	=	fraction ingested from the site (unitless)
ED	=	exposure duration (years)
BW	=	body weight (kg)

AT	=	averaging time (years) - noncarcinogens: 30 years - carcinogens: 70 years
CF	=	conversion factor (1,000 µg/mg)

The resulting post-remedial exposure estimate was then evaluated for cancer risk and non-cancer risk in a manner consistent with the Tier II risk assessment.

- As a separate calculation, the edible tissue concentrations associated with a desired threshold exposure point (TEP) were calculated. The first step in this process is to calculate a TEP associated with a risk threshold of interest (i.e., 10^{-5} cancer probability or HI = 1.0)

$$\mathbf{TEP} = \frac{\mathbf{Risk}}{\mathbf{CSF}}$$

where:

TEP	=	threshold exposure point for carcinogenic exposure (mg/kg-day)
Risk	=	cancer probability (e.g., 0.0001)
CSF	=	oral carcinogenic slope factor (risk/(mg/kg-day))

$$\mathbf{TEP} = RfD$$

where:

TEP	=	threshold exposure point for non-carcinogenic exposure (mg/kg-day)
RfD	=	oral reference dose (mg/kg-day)

- Once TEP values are known, acceptable tissue concentrations in biota can be calculated using the equation below:

$$C_{TEP} = TEP\left(\frac{BW * AT * CF}{CR * FI * ED}\right)$$

where:

C_{TEP}	=	tissue concentration at TEP (µg/kg)
TEP	=	threshold exposure point (mg/kg-day)
BW	=	body weight (kg)
AT	=	averaging time (years)
CR	=	consumption rate (kg/day)
FI	=	fraction ingested from the site (unitless)

ED = exposure duration (years)
CF = conversion factor (1000 µg/mg)

- Using the constant BAFs described above, C_{TEP} can be used to calculate a SWAC that will result in the associated risk threshold ($SWAC_{TEP}$):

$$SWAC_{TEP} = \frac{C_{TEP}}{BAF}$$

Calculations and the results for PCBs, mercury, and copper are shown below. Calculations for all human health risk drivers are provided in the Appendix for Section 32 and are summarized in Table 32-16. For scenarios where post-remedial risk was calculated to remain above the target risk threshold at a fractional intake (FI) of 100 percent, the FI necessary to fully protect the beneficial use was calculated. Exposure and risk are reduced in a linear fashion with FI. Therefore, risk at FI = 50 percent would be exactly half the risk at 100 percent.

The cleanup remedy is expected to result in a post-remedial sediment SWAC of approximately 194 µg/kg for PCBs, 0.68 mg/kg for mercury, and 159 mg/kg for copper. Although BAFs may vary in part due to changes in sediment concentration, it is assumed that BAFs for organisms exposed to these ranges of sediment concentration (194 to 309 µg/kg, 0.75 to 0.68 mg/kg, and 187 to 159 mg/kg) are constant. These BAFs were used to predict concentration in fish and lobster (C_{PR} values) by multiplying the SWAC and the BAF, as shown in Table 32-9 below.

Table 32-9 Estimated Post-Remedial PCB, Mercury, and Copper Tissue Concentrations

COC	Scenario	Species	Tissue	$SWAC_{PR}$ (µg/kg for PCB, mg/kg for metals)	BAF	C_{PR} (µg/kg for PCB, mg/kg for metals)
PCB	recreational	sand bass	fillet	194	0.346	67
PCB	subsistence	sand bass	whole	194	1.85	359
PCB	recreational	lobster	edible	194	0.0256	5
PCB	subsistence	lobster	whole	194	0.142	28
Mercury	recreational	lobster	edible	0.68	0.20	0.14
Mercury	subsistence	sand bass	whole	0.68	0.19	0.13
Copper	subsistence	lobster	whole	159	0.28	44

Note: See Appendix for Section 32 for supporting calculations.

The cancer and non-cancer exposure models described above can then be used to predict risk under post-remedial conditions (see Appendix for Section 32 for supporting calculations). These calculations assume the theoretical worst case scenario where fractional intake of fish from the site is 100 percent (entire fish or lobster diet is caught at the Shipyard Sediment Site).

Post-remedial SWACs should not pose an unreasonable risk to human health if the cancer risks posed by the SWACs should fall within the range of 1 x 10^{-6} to 1 x 10^{-4} and non-cancer risks do not exceed 1.0. For remedial decision making, cancer risks that fall within this range are acceptable pursuant to applicable state and federal regulatory requirements under Title 40 Code of Federal Regulations, Part 300.

The equations for calculating cancer and non-cancer risk are the same with the exception of the calculation of the exposure. Differences in these exposure calculations (Threshold Exposure Point variable) are described in the Carcinogenic Exposure Equation and the Non-carcinogenic Exposure Equation, below.

Equation for Threshold Exposure Point for Carcinogenic Exposure

$$\mathbf{TEP} = \frac{\mathbf{Risk}}{\mathbf{CSF}}$$

Where:

TEP	=	threshold exposure point (mg/kg-day)
Risk	=	0.00001
CSF	=	oral carcinogenic slope factor (risk/(mg/kg-day))

Equation for Threshold Exposure Point for Non-Carcinogenic Exposure

$$\mathbf{TEP} = RfD$$

Where:

TEP	=	threshold exposure point (mg/kg-day)
RfD	=	oral reference dose (mg/kg-day)

The CSF for PCBs is 2 mg/kg-day resulting in a cancer TEP of 0.000005 mg/kg-day and the RfD and, therefore, non-cancer TEP is 0.00002 mg/kg-day. The mercury and copper RfD (TEP) values used in the assessment are 0.0001 and 0.037 mg/kg-day, respectively.

Equation for Acceptable Tissue Concentrations in Biota

$$C_{TEP} = TEP\left(\frac{BW * AT * CF}{CR * FI * ED}\right)$$

Where:

C_{TEP}	=	tissue concentration at TEP (µg/kg)
TEP	=	threshold exposure point (mg/kg-day)
BW	=	body weight (kg)
AT	=	averaging time (years)
CR	=	consumption rate (kg/day)
FI	=	fraction ingested from the site (unitless)

ED	=	exposure duration (years)
CF	=	conversion factor (1000 µg/mg)

The variable values are specified in Table 32-10 and the tissue concentrations protective of recreational and subsistence exposure scenarios evaluated are presented in Table 32-11.

Table 32-10 Variable Values for Risk Scenarios

Variable	Scenario	Value
BW	All	70 kg
AT	Cancer	70 years
	Non-cancer	30 years
CR	Recreational	0.02104 kg/day
	Subsistence	0.161kg/day
FI	All	1.0
ED	All	30 years

Table 32-11 Tissue Concentrations (Threshold Exposure Point)

COC	Scenario	C_{TEP} (mg/kg)[1]
PCB	Recreational fish or lobster consumption cancer risk	0.0388
PCB	Recreational fish or lobster consumption non-cancer risk	0.0665
PCB	Subsistence fish or lobster consumption cancer risk	0.0051
PCB	Subsistence fish or lobster consumption non-cancer risk	0.0087
Mercury	Recreational lobster consumption non-cancer risk	0.3
Mercury	Subsistence fish consumption non-cancer risk	0.04
Copper	Subsistence lobster consumption non-cancer risk	16.1

Note: See Appendix for Section 32 for supporting calculations.

1. Wet weight

Once tissue concentrations have been calculated, acceptable SWAC concentrations can be determined using the BAFs presented in Table 32-12 and by rearranging the BAF equation to solve for SWAC.

$$SWAC_{TEP} = \frac{C_{TEP}}{BAF}$$

Where:

C_{TEP}	=	tissue concentration at TEP (μg/kg)
BAF	=	bioaccumulation factor calculated from pre-remedial data as the ratio of average site-wide tissue concentration (C) to SWAC for a given COC and tissue type

Acceptable SWACs for specific TEP values and exposure scenarios are presented in Table 32-13.

Table 32-12 Biota Accumulation Factors

COC	Scenario	Species	Tissue	Tissue Concentration (μg/kg for PCB, mg/kg for metals)	Pre-Remedial Sediment SWAC (μg/kg for PCB, mg/kg for metals)	BAF
PCB	recreational	sand bass	fillet	106.7	308	0.346
PCB	subsistence	sand bass	whole	569.5	308	1.85
PCB	recreational	lobster	edible	7.9	308	0.0256
PCB	subsistence	lobster	whole	43.6	308	0.142
Mercury	subsistence	sand bass	whole	0.14	0.75	0.19
Mercury	recreational	lobster	edible	0.153	0.75	0.20
Copper	subsistence	lobster	whole	57	187	0.28

Note: See Appendix for Section 32 for supporting calculations.

Table 32-13 SWACs Protective of Human Health at FI=100%

COC	Scenario	$SWAC_{TEP}$ (μg/kg for PCB, mg/kg for metals)					
		Post Remedial SWAC	Back-ground	Cancer (1 x 10^{-4})	Cancer (1 x 10^{-5})	Cancer (1 x 10^{-6})	Non-cancer (HI < 1)
PCB	Recreational consumption of bass fillets	194	84	1,123	112.3	11.2	192.4
PCB	Subsistence consumption of whole bass			27	2.7	0.27	4.7
PCB	Recreational consumption of edible lobster			15,162	1,516.2	151.6	2,599.2
PCB	Subsistence consumption of whole lobster			358	35.8	3.6	61.4
Mercury	Subsistence consumption of whole bass	0.68	0.57	NA	NA	NA	0.2

COC	Scenario	$SWAC_{TEP}$ (µg/kg for PCB, mg/kg for metals)					
		Post Remedial SWAC	**Back-ground**	**Cancer (1×10^{-4})**	**Cancer (1×10^{-5})**	**Cancer (1×10^{-6})**	**Non-cancer (HI < 1)**
Mercury	Recreational consumption of edible lobster			NA	NA	NA	1.6
Copper	Subsistence consumption of whole lobster	159	121	NA	NA	NA	57.9

Note: See Appendix for Section 32 for supporting calculations.
NA: Not applicable.

To assure adequacy of the cleanup, results in Table 32-13 were compared to the projected post-remedial SWACs. The table demonstrates that the post-remedial SWACs for PCBs is protective for recreational anglers (risk in the range of 10^{-4} to 10^{-6} or less, and non-cancer risk Hazard Index (HI) of less than 1). The PCB post-remedial SWAC is not fully protective of cancer or non-cancer risk to subsistence anglers that consume whole bass or lobster. The post-remedial SWAC for mercury is protective of recreational consumers of lobster, but is not protective of subsistence anglers that consume whole bass. The post-remedial SWAC for copper is not protective of subsistence consumers of lobster. Acceptable risk levels for subsistence anglers of whole bass would not be obtained even if the Site was cleaned up to background levels for mercury or PCBs. Acceptable risk levels for subsistence consumers of lobster would not be obtained even if the Site was cleaned up to background levels for copper and PCBs.

The above analysis is based on a fractional intake (FI) of 100 percent, which assumes the angler intake is entirely from the Shipyard Sediment Site. In addition, these results evaluate a cancer risk in the range of 10^{-4} to 10^{-6}, which is consistent with the U.S. EPA, regulations under the National Contingency Plan (U.S. EPA, 1990) and OEHHA (2008) fish tissue advisory guidance.

Various SWACs for recreational anglers were evaluated by varying the fractional intake to identify the post-remedial SWACs for PCBs associated with three different cancer risk levels and the non-cancer risk level in Table 32-14. The bolded cells indicate where the post-remedial SWAC is below the calculated “acceptable” SWAC associated with that fractional intake and cancer risk level where the cancer risk falls within the acceptable range (noted in the preceding paragraph) and the non-cancer risk level (HI) is less than 1.

Table 32-14 Acceptable Total PCB SWACs for Recreational Anglers Assuming Varying Risk Levels and Fractional Intake

Frac-tional Intake (%)	PCBs SWAC (µg/kg)									
	Back-ground	Post-Remedial SWAC	Cancer Risk Level						Non-cancer Risk Level	
			10^{-6}		10^{-5}		10^{-4}		HI < 1	
			Fish	Lobster	Fish	Lobster	Fish	Lobster	Fish	Lobster
25	84	194	44.9	**606.5**	**448.7**	**6,064.8**	**4,487**	**60,648**	**768**	**10,396**
40			28.1	**379.1**	**280.5**	**3,790.5**	**2,805**	**37,905**	**480**	**6,498**
75			15.0	**202.2**	149.6	**2,021.6**	**1,496**	**20,216**	**256**	**3,465**
100			11.2	151.6	112.3	**1,516.2**	**1,123**	**15,162**	192	**2,599**

Note: Bolded values indicate where the projected post-remedy SWAC is acceptable.
See Appendix for Section 32 for supporting calculations.

Various acceptable SWACs for recreational and subsistence anglers were evaluated by varying the fractional intake to identify the post-remedial SWACs for mercury and copper associated with three different cancer risk levels and the non-cancer risk level in Table 32-15. The bolded cells indicate where the post-remedial SWAC is below the calculated acceptable SWAC associated with that fractional intake and non-cancer risk level.

Table 32-15 Acceptable Copper and Mercury SWACs for Recreational and Subsistence Anglers Assuming Varying Risk Levels and Fractional Intake

FI (%)	SWAC (mg/kg)				
	COC	Scenario	Background	Post-Remedial SWAC	Non-cancer Risk Level HI < 1 Lobster
25	Mercury	Subsistence consumption of whole bass	0.57	0.68	0.92
40					0.58
75					0.31
100					0.23
25	Mercury	Recreational consumption of edible lobster			6.4
40					4.0
75					2.1
100					1.6
25	Copper	Subsistence consumption of edible lobster	121	159	232
40					145
75					77
100					58

Notes: FI = Fractional Intake
Bolded values indicate where the projected post-remedy SWAC is acceptable.
See Appendix for Section 32 for supporting calculations.

Results for the post-remedial SWACs are summarized in Table 32-16.

Table 32-16 Protectiveness of the Human Health Beneficial Uses of Post-Remedial SWACs

COC	Scenario	Fractional Intake Protected by Post-Remedial SWACs (%)		
		Post Remedial SWAC	**Cancer Risk (< 1 x 10^{-4} to 1 x 10^{-6} Range)**	**Non-cancer Risk (HI < 1)**
PCB	Recreational consumption of bass fillets	194 µg/kg	100%	**99%** (Background = 100%)[1]
PCB	Subsistence consumption of whole bass	194 µg/kg	**14%** (Background = 33%)[1]	**2%** (Background = 6%)[1]
PCB	Recreational consumption of edible lobster	194 µg/kg	100%	100%
PCB	Subsistence consumption of whole lobster	194 µg/kg	100%	**32%** [2] (Background = 73%)[1]
Mercury	Recreational consumption of bass fillets	0.68 mg/kg	NA	100%
Mercury	Subsistence consumption of whole bass	0.68 mg/kg	NA	**34%** [2] (Background = 41%)[1]
Mercury	Recreational consumption of edible lobster	0.68 mg/kg	NA	100%
Mercury	Subsistence consumption of whole lobster	0.68 mg/kg	NA	100%
Copper	Recreational consumption of bass fillets	159 mg/kg	NA	100%
Copper	Subsistence consumption of whole bass	159 mg/kg	NA	100%
Copper	Recreational consumption of edible lobster	159 mg/kg	NA	100%
Copper	Subsistence consumption of whole lobster	159 mg/kg	NA	**36%** [2] (Background = 48%)[1]
HPAHs	All Scenarios	2,451 µg/kg	NA	100%
TBT	All Scenarios	110 µg/kg	NA	100%

Note: See Appendix for Section 32 for supporting calculations for risk driver scenarios.
Scenarios in which 100% Fractional Intake is not protected by post-remedial SWACs are shown in bold.
NA: Not applicable.

1. Fractional Intake protected by background concentrations (as predicted by the model) is shown in parentheses in the six cases in which the post-remedial SWAC is not protective of 100% Fractional Intake. In five of the six cases, background conditions are also not expected to be protective of 100% Fractional Intake. In the sixth case, the SWAC is protective of 99% Fractional Intake (approximates 100%).
2. Post-remedial SWAC would be protective of this scenario at a 20% Fractional Intake for subsistence fishermen, equivalent to the 1 meal per week ingestion rate used to derive California fish consumption advisories by OEHHA (2008).

For PCBs, seafood consumption for recreational anglers would be limited to consumption of the edible portions of the lobster (at 100 percent consumption rate), while sand bass consumption would be limited to fish fillets (at an approximate 100 percent consumption rate). For mercury, consumers of lobster are protected at a 100 percent consumption rate. In general, SWACs are reasonably protective of the human health beneficial uses at this site because:

- The theoretical 100 percent consumption rate analyzed in this Technical Report represents a conservative evaluation criterion. All post-remedial SWACs approximated protection of recreational angler consumption at 100 percent consumption rates, although subsistence anglers would only be protected at lower consumption rates. In development of fish tissue advisory levels, OEHHA bases risk-based fish tissue advisory levels using a one-meal per week consumption rate (equivalent to 32 g/day; OEHHA, 2008). This is equivalent of a 20 percent fractional intake for subsistence fishermen. The PCB post-remedial SWAC for subsistence fishermen is not protective, although reference conditions are not protective of this PCB exposure route, reflecting the broad regional pattern of PCBs in Southern California.

- The PCB post-remedial SWAC is within the range of acceptable cancer risks ($1x10^{-4}$ to $1x10^{-6}$ cancer risk) that the U.S. EPA requires for remedial decision making (40 CFR Section 300). Furthermore, the PCB post-remedial SWAC is consistent with OEHHA fish tissue advisory levels. OEHHA bases fish tissue advisory levels on a maximum cancer risk of $1x10^{-4}$, and considers that this risk level appropriately balances cancer risk with the numerous known health benefits from eating fish, as their risk-based goal expands “beyond a simple risk paradigm in order to best promote the overall health of the fish consumer” (OEHHA, 2008).

- Target species consumed by recreational or subsistence anglers are known to forage over areas near or greater than the size of the Site, depending on the species. Fish and lobster do not limit their movement to the small area represented by a single sediment sample, but range among a much larger area and would be exposed to sediments of varying chemical concentrations throughout the Site and greater San Diego Bay.

- The amount of exposure sand bass would have to the chemicals at the Shipyard Sediment Site are expected to be less than 100 percent due to physical disturbances interfering with feeding and foraging activities. Thus, the sand bass caught by anglers may have less exposure and less accumulation of chemicals than a strict application of the calculated BAF would indicate.

- With respect to fish and lobster consumption, it is not likely that anglers will consume fish caught from the same location from within the site every day for 30 or more years since anglers are likely to utilize different fishing locations from time to time based on fish abundance, which can be seasonal or vary year to year.

- With respect to the carcinogenicity of PCBs, U.S. EPA (2000b) suggests that there is a level of great conservatism in its published cancer slope factors:

  > "PCB mixtures have been classified as probable human carcinogens (Group B2) (Appendix G) (IRIS, 1999; U.S. EPA, 1988a). PCB mixtures have been shown to cause adverse developmental effects in experimental animals (ATSDR, 1998b). Data are inconclusive in regard to developmental effects in humans. Several studies in humans have suggested that PCB exposure may cause adverse developmental effects in children and in developing fetuses (ATSDR, 1998b) These include lower IQ scores (Jacobson and Jacobson, 1996), low birth weight (Rylander et al., 1998), and lower behavior assessment scores (Lonky et al., 1996). However, study limitations, including lack of control for confounding variables, deficiencies in the general areas of exposure assessment, selection of exposed and control subjects, and the comparability of exposed and control samples obscured interpretation of these results (ATSDR, 1998b)." (U.S. EPA 2000b, page 4-48).

  Human epidemiological studies of PCBs have not yielded conclusive results (Silberhorn et al., 1990). There is some suggestive evidence that xenoestrogens, including PCBs, may play a role in breast cancer induction (ATSDR, 1998c). Some studies have indicated an excess risk of several cancers, including: liver, biliary tract, gallbladder, gastrointestinal tract, pancreas, melanoma, and non-Hodgkin's lymphoma (IRIS, 1999, ATSDR, 1998c). As with all epidemiological studies, it is very difficult to obtain unequivocal results because of the long latency period required for cancer induction and the multiple confounders arising from concurrent exposures, lifestyle differences, and other factors. The currently available human evidence is considered inadequate but suggestive that PCBs may cause cancer in humans (IRIS, 1999).

- With respect to non-cancer health effects of PCBs, the RfD value, 2×10^{-5} mg/kg-day, is based on morphological and potential immunosuppressive effects of ocular exudate, inflamed Meibomian (tarsal) glands, distorted fingernail and toenail growth, and decreased antibody response to injected sheep erythrocytes in Rhesus monkeys exposed to PCBs (OEHHA, 2008). These morphological responses are considered to occur at or below the exposure levels causing developmental neurobehavioral effects, suggesting that the RfD is protective of a sensitive developing fetus (OEHHA, 2008). Data from human studies support the conservativeness of this RfD, as a NOAEL of 5×10^{-5} mg/kg-day (2-3 times less conservative than the RfD value used in this assessment) was found in studies summarized in ATSDR (2000).

- With respect to health effects of mercury, this assessment is conservative because the RfD value, 0.0001 mg/kg-day is protective of developmental neurological abnormalities in infants, and is considered to be protective of the sensitive subpopulation of infants and childbearing women (OEHHA, 2008). OEHHA (2008) specifically recommends that this RfD applies to women aged 18 to 45 years and children aged 1 to 17 years, and suggests application of an RfD three times higher (less conservative) to women over 45 years and men. If the RfD for the general population (i.e., 0.0003 mg/kg-day for men and non-childbearing women) is used in the above calculations, the cleanup would be protective of subsistence fishermen at a fractional intake of 100%.

- With respect to health effects of copper, this assessment is expected to be conservative. Copper is an essential nutrient and a necessary component of the human diet. Copper is not a typical chemical of concern monitored in regulatory fish advisories (in contrast to mercury and PCBs). In contrast to PCBs and mercury, copper accumulation is regulated in humans such that after nutritional requirements are met in the diet, there are several mechanisms that prevent copper overload (ATSDR, 2004). When a large excess of copper is consumed, one of the most commonly reported adverse health effect of copper is gastrointestinal distress; this symptom is not usually persistent and has not been linked with other adverse health effects (ATSDR, 2004).

32.5. Alternative Cleanup Levels to Protect Aquatic Life Beneficial Uses

The triad data evaluated in Section 18 to determine if sediment pollutant levels at the Shipyard Sediment Site were adversely affecting the health of the benthic community and a SWAC approach are not adequate to set cleanup levels for Aquatic Life beneficial uses. As part of the alternative cleanup level approach, an independent evaluation for protection of aquatic life beneficial uses was conducted. This approach included in the remedial footprint all areas with sediment quality related impacts to benthic communities. The approach utilized chemical and biological data available from the Shipyard Report (Exponent, 2003) and addressed two situations: the case where full Triad data were available (29 of 65 stations), and the case where only chemical and Sediment Profile Imaging (SPI) data were available (36 of 65 stations). In each case, the goal was to maximize the use of available data to determine which polygons had sediment pollutant levels likely to adversely affect the health of the benthic community and include those polygons in the remedial footprint.

32.5.1. Analysis for Aquatic Life at Triad Stations

For Triad stations, the assessment relied primarily on the weight of evidence analysis described in Section 18 of this Technical Report. For each Shipyard Sediment Site Triad station, the weight of evidence analysis determined one of three categories to describe the overall likelihood of impairment including: “Unlikely,” “Possibly,” and “Likely.” These categories were assigned to each Shipyard Sediment Site station based on the potential combinations of the three principal Triad lines of evidence as described in Section 18. Triad stations with conditions designated as “Unlikely” impaired were interpreted to not unreasonably affect aquatic life beneficial uses. Triad stations with conditions designated as “Likely” impaired were interpreted to have the potential to impact aquatic life beneficial uses and were targeted for remedial action. Triad stations with conditions designated as “Possibly” impaired were further evaluated using the following approaches:

1. While the Shipyard Sediment Site is explicitly exempt from regulation under the Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1 Sediment Quality (Plan) SWRCB, 2009), the Plan's MLOE approach used to interpret the narrative SQO was used as a tool to evaluate whether or not further action was warranted at the "Possibly" impaired Triad stations. Two of 12 "Possibly" impaired stations were classified as "Likely Impacted" and none were classified as "Clearly Impacted" under the Plan's SQO's MLOE approach (Table 32-17). These two stations, NA11 and SW27, were targeted for further evaluation.

Table 32-17 Evaluation of Triad "Possibly" Impaired Stations Using MLOE Approach in the Bays and Estuaries Plan

Station ID	MLOE Result[1]		Station ID	MLOE Result[1]
SW08	likely unimpacted		NA09	possibly impacted
SW09	possibly impacted		NA11	likely impacted
SW15	likely unimpacted		NA12	possibly impacted
SW17	likely unimpacted		NA16	likely unimpacted
SW21	likely unimpacted		NA17	likely unimpacted
SW25	possibly impacted			
SW27	likely impacted			

1. SCCWRP evaluated a number of stations within San Diego Bay utilizing the MLOE approach in the Bays and Estuaries Plan. This evaluation included 27 stations at the Shipyard Sediment Site (Bay 2007 and 2009). The supporting calculations are provided in the Appendix for Section 32.
Source: Bay 2009

2. Shipyard Sediment Site stations designated as "Possibly" impaired represent areas of uncertainty in the weight of evidence analysis in Section 18 due to inconsistency among lines of evidence. The designation is based on two scenarios resulting from the weight of evidence analysis including: (1) "High" chemistry but "Low"[20] toxicity or benthic community effects relative to reference; or (2) "Moderate" chemistry and "Moderate" toxicity but "Low" benthic community effects. Both scenarios were considered and interpreted on the basis of the underlying data.

   Scenario 1 - High Chemistry with Low Toxicity and Low Benthic Community Effects. Stations with possible impairment under scenario 1 had high COC concentrations relative to reference and benchmarks, no significant toxicity relative to reference and controls, and benthic community conditions consistent with reference areas. Shipyard Sediment Site stations with this condition included NA17, SW02, SW08, SW09 and SW21. Because multiple biological tests showed no significant impact relative to reference, the interpretation for these stations is that COCs are not sufficiently bioavailable to benthic organisms to cause impairment significantly different from reference areas of the bay. The polygons associated with these stations, however, were

[20] The "Low" category for toxicity also includes a no significant toxicity relative to reference and control outcome.

ultimately included in the remedial footprint in order to achieve the post-remedial SWACs for human health and aquatic dependent wildlife protection (see Section 32.2).

Scenario 2 - Moderate Chemistry and Moderate Toxicity with Low Benthic Community Effects. Stations with "Possibly" impairment under scenario 2 had moderate COC concentrations relative to reference and benchmarks, a designation of moderate toxicity based on comparison to reference and control conditions, and benthic community conditions consistent with reference areas. Shipyard Sediment Site stations with this condition included NA09, NA11, NA12, NA16, SW15, SW17, SW25, and SW27. Results for the testing at these stations were further reviewed. Further examination of the biological testing results indicated that in every case, of the seven biological metrics assessed under the toxicity and benthic community lines of evidence, no more than one metric per station exceeded reference conditions (Table 32-18). In every case, the benthic community results indicated communities comparable to reference conditions. Because the predominance of biological tests showed no significant impact relative to reference, the interpretation for these stations is that, even though limited effects were observed in a single toxicity test, healthy benthic community suggests that COC concentrations are not high enough to drive site-specific impairment. Additionally, remediation of NA11 polygon is technologically infeasible due to stability concerns about the slope near the floating dry dock sump. Any dredging in this area of NA11 polygon would drastically undermine the slope. The polygons associated with stations NA09 and SW27, however, were ultimately included in the remedial footprint in order to achieve the post-remedial SWACs for human health and aquatic dependent wildlife protection (see Section 32.2).

Table 32-18 Summary of Biological Line-Of-Evidence Results for Toxicity and Benthic Community Endpoints for the Triad Stations Classified as Possibly Impaired Under Scenario 2

Triad WOE "Possibly" Station	Toxicity Relative to Reference			Benthic Community Impact Relative to Reference			
	Amphipod Survival	Urchin Fertilization	Bivalve Development	BRI	Abundance	# Taxa	S-W Diversity
NA09	No	No	Yes	No	No	No	No
NA11	Yes	No	No	No	No	No	No
NA12	No	No	Yes	No	No	No	No
NA16	No	No	Yes	No	No	No	No
SW15	No	No	Yes	No	No	No	No
SW17	No	No	Yes	No	No	No	No
SW25	No	No	Yes	No	No	No	No
SW27	No	No	Yes	No	No	No	No

32.5.2. Analysis for Aquatic Life at Non-Triad Stations

For non-Triad stations only limited data were available to assess potential impacts to aquatic life beneficial uses. This does not indicate a shortcoming of the study, but rather reflects the goal of the data collection at these stations which was primarily to help delineate the nature and extent of contamination. The available data at non-Triad stations generally included surface sediment COC concentrations, and proximate Sediment Profile Image (SPI) analysis of benthic community successional stage. The analysis relied upon these available data and site specific chemical thresholds that were developed from the Triad station in the Shipyard Report (Exponent, 2003). Chemical thresholds included site-specific Lowest Apparent Effects Thresholds (LAETs) for individual COCs, and a Site-Specific Median Effects Quotient (SS-MEQ) to address combined effects of multiple COCs.

The Apparent Effects Threshold (AET) is a tool for identifying concentrations of a pollutant in sediment above which adverse biological effects are always expected. When multiple site-specific effects endpoints are measured, several AET values can be combined to derive a single set of AET values by conservatively applying the lowest of any of the individual AET values for each chemical. This is known as the lowest AET or LAET. The methodology for calculating the site-specific LAETs is described in additional detail in the Shipyard Report (Exponent, 2003). To provide an additional margin of protection, the LAETs derived from the site-specific Triad data were reduced to 60 percent of the calculated value (60%LAETs), and these 60%LAETs were used to assess individual chemicals at the non-Triad stations. The 60%LAET threshold values are shown in Table 32-19. All non-triad stations exceeding the 60% LAET were designated for remediation (Table 32-23).

Table 32-19 60% LAET Values for Primary COCs

Primary COCs	60%LAET Values
Copper	552 mg/kg
Mercury	2.67 mg/kg
HPAH	15.3 mg/kg
PCBs	3,270 μg/kg
TBT	1,110 μg/kg

Note: See Appendix for Section 32 for supporting calculations.

To address potential combined impacts of chemicals, an SS-MEQ was also developed from the Triad data available in the Shipyard Report (Exponent, 2003). The SS-MEQ was derived by calculating the median concentration of individual COCs at 6 of the 30 Triad stations (Table 32-20). These six stations were identified as likely impaired under the weight of evidence analysis described in Section 18 of this Technical Report (NA19, NA22, SW04, SW13, SW22 and SW23). The SS-MEQ threshold was then established by conservatively optimizing the performance of the quotient in predicting likely effects or the three most chemically-impaired possible stations (true positives) while minimizing false negatives. The optimal threshold was found to be an SS-MEQ of 0.9. The overall reliability for the available data was 70 percent. The term "overall reliability" is defined as the percentage of SS-MEQ predictions that agree with the

Triad weight of evidence categories for the stations. The only false negative was at NA22 which had significant evidence of non-COC related impacts from physical disturbance related to ship movements and propeller testing. Performance metrics for this threshold are summarized in Table 32-21.

$$\mathrm{SS} \bullet \mathrm{MEQ} = \frac{1}{5}\left[\frac{[Cu]}{ME_{Cu}} + \frac{[Hg]}{ME_{Hg}} + \frac{[HPAH]}{ME_{HPAH}} + \frac{[TPCB]}{ME_{TPCB}} + \frac{[TBT]}{ME_{TBT}}\right]$$

For the non-Triad stations, the SS-MEQ threshold of 0.9 was conservatively assumed to be predictive of “Likely” impairment. The SS-MEQ was calculated for all non-Triad stations as where the values in the numerator (e.g. [Cu], [Hg], etc.) are the non-Triad station sediment concentration for that COC, and the values in the denominator (e.g. ME_{Cu}, ME_{Hg}, etc.) are the site-specific median effects levels as shown in Table 32-20. All non-triad stations exceeding the SS-MEQ threshold were designated for remediation (Table 32-23).

Table 32-20 Data from Triad Stations at the Shipyard Sediment Site Used to Develop the SS-MEQ

Station	Sediment COC Concentration				
	Cu mg/kg	Hg mg/kg	HPAH µg/kg	PCB µg/kg	TBT µg/kg
NA19	270	0.78	3,000	990	570
NA22[1]	150	0.38	3,600	180	120
SW04	1,500	1.75	14,000	4,000	3,250
SW13	800	0.86	12,000	490	790
SW22	260	1.1	12,000	900	190
SW23	280	1	11,000	1,000	210
SS-Median	275	0.93	11,500	945	390

Note: See Appendix for Section 32 for supporting calculations.

1. NA22 is not included in the remedial footprint, and is being addressed separately in the TMDL for the mouth of Chollas Creek.

Table 32-21 Performance Summary for the SS-MEQ

Total Stations	30
Threshold	0.90
Reliability	70%
True Positives	5
True Negatives	16
False Positives	8
False Negatives	1

Note: See Appendix for Section 32 for supporting calculations.

In order to confirm that the SS-MEQ/60%LAET approach was protective of the health of the benthic community in polygons with only sediment chemistry data, a supplemental Triad study was conducted at the Shipyard Sediment Site in July 2009. The purpose of the study was to determine if the 60%LAET and SS-MEQ thresholds could reliably predict the likelihood of sediment quality impacts to the benthic community. Sampling and full triad analyses were conducted at five stations and the results compared to the 60%LAET and SS-MEQs for those stations to see if the 60%LAET and SS-MEQ thresholds could reliably predict a "Likely" impaired triad result. Five stations (NA23, NA24, SW06, SW19, and SW30) were selected for inclusion in the study, based on the following criteria:

1. They were not included in the Phase 1 sediment investigation Triad study, conducted in 2001.
2. Station locations were outside of the proposed remedial footprint (see Figure 32-1).
3. These stations had relatively high primary COC concentrations compared to other stations outside the remedial footprint.

The sediment chemistry, toxicity, and benthic community data from these five stations were evaluated in a manner consistent with that described in Section 18. The study depicted that, while 4 of the 5 stations had moderately elevated chemistry (SW19 was low), all had low toxicity. Benthic community disturbance was found to be low at three of the five stations, and moderate at NA23 and NA24. The results in the pre-remediation monitoring are shown in Table 32-22.

Table 32-22 Supplemental Triad Analysis Results and SS-MEQ/60%LAET Predictions

Station ID	Sediment Chemistry	Toxicity	Benthic Community	Triad Analysis Result	SS-MEQ/60%LAET Prediction	Accurate SS-MEQ/ 60%LAET Prediction?
SW06	Moderate	Low	Low	Unlikely	Unlikely or Possible	Yes
SW19	Low	Low	Low	Unlikely	Unlikely or Possible	Yes
SW30	Moderate	Low	Low	Unlikely	Unlikely or Possible	Yes
NA23	Moderate	Low	Moderate	Possible	Unlikely or Possible	Yes
NA24	Moderate	Low	Moderate	Possible	Unlikely or Possible	Yes

Note: See Appendix for Section 32 for supporting calculations.

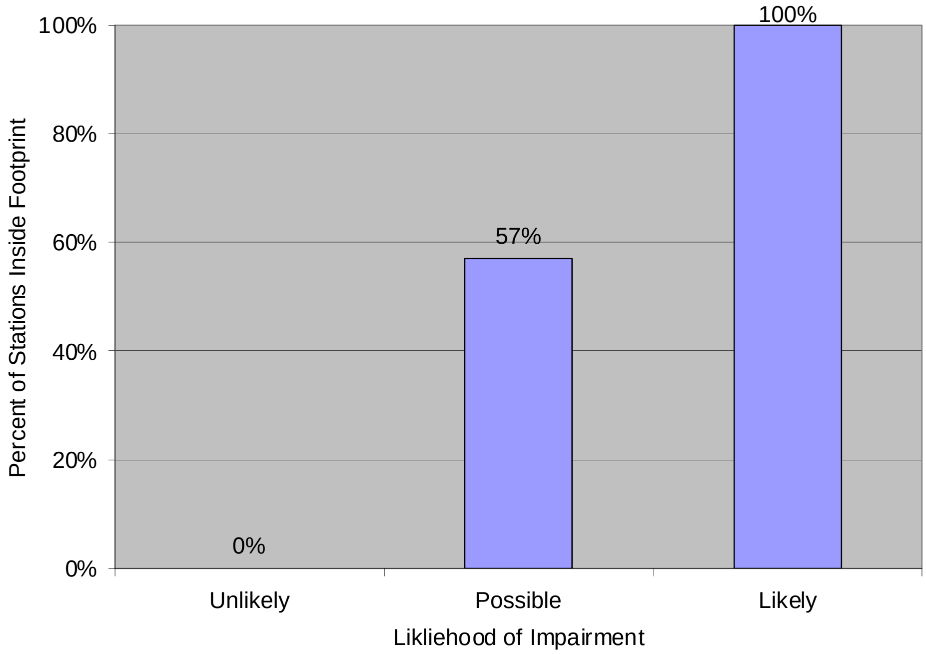
These findings indicated that no benthic community impacts are the result of elevated COCs in the sediments at these locations. None of the stations assessed were deemed “Likely” impaired (although some benthic impacts are likely in some areas due to physical disturbance from shipyard activities, such as ship movements and dry dock operations). At all five stations, the SS-MEQ/60%LAET thresholds successfully predicted the absence of “Likely” benthic community impacts. Based on the preceding evidence, the SS-MEQ and 60%LAET approach appears to be a reliable predictor of likely benthic impairment at other locations at the Shipyard Sediment Site.

32.6. Alternative Cleanup Levels Protect Aquatic Life Beneficial Uses

An analysis of ecological, toxicological, and chemical lines of evidence confirmed that alternative cleanup levels will be protective of aquatic life beneficial uses at the Shipyard Sediment Site.

For polygons with Triad data at the Shipyard Sediment Site, all polygons with a Triad station identified as “Likely” impaired under the weight of evidence analysis in Section 18 were designated for remediation (Figure 32-2). The majority of the polygons with “Possibly” impaired stations, and all of the polygons with “Possibly” impaired stations with “High” chemistry were designated for remediation (Figure 32-2). Of the remaining polygons with “Possibly” impaired stations, all have healthy benthic communities comparable to reference conditions, and showed biological effects in a maximum of one metric out of the seven that were assessed. With respect to the Triad stations, the proposed remedial design targets all of the “Likely” areas of impairment and the majority of areas of “Possible” impairment for remedial action.

Figure 32-2 Percent of Stations Targeted for Remediation as a Function of the Weight-Of-Evidence Category for Aquatic Life Impairment



For polygons with only sediment chemistry data, all exceeding the SS-MEQ or 60%LAET thresholds were designated for remediation (Table 32-23).

Table 32-23 Site-Specific 60%LAET and SS-MEQ Threshold Exceedances SPI Successional Stage, and Remedial Designations at the Shipyard Sediment Site Non-Triad Stations

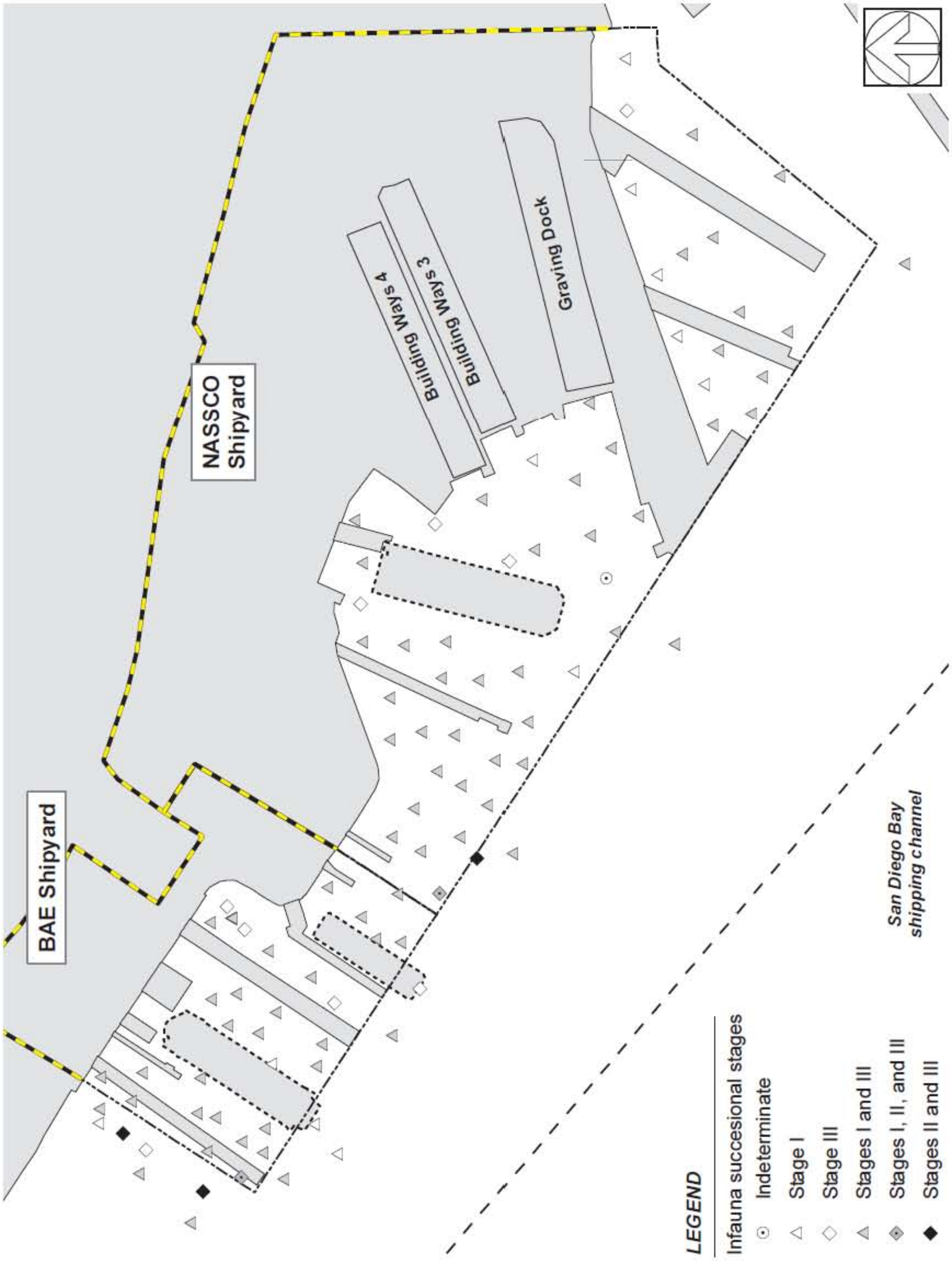
Non-Triad Station	Exceeds 60%LAET Threshold	Exceeds SS-MEQ Threshold	SPI Successional Stage	Designated for Remediation
NA02	No	No	Stage I & III	No
NA08	No	No	Stage I & III*	No
NA10	No	No	Stage I & III	No
NA13	No	No	Stage I & III	No
NA14	No	No	NA	No
NA18	No	No	Stage I & III*	No
NA21	No	No	Stage I & III*	No
NA23	No	No	Stage I & III*	No
NA24	No	No	Stage I & III*	No
NA25	No	No	NA	No
NA26	No	No	NA	No

Non-Triad Station	Exceeds 60%LAET Threshold	Exceeds SS-MEQ Threshold	SPI Successional Stage	Designated for Remediation
NA27	No	No	NA	No
NA28	No	No	NA	No
NA29	No	No	NA	No
NA30	No	No	NA	No
NA31	No	No	NA	No
SW01	No	Yes	Stage I	Yes
SW05	No	Yes	Stage III*	Yes
SW06	No	No	Stage I and III	No
SW07	No	No	Stage I, II & III	No
SW10	Yes	No	Stage I & III	Yes
SW12	No	No	Stage I & III	No
SW14	No	No	Stage I & III*	Yes
SW16	No	Yes	Stage I & III*	Yes
SW19	No	No	NA	No
SW20	No	Yes	Stage I & III	Yes
SW24	Yes	Yes	Stage I & III*	Yes
SW26	No	No	Stage I & III	No
SW28	Yes	Yes	Stage I & III*	Yes
SW29	No	No	NA	Yes (partial)
SW30	No	No	NA	No
SW31	No	No	Stage III*	No
SW32	No	No	NA	No
SW33	No	No	NA	No
SW34	No	No	NA	No
SW36	No	No	Stage I & III	No

Note: Successional stage marked with * indicates condition taken from an SPI location in proximity to the non-Triad station. NA indicates that there was no available SPI station in proximity to the non-Triad station. All other SPI stations were co-located with non-Triad stations.

To further verify protection of aquatic life beneficial uses at non-Triad stations, the available SPI data were also evaluated. These results are described in detail in the Shipyard Report (Exponent, 2003). SPI data were not always specifically co-located with non-Triad chemistry data, but a large number of sampling stations were assessed and thus, if not co-located, SPI stations were generally in close proximity to non-Triad stations, and the SPI data provide the best available generalized assessment of the benthic community health in areas where detailed benthic community assessment was not carried out. While SPI analysis yields a range of metrics, the most relevant measure for this assessment is the infaunal successional stage. Briefly, successional stage measures the degree of development or recolonization of a benthic community following disturbance (physical or chemical). The evolving succession is described in three stages. Stage I occurs soon after sediment has been disturbed and is characterized by colonization of small tube-dwelling polychaetes that feed at the sediment surface. Stage II is characterized by organisms that burrow shallowly into the sediment but nevertheless feed at or near the sediment surface. Stage III is characterized by organisms that burrow well into the anaerobic sediment and feed at depth off of organic matter and microbial decomposers. The three characteristic benthic successional stages can be identified in SPI photographs through the structures that the organisms create (tubes, burrows) and through the modifications they induce in sediment properties. SPI analysis showed that mature Stage III communities are present throughout both shipyards (Figure 32-3). In some limited areas of known physical disturbance only Stage I communities were observed such as the engine test area between Piers 4 and 5, near the southeast end of the NASSCO shipyard. With these exceptions, the SPI analysis generally indicates that healthy Stage III benthic communities are present at Shipyard Sediment Site stations with COC concentrations below the 60%LAET or SS-MEQ thresholds (Table 32-23).

Figure 32-3 Distribution of Benthic Infauna Successional Stage at the Shipyard Sediment Site (Figure 8-1; Exponent, 2003)



In conclusion, under the analysis, all Triad stations at the Shipyard Sediment Site identified as likely impaired under the weight of evidence analysis were designated for remediation. The majority of the possibly impaired stations, and all of the possibly impaired Triad stations with high chemistry were designated for remediation. Of the remaining possibly impaired stations, all have healthy benthic communities comparable to reference conditions, and showed biological effects in a maximum of one metric out of the seven that were assessed. All non-Triad stations exceeding the 60%LAET or SS-MEQ were designated for remediation. The SPI analysis generally indicates that healthy stage III benthic communities are present at Shipyard Sediment Site non-Triad stations with COC concentrations below the 60%LAET or SS-MEQ thresholds.

Table 32-24 Summary of Aquatic Life Beneficial Use Protection Analysis

<table>
<tr><th colspan="3">Beneficial Use</th><th>COC</th><th>Condition</th><th>Basis</th></tr>
<tr><td rowspan="8">Aquatic Life (Benthos)</td><td colspan="2">Triad Stations</td><td>Weight of Evidence Category</td><td>No “Likely” Impacted Stations</td><td>• Cleanup all areas designated as “Likely” impacted or above under the weight of evidence analysis in the Section 18.</td></tr>
<tr><td rowspan="7">Non-Triad Stations</td><td>SS-MEQ</td><td>Quotient of 5 COCs</td><td>0.9</td><td>• Protective of benthic communities consistent with “Likely” stations (Section 18).</td></tr>
<tr><td rowspan="5">60%LAET</td><td>Cu (mg/kg)</td><td>552</td><td rowspan="5">• Protective of benthic communities consistent with Site-specific Lowest Apparent Effects Threshold (LAET)
• Significant margin of safety</td></tr>
<tr><td>Hg (mg/kg)</td><td>2.67</td></tr>
<tr><td>HPAH (µg/kg)</td><td>15,300</td></tr>
<tr><td>PCB (µg/kg)</td><td>3,270</td></tr>
<tr><td>TBT (µg/kg)</td><td>1,110</td></tr>
<tr><td>SPI</td><td>NA</td><td>Presence of Stage 3 Community</td><td>• Supporting line of evidence</td></tr>
</table>

32.7. Other Considerations Regarding Resolution No. 92-49

The alternative cleanup levels must also comply with the provisions of Resolution No. 92-49. This Resolution requires that alternative cleanup levels less stringent than background levels be:

1. The lowest chemical concentrations that are technologically and economically achievable

2. Consistent with maximum benefit to the people of the state, and

3. Not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards.

32.7.1. Technological and Economic Feasibility

In prescribing any alternative cleanup levels less stringent than background the San Diego Water Board must consider setting the alternative cleanup levels at the lowest levels that are technologically and economically feasible. This consideration is mandated by Resolution No. 92-49 which directs the San Diego Water Board to apply section 2550.4 of Title 23 of the California Code of Regulations to the extent feasible.

As demonstrated in Section 31 above, it is not economically feasible to remediate the Shipyard Sediment Site to background sediment-quality levels. Comparing incremental costs of remediation to incremental exposure reduction values, the highest net benefit per remedial dollar spent occurs for the first $24 million (12 polygons), based on the fact that initial exposure reduction is between 16 and 13 percent per $10 million spent. Beyond $24 million, however, exposure reduction drops consistently as the cost of remediation increases.

Based on this comparison of incremental costs versus incremental benefit, the San Diego Water Board cannot require remediation to background sediment-quality levels because doing so would establish alternative cleanup levels that are not economically feasible and, therefore, are above the "ceiling" permitted by section 2550.4(e).

The total cost of the cleanup is estimated to be $58 million (see Appendix for Section 32).[21] The $58 million estimated cost of the remedial footprint cannot be directly overlaid on the cost scenarios shown in Figure 31-1 because of the differences in methods and assumptions between the economic feasibility analysis and the alternative cleanup levels/remedial footprint analysis. The $58 million estimated cost of cleaning up 23 polygons, however, is likely beyond the initial high exposure reduction per cost scenario represented by cleaning up 12 polygons. Accordingly, the alternative cleanup levels established for the Shipyard Sediment Site are the lowest levels that are technologically and economically achievable, consistent with section 2550.4(e).

32.7.2. Maximum Benefit to the People of the State

Resolution No. 92-49 requires that an alternative cleanup level be consistent with maximum benefit to the people of the State of California. When considering an alternative cleanup level under Resolution No. 92-49, a regional water board must consider: "all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." Moreover, a Regional Water Board must consider the total values involved in the light of "current, planned, or future land use, social, and economic impacts to the surrounding community, including property owners other than the discharger." The proposed alternative cleanup levels are judged to be consistent with maximum benefit to the people of the State based on the San Diego Bay resource protection, mass removal and source control, and economic considerations provided below.

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[21] The actual cost of cleanup can vary significantly from the estimate due to a number of factors including variability regarding the estimated volume, and dredging subcontractor, transportation, and disposal costs.

San Diego Bay Resource Protection Considerations

The Shipyard Sediment Site pollution is located in San Diego Bay, one of the finest natural harbors in the world. San Diego Bay is an important and valuable resource to San Diego and the Southern California Region. The Bay provides habitat for fish and wildlife, extensive commercial and industrial economic benefits, and recreational opportunities to citizens and visitors. The Bay is a key element for the military security of the United States.

San Diego Bay is of significant economic value to California and the Nation. The Bay is a major tourist and convention destination, international shipping center, plays a key role in the national defense, and has many other recreational, industrial, and commercial uses. Most of these uses rely on a healthy Bay. Shipping, shipbuilding, boat repair, tourism, and other industries are either directly dependent on, or otherwise benefit from, the Bay. Because of its beauty and availability as a recreational resource, San Diego Bay is a major draw for the tourist industry. In 1997, tourism in the greater San Diego area accounted for 14 million overnight visitors and $4.4 billion in income. Much of this activity occurred around San Diego Bay and downtown San Diego where the hotels and San Diego Convention Center are located.

San Diego Bay is designated as a State Estuary under Section 1, Division 18 (commencing with section 28000) of the Public Resources Code. A State Estuary is defined as a California saltwater bay or body of water, receiving freshwater stream 5 flows, which supports human beneficial uses and wildlife and merits high priority action for preservation.

San Diego Bay is bordered by the cities of San Diego, National City, Chula Vista and Coronado, with an estimated population of approximately 1.65 million persons. San Diego County has a population of over 3 million and is growing at a rate of about 50,000 per year; most of these residents are located in the in the metropolitan western portion of the county.

The proposed alternative cleanup levels are judged to be consistent with maximum benefit to the people of the State because:

1. Remediated areas will approach reference area sediment concentrations for most COCs,

2. All areas identified with “Likely” impacts to benthic beneficial use will be remediated,

3. Adverse impacts to benthic communities from dredging will be temporary, with stasis expected within approximately three years,

4. The alternative cleanup levels support human health, aquatic dependent wildlife, and aquatic life beneficial uses,

5. Impacts on local communities associated with remedial activities are temporary and will be mitigated where feasible,

6. Remedial activities will cause no adverse effects to sport or commercial angling, or to contact or non-contact water recreation beneficial uses because they will take place inside the shipyard security boom, and

7. Adverse effects to eelgrass beds from dredging will be mitigated to levels of insignificance following remediation.

Compared to cleaning up to background cleanup levels, cleaning up to the alternative cleanup levels will cause less diesel emission, less greenhouse gas emission, less noise, less truck traffic, have a lower potential for accidents, and less disruption to the local community. Achieving the alternative cleanup levels also requires less barge and crane movement on San Diego Bay, has a lower risk of re-suspension of contaminated sediments, and reduces the amount of landfill capacity required to dispose of the sediment wastes.

Mass Removal and Source Control Considerations

The alternative cleanup levels also maximize benefit to the people of the State by effectuating source control at the dischargers' storm water facilities, and by causing significant contaminant mass removal from San Diego Bay. The City of San Diego will take protective measures to remove potential contaminants and prevent their discharge to the Bay from its storm drains and storm water collection system in the areas upland of the shipyards, including cleaning sediments out of the catch basins and conveyances, repairing the system where it is damaged, installing filters, and implementing other BMPs.

Preliminary contaminant mass removal estimates based on data from the Shipyard Report are set forth in Table 32-25, below.

Table 32-25 Preliminary Contaminant Mass Removal/Containment Estimates

COC	Estimated Mass Removed (Kg)	Estimated Mass Contained (Kg)	Total Estimated Mass Removed and/or Contained (Kg)
Arsenic	2,200	230	2,400
Cadmium	170	13	180
Chromium	8,700	640	9,300
Copper*	52,000	6,100	58,000
HPAH*	1,300	130	1,400
Lead	15,000	1,500	17,000
Mercury*	230	22	250
PCBs*	190	32	220
Tributyltin*	95	15	110
Zinc	61,000	5,600	67,000
Total All Chemicals	141,000	14,000	156,000

*Primary COC

Notes: See Appendix for Section 32 for supporting calculations.
Total for All Chemicals rounded to nearest thousand.

Assumptions:

1. Concentrations at depths where no data exist are assumed to be the same as the concentrations at the nearest depth interval where data exist within a station bore.

2. Areas being dredged are to be over-dredged 1 foot. The concentrations in this 1 foot over-dredge depth are assumed to be the same as the interval above that depth.
3. Depth of chemicals in under pier areas are assumed to be the same as in the adjacent areas being dredged represented by the same sampling station data inclusive of the 1 foot over-dredged area.
4. NA22 not included in the analysis.
5. The PCBs value is comprised of the 41 congeners. Non-detected congeners are assumed to be at the reporting limit for those congeners.
6. Non detects for all other chemicals are assumed to be at ½ the reporting limit for those chemicals, including HPAH congeners.
7. Where multiple samples exist, averaging was performed as follows:
   - Splits were averaged.
   - The average split sample results were then averaged with samples collected from the same station and depth interval conducted on different dates.
   - All sediment results collected were included in the average data sets from a location, including the solid sediment concentrations measured during the pore water study.
8. All analytical results were assumed to be dry weight.
9. Dry bulk density of the sediments is estimated to be the average of the values found in the Exponent report where dry bulk density is the Total Solids (dry weight as a percent of bulk weight) times the specific gravity values (averages of each).
10. Thiessen polygons approximate dredge and under-pier areas for Sediment Management Units (SMUs).
11. Concentrations in a SMU or polygon are assumed to be constant throughout the SMU or polygon and the same as the concentrations in the sample bore that represents the SMU or polygon. There is one sample bore per SMU or polygon.
12. Dredge depth is based on concentrations detected above background in sediment cores. Where the bottom sample of a core had concentrations above background, additional depths for dredging were assumed based on activities at that location, elevation of the sediment surface, and resulting expectations of contamination at depth due to those activities and elevations.
13. Each SMU is represented by one Thiessen polygon.
14. Data is from Exponent (2003).

Economic Considerations

City of San Diego

There are also significant benefits of the economic and public service activities of the City of San Diego. The City provides numerous public services that contribute to an extraordinarily high quality of life, including law enforcement, fire protection, public safety, administration of justice, road and traffic management, potable water collection treatment and distribution, wastewater collection and treatment, flood protection, planning, zoning and development administration, parks, beaches and recreation, public library services, storm water quality management, among many other public services.

This municipality provides a home to numerous industries including several high technology and innovative industries with global reach. This creates an economic powerhouse that fuels the overall state economy, particularly in the sectors of wireless telecommunications and biotechnology, for which San Diego maintains a world-class reputation that attracts talent and capital from around the world. Maintaining this economic powerhouse requires striking a delicate balance of governance that allows this economic activity to thrive while maintaining an environment that top global talent is attracted to and wants to live in.

This cleanup represents the essence of that balance and improves the environmental conditions of San Diego Bay in balance with ensuring that vital City services can also be maintained so that crime should not increase, fire protection should be sufficient, and a host of other City services should not decline and impair the City's economy and vibrancy.

Shipyards

Despite not having an unreasonable effect on beneficial uses in San Diego Bay, achieving the alternative cleanup levels will result in no long-term loss of use of the Shipyard Sediment Site, thereby furthering continued operation of the shipyards, including vessel construction, maintenance and repair, and the concomitant employment of persons in the San Diego region.

The Shipyards provide significant economic benefit to the San Diego community. NASSCO is the only major construction shipyard on the West Coast. BAE Systems and NASSCO provide essential repairs and maintenance on U.S. Navy vessels. The two Shipyards have repaired more than 250 U.S. Navy vessels this decade. The two Shipyards directly employ approximately 5,800 skilled trade persons while providing work for another 1,100 subcontractors and other companies. The Shipyards are the largest minority employers in San Diego, and continue to provide more manufacturing jobs in San Diego than any other company.

The Shipyards in conjunction with the remaining working waterfront have an estimated $3.5 billion impact in the local community surrounding the Shipyards. BAE Systems alone has spent or invested about $500 million in the community over the course of the last two years.

The Shipyards have heavily invested to eliminate environmental discharges to San Diego Bay. NASSCO and BAE Systems have both set a "zero discharge" goal for their facilities.

32.7.3. Water Quality Control Plans

The Water Quality Control Plans that apply to the alternative cleanup levels are the Basin Plan and State Water Quality Control Plan for Enclosed Bays and Estuaries (Bays and Estuaries Plan). The Basin Plan contains a narrative water quality objective for toxicity that states in relevant part:

> "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the San Diego Water Board."

The Bays and Estuaries Plan contains narrative sediment quality objectives for the protection of aquatic life and human health. These objectives are as follows:

A. Aquatic Life – Benthic Community Protection
Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California.

B. Human Health
Pollutants shall not be present in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health.

The alternative cleanup levels comply with the Basin Plan and Bays and Estuaries Plan narrative water quality objectives because, as discussed in the previous section, human health, aquatic-dependent wildlife, and aquatic life beneficial uses will not be unreasonably affected by the post-cleanup sediment chemistry concentrations. Regarding aquatic life objectives, polygons associated with Triad stations characterized as "Likely" impacted are included in the cleanup footprint. Furthermore, polygons without a Triad station, but with sediment chemistry that exceeds 60%LAET, or the SS-MEQ thresholds are included in the cleanup footprint (see Section 32.5.2). The alternative cleanup levels comply with the human health and aquatic dependent wildlife objectives as shown by the risk assessments for the alternative cleanup levels discussed in Sections 32.3 and 32.4.

Technical Report
for
Cleanup and Abatement
Order No. R9-2012-0024

APPENDIX FOR SECTION 32

ALTERNATIVE CLEANUP LEVELS

March 14, 2012

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Table A32-26 Supporting Calculations for Section 32.7.1 Technological and Economical feasibility, Continued

Anchor QEA, L.P.
Cost Estimate for Remedial Footprint
San Diego Shipyards Sediment Site
July 12 ,2010

Item	Probable Quantity	Unit	Unit Cost	Probable Cost	Assumptions
DESIGN AND PERMITTING					
Additional Pre-Design Site Characterization	1	LUMP SUM	$348,000	$348,000	
Surveys and Engineering Design	1	LUMP SUM	$675,000	$675,000	
Permitting	1	LUMP SUM	$400,000	$400,000	See Note 1.
CEQA EIR - if required	1	LUMP SUM	$900,000	$900,000	As discussed in Note 1, we do not believe an EIR will be required; however in the event that a EIR is required, we have added in estimated costs for the preparation and submittal of an EIR.
CONSTRUCTION PREPARATION					
Mobilization(s) and Demobilization(s)	3	CONSTRUCTION SEASONS	$300,000	$900,000	Estimate assumes work is completed in 3 construction seasons.
Demolition	1	LUMP SUM	$500,000	$450,000	
DREDGING					
Unconstrained open-water dredging (outside of leasehold area)(12.5% of dredge area)	17,925	CY	$10	$179,250	Unit costs are typical for unconstrained dredging outside of shipyard area.
Constrained dredging from inner shipyard (within leasehold area)(87.5% of dredge area)	125,475	CY	$18	$2,258,550	Higher cost for dredging within leasehold line, near piers, in areas of ship traffic, etc.
Dredging Surface/Subsurface Debris	7,170	CY	$120	$860,400	Unknown quantity. Estimates assume 5% of total dredge volume. Pricing includes landfill disposal.
Engineering Controls (silt curtain, oil boom)	3	CONSTRUCTION SEASONS	$32,000	$96,000	Estimate assumes work is completed in 3 construction seasons.
Additional Dredging (as needed for 2nd pass)	28,100	CY	$18	$505,800	Two feet of dredging over one-half the remedial area. Same unit costs as for constrained dredging from inner shipyard.
MARINE STRUCTURES					
Placement of Quarry Run Rock for Protection of Marine Structures	21,887	TON	$45	$984,915	No structural retrofit of structures is assumed to be necessary. Estimated costs assume setback of dredging from marine structures and revetments, and placement of quarry run blankets or berms to reinstate lateral resistance.
SEDIMENT OFFLOADING AND DISPOSAL					
Acquisition/Lease of Sediment Offloading Area	3	CONSTRUCTION SEASONS	$300,000	$900,000	An off-site sediment staging area will be needed in the vicinity of the project area. Location is unknown at this time. Costs assume a three-year construction period.
Preparation of Sediment Offloading Area	1	LUMP SUM	$300,000	$300,000	Preparation of sediment handling and dewatering area.
Rehandling and Dewatering	171,500	CY	$25	$4,287,500	Assumes stockpiling of sediments prior to transport to landfill and addition of lime or cement admixture to facilitate dewatering.
Transportation and Disposal at Landfill	257,250	TON	$75	$19,293,750	Assumes disposal at regional hazardous waste landfill outside of San Diego County (Copper Mountain in Nevada).
UNDERPIER REMEDIATION					
Purchase and place 3 feet of clean sand/gravel beneath piers and overwater structures	103,705	SF	$30	$3,111,150	Assumes 3 foot thick layer of sand placed only under pier areas in the dredging footprint, quarry run rock assumed to be placed on the setback areas.
PLACEMENT OF CLEAN SAND COVER	42,211	CY	$40	$1,688,422	Assumes one half of dredged area receives 1-3 feet of sand.
SW04 cleanout, BMP Installation, Investigation	1	LS	$703,048	$703,048	

Table A32-26 Supporting Calculations for Section 32.7.1 Technological and Economical feasibility, Continued

Item	Probable Quantity	Unit	Unit Cost	Probable Cost	Assumptions
TOTAL DIRECT CONSTRUCTION COSTS				**$38,841,785**	
BID MANAGEMENT AND SUPPORT	**1**	LUMP SUM	$25,000	$25,000	
CONSTRUCTION MANAGEMENT	**3**	CONSTRUCTION SEASONS	$450,000	$1,350,000	Estimate assumes work is completed in 3 construction seasons.
CONTINGENCY	**30%**	Percent		$12,065,036	Unquantifiable or identifiable unknowns
MONITORING COSTS					
Water Quality Monitoring during construction	**24**	WEEK	$18,000	$432,000	Consistent with project approach per mediation discussions.
Post-Dredging Confirmational Sampling	**45**	SAMPLES	$8,000	$360,000	Consistent with project approach per mediation discussions.
Long-Term Monitoring of Remediated Areas	**30**	LOCATIONS	$60,000	$1,800,000	Consistent with project approach per mediation discussions.
SW04 long term monitoring	**1**	LUMP SUM	$595,437	$595,437	PV for 100 years $20K/year, 5% discount rate
OTHER (NON-CONSTRUCTION) COSTS					
Eel Grass Habitat Mitigation (if needed) Construction and maintenance)	**0.87**	ACRES	$600,000	$522,000	Assumes 5% of dredged acreage will require mitigation
Eel Grass land lease costs in perpetuity (LS)	**0.87**	ACRES	$1,500,000	$1,305,000	
Internal Shipyard Costs	**1**	LUMP SUM	$250,000	$250,000	
RWQCB Oversight Costs	**10**	YEARS	$45,000	$450,000	Duration covers periods of design, construction, and long-term monitoring oversight.
GRAND TOTAL				**$58,000,000**	

Note 1:
This is inclusive of all requried permits. Required permits will be identified with legal assistance. Implementation of the cleanup program requires resource agency permits and environmental review under state [California Environmental Quality Act (CEQA)] and possibly federal [National Environmental Policy Act (NEPA)] guidelines.

Table A32-1

Table A32-5A SWACs and Exposure Calculation

Primary COC	Units	Pre-Remedy SWAC	Post-Remedy SWAC	Background Conc	Exposure Reduction[a]	% Exposure Reduction[b]
Copper	mg/kg	187	159	121	28	42
Mercury	mg/kg	0.75	0.68	0.57	0.07	38.9
HPAH	mg/kg	3.509	2.451	0.663	1.1	37.2
PCB	µg/kg	308	194	84	114	50.9
TBT	µg/kg	na	na	na	na	na
Secondary COC	**Units**	**Pre-Remedy SWAC**	**Post-Remedy SWAC**	**Background Conc**	**Exposure Reduction[a]**	**% Exposure Reduction[b]**
Lead	mg/kg	73	66	53	7	35.0
Zinc	mg/kg	252	221	192	31	51.7

[a] Exposure reduction = current SWAC minus post-remedy SWAC
[b] Percent exposure reduction relative to background = (current SWAC - final SWAC)/(current SWAC - background) x 100 SWAC - spatially weighted average concentrations

Table A32-5B Average Prey concentration for each aquatic-dependent wildlife receptor *inside NASSCO*

		Average Prey Concentration For Each Receptor				
Primary COC	**Units**	**Brown Pelican**	**Least Tern**	**Western Grebe**	**Surf Scoter**	
Copper	mg/kg	3.9	4.1	4.1	65	
Mercury	mg/kg	0.62	0.088	0.088	0.11	
HPAH[a]	mg/kg	na	na	na	1.58	
PCB	mg/kg	3.763	1.505	1.505	0.6	
TBT	mg/kg	na	na	na	na	
Secondary COC	**Units**					**Green Turtle**
Lead	mg/kg					19
Zinc (outside NASSCO)	mg/kg	na	190	na	na	na

Source for average detected prey concentrations is Appendix for Section 24
[a] Only surf scoter was identified as a wildlife risk driver in the Tier II ecological risk assessment for HPAH, identified as Benzo[a]pyrene (BAP).

Table A32-5C Average Prey concentration for each aquatic-dependent wildlife receptor *inside SWM*

		Average Prey Concentration For Each Receptor				
Primary COC	**Units**	**Brown Pelican**	**Least Tern**	**Western Grebe**	**Surf Scoter**	
Copper	mg/kg	9	9.9	9.9	48	
Mercury	mg/kg	0.52	0.088	0.088	0.1	
HPAH[a]	mg/kg	na	na	na	4.35	
PCB	mg/kg	4.009	2.273	2.273	0.861	
TBT	mg/kg	na	na	na	na	
Secondary COC	**Units**					**Green Turtle**
Lead	mg/kg					25

Source for average detected prey concentrations is Appendix for Section 24
[a] Only surf scoter was identified as a wildlife risk driver in the Tier II ecological risk assessment for HPAH, identified as Benzo[a]pyrene (BAP).

Table A32-5D Shipyard wide average prey concentration for each aquatic-dependent wildlife receptor and associated BAF

			Average Prey Concentration For Each Receptor[a]			BAF (using pre-remedy SWAC)[b]		
Primary COC	Units	Pre-Remedy SWAC	Brown Pelican, CA Sea lion	Least Tern, Western Grebe	Surf Scoter	Brown Pelican, CA Sea lion	Least Tern, Western Grebe	Surf Scoter
Copper	mg/kg	187	5.99	7.04	56.53	0.0320	0.0376	0.3023
Mercury	mg/kg	0.75	0.57	0.09	0.11	0.75623085	0.1232875	0.1443163
HPAH	mg/kg	3.509	na	na	2.97	na	na	0.8461
PCB	mg/kg	0.308	2.22	1.89	0.57	7.221	6.123	1.862
TBT	mg/kg	na	na	na	na	na	na	na
Secondary COC	Units	Pre-Remedy SWAC			Green Turtle			Green Turtle
Lead	mg/kg	73			22.00			0.3014
Zinc	mg/kg	252	na	157.32	na	na	0.62430325	na

[a] Shipyard wide average concentration = average prey concentration across entire shipyard
b BAF = average chemical level in prey tissue / pre-remedy SWAC
BAF - bioaccumulation factor

Table A32-5E Future prey concentrations for each aquatic-dependent wildlife receptor

			BAF (using pre-remedy SWAC)			New Average Prey Concentration[a]		
Primary COC	Units	Post-Remedy SWAC	Brown Pelican, CA Sea lion	Least Tern, Western Grebe	Surf Scoter	Brown Pelican, CA Sea lion	Least Tern, Western Grebe	Surf Scoter
Copper	mg/kg	159	0.0320	0.0376	0.3023	5.09	5.99	48.07
Mercury	mg/kg	0.68	0.75623085	0.123	0.1443	0.51	0.084	0.098
HPAH	mg/kg	2.451	na	na	0.8461	na	na	2.074
PCB	mg/kg	0.194	7.221	6.123	1.8618	1.40	1.19	0.36
TBT	mg/kg	na	na	na	na	na	na	na
Secondary COC	Units	Post-Remedy SWAC			Green Turtle			Green Turtle
Lead	mg/kg	66			0.3014			19.89
Zinc	mg/kg	221	na	0.624	na	na	137.97	na

[a] Future prey concentration = BAF * post-remedy SWAC
BAF - bioaccumulation factor

Table A32-5F Daily chemical intake

	Exposure Parameters					New Average Prey Concentration (mg/kg dw)								Daily Chemical Intake (mg/kg)[a]							
Receptor	Body Weight (kg)	Food Ingestion Rate (kg/day dw)	Sediment Ingestion Rate (kg/day dw)	Area Use Factor	Absorption Efficiency	Copper		Mercury	HPAH	PCB	TBT	Lead	Zinc	Copper		Mercury	HPAH	PCB	TBT	Lead	Zinc
Brown Pelican	3.174	0.25	0.005	1	1	5.09		0.51	na	1.40	na	na	na	0.6517		0.0416	na	0.1107	na	na	na
Least Tern	0.045	0.0053	0.00011	1	1	5.99		0.08	na	1.19	na	na	137.97	1.0936		0.0115	na	0.1404	na	na	16.7901
Western Grebe	1.2	0.062	0.0031	1	1	5.99		0.08	na	1.19	na	na	na	0.7200		0.0061	na	0.0619	na	na	na
Surf Scoter	1.05	0.056	0.0028	1	1	48.07		0.10	2.07	0.36	na	na	na	2.988		0.0070	0.1173	0.0198	na	na	na
Green Turtle	95	0.35	0.0186	1	1	na		na	na	na	na	19.89	na	na		na	na	na	na	0.0862	na
						Post-Remedy SWAC (mg/kg)															
						159		0.68	2.5	0.194	na	66	221								

Source of exposure parameters is from Section 24

[a] **Daily Intake$_{chemical}$** = [(CM * IR * FI * AE)$_{prey}$ + (CM * IR * FI * AE)$_{sediment}$]/BW

where:

CM = post-remedial concentration of the chemical in prey tissue or sediment (mg/kg). Prey tissue concentrations used in this equation were derived using the equation in Table 5, while the sediment concentration was based on the predicted post-remediation SWAC for the COC.

IR = ingestion rate of prey or sediment (kg/day)

FI = fraction of the daily intake of prey or sediment derived from the site (unitless area-use factor)

AE = relative gastrointestinal absorption efficiency for the chemical in a given prey or sediment (fraction)

BW = body weight of receptor species (kg)

Table A32-5G

	Daily Chemical Intake (mg/kg)						
Receptor	**Copper**	**Mercury**	**HPAH**	**PCB**	**TBT**	**Lead**	**Zinc**
Brown Pelican	0.652	0.042	na	0.111	na	na	na
Least Tern	1.094	0.012	na	0.140	na	na	16.790
Western Grebe	0.720	0.0061	na	0.062	na	na	na
Surf Scoter	2.988	0.0070	0.117	0.020	na	na	na
Green Turtle	na	na	na	na	na	0.086	na
Bird Low TRV	2.3	0.039	0.14	0.09	na	0.014	17.2
Bird High TRV	52.3	0.18	1.4	1.27	na	8.75	172
Bird Geometric Mean TRV (mg/kg-day)	10.9677	0.0837854	0.44271887	0.33808283	na	0.35	54.3911758
		HQ (calculation based on geometric mean)[a]					
Receptor	**Copper**	**Mercury**	**HPAH[b]**	**PCB**	**TBT**	**Lead**	**Zinc**
Brown Pelican	0.0594	0.4962	na	0.3273	na	na	na
Least Tern	0.0997	0.1377	na	0.4153	na	na	0.3087
Western Grebe	0.0656	0.0727	na	0.1830	na	na	na
Surf Scoter	0.2724	0.0841	0.2649	0.0585	na	na	na
Green Turtle	na	na	na	na	na	0.2463	na
		HQ (calculation based on low TRV)					
Receptor	**Copper**	**Mercury**	**HPAH**	**PCB**	**TBT**	**Lead**	**Zinc**
Brown Pelican	0.283	1.066	na	1.2295	na	na	na
Least Tern	0.475	0.296	na	1.5599	na	na	0.9762
Western Grebe	0.313	0.156	na	0.6875	na	na	na
Surf Scoter	1.299	0.181	0.838	0.2198	na	na	na
Green Turtle	na	na	na	na	na	6.1573	na
		HQ (calculation based on high TRV)					
Receptor	**Copper**	**Mercury**	**HPAH**	**PCB**	**TBT**	**Lead**	**Zinc**
Brown Pelican	0.0125	0.2310	na	0.0871	na	na	na
Least Tern	0.0209	0.0641	na	0.1105	na	na	0.0976
Western Grebe	0.0138	0.0338	na	0.0487	na	na	na
Surf Scoter	0.0571	0.0392	0.0838	0.0156	na	na	na
Green Turtle	na	na	na	na	na	0.0099	na

Source of TRVs is from Section 24

[a] HQ = daily chemical intake / geometric mean TRV

[b] Only surf scoter was identified as a wildlife risk driver in the Tier II ecological risk assessment for HPAH, identified as Benzo[a]pyrene (BAP).

A yellow cell notes that the HQ value is greater than a HQ threshold value of 1

Table A32-5H Selected hazard quotient

	HQ[a]						
Receptor	**Copper**	**Mercury**	**HPAH[b]**	**PCB**	**TBT**	**Lead**	**Zinc**
Brown Pelican	0.0594	0.4962	na	0.3273	na	na	na
Least Tern	0.0997	0.1377	na	0.4153	na	na	0.3087
Western Grebe	0.0656	0.0727	na	0.1830	na	na	na
Surf Scoter	0.2724	0.0841	0.2649	0.0585	na	na	na
Green Turtle	na	na	na	na	na	0.2463	na

[a] The selected HQ is based on the geometric mean TRVs

[b] Only surf scoter was identified as a wildlife risk driver in the Tier II ecological risk assessment for HPAH, identified as Benzo[a]pyrene (BAP).

33. Finding 33: Proposed Remedial Footprint and Preliminary Remedial Design

Finding 33 of CAO No. R9-2012-0024 states:

Polygonal areas were developed around the sampling stations at the Shipyard Sediment Site using the Thiessen Polygon method to facilitate the development of the remedial footprint. The polygons targeted for remediation are shown in red and green in Attachment 2. The red areas are where the proposed remedial action is dredging. The areas shown in green represent inaccessible or under-pier areas that will be remediated by one or more methods other than dredging. Portions of polygons NA20, NA21, and NA22 as shown in Attachment 2 were omitted from this analysis because it falls within an area that is being evaluated as part of the TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas Creek TMDL and is not considered part of the Shipyard Sediment Site for purposes of the CAO.

The polygons were ranked based on a number of factors including likely impaired stations, composite surface-area weighted average concentration for the five primary COCs, Site-Specific Median Effects Quotient (SS-MEQ)[22] for non-Triad stations, and highest concentration of individual primary COCs. Based on these rankings, polygons were selected for remediation on a "worst first" basis.

In recognition of the methodologies and limitations of traditional mechanical dredging, the irregular polygons were converted into uniform dredge units. Each dredge unit (sediment management unit or "SMU") was then used to develop the dredge footprint. The conversion from irregular polygons to SMUs is shown in Attachments 3 and 4. These attachments show the remedial footprint, inclusive of areas to be dredged ("dredge remedial area," in red) and under-pier areas ("under-pier remedial area," in green) to be remediated by other means, most likely by sand cover. Together, the dredge remedial area and the under-pier remedial area constitute the remedial footprint.

Upland source control measures in the watershed of municipal separate storm sewer system outfall SW-4 are also needed to eliminate ongoing contamination from this source, if any, and ensure that recontamination of cleaned up areas of the Shipyard Sediment Site from this source does not occur.

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[22] The SS-MEQ is a threshold developed to predict likely benthic community impairments based on sediment chemistry at the Shipyard Sediment Site. The development, validation, and application of the SS-MEQ is described in Section 32.5.2 of the Technical Report.

33.1. Proposed Remedial Footprint

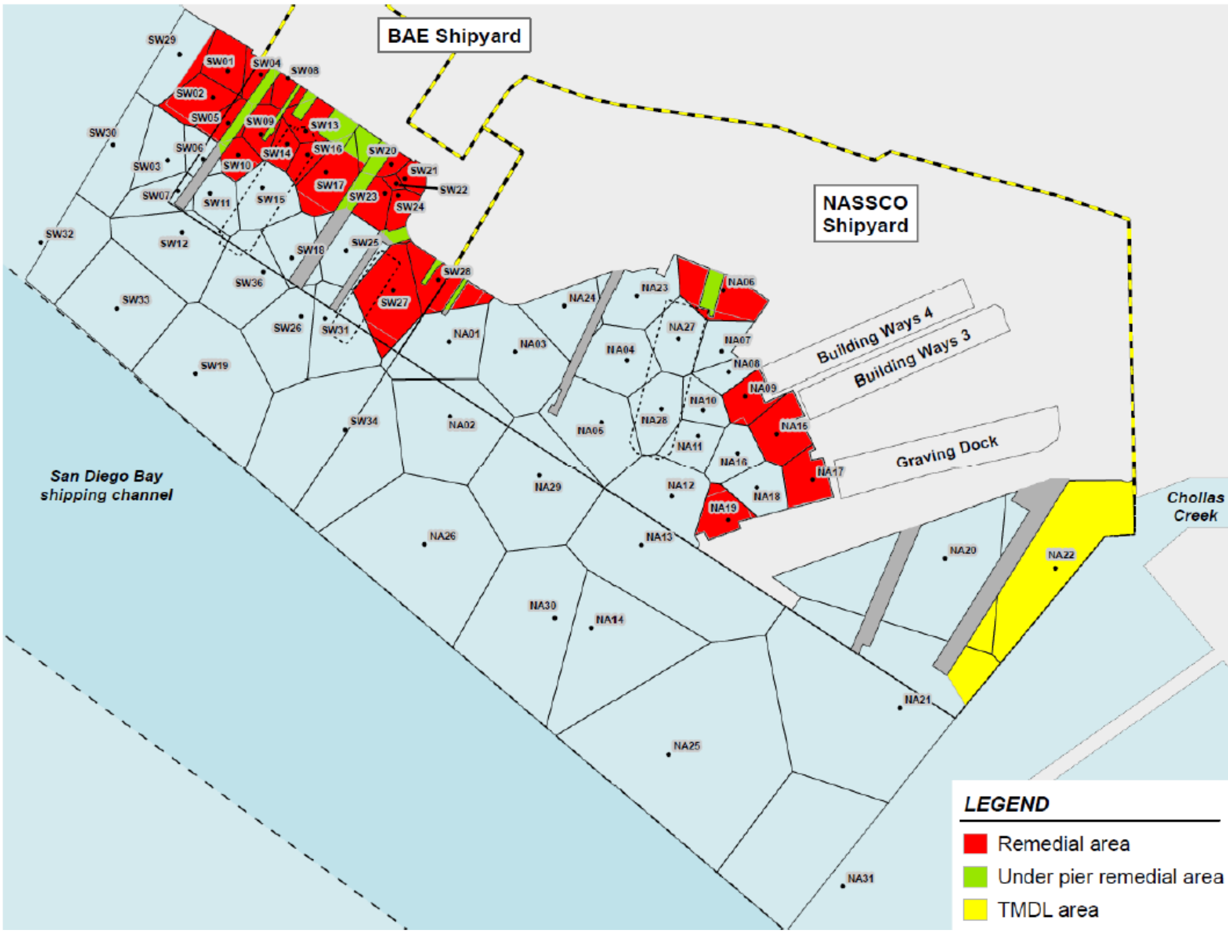
The proposed remedial footprint was developed based on the Thiessen Polygons determined to require remediation, as presented in Section 32. These polygons were used to associate a specific area (the area within a polygon) with the sediment chemistry, toxicity, and benthic sampling within the polygon. The sediment chemistry, toxicity, and benthic community data at the sampling station were assumed to be constant over the entire area of the polygon. The sediment chemistry concentrations at depth for each polygon targeted for remediation were then evaluated to determine the depth necessary to remediate each of those selected polygons to background sediment levels. Once remediation is completed, the SWAC within the remedial footprint is expected to be at or below background levels.[23]

The polygons targeted for remediation are shown in red and green in Figure 33-1. The red areas are where the proposed remedial action is dredging. The areas shown in green represent inaccessible or under-pier areas that will be remediated by one or more methods other than dredging, as described in Section 30 Technological Feasibility Considerations.

[23] While polygon SW29 is considered part of the Shipyard Sediment Site for purposes of the CAO, only a portion of SW29 is included in the dredge area. The San Diego Water Board may address the un-dredged portion of SW29 in a separate regulatory proceeding based upon available information even if compliance with the CAO is achieved in the overall remedial footprint, as indicated in Provision G of this CAO.

Exclusion of the eight additional polygons (polygons NA01, NA04, NA07, NA16, N A22, SW06, SW18, and SW29) from the proposed dredge footprint is consistent with the methodology described in this Technical Report, and the cleanup of the proposed dredge footprint should ensure that present and anticipated beneficial uses of San Diego Bay are protected. Therefore the additional costs associated with the remediation of these polygons is not justified.

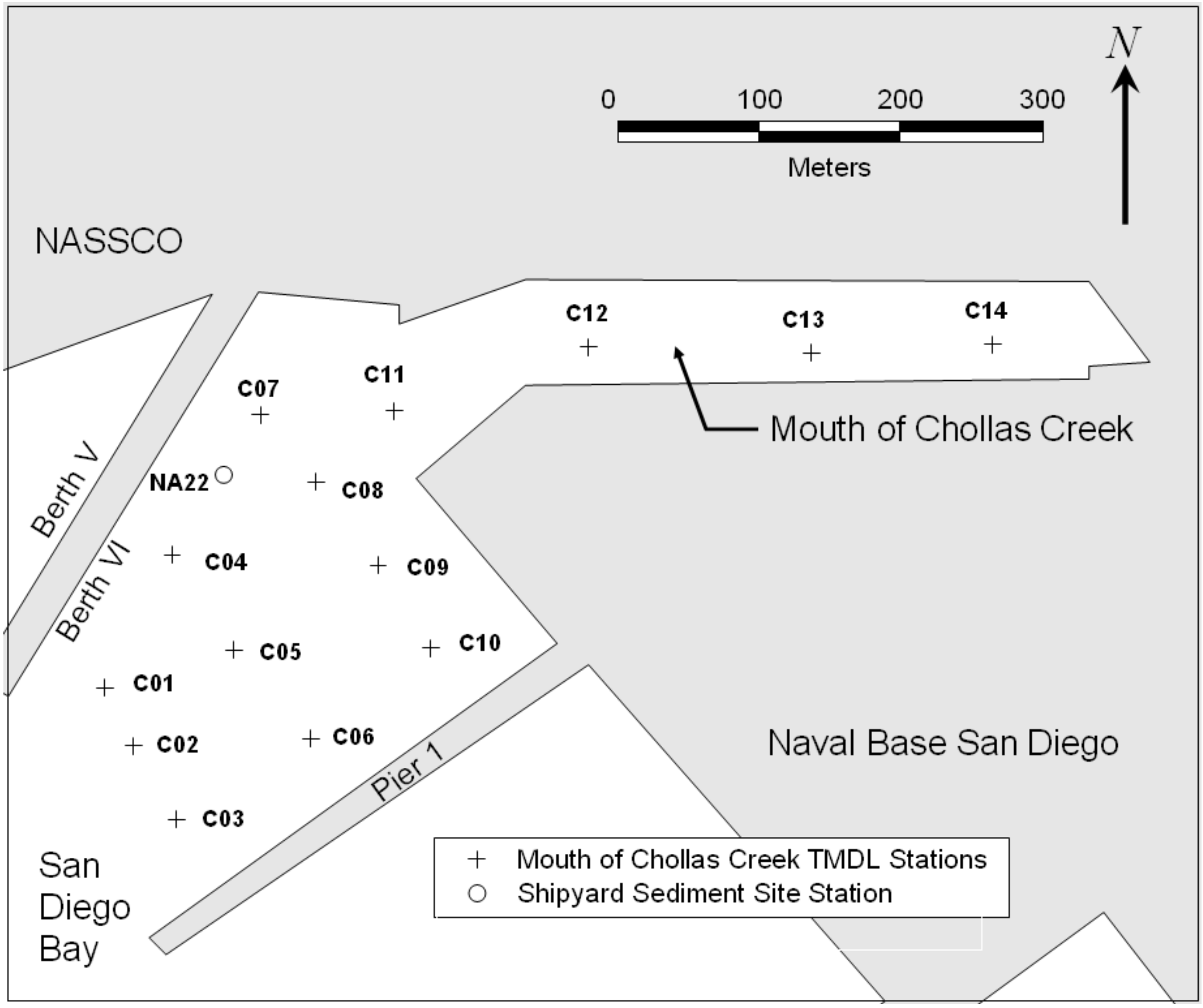
Figure 33-1 Polygons Targeted for Remediation



33.1.2. Exclusion of Station NA22 from the Remedial Footprint

The polygon for station NA22 is excluded from the remediation footprint. A Total Maximum Daily Load (TMDL) is being developed for the mouth of Chollas Creek, which encompasses one station (NA22) of the Shipyard Sediment Site study area. This TMDL will apply to sediments in the mouth of Chollas Creek. Figure 33-2 shows the Chollas Creek Mouth study area and the location of the NA22 sample station.

Figure 33-2 Chollas Creek Mouth Study Area and Shipyard Sediment Site Study Area Sample Location, NA22



During the TMDL study, over a dozen sediment samples were collected in the mouth of Chollas Creek (sample locations notated by a cross in Figure 33-2). These samples have been analyzed for physical parameters, chemistry, toxicity, and benthic communities. There is substantially more data collected in the Chollas Creek Mouth area as part of the TMDL than was collected during the Shipyards sediment study, in which one sample was collected at Station NA22. Therefore, substantially more data is available for decision making in the mouth of Chollas Creek at the completion of the TMDL than is available now.

The triad analysis weight-of-evidence category for Station NA 22, the station in the Chollas Creek Mouth area, was "Likely" impaired based on "Moderate" sediment chemistry, "Moderate" toxicity, and "Moderate" benthic community results for the three legs of the triad (see Table 18-1). NA22 is in an area where propeller testing occurs routinely, suggesting that physical impacts could be causing the impaired benthic condition. The additional samples from the TMDL will allow a better assessment of the causes of potential impairment in the mouth of

Chollas Creek area, which will allow a more effective decision to be made. Therefore, the polygon represented by the station NA22 is excluded from the remediation footprint.

33.1.3. Remedial Footprint Stations Ranked by SWAC

The composite surface-area weighted average concentrations (composite SWACs) for all 5 COCs for each polygon was given a value and ranked to identify which polygons should be removed on a “worst-first” basis. The composite value accounts for all the COC concentrations at the station. The values and ranking are shown in Table 33-1, which includes the polygons within the remedial footprint.

Table 33-1 Remedial Footprint Polygons Ranked by SWAC

Polygon	Composite SWAC Ranking Value	Numerical Ranking
SW04	46.6	1
SW08	33.0	2
SW02	31.8	3
SW24	23.1	4
SW09	17.4	5
SW28	15.1	6
SW13	15.1	7
SW01	14.9	8
SW21	14.8	9
NA17	14.5	10
SW16	13.2	11
SW20	12.0	12
SW05	11.1	13
SW23	10.5	14
SW22	10.3	15
SW17	10.0	16
NA19	9.9	17
NA06	9.7	19
SW10	9.7	20
SW14	9.2	21
NA15	8.7	22
SW27	7.6	23
NA09	5.5	38

Note: See Appendix for Section 33 for supporting calculations.

33.1.4. Remedial Footprint Polygons Ranked by SS-MEQ

Each polygon without full Triad data (i.e., chemistry data only) was evaluated using the SS-MEQ threshold value of 0.9 to predict "Likely" impacted stations. This ranking also was ordered "worst-first," as identified in Table 33-2. There are more non-Triad polygons proposed for remediation than would otherwise be targeted using SS-MEQ alone, as five of the polygons had SS-MEQ values less than the 0.9 threshold (Table 33-2).

Table 33-2 Remedial Footprint Polygons Ranked by SS-MEQ

Polygon	SS-MEQ	Ranking
SW04	4.22	1
SW08	2.99	2
SW02	2.87	3
SW24	1.82	4
SW09	1.60	5
SW13	1.48	6
NA17	1.41	7
SW01	1.42	8
SW16	1.28	9
SW21	1.25	10
SW28	1.20	11
NA06	1.11	12
SW20	1.02	13
SW05	0.94	14
SW23	0.93	15
SW22	0.92	16
SW17	0.92	17
NA19	0.92	18
SW14	0.88	20
NA15	0.87	21
SW10	0.78	22
SW27	0.68	30
NA09	0.62	37

Note: See Appendix for Section 33 for supporting calculations.

33.1.5. Remedial Footprint Generally Includes Areas with Highest Concentrations of COCs

To ensure that the polygons with the highest individual COC concentration are remediated, each polygon was rank-ordered independently for each of the COCs. This rank order is presented in Tables 33-3 through 0.

Table 33-3 Polygons with Highest Individual COCs

Polygon	Total HPAH
SW24	52,000
SW08	25,500
SW09	17,000
SW28	17,000
SW10	16,000
NA07*	15,850
SW02	14,500
SW04	14,000
SW05	13,000
SW22	12,000

Polygon	PCB Congeners
SW02	5,450
SW04	4,000
SW21	2,400
SW08	2,100
SW28	2,100
SW20	1,600
SW01	1,600
SW05	1,200
SW23	1,000
NA19	990

Polygon	Tributyltin
SW04	3,250
SW08	1,850
NA17	1,350
SW16	1,100
SW09	910
SW13	790
NA15	670
NA19	570
SW14	450
SW01	450

Table 33-4 Polygons with Highest Individual COCs

Polygon	Copper
SW04	1,500
SW08	920
SW13	800
SW09	660
SW02	580
SW01	560
NA17	510
SW16	430
NA06	395
NA27*	390

Polygon	Mercury
SW02	4.5
NA06	2.4
SW08	2.3
SW19*	2.1
SW24	1.9
SW04	1.8
SW01	1.5
NA07*	1.5
SW21	1.4
NA09	1.2

Polygon	Lead
SW04	430
SW08	225
SW09	220
SW02	170
SW01	145
NA06	130
NA23*	120
SW05	120
SW21	120
NA17	115

Table 33-5 Polygons with Highest Individual COCs

Polygon	Arsenic
SW04	73
SW09	27
SW08	24
NA08*	18
SW13	15
SW06*	15
SW23	15
NA17	15
SW28	14
SW20	14

Polygon	Zinc
SW04	3,450
SW09	1,200
SW08	830
NA17	620
SW02	585
SW13	580
SW01	520
NA27*	500
NA19	450
NA23	430

Polygon	Cadmium
SW02	3.2
SW04	2.0
SW09	1.1
SW10	0.9
SW05	0.9
SW06*	0.9
SW08	0.7
SW03*	0.7
SW16	0.7
SW13	0.4

*Polygons not within the remedial footprint

Each of the polygons excluded from the remedial footprint, as identified Table 33-3, was independently evaluated to determine consistency with the SWAC and SS-MEQ ranking of stations. Table 33-6 identifies the rational for exclusion of these seven polygons from the remedial footprint.

Table 33-6 Rationale for Exclusion of Polygon from Remedial Footprint

Polygon	Rationale for Exclusion
NA07	• Triad station – "Unlikely" impaired • Low toxicity and low benthic impacts • Technical infeasibility
NA08	• All COCs below 60%LAET and SS-MEQ values • Technical infeasibility
NA23	• All COCs below 60%LAET and SS-MEQ values • Technical infeasibility
NA27	• All COCs below 60%LAET and SS-MEQ values • Technical infeasibility
SW03	• Triad station - Low toxicity and low benthic impacts • All COCs below 60%LAET and SS-MEQ values • Cd not a cleanup driver • Triad analysis – "Unlikely" impaired
SW06	• All COCs below 60%LAET and SS-MEQ values • Triad analysis – "Unlikely" impaired
SW19	• All COCs below 60%LAET and SS-MEQ values • Triad analysis – "Unlikely" impaired

The NA07, NA08, NA23, and NA27 polygons all had technical infeasibility problems associated with dredging. The NA07 polygon is technically infeasible to dredge due to stability concerns about the sheetpile bulkhead on the shoreline and slope near the floating dry dock sump. Any dredging in this area would drastically undermine the slope as well as impacting the sheetpile bulkhead on the east side.

The NA08 polygon is technically infeasible to dredge due to stability concerns about the sheetpile bulkhead on the shoreline and slope near the floating dry dock sump. Any dredging in this area would drastically undermine the slope as well as impacting the sheetpile bulkhead on the east side. The east side of NA08 also supports the structure of the gate at Ways 4. Any dredging in this area would drastically undermine the slope as well as impacting the sheetpile bulkhead on the east side.

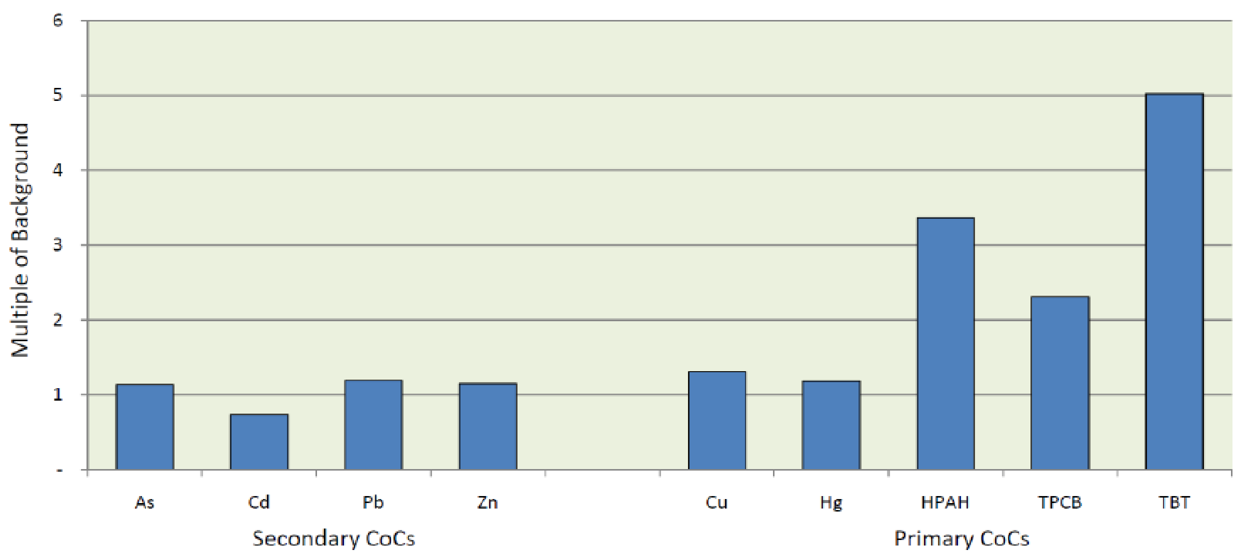
The NA23 polygon is technically infeasible to dredge because dredging would affect Pier 12, the tug boat pier, the rip-rap shoreline, as well as undermining the sediment slope for the floating dry dock sump.

The NA27 polygon is technically infeasible to dredge because the polygon is entirely within the footprint of the floating dry dock sump. Dredging would significantly undermine the slope.

33.2. Evaluation of Estimated Post-Remedial SWACs Relative to Background Sediment Chemistry Levels

Following remediation of all areas identified above, the estimated post-remedial SWAC concentrations in sediment at the site compared to background sediment chemistry levels (see Section 29) are shown in Figure 33-3. The SWAC for cadmium will be below the estimate background concentration, while the SWACs for arsenic, lead, zinc, copper, and mercury will be less than 1.5 times background.

Figure 33-3 Comparison of Post-Remedial SWACs to Background Sediment Chemistry Levels



33.3. Preliminary Remedial Design

In recognition of the methodologies and limitations of traditional mechanical dredging, the irregular polygons were converted into uniform dredge units. Uniform dredge units allow the dredge operator to develop transects of linear, but regular, proportions, e.g., straight lines and 90 degree angles. As a practical matter, uniform dredge units also allow planners to create dredge boxes (units) that contain the same volume of dredge material represented by a given polygon. Each dredge box (sediment management unit or "SMU") is then used to develop the dredge footprint. The details of the area and volume of dredging and under pier areas are identified in Table 33-7.

Table 33-7 Remedial Footprint Details

Activity	North	South
Dredge Remedial Area (Square Feet)	438,300	217,800
Under Pier Remedial Area (Square Feet)	89,980	13,725
Total Remedial Area (Square Feet)	528,295	231,495
Dredge Volume (Cubic Yards)	90,800	52,600

Note: See Appendix for Section 33 for supporting calculations.

The conversion from irregular polygons to SMUs is shown in Figures 33-4 and 33-5. These figures show the proposed remedial footprint, inclusive of areas to be dredged (red areas) and under-pier areas to be remediated by other means (green areas).

Figure 33-4 "North" Dredge Footprint based on SMUs

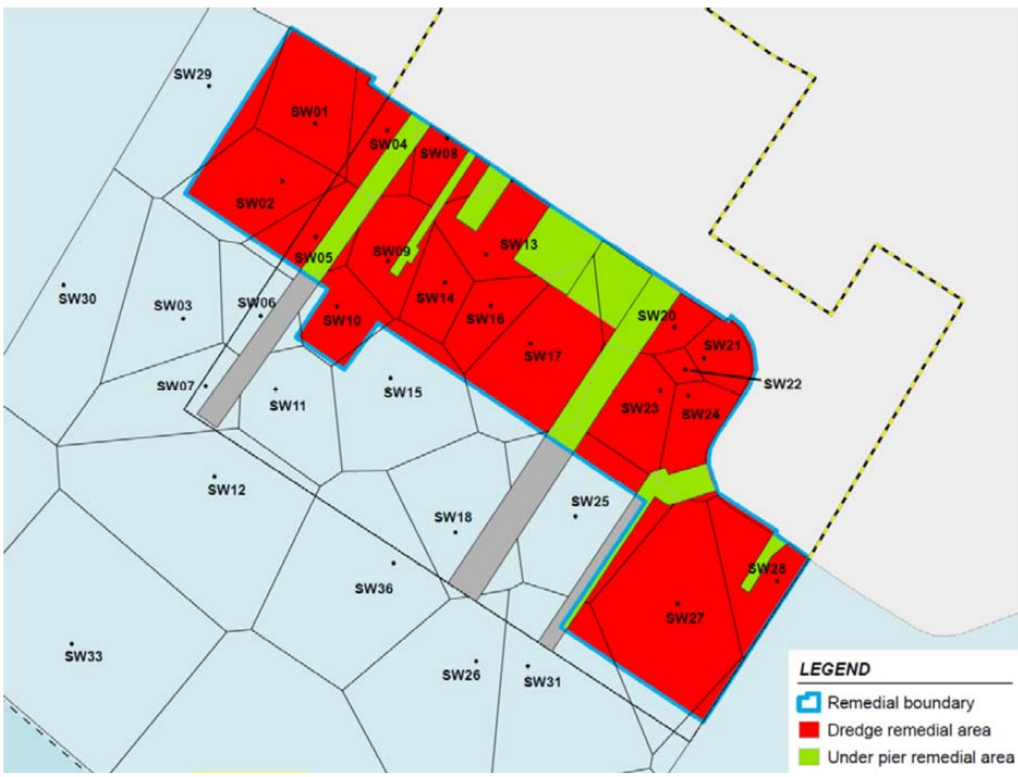
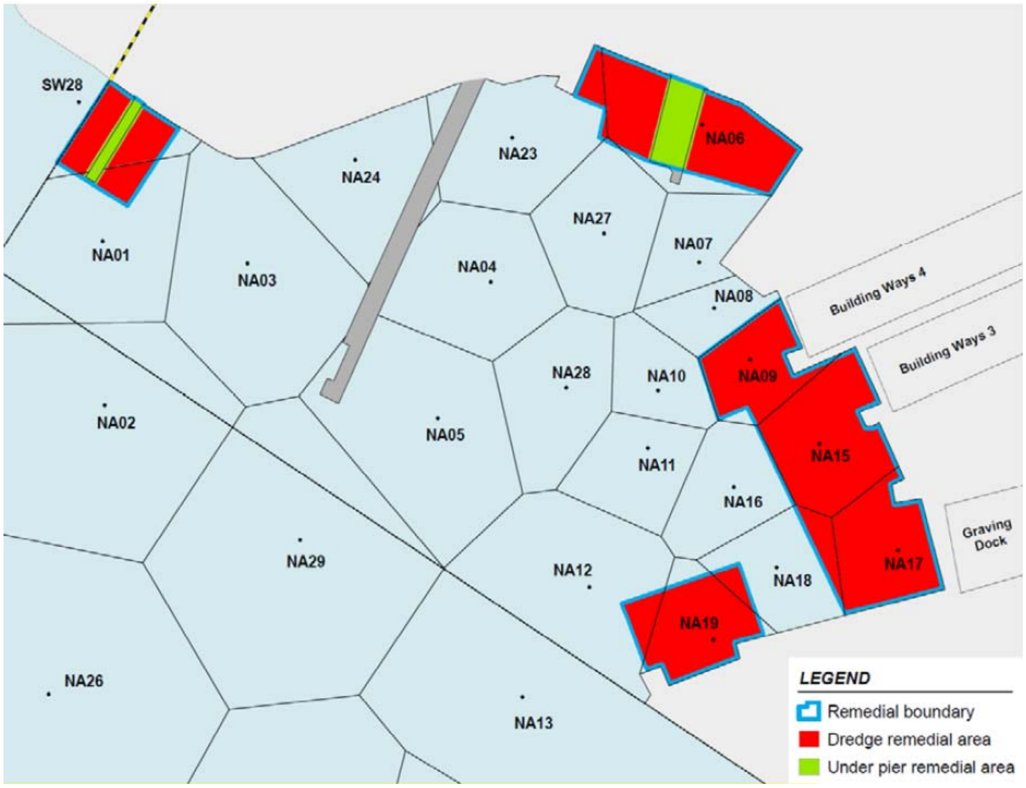


Figure 33-5 "South" Dredge Footprint based upon SMUs



As discussed in Section 30, remedial measures may include dredging (with or without backfill), capping, and thin-layer covers. The presumed remedial measure in accessible areas is dredging. For under-pier areas and other locations, where significant impacts to infrastructure (e.g., piers, wharves and bulkheads) are likely, alternatives to dredging are proposed.

Sand capping is proposed in areas immediately adjacent to sheet pile bulkheads and beneath piers, and is expected to result in achievement of target SWAC concentrations and aquatic life beneficial use concerns. Where necessary, rock or gravel may also be used to fortify or stabilize the sand capping in these set-back areas. Inaccessible areas under piers will be remediated using technically feasible techniques such as placement of a sand layer, nominally 1 to 2 feet in thickness, on top of existing sediment. Design details of the remedial action will be specified in the Remedial Action Plan (RAP) required by CAO No. R9-2012-0024.

Dredge material is currently proposed for upland landfill as daily cover or fill. Local landfills have accepted dredge material for use in daily cover from other dredge projects in San Diego Bay where ocean disposal or beneficial reuse was not appropriate. Alternatives for local landfill disposal include other landfill locations in Southern California or out of state disposal. Upland disposal requires that dredge material be dewatered prior to disposal. This is necessary for at least two reasons. First, California landfills will not accept waste that exceeds a specific moisture content. Generally this includes passing a "paint filter test." Second, transportation of excessively moist material can cause spillage or leaks during transportation. Currently, no site has been identified for off-loading, drying, stockpiling, and loading for transportation of dredged sediment. In addition to identifying a site for sediment management, there are logistical impacts related to traffic, as well as concerns by the local community who may be impacted by the significant number of trucks that would be required to transport the dredged sediment to its ultimate disposal location.

Alternatives to upland disposal, as identified in Section 30 include in-Bay confined aquatic disposal (CAD) or near-shore confined disposal facility (CDF). While these alternatives themselves have many challenges, they should be considered as alternatives to upland disposal as part of the RAP.

33.3.2. Proposed Remedial Footprint Characteristics

The proposed remedial footprint has the following characteristics:

- Total of 23 Polygons
- Captures 100 percent of Triad "Likely" and 69 percent of Triad "Possibly" impacted stations
- Captures all non-Triad stations with COC concentrations above the 60%LAET and SS-MEQ thresholds
- Total Remedial Surface Area (including under piers) = 764,034 ft^2
- Under-pier Remedial Surface Area = 102,202 ft^2
- Dredge Volume = 143,400 $yards^3$
- Achieves SWAC for protection of human health and wildlife
- SWACs are at or near background for 6 out of 9 COCs

The estimated post-remedial SWACs are compared to the current or pre-remediation SWACs in Table 33-8. The pre- and post-remediation station maximum SS-MEQ is also shown.

Table 33-8 Comparison of Pre- and Post-Remedial SWACs

COCs	Background	Pre-Remedy		Post Remedy	
		SWAC	Station Maximum	SWAC	Station Maximum
Primary COCs					
Cu (mg/kg)	121	187	1,500	159	320
Hg (mg/kg)	0.57	0.75	4.5	0.68	2.1
HPAH (μg/kg)	663	3,509	52,000	2,451	15,850
PCB (μg/kg)	84	308	5,450	194	495
TBT (μg/kg)	22	162	3,250	110	410
Secondary COCs					
As (mg/kg)	7.5	9.4	73	8.7	18
Cd (mg/kg)	0.33	0.28	3.2	0.2	0.46
Pb (mg/kg)	53	73	430	66	100
Zn (mg/kg)	192	252	3,450	221	390

Note: See Appendix for Section 32 for Primary COC supporting calculations. See Appendix for Section 33 for Secondary COC supporting calculations.

While the above information, in conjunction with Triad and Non-Triad data evaluations, was used to develop the remedial footprint and anticipated strategy for implementation, the final engineering details necessary to execute the remedial action will require the responsible parties to submit for review and approval a Remedial Act Plan that provides the level of detail necessary to ensure the targeted remedial action will be successful. Many of those details, such as selection of an on-shore dredge material handling site, upland sediment disposal site(s), and alternatives to upland disposal, simply cannot be determined without more extensive engineering assessment and public comment.

33.4. Upland Source Control in Watershed of MS4 Outfall SW-4

Storm water runoff from the shipyards is controlled and monitored in both the BAE Systems and NASSCO NPDES permits. Also, the City of San Diego MS4 outfall located at the foot of Sampson Street discharges at outfall SW4 within the BAE Systems facility. To reduce the risks of ongoing contamination and recontamination post-cleanup from potential pollutant sources in the watershed that drains to MS4 outfall SW-4, several activities will be completed in the watershed of the SW-4 outfall (shown in Figure 33-6) as part of the remedy. These activities include:

- Investigate the storm drain and surrounding environs to identify sources of pollutants to the storm drain.
- Clean out residual sediments in the storm drain.
- Place structural treatment control Best Management Practices (BMPs), where feasible, in the storm drain system to mitigate entry of pollutants into the storm drain to the maximum extent practicable.
- Maintain BMPs, as necessary, to prevent significant degradation in their performance.

Figure 33-6 Map of Watershed that Drains to MS4 Outfall SW-4

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APPENDIX FOR SECTION 33

PROPOSED REMEDIAL FOOTPRINT AND PRELIMINARY REMEDIAL DESIGN

March 14, 2012

List of Tables

Table A33-1 Supporting Calculations for Table 33-1

Station	Composite Ranking Score	Overall Ranking
SW04	46.6	1
SW08	33.0	2
SW02	31.8	3
SW24	23.1	4
SW09	17.4	5
SW28	15.1	6
SW13	15.1	7
SW01	14.9	8
SW21	14.8	9
NA17	14.5	10
SW16	13.2	11
SW20	12.0	12
SW05	11.1	13
SW23	10.5	14
SW22	10.3	15
SW17	10.0	16
NA07	9.9	17
NA19	9.9	18
NA06	9.7	19
SW10	9.7	20
SW14	9.2	21
NA15	8.7	22
SW27	7.6	23
SW29	7.5	24
SW06	7.2	25
SW25	7.1	26
SW15	6.9	27
NA01	6.8	28
SW18	6.7	29
NA16	6.7	30
NA23	6.7	31
NA03	6.7	32
SW30	6.6	33

Station	Composite Ranking Score	Overall Ranking
NA04	6.4	34
SW03	6.2	35
NA27	5.7	36
SW11	5.7	37
NA09	5.4	38
NA18	5.3	39
NA08	5.2	40
NA21	5.1	41
NA28	4.8	42
SW36	4.4	43
SW19	4.2	44
NA24	4.2	45
NA02	3.8	46
NA05	3.8	47
SW34	3.7	48
NA11	3.7	49
NA20	3.7	50
NA22	3.6	51
SW07	3.4	52
NA13	3.3	53
NA10	3.2	54
NA12	3.2	55
SW12	2.9	56
SW26	2.9	57
NA29	2.8	58
NA30	2.4	59
NA14	2.4	60
NA26	2.1	61
SW32	2.1	62
SW33	2.0	63
NA25	1.7	64
SW31	1.4	65
NA31	1.3	66

Table A33-2 Supporting Calculations for Table 33-1

Station	Composite Ranking Score	Overall Ranking
SW04	46.6	1
SW08	33.0	2
SW02	31.8	3
SW24	23.1	4
SW09	17.4	5
SW28	15.1	6
SW13	15.1	7
SW01	14.9	8
SW21	14.8	9
NA17	14.5	10
SW16	13.2	11
SW20	12.0	12
SW05	11.1	13
SW23	10.5	14
SW22	10.3	15
SW17	10.0	16
NA19	9.9	18
NA06	9.7	19
SW10	9.7	20
SW14	9.2	21
NA15	8.7	22
SW27	7.6	23
NA09	5.4	38

Table A33-3 Supporting Data for Table A33-2

Station	Pre-Remedy Average Surface Sediment Concentration																			
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
NA01	10.2	0.24	69.75	252.5	84	1.06	14.75	1.08	1.33	298	6575	7050	5580	2.18	375	533	240	290	580	157
NA02	10.0	0.21	67.00	170	76	0.70	18.00	1.00	1.00	240	2800	3000	2422	2.00	208	299	134	162	324	82
NA03	11.0	0.29	69.00	220	94	1.10	18.00	1.10	1.40	260	6100	6600	5244	2.33	370	520	237	287	574	180
NA04	12.0	0.27	73.00	260	93	1.10	19.00	1.10	1.20	310	3500	3700	2819	2.04	250	350	158	191	381	300
NA05	9.5	0.17	57.00	170	65	0.61	15.00	0.43	0.89	210	2800	3000	2277	1.60	180	250	116	140	280	110
NA06	10.5	0.27	61.50	395	130	2.35	14.50	1.05	1.02	335	3800	4050	3235	2.14	640	935	400	484	969	225
NA07	13.5	0.27	60.50	225	100	1.45	16.00	0.90	1.15	255	15850	16500	13734	2.02	495	710	310	375	749	111
NA08	18.0	0.31	79.00	270	96	0.82	21.00	1.20	1.00	330	3500	3800	2928	2.18	310	430	197	238	476	110
NA09	13.0	0.40	75.00	260	97	1.20	20.00	1.20	1.10	330	2800	3000	2248	2.26	290	410	188	228	455	120
NA10	6.9	0.22	52.00	160	59	0.58	14.00	1.00	0.78	190	1800	1900	1438	1.18	160	230	100	120	241	91
NA11	9.3	0.28	59.00	180	73	0.85	15.00	1.00	1.10	230	2800	3000	2391	1.69	190	270	121	147	294	38
NA12	9.5	0.18	54.00	150	59	0.62	15.00	1.10	0.79	210	2000	2200	1700	1.48	150	220	97	118	235	80
NA13	10.8	0.24	59.00	185	75	0.65	15.50	1.00	0.94	295	1800	1950	1511	1.92	173	265	113	137	273	68
NA14	9.0	0.25	56.00	130	66	0.55	15.00	1.10	0.78	200	1100	1200	963	1.82	128	183	82	99	199	45
NA15	12.0	0.25	62.00	250	83	0.98	16.00	1.00	1.30	310	3300	3600	2714	1.95	340	480	214	259	517	670
NA16	10.5	0.36	70.25	252.5	90	1.09	15.75	1.03	1.35	313	3200	3500	2676	2.00	590	665	368	445	890	175
NA17	14.5	0.41	74.00	510	115	0.85	17.50	1.10	1.30	620	2950	3200	2496	2.03	550	620	339	410	821	1350
NA18	14.0	0.36	67.00	230	97	0.79	17.00	1.00	1.00	380	2400	2600	1957	2.04	350	490	221	268	536	210
NA19	14.0	0.37	65.00	270	100	0.78	17.00	1.00	1.10	450	3000	3200	2415	1.84	990	1400	607	734	1469	570
NA20	6.6	0.44	26.00	96	53	0.24	8.40	1.00	0.53	190	2900	3200	2639	1.42	120	170	74	89	178	280
NA21	11.0	0.39	51.00	150	83	0.51	14.00	1.10	0.88	250	2100	2200	1829	2.15	177	257	114	137	275	410
NA22	8.5	0.46	39	150	95	0.38	12.00	1.10	0.91	230	3600	4000	3317	1.65	180	250	112	135	270	120
NA23	12.0	0.26	77.00	350	120	1.10	18.00	1.30	1.30	430	3400	3700	2988	2.21	510	730	320	387	774	120
NA24	9.6	0.20	60.00	200	88	0.90	11.00	1.10	0.90	280	2100	2300	1812	2.12	290	410	183	222	443	59
NA25	6.0	0.11	33.00	85	41	0.42	8.50	1.10	0.72	130	1100	1100	906	1.24	83	120	55	66	133	25
NA26	6.2	0.11	32.00	80	41	0.48	8.00	1.00	0.66	140	850	910	707	1.22	180	250	115	139	278	37
NA27	13.0	0.29	100.00	390	110	1.20	27.00	1.30	1.50	500	2800	3000	2465	2.01	210	290	137	166	332	100
NA28	10.0	0.31	86.00	290	84	0.89	23.00	1.20	1.40	390	3400	3700	2993	1.87	180	260	118	143	286	90
NA29	6.9	0.14	39.00	110	56	0.55	11.00	1.10	0.86	170	1900	2000	1559	1.70	190	260	119	144	289	58
NA30	7.5	0.22	37.00	140	59	0.71	9.30	1.00	1.00	170	1000	1100	835	1.38	100	150	70	84	168	22
NA31	5.3	0.13	29.00	71	34	0.35	7.50	1.10	0.57	110	530	580	447	0.92	68	96	44	53	107	20
SW01	13.5	0.71	78.50	560	145	1.45	98.00	0.88	1.07	520	7525	8725	7351	2.24	1600	2400	950	1150	2300	450
SW02	13.8	3.18	118.75	580	170	4.45	106.00	1.26	3.90	585	14500	21250	19460	5.98	5450	8325	3312	4008	8015	167

Table A33-3 Supporting Data for Table A33-2, Continued

Station	Pre-Remedy Average Surface Sediment Concentration																			
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SW03	11.0	0.70	52.00	190	79	1.20	18.00	0.80	1.20	230	6800	7500	6134	3.11	410	580	257	310	621	53
SW04	73.0	1.95	87.50	1500	430	1.75	18.00	1.50	1.60	3450	14000	16000	14109	2.28	4000	5200	2476	2996	5992	3250
SW05	11.0	0.86	53.00	230	120	0.96	19.00	0.75	1.20	280	13000	17000	15067	1.55	1200	1800	769	930	1861	170
SW06	15.0	0.85	56.00	170	81	0.75	20.00	0.83	1.10	280	12000	14000	12641	1.82	380	580	235	284	567	100
SW07	8.1	0.19	43.00	150	57	0.52	13.00	0.81	0.74	170	3800	4100	3450	1.73	170	230	107	129	258	44
SW08	24.0	0.73	82.50	920	225	2.25	21.00	1.20	1.45	830	25500	28500	24759	3.80	2100	2700	1308	1583	3166	1850
SW09	27.0	1.10	56.00	660	220	0.96	18.00	0.84	1.30	1200	17000	20000	17383	1.94	710	1100	446	540	1079	910
SW10	13.0	0.87	45.00	160	79	0.58	17.00	0.84	0.82	360	16000	25000	23410	1.21	610	930	380	459	918	250
SW11	9.6	0.24	62.00	170	74	0.75	17.00	0.39	1.10	240	8000	8500	7001	1.81	200	280	127	153	307	140
SW12	7.4	0.14	39.00	119.5	52	0.53	10.80	0.90	0.76	160	3000	3300	2742	1.47	155	231	100	121	243	36
SW13	15.0	0.42	72.00	800	93	0.86	24.00	1.10	1.40	580	12000	14000	12507	2.33	490	710	312	377	754	790
SW14	10.0	0.31	63.00	280	88	1.00	17.00	1.00	1.20	300	8400	9100	7659	2.13	400	570	257	310	621	450
SW15	11.0	0.45	67.00	230	90	0.90	19.00	1.10	1.30	290	7700	8400	7137	2.31	380	540	237	287	573	170
SW16	12.0	0.66	68.00	430	97	1.00	16.00	1.10	1.90	370	5700	6100	4847	2.24	430	610	273	330	661	1100
SW17	12.0	0.37	73.00	270	93	0.98	20.00	0.44	1.50	310	10000	11000	9199	2.53	540	880	333	403	805	440
SW18	11.0	0.33	74.00	220	86	0.75	20.00	0.44	1.30	280	8100	8800	7471	2.19	440	660	276	334	668	130
SW19	7.1	0.15	42.00	110	51	2.10	12.00	0.70	0.78	150	1100	1200	938	1.15	94	135	61	74	148	37
SW20	14.0	0.41	68.00	290	110	0.99	18.00	1.10	1.10	390	11000	12000	9736	2.14	1600	2600	1023	1238	2476	130
SW21	11.0	0.51	70.00	260	120	1.40	14.00	1.00	1.30	330	9700	10000	8480	2.10	2400	3600	1491	1804	3608	170
SW22	13.0	0.35	70.00	260	110	1.10	21.00	1.10	1.30	310	12000	13000	10684	2.46	900	1400	577	698	1396	190
SW23	15.0	0.37	89.00	280	110	1.00	25.00	1.10	1.30	330	11000	12000	9880	2.52	1000	1500	640	775	1550	210
SW24	10.0	0.33	52.50	300	88	1.90	16.00	0.95	1.15	300	52000	57000	50225	1.75	950	1500	588	711	1423	165
SW25	11.5	0.36	64.50	230	86	0.78	16.50	1.00	1.20	345	8150	8800	7505	2.15	350	500	221	268	535	231
SW26	9.0	0.14	45.00	120	58	0.43	12.00	0.90	0.46	160	1600	1700	1345	1.31	293	418	184	222	444	49
SW27	10.0	0.27	63.00	210	80	0.68	18.00	0.42	1.10	250	12000	14000	12055	2.08	200	320	128	155	311	250
SW28	14.0	0.32	65.50	265	100	0.88	15.00	1.20	1.10	330	17000	19000	16165	2.52	2100	2600	1388	1679	3359	150
SW29	8.3	0.49	44.00	220	72	0.93	37.00	1.10	1.20	230	4600	4900	4142	1.34	820	1200	504	610	1220	190
SW30	8.9	0.23	72.00	240	72	1.10	13.00	1.00	1.20	300	4900	5200	4311	2.05	380	540	240	291	581	200
SW31	4.0	0.06	18.00	54	21	0.23	4.90	1.20	0.36	80	1200	1300	1031	0.66	66	93	42	51	101	36
SW32	9.4	0.06	43.00	92	57	0.51	11.00	1.10	0.33	160	820	900	719	1.56	160	230	101	122	245	30
SW33	10.0	0.07	41.00	100	58	0.53	11.00	1.20	0.24	170	1000	1100	826	2.09	100	150	68	82	164	19
SW34	8.3	0.21	53.00	320	99	0.75	11.00	1.10	0.95	310	1400	1500	1155	1.68	130	180	82	99	198	38
SW36	9.9	0.21	70.00	240	79	0.75	13.00	1.00	1.20	300	4000	4300	3607	2.23	200	282	131	159	318	49

Table A33-4 Supporting Calculations for Table 33-7

NORTH SHIPYARD AREA

Polygon/Sample Station/SMU	Apparent Depth of Contaminant Exceedances (ft)	Estimated Required Neatline Dredging Depth (ft)	Dredging Area (sq.ft.)	Underpier Remedial Area (sq.ft.)	Total Remedial Area (sq.ft.)	Estimated Volume of Dredging to Neatline Elevation (cy)	Estimated Volume of 1 ft Additional Dredging (cy)	Total Estimated Dredging Volume (cy)
SW01	4.0	4	**42,886**	**0**	**42,886**	6,400	1,600	**7,400**
SW02	4.9	5	**46,657**	**0**	**46,657**	8,600	1,700	**9,900**
SW04	4.1	5	**16,282**	**6,639**	**22,921**	3,000	600	**3,600**
SW05	surface sample[1]	5	**18,892**	**6,510**	**25,402**	3,500	700	**4,200**
SW08	6.0	6	**9,066**	**6,355**	**15,421**	2,000	300	**2,400**
SW09	surface sample	3	**19,598**	**4,791**	**24,389**	2,200	700	**2,900**
SW10	2.0	3	**18,389**	**3,237**	**21,626**	2,000	700	**2,700**
SW13	surface sample[1]	5	**19,937**	**17,204**	**37,141**	3,700	700	**4,400**
SW14	surface sample	3	**16,208**	**539**	**16,747**	1,800	600	**2,400**
SW16	surface sample[1]	5	**18,223**	**51**	**18,273**	3,400	700	**4,000**
SW17	6.2	7	**46,963**	**9,155**	**56,117**	12,200	1,700	**13,900**
SW20	2.4	3	**7,966**	**19,635**	**27,601**	900	300	**1,200**
SW21	surface sample	3	**13,641**	**0**	**13,641**	1,500	500	**2,000**
SW22	surface sample	3	**4,440**	**0**	**4,440**	500	200	**700**
SW23	surface sample	3	**16,950**	**9,892**	**26,842**	1,900	600	**2,500**
SW24	3.0	3	**20,006**	**5,934**	**25,940**	2,200	700	**3,000**
SW27	4.25	5	**77,488**	**39**	**77,527**	14,300	2,900	**17,200**
SW28	5.3	6	**24,723**	**0**	**24,723**	5,500	900	**6,400**
TOTALS			**438,300**	**89,980**	**528,295**	77,700	16,800	**90,800**

surface sample[1]
Dredge depth estimated considering adjacent polygon core(s)

Table A33-5 Supporting Calculations for Table 33-7

SOUTH SHIPYARD AREA

Polygon/Sample Station/SMU	Apparent Depth of Contaminant Exceedances (ft)	Estimated Required Neatline Dredging Depth (ft)	Dredging Area (sq.ft.)	Underpier Remedial Area (sq.ft.)	Total Remedial Area (sq.ft.)	Estimated Volume of Dredging to Neatline Elevation (cy)	Estimated Volume of 1 ft Additional Dredging (cy)	Total Estimated Dredging Volume (cy)
SW28	5.3	6	**21,920**	**3,370**	**25,290**	4,900	800	**5,700**
NA06	3.9	5	**50,190**	**10,355**	**60,545**	9,300	1,900	**11,200**
NA09	8.0	9	**29,520**		**29,520**	9,800	1,100	**10,900**
NA15	surface sample	3	**47,630**		**47,630**	5,300	1,800	**7,100**
NA17	4.0	5	**36,470**		**36,470**	6,800	1,400	**8,200**
NA19	5.8	7	**32,040**		**32,040**	8,300	1,200	**9,500**
TOTALS			**217,800**	**13,725**	**231,495**	44,400	8,200	**52,600**

Table A33-6 Supporting Calculations for Table 33-8

Pre-Remediation SWAC Calculations for Secondary COPCs

						Concentration x Area Product			
Station	Area (ft2)	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)	Arsenic (mg*ft2/kg)	Cadmium (mg*ft2/kg)	Lead (mg*ft2/kg)	Zinc (mg*ft2/kg)
NA01	99788.14	10.2	0.24	84	298	1,017,839	23,700	8,382,204	29,686,972
NA02	164015.27	10.0	0.21	76	240	1,640,153	34,443	12,465,161	39,363,665
NA03	118384.16	11.0	0.29	94	260	1,302,226	34,331	11,128,111	30,779,882
NA04	72669.16	12.0	0.27	93	310	872,030	19,621	6,758,232	22,527,440
NA05	112824.21	9.5	0.17	65	210	1,071,830	19,180	7,333,574	23,693,084
NA06	61035.38	10.5	0.27	130	335	640,871	16,174	7,934,599	20,446,852
NA07	30297.53	13.5	0.27	100	255	409,017	8,180	3,029,753	7,725,870
NA08	20352.06	18.0	0.31	96	330	366,337	6,309	1,953,798	6,716,180
NA09	29520.76	13.0	0.40	97	330	383,770	11,808	2,863,514	9,741,851
NA10	29135.97	6.9	0.22	59	190	201,038	6,410	1,719,022	5,535,834
NA11	37813.37	9.3	0.28	73	230	351,664	10,588	2,760,376	8,697,075
NA12	91095.58	9.5	0.18	59	210	865,408	16,397	5,374,639	19,130,072
NA13	255727.1	10.8	0.24	75	295	2,749,066	60,096	19,179,533	75,439,495
NA14	208687.42	9.0	0.25	66	200	1,878,187	52,172	13,773,370	41,737,484
NA15	47632.64	12.0	0.25	83	310	571,592	11,908	3,953,509	14,766,118
NA16	38254.43	10.5	0.36	90	313	401,672	13,867	3,433,335	11,954,509
NA17	36471.38	14.5	0.41	115	620	528,835	14,771	4,194,209	22,612,256
NA18	40452.33	14.0	0.36	97	380	566,333	14,563	3,923,876	15,371,885
NA19	32043.3	14.0	0.37	100	450	448,606	11,856	3,204,330	14,419,485
NA20	311465.2	6.6	0.44	53	190	2,055,670	137,045	16,507,656	59,178,388
NA21	476121.97	11.0	0.39	83	250	5,237,342	185,688	39,518,124	119,030,493
NA22	54670.01	8.5	0.46	95	230	464,695	25,148	5,193,651	12,574,102
NA23	67999.54	12.0	0.26	120	430	815,994	17,680	8,159,945	29,239,802
NA24	65314.32	9.6	0.20	88	280	627,017	13,063	5,747,660	18,288,010
NA25	521663.86	6.0	0.11	41	130	3,129,983	57,383	21,388,218	67,816,302
NA26	302543.59	6.2	0.11	41	140	1,875,770	33,280	12,404,287	42,356,103
NA27	53889.29	13.0	0.29	110	500	700,561	15,628	5,927,822	26,944,645
NA28	54261.96	10.0	0.31	84	390	542,620	16,821	4,558,005	21,162,164
NA29	202963.84	6.9	0.14	56	170	1,400,450	28,415	11,365,975	34,503,853
NA30	240837.72	7.5	0.22	59	170	1,806,283	52,984	14,209,425	40,942,412
NA31	229185.41	5.3	0.13	34	110	1,214,683	29,794	7,792,304	25,210,395
SW01	33393.71	13.5	0.71	145	520	450,815	23,710	4,842,088	17,364,729
SW02	39161.81	13.8	3.18	170	585	538,475	124,339	6,657,508	22,909,659
SW03	48810.9	11.0	0.70	79	230	536,920	34,168	3,856,061	11,226,507
SW04	22681.7	73.0	1.95	430	3450	1,655,764	44,229	9,753,131	78,251,865
SW05	24162.5	11.0	0.86	120	280	265,788	20,780	2,899,500	6,765,500
SW06	25750.8	15.0	0.85	81	280	386,262	21,888	2,085,815	7,210,224
SW07	40947.48	8.1	0.19	57	170	331,675	7,780	2,334,006	6,961,072
SW08	16828.59	24.0	0.73	225	830	403,886	12,285	3,786,433	13,967,730
SW09	24478.67	27.0	1.10	220	1200	660,924	26,927	5,385,307	29,374,404
SW10	21608.22	13.0	0.87	79	360	280,907	18,799	1,707,049	7,778,959
SW11	36689.34	9.6	0.24	74	240	352,218	8,805	2,715,011	8,805,442
SW12	112941.81	7.4	0.14	52	160	835,769	15,812	5,872,974	18,070,690

Table A33-6 Supporting Calculations for Table 33-8, Continued

						Concentration x Area Product			
Station	**Area (ft2)**	**Arsenic (mg/kg)**	**Cadmium (mg/kg)**	**Lead (mg/kg)**	**Zinc (mg/kg)**	**Arsenic (mg*ft2/kg)**	**Cadmium (mg*ft2/kg)**	**Lead (mg*ft2/kg)**	**Zinc (mg*ft2/kg)**
SW13	38256.61	15.0	0.42	93	580	573,849	16,068	3,557,865	22,188,834
SW14	16731.93	10.0	0.31	88	300	167,319	5,187	1,472,410	5,019,579
SW15	55765.87	11.0	0.45	90	290	613,425	25,095	5,018,928	16,172,102
SW16	17834.72	12.0	0.66	97	370	214,017	11,771	1,729,968	6,598,846
SW17	55898.31	12.0	0.37	93	310	670,780	20,682	5,198,543	17,328,476
SW18	52601.48	11.0	0.33	86	280	578,616	17,358	4,523,727	14,728,414
SW19	214746.55	7.1	0.15	51	150	1,524,701	32,212	10,952,074	32,211,983
SW20	28174.86	14.0	0.41	110	390	394,448	11,552	3,099,235	10,988,195
SW21	11896.32	11.0	0.51	120	330	130,860	6,067	1,427,558	3,925,786
SW22	3761.78	13.0	0.35	110	310	48,903	1,317	413,796	1,166,152
SW23	30077.25	15.0	0.37	110	330	451,159	11,129	3,308,498	9,925,493
SW24	21179.22	10.0	0.33	88	300	211,792	6,883	1,863,771	6,353,766
SW25	69689.81	11.5	0.36	86	345	801,433	24,740	5,958,479	24,042,984
SW26	86923.41	9.0	0.14	58	160	782,311	12,169	5,041,558	13,907,746
SW27	78888.57	10.0	0.27	80	250	788,886	21,300	6,311,086	19,722,143
SW28	51553.93	14.0	0.32	100	330	721,755	16,239	5,155,393	17,012,797
SW29	62496.99	8.3	0.49	72	230	518,725	30,624	4,499,783	14,374,308
SW30	72230.96	8.9	0.23	72	300	642,856	16,613	5,200,629	21,669,288
SW31	83498.32	4.0	0.06	21	80	333,993	5,344	1,753,465	6,679,866
SW32	78476.82	9.4	0.06	57	160	737,682	5,023	4,473,179	12,556,291
SW33	151872.14	10.0	0.07	58	170	1,518,721	9,872	8,808,584	25,818,264
SW34	304572.02	8.3	0.21	99	310	2,527,948	63,960	30,152,630	94,417,326
SW36	90729.61	9.9	0.21	79	300	898,223	19,053	7,167,639	27,218,883
Total	6,232,430					58,689,345	1,749,081	455,121,895	1,570,306,977

						Arsenic (mg/kg)	**Cadmium (mg/kg)**	**Lead (mg/kg)**	**Zinc (mg/kg)**
SWAC						9.4	0.28	73	252.0
Max						73.0	3.2	430.0	3,450.0

Table A33-7 Supporting Data for Table A33-6

Station	Pre-Remedy Average Surface Sediment Concentration																			
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
NA01	10.2	0.24	69.75	252.5	84	1.06	14.75	1.08	1.33	298	6575	7050	5580	2.18	375	533	240	290	580	157
NA02	10.0	0.21	67.00	170	76	0.70	18.00	1.00	1.00	240	2800	3000	2422	2.00	208	299	134	162	324	82
NA03	11.0	0.29	69.00	220	94	1.10	18.00	1.10	1.40	260	6100	6600	5244	2.33	370	520	237	287	574	180
NA04	12.0	0.27	73.00	260	93	1.10	19.00	1.10	1.20	310	3500	3700	2819	2.04	250	350	158	191	381	300
NA05	9.5	0.17	57.00	170	65	0.61	15.00	0.43	0.89	210	2800	3000	2277	1.60	180	250	116	140	280	110
NA06	10.5	0.27	61.50	395	130	2.35	14.50	1.05	1.02	335	3800	4050	3235	2.14	640	935	400	484	969	225
NA07	13.5	0.27	60.50	225	100	1.45	16.00	0.90	1.15	255	15850	16500	13734	2.02	495	710	310	375	749	111
NA08	18.0	0.31	79.00	270	96	0.82	21.00	1.20	1.00	330	3500	3800	2928	2.18	310	430	197	238	476	110
NA09	13.0	0.40	75.00	260	97	1.20	20.00	1.20	1.10	330	2800	3000	2248	2.26	290	410	188	228	455	120
NA10	6.9	0.22	52.00	160	59	0.58	14.00	1.00	0.78	190	1800	1900	1438	1.18	160	230	100	120	241	91
NA11	9.3	0.28	59.00	180	73	0.85	15.00	1.00	1.10	230	2800	3000	2391	1.69	190	270	121	147	294	38
NA12	9.5	0.18	54.00	150	59	0.62	15.00	1.10	0.79	210	2000	2200	1700	1.48	150	220	97	118	235	80
NA13	10.8	0.24	59.00	185	75	0.65	15.50	1.00	0.94	295	1800	1950	1511	1.92	173	265	113	137	273	68
NA14	9.0	0.25	56.00	130	66	0.55	15.00	1.10	0.78	200	1100	1200	963	1.82	128	183	82	99	199	45
NA15	12.0	0.25	62.00	250	83	0.98	16.00	1.00	1.30	310	3300	3600	2714	1.95	340	480	214	259	517	670
NA16	10.5	0.36	70.25	252.5	90	1.09	15.75	1.03	1.35	313	3200	3500	2676	2.00	590	665	368	445	890	175
NA17	14.5	0.41	74.00	510	115	0.85	17.50	1.10	1.30	620	2950	3200	2496	2.03	550	620	339	410	821	1350
NA18	14.0	0.36	67.00	230	97	0.79	17.00	1.00	1.00	380	2400	2600	1957	2.04	350	490	221	268	536	210
NA19	14.0	0.37	65.00	270	100	0.78	17.00	1.00	1.10	450	3000	3200	2415	1.84	990	1400	607	734	1469	570
NA20	6.6	0.44	26.00	96	53	0.24	8.40	1.00	0.53	190	2900	3200	2639	1.42	120	170	74	89	178	280
NA21	11.0	0.39	51.00	150	83	0.51	14.00	1.10	0.88	250	2100	2200	1829	2.15	177	257	114	137	275	410
NA22	8.5	0.46	39	150	95	0.38	12.00	1.10	0.91	230	3600	4000	3317	1.65	180	250	112	135	270	120
NA23	12.0	0.26	77.00	350	120	1.10	18.00	1.30	1.30	430	3400	3700	2988	2.21	510	730	320	387	774	120
NA24	9.6	0.20	60.00	200	88	0.90	11.00	1.10	0.90	280	2100	2300	1812	2.12	290	410	183	222	443	59
NA25	6.0	0.11	33.00	85	41	0.42	8.50	1.10	0.72	130	1100	1100	906	1.24	83	120	55	66	133	25
NA26	6.2	0.11	32.00	80	41	0.48	8.00	1.00	0.66	140	850	910	707	1.22	180	250	115	139	278	37
NA27	13.0	0.29	100.00	390	110	1.20	27.00	1.30	1.50	500	2800	3000	2465	2.01	210	290	137	166	332	100
NA28	10.0	0.31	86.00	290	84	0.89	23.00	1.20	1.40	390	3400	3700	2993	1.87	180	260	118	143	286	90
NA29	6.9	0.14	39.00	110	56	0.55	11.00	1.10	0.86	170	1900	2000	1559	1.70	190	260	119	144	289	58
NA30	7.5	0.22	37.00	140	59	0.71	9.30	1.00	1.00	170	1000	1100	835	1.38	100	150	70	84	168	22
NA31	5.3	0.13	29.00	71	34	0.35	7.50	1.10	0.57	110	530	580	447	0.92	68	96	44	53	107	20
SW01	13.5	0.71	78.50	560	145	1.45	98.00	0.88	1.07	520	7525	8725	7351	2.24	1600	2400	950	1150	2300	450
SW02	13.8	3.18	118.75	580	170	4.45	106.00	1.26	3.90	585	14500	21250	19460	5.98	5450	8325	3312	4008	8015	167

Table A33-7   Supporting Data for Table A33-6, Continued

Station	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	Pre-Remedy Average Surface Sediment Concentration																			
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SW03	11.0	0.70	52.00	190	79	1.20	18.00	0.80	1.20	230	6800	7500	6134	3.11	410	580	257	310	621	53
SW04	73.0	1.95	87.50	1500	430	1.75	18.00	1.50	1.60	3450	14000	16000	14109	2.28	4000	5200	2476	2996	5992	3250
SW05	11.0	0.86	53.00	230	120	0.96	19.00	0.75	1.20	280	13000	17000	15067	1.55	1200	1800	769	930	1861	170
SW06	15.0	0.85	56.00	170	81	0.75	20.00	0.83	1.10	280	12000	14000	12641	1.82	380	580	235	284	567	100
SW07	8.1	0.19	43.00	150	57	0.52	13.00	0.81	0.74	170	3800	4100	3450	1.73	170	230	107	129	258	44
SW08	24.0	0.73	82.50	920	225	2.25	21.00	1.20	1.45	830	25500	28500	24759	3.80	2100	2700	1308	1583	3166	1850
SW09	27.0	1.10	56.00	660	220	0.96	18.00	0.84	1.30	1200	17000	20000	17383	1.94	710	1100	446	540	1079	910
SW10	13.0	0.87	45.00	160	79	0.58	17.00	0.84	0.82	360	16000	25000	23410	1.21	610	930	380	459	918	250
SW11	9.6	0.24	62.00	170	74	0.75	17.00	0.39	1.10	240	8000	8500	7001	1.81	200	280	127	153	307	140
SW12	7.4	0.14	39.00	119.5	52	0.53	10.80	0.90	0.76	160	3000	3300	2742	1.47	155	231	100	121	243	36
SW13	15.0	0.42	72.00	800	93	0.86	24.00	1.10	1.40	580	12000	14000	12507	2.33	490	710	312	377	754	790
SW14	10.0	0.31	63.00	280	88	1.00	17.00	1.00	1.20	300	8400	9100	7659	2.13	400	570	257	310	621	450
SW15	11.0	0.45	67.00	230	90	0.90	19.00	1.10	1.30	290	7700	8400	7137	2.31	380	540	237	287	573	170
SW16	12.0	0.66	68.00	430	97	1.00	16.00	1.10	1.90	370	5700	6100	4847	2.24	430	610	273	330	661	1100
SW17	12.0	0.37	73.00	270	93	0.98	20.00	0.44	1.50	310	10000	11000	9199	2.53	540	880	333	403	805	440
SW18	11.0	0.33	74.00	220	86	0.75	20.00	0.44	1.30	280	8100	8800	7471	2.19	440	660	276	334	668	130
SW19	7.1	0.15	42.00	110	51	2.10	12.00	0.70	0.78	150	1100	1200	938	1.15	94	135	61	74	148	37
SW20	14.0	0.41	68.00	290	110	0.99	18.00	1.10	1.10	390	11000	12000	9736	2.14	1600	2600	1023	1238	2476	130
SW21	11.0	0.51	70.00	260	120	1.40	14.00	1.00	1.30	330	9700	10000	8480	2.10	2400	3600	1491	1804	3608	170
SW22	13.0	0.35	70.00	260	110	1.10	21.00	1.10	1.30	310	12000	13000	10684	2.46	900	1400	577	698	1396	190
SW23	15.0	0.37	89.00	280	110	1.00	25.00	1.10	1.30	330	11000	12000	9880	2.52	1000	1500	640	775	1550	210
SW24	10.0	0.33	52.50	300	88	1.90	16.00	0.95	1.15	300	52000	57000	50225	1.75	950	1500	588	711	1423	165
SW25	11.5	0.36	64.50	230	86	0.78	16.50	1.00	1.20	345	8150	8800	7505	2.15	350	500	221	268	535	231
SW26	9.0	0.14	45.00	120	58	0.43	12.00	0.90	0.46	160	1600	1700	1345	1.31	293	418	184	222	444	49
SW27	10.0	0.27	63.00	210	80	0.68	18.00	0.42	1.10	250	12000	14000	12055	2.08	200	320	128	155	311	250
SW28	14.0	0.32	65.50	265	100	0.88	15.00	1.20	1.10	330	17000	19000	16165	2.52	2100	2600	1388	1679	3359	150
SW29	8.3	0.49	44.00	220	72	0.93	37.00	1.10	1.20	230	4600	4900	4142	1.34	820	1200	504	610	1220	190
SW30	8.9	0.23	72.00	240	72	1.10	13.00	1.00	1.20	300	4900	5200	4311	2.05	380	540	240	291	581	200
SW31	4.0	0.06	18.00	54	21	0.23	4.90	1.20	0.36	80	1200	1300	1031	0.66	66	93	42	51	101	36
SW32	9.4	0.06	43.00	92	57	0.51	11.00	1.10	0.33	160	820	900	719	1.56	160	230	101	122	245	30
SW33	10.0	0.07	41.00	100	58	0.53	11.00	1.20	0.24	170	1000	1100	826	2.09	100	150	68	82	164	19
SW34	8.3	0.21	53.00	320	99	0.75	11.00	1.10	0.95	310	1400	1500	1155	1.68	130	180	82	99	198	38
SW36	9.9	0.21	70.00	240	79	0.75	13.00	1.00	1.20	300	4000	4300	3607	2.23	200	282	131	159	318	49

Table A33-8 Supporting Calculations for Table 33-8

Predicted Post-Remediation SWAC Calculations for Secondary COPCs

							Concentration x Area Product			
Station		Area (ft2)	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)	Arsenic (mg*ft2/kg)	Cadmium (mg*ft2/kg)	Lead (mg*ft2/kg)	Zinc (mg*ft2/kg)
Areas to be Remediated[a]										
NA01	b	7450.46	7.5	0.33	53	192	55878.45	2458.652	394874.4	1430488.3
NA06	b	41011.66	7.5	0.33	53	192	307587.5	13533.85	2173618	7874238.7
NA09	b	27339.07	7.5	0.33	53	192	205043	9021.893	1448971	5249101.4
NA12	b	4925.27	7.5	0.33	53	192	36939.53	1625.339	261039.3	945651.84
NA15	b	46308.55	7.5	0.33	53	192	347314.1	15281.82	2454353	8891241.6
NA16	b	436.18	7.5	0.33	53	192	3271.35	143.9394	23117.54	83746.56
NA17	b	34490.11	7.5	0.33	53	192	258675.8	11381.74	1827976	6622101.1
NA18	b	8706.93	7.5	0.33	53	192	65301.98	2873.287	461467.3	1671730.6
NA19	b	27443.69	7.5	0.33	53	192	205827.7	9056.418	1454516	5269188.5
NA23	b	4229.31	7.5	0.33	53	192	31719.83	1395.672	224153.4	812027.52
NA27	b	175.35	7.5	0.33	53	192	1315.125	57.8655	9293.55	33667.2
SW01		33393.71	7.5	0.33	53	192	250452.8	11019.92	1769867	6411592.3
SW02	b	39161.57	7.5	0.33	53	192	293711.8	12923.32	2075563	7519021.4
SW03	b	197.35	7.5	0.33	53	192	1480.125	65.1255	10459.55	37891.2
SW04	b	15943.17	7.5	0.33	53	192	119573.8	5261.246	844988	3061088.6
SW05	b	16583.75	7.5	0.33	53	192	124378.1	5472.638	878938.8	3184080
SW06	b	3444.97	7.5	0.33	53	192	25837.28	1136.84	182583.4	661434.24
SW08	b	12302.76	7.5	0.33	53	192	92270.7	4059.911	652046.3	2362129.9
SW09	b	21043.82	7.5	0.33	53	192	157828.7	6944.461	1115322	4040413.4
SW10	b	19662.59	7.5	0.33	53	192	147469.4	6488.655	1042117	3775217.3
SW13	b	21648.86	7.5	0.33	53	192	162366.5	7144.124	1147390	4156581.1
SW14		16731.93	7.5	0.33	53	192	125489.5	5521.537	886792.3	3212530.6
SW15	b	6892.1	7.5	0.33	53	192	51690.75	2274.393	365281.3	1323283.2
SW16	b	17459.12	7.5	0.33	53	192	130943.4	5761.51	925333.4	3352151
SW17	b	48027.07	7.5	0.33	53	192	360203	15848.93	2545435	9221197.4
SW20	b	9224.04	7.5	0.33	53	192	69180.3	3043.933	488874.1	1771015.7
SW21		11896.32	7.5	0.33	53	192	89222.4	3925.786	630505	2284093.4
SW22		3761.78	7.5	0.33	53	192	28213.35	1241.387	199374.3	722261.76
SW23	b	22032	7.5	0.33	53	192	165240	7270.56	1167696	4230144
SW24	b	16399.18	7.5	0.33	53	192	122993.9	5411.729	869156.5	3148642.6
SW25	b	7242.97	7.5	0.33	53	192	54322.28	2390.18	383877.4	1390650.2
SW27	b	71021.23	7.5	0.33	53	192	532659.2	23437.01	3764125	13636076
SW28	b	41115.65	7.5	0.33	53	192	308367.4	13568.16	2179129	7894204.8
SW29	b	18649.41	7.5	0.33	53	192	139870.6	6154.305	988418.7	3580686.7
SW31	b	5048.81	7.5	0.33	53	192	37866.08	1666.107	267586.9	969371.52
Areas Outside of Remediation Footprint										
NA01		92337.68	10.2	0.2375	84	297.5	941844.3	21930.2	7756365	27470460
NA02		164015.3	10	0.21	76	240	1640153	34443.21	12465161	39363665
NA03		118384.2	11	0.29	94	260	1302226	34331.41	11128111	30779882
NA04		72669.16	12	0.27	93	310	872029.9	19620.67	6758232	22527440
NA05		112824.2	9.5	0.17	65	210	1071830	19180.12	7333574	23693084

Table A33-8 Supporting Calculations for Table 33-8, Continued

							Concentration x Area Product			
Station		Area (ft2)	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)	Arsenic (mg*ft2/kg)	Cadmium (mg*ft2/kg)	Lead (mg*ft2/kg)	Zinc (mg*ft2/kg)
NA06		20023.72	10.5	0.265	130	335	210249.1	5306.286	2603084	6707946.2
NA07		30297.53	13.5	0.27	100	255	409016.7	8180.333	3029753	7725870.2
NA08		20352.06	18	0.31	96	330	366337.1	6309.139	1953798	6716179.8
NA09		2181.69	13	0.4	97	330	28361.97	872.676	211623.9	719957.7
NA10		29135.97	6.9	0.22	59	190	201038.2	6409.913	1719022	5535834.3
NA11		37813.37	9.3	0.28	73	230	351664.3	10587.74	2760376	8697075.1
NA12		86170.31	9.5	0.18	59	210	818617.9	15510.66	5084048	18095765
NA13		255727.1	10.75	0.235	75	295	2749066	60095.87	19179533	75439495
NA14		208687.4	9	0.25	66	200	1878187	52171.86	13773370	41737484
NA15		1324.09	12	0.25	83	310	15889.08	331.0225	109899.5	410467.9
NA16		37818.25	10.5	0.3625	89.75	312.5	397091.6	13709.12	3394188	11818203
NA17		1981.27	14.5	0.405	115	620	28728.42	802.4144	227846.1	1228387.4
NA18		31745.4	14	0.36	97	380	444435.6	11428.34	3079304	12063252
NA19		4599.61	14	0.37	100	450	64394.54	1701.856	459961	2069824.5
NA20		311465.2	6.6	0.44	53	190	2055670	137044.7	16507656	59178388
NA21		476122	11	0.39	83	250	5237342	185687.6	39518124	119030493
NA22		54670.01	8.5	0.46	95	230	464695.1	25148.2	5193651	12574102
NA23		63770.23	12	0.26	120	430	765242.8	16580.26	7652428	27421199
NA24		65314.32	9.6	0.2	88	280	627017.5	13062.86	5747660	18288010
NA25		521663.9	6	0.11	41	130	3129983	57383.02	21388218	67816302
NA26		302543.6	6.2	0.11	41	140	1875770	33279.79	12404287	42356103
NA27		53713.94	13	0.29	110	500	698281.2	15577.04	5908533	26856970
NA28		54261.96	10	0.31	84	390	542619.6	16821.21	4558005	21162164
NA29		202963.8	6.9	0.14	56	170	1400450	28414.94	11365975	34503853
NA30		240837.7	7.5	0.22	59	170	1806283	52984.3	14209425	40942412
NA31		229185.4	5.3	0.13	34	110	1214683	29794.1	7792304	25210395
SW02		0.24	13.75	3.175	170	585	3.3	0.762	40.8	140.4
SW03		48613.55	11	0.7	79	230	534749.1	34029.49	3840470	11181117
SW04		6738.53	73	1.95	430	3450	491912.7	13140.13	2897568	23247929
SW05		7578.75	11	0.86	120	280	83366.25	6517.725	909450	2122050
SW06		22305.83	15	0.85	81	280	334587.5	18959.96	1806772	6245632.4
SW07		40947.48	8.1	0.19	57	170	331674.6	7780.021	2334006	6961071.6
SW08		4525.83	24	0.73	225	830	108619.9	3303.856	1018312	3756438.9
SW09		3434.85	27	1.1	220	1200	92740.95	3778.335	755667	4121820
SW10		1945.63	13	0.87	79	360	25293.19	1692.698	153704.8	700426.8
SW11		36689.34	9.6	0.24	74	240	352217.7	8805.442	2715011	8805441.6
SW12		112941.8	7.4	0.14	52	160	835769.4	15811.85	5872974	18070690
SW13		16607.75	15	0.42	93	580	249116.3	6975.255	1544521	9632495
SW15		48873.77	11	0.45	90	290	537611.5	21993.2	4398639	14173393
SW16		375.6	12	0.66	97	370	4507.2	247.896	36433.2	138972
SW17		7871.24	12	0.37	93	310	94454.88	2912.359	732025.3	2440084.4
SW18		52601.48	11	0.33	86	280	578616.3	17358.49	4523727	14728414
SW19		214746.6	7.1	0.15	51	150	1524701	32211.98	10952074	32211983
SW20		18950.82	14	0.41	110	390	265311.5	7769.836	2084590	7390819.8
SW23		8045.25	15	0.37	110	330	120678.8	2976.743	884977.5	2654932.5

Table A33-8 Supporting Calculations for Table 33-8, Continued

							Concentration x Area Product			
Station		Area (ft2)	Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)	Arsenic (mg*ft2/kg)	Cadmium (mg*ft2/kg)	Lead (mg*ft2/kg)	Zinc (mg*ft2/kg)
SW24		4780.04	10	0.325	88	300	47800.4	1553.513	420643.5	1434012
SW25		62446.84	11.5	0.355	85.5	345	718138.7	22168.63	5339205	21544160
SW26		86923.41	9	0.14	58	160	782310.7	12169.28	5041558	13907746
SW27		7867.34	10	0.27	80	250	78673.4	2124.182	629387.2	1966835
SW28		10438.28	14	0.315	100	330	146135.9	3288.058	1043828	3444632.4
SW29		43847.58	8.3	0.49	72	230	363934.9	21485.31	3157026	10084943
SW30		72230.96	8.9	0.23	72	300	642855.5	16613.12	5200629	21669288
SW31		78449.51	4	0.064	21	80	313798	5020.769	1647440	6275960.8
SW32		78476.82	9.4	0.064	57	160	737682.1	5022.516	4473179	12556291
SW33		151872.1	10	0.065	58	170	1518721	9871.689	8808584	25818264
SW34		304572	8.3	0.21	99	310	2527948	63960.12	30152630	94417326
SW36		90729.61	9.9	0.21	79	300	898223.1	19053.22	7167639	27218883
Total		6232430					54061857	1548159	4.12E+08	1.378E+09

							Arsenic (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
SWAC							8.67	0.2	66.09	221.08
Max							18	0.46	100	390

a Concentration in areas to be remediated is set to background for SWAC calculations.
b Only portion of the polygon to be remediated.

Table A33-9 Supporting Data for Table A33-8

Station	Pre-Remedy Average Surface Sediment Concentration																				
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
NA01	10.2	0.24	69.75	252.5	84	1.06	14.75	1.08	1.33	298	6575	7050	5580	2.18	375	533	240	290	580	157
NA02	10.0	0.21	67.00	170	76	0.70	18.00	1.00	1.00	240	2800	3000	2422	2.00	208	299	134	162	324	82
NA03	11.0	0.29	69.00	220	94	1.10	18.00	1.10	1.40	260	6100	6600	5244	2.33	370	520	237	287	574	180
NA04	12.0	0.27	73.00	260	93	1.10	19.00	1.10	1.20	310	3500	3700	2819	2.04	250	350	158	191	381	300
NA05	9.5	0.17	57.00	170	65	0.61	15.00	0.43	0.89	210	2800	3000	2277	1.60	180	250	116	140	280	110
NA06	10.5	0.27	61.50	395	130	2.35	14.50	1.05	1.02	335	3800	4050	3235	2.14	640	935	400	484	969	225
NA07	13.5	0.27	60.50	225	100	1.45	16.00	0.90	1.15	255	15850	16500	13734	2.02	495	710	310	375	749	111
NA08	18.0	0.31	79.00	270	96	0.82	21.00	1.20	1.00	330	3500	3800	2928	2.18	310	430	197	238	476	110
NA09	13.0	0.40	75.00	260	97	1.20	20.00	1.20	1.10	330	2800	3000	2248	2.26	290	410	188	228	455	120
NA10	6.9	0.22	52.00	160	59	0.58	14.00	1.00	0.78	190	1800	1900	1438	1.18	160	230	100	120	241	91
NA11	9.3	0.28	59.00	180	73	0.85	15.00	1.00	1.10	230	2800	3000	2391	1.69	190	270	121	147	294	38
NA12	9.5	0.18	54.00	150	59	0.62	15.00	1.10	0.79	210	2000	2200	1700	1.48	150	220	97	118	235	80
NA13	10.8	0.24	59.00	185	75	0.65	15.50	1.00	0.94	295	1800	1950	1511	1.92	173	265	113	137	273	68
NA14	9.0	0.25	56.00	130	66	0.55	15.00	1.10	0.78	200	1100	1200	963	1.82	128	183	82	99	199	45
NA15	12.0	0.25	62.00	250	83	0.98	16.00	1.00	1.30	310	3300	3600	2714	1.95	340	480	214	259	517	670
NA16	10.5	0.36	70.25	252.5	90	1.09	15.75	1.03	1.35	313	3200	3500	2676	2.00	590	665	368	445	890	175
NA17	14.5	0.41	74.00	510	115	0.85	17.50	1.10	1.30	620	2950	3200	2496	2.03	550	620	339	410	821	1350
NA18	14.0	0.36	67.00	230	97	0.79	17.00	1.00	1.00	380	2400	2600	1957	2.04	350	490	221	268	536	210
NA19	14.0	0.37	65.00	270	100	0.78	17.00	1.00	1.10	450	3000	3200	2415	1.84	990	1400	607	734	1469	570
NA20	6.6	0.44	26.00	96	53	0.24	8.40	1.00	0.53	190	2900	3200	2639	1.42	120	170	74	89	178	280
NA21	11.0	0.39	51.00	150	83	0.51	14.00	1.10	0.88	250	2100	2200	1829	2.15	177	257	114	137	275	410
NA22	8.5	0.46	39	150	95	0.38	12.00	1.10	0.91	230	3600	4000	3317	1.65	180	250	112	135	270	120
NA23	12.0	0.26	77.00	350	120	1.10	18.00	1.30	1.30	430	3400	3700	2988	2.21	510	730	320	387	774	120
NA24	9.6	0.20	60.00	200	88	0.90	11.00	1.10	0.90	280	2100	2300	1812	2.12	290	410	183	222	443	59
NA25	6.0	0.11	33.00	85	41	0.42	8.50	1.10	0.72	130	1100	1100	906	1.24	83	120	55	66	133	25
NA26	6.2	0.11	32.00	80	41	0.48	8.00	1.00	0.66	140	850	910	707	1.22	180	250	115	139	278	37
NA27	13.0	0.29	100.00	390	110	1.20	27.00	1.30	1.50	500	2800	3000	2465	2.01	210	290	137	166	332	100
NA28	10.0	0.31	86.00	290	84	0.89	23.00	1.20	1.40	390	3400	3700	2993	1.87	180	260	118	143	286	90
NA29	6.9	0.14	39.00	110	56	0.55	11.00	1.10	0.86	170	1900	2000	1559	1.70	190	260	119	144	289	58
NA30	7.5	0.22	37.00	140	59	0.71	9.30	1.00	1.00	170	1000	1100	835	1.38	100	150	70	84	168	22

Table A33-9 Supporting Data for Table A33-8, Continued

Station	Pre-Remedy Average Surface Sediment Concentration																			
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
NA31	5.3	0.13	29.00	71	34	0.35	7.50	1.10	0.57	110	530	580	447	0.92	68	96	44	53	107	20
SW01	13.5	0.71	78.50	560	145	1.45	98.00	0.88	1.07	520	7525	8725	7351	2.24	1600	2400	950	1150	2300	450
SW02	13.8	3.18	118.75	580	170	4.45	106.00	1.26	3.90	585	14500	21250	19460	5.98	5450	8325	3312	4008	8015	167
SW03	11.0	0.70	52.00	190	79	1.20	18.00	0.80	1.20	230	6800	7500	6134	3.11	410	580	257	310	621	53
SW04	73.0	1.95	87.50	1500	430	1.75	18.00	1.50	1.60	3450	14000	16000	14109	2.28	4000	5200	2476	2996	5992	3250
SW05	11.0	0.86	53.00	230	120	0.96	19.00	0.75	1.20	280	13000	17000	15067	1.55	1200	1800	769	930	1861	170
SW06	15.0	0.85	56.00	170	81	0.75	20.00	0.83	1.10	280	12000	14000	12641	1.82	380	580	235	284	567	100
SW07	8.1	0.19	43.00	150	57	0.52	13.00	0.81	0.74	170	3800	4100	3450	1.73	170	230	107	129	258	44
SW08	24.0	0.73	82.50	920	225	2.25	21.00	1.20	1.45	830	25500	28500	24759	3.80	2100	2700	1308	1583	3166	1850
SW09	27.0	1.10	56.00	660	220	0.96	18.00	0.84	1.30	1200	17000	20000	17383	1.94	710	1100	446	540	1079	910
SW10	13.0	0.87	45.00	160	79	0.58	17.00	0.84	0.82	360	16000	25000	23410	1.21	610	930	380	459	918	250
SW11	9.6	0.24	62.00	170	74	0.75	17.00	0.39	1.10	240	8000	8500	7001	1.81	200	280	127	153	307	140
SW12	7.4	0.14	39.00	119.5	52	0.53	10.80	0.90	0.76	160	3000	3300	2742	1.47	155	231	100	121	243	36
SW13	15.0	0.42	72.00	800	93	0.86	24.00	1.10	1.40	580	12000	14000	12507	2.33	490	710	312	377	754	790
SW14	10.0	0.31	63.00	280	88	1.00	17.00	1.00	1.20	300	8400	9100	7659	2.13	400	570	257	310	621	450
SW15	11.0	0.45	67.00	230	90	0.90	19.00	1.10	1.30	290	7700	8400	7137	2.31	380	540	237	287	573	170
SW16	12.0	0.66	68.00	430	97	1.00	16.00	1.10	1.90	370	5700	6100	4847	2.24	430	610	273	330	661	1100
SW17	12.0	0.37	73.00	270	93	0.98	20.00	0.44	1.50	310	10000	11000	9199	2.53	540	880	333	403	805	440
SW18	11.0	0.33	74.00	220	86	0.75	20.00	0.44	1.30	280	8100	8800	7471	2.19	440	660	276	334	668	130
SW19	7.1	0.15	42.00	110	51	2.10	12.00	0.70	0.78	150	1100	1200	938	1.15	94	135	61	74	148	37
SW20	14.0	0.41	68.00	290	110	0.99	18.00	1.10	1.10	390	11000	12000	9736	2.14	1600	2600	1023	1238	2476	130
SW21	11.0	0.51	70.00	260	120	1.40	14.00	1.00	1.30	330	9700	10000	8480	2.10	2400	3600	1491	1804	3608	170
SW22	13.0	0.35	70.00	260	110	1.10	21.00	1.10	1.30	310	12000	13000	10684	2.46	900	1400	577	698	1396	190
SW23	15.0	0.37	89.00	280	110	1.00	25.00	1.10	1.30	330	11000	12000	9880	2.52	1000	1500	640	775	1550	210
SW24	10.0	0.33	52.50	300	88	1.90	16.00	0.95	1.15	300	52000	57000	50225	1.75	950	1500	588	711	1423	165
SW25	11.5	0.36	64.50	230	86	0.78	16.50	1.00	1.20	345	8150	8800	7505	2.15	350	500	221	268	535	231
SW26	9.0	0.14	45.00	120	58	0.43	12.00	0.90	0.46	160	1600	1700	1345	1.31	293	418	184	222	444	49
SW27	10.0	0.27	63.00	210	80	0.68	18.00	0.42	1.10	250	12000	14000	12055	2.08	200	320	128	155	311	250
SW28	14.0	0.32	65.50	265	100	0.88	15.00	1.20	1.10	330	17000	19000	16165	2.52	2100	2600	1388	1679	3359	150
SW29	8.3	0.49	44.00	220	72	0.93	37.00	1.10	1.20	230	4600	4900	4142	1.34	820	1200	504	610	1220	190
SW30	8.9	0.23	72.00	240	72	1.10	13.00	1.00	1.20	300	4900	5200	4311	2.05	380	540	240	291	581	200

Table A33-9 Supporting Data for Table A33-8, Continued

Station	Pre-Remedy Average Surface Sediment Concentration																			
	As	Cd	Cr	Cu	Pb	Hg	Ni	Se	Ag	Zn	Total HPAH (half DL)	TPAH	Fairey 13 TPAH (half DL)	TOC	Total PCB Congeners (half DL)	Total PCB Homologs (half DL)	Fairey 15 of 18 PCB Congeners (half DL)	Fairey estimated 18 PCB Congeners (*1.21)	Fairey estimate Total PCBs (*2)	TBT
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg	ug/kg	ug/kg	%	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
SW31	4.0	0.06	18.00	54	21	0.23	4.90	1.20	0.36	80	1200	1300	1031	0.66	66	93	42	51	101	36
SW32	9.4	0.06	43.00	92	57	0.51	11.00	1.10	0.33	160	820	900	719	1.56	160	230	101	122	245	30
SW33	10.0	0.07	41.00	100	58	0.53	11.00	1.20	0.24	170	1000	1100	826	2.09	100	150	68	82	164	19
SW34	8.3	0.21	53.00	320	99	0.75	11.00	1.10	0.95	310	1400	1500	1155	1.68	130	180	82	99	198	38
SW36	9.9	0.21	70.00	240	79	0.75	13.00	1.00	1.20	300	4000	4300	3607	2.23	200	282	131	159	318	49

34. Finding 34: Remedial Monitoring Program

Finding 34 of CAO No. R9-2012-0024 states:

Monitoring during remediation activities is needed to document that remedial actions have not caused water quality standards to be violated outside of the remedial footprint, that the target cleanup levels have been reached within the remedial footprint, and to assess sediment for appropriate disposal. This monitoring should include water quality monitoring, sediment monitoring, and disposal monitoring.

Post-remediation monitoring is needed to verify that remaining pollutant concentrations in the sediments will not unreasonably affect San Diego Bay beneficial uses. Post-remediation monitoring should be initiated two years after remedy implementation has been completed and continue for a period of up to 10 years after remediation. For human health and aquatic dependent wildlife beneficial uses, post-remediation monitoring should include sediment chemistry monitoring to ensure that post-remediation SWACs are maintained at the site following cleanup. A subset of samples should undergo bioaccumulation testing using *Macoma*. For aquatic life beneficial uses, post-remediation monitoring should include sediment chemistry, and toxicity bioassays to verify that post-remedial conditions have the potential to support a healthy benthic community. In addition, post-remediation monitoring should include benthic community condition assessments to evaluate the overall impact of remediation on the benthic community re-colonization activities.

Environmental data has natural variability which does not represent a true difference from expected values. Therefore, if remedial monitoring results are within an acceptable range of the expected outcome, the remedial actions will be considered successful.

34.1. Remediation Monitoring

Remediation monitoring is the monitoring phase conducted during remedy implementation and consists of three components: 1) water quality monitoring, 2) sediment monitoring, and 3) disposal monitoring. The objectives of this monitoring are to document that cleanup activities have not caused water quality standards to be violated outside of the remedial footprint, that the target cleanup levels have been reached within the remedial footprint, and to assess sediment for appropriate disposal. If the monitoring shows that any of these objectives are not being met, then action will be taken to bring the remedy implementation into compliance. Monitoring decision rules which specify when an action should occur and the type of action that should occur are also discussed in this section. At a minimum, the remediation monitoring provisions described below should be included in the waste discharge requirements issued by the San Diego Water Board for dredging activities which may have additional dredging and monitoring requirements.

34.1.1. Water Quality

The goal of water quality monitoring during active remediation is to demonstrate that remedy implementation does not result in violations of water quality standards outside the construction area, specifically at a distance of 500 feet from the dredging activity as the point of compliance. Measures of turbidity and dissolved oxygen (DO) will be used to assess compliance with water quality monitoring goals. One of two methods will be employed:

1. Prior to remedy implementation, a model of turbidity and synoptic water quality measures will be developed for ambient conditions. This model will be used to determine if monitored turbidity would likely result in unacceptable water quality. Turbidity measures will be monitored from four samples each on two arcs outside of the construction area: one arc at 250 feet and one arc at 500 feet. Samples will be collected from a depth of 10 feet below the water surface. Monitored turbidity measures will be compared to synoptic “ambient” measurements outside the construction area, including Bay conditions and effects of non-remedial shipyard activities. The samples collected from the 250 foot arc are intended to warn of potential problems with the point of compliance at the 500 foot arc.

2. Real time monitoring of turbidity and DO readings will be taken synoptically at locations 250 feet from the dredge zone, 500 feet from the dredge zone, and at ambient locations. The 250 and 500 feet measurements will be compared to real time ambient readings taken by the same type of meters. If turbidity exceeds the ambient concentration by more than the error rate of the monitors’ measurement ability, then appropriate corrective action will be taken in the dredge area. As in the prior option the 250 foot arc will warn of potential problems and the 500 foot arc will be the point of compliance.

The frequency of water quality monitoring may be reduced if three days of daily monitoring (performed at the start of dredging activities) shows that no samples exceed water quality targets. In this event, water quality monitoring will be reduced from daily to weekly. Monitoring frequency will return to daily if a significant change in operations occurs. Monitoring frequency can again be reduced to weekly if three days of monitoring show that there are no exceedances.

With respect to water quality, if turbidity or DO are not compliant at 250 feet, the construction activities will be adjusted to reduce turbidity and raise DO to achieve compliance. If turbidity or DO problems are found at 500 feet from the construction area, then remediation activities will be halted while best management practices (BMPs) and alternate remedial methods (i.e., equipment) are evaluated.

34.1.2. Sediment Conditions

Sediment monitoring during dredging activities is intended to confirm that remediation has achieved target cleanup levels within the remedial footprint. This confirmation sampling is necessary because sediment resuspension and chemical release are unavoidable during dredging (U.S. ACE 2008b). Resuspended particulate material will be re-deposited and some resuspended contaminants may also dissolve into the water column and be available for uptake by biota.

Sediments are resuspended not only from the dredge bucket, but also by other mechanisms associated with dredging such as spillage, prop wash, and anchor systems. Chemical release can occur when bed sediments are suspended in the water column and increased turbidity can itself degrade acceptable levels of habitat quality for organisms in the water column. Re-deposition may occur near the dredge area or, depending on the environmental conditions and controls, resuspended sediment may be transported to other locations in the water body. Further, sediment dredging activities are planned such that a sufficient volume of contaminated sediment is removed; however, removing all particles of contaminated sediment is neither practical nor feasible.

Sediment monitoring will occur in footprint polygons and will be implemented immediately after the dredging contractor has confirmed that dredge depths within the footprint area have been achieved. Dredge depths are confirmed using multibeam dual frequency sonar coupled to differential Global Positioning System (dGPS) equipment. Confirmation sediment sampling will consist of core sediment sample collection in each footprint polygon. Sediment concentrations in a horizon that represents the first undisturbed depth beneath the dredge depth will be measured. This will be determined based on the accuracy to which the dredge operator can guarantee the depth to which they dredge. Samples will be collected from beneath this elevation using appropriate sampling techniques. Sample cores will be just deep enough to collect sufficient sample for analysis. COCs that will be monitored and compared to background sediment chemistry levels include PCBs, copper, HPAHs, TBT, and mercury. The background sediment chemistry levels can be found in Section 29, Table 29-1.

With respect to determining sediment remediation success, there will be natural variability in the sediment chemistry data collected, which does not represent a true difference from the expected value. Natural variability can be attributed to random error in laboratory instrument outputs, sample collection and handling techniques, grain size distribution variance in sediment samples, or other random non-systematic differences that cannot be measured or specifically accounted for. Furthermore, sediment cannot be dredged at depths of 10 centimeters or less. Therefore, dredging success will be evaluated based on the following decision rules applied to subsurface monitored sediment:

- If the concentration of any primary COC in subsurface sediments (deeper than the upper 5 cm) is above 120 percent of the background sediment concentration[24] after completion of initial dredging, then additional sediments shall be dredged and the polygon resampled.

- If concentrations of COCs in subsurface sediments are below 120 percent of background concentrations, then dredging is sufficient and will stop. A sand cover will be placed on the sediment surface, if necessary.

- If no sample can be collected because the equipment cannot penetrate a hard substrate, than this area will be evaluated to determine whether sand cover is required.

[24] See Table 29-1 for background concentrations of COCs.

34.1.3. Disposal

When dredging sediments, waste characterization of the dredged sediments is necessary to identify the disposal options which include landfills, confined aquatic disposal facilities (CDFs), uplands re-use, or open water disposal. Disposal options for dredged sediments are typically based on an array of tests which are dictated by the disposal facility. The testing of dredged sediments at this site will occur in a two-tiered approach.

Tier 1 evaluation will be based on existing data. Results will be compared to federal and state disposal criteria, as well as disposal facility specific requirements. The sediments in San Diego Bay have been adequately characterized to facilitate preliminary and conditional approval for identifying general disposal options which include hazardous and non-hazardous wastes landfills.

Tier II testing will occur when specific landfills have been selected for disposal. For uplands disposal, the dredged sediments typically shall require stockpiling and de-watering prior to disposal. Most uplands landfills require leaching tests for specific chemicals prior to final disposal and these can be performed on the stockpiled sediments after de-watering has occurred. Concentrations of chemicals in the leachate are compared to limit values allowing the dredged material to be characterized as non hazardous or hazardous, allowing disposal of the sediments in the appropriate type of landfill. Moisture content will be necessary as well as potentially other physical property measurements for upland disposal or re-use options. Development and placement of materials in CDFs is often preferred to uplands disposal as it minimizes the amount of distance and associated risks with transporting materials. Requirements of CDFs typically include data to show the sediments do not contain free oil, are not designated as hazardous waste, and do not exceed limits on TPH concentrations. Additionally, the geotechnical properties and leachability of the sediments must be shown to be protective of human health and the environment when allowances are made for mixing and natural attenuation. If a CDF in San Diego Bay is determined to be a viable option, Tier II testing to evaluate geotechnical properties associated with the sediments will be completed prior to the start of the sediment dredging activity.

Specific requirements for waste characterization will be developed once a disposal facility or option is developed as these options will dictate the extent and type of characterization required.

34.2. Post-Remediation Monitoring

The objective with post-remedy implementation monitoring is to verify that remaining pollutant concentrations in the sediments will not unreasonably affect San Diego Bay beneficial uses. These long-term beneficial uses include shellfish harvesting (SHELL), commercial and sport fishing (COMM), contact water recreation (REC-1), non-contact water recreations (REC-2), estuarine habitat (EST), marine habitat (MAR), wildlife habitat (WILD), and migration of aquatic organisms (MIGR). The sediment monitoring program will be based upon a conceptual model of the site that identifies the physical and chemical factors that control the fate and transport of pollutants and receptors that could be exposed to pollutants in the sediment.

Post-remediation monitoring will be initiated two years after remedy implementation has been completed and will continue for a period of up to 10 years after remediation.

34.2.1. Human Health and Aquatic-Dependent Wildlife

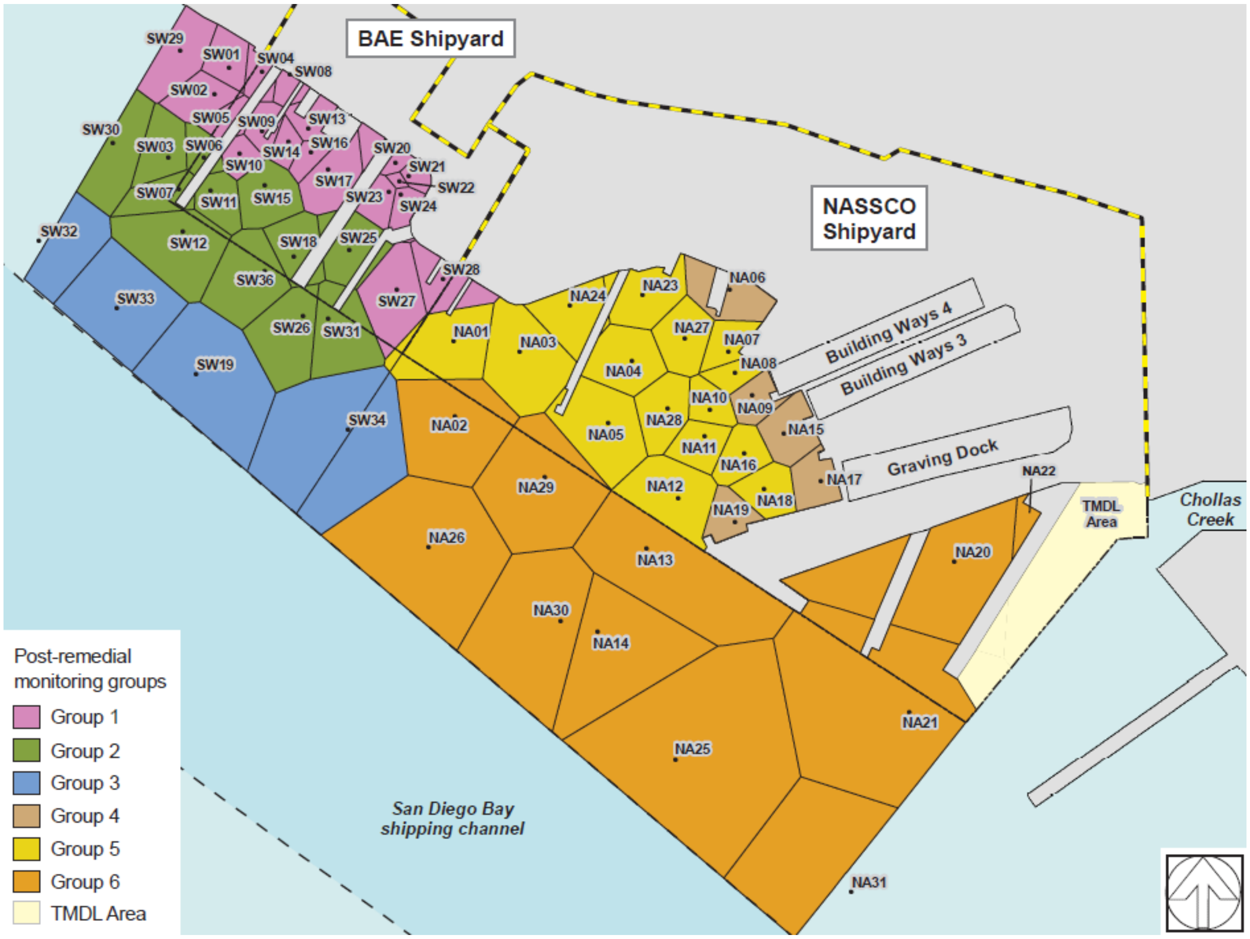
Post-remediation monitoring is intended to verify that remediation was effective in reducing and maintaining pollutants in sediments at levels that do not unreasonably impact human health and aquatic-dependent wildlife. To achieve these goals, composite surface sediment samples will be collected from six polygon groups comprising sub-regions of the site. The six groups are described below and shown in Figure 34-1:

Group 1. Northern half of the site inside the remedial footprint
Group 2. Northern half of the site outside the remedial footprint – smaller polygons
Group 3. Northern half of the site outside the remedial footprint – larger polygons
Group 4. Southern half of the site inside the remedial footprint
Group 5. Southern half of the site outside the remedial footprint – smaller polygons
Group 6. Southern half of the site outside the remedial footprint – larger polygons

To prepare the composite samples, the 65 station locations within the six polygon groups will be sampled. The volume of the sample at each station will be proportional to the area of the polygon the station represents. These samples will be collected from the 0-2 cm interval. Two (2) grab samples will be composited in the field at each station. The composite samples will be separated into six (6) pools and composited into six (6) composite samples representing the areas noted above. Three (3) replicates will be taken from each of these six (6) composite samples and analyzed for the COCs. The average concentration of each of the six (6) composites will be calculated from the analytical results of the replicates for each COC. The average concentrations represent SWACs for each of the six (6) polygon groups. The site-wide SWAC calculated from the average COC concentrations of the six (6) composite sample results is consistent with the SWAC method discussed in this Technical Report. The three replicate sub-samples of composite samples provide an estimate of variances in the compositing process. Sample material from the 65 station-specific composite samples will be archived for potential future analysis.

Analyses of surface sediment samples will include sediment bulk chemistry of the parameters PCBs, copper, mercury, HPAHs, and TBT, and sediment conventional parameters (e.g., grain size and TOC). Nine (9) sediment samples will undergo bioaccumulation testing using the 28-day *macoma* test. The samples selected for bioaccumulation testing will be from the same stations that underwent bioaccumulation testing in the Shipyard Report (Exponent, 2003). These stations are SW04, SW08, SW13, SW21, SW28, and NA06, NA11, NA12, and NA20.

Figure 34-1 Polygon Groups for Composite Sampling



The frequency of sediment sampling and analyses (chemical, physical, and bioaccumulation) will occur at two and five years post-remediation and, depending on the results at year five post-remediation, may also occur at ten years post remediation.

The goals of the sediment chemistry monitoring are to demonstrate that the post-remedial site-wide SWACs are at or below threshold target levels for specific COCs. The goals of bioaccumulation testing are to show decreasing bioaccumulation over time such that at two years post-remediation, the average of stations sampled shows bioaccumulation levels below what was measured in the Shipyard Report (Exponent, 2003) and that this decreasing trend continues at year five post-remediation and, if determined necessary, at year ten post-remediation.

34.2.2. Post-Remediation SWAC Trigger Concentrations

When collecting environmental data, there is natural variability in the data collected, which does not represent a true difference from the expected value. Natural variability can be attributed to random error in laboratory instrument outputs, sample collection and handling techniques, grain size distribution variance in sediment samples, or other random non-systematic differences that cannot be measured or specifically accounted for. Therefore, if the measured SWAC is within a range of the expected SWAC, then it can be stated with statistical significance that the expected

SWAC was achieved. This is accounted for with statistically calculated confidence limits that describe the amount that the measured SWAC can vary from the expected SWAC and still be considered to be the same as the expected SWAC due to random error in the sampling or analytical techniques. The 95 percent Upper Confidence Limit (UCL) is typically employed in environmental sampling programs to determine if a measured set of values are significantly different from the expected set of values.

SWAC trigger concentrations will be used to evaluate whether SWAC cleanup levels have been met, or whether further action is needed. These concentrations represent the surface-area weighted average concentration expected after cleanup, accounting for the variability in measured concentrations throughout the area. If the SWAC after remediation is below the trigger concentration then remediation will be considered successful. Exceedance of the trigger concentration will result in further evaluation of the site-specific conditions to determine if the remedy was successful. For these post-remedial comparisons, it is critical to account for the natural variability of the predicted post-remedial SWAC.

The trigger levels for each primary COC was set at the upper 95 percent confidence limit (UCL) on the estimated post-remediation SWAC. The post-remediation SWAC is based on measured concentrations in non-remediated areas and background concentrations in the areas to be remediated. Calculation of the UCL requires an estimate of the variability in concentrations following remedial activities. The UCL trigger concentrations assumed that remediated areas have the same variability as non-remediated areas. This variability was estimated based on the area-weighted variability of the measured concentrations in the non-remediated areas. Specifics regarding the area-weighted variability estimate and the resulting UCL calculation can be found in Bevington and Robinson (1992).

The trigger concentrations for the primary COCs are listed in Table 34-1, below.

Table 34-1 Trigger Concentrations for Primary COCs

Primary COCs	Trigger Concentrations
Copper	185 mg/kg
Mercury	0.78 mg/kg
HPAHs	3,208 µg/kg
PCBs	253 µg/kg
TBT	156 µg/kg

Note: See Appendix for Section 34 for supporting calculations.

34.2.3. Benthic Community Conditions

The purpose of assessing benthic community conditions as part of post-remedy monitoring is to demonstrate the remediation will successfully create conditions that would be expected to promote re-colonization of a healthy benthic community. This objective will be evaluated by collecting surface sediment samples (0-2 cm interval) from selected stations within the remedial footprint where pre-remedial Triad analyses showed likely effects on benthic receptors. Chemistry and toxicity tests will be performed on these samples to determine if they are likely to have effects on benthic receptors.

Surface sediment samples will be collected at five stations within the footprint area: NA19, SW04, SW13, SW22, and SW23. The frequency of sediment sampling and analyses (chemical, physical, and bioassay testing) will occur at two and five years post-remediation and, depending on the results at year five post-remediation, may also occur at ten years post remediation.

Sediments will be analyzed for sediment conventional parameters (e.g., grain size, TOC, ammonia) and the following: arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, TBT, PCBs, and PAHs.[25] Additionally, sediments will be evaluated using two types of sediment toxicity tests in accordance with protocols recommended by the San Diego Water Board: (1) 10-day amphipod survival test using *Eohaustorius estuarius* exposed to whole sediment, and (2) 48 hour bivalve larva development test using the mussel *Mytilus galloprovincialis* exposed to whole sediment at the sediment-water interface.

Results from the chemical analyses and bioassays will be evaluated in accordance with the flow diagrams in Figures 34-2 and 34-3 to determine if further evaluation or action is necessary based on benthic effects indicators.[26]

[25] See Appendix for Section 34 for list of PCBs and PAHs.

[26] The 2005 Final Reference Pool shall be used for this evaluation (see Section 17).

Figure 34-2 Flow Diagram for the Sediment Chemistry Ranking Criteria (Low, Moderate, and High)

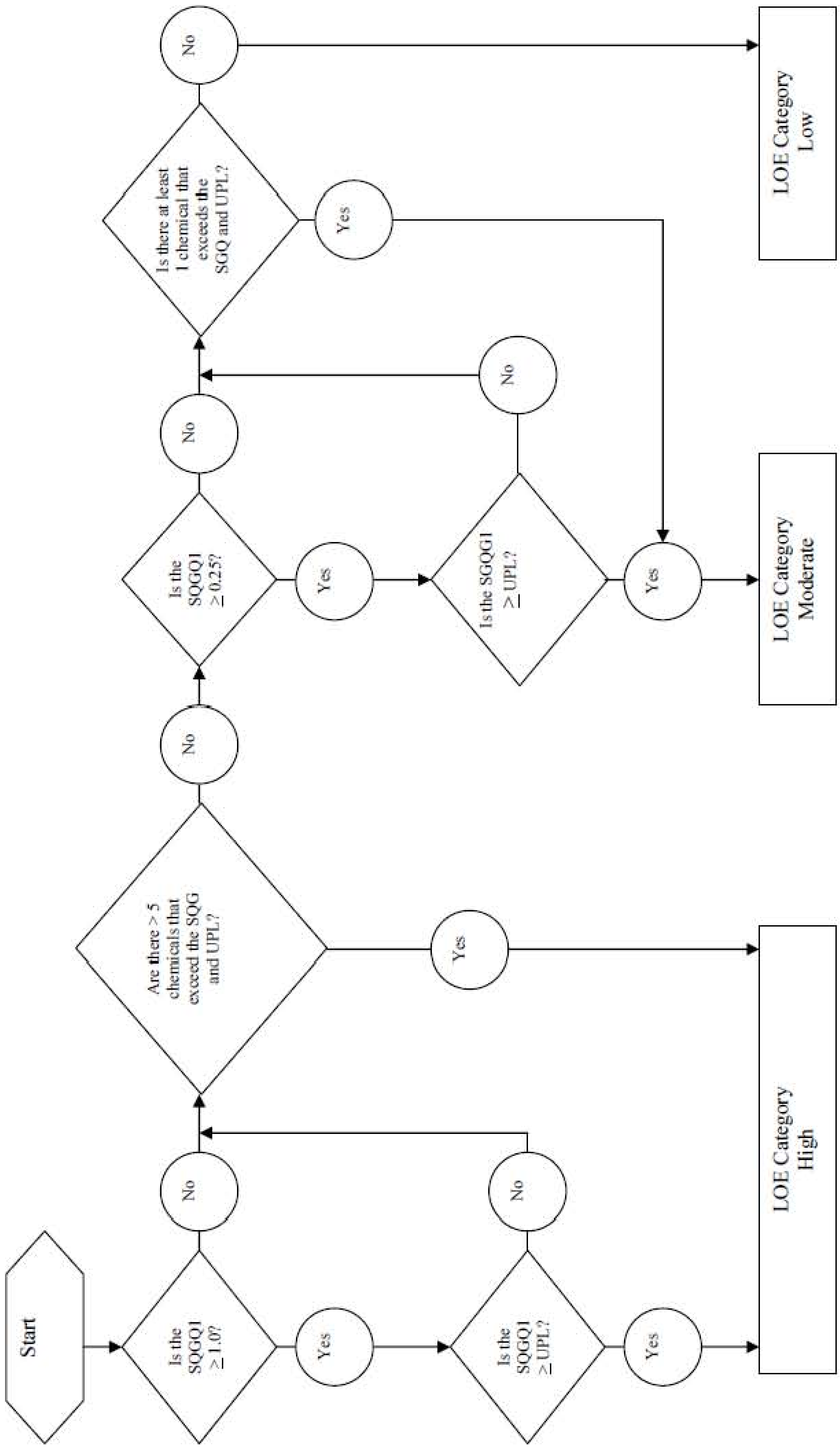
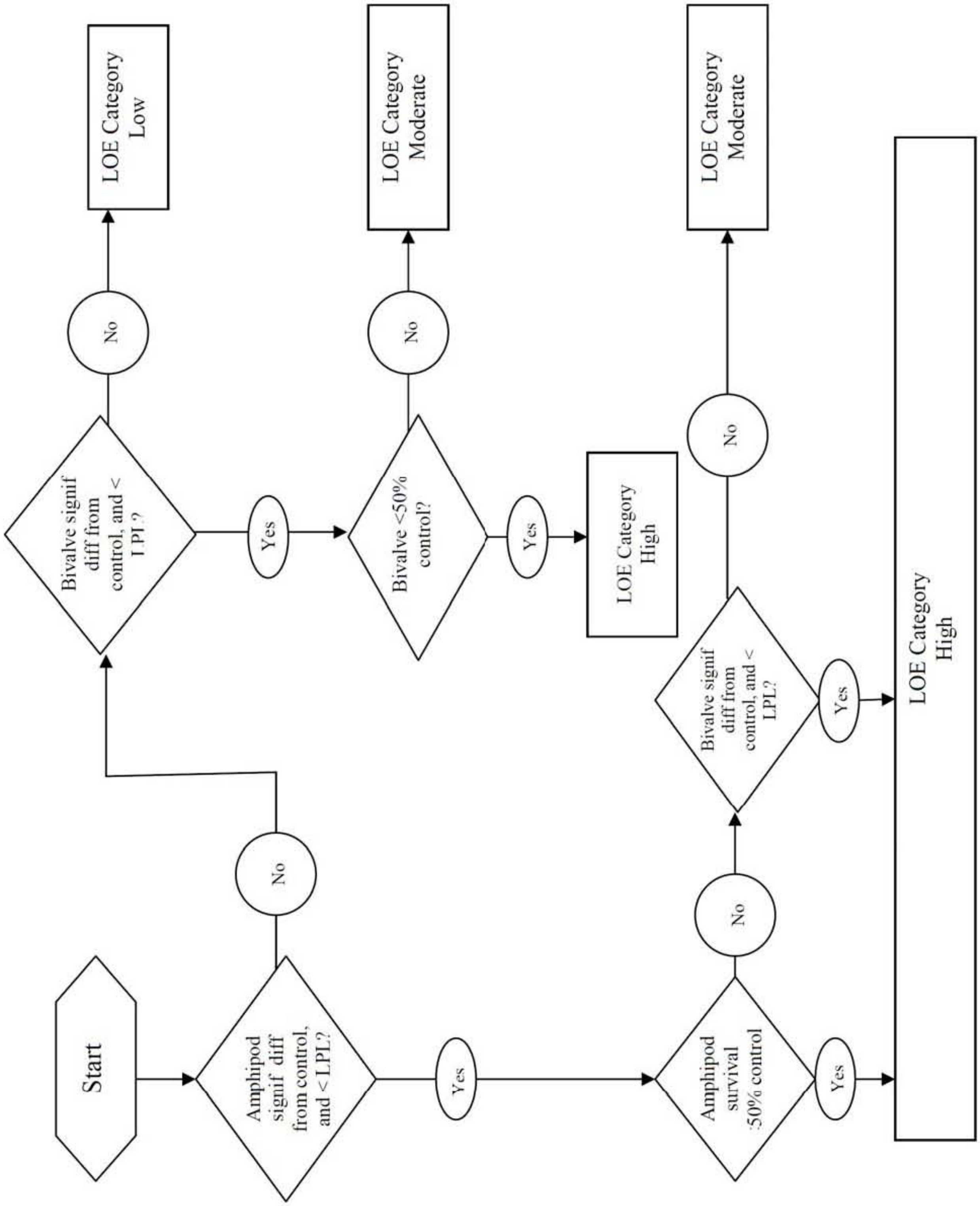


Figure 34-3 Flow Diagram for the Toxicity Ranking Criteria (Low, Moderate, and High)



34.2.4. Benthic Community Development

The purpose of assessing benthic community development as part of post-remedy monitoring is to determine how the benthic community develops within the footprint following remediation. Note that dredging temporarily destroys the benthic community. The intent of these benthic community measurements is to track the degree to which the benthic community re-colonizes the area and will not be used to evaluate the success of the remedy. Benthic community analyses will consist of full taxonomic analyses at five randomly selected sample locations from within the remedial footprint. The random samples will be stratified to assure two to three samples are collected from each of the two shipyard areas, and that sample locations for chemistry, toxicity, and bioaccumulation are avoided as they could potentially be disturbed by sampling activities. Further, to also avoid potential benthic community disturbances from sediment sampling, benthic community development will be assessed on years three and four post-remediation, alternate from sediment sampling years.

The goal of monitoring benthic community development is to observe the nature and extent (e.g., species composition, abundance, and diversity) of re-colonization over time after remediation. All benthic invertebrates in the screened sample shall be identified to the lowest possible taxon and counted. This information will be used to measure the benthic community re-colonization and will be used to assist with remedial decision making elsewhere in San Diego Bay.

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APPENDIX FOR SECTION 34

REMEDIAL MONITORING PROGRAM

March 14, 2012

List of Tables

Table A34-1 Supporting Calculations for Table 34-1

		Area-Weighted Averages					
Parameter	**Units**	**Post-Remediation (i.e., dredge areas at background concentration)**	**Non-Remediated Areas only (excludes dredge areas)[a]**	**Area Weighted Standard Deviation [excluding dredge areas][b]**	**Area Weighted Standard Error [excluding dredge areas][b]**	**95% Confidence Limits on the Post-Remediation Area-Weighted Average Concentration**	
PCBs (sum of congeners)	µg/kg	194	208	232	30	135	253
Mercury (total)	mg/kg	0.68	0.69	0.40	0.051	0.58	0.78
Copper	mg/kg	159	163	101	13	133	185
Tributyltin	µg/kg	110	121	179	23	65	156
HPAH	µg/kg	2,451	2,671	2,985	379	1,694	3,208
Arsenic	mg/kg	8.7	8.8	3.3	0.42	7.8	9.5
Cadmium	mg/kg	0.25	0.24	0.15	0.019	0.21	0.29
Lead	mg/kg	66	68	26	3.3	59	73
Zinc	mg/kg	221	225	144	18	184	258

Note: Concentrations below 100 are reported with two significant figures.

a Area-weighted average concentration with dredge areas excluded is only used in the calculation of the area-weighted standard deviation.

b Dredge areas were excluded for these variability estimates because including them at background could reduce the estimates.

c Confidence limits are for the post-remediation area-weighted average concentration estimate for the 66 locations measured.

* Yellow shading indicates changed values from earlier FinalAugust2010 version

Table A34-2 Data for Table A34-1

								PCBs (sum of congeners, µg/kg dry)					Background=	84
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.^{2}
NA01	NASSCO	Inside	yes	5121.17	0	99788.14	92337.68	375	84	353.27	35252469	375.00	34626630	12984986250
NA01	BAE	Inside	yes	2329.29	0			375	84					
NA01	NASSCO	Inside	no	416.53	416.53			375	375					
NA01	NASSCO	Inside	no	269.86	269.86			375	375					
NA01	BAE	Outside	no	3413.04	3413.04			375	375					
NA01	NASSCO	Outside	no	11893.16	11893.16			375	375					
NA01	NASSCO	Inside	no	75065.19	75065.19			375	375					
NA01	BAE	Inside	no	1279.9	1279.9			375	375					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	208	208	208.00	34115176	208.00	34115176	7095956641
NA02	NASSCO	Inside	no	20907.56	20907.56			208	208					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	370	370	370.00	43802139	370.00	43802139	16206791504
NA03	NASSCO	Inside	no	117647.4	117647.37			370	370					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	250	250	250.00	18167290	250.00	18167290	4541822500
NA04	NASSCO	Inside	no	13.87	13.87			250	250					
NA04	NASSCO	Inside	no	68573.77	68573.77			250	250					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	180	180	180.00	20308358	180.00	20308358	3655504404
NA05	NASSCO	Inside	no	107319.3	107319.33			180	180					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	640	84	266.41	16260160	640.00	12815181	8201715712
NA06	NASSCO	Inside	no	491.33	491.33			640	640					
NA06	NASSCO	Inside	no	10353.97	10353.97			640	640					
NA06	NASSCO	Inside	no	469.55	469.55			640	640					
NA06	NASSCO	Inside	no	651.17	651.17			640	640					
NA06	NASSCO	Inside	no	548.07	548.07			640	640					
NA06	NASSCO	Inside	no	1248.95	1248.95			640	640					
NA06	NASSCO	Inside	no	623.55	623.55			640	640					
NA06	NASSCO	Inside	no	5637.13	5637.13			640	640					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	495	495	495.00	14997277	495.00	14997277	7423652288
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	310	310	310.00	6309139	310.00	6309139	1955832966
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	290	84	99.22	2929172	290.00	632690	183480129
NA09	NASSCO	Inside	no	1070.7	1070.7			290	290					
NA09	NASSCO	Inside	no	1110.99	1110.99			290	290					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	160	160	160.00	4661755	160.00	4661755	745880832
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	190	190	190.00	7184540	190.00	7184540	1365062657
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	150	84	146.43	13339269	150.00	12925547	1938831975
NA12	NASSCO	Inside	no	86170.31	86170.31			150	150					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	173	173	173.00	44240788	173.00	44240788	7653656376
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	128	128	128.00	26711990	128.00	26711990	3419134689
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	340	84	91.12	4340109	340.00	450191	153064804
NA15	NASSCO	Inside	no	1324.09	1324.09			340	340					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	590	84	584.23	22349407	590.00	22312768	13164532825
NA16	NASSCO	Inside	no	37818.25	37818.25			590	590					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	550	84	109.31	3986868	550.00	1089699	599334175
NA17	NASSCO	Inside	no	1981.27	1981.27			550	550					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	350	84	292.75	11842272	350.00	11110890	3888811500
NA18	NASSCO	Inside	yes	2671.13	0			350	84					
NA18	NASSCO	Inside	no	31745.4	31745.4			350	350					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	990	84	214.05	6858884	990.00	4553614	4508077761
NA19	NASSCO	Inside	yes	27442.34	0			990	84					
NA19	NASSCO	Inside	no	1152.78	1152.78			990	990					
NA19	NASSCO	Inside	no	3446.83	3446.83			990	990					

Table A34-2 Data for Table A34-1, Continued

								PCBs (sum of congeners, µg/kg dry)				Background=	84	
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	120	120	120.00	37375824	120.00	37375824	4485098880
NA20	NASSCO	Inside	no	23295.98	23295.98			120	120					
NA20	NASSCO	Inside	no	85022.7	85022.7			120	120					
NA20	NASSCO	Inside	no	176351.5	176351.5			120	120					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	177	177	177.00	84273589	177.00	84273589	14916425198
NA21	NASSCO	Inside	no	9198.08	9198.08			177	177					
NA21	NASSCO	Inside	no	30752.99	30752.99			177	177					
NA21	NASSCO	Outside	no	347483.2	347483.15			177	177					
NA21	NASSCO	Inside	no	79424.32	79424.32			177	177					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	180	180	180.00	9840602	180.00	9840602	1771308324
NA22	NASSCO	Inside	no	13565.26	13565.26			180	180					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	510	84	483.50	32878079	510.00	32522817	16586636823
NA23	NASSCO	Inside	no	6267.98	6267.98			510	510					
NA23	NASSCO	Inside	no	451.2	451.2			510	510					
NA23	NASSCO	Inside	no	3175.16	3175.16			510	510					
NA23	NASSCO	Inside	no	53875.89	53875.89			510	510					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	290	290	290.00	18941153	290.00	18941153	5492934312
NA24	NASSCO	Inside	no	57539.8	57539.8			290	290					
NA24	NASSCO	Inside	no	849.45	849.45			290	290					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	83	83	83.00	43298100	83.00	43298100	3593742332
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	180	180	180.00	54457846	180.00	54457846	9802412316
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	210	84	209.59	11294657	210.00	11279927	2368784754
NA27	NASSCO	Inside	no	53713.94	53713.94			210	210					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	180	180	180.00	9767153	180.00	9767153	1758087504
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	190	190	190.00	38563130	190.00	38563130	7326994624
NA29	NASSCO	Inside	no	29422.14	29422.14			190	190					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	100	100	100.00	24083772	100.00	24083772	2408377200
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	68	68	68.00	15584608	68.00	15584608	1059753336
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	1600	84	84.00	2805072			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	5450	84	84.03	3290880	5450.00	1308	7128600
SW02	BAE	Outside	no	0.24	0.24			5450	5450					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	410	84	408.68	19948133	410.00	19931556	8171937755
SW03	BAE	Outside	no	48613.55	48613.55			410	410					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	4000	84	1247.41	28293346	4000.00	26954120	107816480000
SW04	BAE	Outside	yes	13563.04	0			4000	84					
SW04	BAE	Inside	no	6738.53	6738.53			4000	4000					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	1200	84	434.04	10487535	1200.00	9094500	10913400000
SW05	BAE	Inside	yes	15429.24	0			1200	84					
SW05	BAE	Inside	no	7578.75	7578.75			1200	1200					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	380	84	340.40	8765593	380.00	8476215	3220961852
SW06	BAE	Outside	yes	1749.56	0			380	84					
SW06	BAE	Inside	yes	656.18	0			380	84					
SW06	BAE	Inside	no	5850.65	5850.65			380	380					
SW06	BAE	Inside	no	199.48	199.48			380	380					
SW06	BAE	Inside	no	970.52	970.52			380	380					
SW06	BAE	Outside	no	9831.6	9831.6			380	380					
SW06	BAE	Inside	no	5453.58	5453.58			380	380					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	170	170	170.00	6961072	170.00	6961072	1183382172
SW07	BAE	Outside	no	30303.13	30303.13			170	170					
SW07	BAE	Inside	no	5715.07	5715.07			170	170					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	PCBs (sum of congeners, µg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	84 Area * No-Dredge Conc.[2]
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	2100	84	626.18	10537675	2100.00	9504243	19958910300
SW08	BAE	Inside	yes	9611.17	0			2100	84					
SW08	BAE	Inside	no	647.64	647.64			2100	2100					
SW08	BAE	Inside	no	1805.85	1805.85			2100	2100					
SW08	BAE	Inside	no	2062.65	2062.65			2100	2100					
SW08	BAE	Inside	no	9.69	9.69			2100	2100					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	710	84	171.84	4206424	710.00	2438744	1731507885
SW09	BAE	Inside	no	637.14	637.14			710	710					
SW09	BAE	Inside	no	2797.71	2797.71			710	710					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	610	84	131.36	2838492	610.00	1186834	723968923
SW10	BAE	Inside	no	315.77	315.77			610	610					
SW10	BAE	Inside	no	1505.36	1505.36			610	610					
SW10	BAE	Inside	no	124.5	124.5			610	610					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	200	200	200.00	7337868	200.00	7337868	1467573600
SW11	BAE	Inside	no	34912.38	34912.38			200	200					
SW11	BAE	Inside	no	0.18	0.18			200	200					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	155	155	155.00	17505981	155.00	17505981	2713426985
SW12	BAE	Inside	no	4859.52	4859.52			155	155					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	490	84	260.25	9956302	490.00	8137798	3987520775
SW13	BAE	Inside	no	3900.8	3900.8			490	490					
SW13	BAE	Inside	no	248.4	248.4			490	490					
SW13	BAE	Inside	no	12458.55	12458.55			490	490					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	400	84	84.00	1405482			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	380	84	343.42	19150969	380.00	18572033	7057372388
SW15	BAE	Inside	yes	95.2	0			380	84					
SW15	BAE	Inside	no	48873.77	48873.77			380	380					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	430	84	91.29	1628074	430.00	161508	69448440
SW16	BAE	Inside	no	375.6	375.6			430	430					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	540	84	148.21	8284743	540.00	4250470	2295253584
SW17	BAE	Inside	no	3770.56	3770.56			540	540					
SW17	BAE	Inside	no	171.53	171.53			540	540					
SW17	BAE	Inside	no	2824.69	2824.69			540	540					
SW17	BAE	Inside	no	1104.46	1104.46			540	540					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	440	440	440.00	23144651	440.00	23144651	10183646528
SW18	BAE	Outside	no	772.41	772.41			440	440					
SW18	BAE	Inside	no	37171.63	37171.63			440	440					
SW18	BAE	Inside	no	3616.16	3616.16			440	440					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	94	94	94.00	20186176	94.00	20186176	1897500516
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	1600	84	1103.68	31096131	1600.00	30321312	48514099200
SW20	BAE	Inside	yes	1332.79	0			1600	84					
SW20	BAE	Inside	no	9197.16	9197.16			1600	1600					
SW20	BAE	Inside	no	9753.66	9753.66			1600	1600					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	2400	84	84.00	999291			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	900	84	84.00	315990			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	1000	84	329.02	9895938	1000.00	8045250	8045250000
SW23	BAE	Inside	yes	21998.96	0			1000	84					
SW23	BAE	Inside	no	7839.28	7839.28			1000	1000					
SW23	BAE	Inside	no	205.97	205.97			1000	1000					
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	950	84	279.45	5918569	950.00	4541038	4313986100
SW24	BAE	Inside	yes	470.91	0			950	84					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	PCBs (sum of congeners, µg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	84 Area * No-Dredge Conc.[2]
SW24	BAE	Inside	no	4780.04	4780.04			950	950					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	350	84	322.35	22464803	350.00	21856394	7649737900
SW25	BAE	Inside	yes	1753.5	0			350	84					
SW25	BAE	Inside	no	1305.2	1305.2			350	350					
SW25	BAE	Inside	no	8132.91	8132.91			350	350					
SW25	BAE	Inside	no	653.01	653.01			350	350					
SW25	BAE	Inside	no	11150.23	11150.23			350	350					
SW25	BAE	Inside	no	1910.2	1910.2			350	350					
SW25	BAE	Inside	no	39295.29	39295.29			350	350					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	293	293	293.00	25468559	293.00	25468559	7462287825
SW26	BAE	Outside	no	84700.62	84700.62			293	293					
SW26	BAE	Inside	no	2076.52	2076.52			293	293					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	200	84	95.57	7539251	200.00	1573468	314693600
SW27	BAE	Inside	no	75.92	75.92			200	200					
SW27	BAE	Outside	no	2798.25	2798.25			200	200					
SW27	BAE	Inside	no	4993.17	4993.17			200	200					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	2100	84	492.19	25374103	2100.00	21920388	46032814800
SW28	BAE	Inside	yes	24000.29	0			2100	84					
SW28	NASSCO	Inside	no	2949.78	2949.78			2100	2100					
SW28	BAE	Inside	no	2680.96	2680.96			2100	2100					
SW28	NASSCO	Inside	no	213.63	213.63			2100	2100					
SW28	NASSCO	Inside	no	308.76	308.76			2100	2100					
SW28	NASSCO	Inside	no	1214.31	1214.31			2100	2100					
SW28	NASSCO	Inside	no	3070.84	3070.84			2100	2100					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	820	84	600.37	37521566	820.00	35955016	29483112792
SW29	BAE	Outside	no	43847.58	43847.58			820	820					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	380	380	380.00	27447765	380.00	27447765	10430150624
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	66	84	67.09	5601768	66.00	5177668	341726066
SW31	BAE	Inside	no	3388.46	3388.46			66	66					
SW31	BAE	Outside	no	61423.95	61423.95			66	66					
SW31	BAE	Inside	no	7943.74	7943.74			66	66					
SW31	BAE	Inside	no	5693.36	5693.36			66	66					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	160	160	160.00	12556291	160.00	12556291	2009006592
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	100	100	100.00	15187214	100.00	15187214	1518721400
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	130	130	130.00	39594363	130.00	39594363	5147267138
SW34	NASSCO	Outside	no	132756	132756.04			130	130					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	200	200	200.00	18145922	200.00	18145922	3629184400
SW36	BAE	Inside	no	17866.18	17866.18			200	200					
NA20	NASSCO	Inside	no	13723.08	13723.08			120						
NA21	NASSCO	Inside	no	28457.11	28457.11			177						
NA22	NASSCO	Inside	no	181098.6	181098.6			180						

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.²
								Mercury (total, mg/kg dry)				Background=		0.57
NA01	NASSCO	Inside	yes	5121.17	0	99788.14	92337.68	1.0625	0.57	1.03	102356	1.06	98109	104241
NA01	BAE	Inside	yes	2329.29	0			1.0625	0.57					
NA01	NASSCO	Inside	no	416.53	416.53			1.0625	1.0625					
NA01	NASSCO	Inside	no	269.86	269.86			1.0625	1.0625					
NA01	BAE	Outside	no	3413.04	3413.04			1.0625	1.0625					
NA01	NASSCO	Outside	no	11893.16	11893.16			1.0625	1.0625					
NA01	NASSCO	Inside	no	75065.19	75065.19			1.0625	1.0625					
NA01	BAE	Inside	no	1279.9	1279.9			1.0625	1.0625					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	0.7	0.7	0.70	114811	0.70	114811	80367
NA02	NASSCO	Inside	no	20907.56	20907.56			0.7	0.7					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	1.1	1.1	1.10	130223	1.10	130223	143245
NA03	NASSCO	Inside	no	117647.4	117647.37			1.1	1.1					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	1.1	1.1	1.10	79936	1.10	79936	87930
NA04	NASSCO	Inside	no	13.87	13.87			1.1	1.1					
NA04	NASSCO	Inside	no	68573.77	68573.77			1.1	1.1					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	0.61	0.61	0.61	68823	0.61	68823	41982
NA05	NASSCO	Inside	no	107319.3	107319.33			0.61	0.61					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	2.35	0.57	1.15	70432	2.35	47056	110581
NA06	NASSCO	Inside	no	491.33	491.33			2.35	2.35					
NA06	NASSCO	Inside	no	10353.97	10353.97			2.35	2.35					
NA06	NASSCO	Inside	no	469.55	469.55			2.35	2.35					
NA06	NASSCO	Inside	no	651.17	651.17			2.35	2.35					
NA06	NASSCO	Inside	no	548.07	548.07			2.35	2.35					
NA06	NASSCO	Inside	no	1248.95	1248.95			2.35	2.35					
NA06	NASSCO	Inside	no	623.55	623.55			2.35	2.35					
NA06	NASSCO	Inside	no	5637.13	5637.13			2.35	2.35					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	1.45	1.45	1.45	43931	1.45	43931	63701
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	0.82	0.82	0.82	16689	0.82	16689	13685
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	1.2	0.57	0.62	18201	1.20	2618	3142
NA09	NASSCO	Inside	no	1070.7	1070.7			1.2	1.2					
NA09	NASSCO	Inside	no	1110.99	1110.99			1.2	1.2					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	0.58	0.58	0.58	16899	0.58	16899	9801
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	0.85	0.85	0.85	32141	0.85	32141	27320
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	0.62	0.57	0.62	56233	0.62	53426	33124
NA12	NASSCO	Inside	no	86170.31	86170.31			0.62	0.62					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	0.645	0.645	0.65	164944	0.65	164944	106389
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	0.55	0.55	0.55	114778	0.55	114778	63128
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	0.98	0.57	0.58	27693	0.98	1298	1272
NA15	NASSCO	Inside	no	1324.09	1324.09			0.98	0.98					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	1.0925	0.57	1.09	41565	1.09	41316	45138
NA16	NASSCO	Inside	no	37818.25	37818.25			1.0925	1.0925					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	0.845	0.57	0.58	21334	0.85	1674	1415
NA17	NASSCO	Inside	no	1981.27	1981.27			0.845	0.845					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	0.79	0.57	0.74	30042	0.79	25079	19812
NA18	NASSCO	Inside	yes	2671.13	0			0.79	0.57					
NA18	NASSCO	Inside	no	31745.4	31745.4			0.79	0.79					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	0.78	0.57	0.60	19231	0.78	3588	2798
NA19	NASSCO	Inside	yes	27442.34	0			0.78	0.57					

Table A34-2 Data for Table A34-1, Continued

								Mercury (total, mg/kg dry)					Background=	0.57
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA19	NASSCO	Inside	no	1152.78	1152.78			0.78	0.78					
NA19	NASSCO	Inside	no	3446.83	3446.83			0.78	0.78					
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	0.24	0.24	0.24	74752	0.24	74752	17940
NA20	NASSCO	Inside	no	23295.98	23295.98			0.24	0.24					
NA20	NASSCO	Inside	no	85022.7	85022.7			0.24	0.24					
NA20	NASSCO	Inside	no	176351.5	176351.5			0.24	0.24					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	0.51	0.51	0.51	242822	0.51	242822	123839
NA21	NASSCO	Inside	no	9198.08	9198.08			0.51	0.51					
NA21	NASSCO	Inside	no	30752.99	30752.99			0.51	0.51					
NA21	NASSCO	Outside	no	347483.2	347483.15			0.51	0.51					
NA21	NASSCO	Inside	no	79424.32	79424.32			0.51	0.51					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	0.38	0.38	0.38	20775	0.38	20775	7894
NA22	NASSCO	Inside	no	13565.26	13565.26			0.38	0.38					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	1.1	0.57	1.07	72558	1.10	70147	77162
NA23	NASSCO	Inside	no	6267.98	6267.98			1.1	1.1					
NA23	NASSCO	Inside	no	451.2	451.2			1.1	1.1					
NA23	NASSCO	Inside	no	3175.16	3175.16			1.1	1.1					
NA23	NASSCO	Inside	no	53875.89	53875.89			1.1	1.1					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	0.9	0.9	0.90	58783	0.90	58783	52905
NA24	NASSCO	Inside	no	57539.8	57539.8			0.9	0.9					
NA24	NASSCO	Inside	no	849.45	849.45			0.9	0.9					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	0.42	0.42	0.42	219099	0.42	219099	92022
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	0.48	0.48	0.48	145221	0.48	145221	69706
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	1.2	0.57	1.20	64557	1.20	64457	77348
NA27	NASSCO	Inside	no	53713.94	53713.94			1.2	1.2					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	0.89	0.89	0.89	48293	0.89	48293	42981
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	0.55	0.55	0.55	111630	0.55	111630	61397
NA29	NASSCO	Inside	no	29422.14	29422.14			0.55	0.55					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	0.71	0.71	0.71	170995	0.71	170995	121406
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	0.35	0.35	0.35	80215	0.35	80215	28075
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	1.45	0.57	0.57	19034			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	4.45	0.57	0.57	22323	4.45	1	5
SW02	BAE	Outside	no	0.24	0.24			4.45	4.45					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	1.2	0.57	1.20	58449	1.20	58336	70004
SW03	BAE	Outside	no	48613.55	48613.55			1.2	1.2					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	1.75	0.57	0.92	20880	1.75	11792	20637
SW04	BAE	Outside	yes	13563.04	0			1.75	0.57					
SW04	BAE	Inside	no	6738.53	6738.53			1.75	1.75					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	0.96	0.57	0.69	16728	0.96	7276	6985
SW05	BAE	Inside	yes	15429.24	0			0.96	0.57					
SW05	BAE	Inside	no	7578.75	7578.75			0.96	0.96					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	0.75	0.57	0.73	18693	0.75	16729	12547
SW06	BAE	Outside	yes	1749.56	0			0.75	0.57					
SW06	BAE	Inside	yes	656.18	0			0.75	0.57					
SW06	BAE	Inside	no	5850.65	5850.65			0.75	0.75					
SW06	BAE	Inside	no	199.48	199.48			0.75	0.75					
SW06	BAE	Inside	no	970.52	970.52			0.75	0.75					
SW06	BAE	Outside	no	9831.6	9831.6			0.75	0.75					
SW06	BAE	Inside	no	5453.58	5453.58			0.75	0.75					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	0.52	0.52	0.52	21293	0.52	21293	11072

Table A34-2 Data for Table A34-1, Continued

								Mercury (total, mg/kg dry)					Background=	0.57
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
SW07	BAE	Outside	no	30303.13	30303.13			0.52	0.52					
SW07	BAE	Inside	no	5715.07	5715.07			0.52	0.52					
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	2.25	0.57	1.02	17196	2.25	10183	22912
SW08	BAE	Inside	yes	9611.17	0			2.25	0.57					
SW08	BAE	Inside	no	647.64	647.64			2.25	2.25					
SW08	BAE	Inside	no	1805.85	1805.85			2.25	2.25					
SW08	BAE	Inside	no	2062.65	2062.65			2.25	2.25					
SW08	BAE	Inside	no	9.69	9.69			2.25	2.25					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	0.96	0.57	0.62	15292	0.96	3297	3166
SW09	BAE	Inside	no	637.14	637.14			0.96	0.96					
SW09	BAE	Inside	no	2797.71	2797.71			0.96	0.96					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	0.58	0.57	0.57	12336	0.58	1128	655
SW10	BAE	Inside	no	315.77	315.77			0.58	0.58					
SW10	BAE	Inside	no	1505.36	1505.36			0.58	0.58					
SW10	BAE	Inside	no	124.5	124.5			0.58	0.58					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	0.75	0.75	0.75	27517	0.75	27517	20638
SW11	BAE	Inside	no	34912.38	34912.38			0.75	0.75					
SW11	BAE	Inside	no	0.18	0.18			0.75	0.75					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	0.525	0.525	0.53	59294	0.53	59294	31130
SW12	BAE	Inside	no	4859.52	4859.52			0.525	0.525					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	0.86	0.57	0.70	26623	0.86	14283	12283
SW13	BAE	Inside	no	3900.8	3900.8			0.86	0.86					
SW13	BAE	Inside	no	248.4	248.4			0.86	0.86					
SW13	BAE	Inside	no	12458.55	12458.55			0.86	0.86					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	1	0.57	0.57	9537			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	0.9	0.57	0.86	47915	0.90	43986	39588
SW15	BAE	Inside	yes	95.2	0			0.9	0.57					
SW15	BAE	Inside	no	48873.77	48873.77			0.9	0.9					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	1	0.57	0.58	10327	1.00	376	376
SW16	BAE	Inside	no	375.6	375.6			1	1					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	0.98	0.57	0.63	35089	0.98	7714	7560
SW17	BAE	Inside	no	3770.56	3770.56			0.98	0.98					
SW17	BAE	Inside	no	171.53	171.53			0.98	0.98					
SW17	BAE	Inside	no	2824.69	2824.69			0.98	0.98					
SW17	BAE	Inside	no	1104.46	1104.46			0.98	0.98					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	0.75	0.75	0.75	39451	0.75	39451	29588
SW18	BAE	Outside	no	772.41	772.41			0.75	0.75					
SW18	BAE	Inside	no	37171.63	37171.63			0.75	0.75					
SW18	BAE	Inside	no	3616.16	3616.16			0.75	0.75					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	2.1	2.1	2.10	450968	2.10	450968	947032
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	0.99	0.57	0.85	24019	0.99	18761	18574
SW20	BAE	Inside	yes	1332.79	0			0.99	0.57					
SW20	BAE	Inside	no	9197.16	9197.16			0.99	0.99					
SW20	BAE	Inside	no	9753.66	9753.66			0.99	0.99					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	1.4	0.57	0.57	6781			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	1.1	0.57	0.57	2144			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	1	0.57	0.69	20603	1.00	8045	8045
SW23	BAE	Inside	yes	21998.96	0			1	0.57					
SW23	BAE	Inside	no	7839.28	7839.28			1	1					
SW23	BAE	Inside	no	205.97	205.97			1	1					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Mercury (total, mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	0.57 Area * No-Dredge Conc.[2]
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	1.9	0.57	0.87	18430	1.90	9082	17256
SW24	BAE	Inside	yes	470.91	0			1.9	0.57					
SW24	BAE	Inside	no	4780.04	4780.04			1.9	1.9					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	0.775	0.57	0.75	52525	0.78	48396	37507
SW25	BAE	Inside	yes	1753.5	0			0.775	0.57					
SW25	BAE	Inside	no	1305.2	1305.2			0.775	0.775					
SW25	BAE	Inside	no	8132.91	8132.91			0.775	0.775					
SW25	BAE	Inside	no	653.01	653.01			0.775	0.775					
SW25	BAE	Inside	no	11150.23	11150.23			0.775	0.775					
SW25	BAE	Inside	no	1910.2	1910.2			0.775	0.775					
SW25	BAE	Inside	no	39295.29	39295.29			0.775	0.775					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	0.43	0.43	0.43	37377	0.43	37377	16072
SW26	BAE	Outside	no	84700.62	84700.62			0.43	0.43					
SW26	BAE	Inside	no	2076.52	2076.52			0.43	0.43					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	0.68	0.57	0.58	45832	0.68	5350	3638
SW27	BAE	Inside	no	75.92	75.92			0.68	0.68					
SW27	BAE	Outside	no	2798.25	2798.25			0.68	0.68					
SW27	BAE	Inside	no	4993.17	4993.17			0.68	0.68					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	0.875	0.57	0.63	32569	0.88	9133	7992
SW28	BAE	Inside	yes	24000.29	0			0.875	0.57					
SW28	NASSCO	Inside	no	2949.78	2949.78			0.875	0.875					
SW28	BAE	Inside	no	2680.96	2680.96			0.875	0.875					
SW28	NASSCO	Inside	no	213.63	213.63			0.875	0.875					
SW28	NASSCO	Inside	no	308.76	308.76			0.875	0.875					
SW28	NASSCO	Inside	no	1214.31	1214.31			0.875	0.875					
SW28	NASSCO	Inside	no	3070.84	3070.84			0.875	0.875					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	0.93	0.57	0.82	51408	0.93	40778	37924
SW29	BAE	Outside	no	43847.58	43847.58			0.93	0.93					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	1.1	1.1	1.10	79454	1.10	79454	87399
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	0.23	0.57	0.25	20921	0.23	18043	4150
SW31	BAE	Inside	no	3388.46	3388.46			0.23	0.23					
SW31	BAE	Outside	no	61423.95	61423.95			0.23	0.23					
SW31	BAE	Inside	no	7943.74	7943.74			0.23	0.23					
SW31	BAE	Inside	no	5693.36	5693.36			0.23	0.23					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	0.51	0.51	0.51	40023	0.51	40023	20412
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	0.53	0.53	0.53	80492	0.53	80492	42661
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	0.75	0.75	0.75	228429	0.75	228429	171322
SW34	NASSCO	Outside	no	132756	132756.04			0.75	0.75					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	0.75	0.75	0.75	68047	0.75	68047	51035
SW36	BAE	Inside	no	17866.18	17866.18			0.75	0.75					
NA20	NASSCO	Inside	no	13723.08	13723.08			0.24						
NA21	NASSCO	Inside	no	28457.11	28457.11			0.51						
NA22	NASSCO	Inside	no	181098.6	181098.6			0.38						

Table A34-2 Data for Table A34-1, Continued

								Copper (mg/kg dry)					Background=	121
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.2
NA01	NASSCO	Inside	yes	5121.17	0	99788.14	92337.68	252.5	121	242.68	24216770	252.50	23315264	5887104211
NA01	BAE	Inside	yes	2329.29	0			252.5	121					
NA01	NASSCO	Inside	no	416.53	416.53			252.5	252.5					
NA01	NASSCO	Inside	no	269.86	269.86			252.5	252.5					
NA01	BAE	Outside	no	3413.04	3413.04			252.5	252.5					
NA01	NASSCO	Outside	no	11893.16	11893.16			252.5	252.5					
NA01	NASSCO	Inside	no	75065.19	75065.19			252.5	252.5					
NA01	BAE	Inside	no	1279.9	1279.9			252.5	252.5					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	170	170	170.00	27882596	170.00	27882596	4740041303
NA02	NASSCO	Inside	no	20907.56	20907.56			170	170					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	220	220	220.00	26044515	220.00	26044515	5729793344
NA03	NASSCO	Inside	no	117647.4	117647.37			220	220					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	260	260	260.00	18893982	260.00	18893982	4912435216
NA04	NASSCO	Inside	no	13.87	13.87			260	260					
NA04	NASSCO	Inside	no	68573.77	68573.77			260	260					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	170	170	170.00	19180116	170.00	19180116	3260619669
NA05	NASSCO	Inside	no	107319.3	107319.33			170	170					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	395	121	210.89	12871780	395.00	7909369	3124200913
NA06	NASSCO	Inside	no	491.33	491.33			395	395					
NA06	NASSCO	Inside	no	10353.97	10353.97			395	395					
NA06	NASSCO	Inside	no	469.55	469.55			395	395					
NA06	NASSCO	Inside	no	651.17	651.17			395	395					
NA06	NASSCO	Inside	no	548.07	548.07			395	395					
NA06	NASSCO	Inside	no	1248.95	1248.95			395	395					
NA06	NASSCO	Inside	no	623.55	623.55			395	395					
NA06	NASSCO	Inside	no	5637.13	5637.13			395	395					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	225	225	225.00	6816944	225.00	6816944	1533812456
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	270	270	270.00	5495056	270.00	5495056	1483665174
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	260	121	131.27	3875267	260.00	567239	147482244
NA09	NASSCO	Inside	no	1070.7	1070.7			260	260					
NA09	NASSCO	Inside	no	1110.99	1110.99			260	260					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	160	160	160.00	4661755	160.00	4661755	745880832
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	180	180	180.00	6806407	180.00	6806407	1225153188
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	150	121	148.43	13521504	150.00	12925547	1938831975
NA12	NASSCO	Inside	no	86170.31	86170.31			150	150					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	185	185	185.00	47309514	185.00	47309514	8752259998
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	130	130	130.00	27129365	130.00	27129365	3526817398
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	250	121	124.59	5934357	250.00	331023	82755625
NA15	NASSCO	Inside	no	1324.09	1324.09			250	250					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	252.5	121	251.00	9601886	252.50	9549108	2411149802
NA16	NASSCO	Inside	no	37818.25	37818.25			252.5	252.5					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	510	121	142.13	5183751	510.00	1010448	515328327
NA17	NASSCO	Inside	no	1981.27	1981.27			510	510					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	230	121	206.54	8354981	230.00	7301442	1679331660
NA18	NASSCO	Inside	yes	2671.13	0			230	121					
NA18	NASSCO	Inside	no	31745.4	31745.4			230	230					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	270	121	142.39	4562581	270.00	1241895	335311569
NA19	NASSCO	Inside	yes	27442.34	0			270	121					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Copper (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	121 Area * No-Dredge Conc.2
NA19	NASSCO	Inside	no	1152.78	1152.78			270	270					
NA19	NASSCO	Inside	no	3446.83	3446.83			270	270					
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	96	96	96.00	29900659	96.00	29900659	2870463283
NA20	NASSCO	Inside	no	23295.98	23295.98			96	96					
NA20	NASSCO	Inside	no	85022.7	85022.7			96	96					
NA20	NASSCO	Inside	no	176351.5	176351.5			96	96					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	150	150	150.00	71418296	150.00	71418296	10712744325
NA21	NASSCO	Inside	no	9198.08	9198.08			150	150					
NA21	NASSCO	Inside	no	30752.99	30752.99			150	150					
NA21	NASSCO	Outside	no	347483.2	347483.15			150	150					
NA21	NASSCO	Inside	no	79424.32	79424.32			150	150					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	150	150	150.00	8200502	150.00	8200502	1230075225
NA22	NASSCO	Inside	no	13565.26	13565.26			150	150					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	350	121	335.76	22831327	350.00	22319581	7811853175
NA23	NASSCO	Inside	no	6267.98	6267.98			350	350					
NA23	NASSCO	Inside	no	451.2	451.2			350	350					
NA23	NASSCO	Inside	no	3175.16	3175.16			350	350					
NA23	NASSCO	Inside	no	53875.89	53875.89			350	350					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	200	200	200.00	13062864	200.00	13062864	2612572800
NA24	NASSCO	Inside	no	57539.8	57539.8			200	200					
NA24	NASSCO	Inside	no	849.45	849.45			200	200					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	85	85	85.00	44341428	85.00	44341428	3769021389
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	80	80	80.00	24203487	80.00	24203487	1936278976
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	390	121	389.12	20969654	390.00	20948437	8169890274
NA27	NASSCO	Inside	no	53713.94	53713.94			390	390					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	290	290	290.00	15735968	290.00	15735968	4563430836
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	110	110	110.00	22326022	110.00	22326022	2455862464
NA29	NASSCO	Inside	no	29422.14	29422.14			110	110					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	140	140	140.00	33717281	140.00	33717281	4720419312
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	71	71	71.00	16272164	71.00	16272164	1155323652
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	560	121	121.00	4040639			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	580	121	121.00	4738689	580.00	139	80736
SW02	BAE	Outside	no	0.24	0.24			580	580					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	190	121	189.72	9260454	190.00	9236575	1754949155
SW03	BAE	Outside	no	48613.55	48613.55			190	190					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	1500	121	530.69	12036919	1500.00	10107795	15161692500
SW04	BAE	Outside	yes	13563.04	0			1500	121					
SW04	BAE	Inside	no	6738.53	6738.53			1500	1500					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	230	121	155.19	3749746	230.00	1743113	400915875
SW05	BAE	Inside	yes	15429.24	0			230	121					
SW05	BAE	Inside	no	7578.75	7578.75			230	230					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	170	121	163.44	4208832	170.00	3791991	644638487
SW06	BAE	Outside	yes	1749.56	0			170	121					
SW06	BAE	Inside	yes	656.18	0			170	121					
SW06	BAE	Inside	no	5850.65	5850.65			170	170					
SW06	BAE	Inside	no	199.48	199.48			170	170					
SW06	BAE	Inside	no	970.52	970.52			170	170					
SW06	BAE	Outside	no	9831.6	9831.6			170	170					
SW06	BAE	Inside	no	5453.58	5453.58			170	170					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	150	150	150.00	6142122	150.00	6142122	921318300

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Copper (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	121 Area * No-Dredge Conc.2
SW07	BAE	Outside	no	30303.13	30303.13			150	150					
SW07	BAE	Inside	no	5715.07	5715.07			150	150					
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	920	121	335.88	5652398	920.00	4163764	3830662512
SW08	BAE	Inside	yes	9611.17	0			920	121					
SW08	BAE	Inside	no	647.64	647.64			920	920					
SW08	BAE	Inside	no	1805.85	1805.85			920	920					
SW08	BAE	Inside	no	2062.65	2062.65			920	920					
SW08	BAE	Inside	no	9.69	9.69			920	920					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	660	121	196.63	4813303	660.00	2267001	1496220660
SW09	BAE	Inside	no	637.14	637.14			660	660					
SW09	BAE	Inside	no	2797.71	2797.71			660	660					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	160	121	124.51	2690474	160.00	311301	49808128
SW10	BAE	Inside	no	315.77	315.77			160	160					
SW10	BAE	Inside	no	1505.36	1505.36			160	160					
SW10	BAE	Inside	no	124.5	124.5			160	160					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	170	170	170.00	6237188	170.00	6237188	1060321926
SW11	BAE	Inside	no	34912.38	34912.38			170	170					
SW11	BAE	Inside	no	0.18	0.18			170	170					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	119.5	119.5	119.50	13496546	119.50	13496546	1612837282
SW12	BAE	Inside	no	4859.52	4859.52			119.5	119.5					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	800	121	415.76	15905712	800.00	13286200	10628960000
SW13	BAE	Inside	no	3900.8	3900.8			800	800					
SW13	BAE	Inside	no	248.4	248.4			800	800					
SW13	BAE	Inside	no	12458.55	12458.55			800	800					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	280	121	121.00	2024564			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	230	121	216.53	12074911	230.00	11240967	2585422433
SW15	BAE	Inside	yes	95.2	0			230	121					
SW15	BAE	Inside	no	48873.77	48873.77			230	230					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	430	121	127.51	2274062	430.00	161508	69448440
SW16	BAE	Inside	no	375.6	375.6			430	430					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	270	121	141.98	7936510	270.00	2125235	573813396
SW17	BAE	Inside	no	3770.56	3770.56			270	270					
SW17	BAE	Inside	no	171.53	171.53			270	270					
SW17	BAE	Inside	no	2824.69	2824.69			270	270					
SW17	BAE	Inside	no	1104.46	1104.46			270	270					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	220	220	220.00	11572326	220.00	11572326	2545911632
SW18	BAE	Outside	no	772.41	772.41			220	220					
SW18	BAE	Inside	no	37171.63	37171.63			220	220					
SW18	BAE	Inside	no	3616.16	3616.16			220	220					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	110	110	110.00	23622121	110.00	23622121	2598433255
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	290	121	234.67	6611847	290.00	5495738	1593763962
SW20	BAE	Inside	yes	1332.79	0			290	121					
SW20	BAE	Inside	no	9197.16	9197.16			290	290					
SW20	BAE	Inside	no	9753.66	9753.66			290	290					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	260	121	121.00	1439455			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	260	121	121.00	455175			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	280	121	163.53	4918542	280.00	2252670	630747600
SW23	BAE	Inside	yes	21998.96	0			280	121					
SW23	BAE	Inside	no	7839.28	7839.28			280	280					
SW23	BAE	Inside	no	205.97	205.97			280	280					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Copper (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	121 Area * No-Dredge Conc.2
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	300	121	161.40	3418313	300.00	1434012	430203600
SW24	BAE	Inside	yes	470.91	0			300	121					
SW24	BAE	Inside	no	4780.04	4780.04			300	300					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	230	121	218.67	15239173	230.00	14362773	3303437836
SW25	BAE	Inside	yes	1753.5	0			230	121					
SW25	BAE	Inside	no	1305.2	1305.2			230	230					
SW25	BAE	Inside	no	8132.91	8132.91			230	230					
SW25	BAE	Inside	no	653.01	653.01			230	230					
SW25	BAE	Inside	no	11150.23	11150.23			230	230					
SW25	BAE	Inside	no	1910.2	1910.2			230	230					
SW25	BAE	Inside	no	39295.29	39295.29			230	230					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	120	120	120.00	10430809	120.00	10430809	1251697104
SW26	BAE	Outside	no	84700.62	84700.62			120	120					
SW26	BAE	Inside	no	2076.52	2076.52			120	120					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	210	121	129.88	10245710	210.00	1652141	346949694
SW27	BAE	Inside	no	75.92	75.92			210	210					
SW27	BAE	Outside	no	2798.25	2798.25			210	210					
SW27	BAE	Inside	no	4993.17	4993.17			210	210					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	265	121	150.16	7741138	265.00	2766144	733028213
SW28	BAE	Inside	yes	24000.29	0			265	121					
SW28	NASSCO	Inside	no	2949.78	2949.78			265	265					
SW28	BAE	Inside	no	2680.96	2680.96			265	265					
SW28	NASSCO	Inside	no	213.63	213.63			265	265					
SW28	NASSCO	Inside	no	308.76	308.76			265	265					
SW28	NASSCO	Inside	no	1214.31	1214.31			265	265					
SW28	NASSCO	Inside	no	3070.84	3070.84			265	265					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	220	121	190.46	11903046	220.00	9646468	2122222872
SW29	BAE	Outside	no	43847.58	43847.58			220	220					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	240	240	240.00	17335430	240.00	17335430	4160503296
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	54	121	58.05	4847180	54.00	4236274	228758771
SW31	BAE	Inside	no	3388.46	3388.46			54	54					
SW31	BAE	Outside	no	61423.95	61423.95			54	54					
SW31	BAE	Inside	no	7943.74	7943.74			54	54					
SW31	BAE	Inside	no	5693.36	5693.36			54	54					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	92	92	92.00	7219867	92.00	7219867	664227804
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	100	100	100.00	15187214	100.00	15187214	1518721400
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	320	320	320.00	97463046	320.00	97463046	31188174848
SW34	NASSCO	Outside	no	132756	132756.04			320	320					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	240	240	240.00	21775106	240.00	21775106	5226025536
SW36	BAE	Inside	no	17866.18	17866.18			240	240					
NA20	NASSCO	Inside	no	13723.08	13723.08			96						
NA21	NASSCO	Inside	no	28457.11	28457.11			150						
NA22	NASSCO	Inside	no	181098.6	181098.6			150						

Table A34-2 Data for Table A34-1, Continued

								Tributyltin (µg/kg dry)					Background=	22
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA01	NASSCO	Inside	yes	5[illegible]21.17	0	99788.14	92337.68	157	22	146.92	14660926	157.00	14497016	2276031474
NA01	BAE	Inside	yes	2329.29	0			157	22					
NA01	NASSCO	Inside	no	416.53	416.53			157	157					
NA01	NASSCO	Inside	no	269.86	269.86			157	157					
NA01	BAE	Outside	no	3413.04	3413.04			157	157					
NA01	NASSCO	Outside	no	11893.16	11893.16			157	157					
NA01	NASSCO	Inside	no	75065.19	75065.19			157	157					
NA01	BAE	Inside	no	1279.9	1279.9			157	157					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	82	82	82.00	13449252	82.00	13449252	1102838675
NA02	NASSCO	Inside	no	20907.56	20907.56			82	82					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	180	180	180.00	21309149	180.00	21309149	3835646784
NA03	NASSCO	Inside	no	117647.4	117647.37			180	180					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	300	300	300.00	21800748	300.00	21800748	6540224400
NA04	NASSCO	Inside	no	13.87	13.87			300	300					
NA04	NASSCO	Inside	no	68573.77	68573.77			300	300					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	110	110	110.00	12410663	110.00	12410663	1365172941
NA05	NASSCO	Inside	no	107319.3	107319.33			110	110					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	225	22	88.60	5407594	225.00	4505337	1013700825
NA06	NASSCO	Inside	no	491.33	491.33			225	225					
NA06	NASSCO	Inside	no	10353.97	10353.97			225	225					
NA06	NASSCO	Inside	no	469.55	469.55			225	225					
NA06	NASSCO	Inside	no	651.17	651.17			225	225					
NA06	NASSCO	Inside	no	548.07	548.07			225	225					
NA06	NASSCO	Inside	no	1248.95	1248.95			225	225					
NA06	NASSCO	Inside	no	623.55	623.55			225	225					
NA06	NASSCO	Inside	no	5637.13	5637.13			225	225					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	110.5	110.5	110.50	3347877	110.50	3347877	369940416
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	110	110	110.00	2238727	110.00	2238727	246259926
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	120	22	29.24	863262	120.00	261803	31416336
NA09	NASSCO	Inside	no	[illegible]070.7	1070.7			120	120					
NA09	NASSCO	Inside	no	1110.99	1110.99			120	120					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	91	91	91.00	2651373	91.00	2651373	241274968
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	38	38	38.00	1436908	38.00	1436908	54602506
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	80	22	76.86	7001981	80.00	6893625	551489984
NA12	NASSCO	Inside	no	86170.31	86170.31			80	80					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	68	68	68.00	17389443	68.00	17389443	1182482110
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	45	45	45.00	9390934	45.00	9390934	422592026
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	670	22	40.01	1905928	670.00	887140	594384001
NA15	NASSCO	Inside	no	1324.09	1324.09			670	670					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	175	22	173.26	6627790	175.00	6618194	1158183906
NA16	NASSCO	Inside	no	37818.25	37818.25			175	175					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	1350	22	94.14	3433497	1350.00	2674715	3610864575
NA17	NASSCO	Inside	no	1981.27	1981.27			1350	1350					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	210	22	169.54	6858086	210.00	6666534	1399972140
NA18	NASSCO	Inside	yes	2671.13	0			210	22					
NA18	NASSCO	Inside	no	31745.4	31745.4			210	210					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	570	22	100.66	3225539	570.00	2621778	1494413289
NA19	NASSCO	Inside	yes	27442.34	0			570	22					

Table A34-2 Data for Table A34-1, Continued

								Tributyltin (µg/kg dry)				Background=		22
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA19	NASSCO	Inside	no	1152.78	1152.78			570	570					
NA19	NASSCO	Inside	no	3446.83	3446.83			570	570					
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	280	280	280.00	87210256	280.00	87210256	24418871680
NA20	NASSCO	Inside	no	23295.98	23295.98			280	280					
NA20	NASSCO	Inside	no	85022.7	85022.7			280	280					
NA20	NASSCO	Inside	no	176351.5	176351.5			280	280					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	410	410	410.00	195210008	410.00	195210008	80036103157
NA21	NASSCO	Inside	no	9198.08	9198.08			410	410					
NA21	NASSCO	Inside	no	30752.99	30752.99			410	410					
NA21	NASSCO	Outside	no	347483.2	347483.15			410	410					
NA21	NASSCO	Inside	no	79424.32	79424.32			410	410					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	120	120	120.00	6560401	120.00	6560401	787248144
NA22	NASSCO	Inside	no	13565.26	13565.26			120	120					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	120	22	113.90	7745472	120.00	7652428	918291312
NA23	NASSCO	Inside	no	6267.98	6267.98			120	120					
NA23	NASSCO	Inside	no	451.2	451.2			120	120					
NA23	NASSCO	Inside	no	3175.16	3175.16			120	120					
NA23	NASSCO	Inside	no	53875.89	53875.89			120	120					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	59	59	59.00	3853545	59.00	3853545	227359148
NA24	NASSCO	Inside	no	57539.8	57539.8			59	59					
NA24	NASSCO	Inside	no	849.45	849.45			59	59					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	25	25	25.00	13041597	25.00	13041597	326039913
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	37	37	37.00	11194113	37.00	11194113	414182175
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	100	22	99.75	5375252	100.00	5371394	537139400
NA27	NASSCO	Inside	no	53713.94	53713.94			100	100					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	90	90	90.00	4883576	90.00	4883576	439521876
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	58	58	58.00	11771903	58.00	11771903	682770358
NA29	NASSCO	Inside	no	29422.14	29422.14			58	58					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	22	22	22.00	5298430	22.00	5298430	116565456
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	20	20	20.00	4583708	20.00	4583708	91674164
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	450	22	22.00	734662			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	167	22	22.00	861595	167.00	40	6693
SW02	BAE	Outside	no	0.24	0.24			167	167					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	53	22	52.87	2580860	53.00	2576518	136555462
SW03	BAE	Outside	no	48613.55	48613.55			53	53					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	3250	22	981.01	22250972	3250.00	21900223	71175723125
SW04	BAE	Outside	yes	13563.04	0			3250	22					
SW04	BAE	Inside	no	6738.53	6738.53			3250	3250					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	170	22	68.42	1653230	170.00	1288388	219025875
SW05	BAE	Inside	yes	15429.24	0			170	22					
SW05	BAE	Inside	no	7578.75	7578.75			170	170					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	100	22	89.57	2306372	100.00	2230583	223058300
SW06	BAE	Outside	yes	1749.56	0			100	22					
SW06	BAE	Inside	yes	656.18	0			100	22					
SW06	BAE	Inside	no	5850.65	5850.65			100	100					
SW06	BAE	Inside	no	199.48	199.48			100	100					
SW06	BAE	Inside	no	970.52	970.52			100	100					
SW06	BAE	Outside	no	9831.6	9831.6			100	100					
SW06	BAE	Inside	no	5453.58	5453.58			100	100					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	44	44	44.00	1801689	44.00	1801689	79274321

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Tributyltin (µg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	22 Area * No-Dredge Conc.[2]
SW07	BAE	Outside	no	30303.13	30303.13			44	44					
SW07	BAE	Inside	no	5715.07	5715.07			44	44					
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	1850	22	513.62	8643446	1850.00	8372786	15489653175
SW08	BAE	Inside	yes	9611.17	0			1850	22					
SW08	BAE	Inside	no	647.64	647.64			1850	1850					
SW08	BAE	Inside	no	1805.85	1805.85			1850	1850					
SW08	BAE	Inside	no	2062.65	2062.65			1850	1850					
SW08	BAE	Inside	no	9.69	9.69			1850	1850					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	910	22	146.60	3588678	910.00	3125714	2844399285
SW09	BAE	Inside	no	637.14	637.14			910	910					
SW09	BAE	Inside	no	2797.71	2797.71			910	910					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	250	22	42.53	918984	250.00	486408	121601875
SW10	BAE	Inside	no	315.77	315.77			250	250					
SW10	BAE	Inside	no	1505.36	1505.36			250	250					
SW10	BAE	Inside	no	124.5	124.5			250	250					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	140	140	140.00	5136508	140.00	5136508	719111064
SW11	BAE	Inside	no	34912.38	34912.38			140	140					
SW11	BAE	Inside	no	0.18	0.18			140	140					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	36	36	36.00	4065905	36.00	4065905	146372586
SW12	BAE	Inside	no	4859.52	4859.52			36	36					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	790	22	355.40	13596397	790.00	13120123	10364896775
SW13	BAE	Inside	no	3900.8	3900.8			790	790					
SW13	BAE	Inside	no	248.4	248.4			790	790					
SW13	BAE	Inside	no	12458.55	12458.55			790	790					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	450	22	22.00	368102			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	170	22	151.71	8460167	170.00	8308541	1412451953
SW15	BAE	Inside	yes	95.2	0			170	22					
SW15	BAE	Inside	no	48873.77	48873.77			170	170					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	1100	22	44.70	797261	1100.00	413160	454476000
SW16	BAE	Inside	no	375.6	375.6			1100	1100					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	440	22	80.86	4519941	440.00	3463346	1523872064
SW17	BAE	Inside	no	3770.56	3770.56			440	440					
SW17	BAE	Inside	no	171.53	171.53			440	440					
SW17	BAE	Inside	no	2824.69	2824.69			440	440					
SW17	BAE	Inside	no	1104.46	1104.46			440	440					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	130	130	130.00	6838192	130.00	6838192	888965012
SW18	BAE	Outside	no	772.41	772.41			130	130					
SW18	BAE	Inside	no	37171.63	37171.63			130	130					
SW18	BAE	Inside	no	3616.16	3616.16			130	130					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	37	37	37.00	7945622	37.00	7945622	293988027
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	130	22	94.64	2666535	130.00	2463607	320268858
SW20	BAE	Inside	yes	1332.79	0			130	22					
SW20	BAE	Inside	no	9197.16	9197.16			130	130					
SW20	BAE	Inside	no	9753.66	9753.66			130	130					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	170	22	22.00	261719			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	190	22	22.00	82759			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	210	22	72.29	2174207	210.00	1689503	354795525
SW23	BAE	Inside	yes	21998.96	0			210	22					
SW23	BAE	Inside	no	7839.28	7839.28			210	210					
SW23	BAE	Inside	no	205.97	205.97			210	210					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Tributyltin (µg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	22 Area * No-Dredge Conc.[2]
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	165	22	54.27	1149489	165.00	788707	130136589
SW24	BAE	Inside	yes	470.91	0			165	22					
SW24	BAE	Inside	no	4780.04	4780.04			165	165					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	230.5	22	208.83	14553342	230.50	14393997	3317816221
SW25	BAE	Inside	yes	1753.5	0			230.5	22					
SW25	BAE	Inside	no	1305.2	1305.2			230.5	230.5					
SW25	BAE	Inside	no	8132.91	8132.91			230.5	230.5					
SW25	BAE	Inside	no	653.01	653.01			230.5	230.5					
SW25	BAE	Inside	no	11150.23	11150.23			230.5	230.5					
SW25	BAE	Inside	no	1910.2	1910.2			230.5	230.5					
SW25	BAE	Inside	no	39295.29	39295.29			230.5	230.5					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	49	49	49.00	4259247	49.00	4259247	208703107
SW26	BAE	Outside	no	84700.62	84700.62			49	49					
SW26	BAE	Inside	no	2076.52	2076.52			49	49					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	250	22	44.74	3529302	250.00	1966835	491708750
SW27	BAE	Inside	no	75.92	75.92			250	250					
SW27	BAE	Outside	no	2798.25	2798.25			250	250					
SW27	BAE	Inside	no	4993.17	4993.17			250	250					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	150	22	47.92	2470286	150.00	1565742	234861300
SW28	BAE	Inside	yes	24000.29	0			150	22					
SW28	NASSCO	Inside	no	2949.78	2949.78			150	150					
SW28	BAE	Inside	no	2680.96	2680.96			150	150					
SW28	NASSCO	Inside	no	213.63	213.63			150	150					
SW28	NASSCO	Inside	no	308.76	308.76			150	150					
SW28	NASSCO	Inside	no	1214.31	1214.31			150	150					
SW28	NASSCO	Inside	no	3070.84	3070.84			150	150					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	190	22	139.87	8741327	190.00	8331040	1582897638
SW29	BAE	Outside	no	43847.58	43847.58			190	190					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	200	200	200.00	14446192	200.00	14446192	2889238400
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	36	22	35.15	2935256	36.00	2824182	101670565
SW31	BAE	Inside	no	3388.46	3388.46			36	36					
SW31	BAE	Outside	no	61423.95	61423.95			36	36					
SW31	BAE	Inside	no	7943.74	7943.74			36	36					
SW31	BAE	Inside	no	5693.36	5693.36			36	36					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	30	30	30.00	2354305	30.00	2354305	70629138
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	19	19	19.00	2885571	19.00	2885571	54825843
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	38	38	38.00	11573737	38.00	11573737	439801997
SW34	NASSCO	Outside	no	132756	132756.04			38	38					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	49	49	49.00	4445751	49.00	4445751	217841794
SW36	BAE	Inside	no	17866.18	17866.18			49	49					
NA20	NASSCO	Inside	no	13723.08	13723.08			280						
NA21	NASSCO	Inside	no	28457.11	28457.11			410						
NA22	NASSCO	Inside	no	181098.6	181098.6			120						

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	HPAH (µg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	663 Area * No-Dredge Conc.[2]
NA01	NASSCO	Inside	yes	5121.17	0	99788.14	92337.68	6575	663	6133.59	612059901	6575.00	607120246	3991815617450
NA01	BAE	Inside	yes	2329.29	0			6575	663					
NA01	NASSCO	Inside	no	416.53	416.53			6575	6575					
NA01	NASSCO	Inside	no	269.86	269.86			6575	6575					
NA01	BAE	Outside	no	3413.04	3413.04			6575	6575					
NA01	NASSCO	Outside	no	11893.16	11893.16			6575	6575					
NA01	NASSCO	Inside	no	75065.19	75065.19			6575	6575					
NA01	BAE	Inside	no	1279.9	1279.9			6575	6575					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	2800	2800	2800.00	459242756	2800.00	459242756	1285879716800
NA02	NASSCO	Inside	no	20907.56	20907.56			2800	2800					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	6100	6100	6100.00	722143376	6100.00	722143376	4405074593600
NA03	NASSCO	Inside	no	117647.4	117647.37			6100	6100					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	3500	3500	3500.00	254342060	3500.00	254342060	890197210000
NA04	NASSCO	Inside	no	13.87	13.87			3500	3500					
NA04	NASSCO	Inside	no	68573.77	68573.77			3500	3500					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	2800	2800	2800.00	315907788	2800.00	315907788	884541806400
NA05	NASSCO	Inside	no	107319.3	107319.33			2800	2800					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	3800	663	1692.15	103280867	3800.00	76090136	289142516800
NA06	NASSCO	Inside	no	491.33	491.33			3800	3800					
NA06	NASSCO	Inside	no	10353.97	10353.97			3800	3800					
NA06	NASSCO	Inside	no	469.55	469.55			3800	3800					
NA06	NASSCO	Inside	no	651.17	651.17			3800	3800					
NA06	NASSCO	Inside	no	548.07	548.07			3800	3800					
NA06	NASSCO	Inside	no	1248.95	1248.95			3800	3800					
NA06	NASSCO	Inside	no	623.55	623.55			3800	3800					
NA06	NASSCO	Inside	no	5637.13	5637.13			3800	3800					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	15850	15850	15850.00	480215851	15850.00	480215851	7611421230425
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	3500	3500	3500.00	71232210	3500.00	71232210	249312735000
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	2800	663	820.93	24234535	2800.00	6108732	17104449600
NA09	NASSCO	Inside	no	1070.7	1070.7			2800	2800					
NA09	NASSCO	Inside	no	1110.99	1110.99			2800	2800					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	1800	1800	1800.00	52444746	1800.00	52444746	94400542800
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	2800	2800	2800.00	105877436	2800.00	105877436	296456820800
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	2000	663	1927.71	175606074	2000.00	172340620	344681240000
NA12	NASSCO	Inside	no	86170.31	86170.31			2000	2000					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	1800	1800	1800.00	460308780	1800.00	460308780	828555804000
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	1100	1100	1100.00	229556162	1100.00	229556162	252511778200
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	3300	663	736.30	35072066	3300.00	4369497	14419340100
NA15	NASSCO	Inside	no	1324.09	1324.09			3300	3300					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	3200	663	3171.07	121307587	3200.00	121018400	387258880000
NA16	NASSCO	Inside	no	37818.25	37818.25			3200	3200					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	2950	663	787.24	28711689	2950.00	5844747	17242002175
NA17	NASSCO	Inside	no	1981.27	1981.27			2950	2950					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	2400	663	2026.13	81961655	2400.00	76188960	182853504000
NA18	NASSCO	Inside	yes	2671.13	0			2400	663					
NA18	NASSCO	Inside	no	31745.4	31745.4			2400	2400					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	3000	663	998.46	31993996	3000.00	13798830	41396490000
NA19	NASSCO	Inside	yes	27442.34	0			3000	663					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	HPAH (µg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	663 Area * No-Dredge Conc.[2]
NA19	NASSCO	Inside	no	1152.78	1152.78			3000	3000					
NA19	NASSCO	Inside	no	3446.83	3446.83			3000	3000					
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	2900	2900	2900.00	903249080	2900.00	903249080	2619422332000
NA20	NASSCO	Inside	no	23295.98	23295.98			2900	2900					
NA20	NASSCO	Inside	no	85022.7	85022.7			2900	2900					
NA20	NASSCO	Inside	no	176351.5	176351.5			2900	2900					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	2100	2100	2100.00	999856137	2100.00	999856137	2099697887700
NA21	NASSCO	Inside	no	9198.08	9198.08			2100	2100					
NA21	NASSCO	Inside	no	30752.99	30752.99			2100	2100					
NA21	NASSCO	Outside	no	347483.2	347483.15			2100	2100					
NA21	NASSCO	Inside	no	79424.32	79424.32			2100	2100					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	3600	3600	3600.00	196812036	3600.00	196812036	708523329600
NA22	NASSCO	Inside	no	13565.26	13565.26			3600	3600					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	3400	663	3229.77	219622815	3400.00	216818782	737183858800
NA23	NASSCO	Inside	no	6267.98	6267.98			3400	3400					
NA23	NASSCO	Inside	no	451.2	451.2			3400	3400					
NA23	NASSCO	Inside	no	3175.16	3175.16			3400	3400					
NA23	NASSCO	Inside	no	53875.89	53875.89			3400	3400					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	2100	2100	2100.00	137160072	2100.00	137160072	288036151200
NA24	NASSCO	Inside	no	57539.8	57539.8			2100	2100					
NA24	NASSCO	Inside	no	849.45	849.45			2100	2100					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	1100	1100	1100.00	573830246	1100.00	573830246	631213270600
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	850	850	850.00	257162052	850.00	257162052	218587743775
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	2800	663	2793.05	150515289	2800.00	150399032	421117289600
NA27	NASSCO	Inside	no	53713.94	53713.94			2800	2800					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	3400	3400	3400.00	184490664	3400.00	184490664	627268257600
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	1900	1900	1900.00	385631296	1900.00	385631296	732699462400
NA29	NASSCO	Inside	no	29422.14	29422.14			1900	1900					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	1000	1000	1000.00	240837720	1000.00	240837720	240837720000
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	530	530	530.00	121468267	530.00	121468267	64378181669
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	7525	663	663.00	22140030			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	14500	663	663.08	25967601	14500.00	3480	50460000
SW02	BAE	Outside	no	0.24	0.24			14500	14500					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	6800	663	6775.19	330702983	6800.00	330572140	2247890552000
SW03	BAE	Outside	no	48613.55	48613.55			6800	6800					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	14000	663	4625.30	104909742	14000.00	94339420	1320751880000
SW04	BAE	Outside	yes	13563.04	0			14000	663					
SW04	BAE	Inside	no	6738.53	6738.53			14000	14000					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	13000	663	4532.59	109518776	13000.00	98523750	1280808750000
SW05	BAE	Inside	yes	15429.24	0			13000	663					
SW05	BAE	Inside	no	7578.75	7578.75			13000	13000					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	12000	663	10483.32	269953975	12000.00	267669960	3212039520000
SW06	BAE	Outside	yes	1749.56	0			12000	663					
SW06	BAE	Inside	yes	656.18	0			12000	663					
SW06	BAE	Inside	no	5850.65	5850.65			12000	12000					
SW06	BAE	Inside	no	199.48	199.48			12000	12000					
SW06	BAE	Inside	no	970.52	970.52			12000	12000					
SW06	BAE	Outside	no	9831.6	9831.6			12000	12000					
SW06	BAE	Inside	no	5453.58	5453.58			12000	12000					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	3800	3800	3800.00	155600424	3800.00	155600424	591281611200

Table A34-2 Data for Table A34-1, Continued

								HPAH (µg/kg dry)					Background=	663
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
SW07	BAE	Outside	no	30303.13	30303.13			3800	3800					
SW07	BAE	Inside	no	5715.07	5715.07			3800	3800					
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	25500	663	7342.59	123565395	25500.00	115408665	2942920957500
SW08	BAE	Inside	yes	9611.17	0			25500	663					
SW08	BAE	Inside	no	647.64	647.64			25500	25500					
SW08	BAE	Inside	no	1805.85	1805.85			25500	25500					
SW08	BAE	Inside	no	2062.65	2062.65			25500	25500					
SW08	BAE	Inside	no	9.69	9.69			25500	25500					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	17000	663	2955.41	72344503	17000.00	58392450	992671650000
SW09	BAE	Inside	no	637.14	637.14			17000	17000					
SW09	BAE	Inside	no	2797.71	2797.71			17000	17000					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	16000	663	2043.96	44166377	16000.00	31130080	498081280000
SW10	BAE	Inside	no	315.77	315.77			16000	16000					
SW10	BAE	Inside	no	1505.36	1505.36			16000	16000					
SW10	BAE	Inside	no	124.5	124.5			16000	16000					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	8000	8000	8000.00	293514720	8000.00	293514720	2348117760000
SW11	BAE	Inside	no	34912.38	34912.38			8000	8000					
SW11	BAE	Inside	no	0.18	0.18			8000	8000					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	3000	3000	3000.00	338825430	3000.00	338825430	1016476290000
SW12	BAE	Inside	no	4859.52	4859.52			3000	3000					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	12000	663	5584.56	213646194	12000.00	199293000	2391516000000
SW13	BAE	Inside	no	3900.8	3900.8			12000	12000					
SW13	BAE	Inside	no	248.4	248.4			12000	12000					
SW13	BAE	Inside	no	12458.55	12458.55			12000	12000					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	8400	663	663.00	11093270			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	7700	663	6830.30	380897491	7700.00	376328029	2897725823300
SW15	BAE	Inside	yes	95.2	0			7700	663					
SW15	BAE	Inside	no	48873.77	48873.77			7700	7700					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	5700	663	769.08	13716317	5700.00	2140920	12203244000
SW16	BAE	Inside	no	375.6	375.6			5700	5700					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	10000	663	1977.78	110554347	10000.00	78712400	787124000000
SW17	BAE	Inside	no	3770.56	3770.56			10000	10000					
SW17	BAE	Inside	no	171.53	171.53			10000	10000					
SW17	BAE	Inside	no	2824.69	2824.69			10000	10000					
SW17	BAE	Inside	no	1104.46	1104.46			10000	10000					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	8100	8100	8100.00	426071988	8100.00	426071988	3451183102800
SW18	BAE	Outside	no	772.41	772.41			8100	8100					
SW18	BAE	Inside	no	37171.63	37171.63			8100	8100					
SW18	BAE	Inside	no	3616.16	3616.16			8100	8100					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	1100	1100	1100.00	236221205	1100.00	236221205	259843325500
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	11000	663	7615.82	214574559	11000.00	208459020	2293049220000
SW20	BAE	Inside	yes	1332.79	0			11000	663					
SW20	BAE	Inside	no	9197.16	9197.16			11000	11000					
SW20	BAE	Inside	no	9753.66	9753.66			11000	11000					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	9700	663	663.00	7887260			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	12000	663	663.00	2494060			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	11000	663	3428.01	103104966	11000.00	88497750	973475250000
SW23	BAE	Inside	yes	21998.96	0			11000	663					
SW23	BAE	Inside	no	7839.28	7839.28			11000	11000					
SW23	BAE	Inside	no	205.97	205.97			11000	11000					

Table A34-2 Data for Table A34-1, Continued

								HPAH (µg/kg dry)					Background=	663
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	52000	663	12249.49	259434736	52000.00	248562080	##############
SW24	BAE	Inside	yes	470.91	0			52000	663					
SW24	BAE	Inside	no	4780.04	4780.04			52000	52000					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	8150	663	7371.86	513743835	8150.00	508941746	4147875229900
SW25	BAE	Inside	yes	1753.5	0			8150	663					
SW25	BAE	Inside	no	1305.2	1305.2			8150	8150					
SW25	BAE	Inside	no	8132.91	8132.91			8150	8150					
SW25	BAE	Inside	no	653.01	653.01			8150	8150					
SW25	BAE	Inside	no	11150.23	11150.23			8150	8150					
SW25	BAE	Inside	no	1910.2	1910.2			8150	8150					
SW25	BAE	Inside	no	39295.29	39295.29			8150	8150					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	1600	1600	1600.00	139077456	1600.00	139077456	222523929600
SW26	BAE	Outside	no	84700.62	84700.62			1600	1600					
SW26	BAE	Inside	no	2076.52	2076.52			1600	1600					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	12000	663	1793.61	141495155	12000.00	94408080	1132896960000
SW27	BAE	Inside	no	75.92	75.92			12000	12000					
SW27	BAE	Outside	no	2798.25	2798.25			12000	12000					
SW27	BAE	Inside	no	4993.17	4993.17			12000	12000					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	17000	663	3970.80	204710436	17000.00	177450760	3016662920000
SW28	BAE	Inside	yes	24000.29	0			17000	663					
SW28	NASSCO	Inside	no	2949.78	2949.78			17000	17000					
SW28	BAE	Inside	no	2680.96	2680.96			17000	17000					
SW28	NASSCO	Inside	no	213.63	213.63			17000	17000					
SW28	NASSCO	Inside	no	308.76	308.76			17000	17000					
SW28	NASSCO	Inside	no	1214.31	1214.31			17000	17000					
SW28	NASSCO	Inside	no	3070.84	3070.84			17000	17000					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	4600	663	3425.18	214063427	4600.00	201698868	927814792800
SW29	BAE	Outside	no	43847.58	43847.58			4600	4600					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	4900	4900	4900.00	353931704	4900.00	353931704	1734265349600
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	1200	663	1167.53	97486773	1200.00	94139412	112967294400
SW31	BAE	Inside	no	3388.46	3388.46			1200	1200					
SW31	BAE	Outside	no	61423.95	61423.95			1200	1200					
SW31	BAE	Inside	no	7943.74	7943.74			1200	1200					
SW31	BAE	Inside	no	5693.36	5693.36			1200	1200					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	820	820	820.00	64350992	820.00	64350992	52767813768
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	1000	1000	1000.00	151872140	1000.00	151872140	151872140000
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	1400	1400	1400.00	426400828	1400.00	426400828	596961159200
SW34	NASSCO	Outside	no	132756	132756.04			1400	1400					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	4000	4000	4000.00	362918440	4000.00	362918440	1451673760000
SW36	BAE	Inside	no	17866.18	17866.18			4000	4000					
NA20	NASSCO	Inside	no	13723.08	13723.08			2900						
NA21	NASSCO	Inside	no	28457.11	28457.11			2100						
NA22	NASSCO	Inside	no	181098.6	181098.6			3600						

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Arsenic (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	7.5 Area * No-Dredge Conc. [2]
NA01	NASSCO	Inside	yes	5121.17	0	99788.14	92337.68	10.2	7.5	10.00	997723	10.20	941844	9606812
NA01	BAE	Inside	yes	2329.29	0			10.2	7.5					
NA01	NASSCO	Inside	no	416.53	416.53			10.2	10.2					
NA01	NASSCO	Inside	no	269.86	269.86			10.2	10.2					
NA01	BAE	Outside	no	3413.04	3413.04			10.2	10.2					
NA01	NASSCO	Outside	no	11893.16	11893.16			10.2	10.2					
NA01	NASSCO	Inside	no	75065.19	75065.19			10.2	10.2					
NA01	BAE	Inside	no	1279.9	1279.9			10.2	10.2					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	10	10	10.00	1640153	10.00	1640153	16401527
NA02	NASSCO	Inside	no	20907.56	20907.56			10	10					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	11	11	11.00	1302226	11.00	1302226	14324483
NA03	NASSCO	Inside	no	117647.4	117647.37			11	11					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	12	12	12.00	872030	12.00	872030	10464359
NA04	NASSCO	Inside	no	13.87	13.87			12	12					
NA04	NASSCO	Inside	no	68573.77	68573.77			12	12					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	9.5	9.5	9.50	1071830	9.50	1071830	10182385
NA05	NASSCO	Inside	no	107319.3	107319.33			9.5	9.5					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	10.5	7.5	8.48	517837	10.50	210249	2207615
NA06	NASSCO	Inside	no	491.33	491.33			10.5	10.5					
NA06	NASSCO	Inside	no	10353.97	10353.97			10.5	10.5					
NA06	NASSCO	Inside	no	469.55	469.55			10.5	10.5					
NA06	NASSCO	Inside	no	651.17	651.17			10.5	10.5					
NA06	NASSCO	Inside	no	548.07	548.07			10.5	10.5					
NA06	NASSCO	Inside	no	1248.95	1248.95			10.5	10.5					
NA06	NASSCO	Inside	no	623.55	623.55			10.5	10.5					
NA06	NASSCO	Inside	no	5637.13	5637.13			10.5	10.5					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	13.5	13.5	13.50	409017	13.50	409017	5521725
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	18	18	18.00	366337	18.00	366337	6594067
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	13	7.5	7.91	233405	13.00	28362	368706
NA09	NASSCO	Inside	no	1070.7	1070.7			13	13					
NA09	NASSCO	Inside	no	1110.99	1110.99			13	13					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	6.9	6.9	6.90	201038	6.90	201038	1387164
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	9.3	9.3	9.30	351664	9.30	351664	3270478
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	9.5	7.5	9.39	855557	9.50	818618	7776870
NA12	NASSCO	Inside	no	86170.31	86170.31			9.5	9.5					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	10.75	10.75	10.75	2749066	10.75	2749066	29552463
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	9	9	9.00	1878187	9.00	1878187	16903681
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	12	7.5	7.63	363203	12.00	15889	190669
NA15	NASSCO	Inside	no	1324.09	1324.09			12	12					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	10.5	7.5	10.47	400363	10.50	397092	4169462
NA16	NASSCO	Inside	no	37818.25	37818.25			10.5	10.5					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	14.5	7.5	7.88	287404	14.50	28728	416562
NA17	NASSCO	Inside	no	1981.27	1981.27			14.5	14.5					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	14	7.5	12.60	509738	14.00	444436	6222098
NA18	NASSCO	Inside	yes	2671.13	0			14	7.5					
NA18	NASSCO	Inside	no	31745.4	31745.4			14	14					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	14	7.5	8.43	270222	14.00	64395	901524
NA19	NASSCO	Inside	yes	27442.34	0			14	7.5					

Table A34-2 Data for Table A34-1, Continued

								Arsenic (mg/kg dry)				Background=	7.5	
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA19	NASSCO	Inside	no	1152.78	1152.78			14	14					
NA19	NASSCO	Inside	no	3446.83	3446.83			14	14					
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	6.6	6.6	6.60	2055670	6.60	2055670	13567424
NA20	NASSCO	Inside	no	23295.98	23295.98			6.6	6.6					
NA20	NASSCO	Inside	no	85022.7	85022.7			6.6	6.6					
NA20	NASSCO	Inside	no	176351.5	176351.5			6.6	6.6					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	11	11	11.00	5237342	11.00	5237342	57610758
NA21	NASSCO	Inside	no	9198.08	9198.08			11	11					
NA21	NASSCO	Inside	no	30752.99	30752.99			11	11					
NA21	NASSCO	Outside	no	347483.2	347483.15			11	11					
NA21	NASSCO	Inside	no	79424.32	79424.32			11	11					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	8.5	8.5	8.50	464695	8.50	464695	3949908
NA22	NASSCO	Inside	no	13565.26	13565.26			8.5	8.5					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	12	7.5	11.72	796963	12.00	765243	9182913
NA23	NASSCO	Inside	no	6267.98	6267.98			12	12					
NA23	NASSCO	Inside	no	451.2	451.2			12	12					
NA23	NASSCO	Inside	no	3175.16	3175.16			12	12					
NA23	NASSCO	Inside	no	53875.89	53875.89			12	12					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	9.6	9.6	9.60	627017	9.60	627017	6019368
NA24	NASSCO	Inside	no	57539.8	57539.8			9.6	9.6					
NA24	NASSCO	Inside	no	849.45	849.45			9.6	9.6					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	6	6	6.00	3129983	6.00	3129983	18779899
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	6.2	6.2	6.20	1875770	6.20	1875770	11629776
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	13	7.5	12.98	699596	13.00	698281	9077656
NA27	NASSCO	Inside	no	53713.94	53713.94			13	13					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	10	10	10.00	542620	10.00	542620	5426196
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	6.9	6.9	6.90	1400450	6.90	1400450	9663108
NA29	NASSCO	Inside	no	29422.14	29422.14			6.9	6.9					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	7.5	7.5	7.50	1806283	7.50	1806283	13547122
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	5.3	5.3	5.30	1214683	5.30	1214683	6437818
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	13.5	7.5	7.50	250453			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	13.75	7.5	7.50	293715	13.75	3	45
SW02	BAE	Outside	no	0.24	0.24			13.75	13.75					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	11	7.5	10.99	536229	11.00	534749	5882240
SW03	BAE	Outside	no	48613.55	48613.55			11	11					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	73	7.5	26.96	611486	73.00	491913	35909626
SW04	BAE	Outside	yes	13563.04	0			73	7.5					
SW04	BAE	Inside	no	6738.53	6738.53			73	73					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	11	7.5	8.60	207744	11.00	83366	917029
SW05	BAE	Inside	yes	15429.24	0			11	7.5					
SW05	BAE	Inside	no	7578.75	7578.75			11	11					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	15	7.5	14.00	360425	15.00	334587	5018812
SW06	BAE	Outside	yes	1749.56	0			15	7.5					
SW06	BAE	Inside	yes	656.18	0			15	7.5					
SW06	BAE	Inside	no	5850.65	5850.65			15	15					
SW06	BAE	Inside	no	199.48	199.48			15	15					
SW06	BAE	Inside	no	970.52	970.52			15	15					
SW06	BAE	Outside	no	9831.6	9831.6			15	15					
SW06	BAE	Inside	no	5453.58	5453.58			15	15					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	8.1	8.1	8.10	331675	8.10	331675	2686564

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Arsenic (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	7.5 Area * No-Dredge Conc.[2]
SW07	BAE	Outside	no	30303.13	30303.13			8.1	8.1					
SW07	BAE	Inside	no	5715.07	5715.07			8.1	8.1					
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	24	7.5	11.94	200891	24.00	108620	2606878
SW08	BAE	Inside	yes	9611.17	0			24	7.5					
SW08	BAE	Inside	no	647.64	647.64			24	24					
SW08	BAE	Inside	no	1805.85	1805.85			24	24					
SW08	BAE	Inside	no	2062.65	2062.65			24	24					
SW08	BAE	Inside	no	9.69	9.69			24	24					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	27	7.5	10.24	250570	27.00	92741	2504006
SW09	BAE	Inside	no	637.14	637.14			27	27					
SW09	BAE	Inside	no	2797.71	2797.71			27	27					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	13	7.5	8.00	172763	13.00	25293	328811
SW10	BAE	Inside	no	315.77	315.77			13	13					
SW10	BAE	Inside	no	1505.36	1505.36			13	13					
SW10	BAE	Inside	no	124.5	124.5			13	13					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	9.6	9.6	9.60	352218	9.60	352218	3381290
SW11	BAE	Inside	no	34912.38	34912.38			9.6	9.6					
SW11	BAE	Inside	no	0.18	0.18			9.6	9.6					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	7.4	7.4	7.40	835769	7.40	835769	6184694
SW12	BAE	Inside	no	4859.52	4859.52			7.4	7.4					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	15	7.5	10.76	411483	15.00	249116	3736744
SW13	BAE	Inside	no	3900.8	3900.8			15	15					
SW13	BAE	Inside	no	248.4	248.4			15	15					
SW13	BAE	Inside	no	12458.55	12458.55			15	15					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	10	7.5	7.50	125489			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	11	7.5	10.57	589302	11.00	537611	5913726
SW15	BAE	Inside	yes	95.2	0			11	7.5					
SW15	BAE	Inside	no	48873.77	48873.77			11	11					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	12	7.5	7.59	135451	12.00	4507	54086
SW16	BAE	Inside	no	375.6	375.6			12	12					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	12	7.5	8.13	454658	12.00	94455	1133459
SW17	BAE	Inside	no	3770.56	3770.56			12	12					
SW17	BAE	Inside	no	171.53	171.53			12	12					
SW17	BAE	Inside	no	2824.69	2824.69			12	12					
SW17	BAE	Inside	no	1104.46	1104.46			12	12					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	11	11	11.00	578616	11.00	578616	6364779
SW18	BAE	Outside	no	772.41	772.41			11	11					
SW18	BAE	Inside	no	37171.63	37171.63			11	11					
SW18	BAE	Inside	no	3616.16	3616.16			11	11					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	7.1	7.1	7.10	1524701	7.10	1524701	10825374
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	14	7.5	11.87	334492	14.00	265311	3714361
SW20	BAE	Inside	yes	1332.79	0			14	7.5					
SW20	BAE	Inside	no	9197.16	9197.16			14	14					
SW20	BAE	Inside	no	9753.66	9753.66			14	14					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	11	7.5	7.50	89222			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	13	7.5	7.50	28213			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	15	7.5	9.51	285919	15.00	120679	1810181
SW23	BAE	Inside	yes	21998.96	0			15	7.5					
SW23	BAE	Inside	no	7839.28	7839.28			15	15					
SW23	BAE	Inside	no	205.97	205.97			15	15					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Arsenic (mg/kg dry)					Background=	7.5
								Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	10	7.5	8.06	170794	10.00	47800	478004
SW24	BAE	Inside	yes	470.91	0			10	7.5					
SW24	BAE	Inside	no	4780.04	4780.04			10	10					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	11.5	7.5	11.08	772461	11.50	718139	8258595
SW25	BAE	Inside	yes	1753.5	0			11.5	7.5					
SW25	BAE	Inside	no	1305.2	1305.2			11.5	11.5					
SW25	BAE	Inside	no	8132.91	8132.91			11.5	11.5					
SW25	BAE	Inside	no	653.01	653.01			11.5	11.5					
SW25	BAE	Inside	no	11150.23	11150.23			11.5	11.5					
SW25	BAE	Inside	no	1910.2	1910.2			11.5	11.5					
SW25	BAE	Inside	no	39295.29	39295.29			11.5	11.5					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	9	9	9.00	782311	9.00	782311	7040796
SW26	BAE	Outside	no	84700.62	84700.62			9	9					
SW26	BAE	Inside	no	2076.52	2076.52			9	9					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	10	7.5	7.75	611333	10.00	78673	786734
SW27	BAE	Inside	no	75.92	75.92			10	10					
SW27	BAE	Outside	no	2798.25	2798.25			10	10					
SW27	BAE	Inside	no	4993.17	4993.17			10	10					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	14	7.5	8.82	454503	14.00	146136	2045903
SW28	BAE	Inside	yes	24000.29	0			14	7.5					
SW28	NASSCO	Inside	no	2949.78	2949.78			14	14					
SW28	BAE	Inside	no	2680.96	2680.96			14	14					
SW28	NASSCO	Inside	no	213.63	213.63			14	14					
SW28	NASSCO	Inside	no	308.76	308.76			14	14					
SW28	NASSCO	Inside	no	1214.31	1214.31			14	14					
SW28	NASSCO	Inside	no	3070.84	3070.84			14	14					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	8.3	7.5	8.06	503805	8.30	363935	3020660
SW29	BAE	Outside	no	43847.58	43847.58			8.3	8.3					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	8.9	8.9	8.90	642856	8.90	642856	5721414
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	4	7.5	4.21	351664	4.00	313798	1255192
SW31	BAE	Inside	no	3388.46	3388.46			4	4					
SW31	BAE	Outside	no	61423.95	61423.95			4	4					
SW31	BAE	Inside	no	7943.74	7943.74			4	4					
SW31	BAE	Inside	no	5693.36	5693.36			4	4					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	9.4	9.4	9.40	737682	9.40	737682	6934212
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	10	10	10.00	1518721	10.00	1518721	15187214
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	8.3	8.3	8.30	2527948	8.30	2527948	20981966
SW34	NASSCO	Outside	no	132756	132756.04			8.3	8.3					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	9.9	9.9	9.90	898223	9.90	898223	8892409
SW36	BAE	Inside	no	17866.18	17866.18			9.9	9.9					
NA20	NASSCO	Inside	no	13723.08	13723.08			6.6						
NA21	NASSCO	Inside	no	28457.11	28457.11			11						
NA22	NASSCO	Inside	no	181098.6	181098.6			8.5						

Table A34-2 Data for Table A34-1, Continued

								Cadmium (mg/kg dry)					Background=	0.33
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA01	NASSCO	Inside	yes	5121.17	0	99788.14	92337.68	0.2375	0.33	0.24	24389	0.24	21930	5208
NA01	BAE	Inside	yes	2329.29	0			0.2375	0.33					
NA01	NASSCO	Inside	no	416.53	416.53			0.2375	0.2375					
NA01	NASSCO	Inside	no	269.86	269.86			0.2375	0.2375					
NA01	BAE	Outside	no	3413.04	3413.04			0.2375	0.2375					
NA01	NASSCO	Outside	no	11893.16	11893.16			0.2375	0.2375					
NA01	NASSCO	Inside	no	75065.19	75065.19			0.2375	0.2375					
NA01	BAE	Inside	no	1279.9	1279.9			0.2375	0.2375					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	0.21	0.21	0.21	34443	0.21	34443	7233
NA02	NASSCO	Inside	no	20907.56	20907.56			0.21	0.21					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	0.29	0.29	0.29	34331	0.29	34331	9956
NA03	NASSCO	Inside	no	117647.4	117647.37			0.29	0.29					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	0.27	0.27	0.27	19621	0.27	19621	5298
NA04	NASSCO	Inside	no	13.87	13.87			0.27	0.27					
NA04	NASSCO	Inside	no	68573.77	68573.77			0.27	0.27					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	0.17	0.17	0.17	19180	0.17	19180	3261
NA05	NASSCO	Inside	no	107319.3	107319.33			0.17	0.17					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	0.265	0.33	0.31	18840	0.27	5306	1406
NA06	NASSCO	Inside	no	491.33	491.33			0.265	0.265					
NA06	NASSCO	Inside	no	10353.97	10353.97			0.265	0.265					
NA06	NASSCO	Inside	no	469.55	469.55			0.265	0.265					
NA06	NASSCO	Inside	no	651.17	651.17			0.265	0.265					
NA06	NASSCO	Inside	no	548.07	548.07			0.265	0.265					
NA06	NASSCO	Inside	no	1248.95	1248.95			0.265	0.265					
NA06	NASSCO	Inside	no	623.55	623.55			0.265	0.265					
NA06	NASSCO	Inside	no	5637.13	5637.13			0.265	0.265					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	0.27	0.27	0.27	8180	0.27	8180	2209
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	0.31	0.31	0.31	6309	0.31	6309	1956
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	0.4	0.33	0.34	9895	0.40	873	349
NA09	NASSCO	Inside	no	1070.7	1070.7			0.4	0.4					
NA09	NASSCO	Inside	no	1110.99	1110.99			0.4	0.4					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	0.22	0.22	0.22	6410	0.22	6410	1410
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	0.28	0.28	0.28	10588	0.28	10588	2965
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	0.18	0.33	0.19	17136	0.18	15511	2792
NA12	NASSCO	Inside	no	86170.31	86170.31			0.18	0.18					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	0.235	0.235	0.24	60096	0.24	60096	14123
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	0.25	0.25	0.25	52172	0.25	52172	13043
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	0.25	0.33	0.33	15613	0.25	331	83
NA15	NASSCO	Inside	no	1324.09	1324.09			0.25	0.25					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	0.3625	0.33	0.36	13853	0.36	13709	4970
NA16	NASSCO	Inside	no	37818.25	37818.25			0.3625	0.3625					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	0.405	0.33	0.33	12184	0.41	802	325
NA17	NASSCO	Inside	no	1981.27	1981.27			0.405	0.405					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	0.36	0.33	0.35	14302	0.36	11428	4114
NA18	NASSCO	Inside	yes	2671.13	0			0.36	0.33					
NA18	NASSCO	Inside	no	31745.4	31745.4			0.36	0.36					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	0.37	0.33	0.34	10758	0.37	1702	630
NA19	NASSCO	Inside	yes	27442.34	0			0.37	0.33					

Table A34-2 Data for Table A34-1, Continued

								Cadmium (mg/kg dry)				Background=		0.33
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA19	NASSCO	Inside	no	1152.78	1152.78			0.37	0.37					
NA19	NASSCO	Inside	no	3446.83	3446.83			0.37	0.37					
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	0.44	0.44	0.44	137045	0.44	137045	60300
NA20	NASSCO	Inside	no	23295.98	23295.98			0.44	0.44					
NA20	NASSCO	Inside	no	85022.7	85022.7			0.44	0.44					
NA20	NASSCO	Inside	no	176351.5	176351.5			0.44	0.44					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	0.39	0.39	0.39	185688	0.39	185688	72418
NA21	NASSCO	Inside	no	9198.08	9198.08			0.39	0.39					
NA21	NASSCO	Inside	no	30752.99	30752.99			0.39	0.39					
NA21	NASSCO	Outside	no	347483.2	347483.15			0.39	0.39					
NA21	NASSCO	Inside	no	79424.32	79424.32			0.39	0.39					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	0.46	0.46	0.46	25148	0.46	25148	11568
NA22	NASSCO	Inside	no	13565.26	13565.26			0.46	0.46					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	0.26	0.33	0.26	17976	0.26	16580	4311
NA23	NASSCO	Inside	no	6267.98	6267.98			0.26	0.26					
NA23	NASSCO	Inside	no	451.2	451.2			0.26	0.26					
NA23	NASSCO	Inside	no	3175.16	3175.16			0.26	0.26					
NA23	NASSCO	Inside	no	53875.89	53875.89			0.26	0.26					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	0.2	0.2	0.20	13063	0.20	13063	2613
NA24	NASSCO	Inside	no	57539.8	57539.8			0.2	0.2					
NA24	NASSCO	Inside	no	849.45	849.45			0.2	0.2					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	0.11	0.11	0.11	57383	0.11	57383	6312
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	0.11	0.11	0.11	33280	0.11	33280	3661
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	0.29	0.33	0.29	15635	0.29	15577	4517
NA27	NASSCO	Inside	no	53713.94	53713.94			0.29	0.29					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	0.31	0.31	0.31	16821	0.31	16821	5215
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	0.14	0.14	0.14	28415	0.14	28415	3978
NA29	NASSCO	Inside	no	29422.14	29422.14			0.14	0.14					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	0.22	0.22	0.22	52984	0.22	52984	11657
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	0.13	0.13	0.13	29794	0.13	29794	3873
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	0.71	0.33	0.33	11020			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	3.175	0.33	0.33	12924	3.18	1	2
SW02	BAE	Outside	no	0.24	0.24			3.175	3.175					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	0.7	0.33	0.70	34095	0.70	34029	23821
SW03	BAE	Outside	no	48613.55	48613.55			0.7	0.7					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	1.95	0.33	0.81	18401	1.95	13140	25623
SW04	BAE	Outside	yes	13563.04	0			1.95	0.33					
SW04	BAE	Inside	no	6738.53	6738.53			1.95	1.95					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	0.86	0.33	0.50	11990	0.86	6518	5605
SW05	BAE	Inside	yes	15429.24	0			0.86	0.33					
SW05	BAE	Inside	no	7578.75	7578.75			0.86	0.86					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	0.85	0.33	0.78	20097	0.85	18960	16116
SW06	BAE	Outside	yes	1749.56	0			0.85	0.33					
SW06	BAE	Inside	yes	656.18	0			0.85	0.33					
SW06	BAE	Inside	no	5850.65	5850.65			0.85	0.85					
SW06	BAE	Inside	no	199.48	199.48			0.85	0.85					
SW06	BAE	Inside	no	970.52	970.52			0.85	0.85					
SW06	BAE	Outside	no	9831.6	9831.6			0.85	0.85					
SW06	BAE	Inside	no	5453.58	5453.58			0.85	0.85					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	0.19	0.19	0.19	7780	0.19	7780	1478

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Cadmium (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	0.33 Area * No-Dredge Conc.[2]
SW07	BAE	Outside	no	30303.13	30303.13			0.19	0.19					
SW07	BAE	Inside	no	5715.07	5715.07			0.19	0.19					
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	0.73	0.33	0.44	7364	0.73	3304	2412
SW08	BAE	Inside	yes	9611.17	0			0.73	0.33					
SW08	BAE	Inside	no	647.64	647.64			0.73	0.73					
SW08	BAE	Inside	no	1805.85	1805.85			0.73	0.73					
SW08	BAE	Inside	no	2062.65	2062.65			0.73	0.73					
SW08	BAE	Inside	no	9.69	9.69			0.73	0.73					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	1.1	0.33	0.44	10723	1.10	3778	4156
SW09	BAE	Inside	no	637.14	637.14			1.1	1.1					
SW09	BAE	Inside	no	2797.71	2797.71			1.1	1.1					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	0.87	0.33	0.38	8181	0.87	1693	1473
SW10	BAE	Inside	no	315.77	315.77			0.87	0.87					
SW10	BAE	Inside	no	1505.36	1505.36			0.87	0.87					
SW10	BAE	Inside	no	124.5	124.5			0.87	0.87					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	0.24	0.24	0.24	8805	0.24	8805	2113
SW11	BAE	Inside	no	34912.38	34912.38			0.24	0.24					
SW11	BAE	Inside	no	0.18	0.18			0.24	0.24					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	0.14	0.14	0.14	15812	0.14	15812	2214
SW12	BAE	Inside	no	4859.52	4859.52			0.14	0.14					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	0.42	0.33	0.37	14119	0.42	6975	2930
SW13	BAE	Inside	no	3900.8	3900.8			0.42	0.42					
SW13	BAE	Inside	no	248.4	248.4			0.42	0.42					
SW13	BAE	Inside	no	12458.55	12458.55			0.42	0.42					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	0.31	0.33	0.33	5522			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	0.45	0.33	0.44	24268	0.45	21993	9897
SW15	BAE	Inside	yes	95.2	0			0.45	0.33					
SW15	BAE	Inside	no	48873.77	48873.77			0.45	0.45					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	0.66	0.33	0.34	6009	0.66	248	164
SW16	BAE	Inside	no	375.6	375.6			0.66	0.66					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	0.37	0.33	0.34	18761	0.37	2912	1078
SW17	BAE	Inside	no	3770.56	3770.56			0.37	0.37					
SW17	BAE	Inside	no	171.53	171.53			0.37	0.37					
SW17	BAE	Inside	no	2824.69	2824.69			0.37	0.37					
SW17	BAE	Inside	no	1104.46	1104.46			0.37	0.37					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	0.33	0.33	0.33	17358	0.33	17358	5728
SW18	BAE	Outside	no	772.41	772.41			0.33	0.33					
SW18	BAE	Inside	no	37171.63	37171.63			0.33	0.33					
SW18	BAE	Inside	no	3616.16	3616.16			0.33	0.33					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	0.15	0.15	0.15	32212	0.15	32212	4832
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	0.41	0.33	0.38	10814	0.41	7770	3186
SW20	BAE	Inside	yes	1332.79	0			0.41	0.33					
SW20	BAE	Inside	no	9197.16	9197.16			0.41	0.41					
SW20	BAE	Inside	no	9753.66	9753.66			0.41	0.41					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	0.51	0.33	0.33	3926			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	0.35	0.33	0.33	1241			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	0.37	0.33	0.34	10247	0.37	2977	1101
SW23	BAE	Inside	yes	21998.96	0			0.37	0.33					
SW23	BAE	Inside	no	7839.28	7839.28			0.37	0.37					
SW23	BAE	Inside	no	205.97	205.97			0.37	0.37					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Cadmium (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	0.33 Area * No-Dredge Conc.[2]
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	0.325	0.33	0.33	6965	0.33	1554	505
SW24	BAE	Inside	yes	470.91	0			0.325	0.33					
SW24	BAE	Inside	no	4780.04	4780.04			0.325	0.325					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	0.355	0.33	0.35	24559	0.36	22169	7870
SW25	BAE	Inside	yes	1753.5	0			0.355	0.33					
SW25	BAE	Inside	no	1305.2	1305.2			0.355	0.355					
SW25	BAE	Inside	no	8132.91	8132.91			0.355	0.355					
SW25	BAE	Inside	no	653.01	653.01			0.355	0.355					
SW25	BAE	Inside	no	11150.23	11150.23			0.355	0.355					
SW25	BAE	Inside	no	1910.2	1910.2			0.355	0.355					
SW25	BAE	Inside	no	39295.29	39295.29			0.355	0.355					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	0.14	0.14	0.14	12169	0.14	12169	1704
SW26	BAE	Outside	no	84700.62	84700.62			0.14	0.14					
SW26	BAE	Inside	no	2076.52	2076.52			0.14	0.14					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	0.27	0.33	0.32	25561	0.27	2124	574
SW27	BAE	Inside	no	75.92	75.92			0.27	0.27					
SW27	BAE	Outside	no	2798.25	2798.25			0.27	0.27					
SW27	BAE	Inside	no	4993.17	4993.17			0.27	0.27					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	0.315	0.33	0.33	16856	0.32	3288	1036
SW28	BAE	Inside	yes	24000.29	0			0.315	0.33					
SW28	NASSCO	Inside	no	2949.78	2949.78			0.315	0.315					
SW28	BAE	Inside	no	2680.96	2680.96			0.315	0.315					
SW28	NASSCO	Inside	no	213.63	213.63			0.315	0.315					
SW28	NASSCO	Inside	no	308.76	308.76			0.315	0.315					
SW28	NASSCO	Inside	no	1214.31	1214.31			0.315	0.315					
SW28	NASSCO	Inside	no	3070.84	3070.84			0.315	0.315					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	0.49	0.33	0.44	27640	0.49	21485	10528
SW29	BAE	Outside	no	43847.58	43847.58			0.49	0.49					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	0.23	0.23	0.23	16613	0.23	16613	3821
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	0.064	0.33	0.08	6687	0.06	5021	321
SW31	BAE	Inside	no	3388.46	3388.46			0.064	0.064					
SW31	BAE	Outside	no	61423.95	61423.95			0.064	0.064					
SW31	BAE	Inside	no	7943.74	7943.74			0.064	0.064					
SW31	BAE	Inside	no	5693.36	5693.36			0.064	0.064					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	0.064	0.064	0.06	5023	0.06	5023	321
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	0.065	0.065	0.07	9872	0.07	9872	642
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	0.21	0.21	0.21	63960	0.21	63960	13432
SW34	NASSCO	Outside	no	132756	132756.04			0.21	0.21					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	0.21	0.21	0.21	19053	0.21	19053	4001
SW36	BAE	Inside	no	17866.18	17866.18			0.21	0.21					
NA20	NASSCO	Inside	no	13723.08	13723.08			0.44						
NA21	NASSCO	Inside	no	28457.11	28457.11			0.39						
NA22	NASSCO	Inside	no	181098.6	181098.6			0.46						

Table A34-2 Data for Table A34-1, Continued

								Lead (mg/kg dry)					Background=	53
Station	**Shipyard**	**Leasehold**	**Dredge/ Remediate**	**Area (ft2)**	**Non-Dredge Area (ft2)**	**Total Area by Station (ft2)**	**Total Non-Dredge Area by Station (ft2)**	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA01	NASSCO	Inside	yes	5121.17	0	99788.14	92337.68	84	53	81.69	8151240	84.00	7756365	651534670
NA01	BAE	Inside	yes	2329.29	0			84	53					
NA01	NASSCO	Inside	no	416.53	416.53			84	84					
NA01	NASSCO	Inside	no	269.86	269.86			84	84					
NA01	BAE	Outside	no	3413.04	3413.04			84	84					
NA01	NASSCO	Outside	no	11893.16	11893.16			84	84					
NA01	NASSCO	Inside	no	75065.19	75065.19			84	84					
NA01	BAE	Inside	no	1279.9	1279.9			84	84					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	76	76	76.00	12465161	76.00	12465161	947352200
NA02	NASSCO	Inside	no	20907.56	20907.56			76	76					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	94	94	94.00	11128111	94.00	11128111	1046042438
NA03	NASSCO	Inside	no	117647.4	117647.37			94	94					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	93	93	93.00	6758232	93.00	6758232	628515565
NA04	NASSCO	Inside	no	13.87	13.87			93	93					
NA04	NASSCO	Inside	no	68573.77	68573.77			93	93					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	65	65	65.00	7333574	65.00	7333574	476682287
NA05	NASSCO	Inside	no	107319.3	107319.33			65	65					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	130	53	78.26	4776702	130.00	2603084	338400868
NA06	NASSCO	Inside	no	491.33	491.33			130	130					
NA06	NASSCO	Inside	no	10353.97	10353.97			130	130					
NA06	NASSCO	Inside	no	469.55	469.55			130	130					
NA06	NASSCO	Inside	no	651.17	651.17			130	130					
NA06	NASSCO	Inside	no	548.07	548.07			130	130					
NA06	NASSCO	Inside	no	1248.95	1248.95			130	130					
NA06	NASSCO	Inside	no	623.55	623.55			130	130					
NA06	NASSCO	Inside	no	5637.13	5637.13			130	130					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	100	100	100.00	3029753	100.00	3029753	302975300
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	96	96	96.00	1953798	96.00	1953798	187564585
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	97	53	56.25	1660595	97.00	211624	20527521
NA09	NASSCO	Inside	no	1070.7	1070.7			97	97					
NA09	NASSCO	Inside	no	1110.99	1110.99			97	97					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	59	59	59.00	1719022	59.00	1719022	101422312
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	73	73	73.00	2760376	73.00	2760376	201507449
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	59	53	58.68	5345088	59.00	5084048	299958849
NA12	NASSCO	Inside	no	86170.31	86170.31			59	59					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	75	75	75.00	19179533	75.00	19179533	1438464938
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	66	66	66.00	13773370	66.00	13773370	909042402
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	83	53	53.83	2564253	83.00	109899	9121656
NA15	NASSCO	Inside	no	1324.09	1324.09			83	83					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	89.75	53	89.33	3417305	89.75	3394188	304628367
NA16	NASSCO	Inside	no	37818.25	37818.25			89.75	89.75					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	115	53	56.37	2055822	115.00	227846	26202296
NA17	NASSCO	Inside	no	1981.27	1981.27			115	115					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	97	53	87.53	3540771	97.00	3079304	298692469
NA18	NASSCO	Inside	yes	2671.13	0			97	53					
NA18	NASSCO	Inside	no	31745.4	31745.4			97	97					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	100	53	59.75	1914477	100.00	459961	45996100
NA19	NASSCO	Inside	yes	27442.34	0			100	53					

Table A34-2 Data for Table A34-1, Continued

								Lead (mg/kg dry)					Background=	53
Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.[2]
NA19	NASSCO	Inside	no	1152.78	1152.78			100	100					
NA19	NASSCO	Inside	no	3446.83	3446.83			100	100					
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	53	53	53.00	16507656	53.00	16507656	874905747
NA20	NASSCO	Inside	no	23295.98	23295.98			53	53					
NA20	NASSCO	Inside	no	85022.7	85022.7			53	53					
NA20	NASSCO	Inside	no	176351.5	176351.5			53	53					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	83	83	83.00	39518124	83.00	39518124	3280004251
NA21	NASSCO	Inside	no	9198.08	9198.08			83	83					
NA21	NASSCO	Inside	no	30752.99	30752.99			83	83					
NA21	NASSCO	Outside	no	347483.2	347483.15			83	83					
NA21	NASSCO	Inside	no	79424.32	79424.32			83	83					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	95	95	95.00	5193651	95.00	5193651	493396840
NA22	NASSCO	Inside	no	13565.26	13565.26			95	95					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	120	53	115.83	7876581	120.00	7652428	918291312
NA23	NASSCO	Inside	no	6267.98	6267.98			120	120					
NA23	NASSCO	Inside	no	451.2	451.2			120	120					
NA23	NASSCO	Inside	no	3175.16	3175.16			120	120					
NA23	NASSCO	Inside	no	53875.89	53875.89			120	120					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	88	88	88.00	5747660	88.00	5747660	505794094
NA24	NASSCO	Inside	no	57539.8	57539.8			88	88					
NA24	NASSCO	Inside	no	849.45	849.45			88	88					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	41	41	41.00	21388218	41.00	21388218	876916949
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	41	41	41.00	12404287	41.00	12404287	508575775
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	110	53	109.81	5917827	110.00	5908533	649938674
NA27	NASSCO	Inside	no	53713.94	53713.94			110	110					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	84	84	84.00	4558005	84.00	4558005	382872390
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	56	56	56.00	11365975	56.00	11365975	636494602
NA29	NASSCO	Inside	no	29422.14	29422.14			56	56					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	59	59	59.00	14209425	59.00	14209425	838356103
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	34	34	34.00	7792304	34.00	7792304	264938334
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	145	53	53.00	1769867			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	170	53	53.00	2075604	170.00	41	6936
SW02	BAE	Outside	no	0.24	0.24			170	170					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	79	53	78.89	3850930	79.00	3840470	303397166
SW03	BAE	Outside	no	48613.55	48613.55			79	79					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	430	53	165.00	3742556	430.00	2897568	1245954197
SW04	BAE	Outside	yes	13563.04	0			430	53					
SW04	BAE	Inside	no	6738.53	6738.53			430	430					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	120	53	74.02	1788389	120.00	909450	109134000
SW05	BAE	Inside	yes	15429.24	0			120	53					
SW05	BAE	Inside	no	7578.75	7578.75			120	120					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	81	53	77.25	1989356	81.00	1806772	146348551
SW06	BAE	Outside	yes	1749.56	0			81	53					
SW06	BAE	Inside	yes	656.18	0			81	53					
SW06	BAE	Inside	no	5850.65	5850.65			81	81					
SW06	BAE	Inside	no	199.48	199.48			81	81					
SW06	BAE	Inside	no	970.52	970.52			81	81					
SW06	BAE	Outside	no	9831.6	9831.6			81	81					
SW06	BAE	Inside	no	5453.58	5453.58			81	81					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	57	57	57.00	2334006	57.00	2334006	133038363

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Lead (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	53 Area * No-Dredge Conc.^{2}
SW07	BAE	Outside	no	30303.13	30303.13			57	57					
SW07	BAE	Inside	no	5715.07	5715.07			57	57					
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	225	53	99.26	1670358	225.00	1018312	229120144
SW08	BAE	Inside	yes	9611.17	0			225	53					
SW08	BAE	Inside	no	647.64	647.64			225	225					
SW08	BAE	Inside	no	1805.85	1805.85			225	225					
SW08	BAE	Inside	no	2062.65	2062.65			225	225					
SW08	BAE	Inside	no	9.69	9.69			225	225					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	220	53	76.43	1870989	220.00	755667	166246740
SW09	BAE	Inside	no	637.14	637.14			220	220					
SW09	BAE	Inside	no	2797.71	2797.71			220	220					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	79	53	55.34	1195822	79.00	153705	12142677
SW10	BAE	Inside	no	315.77	315.77			79	79					
SW10	BAE	Inside	no	1505.36	1505.36			79	79					
SW10	BAE	Inside	no	124.5	124.5			79	79					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	74	74	74.00	2715011	74.00	2715011	200910826
SW11	BAE	Inside	no	34912.38	34912.38			74	74					
SW11	BAE	Inside	no	0.18	0.18			74	74					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	52	52	52.00	5872974	52.00	5872974	305394654
SW12	BAE	Inside	no	4859.52	4859.52			52	52					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	93	53	70.36	2691910	93.00	1544521	143640430
SW13	BAE	Inside	no	3900.8	3900.8			93	93					
SW13	BAE	Inside	no	248.4	248.4			93	93					
SW13	BAE	Inside	no	12458.55	12458.55			93	93					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	88	53	53.00	886792			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	90	53	85.43	4763921	90.00	4398639	395877537
SW15	BAE	Inside	yes	95.2	0			90	53					
SW15	BAE	Inside	no	48873.77	48873.77			90	90					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	97	53	53.93	961767	97.00	36433	3534020
SW16	BAE	Inside	no	375.6	375.6			97	97					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	93	53	58.63	3277460	93.00	732025	68078355
SW17	BAE	Inside	no	3770.56	3770.56			93	93					
SW17	BAE	Inside	no	171.53	171.53			93	93					
SW17	BAE	Inside	no	2824.69	2824.69			93	93					
SW17	BAE	Inside	no	1104.46	1104.46			93	93					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	86	86	86.00	4523727	86.00	4523727	389040546
SW18	BAE	Outside	no	772.41	772.41			86	86					
SW18	BAE	Inside	no	37171.63	37171.63			86	86					
SW18	BAE	Inside	no	3616.16	3616.16			86	86					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	51	51	51.00	10952074	51.00	10952074	558555777
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	110	53	91.34	2573464	110.00	2084590	229304922
SW20	BAE	Inside	yes	1332.79	0			110	53					
SW20	BAE	Inside	no	9197.16	9197.16			110	110					
SW20	BAE	Inside	no	9753.66	9753.66			110	110					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	120	53	53.00	630505			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	110	53	53.00	199374			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	110	53	68.25	2052674	110.00	884978	97347525
SW23	BAE	Inside	yes	21998.96	0			110	53					
SW23	BAE	Inside	no	7839.28	7839.28			110	110					
SW23	BAE	Inside	no	205.97	205.97			110	110					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Lead (mg/kg dry)					Background=	53
								Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Area * No-Dredge Conc.^{2}
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	88	53	60.90	1289800	88.00	420644	37016630
SW24	BAE	Inside	yes	470.91	0			88	53					
SW24	BAE	Inside	no	4780.04	4780.04			88	88					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	85.5	53	82.12	5723082	85.50	5339205	456502012
SW25	BAE	Inside	yes	1753.5	0			85.5	53					
SW25	BAE	Inside	no	1305.2	1305.2			85.5	85.5					
SW25	BAE	Inside	no	8132.91	8132.91			85.5	85.5					
SW25	BAE	Inside	no	653.01	653.01			85.5	85.5					
SW25	BAE	Inside	no	11150.23	11150.23			85.5	85.5					
SW25	BAE	Inside	no	1910.2	1910.2			85.5	85.5					
SW25	BAE	Inside	no	39295.29	39295.29			85.5	85.5					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	58	58	58.00	5041558	58.00	5041558	292410351
SW26	BAE	Outside	no	84700.62	84700.62			58	58					
SW26	BAE	Inside	no	2076.52	2076.52			58	58					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	80	53	55.69	4393512	80.00	629387	50350976
SW27	BAE	Inside	no	75.92	75.92			80	80					
SW27	BAE	Outside	no	2798.25	2798.25			80	80					
SW27	BAE	Inside	no	4993.17	4993.17			80	80					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	100	53	62.52	3222957	100.00	1043828	104382800
SW28	BAE	Inside	yes	24000.29	0			100	53					
SW28	NASSCO	Inside	no	2949.78	2949.78			100	100					
SW28	BAE	Inside	no	2680.96	2680.96			100	100					
SW28	NASSCO	Inside	no	213.63	213.63			100	100					
SW28	NASSCO	Inside	no	308.76	308.76			100	100					
SW28	NASSCO	Inside	no	1214.31	1214.31			100	100					
SW28	NASSCO	Inside	no	3070.84	3070.84			100	100					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	72	53	66.33	4145444	72.00	3157026	227305855
SW29	BAE	Outside	no	43847.58	43847.58			72	72					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	72	72	72.00	5200629	72.00	5200629	374445297
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	21	53	22.93	1915027	21.00	1647440	34596234
SW31	BAE	Inside	no	3388.46	3388.46			21	21					
SW31	BAE	Outside	no	61423.95	61423.95			21	21					
SW31	BAE	Inside	no	7943.74	7943.74			21	21					
SW31	BAE	Inside	no	5693.36	5693.36			21	21					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	57	57	57.00	4473179	57.00	4473179	254971188
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	58	58	58.00	8808584	58.00	8808584	510897879
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	99	99	99.00	30152630	99.00	30152630	2985110368
SW34	NASSCO	Outside	no	132756	132756.04			99	99					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	79	79	79.00	7167639	79.00	7167639	566243496
SW36	BAE	Inside	no	17866.18	17866.18			79	79					
NA20	NASSCO	Inside	no	13723.08	13723.08			53						
NA21	NASSCO	Inside	no	28457.11	28457.11			83						
NA22	NASSCO	Inside	no	181098.6	181098.6			95						

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Zinc (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc. (Background=	192) Area * No-Dredge Conc.[2]
NA01	NASSCO	Inside	yes	5121.17	0	99788.14	92337.68	297.5	192	289.62	28900948	297.50	27470460	8172461791
NA01	BAE	Inside	yes	2329.29	0			297.5	192					
NA01	NASSCO	Inside	no	416.53	416.53			297.5	297.5					
NA01	NASSCO	Inside	no	269.86	269.86			297.5	297.5					
NA01	BAE	Outside	no	3413.04	3413.04			297.5	297.5					
NA01	NASSCO	Outside	no	11893.16	11893.16			297.5	297.5					
NA01	NASSCO	Inside	no	75065.19	75065.19			297.5	297.5					
NA01	BAE	Inside	no	1279.9	1279.9			297.5	297.5					
NA02	NASSCO	Outside	no	143107.7	143107.71	164015.27	164015.27	240	240	240.00	39363665	240.00	39363665	9447279552
NA02	NASSCO	Inside	no	20907.56	20907.56			240	240					
NA03	NASSCO	Inside	no	736.79	736.79	118384.16	118384.16	260	260	260.00	30779882	260.00	30779882	8002769216
NA03	NASSCO	Inside	no	117647.4	117647.37			260	260					
NA04	NASSCO	Inside	no	4081.52	4081.52	72669.16	72669.16	310	310	310.00	22527440	310.00	22527440	6983506276
NA04	NASSCO	Inside	no	13.87	13.87			310	310					
NA04	NASSCO	Inside	no	68573.77	68573.77			310	310					
NA05	NASSCO	Inside	no	5504.88	5504.88	112824.21	112824.21	210	210	210.00	23693084	210.00	23693084	4975547661
NA05	NASSCO	Inside	no	107319.3	107319.33			210	210					
NA06	NASSCO	Inside	yes	41011.66	0	61035.38	20023.72	335	192	238.91	14582185	335.00	6707946	2247161977
NA06	NASSCO	Inside	no	491.33	491.33			335	335					
NA06	NASSCO	Inside	no	10353.97	10353.97			335	335					
NA06	NASSCO	Inside	no	469.55	469.55			335	335					
NA06	NASSCO	Inside	no	651.17	651.17			335	335					
NA06	NASSCO	Inside	no	548.07	548.07			335	335					
NA06	NASSCO	Inside	no	1248.95	1248.95			335	335					
NA06	NASSCO	Inside	no	623.55	623.55			335	335					
NA06	NASSCO	Inside	no	5637.13	5637.13			335	335					
NA07	NASSCO	Inside	no	30297.53	30297.53	30297.53	30297.53	255	255	255.00	7725870	255.00	7725870	1970096888
NA08	NASSCO	Inside	no	20352.06	20352.06	20352.06	20352.06	330	330	330.00	6716180	330.00	6716180	2216339334
NA09	NASSCO	Inside	yes	27339.07	0	29520.76	2181.69	330	192	202.20	5969059	330.00	719958	237586041
NA09	NASSCO	Inside	no	1070.7	1070.7			330	330					
NA09	NASSCO	Inside	no	1110.99	1110.99			330	330					
NA10	NASSCO	Inside	no	29135.97	29135.97	29135.97	29135.97	190	190	190.00	5535834	190.00	5535834	1051808517
NA11	NASSCO	Inside	no	37813.37	37813.37	37813.37	37813.37	230	230	230.00	8697075	230.00	8697075	2000327273
NA12	NASSCO	Inside	yes	4925.27	0	91095.58	86170.31	210	192	209.03	19041417	210.00	18095765	3800110671
NA12	NASSCO	Inside	no	86170.31	86170.31			210	210					
NA13	NASSCO	Outside	no	255727.1	255727.1	255727.1	255727.1	295	295	295.00	75439495	295.00	75439495	22254650878
NA14	NASSCO	Outside	no	208687.4	208687.42	208687.42	208687.42	200	200	200.00	41737484	200.00	41737484	8347496800
NA15	NASSCO	Inside	yes	46308.55	0	47632.64	1324.09	310	192	195.28	9301710	310.00	410468	127245049
NA15	NASSCO	Inside	no	1324.09	1324.09			310	310					
NA16	NASSCO	Inside	yes	436.18	0	38254.43	37818.25	312.5	192	311.13	11901950	312.50	11818203	3693188477
NA16	NASSCO	Inside	no	37818.25	37818.25			312.5	312.5					
NA17	NASSCO	Inside	yes	34490.11	0	36471.38	1981.27	620	192	215.25	7850489	620.00	1228387	761600188
NA17	NASSCO	Inside	no	1981.27	1981.27			620	620					
NA18	NASSCO	Inside	yes	6035.8	0	40452.33	31745.4	380	192	339.54	13734983	380.00	12063252	4584035760
NA18	NASSCO	Inside	yes	2671.13	0			380	192					
NA18	NASSCO	Inside	no	31745.4	31745.4			380	380					
NA19	NASSCO	Inside	yes	1.35	0	32043.3	4599.61	450	192	229.03	7339013	450.00	2069825	931421025
NA19	NASSCO	Inside	yes	27442.34	0			450	192					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Zinc (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	192 Area * No-Dredge Conc.[2]
NA19	NASSCO	Inside	no	1152.78	1152.78			450	450					
NA19	NASSCO	Inside	no	3446.83	3446.83			450	450					
NA20	NASSCO	Inside	no	26795.02	26795.02	311465.2	311465.2	190	190	190.00	59178388	190.00	59178388	11243893720
NA20	NASSCO	Inside	no	23295.98	23295.98			190	190					
NA20	NASSCO	Inside	no	85022.7	85022.7			190	190					
NA20	NASSCO	Inside	no	176351.5	176351.5			190	190					
NA21	NASSCO	Inside	no	9263.43	9263.43	476121.97	476121.97	250	250	250.00	119030493	250.00	119030493	29757623125
NA21	NASSCO	Inside	no	9198.08	9198.08			250	250					
NA21	NASSCO	Inside	no	30752.99	30752.99			250	250					
NA21	NASSCO	Outside	no	347483.2	347483.15			250	250					
NA21	NASSCO	Inside	no	79424.32	79424.32			250	250					
NA22	NASSCO	Inside	no	41104.75	41104.75	54670.01	54670.01	230	230	230.00	12574102	230.00	12574102	2892043529
NA22	NASSCO	Inside	no	13565.26	13565.26			230	230					
NA23	NASSCO	Inside	yes	4229.31	0	67999.54	63770.23	430	192	415.20	28233226	430.00	27421199	11791115527
NA23	NASSCO	Inside	no	6267.98	6267.98			430	430					
NA23	NASSCO	Inside	no	451.2	451.2			430	430					
NA23	NASSCO	Inside	no	3175.16	3175.16			430	430					
NA23	NASSCO	Inside	no	53875.89	53875.89			430	430					
NA24	NASSCO	Inside	no	6925.07	6925.07	65314.32	65314.32	280	280	280.00	18288010	280.00	18288010	5120642688
NA24	NASSCO	Inside	no	57539.8	57539.8			280	280					
NA24	NASSCO	Inside	no	849.45	849.45			280	280					
NA25	NASSCO	Outside	no	521663.9	521663.86	521663.86	521663.86	130	130	130.00	67816302	130.00	67816302	8816119234
NA26	NASSCO	Outside	no	302543.6	302543.59	302543.59	302543.59	140	140	140.00	42356103	140.00	42356103	5929854364
NA27	NASSCO	Inside	yes	175.35	0	53889.29	53713.94	500	192	499.00	26890637	500.00	26856970	13428485000
NA27	NASSCO	Inside	no	53713.94	53713.94			500	500					
NA28	NASSCO	Inside	no	54261.96	54261.96	54261.96	54261.96	390	390	390.00	21162164	390.00	21162164	8253244116
NA29	NASSCO	Outside	no	173541.7	173541.7	202963.84	202963.84	170	170	170.00	34503853	170.00	34503853	5865654976
NA29	NASSCO	Inside	no	29422.14	29422.14			170	170					
NA30	NASSCO	Outside	no	240837.7	240837.72	240837.72	240837.72	170	170	170.00	40942412	170.00	40942412	6960210108
NA31	NASSCO	Outside	no	229185.4	229185.41	229185.41	229185.41	110	110	110.00	25210395	110.00	25210395	2773143461
SW01	BAE	Outside	yes	33393.71	0	33393.71	0	520	192	192.00	6411592			
SW02	BAE	Inside	yes	39161.57	0	39161.81	0.24	585	192	192.00	7519162	585.00	140	82134
SW02	BAE	Outside	no	0.24	0.24			585	585					
SW03	BAE	Outside	yes	197.35	0	48810.9	48613.55	230	192	229.85	11219008	230.00	11181117	2571656795
SW03	BAE	Outside	no	48613.55	48613.55			230	230					
SW04	BAE	Inside	yes	2380.13	0	22681.7	6738.53	3450	192	1159.92	26309017	3450.00	23247929	80205353325
SW04	BAE	Outside	yes	13563.04	0			3450	192					
SW04	BAE	Inside	no	6738.53	6738.53			3450	3450					
SW05	BAE	Inside	yes	1154.51	0	24162.5	7578.75	280	192	219.60	5306130	280.00	2122050	594174000
SW05	BAE	Inside	yes	15429.24	0			280	192					
SW05	BAE	Inside	no	7578.75	7578.75			280	280					
SW06	BAE	Inside	yes	1039.23	0	25750.8	22305.83	280	192	268.23	6907067	280.00	6245632	1748777072
SW06	BAE	Outside	yes	1749.56	0			280	192					
SW06	BAE	Inside	yes	656.18	0			280	192					
SW06	BAE	Inside	no	5850.65	5850.65			280	280					
SW06	BAE	Inside	no	199.48	199.48			280	280					
SW06	BAE	Inside	no	970.52	970.52			280	280					
SW06	BAE	Outside	no	9831.6	9831.6			280	280					
SW06	BAE	Inside	no	5453.58	5453.58			280	280					
SW07	BAE	Inside	no	4929.28	4929.28	40947.48	40947.48	170	170	170.00	6961072	170.00	6961072	1183382172

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Zinc (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Area * No-Dredge Conc.	Background= 192 Area * No-Dredge Conc.[2]
SW07	BAE	Outside	no	30303.13	30303.13			170	170					
SW07	BAE	Inside	no	5715.07	5715.07			170	170					
SW08	BAE	Inside	yes	2691.59	0	16828.59	4525.83	830	192	363.58	6118569	830.00	3756439	3117844287
SW08	BAE	Inside	yes	9611.17	0			830	192					
SW08	BAE	Inside	no	647.64	647.64			830	830					
SW08	BAE	Inside	no	1805.85	1805.85			830	830					
SW08	BAE	Inside	no	2062.65	2062.65			830	830					
SW08	BAE	Inside	no	9.69	9.69			830	830					
SW09	BAE	Inside	yes	21043.82	0	24478.67	3434.85	1200	192	333.44	8162233	1200.00	4121820	4946184000
SW09	BAE	Inside	no	637.14	637.14			1200	1200					
SW09	BAE	Inside	no	2797.71	2797.71			1200	1200					
SW10	BAE	Inside	yes	19662.59	0	21608.22	1945.63	360	192	207.13	4475644	360.00	700427	252153648
SW10	BAE	Inside	no	315.77	315.77			360	360					
SW10	BAE	Inside	no	1505.36	1505.36			360	360					
SW10	BAE	Inside	no	124.5	124.5			360	360					
SW11	BAE	Inside	no	1776.78	1776.78	36689.34	36689.34	240	240	240.00	8805442	240.00	8805442	2113305984
SW11	BAE	Inside	no	34912.38	34912.38			240	240					
SW11	BAE	Inside	no	0.18	0.18			240	240					
SW12	BAE	Outside	no	108082.3	108082.29	112941.81	112941.81	160	160	160.00	18070690	160.00	18070690	2891310336
SW12	BAE	Inside	no	4859.52	4859.52			160	160					
SW13	BAE	Inside	yes	21648.86	0	38256.61	16607.75	580	192	360.44	13789076	580.00	9632495	5586847100
SW13	BAE	Inside	no	3900.8	3900.8			580	580					
SW13	BAE	Inside	no	248.4	248.4			580	580					
SW13	BAE	Inside	no	12458.55	12458.55			580	580					
SW14	BAE	Inside	yes	16731.93	0	16731.93	0	300	192	192.00	3212531			
SW15	BAE	Inside	yes	6796.9	0	55765.87	48873.77	290	192	277.89	15496677	290.00	14173393	4110284057
SW15	BAE	Inside	yes	95.2	0			290	192					
SW15	BAE	Inside	no	48873.77	48873.77			290	290					
SW16	BAE	Inside	yes	17459.12	0	17834.72	375.6	370	192	195.75	3491123	370.00	138972	51419640
SW16	BAE	Inside	no	375.6	375.6			370	370					
SW17	BAE	Inside	yes	48027.07	0	55898.31	7871.24	310	192	208.62	11661282	310.00	2440084	756426164
SW17	BAE	Inside	no	3770.56	3770.56			310	310					
SW17	BAE	Inside	no	171.53	171.53			310	310					
SW17	BAE	Inside	no	2824.69	2824.69			310	310					
SW17	BAE	Inside	no	1104.46	1104.46			310	310					
SW18	BAE	Inside	no	11041.28	11041.28	52601.48	52601.48	280	280	280.00	14728414	280.00	14728414	4123956032
SW18	BAE	Outside	no	772.41	772.41			280	280					
SW18	BAE	Inside	no	37171.63	37171.63			280	280					
SW18	BAE	Inside	no	3616.16	3616.16			280	280					
SW19	BAE	Outside	no	214746.6	214746.55	214746.55	214746.55	150	150	150.00	32211983	150.00	32211983	4831797375
SW20	BAE	Inside	yes	7891.25	0	28174.86	18950.82	390	192	325.18	9161835	390.00	7390820	2882419722
SW20	BAE	Inside	yes	1332.79	0			390	192					
SW20	BAE	Inside	no	9197.16	9197.16			390	390					
SW20	BAE	Inside	no	9753.66	9753.66			390	390					
SW21	BAE	Inside	yes	11896.32	0	11896.32	0	330	192	192.00	2284093			
SW22	BAE	Inside	yes	3761.78	0	3761.78	0	310	192	192.00	722262			
SW23	BAE	Inside	yes	33.04	0	30077.25	8045.25	330	192	228.91	6885077	330.00	2654933	876127725
SW23	BAE	Inside	yes	21998.96	0			330	192					
SW23	BAE	Inside	no	7839.28	7839.28			330	330					
SW23	BAE	Inside	no	205.97	205.97			330	330					

Table A34-2 Data for Table A34-1, Continued

Station	Shipyard	Leasehold	Dredge/ Remediate	Area (ft2)	Non-Dredge Area (ft2)	Total Area by Station (ft2)	Total Non-Dredge Area by Station (ft2)	Zinc (mg/kg dry) Measured Conc.	Remediated Conc.	Station AW-Avg. Post-Dredge Conc	Area * Post-Dredge Conc.	Station AW-Avg. No-Dredge Conc	Background= Area * No-Dredge Conc.	192 Area * No-Dredge Conc.[2]
SW24	BAE	Inside	yes	15928.27	0	21179.22	4780.04	300	192	216.38	4582655	300.00	1434012	430203600
SW24	BAE	Inside	yes	470.91	0			300	192					
SW24	BAE	Inside	no	4780.04	4780.04			300	300					
SW25	BAE	Inside	yes	5489.47	0	69689.81	62446.84	345	192	329.10	22934810	345.00	21544160	7432735131
SW25	BAE	Inside	yes	1753.5	0			345	192					
SW25	BAE	Inside	no	1305.2	1305.2			345	345					
SW25	BAE	Inside	no	8132.91	8132.91			345	345					
SW25	BAE	Inside	no	653.01	653.01			345	345					
SW25	BAE	Inside	no	11150.23	11150.23			345	345					
SW25	BAE	Inside	no	1910.2	1910.2			345	345					
SW25	BAE	Inside	no	39295.29	39295.29			345	345					
SW26	BAE	Inside	no	146.27	146.27	86923.41	86923.41	160	160	160.00	13907746	160.00	13907746	2225239296
SW26	BAE	Outside	no	84700.62	84700.62			160	160					
SW26	BAE	Inside	no	2076.52	2076.52			160	160					
SW27	BAE	Inside	yes	71021.23	0	78888.57	7867.34	250	192	197.78	15602911	250.00	1966835	491708750
SW27	BAE	Inside	no	75.92	75.92			250	250					
SW27	BAE	Outside	no	2798.25	2798.25			250	250					
SW27	BAE	Inside	no	4993.17	4993.17			250	250					
SW28	NASSCO	Inside	yes	17115.36	0	51553.93	10438.28	330	192	219.94	11338837	330.00	3444632	1136728692
SW28	BAE	Inside	yes	24000.29	0			330	192					
SW28	NASSCO	Inside	no	2949.78	2949.78			330	330					
SW28	BAE	Inside	no	2680.96	2680.96			330	330					
SW28	NASSCO	Inside	no	213.63	213.63			330	330					
SW28	NASSCO	Inside	no	308.76	308.76			330	330					
SW28	NASSCO	Inside	no	1214.31	1214.31			330	330					
SW28	NASSCO	Inside	no	3070.84	3070.84			330	330					
SW29	BAE	Outside	yes	18649.41	0	62496.99	43847.58	230	192	218.66	13665630	230.00	10084943	2319536982
SW29	BAE	Outside	no	43847.58	43847.58			230	230					
SW30	BAE	Outside	no	72230.96	72230.96	72230.96	72230.96	300	300	300.00	21669288	300.00	21669288	6500786400
SW31	BAE	Inside	yes	5048.81	0	83498.32	78449.51	80	192	86.77	7245332	80.00	6275961	502076864
SW31	BAE	Inside	no	3388.46	3388.46			80	80					
SW31	BAE	Outside	no	61423.95	61423.95			80	80					
SW31	BAE	Inside	no	7943.74	7943.74			80	80					
SW31	BAE	Inside	no	5693.36	5693.36			80	80					
SW32	BAE	Outside	no	78476.82	78476.82	78476.82	78476.82	160	160	160.00	12556291	160.00	12556291	2009006592
SW33	BAE	Outside	no	151872.1	151872.14	151872.14	151872.14	170	170	170.00	25818264	170.00	25818264	4389104846
SW34	BAE	Outside	no	171816	171815.98	304572.02	304572.02	310	310	310.00	94417326	310.00	94417326	29269371122
SW34	NASSCO	Outside	no	132756	132756.04			310	310					
SW36	BAE	Outside	no	72863.43	72863.43	90729.61	90729.61	300	300	300.00	27218883	300.00	27218883	8165664900
SW36	BAE	Inside	no	17866.18	17866.18			300	300					
NA20	NASSCO	Inside	no	13723.08	13723.08			190						
NA21	NASSCO	Inside	no	28457.11	28457.11			250						
NA22	NASSCO	Inside	no	181098.6	181098.6			230						

Table A34-3 List of PCBs and PAHs for Section 34.2.3

Summed List of PAH Analytes Measured in Bulk Sediments

PAH	Identifier	PAH	Identifier
Naphthalene	C0N	Pyrene	PYR
C1-Naphthalenes	C1N	C1-Fluoranthenes/pyrenes	C1F/P
C2-Naphthalenes	C2N	C2-Fluoranthenes/pyrenes	C2F/P
C3-Naphthalenes	C3N	C3-Fluoranthenes/pyrenes	C3F/P
C4-Naphthalenes	C4N	Benzo[a]anthracene	BAA
Acenaphthylene	ACEY	Chrysene	C0C
Acenaphthene	ACE	C1-Chrysenes	C1C
Biphenyl	BIP	C2-Chrysenes	C2C
Fluorene	C0F	C3-Chrysenes	C3C
C1-Fluorenes	C1F	C4-Chrysenes	C4C
C2-Fluorenes	C2F	Benzo[b]fluoranthene	BBF
C3-Fluorenes	C3F	Benzo[k]fluoranthene	BKF
Anthracene	C0A	Benzo[e]pyrene	BEP
Phenanthrene	C0P	Benzo[a]pyrene	BAP
C1-Phenanthrenes/anthracenes	C1P/A	Perylene	PER
C2-Phenanthrenes/anthracenes	C2P/A	Indeno[1,2,3,-c,d]pyrene	INDENO
C3-Phenanthrenes/anthracenes	C3P/A	Dibenzo[a,h]anthracene	DAH
C4-Phenanthrenes/anthracenes	C4P/A	Benzo[g,h,i]perylene	BGP
Dibenzothiophene	C0D	Total PAH[1]	TPAH
C1-Dibenzothiophenes	C1D	Priority Pollutant PAH[2]	PPPAH
C2-Dibenzothiophenes	C2D	Low Molecular Weight PAH[3]	LMWPAH
C3-Dibenzothiophenes	C3D	High Molecular Weight PAH[4]	HMWPAH
Fluoranthene	FLANT		

SCCWRP and U.S. Navy, 2005b

1. Total PAH = sum of all listed PAH analytes
2. Priority pollutant PAH = sum of C0N, ACEY, ACE, C0F, C0A, C0P, FLANT, PYR, BAA, C0C, BBF, BKF, BAP, INDENO, DAH, BGP
3. Low Molecular Weight PAH = sum of C0N, C2N, ACEY, ACE, C0F, C0A, C0P
4. High Molecular Weidht PAH = sum of FLANT, PYR, BAA, C0C, BAP, DAH

Table A34-3 List of PCBs and PAHs for Section 34.2.3, Continued

Summed List of PCB Congeners Measured in Bulk Sediments

PCB Congener	Congener Number	PCB Congener	Congener Number
2,2',5-Trichlorobiphenyl (Cl3)	18	2,2',3,3',4,4'-Hexachlorobiphenyl (Cl6)	128
2,4,4'-Trichlorobiphenyl (Cl3)	28	2,2',3,4,4',5'-Hexachlorobiphenyl (Cl6)	138
3,4,4'-Trichlorobiphenyl (Cl3)	37	2,2',3,4',5',6-Hexachlorobiphenyl (Cl6)	149
2,2',3,5'-Tetrachlorobiphenyl (Cl4)	44	2,2',3,5,5',6-Hexachlorobiphenyl (Cl6)	151
2,4,4',5'-Tetrachlorobiphenyl (Cl4)	49	2,2',4,4',5,5'-Hexachlorobiphenyl (Cl6)	153
2,2',5,5'-Tetrachlorobiphenyl (Cl4)	52	2,3,3',4,4',5-Hexachlorobiphenyl (Cl6)	156
2,3',4,4'-Tetrachlorobiphenyl (Cl4)	66	2,3,3',4,4',5'-Hexachlorobiphenyl (Cl6)	157
2,3',4',5 - Tetrachlorobiphenyl (Cl4)	70	2,3,3',4,4',6-Hexachlorobiphenyl (Cl6)	158
2,4,4',5 -Tetrachlorobiphenyl (Cl4)	74	2,3',4,4',5,5'-Hexachlorobiphenyl (Cl6)	167
3,4,4',5 -Tetrachlorobiphenyl (Cl4)	81	2,3',4,4',5',6-Hexachlorobiphenyl (Cl6)	168
3,3',4,4'-Tetrachlorobiphenyl (Cl4)	77	3,3',4,4',5,5'-Hexachlorobiphenyl (Cl6)	169
2,2'3,4,5'-Pentachlorobiphenyl (Cl5)	87	2,2',3,3',4,4',5-Heptachlorobiphenyl (Cl7)	170
2,2',4,4',5-Pentachlorobiphenyl (Cl5)	99	2,2',3,3',4,5',6'-Heptachlorobiphenyl (Cl7)	177
2,2',4,5,5'-Pentachlorobiphenyl (Cl5)	101	2,2',3,4,4',5,5'-Heptachlorobiphenyl (Cl7)	180
2,3,3',4,4'-Pentachlorobiphenyl (Cl5)	105	2,2',3,4,4',5',6-Heptachlorobiphenyl (Cl7)	183
2,3,3',4',6-Pentachlorobiphenyl (Cl5)	110	2,2',3,4',5,5',6-Heptachlorobiphenyl (Cl7)	187
2,3,4,4',5-Pentachlorobiphenyl (Cl5)	114	2,3,3',4,4',5,5'-Heptachlorobiphenyl (Cl7)	189
2,3',4,4',5-Pentachlorobiphenyl (Cl5)	118	2,2',3,3',4,4',5,5'-Octachlorobiphenyl (Cl8)	194
2,3',4,4',6-Pentachlorobiphenyl (Cl5)	119	2,2',3,3',4,5',6,6'-Octachlorobiphenyl (Cl8)	201
2,3',4,4',5'-Pentachlorobiphenyl (Cl5)	123	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (Cl9)	206
3,3',4,4',5-Pentachlorobiphenyl (Cl5)	126	Total PCB[1]	TPCB

SCCWRP and U.S. Navy, 2005b

1. Total PCB = sum of all listed PCB congeners.

35. Finding 35: Remedial Action Implementation Schedule

Finding 35 of CAO No. R9-2012-0024 states:

The dischargers have proposed a remedial action implementation schedule and a description of specific remedial actions they intend to undertake to comply with this CAO. The remedial action implementation schedule will begin with the adoption of this CAO and end with the submission of final reports documenting that the alternative sediment cleanup levels have been met. From start to finish, remedial action implementation is expected to take approximately 5 years to complete.

The proposed remedial actions have a substantial likelihood to achieve compliance with the requirements of this CAO within a reasonable time frame. The proposed schedule is as short as possible, given 1) the scope, size, complexity, and cost of the remediation, 2) industry experience with the time typically required to implement similar remedial actions, 3) the time needed to secure other regulatory agency approvals and permits before remediation can start, and 4) the need to conduct dredging in a phased manner to prevent or reduce adverse effects to the endangered California Least Tern. Therefore, the remedial action implementation schedule proposed by the dischargers is consistent with the provisions in Resolution No. 92-49 for schedules for cleanup and abatement.

35.1. Resolution No. 92-49 Requirements

Resolution No. 92-49 requires the San Diego Water Board to determine schedules for cleanup and abatement taking into consideration:

a. The degree of threat or impact of the discharge on water quality and beneficial uses;

b. The obligation to achieve timely compliance with cleanup and abatement goals and objectives that implement the applicable Water Quality Control Policies adopted by the Water Boards;

c. The financial and technical resources available to the discharger; and

d. Minimizing the likelihood of imposing a burden on the people of the state with the expense of cleanup and abatement, where feasible.

Under Water Code section 13360, the San Diego Water Board may not specify the “design, location, type of construction, or particular manner” of compliance with cleanup and abatement orders and dischargers can comply in any lawful manner. This restriction serves as a shield against unwarranted interference with the ingenuity of the party subject to the cleanup and abatement order who can elect between available strategies to comply with cleanup objectives and other standards stipulated in a cleanup and abatement order.

The Dischargers have provided a remedial action implementation schedule and a description of specific remedial actions they intend to undertake to comply with the CAO. The proposed remedial actions have a substantial likelihood to achieve compliance with the requirements of the CAO within a reasonable time frame. The proposed schedule is as short as possible, given 1) the scope, size, complexity, and cost of the remediation, 2) industry experience with the time typically required to implement similar remedial actions, 3) the time needed to secure other regulatory agency approvals and permits before remediation can start, and 4) the need to conduct dredging in a phased manner to prevent or reduce adverse effects to the endangered California Least Tern.

The remedial action implementation schedule proposed by the Dischargers is consistent with the provisions in Resolution No. 92-49 for schedules for cleanup and abatement. The cleanup and abatement actions and milestone dates stipulated in the directives of the CAO, therefore, are based on this remedial action implementation schedule. The schedule, and the remedial actions proposed by the dischargers are discussed in further detail below.

35.2. Remedial Action Implementation Schedule

The remedial action implementation schedule will begin with the adoption of CAO No. R9-2012-0024 and end with the submission of final reports documenting that the alternative sediment cleanup levels have been met. This would mark the start of the Post-remedial Monitoring Phase of the cleanup. From start to finish, remedial action implementation is expected to take 5 years to complete. The schedule is constrained by the limited dredging window of September 15 through March 31 to protect the endangered California Least Tern. Because of the limited dredging window, three annual dredging episodes will be needed to complete the proposed dredging activities.

Following is a list of the major tasks to be carried out during the remedial action implementation time frame:

a. Establish framework for funding with a funding mechanism based on an allocation share ratio agreed upon by the Responsible Parties.

b. Bid and select the remedial action project management firm.

c. Design and submit the remedial action plan (RAP).

d. Prepare environmental document, most likely an Environmental Impact Report (EIR).

e. Secure all needed permits from permitting agencies. These permits are likely to include a Clean Water Act Section 401 Water Quality Certification, a Coastal Development Permit, a Rivers and Harbors Act Section 10 Permit, and a Clean Water Act Section 404 Permit.

f. Establish sediment management areas.

g. Implement the selected remedial actions.

h. Conduct final confirmation monitoring.

i. Terminate permits and submit final reports.

A timeline showing when these tasks are expected to occur is shown in Figure 35-1. The timeline is based on implementation schedule running from the final issuance of the CAO by the San Diego Water Board.

35.3. Remedial Actions

The remedial actions that can be used in the different areas of the Shipyard Sediment Site are constrained by both operations at the site, such as vessel and dry dock operations, and physical conditions such as near-shore obstructions and piers. For this reason a variety of remedial techniques are necessary to achieve remedial action objectives.[27] The selected techniques include removing the sediments from the aquatic environment by dredging, capping[28] contaminated sediments with clean material, source control, and relying on natural processes while monitoring the sediments to ensure that contaminant levels are not increasing. These techniques differ in complexity and cost; dredging is the most complex and expensive, and monitoring without active remediation is the least difficult and least expensive.

Vessel and dry-dock operation areas are likely to be prioritized for dredging first because their limited open berth space time requires these areas to be dredged quickly. Near-shore areas present challenges for dredging because of the limited room in these areas for the dredge and barge, and the difficulty maneuvering the dredge and barge in these areas. Land-based excavation/dredging may be an option in these areas. Under-pier areas will be dredged where possible. Where dredging is impossible under the piers, sand capping will be used to cover and contain contaminated sediment. Unconstrained open areas are the easiest to dredge. These areas will be scheduled for dredging around the more difficult areas such as piers, berths, and dry docks.

Structures such as pile bulkheads, rock reveted slopes, piers, and pilings will need to be protected during dredging operations. Protection and/or support will be installed iteratively during remedial activities.

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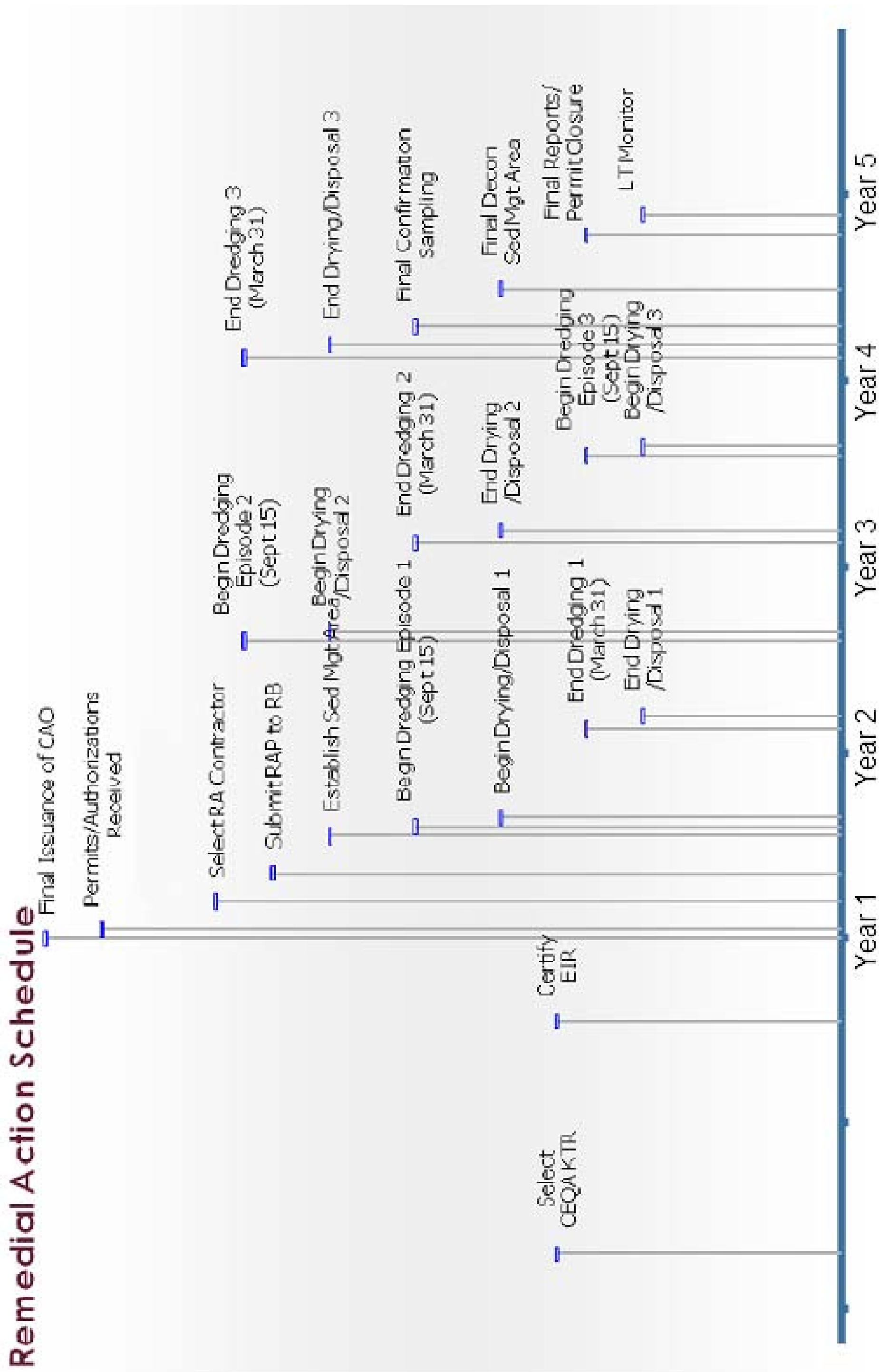
[27] While NASSCO and BAE Systems sought San Diego Water Board concurrence that monitored natural attenuation is an appropriate and exclusive remedy, none of the Dischargers has demonstrated, and there is insufficient evidence in the record, to support a conclusion that, monitored natural attenuation has a substantial likelihood of achieving compliance with the alternative cleanup levels established for the Sediment Management Units identified in this CAO within a reasonable time frame. See also Response to Comments Report, August 23, 2011, pp. 1-26 through 1-28 and 30-1 through 30-4.

[28] Capping refers broadly to the placement of a layer of uncontaminated material over material with elevated concentrations to contain contaminated sediment.

Sand capping will be used to manage residual contamination at depth that may be exposed by dredging. Clean sand will be applied in these areas to a depth that will ensure that the bioactive zone does not extend into residually contaminated areas.

Source control measures will be implemented to ensure that recontamination of the site from storm drain discharges does not occur. These measures include identifying storm drains that are sources of sediment discharge to the Shipyard Sediment Site, cleaning sediment from those storm drains, repairing them if damaged, installing filter best management practices within storm drains, and verifying that the storm drains remain clean and in good repair through closed circuit television inspections.

Figure 35-1 Remedial Action Implementation Schedule



36. Finding 36: Legal and Regulatory Authority

Finding 36 of CAO No. R9-2012-0024 states:

This Order is based on (1) section 13267 and Chapter 5, Enforcement, of the Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with section 13000), commencing with section 13300; (2) applicable state and federal regulations; (3) all applicable provisions of statewide Water Quality Control Plans adopted by the State Water Resources Control Board and the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) adopted by the San Diego Water Board including beneficial uses, water quality objectives, and implementation plans; (4) State Water Board policies for water quality control, including State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California* and Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code section 13304*; and (5) relevant standards, criteria, and advisories adopted by other state and federal agencies.

36.1. Porter-Cologne Water Quality Control Act Jurisdiction

The Porter-Cologne Water Quality Control Act (Division 7 of the Water Code, commencing with section 13000) is replete with provisions intended to protect beneficial uses from impacts from contaminated sediment. Porter-Cologne jurisdiction extends beyond water column effects to require the reasonable protection of beneficial uses from discharges of waste to waters of the state. Legislative history of the Porter-Cologne Act states in commentary on the definition of "pollution" that "it is the unreasonable effect upon beneficial uses of water, caused by waste, that constitutes pollution."[29] This history expresses the intent that if a person discharges waste into waters of the state and beneficial uses of the water are thereby harmed – then pollution exists even if water column concentrations are not effected by wastes that have settled in sediment.

36.1.1. Water Code Section 13267

Water Code section 13267 provides that the San Diego Water Board can require any person who has discharged, discharges, proposes to discharge or is suspected of discharging waste to investigate, monitor, and report information. The only restriction is that the burden of preparing the reports bears a reasonable relationship to the need for and the benefits to be obtained from the reports.

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[29] Final Report of the Study Panel to the California State Water Resources Control Board, 1969, p. 30.

36.1.2. Water Code Section 13304

Water Code section 13304 contains the cleanup and abatement authority of the San Diego Water Board. Section 13304(a) provides that any person who has discharged or discharges waste[30] into waters of the state in violation of any waste discharge requirement[31] or other order or prohibition issued by a Regional Water Board or the State Water Board or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution[32] or nuisance[33] may be required to clean up the discharge and abate the effects thereof. This Section authorizes Regional Water Boards to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge). The San Diego Water Board Cleanup Team's Response to Comments documents or other documents in the record state or suggest that the applicable standard of proof to support issuance of this CAO is substantial evidence. The San Diego Water Board has applied the weight of the evidence standard to its consideration of this CAO and finds that the weight of the evidence supports the factual determinations made in this matter.

36.2. Applicable Federal Regulations

U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 300 – National Oil And Hazardous Substances Pollution Contingency Plan (NCP), Section 300.430, Remedial Investigation/Feasibility Study and Selection of Remedy

The National Oil and Hazardous Substance Pollution Contingency Plan (NCP) in Title 40 Code of Federal Regulations, Part 300 (40 CFR 300) implements the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Oil Pollution Act. CERCLA is a federal law enacted in 1980 and amended in 1986 to clean up uncontrolled or abandoned hazardous-waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment. CERCLA established a "Superfund" to be used by the U.S. EPA to respond to releases of hazardous wastes at certain sites. Under CERCLA, remedial

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[30] "Waste" is very broadly defined in Water Code section 13050 subdivision (d) and" includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal."

[31] The term waste discharge requirements include those, which implement the National Pollutant Discharge Elimination System (NPDES).

[32] Pollution" is defined in Water Code section 13050, subdivision (1) as "an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects either of the following: (A) the waters for beneficial uses, (B) Facilities which serve these beneficial uses." Pollution" may include "contamination."

[33] Nuisance is defined in Water Code section 13050, subdivision (m) "... anything which: (1) is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, and (2) affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal, and (3) occurs during or as a result of the treatment or disposal of wastes."

actions selected by U.S. EPA or other delegated federal agencies for "Superfund" cleanup sites must be protective of human health and the environment.

If CERCLA hazardous substances remain on-site after cleanup, the cleanup levels or remedial action must also attain "legally" applicable or relevant and appropriate requirements (ARARs).[34] ARARs are defined in CERCLA as standards, requirements, criteria, or limitations of federal environmental laws and any more stringent standards, requirements, criteria, or limitations of state environmental or facility sitting laws.[35] To qualify as a state ARAR, the requirement must be a state environmental or facility siting law, not a local law. The requirement must be promulgated (legally enforceable and of general applicability), and more stringent than the federal requirement.[36] The State Water Board's, Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code section 13304*, is an example of a state ARAR that would apply to the setting of cleanup levels at CERCLA sites in California.[37]

The NCP described in 40 CFR 300 provides the USEPA's organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The NCP is required by section 105 of CERCLA and by section 311 of the Clean Water Act and addresses CERCLA's requirements and goals concerning clean-up levels.

Although the Shipyard Sediment Site remediation is not a "Superfund" remediation site subject to the requirements of CERCLA or its implementing regulations, the San Diego Water Board did consider guidance provided in 40 CFR 300.430 clarifying flexibility in the use of baseline risk assessments and acceptable exposure levels in selecting appropriate cleanup levels at CERCLA sites. Based on the considerations provided below the alternative cleanup levels for the Shipyard Sediment Site prescribed in Section 32 are consistent with the requirements of 40 CFR 300.430 pertaining to the protection of human health and the environment and acceptable exposure levels.

Subpart E of 40 CFR 300, Hazardous Substance Response, beginning with 40 CFR 300.430 contains regulations pertaining to the remedy selection process for CERCLA cleanup sites to ensure remedies are implemented 1) that are protective of human health and the environment, 2) that maintain protection over time, and 3) that minimize untreated waste. The NCP provides that remediation goals at CERCLA cleanup sites shall establish acceptable exposure levels that are protective of human health and the environment.[38] Exposures are evaluated based on the potential risk for developing cancer and the potential for non-cancer health hazards.

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34 CERCLA section 121(d)(2)(A), 42 U.S.C. 69621(6)(2)(A).

35 CERCLA section 121(d)(2), 42 U.S.C. 9621(d)(2).

36 CERCLA section 121(d)(4).

37 January 3, 1996 letter from Frances McChesney, Staff Counsel, State Water Resources Control Board to Rex Callaway, Counsel, Department of the Navy, Southwest Division, Naval Facilities Engineering Command, Subject: Resolution No. 92-49.

38 40 CFR 300.430(e)(2)(i).

Risk estimates for non-cancer health effects are expressed as hazard quotients (HQs) and hazard indices (HIs). An RfD is the intake level that represents a threshold below which it is unlikely that even sensitive individuals, such as children, will experience adverse health effects following a chronic exposure. An HQ is the ratio of a specified intake relative to an acceptable intake (i.e., the RfD). If the average daily intake exceeds the RfD (i.e., if the HQ exceeds 1), then there may be cause for concern. The HQ for each contaminant of concern are summed to yield a Hazard Index (HI) to integrate non-cancer hazards from multiple chemicals. The assumption of additive health effects inherent in the HI is most appropriate for substances that induce a common adverse effect by a shared mechanism. Similarly, hazards from exposure to multiple COPCs from multiple pathways are characterized by adding HIs from the relevant pathways to calculate an integrative HI. If the HI is less than or equal to one, then multiple-pathway exposures to contaminants of concern at the site are considered unlikely to result in an adverse effect. Thus remediation goals at CERCLA cleanup sites achieving HQs less than or equal to one for chemical specific hazards and HIs less than or equal to one for multiple-pathway exposures can be considered protective for non-cancer human health effects.[39,40] Alternative cleanup levels for the Shipyard Sediment Site, were set consistent with the requirements of Resolution No. 92-49, to achieve HQs less than or equal to one for chemical specific hazards and HIs less than or equal to one to address non-cancer health effects. These criteria are consistent with the requirements of 40 CFR 300.430.

Cancer risk is expressed as an excess probability of developing cancer over a lifetime (i.e., an increased risk of developing cancer attributable to exposures to site-related contaminants). For example, a 10^{-4} cancer risk means a “one in 10,000 excess cancer risk,” or an increased risk of an individual developing cancer of one in 10,000 as a result of exposure to site contaminants under the conditions used in the baseline risk assessment. The NCP provides that for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000) using U.S. EPA information on the relationship between dose and response.[41] At CERCLA sites cancer risks below 10^{-6} are considered acceptable and cancer risks above 10^{-4} are considered unacceptable. Thus cleanup levels at CERCLA cleanup sites achieving exposure levels within the 10^{-4} to 10^{-6} cancer risk range for known or suspected carcinogens can be considered protective of human health.

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[39] 1986. Guidelines for Health Risk Assessment of Chemical Mixtures. 51 Federal Register 34014. EPA: Washington, D.C. September 24.

[40] 1989. Risk Assessment Guidance for Superfund Human Health Evaluation Manual Part A. Interim Final. Office of Solid Waste and Emergency Response: Washington, D.C. 9285.701A. July. http://www.epa.gov/superfund/programs/risk/ragsa/index.htm

[41] 40 CFR 300.430(e)(2)(i)(A)(2).

The NCP does establish a preference that cleanup levels be set for the more protective end of the range at 10^{-6} when ARARS are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure.[42] However, cleanup levels can be revised to attain a different risk level within the range of 10^{-4} to 10^{-6} based on the balancing of site-specific factors including, but not limited to exposure factors, uncertainty factors, technical factors, and the cost of remediation. In California ARARS are available for setting contaminated sediment cleanup levels at CERCLA sites including the State Water Board's, Resolution No. 92-49. Thus setting alternative cleanup levels for the Shipyard Sediment Site, consistent with the requirements of Resolution No. 92-49, to achieve exposure levels anywhere in the 10^{-4} to 10^{-6} cancer risk range would also be consistent with the requirements of 40 CFR 300.430.

U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 131 – Water Quality Standards, Section 131.38, Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California

U.S. EPA promulgated a final rule prescribing water quality criteria for toxic pollutants in inland surface waters, enclosed bays, and estuaries in California in 2000 (The California Toxics Rule or "CTR."[43] CTR criteria constitute applicable water quality objectives in California. In addition to the CTR, certain criteria for toxic pollutants in the National Toxics Rule (NTR) [40 CFR 131.36] constitute applicable water quality objectives in California as well.

36.3. Applicable State Regulations

California Code of Regulations (CCR), Title 23, Division 3, Chapter 30, Section 3890 et. seq. (Section 3890)

Water Code (Porter Cologne Water Quality Act) section 13196 authorizes the San Diego Water Board to require electronic reporting of information and section 13197.5 directs the State Water Board to promulgate associated regulations for electronic reporting of information. The Electronic Reporting Regulations (Chapter 30, Division 3 of Title 23, section 3890 et seq.) require electronic submission of reports or data required under a San Diego Water Board Order issued after July 1, 2005.

The regulations are to be applied as follows:

Title 23 CCR, Section 3890. (a) The regulations in this Chapter are intended to provide electronic access to reports, including soil, vapor, and water data, prepared for the purpose of subsurface investigation or remediation of: (1) an unauthorized discharge or deposit of waste as defined in section 13050 of the Water Code, (2) an unauthorized release of a hazardous substance as defined in section 25281 of the Health and Safety Code, or (3) a discharge of waste to land

42 40 CFR 300.430(e)(2)(i)(A)(2).

43 The California Toxics Rule (CTR) was finalized by the U.S. EPA in the Federal Register (65 Fed. Register 31682-31719), adding Section 131.38 to Title 40 of the Code of Federal Regulations on May 18, 2000. The full text of the CTR is available at the following web address: http://www.epa.gov/OST/standards/ctrindex.html.

subject to Division 2 of Title 27 or Division 3, Chapter 15, of Title 23 of the California Code of Regulations.

The regulations in Section 3890 require persons responsible for submitting certain reports to the State Board, a Regional Water Board, or a local agency to submit these reports electronically over the Internet to the State Board's Geotracker system. The requirements of Section 3890 are in addition to, and not superseded by, any other applicable reporting requirements. Except as provided in Section 3895(b), the electronic reporting requirements of this Chapter are intended to replace requirements for the submittal of paper copies of reports, beginning July 1, 2005.

23 CCR, Section 3892. The reporting of information by directives of this cleanup and abatement Order are subject to the requirements of California Code of Regulations, Title 23, section 3892 et seq., when those reports are required for the purpose of subsurface investigation or remediation of: (1) an unauthorized discharge or deposit of waste as defined in section 13050 of the Water Code, (2) an unauthorized release of a hazardous substance as defined in section 25281 of the Health and Safety Code, or (3) a discharge of waste to land subject to Division 2 of Title 27 or Division 3, Chapter 15 of Title 23 of the California Code of Regulations. Further, these reporting requirements apply to:

a) Reports submitted pursuant to Division 2 of Title 27 or Division 3, Chapter 15 of Title 23 of the California Code of Regulations (referenced in Resolution 92-49).

b) Reports submitted pursuant to section 13304 of the Water Code.

c) Reports submitted pursuant to section 13267 of the Water Code.

d) Reports submitted pursuant to any order or directive of the State Board, a regional board or a local agency.

In addition to the electronic submittal of reports required pursuant to this Chapter, a regulatory agency may require the submittal of a report, or portions thereof, in diskette, compact disc or other form if the agency determines that the alternative form is necessary. The burden, including cost, of these alternative forms shall bear a reasonable relationship to the need for alternative form and benefits to be obtained from the alternative form (23 CCR Section 3895(b)).

36.4. Water Quality Control Plan for the San Diego Basin (Basin Plan)

The San Diego Water Board's Water Quality Control Plan for the San Diego Basin (Basin Plan) designates 12 beneficial uses[44] for San Diego Bay[45] that may be adversely affected by contaminated sediment. These beneficial uses fall into four broad categories called target receptors, as shown below:

TARGET RECEPTORS	AQUATIC LIFE	AQUATIC - DEPENDENT WILDLIFE	HUMAN HEALTH	NAVIGATION AND SHIPPING
BENEFICIAL USES	Estuarine Habitat (EST)	Wildlife Habitat (WILD)	Contact Water Recreation (REC1)	Navigation (NAV)
	Marine Habitat (MAR)	Preservation of Biological Habitats of Special Significance (BIOL)	Non Contact Water Recreation (REC2)	
	Migration of Aquatic Organisms (MIGR)	Rare, Threatened or Endangered Species (RARE)	Shellfish Harvesting (SHELL)	
	Preservation of Biological Habitats of Special Significance (BIOL)		Commercial and Sport Fishing (COMM)	

44 See Water Code section 13050(f). "Beneficial uses" of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

45 Basin Plan, Table 2-3, Beneficial Uses of Coastal Waters at page 2-47. Specific definitions of the beneficial uses are provided in the Basin Plan at pages 2-3 and 2-4.

The Basin Plan also contains a narrative water quality objective[46] for toxicity[47] applicable to San Diego Bay as follows:

> *"All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.*
>
> *'The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in US EPA, State Water Resources Control Board or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay.*
>
> *'In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged."*

36.5. Resolution No. 92-49

State Water Board Resolution No. 92-49, *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code section 13304* describes the policies and procedures that apply to the cleanup and abatement of all types of discharges subject to Water Code section 13304. These include discharges, or threatened discharges, to surface and groundwater. The Resolution requires dischargers to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality or the best water quality that is reasonable if background levels of water quality cannot be restored, considering economic and other factors. In approving any alternative cleanup levels less stringent than background, Regional Water Boards must apply section 2550.4 of Title 23 of the California Code of Regulations.[48] Section 2550.4 provides that a Regional Water Board can only approve cleanup levels less stringent than background if the Regional Water Board finds that it is technologically or economically infeasible to achieve background.[49] Resolution No. 92-49 further requires that

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[46] "Water quality objectives" are defined in Water Code section 13050(h) as "the limits or levels water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area."

[47] Basin Plan, Chapter 3. Water Quality Objectives, Page 3-15.

[48] Resolution No. 92-49, Section III.G.

[49] See also State Water Board, Water Quality Enforcement Policy, App. A, § 4, pp. 34-35 which states in part: "CAOs shall require dischargers to clean up the pollution to background levels or the best water quality that is reasonable if background levels of water quality cannot be restored in accordance with Resolution No. 92-49."

any alternative cleanup level shall: (1) be consistent with maximum benefit to the people of the state; (2) not unreasonably affect present and anticipated beneficial uses of such water; and (3) not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards.[50]

Resolution No. 92-49 is applicable to establishing cleanup levels at the Shipyard Sediment Site. The State Water Board's Office of Chief Counsel (hereinafter Office of Chief Counsel) fully supports this position. A Regional Water Board must apply Resolution No. 92-49 when setting cleanup levels for contaminated sediment if such sediment threatens beneficial uses of the waters of the state, and the contamination or pollution is the result of a discharge of waste. Contaminated sediment must be cleaned up to background sediment quality unless it would be technologically or economically infeasible to do so (Wilson, 2002).

36.6. Resolution No. 68-16

Resolution No. 92-49 specifies that cleanup and abatement actions must conform to State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality of Waters in California*. Resolution No. 68-16 is a state policy that establishes the requirement that discharges to waters of the state shall be regulated to achieve the highest water quality with maximum benefit to the people of the state. Resolution No. 68-16 also establishes the intent where the waters of the state are of higher quality than required by state policies, including Water Quality Control Plans, such higher quality "shall be maintained to the maximum extent possible" consistent with the maximum benefit to the people of the state.

36.7. Policy for Implementation of Toxics Standards

The State Water Board *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (State Implementation Policy, or "SIP") provides that mixing zones shall not result in "objectionable bottom deposits." This term is defined as "an accumulation of materials … on or near the bottom of a water body which creates conditions that adversely impact aquatic life, human health, beneficial uses, or aesthetics. These conditions include, but are not limited to, the accumulation of pollutants in the sediment (SIP at Appendix 4).

[50] Resolution No. 92-49, Section III.G .

36.8. Environmental Justice

Environmental justice is defined in California law[51] as “the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.” The California Environmental Protection Agency (Cal EPA), and its Boards, Departments, and Offices, which include the State and Regional Water Boards, are charged[52] with conducting its programs, policies, and activities in a manner that ensures the fair treatment of people of all races, cultures, and income levels, including minority populations and low-income populations of the state.

Cal EPA’s stated mission, as described in its 2004 Intra-Agency Environmental Justice Strategy, is to accord the highest respect and value to every individual and community, by developing and conducting our public health and environmental protection programs, policies, and activities in a manner that promotes equity and affords fair treatment, accessibility, and protection for all Californians, regardless of race, age, culture, income, or geographic location. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

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[51] Gov. Code, § 65040.12(e).

[52] Pub. Resources Code, §§ 71110 – 71113.

37. Finding 37: CEQA Review

Finding 37 of CAO No. R9-2012-0024 states:

In many cases, an enforcement action such as this could be exempt from the provisions of the California Environmental Quality Act ("CEQA"; Public Resources Code, section 21000 et seq.), because it would fall within Classes 7, 8, and 21 of the categorical exemptions for projects that have been determined not to have a significant effect on the environment under section 21084 of CEQA.[53] In Resolution No. R9-2010-0115 adopted on September 8, 2010, the San Diego Water Board found that because the tentative CAO presents unusual circumstances and there is a reasonable possibility of a significant effect on the environment due to the unusual circumstances, the tentative CAO is not exempt from CEQA and that an EIR analyzing the potential environmental effects of the tentative CAO should be prepared.

As the lead agency for the tentative CAO, the San Diego Water Board prepared an EIR that complies with CEQA. The San Diego Water Board has reviewed and considered the information in the EIR and certified the EIR, adopting a statement of overriding considerations, in Resolution No. R9-2012-0025.

37.1. Guiding Principles for Determination of CEQA Applicability

The California Environmental Quality Act (CEQA)[54] requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. CEQA applies to certain activities of state and local public agencies. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a "project." A project is an activity undertaken by a public agency or a private activity which must receive some discretionary approval (meaning that the agency has the authority to deny the requested permit or approval) from a government agency which may cause either a direct physical change in the environment or a reasonably foreseeable indirect change in the environment.[55]

When more than one public agency is involved, a "Lead Agency" is the public agency that has the primary responsibility for approving a project that may have a significant impact upon the environment.[56] A "lead agency" must complete the environmental review process required by CEQA. The most basic steps of the environmental review process are:

53 Cal. Code Regs., tit. 14, §§ 15307, 15308, and 15321.

54 Pub. Resources Code. § 21000. et seq.

55 Pub. Resources Code. § 21065.

56 Pub. Resources Code. § 21067.

1. Determine if the activity is a "project" subject to CEQA;

2. Determine if the "project" is "exempt"[57] from CEQA;

3. Perform an Initial Study to identify the environmental impacts of the project and determine whether the identified impacts are "significant." Based on its findings of "significance," the lead agency prepares one of the following environmental review documents:

    a) Negative Declaration if it finds no "significant" impacts;[58]

    b) Mitigated Negative Declaration if it finds "significant" impacts but revises the project to avoid or mitigate those significant impacts;[59]

    c) Environmental Impact Report (EIR) if it finds "significant" impacts.[60]

While there is no ironclad definition of "significance," the State CEQA Guidelines provides criteria to lead agencies in determining whether a project may have significant effects.[61]

CEQA requires an Environmental Impact Report to be prepared whenever it can be fairly argued on the basis of substantial evidence in the record that a project may have a significant effect on the environment.[62] The purpose of an EIR is to provide State and local agencies and the general public with detailed information on the potentially significant environmental effects which a proposed project is likely to have and to list ways which the significant environmental effects may be minimized and indicate alternatives to the project.

CEQA authorizes the Secretary of Resources to develop a list of classes of projects that are to be categorically exempt from the requirement to prepare environmental documents under CEQA after a determination that such classes of projects ordinarily will not have a significant effect on the environment.[63] The Secretary's list includes, in pertinent part: (1) actions by regulatory agencies for the protection of natural resources; (2) actions by regulatory agencies for the protection of the environment; and (3) enforcement actions by regulatory agencies.[64] The San Diego Water Board has routinely used these categorical exemptions when taking regulatory enforcement actions, including when it issues cleanup and abatement orders in past years. However, a lead agency may not use a categorical exemption if there is a reasonable possibility

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[57] Pub. Resources Code. § 21080 - 21080.33.

[58] Pub. Resources Code. § 21064.

[59] Pub. Resources Code. § 21064.5.

[60] Pub. Resources Code. § 21064.5.

[61] Cal. Code Regs. tit. 17. §§ 15060 – 15065.

[62] See *No Oil, Inc. v. City of Los Angeles* (1974) 13 Cal.3d 68, 75.

[63] Pub. Resources Code. § 21084 subd. (a).

[64] Cal. Code Regs. tit. 14 §§ 15307, 15308, 15321, respectively.

that the project will have a significant effect on the environment due to unusual circumstances.[65] The two-part test for when a categorical exemption may not be is whether the circumstances of a particular project differ from the general circumstances of the projects covered by a particular categorical exemption, and whether those circumstances create an environmental risk that does not exist for the general class of exempt projects.[66]

37.2. Cleanup and Abatement Order Project Description

The Shipyard Sediment Site Cleanup and Abatement Order Project (the CAO Project) requires that remedial actions be implemented within the Shipyard Sediment Site which may include dredging, capping, and/or natural recovery depending upon a number of factors, including levels of contamination in sediment and site accessibility. Under the terms of the CAO, dredging and disposal of sediments is the proposed remedy for approximately 15.2 acres, (661,832 square feet) of the Site. Dredging of these 15.2 acres is expected to generate approximately 143,400 cubic yards of marine sediment that would require transport to shore, on-shore dewatering and possible treatment, and transport of the dewatered dredge spoil to an appropriate landfill disposal site. If cleanup criteria for chemical constituents of concern in the sediments cannot be attained by dredging (for example, contaminants extend more deeply than anticipated or there is equipment refusal due to a hard substrate) some dredge areas may be capped with sand. In addition to the 15.2 acres targeted for dredging, approximately 2.3 acres of the project site are inaccessible or under-pier areas that will be remediated by one or more methods other than dredging, most likely by sand capping. Sand capping would involve the transport of capping material to the site (possibly via truck or barge) and placement of the materials over contaminated sediment.

The specific actions to be taken by the responsible parties for cleanup will be described in a Remedial Action Plan (RAP) that is to be prepared and submitted to the San Diego Water Board within 90 days of adoption of the CAO. The remedial action is expected to take 5 years to complete and would be followed by a period of post-remedial monitoring.

This type of physical disturbance to the environment includes, but is not limited to, sediment movement, air quality impacts from diesel emissions from dredging equipment, and potential impacts to traffic patterns and noise from equipment operations in the area where the sediment will be dewatered and from which it will be transported. Because of the proposed remedial design, this CAO differs considerably from the typical agency enforcement action, or action to protect natural resources or the environment. The CAO is considerably different in scope and detail, and the potential for significant impacts to the physical environment from the proposed remedial design is manifest. Because the CAO Project presents unusual circumstances both with respect to its scope and unique characteristics, and because substantial evidence in the record indicates the CAO Project may cause potentially-significant adverse environmental impacts, it is not categorically exempt from CEQA.

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65 Cal. Code Regs., tit. 14, § 15300.2, subd. (c); *Azusa Land Reclamation Co. v. Main San Gabriel Basin Watermaster* (1997) 52 Cal.App.4th 1165, 1198-1199.

66 *Id.*, at 1207.

On July 23, 2010, NASSCO submitted a motion requesting that the San Diego Water Board determine that the tentative CAO is exempt from CEQA such that no EIR would be required if the San Diego Water Board were to approve the tentative CAO. In Resolution No. R9-2010-0115 adopted on September 8, 2010, the San Diego Water Board found that because the tentative CAO presents unusual circumstances and there is a reasonable possibility of a significant effect on the environment due to the unusual circumstances, the tentative CAO is not exempt from CEQA and that an EIR analyzing the potential environmental effects of the tentative CAO should be prepared.

37.3. CEQA Process to Date

The San Diego Water Board is the lead agency under CEQA for the CAO Project. The San Diego Water Board initiated the environmental review process for the CAO Project on November 25, 2009, with the issuance of a Notice of Preparation. On December 22, 2009, the San Diego Water Board released for public review an Initial Study for the CAO Project which concluded that the CAO Project may have a significant effect on the environment and that an Environmental Impact Report was required. The Initial Study was posted on the San Diego Water Board's website for a 30-day public review period. At the end of the review period, on January 21, 2010, a CEQA scoping meeting was held at the Water Board's office to receive comments on the Initial Study and the scope of the environmental issues to be addressed in the EIR.

The Initial Study identified three topics for further study in a focused EIR — air quality, geology/soils, and transportation — either by explicitly stating that the issue will be addressed in the EIR in response to a checklist question (air quality and transportation) or by checking the box for that issue at the beginning of the Initial Study, thereby indicating that the topic is a "potentially significant impact" (air quality and geology/soils). Comments received on the Initial Study raised additional concerns with regard to impacts to Air Quality, Marine Biological Resources, Noise, Hazards and Hazardous Materials, Hydrology and Water Quality, and Environmental Justice. Based on these considerations the San Diego Water Board has proceeded to develop an EIR for the CAO Project. The EIR for the CAO Project includes the analysis of the environmental impacts of sediment management, including the impacts of the proposed dredging activities, handling of the dredged material, dewatering and potential treatment of the dredged material, and transport to the disposal site. These effects may include but are not limited to the potential for release of contaminants into the water and air as a result of the sediment management activities, air quality impacts from the equipment emissions and vehicular trips associated with the dredge activity, and short-term noise from truck trips traveling to and from the project site/shore to the freeway.

38. Finding 38: Public Notice

Finding 38 of CAO No. R9-2012-0024 states:

The San Diego Water Board has notified all known interested persons and the public of its intent to adopt this CAO, and has provided them with an opportunity to submit written comments, evidence, testimony and recommendations.

38.1. Public Review Process to Date

The San Diego Water Board is considering development and issuance of a cleanup and abatement order for discharges of metals and other pollutant wastes to San Diego Bay marine sediment and waters at the Shipyard Sediment Site. On April 29, 2005 the San Diego Water Board circulated for public review and comment an initial tentative version of the cleanup and abatement order (see tentative CAO No. R9-2005-0126). A revised CAO was released in April 2008 (see tentative CAO No. R9-2005-0126 issued on April 4, 2008).

On June 9, 2008, the San Diego Water Board's Presiding Officer in this matter, David King, referred the CAO proceedings to confidential mediation. The Mediation Parties, which included the San Diego Water Board Cleanup Team (Cleanup Team) and other Parties to whom the tentative CAO is directed, through the course of mediation, reached agreement on appropriate cleanup levels, the preliminary remedial design, remediation and post-remediation monitoring requirements, and a remedial action implementation schedule. Those agreements are contained in tentative CAO No. R9-2010-0002, which was released for public review on December 22, 2009.

On September 15, 2010 the San Diego Water Board released a revised version of the tentative CAO (see tentative CAO No. R9-2012-0024). This version updated and clarified the tentative CAO which was previously released on December 22, 2010. The Designated Parties conducted extensive discovery, including depositions, pursuant to a discovery schedule first adopted in February 2010. In May and June 2011, the Designated Parties submitted initial and rebuttal comments, evidence and testimony, respectively. The San Diego Water Board Cleanup Team prepared a Response to Comments Report dated August 23, 2011. Following additional revisions to tentative Order No. R9-2011-0001, and additional public comment, the Designated Parties submitted hearing briefs. Interested Persons and Designated Parties were permitted to participate in the evidentiary hearings conducted before a panel of Board Members (Destache, Anderson and Strawn) on November 9, 14, 15 and 16, 2011. They subsequently released for public comment its recommendation to the San Diego Water Board in the form of Tentative Cleanup and Abatement Order No. R9-2012-0024. The San Diego Water Board convened on March 14, 2012 to consider adoption of Tentative Cleanup and Abatement Order No. R9-2012-0024 and consider adoption of Tentative Resolution No. R9-2012-0025 to certify the Environmental Impact Report for the Shipyard Sediment Site project.

39. Finding 39: Public Hearing

Finding 39 of CAO No. R9-2012-0024 states:

A lengthy procedural history preceded adoption of this CAO. The San Diego Water Board has considered all comments, evidence and testimony pertaining to this CAO submitted to the San Diego Water Board in writing, or by oral presentations at the public hearing held on November 9, 14, 15 and 16, 2011, and March 14, 2012. Responses to many relevant comments have been incorporated into the Technical Report for this CAO and/or are provided in the Response to Comments Report, as revised, prepared by the San Diego Water Board Cleanup Team.

39.1. Public Hearing

See discussion in Section 38 of this Technical Report on the public participation process.

40. Finding 40: Technical Report

Finding 40 of CAO No. R9-2012-0024 states:

The "*Technical Report for Cleanup and Abatement Order No. R9-2012-0024 for the Shipyard Sediment Site, San Diego Bay, San Diego, CA*" is hereby incorporated as a finding in support of the CAO No. R9-2012-0024 as if fully set forth here verbatim.

41. Finding 41: Cost Recovery

Finding 41 of CAO No. R9-2012-0024 states:

COST RECOVERY. Pursuant to Water Code section 13304, and consistent with other statutory and regulatory requirements, including but not limited to Water Code section 13365, the San Diego Water Board and the State Water Board are entitled to, and will seek reimbursement for, all reasonable costs actually incurred by the San Diego Water Board and the State Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action required by this Order.

Unreimbursed reasonable costs actually incurred by the San Diego Water Board and the State Water Board for the development and issuance of this Cleanup and Abatement Order are as follows:

a. Contracts funded by the State Water Board Cleanup and Abatement Account or other San Diego Water Board contract funds for services in support of the development and issuance of this Cleanup and Abatement Order.

    i. DM Information Services, Inc. produced the electronic administrative record. This work was paid for with Cleanup and Abatement Account funds and San Diego Water Board contract funds in the amount of $109,908.
    ii. The Department of Fish and Game provided technical consultation services on the fish histopathology and bile studies, and the wildlife risk assessments. This work was paid for with Cleanup and Abatement Account funds in the amount of $43,287.
    iii. The Office of Environmental Health Hazard Assessment provided technical consultation services on the human health risk assessments. This work was paid for with San Diego Water Board contract funds in the amount of $12,009.

b. Filing fees for CEQA documents. Pursuant to Fish and Game Code Section 711.4, the San Diego Water Board must pay to the Department of Fish and Game a filing fee to defray the costs of managing and protecting California's vast fish and wildlife resources. The filing fee for the Environmental Impact Report is $2,919 and the County Clerk Processing fee is 50.00 for a total of $2,969.

The amount of past and future recoverable staff costs will be determined through the process set forth in Water Code section 13365. The Chair may designate an individual qualified under Water Code section 13365, subdivision (c)(4) to resolve dischargers' disputes about the reasonableness of past and future oversight costs the San Diego Water Board seeks to recover from the dischargers to this Order. Under Water Code section 13365, the determination of the reasonableness of oversight costs can include, but is not limited to, evaluation of documentary support (including information not already in the record) for requested oversight costs. The Assistant Executive Officer is authorized to amend this Order as necessary to include any undisputed oversight cost amounts or amounts derived through the dispute resolution process identified in Water Code section 13365, subdivision (c)(4) and determined to be owed by the discharger(s).

41.1. Cost Recovery

Pursuant to Water Code section 13304, and consistent with other statutory and regulatory requirements, including but not limited to Water Code section 13365,[67] the San Diego Water Board and the State Water Board are entitled to, and will seek reimbursement for all reasonable costs actually incurred by the San Diego Water Board and the State Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action required by this Order.

Finding 41 identifies reasonable costs actually incurred by the San Diego Water Board for contract services (for production of the administrative record and technical consultation services provided by the Office of Environmental Health hazard Assessment and California Department of Fish and Game) and California Department of Fish and Game filing fees for the Environmental Impact Report. Section 15045 of the CEQA Guidelines (Cal. Code Regs., tit.14) provides additional support for recovery of reasonable fees for preparation of environmental documents and "for procedures necessary to comply with CEQA on the project."

The supporting documentation for cost recovery amounts, cited in Finding 41 of Cleanup and Abatement Order No. R9-2012-0024, are provided in the Appendix for Section 41. The Appendix also includes documentation submitted as of November 2, 2011, in support of staff oversight costs. The San Diego Water Board expects that evaluation of the reasonableness of past oversight costs will include evidence in the administrative record for this Order and any additional relevant documentary support.

[67] Water Code section 13365, subdivision (c), also establishes a framework for resolving disputes concerning cost recovery.

Technical Report
for
Cleanup and Abatement
Order No. R9-2012-0024

APPENDIX FOR SECTION 41

SUPPLEMENTAL INVOICE DOCUMENTATION

March 14, 2012

APPENDIX – DOCUMENTATION SUPPORTING TCAO FINDING 41 (COST RECOVERY)

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DM Information Services, Inc.

DM Information Services, Inc.

Invoice #	Invoice Date	Invoice Period	Total
2006113022	11/30/2006	9/12/2006 - 11/30/06	$2,425.14
2007013119	1/31/2007	12/01/06 - 02/01/07	$11,320.92
2007022828	2/28/2007	2/2/07 - 2/27/07	$3,214.13
2007033130	3/31/2007	3/1/07 - 3/31/07	$3,208.23
2007043015	4/30/2007	4/01/07 - 4/30/07	$3,045.60
2007053117	5/31/2007	5/1/07 - 5/28/07	$2,751.46
2007062703	6/27/2007	5/29/07 - 6/25/07	$4,603.54
2007093018	9/30/2007	8/15/07 - 9/24/07	$6,400.73
2007103105	10/31/2007	9/25/07-10/31/07	$1,422.17
2007113022	11/30/2007	11/01/07 - 11/30/07	$5,937.08
2008010107	1/1/2008	12/01/07 - 12/25/2007	$6,466.36
2008013126	1/31/2008	12/26/2007 - 1/28/08	$809.57
2008050101	3/31/08 revised		$58,302.62
			$109,907.55

D-M Information Systems, Inc.

Ok

INVOICE

NEW REMIT ADDRESS – Esquire
[eff. 12/01/06]
P.O. Box 79019 DTI
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

Craig Carlisle 1-19-07

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Project Consulting
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Document Summaries
Bates Labeling
Software

BILL TO

CA State Water Resources Control Board
Attn.: Accounting
P.O. Box 100
Sacramento CA 95812-0100

REFERENCE

RWQCB - San Diego - Region 9
Contr Reg #39400606125716
Agency Order #05-190-8037
MSA #5-03-70-33
Invoice Period: 09/12/06 - 11/30/06

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
11/30/2006	06113022	NET 30	1/14/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
Litigation Support Services				
DOCUMENT SCANNING SERVICES				
LA-5: Scanning Manager	3	40.00	/hour	120.00
SC-5: Normal Document Preparation	10,855	0.03	/page	325.65
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	10,855	0.08	/page	868.40
SC-23: Normal Document Reassembly	10,855	0.03	/page	325.65
SC-9: Copying Difficult Documents Before Scanning	287	0.20	/copy	57.40
TECHNICAL SUPPORT SERVICES				
LA-2: Program Manager [Client communication and project oversight.]	2	95.00	/hour	190.00
LA-9: Senior Technical Support Specialist [Linking of files on CDs and floppy disks.]	4	75.00	/hour	300.00
DELIVERABLES AND SHIPPING				
DE-1: CD-ROM Production [Master + Archive] [RWQCB_001, -002, -004]	3	25.00	/CD	75.00
DE-3: DVD Production [Master + Archive] [RWQCB_003]	1	50.00	/DVD	50.00
ME-7: Shipping - CA Overnight: 11/10, 11/21, 11/30/06 [cost + 15%]	1.15	42.03		48.33
ME-7: Shipping - FedEx: 10/04/06 [cost + 15%]	1.15	15.23		17.51
ME-7: Shipping - UPS: 09/28, 11/07/06 [cost + 15%]	1.15	41.04		47.20
Invoice TOTAL				2,425.14

Please note our new Remit Address at the top!	TOTAL	$2,425.14

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D-M Information Systems, Inc.

INVOICE

OK
Craig Carlisle 2-26-07

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REFERENCE

RWQCB - San Diego - Region 9
Contr Reg #39400606125716
Agency Order #05-190-8037
MSA #5-03-70-33
Invoice Period: 12/01/06 - 02/01/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
1/31/2007	07013119	NET 30	3/2/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
Litigation Support Services				
DOCUMENT SCANNING SERVICES				
LA-5: Scanning Manager	1	40.00	/hour	40.00
SC-5: Normal Document Preparation	10,158	0.03	/page	304.74
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	10,158	0.08	/page	812.64
SC-23: Normal Document Reassembly	10,158	0.03	/page	304.74
SC-9: Copying Difficult Documents Before Scanning	1,009	0.20	/copy	201.80
CODING SERVICES				
LA-4: Managing Project-Specific Activities	2.75	50.00	/hour	137.50
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title] [for period 12/01/06 to 02/01/07]	1,081	1.05	/doc	1,135.05
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title] [for period 09/12/06 to 11/30/06 - NOT Previously Billed]	1,771	1.05	/doc.	1,859.55
CD-4: Key Entry - Each Additional Coded Field [for period 12/01/06 to 02/01/07]	1,081	0.40	/doc	432.40
CD-4: Key Entry - Each Additional Coded Field [for period 09/12/06 to 11/30/06 - NOT Previously Billed]	1,771	0.40	/doc.	708.40
CD-7: Key Entry - Global Fields [for period 12/01/06 to 02/01/07]	1,081	0.12	/entry	129.72
CD-7: Key Entry - Global Fields [for period 09/12/06 to 11/30/06 - NOT Previously Billed]	1,771	0.12	/entry	212.52
CD-13: Quality Control of Coded Entry	1.5	50.00	/hour	75.00
Please note our new Remit Address at the top!		TOTAL		--continued--

FY 05-06

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REFERENCE

RWQCB - San Diego - Region 9
Contr Reg #39400606125716
Agency Order #05-190-8037
MSA #5-03-70-33
Invoice Period: 12/01/06 - 02/01/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
1/31/2007	07013119	NET 30	3/2/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
OCR SERVICES				
OC-2: Tiff Image to Text Conversion [for period 12/01/06 to 02/01/07]	10,158	0.03	/page	304.74
OC-2: Tiff Image to Text Conversion [for period 09/12/06 to 11/30/06 - NOT Previously Billed]	10,855	0.03	/page	325.65
TECHNICAL SUPPORT SERVICES				
LA-2: Program Manager [Client communication and project oversight.]	5	95.00	/hour	475.00
LA-9: Senior Technical Support Specialist [Linking of files on CDs and floppy disks.]	5	75.00	/hour	375.00
DELIVERABLES				
DE-1: CD-ROM Production [Master + Archive] [RWQCB_005, _007]	2	25.00	/CD	50.00
DE-3: DVD Production [Master + Archive] [RWQCB_006_1 , -2, -3]	3	50.00	/DVD	150.00
PROJECT MATERIALS AND ODC'S				
Materials Used in Production [Subcontracted conversion of VHS tapes to digital format - 35 tapes at $65 per tape hour - 29 hours of tape] [cost + 15%] [ELS Invoice #13262, dated 01/31/07, for services provided 12/22/06]	1.15	1,908.16		2,194.38

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TOTAL --continued--

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D-M Information Systems, Inc.

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REFERENCE

RWQCB - San Diego - Region 9
Contr Reg #39400606125716
Agency Order #05-190-8037
MSA #5-03-70-33
Invoice Period: 12/01/06 - 02/01/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
1/31/2007	07013119	NET 30	3/2/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
Materials Used in Production [Subcontracted conversion of VHS tapes to digital format - 12 tapes at $65 per tape hour - 13 hours of tape] [cost + 15%] [ELS Invoice #12660, 02/15/06, for services provided 11/10/06 - NOT Previously Billed]	1.15	845.00		971.75
ME-7: Shipping - CA Overnight: 12/06/06 [cost + 15%]	1.15	14.93		17.17
ME-7: Shipping - FedEx: 01/16/07, 02/01/07 [cost + 15%]	1.15	53.33		61.33
ME-7: Shipping - UPS: 12/12/06, 01/02/07, 01/24/07 [cost + 15%]	1.15	36.38		41.84
Invoice TOTAL				11,320.92
Please note our new Remit Address at the top!		TOTAL		$11,320.92

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REFERENCE

RWQCB - San Diego - Region 9
Contr Reg #39400606125716
Agency Order #05-190-8037
MSA #5-03-70-33
Invoice Period: 02/02/07 - 02/27/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
2/28/2007	07022828	NET 30	3/30/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
DOCUMENT SCANNING SERVICES				
SC-5: Normal Document Preparation	2,744	0.03	/page	82.32
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	2,744	0.08	/page	219.52
SC-23: Normal Document Reassembly	2,774	0.03	/page	83.22
CODING SERVICES				
LA-4: Managing Project-Specific Activities	3.5	50.00	/hour	175.00
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	1,139	1.05	/doc	1,195.95
CD-4: Key Entry - Each Additional Coded Field	1,139	0.40	/doc	455.60
CD-7: Key Entry - Global Fields	1,139	0.12	/entry	136.68
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	2,744	0.03	/page	82.32
LA-10: Technical Support Specialist	7.75	50.00	/hour	387.50
DE-3: DVD Production [Master + Archive] [RWQCB_008 - _010]	3	50.00	/DVD	150.00
PROJECT MATERIALS AND ODC'S				
Materials Used in Production [Subcontracted conversion of VHS tapes to digital format - 6 tapes at $65 per tape hour - 4 hours of tape] [cost + 15%] [ELS Invoice #13293, dated 02/01/07, for services provided 01/26/07]	1.15	200.79		230.91
ME-7: Shipping - UPS: 02/02/07, 02/13/07, 02/23/07 [cost + 15%]	1.15	13.14		15.11
Invoice TOTAL				3,214.13
Please note our new Remit Address at the top!		TOTAL		$3,214.13

2007 MAR 14 P 1:46

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

FY 05-06

D-M Information Systems, Inc.

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BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCB - San Diego - Region 9 Contr Reg #39400606125716 Agency Order #05-190-8037 MSA #5-03-70-33 Invoice Period: 03/01/07 - 03/31/07

OK
Craig Carlisle
5-7-07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
3/31/2007	07033130	NET 30	4/30/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
DOCUMENT SCANNING SERVICES				
LA-5: Scanning Manager	3	50.00	/hour	150.00
SC-5: Normal Document Preparation	9,898	0.03	/page	296.94
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	9,898	0.08	/page	791.84
SC-23: Normal Document Reassembly	9,898	0.03	/page	296.94
CODING SERVICES				
LA-4: Managing Project-Specific Activities	1.25	50.00	/hour	62.50
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	578	1.05	/doc	606.90
CD-4: Key Entry - Each Additional Coded Field	578	0.40	/doc	231.20
CD-7: Key Entry - Global Fields	578	0.12	/entry	69.36
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	9,898	0.03	/page	296.94
LA-10: Technical Support Specialist	5	50.00	/hour	250.00
DE-1: CD-ROM Production [Master + Archive] [RWQCB_011]	1	25.00	/CD	25.00
DE-3: DVD Production [Master + Archive] [RWQCB_012]	1	50.00	/DVD	50.00
ME-7: Shipping - California Overnight: 03/29/07 [cost + 15%]	1.15	11.57		13.31
ME-7: Shipping - FedEx: 03/06/07, 03/13/07 [cost + 15%]	1.15	52.84		60.77
ME-7: Shipping - UPS: 03/14/07 [cost + 15%]	1.15	5.68		6.53
Invoice TOTAL				3,208.23
Please note our new Remit Address at the top!		TOTAL		$3,208.23

D-M Information Systems, Inc.

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CA State Water Resources Control Board
Attn.: Accounting
P.O. Box 100
Sacramento CA 95812-0100

REFERENCE

RWQCB - San Diego - Region 9
Contr Reg #39400606125716
Agency Order #05-190-8037
MSA #5-03-70-33
Invoice Period: 04/01/07 - 04/30/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
4/30/2007	07043015	NET 30	5/30/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
DOCUMENT SCANNING SERVICES				
LA-5: Scanning Manager	1	50.00	/hour	50.00
SC-5: Normal Document Preparation	10,342	0.03	/page	310.26
SC-9: Copying Difficult Documents Before Scanning	99	0.20	/copy	19.80
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	10,342	0.08	/page	827.36
SC-23: Normal Document Reassembly	10,342	0.03	/page	310.26
CODING SERVICES				
LA-4: Managing Project-Specific Activities	0.75	50.00	/hour	37.50
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	631	1.05	/doc	662.55
CD-4: Key Entry - Each Additional Coded Field	631	0.40	/doc	252.40
CD-13: Quality Control of Coded Entry	0.25	50.00	/hour	12.50
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	10,342	0.03	/page	310.26
LA-10: Technical Support Specialist	3	50.00	/hour	150.00
DE-1: CD-ROM Production [Master + Archive] [RWQCB_013, RWQCB_014]	2	25.00	/CD	50.00
ME-7: Shipping - FedEx: 04/03/07, 04/12/07 [cost + 15%]	1.15	40.70		46.81
ME-7: Shipping - UPS: 04/18/07 [cost + 15%]	1.15	5.13		5.90
Invoice TOTAL				3,045.60
Please remit to above address.		TOTAL		$3,045.60

OK F705-06 06-13-07
Craig Carlisle

D-M Information Systems, Inc.

INVOICE

NEW REMIT ADDRESS
[eff. 12/01/06]
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

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CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100

REFERENCE
RWQCB - San Diego - Region 9 Contr Reg #39400606125716 Agency Order #05-190-8037 MSA #5-03-70-33 Invoice Period: 05/01/07 - 05/28/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
5/31/2007	07053117	NET 30	6/30/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
DOCUMENT SCANNING SERVICES				
LA-5: Scanning Manager	1.75	50.00	/hour	87.50
SC-5: Normal Document Preparation	7,017	0.03	/page	210.51
SC-9: Copying Difficult Documents Before Scanning	262	0.20	/copy	52.40
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	7,017	0.08	/page	561.36
SC-23: Normal Document Reassembly	7,017	0.03	/page	210.51
CODING SERVICES				
LA-4: Managing Project-Specific Activities	2.25	50.00	/hour	112.50
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	502	1.05	/doc	527.10
CD-4: Key Entry - Each Additional Coded Field	502	0.20	/doc	100.40
CD-13: Quality Control of Coded Entry	0.5	50.00	/hour	25.00
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	7,017	0.03	/page	210.51
LA-10: Technical Support Specialist	11	50.00	/hour	550.00
DE-1: CD-ROM Production [Master + Archive] [RWQCB_015]	1	25.00	/CD	25.00
DE-3: DVD Production [Master + Archive] [RWQCB_016]	1	50.00	/DVD	50.00
ME-7: Shipping - FedEx: 05/17/07 [cost + 15%]	1.15	20.54		23.62
ME-7: Shipping - UPS: 05/25/07 [cost + 15%]	1.15	4.39		5.05
Invoice TOTAL				2,751.46
Please remit to above address.		TOTAL		$2,751.46

D-M Information Systems, Inc.

INVOICE

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[eff. 12/01/06]
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

Ok Craig Carlisle
7/24/07

2007 JUL 13 AM 10 58
STATE WATER RESOURCES CONTROL BOARD
SACRAMENTO

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCB - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Period: 05/29/07 - 06/25/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
6/27/2007	07062703	NET 30	7/27/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
DOCUMENT SCANNING SERVICES				
SC-5: Normal Document Preparation	14,867	0.03	/page	446.01
SC-9: Copying Difficult Documents To Scan	26	0.20	/copy	5.20
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	14,867	0.08	/page	1,189.36
SC-23: Normal Document Reassembly	14,867	0.03	/page	446.01
CODING SERVICES				
LA-4: Managing Project-Specific Activities	1.75	50.00	/hour	87.50
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	788	1.05	/doc	827.40
CD-4: Key Entry - Each Additional Coded Field	788	0.40	/doc	315.20
CD-13: Quality Control of Coded Entry	2	50.00	/hour	100.00
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	14,867	0.03	/page	446.01
LA-10: Technical Support Specialist	7	50.00	/hour	350.00
DE-3: DVD Production [Master + Archive] [RWQCB_017, _018]	2	50.00	/DVD	100.00
Contract Specific Supplies [Subcontracted version of VHS tapes to digital format: 4 tapes (DM-31770) at $65 per tape hour, approx. 3.5 hours of tape. Work done MAR07, not yet billed.] [cost + 15%]	1.15	227.50		261.63
ME-7: Shipping - FedEx: 06/12/07 [cost+15%]	1.15	21.00		24.15
ME-7: Shipping - UPS: 06/19/07 [cost+15%]	1.15	4.41		5.07
Invoice TOTAL				4,603.54
Please remit to above address.		TOTAL		$4,603.54

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
2007 JUL 2? P 4:02

D-M Information Systems, Inc.

INVOICE

NEW REMIT ADDRESS
[eff. 12/01/06]
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCB - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Period: 08/15/07 - 09/24/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
9/30/2007	07093018	NET 30	10/30/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
SHIPPING AND OTHER COSTS				
ME-7: Shipping - UPS: 09/18/07, 09/19/07, 09/24/07 [cost + 15%]	1.15	51.23		58.91
Subtotal - Batches 90, 91, 92 -- 09/17/07 - 09/24/07				607.20
Invoice TOTAL				6,400.73
Please remit to above address.		TOTAL		$6,400.73

D-M Information Systems, Inc.

NEW REMIT ADDRESS
[eff. 12/01/06]
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

INVOICE

2007 NOV 7 AM 9 27

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCB - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Period: 09/25/07 - 10/31/07 Approved Craig Carlisle 11-14-07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
10/31/2007	07103105	NET 30	11/30/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
PROJECT SERVICES 09/25/07 - 10/15/07				
DOCUMENT SCANNING SERVICES				
SC-5: Normal Document Preparation	1,810	0.03	/page	54.30
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	1,810	0.08	/page	144.80
SC-23: Normal Document Reassembly	1,810	0.03	/page	54.30
DOCUMENT CODING SERVICES				
LA-4: Managing Project-Specific Activities	0.5	50.00	/hour	25.00
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	55	1.05	/doc	57.75
CD-7: Key Entry - Global Fields [18 requested fields X number of docs]	990	0.01	/entry	9.90
CD-13: Quality Control of Coded Entry	0.25	50.00	/hour	12.50
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	1,810	0.03	/page	54.30
LA-10: Technical Support Specialist	2.25	50.00	/hour	112.50
DE-1: CD-ROM Production [Master + Archive] [RWQCB_025, -026]	2	25.00	/CD	50.00
SHIPPING AND OTHER COSTS				
ME-7: Shipping - UPS: 09/28/07, 10/03/07 [cost+15%]	1.15	8.38		9.64
Subtotal - 09/25/07 -- 10/15/07				584.99

Please remit to above address.

TOTAL --continued--

D-M Information Systems, Inc.

INVOICE

NEW REMIT ADDRESS
[eff. 12/01/06]
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

'07 NOV 7 AM 9 27

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCB - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Period: 09/25/07 - 10/31/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
10/31/2007	07103105	NET 30	11/30/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
PROJECT SERVICES 10/16/07 - 10/31/07				
DOCUMENT SCANNING SERVICES				
SC-5: Normal Document Preparation	4,062	0.03	/page	121.86
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	4,062	0.08	/page	324.96
SC-23: Normal Document Reassembly	4,062	0.03	/page	121.86
DOCUMENT CODING SERVICES				
LA-4: Managing Project-Specific Activities	0.25	50.00	/hour	12.50
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	34	1.05	/doc.	35.70
CD-7: Key Entry - Global Fields [18 requested fields X number of docs]	612	0.01	/entry	6.12
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	4,062	0.03	/page	121.86
LA-10: Technical Support Specialist	1.25	50.00	/hour	62.50
DE-1: CD-ROM Production [Master + Archive] [RWQCB_027]	1	25.00	/CD	25.00
SHIPPING AND OTHER COSTS				
ME-7: Shipping - UPS: 10/24/07 [cost + 15%]	1.15	4.19		4.82
Subtotal -- 10/16/07 - 10/23/07				837.18
Invoice TOTAL				1,422.17
Please remit to above address.	Page 2 of 2	TOTAL		$1,422.17

D-M Information Systems, Inc.

NEW REMIT ADDRESS
[eff. 12/01/06]
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

INVOICE

Approved

12-10-07

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCB - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Period: 11/01/07 - 11/30/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
11/30/2007	07113022	NET 30	12/30/2007	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
DOCUMENT SCANNING SERVICES				
SC-5: Normal Document Preparation	19,896	0.03	/page	596.88
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	19,896	0.08	/page	1,591.68
SC-14: Color Scanning	606	1.00	/page	606.00
SC-15: Oversized Scanning	77	7.00	/page	539.00
SC-23: Normal Document Reassembly	19,896	0.03	/page	596.88
DOCUMENT CODING SERVICES				
LA-4: Managing Project-Specific Activities	1.75	50.00	/hour	87.50
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	462	1.05	/doc	485.10
CD-7: Key Entry - Global Fields [18 requested fields X number of docs]	462	0.01	/entry	4.62
CD-13: Quality Control of Coded Entry	1.5	50.00	/hour	75.00
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	19,896	0.03	/page	596.88
LA-10: Technical Support Specialist	7.75	50.00	/hour	387.50
DE-1: CD-ROM Production [Master + Archive] [RWQCB_028, _030, _031, _032]	4	25.00	/CD	100.00
DE-3: DVD Production [Master + Archive] [RWQCB_029]	1	50.00	/DVD	50.00
SHIPPING AND OTHER COSTS				
ME-7: Shipping - UPS: 11/06/07, 11/13/07, 11/14/07, 11/15/07, 11/20/07, 11/25/07, 11/27/07 [cost+15%]	1.15	191.34		220.04
Invoice TOTAL				5,937.08
Please remit to above address.		TOTAL		$5,937.08

D-M Information Systems, Inc.

NEW REMIT ADDRESS
[eff. 12/01/06]
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2008 JAN 28 A 10: 19

2008 JAN 22 AM 9: 12

INVOICE

Approved
Craig Carlisle
1-29-08

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCBSD - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Period: 12/01/07 - 12/25/07

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
1/1/2008	2008010107	NET 30	1/31/2008	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
REVISED: 01/08/08 [Orig. Inv. #07123119]				
PROJECT SERVICES 12/01/07 - 12/25/07				
DOCUMENT SCANNING SERVICES				
SC-5: Normal Document Preparation	20,879	0.03	/page	626.37
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	20,879	0.08	/page	1,670.32
SC-23: Normal Document Reassembly	20,879	0.03	/page	626.37
SC-14: Color Scanning [up to 8.5x11]	1,088	1.00	/page	1,088.00
SC-15: Oversized Scanning [B&W]	14	6.00	/page	84.00
SC-14: Color Scanning [Oversize]	100	11.00	/page	1,100.00
LA-5: Scanning Manager	1	50.00	/hour	50.00
DOCUMENT CODING SERVICES				
LA-4: Managing Project-Specific Activities	2.25	50.00	/hour	112.50
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	180	1.05	/doc	189.00
CD-7: Key Entry - Global Fields [18 requested fields times number of docs (i.e. 18x180=3,240)]	3,240	0.01	/entry	32.40
CD-13: Quality Control of Coded Entry	1.25	50.00	/hour	62.50
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	22,081	0.03	/page	662.43
DE-1: CD-ROM Production [RWQCB_033, -034]	2	25.00	/CD	50.00
DE-3: DVD Production [RWQCB_035]	1	50.00	/DVD	50.00
SHIPPING AND OTHER COSTS				
ME-7: Shipping - UPS: 12/10, 12/18, 12/20/07 [cost + 15%]	1.15	54.32		62.47
Invoice TOTAL -- 12/01/07 - 12/25/07				6,466.36
Thank you for your business.		TOTAL		$6,466.36

J-0-08 Newer pdf copy of invoice to Dave Erin et

D-M Information Systems, Inc.

INVOICE

NEW REMIT ADDRESS
[eff. 12/01/06]
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.655.2112

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
2008 MAR -5 A 9:41

Approved Cary Carlisle 3-4-08

2008 FEB 19 AM 7 42

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100 9I.0907 WRC1Q1	RWQCBSD - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #06-190-8063 MSA #5-03-70-33 Invoice Period: 12/26/07 - 01/28/08

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
1/31/2008	2008013126	NET 30	3/1/2008	RWQCB - SD (Reg. 9)

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD
2008 MAR -5 A 9:42

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
PROJECT SERVICES				
DOCUMENT SCANNING SERVICES				
SC-5: Normal Document Preparation	1,719	0.03	/page	51.57
SC-13: Litigation Scanning - 300 dpi [up to 11"x17"]	1,687	0.08	/page	134.96
SC-14: Color Scanning	32	1.00	/page	32.00
SC-23: Normal Document Reassembly	1,719	0.03	/page	51.57
DOCUMENT CODING SERVICES				
LA-4: Managing Project-Specific Activities	1.5	50.00	/hour	75.00
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	176	1.05	/doc	184.80
CD-7: Key Entry - Global Fields [18 requested fields times number of docs (i.e. 18x176=3,168)]	3,168	0.01	/entry	31.68
CD-13: Quality Control of Coded Entry	0.75	50.00	/hour	37.50
TECHNICAL SUPPORT SERVICES				
OC-2: Tiff Image to Text Conversion	3,742	0.03	/page	112.26
DE-1: CD-ROM Production [RWQCB_036, -037]	2	25.00	/CD	50.00
SHIPPING AND OTHER COSTS				
ME-7: Shipping - UPS: 12/27/07, 01/02/08, 01/11/08 [cost + 15%]	1.15	41.94		48.23
Invoice TOTAL				809.57
Thank you for your business.		TOTAL		$809.57

D-M Information Systems, Inc.

INVOICE

PAYMENT REMIT ADDRESS:
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100 9I-0907 wrctl	RWQCBSD - San Diego - Region 9 Contr Reg #39400607224510 Agency Order ~~#05-190-8063~~ MSA #5-03-70-33 Invoice Date: 03/31/08 PO# 06.190.8063

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
5/1/2008	2008050101	NET 30	5/31/2008	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
Subtotal - New Work				67,781.27
CREDIT - To Meet Amount Remaining for PO #05-190-8063		-9,478.65		-9,478.65
Subtotal - Credit				-9,478.65
Invoice TOTAL				58,302.62

Approved
Craig Carlisle
5-13-08

Thank you for your business.	Page 4 of 4	TOTAL	$58,302.62

D-M Information Systems, Inc.

INVOICE

PAYMENT REMIT ADDRESS:
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCBSD - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Date: 03/31/08

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
5/1/2008	2008050101	NET 30	5/31/2008	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
New Work [cont'd.]				
EE-7: Processing [Creating a record for each disk or item with e-mail attachment fields; Internal mailbox de-duping; Extracting text for filtering; Creating formatted text for attachments; Gathering metadata for attachments files; Combining all elements to prep.]	18.372	750.00	/GB	13,779.00
EE-12: Creating Tiff File Images [Generating standard Group IV TIFF file images for each page.]	155,767	0.08	/tiff	12,461.36
DE-5: Data/Images Delivery by Harddrive	21	250.00	/h'drive	5,250.00
ME-7: Shipping - CA Overnight: 02/29/08 [cost + 15%]	1.15	12.13		13.95
ME-7: Shipping - UPS: 03/27/08 [cost + 15%]	1.15	14.37		16.53
ME-7: Shipping - UPS: 04/03/08 [cost + 15%)] [[17 Harddrives shipped to 13 addresses: C. Volz - McKenna Long - SF CA; J. Tracy - Sempra Energy - SD CA; E. Spiess - SWRCB - SAC CA; D. Merk - SDUPD - SD CA; D. Mulliken - Latham & Watkins - SD CA; M. Gonzalez - Coast Law Group - Encinitas CA; P. Schmidt - Construction & Design/Campbell Industries - Seattle WA; D. Silverstein - NFCSW - SD CA; J. Dragna - Bingham & McCutchen - LA CA; S. Cloward - SD Port Tenants Assn. - SD CA; C. McNevis - Pillsbury Winthrop - LA CA; B. Ledger - Gordon & Rees - SD CA; C. Carlisle - RWQCB - SD CA.]	1.15	149.15		171.52
Thank you for your business.		TOTAL		--continued--

D-M Information Systems, Inc.

INVOICE

PAYMENT REMIT ADDRESS:
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCBSD - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Date: 03/31/08

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
5/1/2008	2008050101	NET 30	5/31/2008	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
New Work [cont'd.]				
LA-9: Senior Technical Support Specialist [Matching coded records to directory structures populated with multiple files.]	2.5	75.00	/hour	187.50
SC-16: Electronic Image Numbering	375,697	0.01	/page	3,756.97
SC-17: Electronic Image Branding	375,697	0.01	/page	3,756.97
OC-2: Tiff Image to Text Conversion [OCR]	375,697	0.03	/page	11,270.91
SC-33: PDF Conversions [tiff to PDF, PDF to tiff] [To create new searchable .pdf's.]	375,697	0.03	/page	11,270.91
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title]	93	1.05	/doc.	97.65
CD-3: Key Entry - Basic Document [BID, EID, Date, Doc Type, Exact RE/Title] [New data for RWQCB_038]	10	1.05	/doc.	10.50
LA1: Specialized Technical Assistance, Consulting, and Training [Writing of three programs to effect the numbering and integration of EE into the existing file collection, and associated revision of coded files.]	6.5	150.00	/hour	975.00
LA-9: Senior Technical Support Specialist [Creation of final index from multiple exports, including the consolidation of directory structures, creation of hyperlinks to pdfs, and creation of hyperlinks to native files for "file not processed" files.]	19	75.00	/hour	1,425.00
LA-9: Senior Technical Support Specialist [Complex linking of unusual file types, conversion of audio files to .mp3, etc.]	3	75.00	/hour	225.00

Thank you for your business.

TOTAL --continued--

D-M Information Systems, Inc.

INVOICE

PAYMENT REMIT ADDRESS:
P.O. Box 79019
City of Industry CA 91716-9019
530.750.7100 or 800.653.2112

BILL TO	REFERENCE
CA State Water Resources Control Board Attn.: Accounting P.O. Box 100 Sacramento CA 95812-0100	RWQCBSD - San Diego - Region 9 Contr Reg #39400607224510 Agency Order #05-190-8063 MSA #5-03-70-33 Invoice Date: 03/31/08

DATE	INVOICE #	TERMS	DUE DATE	PROJECT
5/1/2008	2008050101	NET 30	5/31/2008	RWQCB - SD (Reg. 9)

DATE/DESCRIPTION	QTY	COST	UNIT	AMOUNT
REPLACES INVOICE 2008033124, DATED 03/31/08, IN THE AMOUNT OF $67,609.75.				
CONSOLIDATION PROJECT SERVICES 11/15/07 - 03/31/08				
D-M Fixes				
LA-10: Technical Support Specialist [Electronic Evidence re-collection and review: Catalogue and load incoming media for review of missed files.]	14	50.00	/hour	700.00
LA-9: Senior Technical Support Specialist [Electronic file review: Check existing exports against newly received file collection.]	3	75.00	/hour	225.00
CREDIT -- For 2 Line Items Above		-925.00	/hour	-925.00
Subtotal - D-M Fixes [NO CHARGE to RWQCBSD]				0.00
New Work				
LA-9: Senior Technical Support Specialist [Creation of new "export", RWQCB_038 from electronic media newly received from client (Note: this is not remediation on previously received work; these discs were of never before received materials).]	3	75.00	/hour	225.00
LA-9: Senior Technical Support Specialist [Preparation of EE files for processing, and integration of EE processing into the existing file structure, including "file not processed" integration.]	38.5	75.00	/hour	2,887.50

Thank you for your business.

TOTAL --continued--

Department of Fish and Game

Department of Fish and Game Technical Consultation Services

Invoice	Period	Site	Task 1	Task 2	Task 3	Task 4	Task 5	Admin Overhead	Total
20425	9/1/01 - 6/30/02	Shipyards	$2,264.64	$0.00	$10,285.95	$6,249.53	$120.66	$1,562.79	$20,483.57
		BF Goodrich	$0.00	$0.00	$1,916.39	$0.00	$0.00	$1,562.79	$3,479.18
20113	7/1/02 - 10/31/02	Shipyards	$2,147.92	$1,866.96	$5,362.32	$2,899.22	$0.00	$920.73	$13,197.15
		BF Goodrich	$0.00	$0.00	$0.00	$0.00	$0.00	$920.73	$920.73
20447	11/2/02 - 2/28/03	Shipyards	$1,319.07	$0.00	$1,008.75	$3,550.69	$0.00	$440.89	$6,319.40
		BF Goodrich	$0.00	$0.00	$0.00	$0.00	$0.00	$440.89	$440.89
21132	3/1/03 - 6/30/03	Shipyards	$1,255.20	$0.00	$443.78	$951.35	$322.95	$313.36	$3,286.64
		BF Goodrich	$0.00	$0.00	$484.13	$720.72	$0.00	$313.36	$1,518.21

$43,286.76	**Shipyards**
$6,359.01	BF Goodrich
$49,645.77	Total

INVOICE 20425

Task 1		Task 2		Task 3		Task 4		Task 5		Admin Overhead		TOTAL	
$2,264.64		$0.00		$12,202.34		$6,249.53		$120.66		$3,125.58		$23,962.75	
Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG
13	0	0	0	28	41	30	0	3	0	$1,562.79	$1,562.79		
21				29	8	33							
11				16		10							
3				68		33							
5				24									
3				50									
				18									
				30									
56	0	0	0	263	49	106	0	3	0				
56	56	0	0	312	312	106	0	3	0				
$2,264.64	$0.00	$0.00	$0.00	$10,285.95	$1,916.39	$6,249.53	$0.00	$120.66	$0.00	$1,562.79	$1,562.79	**$20,483.57**	**$3,479.18**

INVOICE 20113

Task 1		Task 2		Task 3		Task 4		Task 5		Admin Overhead		TOTAL	
$2,147.92		$1,866.96		$5,362.32		$2,899.22		$0.00		$1,841.46		$14,117.88	
Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG
8	0	6	0	7	0	31	0	0	0	$920.73	$920.73		
42		16		12									
33				6									
				16									
				16									
				104									
83	0	22	0	161	0	31	0	0	0				
83	83	22	0	161	161	31	0	0	0				
$2,147.92	$0.00	$1,866.96	$0.00	$5,362.32	$0.00	$2,899.22	$0.00	$0.00	$0.00	$920.73	$920.73	**$13,197.15**	**$920.73**

INVOICE 20447

Task 1		Task 2		Task 3		Task 4		Task 5		Admin Overhead		TOTAL	
$1,319.07		$0.00		$1,008.75		$3,550.69		$0.00		$881.78		$6,760.29	
Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG
2	0	0	0	4	0	16	0	0	0	$440.89	$440.89		
8				5		27							
8				16									
14													
8													
40	0	0	0	25	0	43	0	0	0				
40	40	0	0	25	25	43	0	0	0				
$1,319.07	$0.00	$0.00	$0.00	$1,008.75	$0.00	$3,550.69	$0.00	$0.00	$0.00	$440.89	$440.89	**$6,319.40**	**$440.89**

INVOICE 21132

Task 1		Task 2		Task 3		Task 4		Task 5		Admin Overhead		TOTAL	
$1,255.20		$0.00		$927.91		$1,672.07		$322.95		$626.72		$4,804.85	
Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG	Shipyards	BFG
4	0	0	0	3	7	8.5	4	8	0	$313.36	$313.36		
4				8	5	8	8.5						
7.5													
4													
17													
2													
2													
40.5	0	0	0	11	12	16.5	12.5	8	0				
40.5	40.5	0	0	23	23	29	29	8	0				
$1,255.20	$0.00	$0.00	$0.00	$443.78	$484.13	$951.35	$720.72	$322.95	$0.00	$313.36	$313.36	**$3,286.64**	**$1,518.21**

7

CLEANUP AND ABATEMENT FUND

REQUEST FOR PAYMENT

Applicant Agency: San Diego Regional Water Quality Control Board

Project Title: Contaminated Sediments in San Diego Bay

Project Account Number: C/A 197

PCA Number 27897

Total Amount Approved For Project: $54,000

Payee Name: Department of Fish and Game

Payee Address: ATT: FASB

1416 9TH Street, 12th Floor

Sacramento, CA 95814

This Invoice Total: $23,962.75 (Attach invoice)

Agency Representative: Craig Carlisle, Senior Engineering Geologist

Representative Signature: Craig Carlisle

Representative Phone Number: (858) 636-3154

Service or Goods Provided Under This Invoice: Review bioaccumulation and Ecological risk studies and developing cleanup levels in the San Diego Bay.

State of California - The Resource Agency

GRAY DAVIS, *Governor*

DEPARTMENT OF FISH AND GAME

WATER RESOURCES CONTROL BOARD
CALIFORNIA WATER QUALITY C/B SAN
9174 SKY PARK COURT, STE., 100
SAN DIEGO, CA 92123-4340

INVOICE NO. 20425

INVOICE DATE 04/04/2003

DESCRIPTION	AMOUNT
SERVICE IN ACCORDANCE WITH AGREEMENT FOR: 01-251-190-0, R0175653	
SAN DIEGO BAY CLEANUP	
PERIOD COVERED:09/01/2001 THROUGH:06/30/2002	
ACTIVITY COVERED:	
TASK 1 PROJECT MANAGEMENT AND ADMINISTRATION	$2,264.64
TASK 2 SITE VISIT(S)	
TASK 3 TECHNICAL REVIEW AND GUIDANCE	$12,202.34
TASK 4 TECHNICAL MEETINGS AND EXPERT TESTIMONY	$6,249.53
TASK 5 LIAISON W/OTHER NATURAL RESOURCE TRUSTEE AGENCIES	$120.66
SUB-TOTAL $20,837.17	
ADMINISTRATIVE OVERHEAD	$3,125.58
INVOICE TOTAL $23,962.75	

4/23/03
APPROVED
$23,962.75
Tommy C. Alo

CC: JULIE YAMAMOTO / CAROL BERNAL - OSPR

TOTAL PRIOR PAYMENTS

QUESTIONS CALL: HELEN F BERNSTEIN (916)653-0866 TOTAL AMOUNT DUE $23,962.75

FOR ACCOUNTING USE ONLY:

C	174	FY	2001	DOC20425-00	INDEX	K123	OBJ	PCA	W0540	AMT	$23,962.75
TYPE:	02	FM:	10	BATCH:	502	BATCH DATE:	04/04/2003	SUBSIDIARY:	00010000		
PROJ	N00092-00	SOURCE	991913	AS	FS	FD	FUND	M	Act/Loc		

IMPORTANT Send a copy of the invoice along with the remittance
Dept. of Fish and Game, P.O. Box 944209, Sacramento, CA 94244-2090

State of California

Memorandum

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2003 APR 10 P 1:48

To : Mr. Tom Alo, Contract Manager
State Water Resource Control Board,
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Date : April 4, 2003

From : **Department of Fish and Game**

Subject : Invoice #20425 - State Water Resource Control Board (R0175653) Agreement

Enclosed is DFG approved invoice #20425 in the amount of $23,962.75 covering period listed against FY 01/02. Expenditures charged are listed by tasks per contract agreement. Refer any questions regarding the tasks to contract manager, Dr. Julie Yamamoto or the designee on this project, Dr. Michael Martin, (831) 649-7150.

Period Covered: September 1, 2001 through June 30, 2002

Activity Covered:

Task 1	Project Management and Administration
Task 2	Site Visit(s)
Task 3	Technical Review and Guidance
Task 4	Technical Meetings and Expert Testimony
Task 5	Liaison w/other Natural Resource Trustee Agencies

All cost identified include departmental overhead of 15%. The original invoice and two copies are enclosed with the Progress Report covering the periods noted above. If you have any questions regarding the invoice contact Carol Bernal at (916) 323-4728 or via email: cbernal@ospr.dfg.ca.gov.

E Carol Bernal

E. Carol Bernal
Office of Spill Prevention
and Response

cc: Dr. Michael Martin

Attachments

State of California - The Resources Agency
GRAY DAVIS, *Governor*
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
1416 Ninth Street
Sacramento, CA 95814

March 27, 2003

Mr. Tom Alo, Contract Manager
State Water Resources Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

RE: September 2001–June 2002 Progress Report for San Diego Bay Cleanup R0175653

Dear Mr. Alo:

The objective of this project is to provide assistance in reviewing bioaccumulation and ecological risk (fish population and aquatic dependent wildlife) studies and developing cleanup levels based in part on those studies. The California Department of Fish and Game (DFG) and the State Water Resources Control Board (SWRCB) are working jointly on this project.

I. Task 1 – Project Management and Administration

October 1-2, 2001: Provide input on contract management; contract specifications; meeting with staff on contract details (13 hours) – San Diego Bay Shipyards Site.

October 31-November 1, 2, 2001: Conference calls and Organizational Meeting with Staff at SWRCB (21 hours) – San Diego Bay Shipyards Site.

November 12, 2001: Administration, time sheets, end of month reports (11 hours) – San Diego Bay Shipyards Site

January 14, 2002: Administration, time sheets, email responses (3 hours) – San Diego Bay Shipyards Site

April 4, 2002: Contract review with DFG Staff, email revisions to Tom Alo (5 hours) – San Diego Bay Shipyards Site

March 29, 2002: Administration, time sheets, email responses (3 hours) – San Diego Bay Shipyards Site.

II. Task 2 – Site Visit(s)

None in FY 01-02

III. Task 3 – Technical Review and Guidance

November 6-9, 2001: Review Technical Documents for Sediment Cleanup Approach by RWQCB Staff (28 hours)- San Diego Bay Shipyards Site.

December 6 - 28, 2001: Voicemail and emails regarding "background" sediment concentrations", COPEC Selection, Chemistry Data Reviews SWCS/Outfall 1 Reviews (41 Hours) – BF Goodrich Site

January 2 – 8, 2002: Review and comment on the Response to San Diego Bay Coalition comments regarding: Shipyards Cleanup Approach, Conference Calls and Research Evaluations. (29 hours)- San Diego Bay Shipyards Site

January 23-January 24, 2002: Review and comment on Exponent's (Shipyard Consultants) Technical Memoranda 1, 2, & 4. (16 hours) – San Diego Bay Shipyard.

March 11-29, 2002: Development of the Ecological Risk Assessment Process; Fish Histopathology Studies & Responses to DTSC Comments; Review of Phase 1 & 2 Screening Approaches; Review of Elaine Carlin letter and comments on Public Meeting; Recommended Responses to Comments (68 hours) – San Diego Bay Shipyards Site.

April 3-11, 2002: Document reviews and meeting with B.F. Goodrich and RWQCB (24 hours) – San Diego Bay Shipyard Site.

April 5-30, 2002: San Diego Risk Management Approach (develop a flow chart), Sediment review comment of Elaine Carlin & Rusty Fairey, Risk Assessment and BSAF Issues, Letter of Fish Histopathology; sediment evaluations with *Macoma*, toxicity experiments, Alan Monji's review; review RWQCB White Paper Development; Evaluation of Reference Sediments (50 hours) – San Diego Bay Shipyards Site.

June 3, 2002: Review and comment on URS Report "North Campus Site Investigation Report and Ecological Risk Assessment Approach - (8 hours)- Goodrich Aerospace – Outfall No. 1.

June 4, & 5, 2002: Review Dr. Ford's Review of the Benthic Community Analyses; Conference Call with Jim Oakdon, Moss Landing Marine Laboratories – (18 hours).

June 11- 13, 2002: Review RWQCB & DFG Slide show presentations for Board Meeting; review details of Fish Histology Studies; Develop Power Point Presentation for Shipyard Sediment Remediation; Consult with Elaine Carlin on Presentations by DFG and S.D. Bay Council (30 hours).

IV. Task 4 – Technical Meetings and Expert Testimony

January 28-30, 2002: Technical & Public Stakeholders Technical Memoranda and Site findings, Assessment Approach (30 hours) – San Diego Bay Shipyards Site

March 27-29, 2002: Meetings and consultations on San Diego Bay Council's Comment Letter and Technical Responses (33 hours) – San Diego Bay Shipyards Site

June 6, 2002: Meeting with Alo on Presentation Issues for Public Workshop for RWQCB; review reference site criteria; meeting on Pore Water interpretation with John Roberts/Pete Peuron; Meeting with BF Goodrich on interpretation of Reference Site criteria (10 hours) –San Diego Bay Shipyards Site

June 16-18, 2002: Regional Board Workshop on Sediment Contaminants, Review & Practice Presentations; Board Workshop Presentation for DFG (33 hours) – San Diego Bay Shipyards

V. Task 5 – Liaison with other Natural Resource Trustee Agencies

April 17, 2002: Conference call with OEHHA and Natural Resource Trustees on Risk Assessment approaches (3 hours)- San Diego Bay Shipyards Site

VI. April 30, 2003 – Draft Final Report

To be submitted.

VII. June 30, 2003 – Final Report

To be submitted

If you have any question or concern with the progress report please contact Michael Martin, (831) 649-7178.

Sincerely,

Michael Martin

Michael Martin
Ph.D. Staff Toxicologist , CERCLA

cc: Carol Bernal, DFG-OSPR

(2)

CLEANUP AND ABATEMENT FUND

REQUEST FOR PAYMENT

Applicant Agency: San Diego Regional Water Quality Control Board

Project Title: Contaminated Sediments in San Diego Bay

Project Account Number: C/A 197

PCA Number 27897

Total Amount Approved For Project: $54,000

Payee Name: Department of Fish and Game

Payee Address: ATT: FASB

1416 9TH Street, 12th Floor

Sacramento, CA 95814

This Invoice Total: $14,117.88 (Attach invoice)

Agency Representative: Craig Carlisle, Senior Engineering Geologist

Representative Signature: Craig Carlisle

Representative Phone Number: (858) 636-3154

Service or Goods Provided Under This Invoice: Review bioaccumulation and Ecological risk studies and developing cleanup levels in the San Diego Bay.

State of California - The Resource Agency GRAY DAVIS, *Governor*

DEPARTMENT OF FISH AND GAME

WATER RESOURCES CONTROL BOARD
CALIFORNIA WATER QUALITY C/B SAN DIEGO
9174 SKY PARK COURT, STE., 100
SAN DIEGO, CA 92123-4340

INVOICE NO. 20113

INVOICE DATE 02/10/2003

DESCRIPTION	AMOUNT
SERVICE IN ACCORDANCE WITH AGREEMENT: 01-251-190-0, R0175653	
SAN DIEGO BAY CLEANUP	
PERIOD COVERED:07/01/2002 THROUGH:10/31/2002	
TASK	
1 PROJECT MANAGEMENT & ADMINISTRATION	$2,147.92
2 SITE VISIT(S)	$1,866.96
3 TECHNICAL REVIEW & GUIDANCE	$5,362.32
4 TECHNICAL MEETINGS & EXPERT TESTIMONY	$2,899.22
5 LIAISON W/OTHER NATURAL RESOURCE TRUSTEE AGENCIES	
ADMINISTRATIVE OVERHEAD	$1,841.46
INVOICE TOTAL $ 14,117.88	

4/01/03
APPROVED
$14,117.88
Tommy C. Alo

CC:JULIE YAMAMOTO / CAROL BERNAL - OSPR

TOTAL PRIOR PAYMENTS

QUESTIONS CALL: BILL AGNEW (916)653-0866 TOTAL AMOUNT DUE $14,117.88

FOR ACCOUNTING USE ONLY:

TC 174 FY 2002 DOC 20113-00 INDEX K123 OBJ PCA W0540 AMT $14,117.88
TYPE: 02 FM: 08 BATCH: 504 BATCH DATE: 02/10/2003 SUBSIDIARY: 00010000
PROJ N00092-00 SOURCE 991913 AS FS FD FUND M Act/Loc

IMPORTANT Send a copy of the invoice along with the remittance to:
Dept. of Fish and Game, P.O. Box 944209, Sacramento, CA 94244-2090

State of California - The Resources Agency
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
1416 Ninth Street
Sacramento, CA 95814

GRAY DAVIS, *Governor*

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

March 12, 2003 2003 MAR 14 P 1:42

WATER RESOURCES CONTROL BOARD
CALIFORNIA WATER QUALITY C/B SAN DIEGO
9174 SKY PARK COURT, STE., 100
SAN DIEGO, CA 92123

RE: PAYMENT OF INVOICE 20113, DATED: 02/10/2003

To date we have not received payment for the above referenced invoice in the amount of **$ 14,117.88.**

In view of the possibility that the original invoice was lost, we are enclosing a duplicate copy in order that you may see exactly what this amount covers.

Please remit the total invoiced amount to:

The Department of Fish and Game
Attn: FASB
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Your immediate attention to this matter is appreciated. If you have any questions, please contact me at (916) 653-0866.

Suzette D. Smythe
Accounts Receivable

Enclosure

State of California

Memorandum

To : Mr. Tom Alo, Contract Manager
California Regional Water Quality
Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Date: February 24, 2003

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD
2003 FEB 26 P 12: 26

From : **Department of Fish and Game – OSPR Scientific Branch**
Carol Bernal, BRAC/CERCLA Program Analyst Carol

Subject : Invoice # 20113 against State Water Resource Control Board (R0175653) Agreement

Enclosed is DFG invoice # 20113 in the amount of $14,117.88 covering period listed against FY 02/03. Expenditures charged are listed by tasks per contract agreement. Refer any questions regarding the tasks to Dr. Julie Yamamoto, contract manager or the designee on this project, Dr. Michael Martin, (831) 649-7150.

Period Covered: July 1, 2002 through October 31, 2002

Activity Covered:

Task 1	Project Management and Administration
Task 2	Site Visit(s)
Task 3	Technical Review and Guidance
Task 4	Technical Meetings and Expert Testimony
Task 5	Liaison w/other Natural Resource Trustee Agencies

For your information, expenses incurred during the past fiscal year (Sept. 2001 – June 30, 2002) were moved from program's default fund and entered on February 4, 2003 to agreement's established fund source, PCA E4715 (contract term and amount: 9/01-6/30/03, $54,000). The delay in invoicing 01/02 fiscal year expenditures is due to the late agreement execution date, December 2002, and the DFG Fiscal Branch inability to invoice the 01/02 FY expenditures until DFG official Calstars Report are released for the February 2003 entries in April or May 2003.

All cost identified include departmental overhead of 15%. The original invoice and two copies are enclosed with the Progress Report covering the periods noted above. If you have any questions regarding the invoice amount, contact Carol Bernal at (916) 323-4728 or via email: cbernal@ospr.dfg.ca.gov.

Attachments

cc: Michael Martin w/attachments

State of California - The Resources Agency
GRAY DAVIS, *Governor*
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
1416 Ninth Street
Sacramento, CA 95814

November 5, 2002

Mr. Tom Alo, Contract Manager
State Water Resources Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

July 2002 – October 2002 Progress Report for San Diego Bay Cleanup R0175653

The objective of this project is to provide assistance in reviewing bioaccumulation and ecological risk (fish population and aquatic dependent wildlife) studies and developing cleanup levels based in part on those studies. The California Department of Fish and Game (DFG) and the State Water Resources Control Board (SWRCB) are working jointly on this project.

Work to Date:

I. **Task 1 – Project Management and Administration**

August 28, 2002: Administration, time sheets, email responses (8 hours) – San Diego Bay Shipyards Site

September 29 – 30, 2002: Administration, time sheet, email correspondence with DFG support and technical staff and RWQCB staff, documentation of findings/reports (42 hours) – San Diego Bay Shipyards Site

October 2 – 21, 2002: Provide Administrative Support for technical staff, email correspondence w/CERCLA staff re: contract status, time sheets amendments, travel expense claims and amendments, correspondence with RWQCB Brennan requesting budget estimates for 02/03 fiscal year (33 hours) – San Diego Bay Shipyard Site

II. **Task 2 – Site Visit(s)**

September 19, 2002: Lodging arrangements and travel preparation for Field Sampling trip scheduled with RWQCB and contractor (6 hours) – Southwestern Marine and NASSCO Shipyards, San Diego Bay Shipyards Site

September 23, 2002: Travel, Independence-San Diego, Field Site Planning (16 hours) – San Diego Bay Shipyards Site

III. Task 3 – Technical Review and Guidance

July 8, 2002: Consultation in Conference Call on Fish Health and Histopathology Study design (7 Hours) – San Diego Bay Shipyards Site

July 22, 2002: Consultation in Conference Call and Research on Fish Health and Histopathology Study Design; Background Risk Calculations (12 hours) – San Diego Bay Shipyards Site

July 29, 2002: Consultation on Ecological Risk Assessment Model and Field Sampling Plan (1400-1600 + preparation – 6 hours) - San Diego Bay Shipyards Site

August 5 and 6 2002: Consultation and Review of Field Sampling Plan (16 hours) – San Diego Bay Shipyards Site

September 24, 2002: Meeting with Water Board Staff (Alo and Monji) and Field Contractors Staff (16 hours) – San Diego Bay Shipyards Site

September 25-30, 2002: Field Sampling on two boats with RWQCB and Contractor (104 hours) – San Diego Bay Shipyards Site

IV. Task 4 – Technical Meetings and Expert Testimony

August 21-23, 2002: Stakeholders Meeting at Regional Water Quality Control Board, Trustees, and Exponent on Field Sampling Plan (31 hours) – San Diego Bay Shipyards Site

V. Task 5 – Liaison with other Natural Resource Trustee Agencies

None during report period

VI. April 30, 2003 – Draft Final Report

To be submitted

VII. June 30, 2003 – Final Report

To be submitted

Sincerely,

Michael Martin

Michael Martin, Ph.D. Staff Toxicologist
Pat McLernon, Environmental Specialist II
Tom Lipp, Environmental Specialist II

Comprehensive Environmental Response,
Compensation & Liability Act (CERCLA)

3

CLEANUP AND ABATEMENT FUND

REQUEST FOR PAYMENT

Applicant Agency: San Diego Regional Water Quality Control Board

Project Title: Contaminated Sediments in San Diego Bay

Project Account Number: C/A 197

PCA Number 27897

Total Amount Approved For Project: $54,000

Payee Name: Department of Fish and Game

Payee Address: ATT: FASB

1416 9TH Street, 12th Floor

Sacramento, CA 95814

This Invoice Total: $6,760.29 (Attach invoice)

Agency Representative: ~~Tom Alo~~, WRCE

Representative Signature:

Representative Phone Number: (858) 636-3154

Service or Goods Provided Under This Invoice: Review bioaccumulation and Ecological risk studies and developing cleanup levels in the San Diego Bay.

T. ALO

State of California - The Resource Agency
GRAY DAVIS, *Governor*

DEPARTMENT OF FISH AND GAME

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

WATER RESOURCES CONTROL BOARD
CALIFORNIA WATER QUALITY C/B SAN
9174 SKY PARK COURT, STE., 100
SAN DIEGO, CA 92123-4340

2003 APR 18 P 2:46

INVOICE NO. 20447
INVOICE DATE 04/11/2003

DESCRIPTION	AMOUNT
SERVICE IN ACCORDANCE WITH AGREEMENT FOR: 01-251-190-0, R0175653	
SAN DIEGO BAY CLEANUP	
PERIOD COVERED:11/01/2002 THROUGH:02/28/2003	
TASK	
1 PROJECT MANAGEMENT AND ADMINISTRATION	$1,319.07
2 SITE VISIT(S)	
3 TECHNICAL REVIEW AND GUIDANCE	$1,008.75
4 TECHNICAL MEETINGS AND EXPERT TESTIMONY	$3,550.69
ADMINISTRATIVE OVERHEAD	$881.78
INVOICE TOTAL $ 6,760.29	
CC: JULIE YAMAMOTO / CAROL BERNAL - OSPR	
TOTAL PRIOR PAYMENTS	
UESTIONS CALL: HELEN F BERNSTEIN (916)653-0866 TOTAL AMOUNT DUE	$6,760.29

6/11/03
APPROVED
$6,760.29
Tommy C. Alo

FOR ACCOUNTING USE ONLY:

C	174	FY	2002	DOC20447-00	INDEX	K123	OBJ	PCA	W0540	AMT	$6,760.29
TYPE:	02	FM:	10	BATCH:	507	BATCH DATE:	04/11/2003	SUBSIDIARY:	00010000		
ROJ	N00092-00	SOURCE	991913	AS	FS	FD	FUND	M	Act/Loc		

IMPORTANT Send a copy of the invoice along with the remittance
Dept. of Fish and Game, P.O. Box 944209, Sacramento, CA 94244-2090

State of California - The Resources Agency
GRAY DAVIS, *Governor*
DEPARTMENT OF FISH AND GAME
http://www.dfg.ca.gov
1416 Ninth Street
Sacramento, CA 95814

April 8, 2003

Mr. Tom Alo, Contract Manager
State Water Resources Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

RE: November 1, 2002 – February 28, 2003 Progress Report for San Diego Bay Cleanup R0175653

The objective of this project is to provide assistance in reviewing bioaccumulation and ecological risk (fish population and aquatic dependent wildlife) studies and developing cleanup levels based in part on those studies. The California Department of Fish and Game (DFG) and the State Water Resources Control Board (SWRCB) are working jointly on this project.

Work to Date:

I. Task 1 – Project Management and Administration

November 5, 2002: Preparation of Quarterly Report, Fall 2002 (2 hours) – San Diego Bay Shipyards Site.

December 13, 2002: Administration, time sheets, email responses (8 hours) – San Diego Bay Shipyards Site.

January 26, 2003: End of month administrative preparation (time sheets, expense reports), Quarterly Report & Contract Administration (8 hours) – San Diego Bay Shipyards Site.

January 29 - 30, 2003: Provide Administrative support; email correspondence w/staff regarding progress report, amending contract, reconcile timesheet w/DFG Calstars report (14 hours) – San Diego Shipyard.

January 31 & February 4 , 2003: Prepare request to invoice to DFG FASB Branch, email correspondence w/CERCLA staff. Prepare invoice memo to SWRCB manager w/supporting document `Progress Report` and official DFG invoice (8 hours) – San Diego Bay Shipyard.

II. Task 2 – Site Visit(s)

None

III. Task 3 – Technical Review and Guidance

November 13, 2002: Review and comment on Regional Board Response to Letter from Environmental Health Coalition, Laura Hunter (4 hours) – San Diego Bay Shipyards Site.

December 10, 2002: Review SCCRWP and Exponent's Approach to Background Conditions. (5 hours) - San Diego Shipyards Site.

January 6, 13, and 14, 2003: Consultation and Review Distance from Shore, Principal Component Analyses, and NOAA Approaches to Reference Sediment Condition, San Diego Bay (16 hours) – San Diego Bay Shipyards Site.

IV. Task 4 – Technical Meetings and Expert Testimony

December 11 & 12, 2002: Technical Meeting at Regional Water Quality Control Board, on Reference Envelope approaches developed by SCCWRP and Exponent (16 hours) – San Diego Bay Shipyards Site.

January 21, 22, & 23, 2003: Meeting at Regional Water Quality Control Board on Reference Sediment Approach for San Diego Bay (27 hours) – San Diego Bay Shipyards Site.

V. Task 5 – Liaison with other Natural Resource Trustee Agencies

None during report period.

VI. April 30, 2003 – Draft Final Report

To be submitted.

VII. June 30, 2003 – Final Report

To be submitted

Sincerely,

Michael Martin

Michael Martin, Ph.D. Staff Toxicologist
Comprehensive Environmental Response,
Compensation & Liability Act (CERCLA)

cc: Carol Bernal, DFG-OSPR

4

(4)

CLEANUP AND ABATEMENT FUND

REQUEST FOR PAYMENT

Applicant Agency: San Diego Regional Water Quality Control Board

Project Title: Contaminated Sediments in San Diego Bay

Project Account Number: C/A 197

PCA Number 27897

Total Amount Approved For Project: $54,000

Payee Name: Department of Fish and Game

Payee Address: ATT: FASB

1416 9TH Street, 12th Floor

Sacramento, CA 95814

This Invoice Total: $4,804.85 (Attach invoice)

Agency Representative: Tom Alo, WRCE

Representative Signature:

Representative Phone Number: (858) 636-3154

Service or Goods Provided Under This Invoice: Review bioaccumulation and Ecological risk studies and developing cleanup levels in the San Diego Bay.

State of California - The Resource Agenc[illegible]
DEPARTMENT OF FISH AND [illegible]AME

GRAY DAVIS, *Governor*

WATER RESOURCES CONTROL BOARD
CALIFORNIA WATER QUALITY C/B SAN DIEGO
9174 SKY PARK COURT, STE., 100
SAN DIEGO, CA 92123-4340

INVOICE NO. 21132

INVOICE DATE 08/06/2003

DESCRIPTION		AMOUNT
SERVICE IN ACCORDANCE WITH AGREEMENT FOR: 01-251-190-0, R0175653		
SAN DIEGO BAY CLEANUP		
PERIOD COVERED:03/01/2003 THROUGH:06/30/2003		
TASK		
1	PROJECT MANAGEMENT AND ADMINISTRATION	$1,255.20
2	SITE VISIT(S)	
3	TECHNICAL REVIEW AND GUIDANCE	$927.91
4	TECHNICAL MEETINGS AND EXPERT TESTIMONY	$1,672.07
5	LIAISON W/ OTHER NATURAL RESOURCE TRUSTEE AGENCIES	$322.95
	SUB-TOTAL $ 4,178.13	
	ADMINISTRATIVE OVERHEAD	$626.72
	INVOICE TOTAL $ 4,804.85	

9/10/03
APPROVED

CC: JULIE YAMAMOTO / CAROL BERNAL - OSPR

TOTAL PRIOR PAYMENTS

QUESTIONS CALL: HELEN F BERNSTEIN (916)653-0866 TOTAL AMOUNT DUE $4,804.85

FOR ACCOUNTING USE ONLY:

TC 174 FY 2002 DOC 21132-00 INDEX K123 OBJ PCA W0540 AMT $4,804.85

TYPE: 02 FM: 02 BATCH: 505 BATCH DATE: 08/06/2003 SUBSIDIARY: 00010000

PROJ N00092-00 SOURCE 991913 AS FS FD FUND M Act/Loc

IMPORTANT Send a copy of the invoice along with the remittance to:
Dept. of Fish and Game, P.O. Box 944209, Sacramento, CA 94244-2090

State of California

Memorandum

To: Mr. Tom Alo, Contract Manager
State Water Resources Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Date: July 28, 2003

Michael Martin

From: Michael Martin, Ph. D.
California Department of Fish and Game
Office of Spill Prevention and Response
Resource Assessment Program
20 Lower Ragsdale Dr., Suite 100
Monterey, CA 93940

Subject: **March 1, 2003 – June 30, 2003 Progress and Final Report for San Diego Bay Cleanup RO175653**

The objective of this project is to provide assistance in reviewing bioaccumulation and ecological risk (fish population and aquatic dependent wildlife) studies and developing cleanup levels based in part on those studies. The California Department of Fish and Game (DFG) and the State Water Resources Control Board (SWRCB) are working jointly on this project.

Work to Date:

I. Task 1 – Project Management and Administration

March 4, 2003: Administration, time sheets, email responses (4 hours) – San Diego Bay Shipyards Site.

March 27, 2003: Administration, time sheets, email responses (4 hours) – San Diego Bay Shipyards Site.

March 27 & 28, 2003: Provided Administrative Support; reconciled calstar reports, timesheet hours and travel expenses. Prepared spreadsheet per contract agreement identifying staff tasks, hours and staff expenditures. Email/phone correspondence with technical staff regarding amending of time sheet hours. Submitted memo requesting contract be invoiced for 01/02 FY expenses (7.5 hours) – San Diego Bay Shipyards.

April 8, 2003: Preparation of Quarterly Progress Report, Spring 2003 (4 hours) – San Diego Bay Shipyards Site.

April 1-25, 2003: Provided Administrative Support; email correspondence with SWRCB Program Manager,Tom Alo, and DFG Fiscal Branch regarding invoice sent by DFG Fiscal Branch. Prepared amended time sheets and prepared STD 187s to move expenses to the appropriate fund sources associated with San Diego Bay agreement. Updated budget allotment associated with San Diego Bay. Reconciled calstar reports, timesheet hours and travel expenses for Nov. 2002 to Feb. 2003, and submitted memo to DFG to invoice expenditures for 02/03 FY (Sept 2002 – Feb. 2003). Reviewed official invoice and prepared letter to Tom Alo with supporting documents. Made copies of signed Transfer Budget Allotment and distributed to DFG/OSPR, DFG Contracts Services and DFG Fiscal Branch (17 hours) – San Diego Bay Shipyards.

May 23, 2003: Pulled and copied time sheets and travel expenses on technical staff activity for March – April 2003 (2 hours) – San Diego Bay Shipyards.

June 24, 2003: Reconciled calstar reports, time sheet hours and travel for March – June 2003 fiscal-year-end (2 hours) – San Diego Bay Shipyards.

II. Task 2 – Site Visit(s)

None

III. Task 3 – Technical Review and Guidance

March 11, 2003: Review B.F. Goodrich, URS Work Plan. (7 hours) – B.F. Goodrich Site

March 13, 2003: Review Comments on Goodrich Outfall #1, Sampling Plan & Prepare comments. (5 hours) – B.F. Goodrich Site.

May 12, 2003: Review Regional Water Quality Control Board Staff Report on San Diego Bay Background Conditions. (3 hours) - San Diego Shipyards Site.

May 24, 2003: Review and summarize issues with Regional Water Quality Control Board Staff Report (8 hours) – San Diego Bay Shipyards Site.

IV. Task 4 – Technical Meetings and Expert Testimony

March 27, 2003: Teleconference Meeting on BF Goodrich Site, regarding sampling station locations in Channel, tributary to San Diego Bay (4 hours) – B.F. Goodrich Site.

April 7-8, 2003: Technical Meeting at Regional Water Quality Control Board, on Reference Site Selection by Regional Water Quality Control Board (17 hours) – San Diego Bay Shipyards and BF Goodrich Sites.

May 28, 2003: Conference Call and Technical Meeting: Regional Water Quality Control Board Staff, Tom O'Conner (NOAA) and Natural Resource Trustees on the Background for Sediments Approach (8 hours) – San Diego Bay Shipyards Site.

V. Task 5 – Liaison with other Natural Resource Trustee Agencies

May 14, 2003: Conference call with Natural Resource Trustees, National Oceanic and Atmospheric Administration and U.S. Fish and Wildlife Service on Regional Water Quality Control Board Staff position on Sediment Background for San Diego Bay (8 hours) – San Diego Bay Shipyards Site.

VI. Draft Final Report & June 30, 2003 – Final Report

The Quarterly Reports have provided Regional Water Quality Control Board Staff with details of the consultation, recommendations, and administrative progress of Department of Fish and Game's work on the cooperative agreement. Staff of the Department of Fish and Game have participated with, and provided assistance to, Regional Board Staff with technical information and professional advice on details of the development of several aspects of the San Diego Bay Shipyard Cleanup Project, including development of "background" conditions for San Diego Bay, as well as reviews of project documents, data, information, and reports submitted to Regional Board Staff evaluate sediment contamination and cleanup alternatives. Staff of Department of Fish and Game has coordinated and consulted with the other natural resource trustees (National Oceanic and Atmospheric Administration and U.S. Fish and Wildlife Service) to assist Regional Board Staff in receiving timely and relevant input to the Cleanup Project issues. Staff of Department of Fish and Game believes that the cooperative agreement was beneficial in facilitating communication, concerns, and views of the Natural Resource Trustee agencies. The cooperative agreement allowed Department of Fish and Game to provide expertise and advice on issues of ecological risk assessment and development of sediment cleanup criteria that will protect the Bay's future beneficial uses of fish and wildlife use. Department of Fish and Game appreciates the opportunity to participate in the development of this project and looks forward to continued communication and consultation as the project, and related projects, move(s) forward in the future.

cc: Carol Bernal, DFG-OSPR

OEHHA

OEHHA Technical Consultation Services

Year	Month	Total
2002	June	$148.99
		$148.99
	July	$46.00
	August	$987.00
	October	$81.25
		$35.25
2003	July	$51.50
	November	$1,099.00
		$1,099.00
	December	$274.75
		$274.75
2004	February	$667.25
		$667.25
	March	$1,099.00
		$1,099.00
	April	$363.25
		$363.25
	June	$1,530.75
		$1,530.75
	November	$193.50
		$193.50
2005	March	$27.50
		$27.50
		$12,008.98

Office of Environmental Health Hazard Assessment

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RAFAELA PADILLA
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DIVISION OF FINANCIAL ASSISTANCE
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH321
DATE: Apr-17-03

FOR INTERAGENCY AGREEMENT SWRCB #9-080-550-0/ OEHHA #99-E0022
FOR THE MONTH OF JUNE 1, 2002

ACTUAL CHARGES	$ 30,272.71
AMOUNT DUE	**$ 30,272.71**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-01-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100 OEH321 99 880 1200 85000 991913.20 00010000 $30,272.71

PCA No.	Site I.D. No.	SWRCB Region & Project Contact	Projects/Site/Task	OEHHA Mo/Yr	OEHHA Employee Classification		Number of Hours	Direct Salary & Benefits	Direct OEE Costs	Indirect PS & OEE Costs	Total
203-09	20309-00	**Central Coast (3)**	**Guadalupe Oil Field (San Luis Obispo)**	Jun-02	Senior Toxicologist		51.0	2,503.92	408.28	4,826.23	7,798.43
		K. Anderson		Jun-02	Staff Toxicologist		1.0	49.14	0.00	92.50	141.64
			Task(s): Provided follow-up consultation regarding OEHHA's review comments, dated March 5, 2002, entitled "Comments on the Guadelupe Oil Field Screening Human Health Risk Assessment Conceptual Site Model"			Subtotal	52.0	2,613.06	408.28	4,918.73	7,940.07
180-41	18431-00	**Los Angeles (4)**	**GPM Prop. San Antonio/Foster Road (Norwalk)**	Jun-02	Associate Toxicologist		3.0	125.86	0.00	236.91	362.77
		Adnan Siddiqui	**Task(s)**: Commenced review/consultation/comment on "Response to OEHHA Comments", dated April 23, 2002; prepared by Earth Tech (Focused Risk Assesment for the Proposed Commercial Development at the Corner of San Antonio and Foster Road, Norwalk CA, dated May 11, 2001, prepared by Earth Tech)			Subtotal	3.0	125.86	0.00	236.91	362.77
180-41	2043W-00	**Los Angeles (4)**	**Playa Vista (Los Angeles)**	Jun-02	Staff Toxicologist		99.0	4,864.79	0.00	9,157.31	14,022.10
		Rebecca Neveraz	**Task(s)**: Continued review/consultation/comment on "Phase I Residential Area Health Based Remediation Goals, Playa Vista Development Project, Los Angeles, California, dated November 9, 2001, prepared by Integrated Environmental Services, Inc.			Subtotal	99.0	4,864.79	0.00	9,157.31	14,022.10
180-01	18901-00	**Los Angeles (4)**	**Boeing C-6 (Torrance)**	Jun-02	Staff Toxicologist		10.0	491.40	0.00	924.99	1,416.39
		John Geroch	**Task(s)**: Commenced review/consultation/comment on "Soil Investigatin, Shallow Soil Remediation and Screening Level Risk Assesament, Volume I and II, Boeing Realty Corporation, Former C-6 Facility, Parcel C, Los Angeles, California", dated March 13, 2002, prepared by Haley and Aldrich			Subtotal	10.0	491.40	0.00	924.99	1,416.39
37041-00	370-41	**Los Angeles (4)**	**Golden West Refinery (Santa Fe Springs)**	Jun-02	Associate Toxicologist		27.0	964.05	0.00	1,814.69	2,778.74
		Jimmie Woo		Jun-02	Supervising Toxicologist		1.0	54.00	0.00	101.65	155.65
			Task(s): Continued review/consultation/comment on "Health Risk Assessment No. 3, Processing Unit Deliverables 3 and 4", dated March 7, 2002, prepared by X. Mahnini.			Subtotal	28.0	1,018.1	0.00	1,916.3	2,934.39
37748-00	370-41	**Los Angeles (4)**	**Los Angeles Bulk Fuel Distribution**	Jun-02	Staff Toxicologist		7.0	287.61	0.00	541.39	829.00
		Wendy Liu	**Task(s)**: Commenced review/consultation/comment on "Response to RWQCB Correspondence dated January 18, 2002" addressed to W. Liu, Region 4, from Miller Brooks Environmental, Inc., "Volume I and II Revised Risk Assessment Report", dated June 5, 2002.			Subtotal	7.0	287.61	0.00	541.39	829.00
180-41	204GA-00	**Los Angeles (4)**	**Frmr Mansfield Plumbing (Walnut)**	Jun-02	Associate Toxicologist		24.0	856.94	0.00	1,613.07	2,470.01
		Andan Siddiqui	**Task(s)**: Reviewed/consulted/prepared and submitted written comments to Region 4, dated June 27, 2002, on "Risk Based Evaluation of Arsenic Soil Concentrations, Former Mansfield Plumbing Products Site, 700 Fairway Drive, Walnut, CA, SLIC #1048", dated April 1, 2002, addressed to A. Siddiqui, LARWQCB, from Environ.			Subtotal	24.0	856.94	0.00	1,613.07	2,470.01
180-91	20900-04	**San Diego (9)**	**NASSCO Marine Shipyard (San Diego)**	Jun-02	Senior Toxicologist		1.0	51.69	0.00	97.30	148.99
		Tom Alo	**Task(s)**: Participated in teleconference project meetings with Region 9; reviewed information/meeting preparation			Subtotal	1.0	51.7	0.00	97.30	148.99
180-91	20900-05	**San Diego (9)**	**Southwest Marine Shipyard (San Diego)**	Jun-02	Senior Toxicologist		1.0	51.69	0.00	97.30	148.99
		Tom Alo	**Task(s)**: Participated in teleconference project meetings with Region 9; reviewed information/meeting preparation			Subtotal	1.0	51.69	0.00	97.30	148.99
						JUNE 2002 TOTAL:	**225.0**	**10,361.09**	**408.28**	**19,503.34**	**30,272.71**

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SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH401
DATE: Feb-24-03

FOR INTERAGENCY AGREEMENT SWRCB #9-080-550-0/ OEHHA #99-E0022
FOR THE MONTH OF JULY 1, 2002

ACTUAL CHARGES $ 19,279.50

AMOUNT DUE $ 19,279.50

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-02-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100 OEH401 99 880 1200 85000 991913.20 00010000 $19,279.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB #02-087-550-0
OEHHA Invoice #02OEH401
For the Period of July 2002 (Revised 02/11/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Jul-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-11	20150-00	North Coast	R1-02-10	Frmr G&R Metals	Assoc Tox	0.5	111.00		55.50
SLIC		Lisa Bernard	*Cancelled*		Senior Tox		141.00		0.00
			07/25/02		Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**1**		**0.00**	**101.50**
180-31	20309-00	Central Coast	R3-02-17	Guadalupe Oil -	Senior Tox	2	141.00		282.00
SLIC		K. DiSmone		Project/Site Mtgs	Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**2.5**		**0.00**	**328.00**
180-41	20424-00	Los Angeles	R4-02-01	Frmr Deepwater	Assoc Tox	4	111.00		444.00
SLIC		P. Cho		Iodides Fac	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**4.5**		**0.00**	**490.00**
180-41	37341-00	Los Angeles	R4-02-02	Golden West Refinery	Assoc Tox	5	111.00		555.00
SLIC		M. Chakbrabarti			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**5.5**		**0.00**	**601.00**
180-41	37748-00	Los Angeles	R4-02-03	LA Bulk Fuel	Staff Tox	6	134.00		804.00
SLIC		Wendy Liu	*Cancelled*		Senior Tox		141.00		0.00
			09/27/02		Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**6.5**		**0.00**	**850.00**

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SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Jul-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
189-01		Los Angeles	R4-02-04	Boeing C-1 Addnm2	Staff Tox		134.00		0.00
		John Geroch			Senior Tox	1	141.00		141.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**1.5**		**0.00**	**187.00**
189-01		Los Angeles	R4-02-05	Boeing C-1 Metals	Staff Tox		134.00		0.00
		John Geroch			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	37646-00	Los Angeles	R4-02-11	Frmr WITCO	Assoc Tox	8	111.00		888.00
SLIC		Jeffrey Hu	*Cancelled*		AGPA	0.5	92.00		46.00
			07/30/02	**Subtotal**		**8.5**		**0.00**	**934.00**
180-41	18431-00	Los Angeles	R4-02-13	GPM/San Antonio/Foster Road	Assoc Tox	10	111.00		1,110.00
SLIC		Adnen Siddiqui		(Norwalk Tank)	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**10.5**		**0.00**	**1,156.00**
180-41	204DG-00	Los Angeles	R4-02-16	Willow Apartments - Soil	Staff Tox		134.00		0.00
SLIC		David Young			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**

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SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Jul-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-41	37343-00	Los Angeles	R4-02-18	Ultramar Marine Terminal	Staff Tox		134.00		0.00
SLIC		M. Chakrabarti			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	2043-W00	Los Angeles	R4-02-19	Playa Vista - Comm HBRG	Staff Tox	46	134.00		6,164.00
SLIC		R. Nevarez			Senior Tox		141.00		0.00
					Office Tech	1	55.00		55.00
					AGPA	0.5	92.00		46.00
				Subtotal		**47.5**		**0.00**	**6,265.00**
180-41	2043-W00	Los Angeles	R4-02-20	Playa Vista - Resid HBRG	Staff Tox	28	134.00		3,752.00
SLIC		R. Nevarez			Office Tech	1	55.00		55.00
					AGPA	0.5	92.00		46.00
				Subtotal		**29.5**		**0.00**	**3,853.00**
189-01		Los Angeles	R4-02-21	Boeing C-6 - Soil (Vol 1 & II)	Staff Tox		134.00		0.00
		John Geroch			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	2043-W00	Los Angeles	R4-02-22	Playa Vista - DTSC Memoranda	Staff Tox	9	134.00		1,206.00
SLIC		R. Nevarez			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**9.5**		**0.00**	**1,252.00**

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For the Period of July 2002 (Revised 02/11/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Jul-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
324-51		Los Angeles	R4-02-23	243 Chestnut Ave	Assoc Tox	4	111.00		444.00
UST		Heesu Park	*Cancelled*	Long Beach	Senior Tox		141.00		0.00
			08/26/02		Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**4.5**		**0.00**	**490.00**
180-41	204EG-00	Los Angeles	R4-02-25	Blue Line Construction	Staff Tox	1	134.00		134.00
SLIC		David Young			Office Tech	2	55.00		110.00
					AGPA		92.00		0.00
				Subtotal		**3**		**0.00**	**244.00**
180-51	20584-00	Central Valley	R5-02-08	PureGro/Brea Fac	Staff Tox	12	134.00		1,608.00
SLIC		Amy Terrell			Senior Tox		141.00		0.00
					Office Tech	6	55.00		330.00
					AGPA	0.5	92.00		46.00
				Subtotal		**18.5**		**0.00**	**1,984.00**
180-51	18637-00	Central Valley	R5-02-06	Natomas Airpark	Staff Tox (HH)		134.00		0.00
SLIC		Amy Terrell			Staff Tox (JS)		134.00		0.00
					Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**

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For the Period of July 2002 (Revised 02/11/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Jul-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-51	20500-24	Central Valley	R5-02-07	Executive Cleaners	Assoc Tox	2	111.00		222.00
SLIC		Susan Timm			Staff Tox		134.00		0.00
					Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**2.5**		**0.00**	**268.00**
180-91	20900-04	San Diego	R9-02-15	NASSCO & SW	Sen Tox (RB)		141.00		0.00
SLIC	20900-05	Tom Alo		Marine Shipyards	Sen Tox (JC)		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
					TOTAL:	**158.5**		**$0.00**	**$19,279.50**

*Includes work performed prior to receipt of cancellation notification.
**For a description of activities, please refer to corresponding SWRCB Work Transmittal Form (WTF).
Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

Office of Environmental Health Hazard Assessment

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INVOICE

PLEASE RETURN COPY OF INVOICE WITH YOUR REMITTANCE TO ADDRESS AT TOP OF FORM	INVOICE NO: OEH402 DATE: Feb-24-03

FOR INTERAGENCY AGREEMENT SWRCB #9-080-550-0/ OEHHA #99-E0022
FOR THE MONTH OF AUGUST 1, 2002

ACTUAL CHARGES	$ 21,726.00
AMOUNT DUE	**$ 21,726.00**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-02-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100 OEH402 99 880 1200 85000 991913.20 00010000 $21,726.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB#02-087-550-0
OEHHA Invoice #02OEH402
For the Period of August 2002 (Revised 02/11/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Aug-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-11	20173-00	North Coast	R1-02-30	Schmidbauer Mill - Plume	Staff Tox		134.00		0.00
SLIC		Kasey Ashley			Senior Tox	5	141.00		705.00
					AGPA	0.5	92.00		46.00
				Subtotal		**5.5**		**0.00**	**751.00**
180-41	37748-00	Los Angeles	R4-02-03	LA Bulk Fuel	Staff Tox	22	134.00		2,948.00
SLIC		Wendy Liu	*Cancelled*		Senior Tox	1	141.00		141.00
			09/27/02		Office Tech		55.00		0.00
					AGPA		92.00		0.00
				Subtotal		**23**		**0.00**	**3,089.00**
189-01		Los Angeles	R4-02-04	Boeing C-1 Addnm 2	Staff Tox	15	134.00		2,010.00
		John Geroch			Senior Tox	2	141.00		282.00
					Office Tech	2	55.00		110.00
					AGPA		92.00		0.00
				Subtotal		**19**		**0.00**	**2,402.00**
180-41	18431-00	Los Angeles	R4-02-13	GPM/San Antonio/Foster Road	Assoc Tox		111.00		0.00
SLIC		Adnen Siddiqui		(Norwalk Tank)	Senior Tox		141.00		0.00
					Office Tech	1	55.00		55.00
					AGPA		92.00		0.00
				Subtotal		**1**		**0.00**	**55.00**
180-41	204DG-00	Los Angeles	R4-02-16	Willow Apartments - Soil	Staff Tox	15	134.00		2,010.00
SLIC		David Young			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA		92.00		0.00
				Subtotal		**15**		**0.00**	**2,010.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB#02-087-550-0
OEHHA Invoice #02OEH402
For the Period of August 2002 (Revised 02/11/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Aug-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-41	37343-00	Los Angeles	R4-02-18	Ultramar Marine Terminal	Staff Tox	10	134.00		1,340.00
SLIC		M. Chakrabarti			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA		92.00		0.00
				Subtotal		**10**		**0.00**	**1,340.00**
180-41	2043-W00	Los Angeles	R4-02-19	Playa Vista - Comm HBRG	Staff Tox		134.00		0.00
SLIC		R. Nevarez			Senior Tox		141.00		0.00
					Office Tech	1	55.00		55.00
					AGPA		92.00		0.00
				Subtotal		**1**		**0.00**	**55.00**
180-41	2043-W00	Los Angeles	R4-02-20	Playa Vista - Resid HBRG	Staff Tox		134.00		0.00
SLIC		R. Nevarez			Office Tech	1	55.00		55.00
					AGPA		92.00		0.00
				Subtotal		**1**		**0.00**	**55.00**
180-41	2043-W00	Los Angeles	R4-02-22	Playa Vista - DTSC Memoranda	Staff Tox	31	134.00		4,154.00
SLIC		R. Nevarez			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA		92.00		0.00
				Subtotal		**31**		**0.00**	**4,154.00**
324-51		Los Angeles	R4-02-23	243 Chestnut Ave	Assoc Tox	6	111.00		666.00
UST		Heesu Park	*Cancelled*	Long Beach	Senior Tox		141.00		0.00
			08/26/02		Office Tech		55.00		0.00
					AGPA		92.00		0.00
				Subtotal		**6**		**0.00**	**666.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB#02-087-550-0
OEHHA Invoice #02OEH402
For the Period of August 2002 (Revised 02/11/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Aug-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-41	204EG-00	Los Angeles	R4-02-25	Blue Line Construction	Staff Tox		134.00		0.00
SLIC		David Young			Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	20430-00	Los Angeles	R4-02-26	Former Abex Facility	Assoc Tox	8	111.00		888.00
SLIC		P. Raftery			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**8.5**		**0.00**	**934.00**
180-41	20479-00	Los Angeles	R4-02-27	BP Chemical	Assoc Tox	10	111.00		1,110.00
SLIC		P. Guna-Niyogi			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**10.5**		**0.00**	**1,156.00**
180-41	2043W-00	Los Angeles	R4-02-28	Playa Vista - Methane	Staff Tox		134.00		0.00
SLIC		R. Nevarez			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	2043W-00	Los Angeles	R4-02-29	Playa Vista - Resid D NFA	Staff Tox	4	134.00		536.00
SLIC		A. Siddiqui			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**4.5**		**0.00**	**582.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB#02-087-550-0
OEHHA Invoice #02OEH402
For the Period of August 2002 (Revised 02/11/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Aug-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
189-01		Los Angeles	R4-02-31	Boeing C-6 Workplan Addnm 1	Staff Tox	15	134.00		2,010.00
		John Geroch			Senior Tox		141.00		0.00
					Supv Tox	3	147.00		441.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**18.5**		**0.00**	**2,497.00**
189-01		Los Angeles	R4-02-32	Boeing C-1 Workplan Addnm 1	Staff Tox		134.00		0.00
		John Geroch			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-51	20500-24	Central Valley	R5-02-07	Executive Cleaners	Assoc Tox	6	111.00		666.00
SLIC		Susan Timm			Staff Tox	1	134.00		134.00
					Senior Tox		141.00		0.00
					Office Tech	1	55.00		55.00
					AGPA		92.00		0.00
				Subtotal		**8**		**0.00**	**855.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB#02-087-550-0
OEHHA Invoice #02OEH402
For the Period of August 2002 (Revised 02/11/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Aug-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-91	20900-04	San Diego	R9-02-15	NASSCO & SW	Sen Tox (RB)	7	141.00		987.00
SLIC	20900-05	Tom Alo		Marine Shipyards	Sen Tox (JC)		141.00		0.00
					Office Tech		55.00		0.00
					AGPA		92.00		0.00
				Subtotal		**7**		**0.00**	**987.00**
					TOTAL:	**171**		**$0.00**	**$21,726.00**

*Includes work performed prior to receipt of cancellation notification.
**For a description of activities, please refer to corresponding SWRCB Work Transmittal Form (WTF).
Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

Office of Environmental Health Hazard Assessment

Joan E. Denton, Ph.D., Director
Headquarters • 1001 I Street • Sacramento, California 95814
Mailing Address: P.O. Box 4010 • Sacramento, California 95812-4010
Oakland Office • Mailing Address: 1515 Clay Street, 16th Floor • Oakland, California 94612

Winston H. Hickox
Agency Secretary

Gray Davis
Governor

ATTENTION: BEVERLY SLOAN
TELEPHONE: (916) 324-1775 or (916) 323-8801

RAFAELA B. PADILLA
SPILLS LEAKS INVESTIGATION & CLEANUP PROGRAM
DIVISION OF FINANCIAL ASSISTANCE
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH		INVOICE NO:	OEH414
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM		DATE:	Mar-14-03

FOR INTERAGENCY AGREEMENT SWRCB #2-087-550-0 / OEHHA #C02-E0013
FOR THE MONTH OF OCTOBER 2002

ACTUAL CHARGES	$ 22,139.60
AMOUNT DUE	**$ 22,139.60**

NO WARRANT CLAIM SCHEDULE CREDIT: 0001-3980-02-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100	OEH414	99 880	1200 85000	991913.20	00010000	$22,139.60

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 02-087-550-0
OEHHA Invoice # OEH414
For the Period of October 2002 (Rev. 03/10/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Oct-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-11	20173-00	North Coast	R1-02-30	Schmidbauer Mill - Plume	Staff Tox		134.00		0.00
SLIC		Kasey Ashley			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-31	20309-00	Central Coast	R3-02-17	Guadalupe Oil Field -	Staff Tox		134.00		0.00
SLIC		K. DiSmone		Project/Site Meetings	Senior Tox	17	141.00	390.57	2,787.57
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**17.5**		**390.57**	**2,833.57**
180-31	20309-00	Central Coast	R3-02-34	Guadalupe Oil Field -	Staff Tox		134.00		0.00
SLIC		K. DiSmone		Human Health Risk Assessment	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	37748-00	Los Angeles	R4-02-03	LA Bulk Fuel	Staff Tox		134.00		0.00
SLIC		Wendy Liu			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	18431-00	Los Angeles	R4-02-13	GPM/San Antonio/Foster Road	Staff Tox		134.00		0.00
SLIC		Adnen Siddiqui		(Norwalk Tank)	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 02-087-550-0
OEHHA Invoice # OEH414
For the Period of October 2002 (Rev. 03/10/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Oct-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-41	18431-00	Los Angeles	R4-02-38	GPM/San Antonio/Foster Road	Staff Tox		134.00		0.00
SLIC		Adnen Siddiqui		(Norwalk Tank)	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	37341-00	Los Angeles	R4-02-02	Golden West Refinery	Staff Tox		134.00		0.00
SLIC		M.Chakbrabarti			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	37646-00	Los Angeles	R4-02-11	Frmr WITCO	Staff Tox		134.00		0.00
SLIC		Jeffrey Hu			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	204DG-00	Los Angeles	R4-02-16	Willow Apartments - Soil	Staff Tox		134.00		0.00
SLIC		David Young			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	37343-00	Los Angeles	R4-02-18	Ultramar Marine Terminal	Staff Tox		134.00		0.00
SLIC		M. Chakrabarti			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 02-087-550-0
OEHHA Invoice # OEH414
For the Period of October 2002 (Rev. 03/10/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Oct-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-41	204-30	Los Angeles	R4-02-26	Former Abex Facility	Assoc Tox	12	111.00		1,332.00
SLIC		P. Raftery			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**12.5**		**0.00**	**1,378.00**
180-41	2041Y-00	Los Angeles	R4-02-36	HR Textron (Valencia)	Assoc Tox	33	111.00		3,663.00
SLIC		P. Raftery			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**33.5**		**0.00**	**3,709.00**
180-41	20479-00	Los Angeles	R4-02-27	BP Chemical	Assoc Tox		111.00		0.00
SLIC		P. Guna-Niyogi			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	2043W-00	Los Angeles	R4-02-19	Playa Vista - Commercial	Staff Tox		134.00		0.00
SLIC		A. Siddiqui		HBRG	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	2043W-00	Los Angeles	R4-02-20	Playa Vista - Residential	Staff Tox		134.00		0.00
SLIC		A. Siddiqui		HBRG	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 02-087-550-0
OEHHA Invoice # OEH414
For the Period of October 2002 (Rev. 03/10/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Oct-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-41	2043W-00	Los Angeles	R4-02-22	Playa Vista - DTSC Memos	Staff Tox		134.00		0.00
SLIC		A. Siddiqui			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	2043W-00	Los Angeles	R4-02-28	Playa Vista - Methane	Staff Tox	15	134.00		2,010.00
SLIC		A. Siddiqui			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**15.5**		**0.00**	**2,056.00**
180-41	2043W-00	Los Angeles	R4-02-29	Playa Vista - Resid D NFA	Staff Tox	9	134.00		1,206.00
SLIC		A. Siddiqui			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00	5.78	51.78
				Subtotal		**9.5**		**5.78**	**1,257.78**
189-01	TBA	Los Angeles	R4-02-31	Boeing C-6 - Soil (Vol I & II)	Staff Tox	39	134.00		5,226.00
		John Geroch			Senior Tox	3	141.00		423.00
					Supv Tox	1.5	147.00		220.50
					Office Tech	1	55.00		55.00
					AGPA	0.5	92.00	5.25	51.25
				Subtotal		**45**		**5.25**	**5,975.75**
189-01	TBA	Los Angeles	R4-02-31	Boeing C-6 Workplan Addnm 1	Staff Tox		134.00		0.00
		John Geroch			Senior Tox		141.00		0.00
					Supv Tox		147.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 02-087-550-0
OEHHA Invoice # OEH414
For the Period of October 2002 (Rev. 03/10/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Oct-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
189-01	TBA	Los Angeles	R4-02-04	Boeing C-1 - Addnm 2	Staff Tox		134.00		0.00
		John Geroch			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
189-01	TBA	Los Angeles	R4-02-32	Boeing C-1 Workplan Addnm 1	Staff Tox		134.00		0.00
		John Geroch			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	20424-00	Los Angeles	R4-02-01	Frmr Deepwater	Staff Tox		134.00		0.00
SLIC		P.Cho		Iodides Fac	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41		Los Angeles	R4-02-23	243 Chestnut Ave	Staff Tox		134.00		0.00
SLIC		Heesu Park		Long Beach	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-41	204EG-00	Los Angeles	R4-02-25	Blue Line Construction	Staff Tox		134.00		0.00
SLIC		David Young		Iodides Fac	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 02-087-550-0
OEHHA Invoice # OEH414
For the Period of October 2002 (Rev. 03/10/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Oct-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-41	20408-00	Los Angeles	R4-02-37	Frmr Memorex Fax	Staff Tox		134.00		0.00
SLIC		P. Raftery		(Westlake Village)	Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-51	18637-00	Central Valley	R5-02-06	Natomas Airpark	Staff Tox (HH)	1.5	134.00		201.00
SLIC		Amy Terrell		RA Workshop	Staff Tox (JS)		134.00		0.00
					Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**2**		**0.00**	**247.00**
180-51	20524-00	Central Valley	R5-02-08	PureGro	Staff Tox (JS)		134.00		0.00
SLIC		Amy Terrell		RA Workshop	Staff Tox (JS)		134.00		0.00
					Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**
180-51	20500-23	Central Valley	R5-02-07	Executive Cleanters	Assoc Tox		111.00		0.00
SLIC		Susan Timm			Senior Tox		141.00		0.00
					Office Tech		55.00		0.00
					AGPA	0.5	92.00		46.00
				Subtotal		**0.5**		**0.00**	**46.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 02-087-550-0
OEHHA Invoice # OEH414
For the Period of October 2002 (Rev. 03/10/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**		OEHHA Staff	Oct-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs
180-51	20500-23	Central Valley	R5-02-35	AmeriPride (Sacramento)		Staff Tox	0.5	134.00		67.00
SLIC		L. Laudon				Senior Tox		141.00		0.00
						Office Tech		55.00		0.00
						AGPA	1	92.00		92.00
					Subtotal		**1.5**		**0.00**	**159.00**
180-62	TBA	Lahonton	R6-02-33	BNSF Railroad		Staff Tox	8	134.00		1,072.00
SLIC		Jay Cass				Res Sci I	22	101.00		2,222.00
						Senior Tox		141.00		0.00
						Office Tech	1	55.00		55.00
						AGPA	0.5	92.00		46.00
					Subtotal		**31.5**		**0.00**	**3,395.00**
180-91	20900-04	San Diego	R9-02-15	NASSCO & SW		Staff Tox		134.00		0.00
SLIC	20900-05	Tom Alo		Marine Shipyards		Sen Tox (RB)	0.25	141.00		35.25
						Office Tech		55.00		0.00
						AGPA	0.5	92.00		46.00
					Subtotal		**0.75**		**0.00**	**81.25**
180-91	20900-04	San Diego	R9-02-15	NASSCO & SW		Staff Tox		134.00		0.00
SLIC	20900-05	Tom Alo		Marine Shipyards		Sen Tox (RB)	0.25	141.00		35.25
						Office Tech		55.00		0.00
						AGPA		92.00		0.00
					Subtotal		**0.25**		**0.00**	**35.25**
						TOTAL:	**180.5**		**$401.60**	**$22,139.60**

*Includes work performed prior to receipt of cancellation notification.

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 02-087-550-0
OEHHA Invoice # OEH414
For the Period of October 2002 (Rev. 03/10/03)

SWRCB PCA	SWRCB Site ID #	Region/ Project Mgr	SWRCB WTF#*	Site/Project**	OEHHA Staff	Oct-02 Hours	Hourly Rate	Direct OEE/ Travel Costs	Total Costs

**For a description of activities, please refer to corresponding SWRCB Work Transmittal Form (WTF).
Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

Office of Environmental Health Hazard Assessment

Joan E. Denton, Ph.D., Director
Headquarters • 1001 I Street • Sacramento, California 95814
Mailing Address: P.O. Box 4010 • Sacramento, California 95812-4010
Oakland Office • Mailing Address: 1515 Clay Street, 16th Floor • Oakland, California 94612

Winston H. Hickox
Agency Secretary

Gray Davis
Governor

ATTENTION: ANGIE N. ZAMORA
TELEPHONE: (916) 324-1252

RAFAELA PADILLA
SPILLS LEAKS INVESTIGATION & CLEANUP PROGRAM
DIVISION OF FINANCIAL ASSISTANCE
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH YOUR REMITTANCE TO ADDRESS AT TOP OF FORM	INVOICE NO: OEH501 DATE: Sep-26-03

FOR INTERAGENCY AGREEMENT SWRCB #03-055-550-0/ OEHHA #C03-E0003
FOR THE MONTH OF JULY 2003

ACTUAL CHARGES	$ 9,733.00
AMOUNT DUE	**$ 9,733.00**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-03-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100	OEH501	03 880	1200 85000	991913.20	00010000	$9,733.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-501
For the Period of July 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	July '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18031	2030005	Central Coast	R3-03-17		Unocal Avila Tank Farm	Staff Tox		150.00		0.00
SLIC		D. Kukol			On-call assistance	Senior Tox		157.00		0.00
					w/HHRA; meetings	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18031	2030300	Central Coast	R3-03-18		Unocal Pipeline	Staff Tox		150.00		0.00
SLIC		D. Kukol			Tank Farm Road	Senior Tox		157.00		0.00
					On-call assistance	Office Tech		62.00		0.00
					w/Corrective Action Plan	AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18031	2030100	Central Coast	R3-03-19		Unocal Tank Farm Road	Staff Tox		150.00		0.00
SLIC		D. Kukol			Bulk Storage	Senior Tox		157.00		0.00
					On-call assistance	Office Tech		62.00		0.00
					w/HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18041	2040095	Los Angeles	R4-03-01		Witco Southwest	Assoc Tox	10	124.00		1,240.00
SLIC		A. Castaneda			HHRA Areas 1-4	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**10.5**		**0.00**	**1,291.50**

Emailed to SWRCB/DFA

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-501
For the Period of July 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	July '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18041	2043WOO	Los Angeles	R4-03-05		Playa Vista Property	Staff Tox		150.00		0.00
SLIC		A. Siddiqui			Carryover #R4-02-22/	Senior Tox		157.00		0.00
					DTSC Memoranda	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18041	204GT00	Los Angeles	R4-03-06		Honeywell Intl. Gardena	Staff Tox		150.00		0.00
SLIC		A. Siddiqui			Site (Lot 6)	Senior Tox		157.00		0.00
					Carryover #R4-02-44/	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18041	2043WOO	Los Angeles	R4-03-07		Playa Vista Property	Staff Tox		150.00		0.00
SLIC		A. Siddiqui			Carryover #R4-02-51/	Senior Tox		157.00		0.00
					Commercial HBRG	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18041	2040115	Los Angeles	R4-03-08		City of LA Staples Arena/	Staff Tox		150.00		0.00
SLIC		D. Young			Grand & Venice	Senior Tox		157.00		0.00
					Carryover #R4-02-52/	Office Tech		62.00		0.00
					HHRA & Corr Action Pln	AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18041	204GT00	Los Angeles	R4-03-09		Honeywell Intl. Gardena	Staff Tox		150.00		0.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-501
For the Period of July 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	July '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
SLIC		A. Siddiqui			Site (Lots 1-5)	Senior Tox		157.00		0.00
					Carryover #R4-02-56/	Office Tech		62.00		0.00
					Soil Sampling	AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18041	204DGOO	Los Angeles	R4-03-10		Willow Apartments	Staff Tox		150.00		0.00
SLIC		D. Young			Carryover #R4-02-57/	Senior Tox		157.00		0.00
					HBRA & Subsurface	Office Tech	2	62.00		124.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**2.5**		**0.00**	**175.50**
18041	2042400	Los Angeles	R4-03-11		Dominguez Compton	Staff Tox		150.00		0.00
SLIC		P. Cho			Wilmington (Levinson,	Senior Tox		157.00		0.00
					Callender Property)	Office Tech		62.00		0.00
					Carryover #R4-02-60/PEAs	AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18041	2040800	Los Angeles	R4-03-13		Unisys Corp (Westlake	Staff Tox		150.00		0.00
SLIC		R. Raftery			Village)	Senior Tox		157.00		0.00
					Site Investigation &	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18041	204DYOO	Los Angeles	R4-03-15		Costco Gateway Ctr	Staff Tox		150.00		0.00
SLIC		D.Rasmussen			AutoNation Hawthorne	Senior Tox	11	157.00		1,727.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
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OEHHA Invoice #03OEH-501
For the Period of July 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	July '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
					Vapor Migration HRA	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**11.5**		**0.00**	**1,778.50**
18051 SLIC	2050023	Central Valley S. Timm	R5-03-02		AmeriPride Unfrm Svcs BHRA Work Plan	Senior Tox		157.00		0.00
						Assoc Tox	25	124.00		3,100.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**25.5**		**0.00**	**3,151.50**
18051 SLIC	2050023	Central Valley S. Timm	R5-03-03		AmeriPride Unfrm Srvs On-call assistance	Staff Tox		150.00		0.00
						Senior Tox		157.00		0.00
						Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
18051 SLIC	2058400	Central Valley D. Lewis	R5-03-12		Western Farm Service, Stockton *7/17/03:WTF Withdrawn*	Staff Tox		150.00		0.00
						Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	1	103.00		103.00
						Subtotal:	**1**		**0.00**	**103.00**

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-501
For the Period of July 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	July '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18051	1864700	Central Valley	R5-03-16		203 J Street, Davis	Staff Tox		150.00		0.00
SLIC		B. Taylor			Indoor Air Quality	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
16661	GAFB-16661	Victorville	R6-03-14	Jul-03	George AFB Op Unit 2	Staff Tox		150.00		0.00
DOD		J. Cass			Remediation Goals	Senior Tox	16	157.00		2,512.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	**16.5**		**0.00**	**2,563.50**
18091	2090004(NASSCO)	San Diego	R9-03-04		NTL SW Steel Ship	Staff Tox		150.00		0.00
SLIC	2090005(Southwest)	T. Alo			SW Marine	Senior Tox		157.00		0.00
					Carryover #R9-02-15	Office Tech		62.00		0.00
					On-call assistance	AGPA	0.5	103.00		51.50
						Subtotal:	**0.5**		**0.00**	**51.50**
						TOTAL:	**74.0**	**0.0**	**$0.00**	**$9,733.00**

* Includes work performed prior to receipt of cancellation notification.

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-501
For the Period of July 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	July '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost

** For a description of project site status activities refer to SWRCB Work Transmittal Form (WTF) number on OEHHA monthly status reports.
Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

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Terry Tamminen
Agency Secretary

Arnold Schwarzenegger
Governor

ATTENTION: ANGIE N. ZAMORA
TELEPHONE: (916) 324-1252

RAFAELA PADILLA
SPILLS LEAKS INVESTIGATION & CLEANUP PROGRAM
DIVISION OF FINANCIAL ASSISTANCE
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P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH514
DATE: Jan-14-04

FOR INTERAGENCY AGREEMENT SWRCB #03-055-550-0/ OEHHA #C03-E0003
FOR THE MONTH OF NOVEMBER 2003

ACTUAL CHARGES	$ 16,410.80
AMOUNT DUE	**$ 16,410.80**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-03-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100 OEH514 03 880 1200 85000 991913.20 00010000 $16,410.80

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-514
For the Period of NOVEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	November '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18011	1811900	North Coast	R1-03-27		Gaddis Nursery	Staff Tox		150.00		0.00
SLIC		J. Bentz			HHRA	Senior Tox		157.00		0.00
						Assoc Tox	4	124.00		496.00
						AGPA		103.00		0.00
						Subtotal:	4		0.00	496.00
18031	2030100	Central Coast	R3-03-19		Unocal Tank Farm Road	Staff Tox		150.00		0.00
SLIC		D. Kukol			Bulk Storage	Senior Tox	31	157.00	397.20	5,264.20
					On-call assistance	Office Tech		62.00		0.00
					w/HHRA	AGPA		103.00		0.00
						Subtotal:	31		397.20	5,264.20
18041	2040095	Los Angeles	R4-03-01		Witco Southwest	Assoc Tox		124.00		0.00
SLIC		A. Castaneda			HHRA Areas 1-4	Senior Tox		157.00		0.00
						Supv Tox	0.5	165.00		82.50
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	1		0.00	134.00
18041	204DGOO	Los Angeles	R4-03-10	Nov-03	Willow Apartments	Staff Tox		150.00		0.00
SLIC		D. Young			Carryover #R4-02-57/	Senior Tox		157.00		0.00
					HBRA & Subsurface	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-514
For the Period of NOVEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	November '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18041	2040800	Los Angeles	R4-03-13		Unisys Corp (Westlake	Staff Tox	27	150.00		4,050.00
SLIC		R. Raftery			Village)	Senior Tox		157.00		0.00
					Site Investigation &	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	27.5		0.00	4,101.50
18041	2048Y00	Los Angeles	R4-03-22		99-NLF Newhall & Farm	Staff Tox		150.00		0.00
SLIC		M. Zaidi			HHRA & Closure Rpt	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2040115	Los Angeles	R4-03-26		City of LA Staples Arena	Staff Tox	1	150.00		150.00
SLIC		D. Young			(Grand & Venice)-Prop	Senior Tox		157.00		0.00
					Target Screen Levels	Assoc Tox		124.00		0.00
					Soil Remedn	Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	1		0.00	150.00
18041	2047800	Los Angeles	R4-03-28		Allied Signal/Honeywell	Staff Tox		150.00		0.00
SLIC		A. Siddiqui			(El Segundo) HHRA	Senior Tox	1.3	157.00		204.10
						Office Tech	2	62.00		124.00
						AGPA	0.5	103.00		51.50
						Subtotal:	3.8		0.00	379.60

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-514
For the Period of NOVEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	November '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18041	2040029	Los Angeles	R4-03-29	Nov-03	Dominquez Hills	Staff Tox		150.00		0.00
SLIC		S. Hariri			HHRA	Senior Tox		157.00		0.00
						Office Tech	2	62.00		124.00
						AGPA	0.5	103.00		51.50
						Subtotal:	2.5		0.00	175.50
18051	2050023	Central Valley	R5-03-02	Nov-03	AmeriPride Unfrm Svcs	Senior Tox		157.00		0.00
SLIC		S. Timm			BHRA Work Plan	Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18051	1864700	Central Valley	R5-03-16	Nov-03	203 J Street, Davis	Staff Tox		150.00		0.00
SLIC		B. Taylor			Indoor Air Quality	Senior Tox		157.00		0.00
						Office Tech	2	62.00		124.00
						AGPA		103.00		0.00
						Subtotal:	2		0.00	124.00
18051	1861600	Central Valley	R5-03-24	Nov-03	Lewis Cleaners (Davis)	Staff Tox	0	150.00		0.00
SLIC		B. Taylor			Indoor Air Sampling &	Senior Tox		157.00		0.00
					Analysis	Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-514
For the Period of NOVEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	November '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18051	2053800	Central Valley	R5-03-31		KMEP-Balfour	Staff Tox		150.00		0.00
SLIC		M. Serra			HHRA	Senior Tox		157.00		0.00
						Assoc Tox	2	124.00		248.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	2.5		0.00	299.50
18051	1858400	Central Valley	R5-03-32		John Taylor Fertilizer	Staff Tox	14	150.00		2,100.00
SLIC		A. Terrell			(Yuba City)	Senior Tox		157.00		0.00
					Draft RA Workplan	Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	14.5		0.00	2,151.50
16661	GAFB-	Victorville	R6-03-25		George AFB	Staff Tox		150.00		0.00
DOD	16661	J. Cass			Rememdn Goals	Senior Tox	4	157.00		628.00
						Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	1	103.00		103.00
						Subtotal:	5		0.00	731.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-514
For the Period of NOVEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	November '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18091 SLIC	2090004	San Diego T. Alo	R9-03-04		NASSCO Marine Shipyard (San Diego)	Staff Tox		150.00		0.00
						Senior Tox	7	157.00		1,099.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	7		0.00	1,099.00
18091 SLIC	2090005	San Diego T. Alo	R9-03-04		Southwest Marine Inc.	Staff Tox		150.00		0.00
						Senior Tox	7	157.00		1,099.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	7		0.00	1,099.00
						TOTAL:	110.8		$397.20	$16,410.80

* Includes work performed prior to receipt of cancellation notification.
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STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH515
DATE: Jan-29-04

FOR INTERAGENCY AGREEMENT SWRCB #03-055-550-0/ OEHHA #C03-E0003
FOR THE MONTH OF DECEMBER 2003

ACTUAL CHARGES	$	27,508.20
AMOUNT DUE	**$**	**27,508.20**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-03-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100	OEH515	03 880	1200 85000	991913.20	00010000	$27,508.20

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-515
For the Period of DECEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	December '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18011	201004	North Coast	R1-03-21		Sierra Pac Arcata Div	Staff Tox		150.00		0.00
SLIC		D. Prat			Workplan; HH&ERA	Senior Tox	3	157.00		471.00
						Assoc Tox		124.00		0.00
						AGPA		103.00		0.00
						Subtotal:	3		0.00	471.00
18011	1811900	North Coast	R1-03-27		Gaddis Nursery	Staff Tox		150.00		0.00
SLIC		J. Bentz			HHRA	Senior Tox		157.00		0.00
						Assoc Tox		124.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18031	2030300	Central Coast	R3-03-18		Unocal Pipeline	Staff Tox		150.00		0.00
SLIC		D. Kukol			Tank Farm Road	Senior Tox		157.00		0.00
					On-call assistance	Office Tech		62.00		0.00
					w/Correction Action Plan	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18031	2030100	Central Coast	R3-03-19		Unocal Tank Farm Road	Staff Tox		150.00		0.00
SLIC		D. Kukol			Bulk Storage	Senior Tox	6.5	157.00		1,020.50
					On-call assistance	Office Tech	2	62.00		124.00
					w/HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	9		0.00	1,196.00
18041	2040095	Los Angeles	R4-03-01		Witco Southwest	Assoc Tox		124.00		0.00
SLIC		A. Castaneda			HHRA Areas 1-4	Senior Tox		157.00		0.00
						Supv Tox	6	165.00		990.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	6		0.00	990.00
18041	2043WOO	Los Angeles	R4-03-05	Dec-03	Playa Vista	Staff Tox		150.00		0.00
SLIC		A. Siddiqui			Carryover #R4-02-22/	Senior Tox		157.00		0.00
					DTSC Memoranda	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	204GTOO	Los Angeles	R4-03-06		Honeywill Intl. Gardena	Staff Tox		150.00		0.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-515
For the Period of DECEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	December '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
SLIC		A.Siddiui			Site (Lot 6)	Senior Tox		157.00		0.00
					Carryover #R4-02-44/	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2043WOO	Los Angeles	R4-03-07	Dec-03	Playa Vista Property	Staff Tox		150.00		0.00
SLIC		A. Siddiqui			Carryover #R4-02-51/	Senior Tox		157.00		0.00
					Commercial HBRG	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	204GT00	Los Angeles	R4-03-09		Honeywell Int. Gardena	Staff Tox		150.00		0.00
SLIC		A. Siddiqui			Site (Lots 1-5)	Senior Tox		157.00		0.00
					Carryover #R4-02-561	Office Tech		62.00		0.00
					Soil Sampling	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2042400	Los Angeles	R4-03-11		Dominquez Compton	Staff Tox		150.00		0.00
SLIC		P.Cho			Wilmington (Levinson,	Senior Tox		157.00		0.00
					Callender Property)	Office Tech		62.00		0.00
					Carryover #R4-20-60/PEAs	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2040800	Los Angeles	R4-03-13		Unisys Corp (Westlake	Staff Tox	4	150.00		600.00
SLIC		P. Raftery			Village)	Senior Tox		157.00		0.00
					Site Investigation &	Office Tech	2	62.00		124.00
					HHRA	AGPA		103.00		0.00
						Subtotal:	6		0.00	724.00
18041	2048Y00	Los Angeles	R4-03-22		99-NLF Newhall & Farm	Staff Tox	6	150.00		900.00
SLIC		M. Zaidi			HHRA & Closure Rpt	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	6		0.00	900.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-515
For the Period of DECEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	December '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18041	2040115	Los Angeles	R4-03-26		City of LA Staples Arena	Staff Tox	1	150.00		150.00
SLIC		D. Young			(Grand & Venice)-Prop	Senior Tox		157.00		0.00
					Target Screen Levels	Assoc Tox		124.00		0.00
					Soil Remedn	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	1.5		0.00	201.50
18041	2047800	Los Angeles	R4-03-28		Allied Signal/Honeywell	Staff Tox	57	150.00	128.85	8,678.85
SLIC		A. Siddiqui			(El Segundo) HHRA	Senior Tox	1.5	157.00		235.50
						Office Tech		62.00		0.00
						AGPA	1	103.00		103.00
						Subtotal:	59.5		128.85	9,017.35
18041	2040400	Los Angeles	R4-03-30	Dec-03	Hugo Neu-Proler	Staff Tox	28	150.00		4,200.00
SLIC		P.Guha-Niyogi			PRG/Clean Closure	Senior Tox		157.00		0.00
						Office Tech	2	62.00		124.00
						AGPA	0.5	103.00		51.50
						Subtotal:	30.5		0.00	4,375.50
18901	N/A	Los Angeles	R4-03-33		Boeing Compton	Staff Tox	9	150.00		1,350.00
		J. Geroch			PRGs	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	9.5		0.00	1,401.50
18041	204EJOO	Los Angeles	R4-03-34		Honeywell Intl. Torrance	Staff Tox	40	150.00	128.85	6,128.85
SLIC		D.Rasmussen			Soil Investigation	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	40.5		128.85	6,180.35
18051	1858400	Central Valley	R5-03-32	Dec-03	John Taylor Fertilizer	Staff Tox	4	150.00		600.00
SLIC		A. Terrell			(Yuba City)	Senior Tox	1	157.00		157.00
					Draft RA Workplan	Assoc Tox		124.00		0.00
						Office Tech	2	62.00		124.00
						AGPA	0.5	103.00		51.50
						Subtotal:	7.5		0.00	932.50
18051	1863100	Central Valley	R5-03-35		Cottonwood Cleaners/	Staff Tox		150.00		0.00
SLIC		D. Lewis			Plaza	Senior Tox		157.00		0.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-515
For the Period of DECEMBER 2003

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	December '03 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
					Workplan HRA	Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
16661 DOD	GAFB-16661	Victorville J. Cass	R6-03-25		George AFB Rememdn Goals	Staff Tox		150.00		0.00
						Senior Tox	1	157.00		157.00
						Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	1		0.00	157.00
18091 SLIC	2090004	San Diego T. Alo	R9-03-04		NASSCO Marine Shipyard (San Diego)	Staff Tox		150.00		0.00
						Senior Tox	1.75	157.00		274.75
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	1.75		0.00	274.75
18091 SLIC	2090005	San Diego T. Alo	R9-03-04		Southwest Marine Shipyard	Staff Tox		150.00		0.00
						Senior Tox	1.75	157.00		274.75
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	1.75		0.00	274.75
						TOTAL:	187.5		$ 257.70	$ 27,508.20

* Includes work performed prior to receipt of cancellation notification.
** For a description of project site status activities refer to SWRCB Work Transmittal Form (WTF) number on OEHHA monthly status reports.
Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

Office of Environmental Health Hazard Assessment

Joan E. Denton, Ph.D., Director
Headquarters • 1001 I Street • Sacramento, California 95814
Mailing Address: P.O. Box 4010 • Sacramento, California 95812-4010
Oakland Office • Mailing Address: 1515 Clay Street, 16th Floor • Oakland, California 94612

Terry Tamminen
Agency Secretary

Arnold Schwarzenegger
Governor

ATTENTION: ANGIE N. ZAMORA
TELEPHONE: (916) 324-1252

RAFAELA PADILLA
SPILLS LEAKS INVESTIGATION & CLEANUP PROGRAM
DIVISION OF FINANCIAL ASSISTANCE
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH523
DATE: Mar-19-04

FOR INTERAGENCY AGREEMENT SWRCB #03-055-550-0/ OEHHA #C03-E0003
FOR THE MONTH OF FEBRUARY 2004

ACTUAL CHARGES	$ 18,431.50
AMOUNT DUE	**$ 18,431.50**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-03-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100	OEH523	03 880	1200 85000	991913.20	00010000	$18,431.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-523
For the Period of February 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Feb '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18011	201004	North Coast	R1-03-21		Sierra Pac Arcata Div	Staff Tox		150.00		0.00
SLIC		D. Prat			Workplan; HH&ERA	Senior Tox	2.5	157.00		392.50
						Assoc Tox		124.00		0.00
						AGPA		103.00		0.00
						Subtotal:	2.5		0.00	392.50
18041	2040095	Los Angeles	R4-03-01		Witco Southwest	Assoc Tox		124.00		0.00
SLIC		A. Castaneda			HHRA Areas 1-4	Senior Tox		157.00		0.00
						Supv Tox	5.5	165.00		907.50
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	6		0.00	959.00
18041	2042400	Los Angeles	R4-03-11		Dominquez Compton	Staff Tox		150.00		0.00
SLIC		P.Cho			Wilmington (Levinson,	Senior Tox		157.00		0.00
					Callender Property)	Office Tech		62.00		0.00
					Carryover #R4-20-60/PEAs	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2040800	Los Angeles	R4-03-13		Unisys Corp (Westlake	Staff Tox	7	150.00		1,050.00
SLIC		P. Raftery			Village)	Senior Tox		157.00		0.00
					Site Investigation &	Office Tech	2	62.00		124.00
					HHRA	AGPA		103.00		0.00
						Subtotal:	9		0.00	1,174.00
18041	2048Y00	Los Angeles	R4-03-22		99-NLF Newhall & Farm	Staff Tox	2	150.00		300.00
SLIC		M. Zaidi			HHRA & Closure Rpt	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	2.5		0.00	351.50
18041	2047800	Los Angeles	R4-03-28		Allied Signal/Honeywell	Staff Tox		150.00		0.00
SLIC		A. Siddiqui			(El Segundo) HHRA	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-523
For the Period of February 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Feb '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18901		Los Angeles	R4-03-33	Feb-04	Boeing Compton	Staff Tox		150.00		0.00
		J. Geroch			PRGs	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	204EJOO	Los Angeles	R4-03-34		Honeywell Intl. Torrance	Staff Tox	11	150.00		1,650.00
SLIC		D.Rasmussen			Soil Investigation	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	11		0.00	1,650.00
18901		Los Angeles	R4-03-37		Boeing C-1, Area C	Staff Tox	46	150.00		6,900.00
		J. Geroch			(Long Beach) Soil Inv &	Senior Tox		157.00		0.00
					Screen Lvl HHRA	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	46.5		0.00	6,951.50
18041	2040071	Los Angeles	R4-03-38		Powerine/Cenco	Staff Tox	29	150.00		4,350.00
SLIC		S. Hariri			Stanta Fe Springs	Senior Tox		157.00		0.00
					Rem Action Plan & HRA	Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	29		0.00	4,350.00
18051	2053800	Central Valley	R5-03-31		KMEP-Balfour	Staff Tox		150.00		0.00
SLIC		M. Serra			Brentwood	Senior Tox		157.00		0.00
					HHRA	Assoc Tox	5	124.00		620.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	5		0.00	620.00
18051	1863100	Central Valley	R5-03-35	Feb-04	Cottonwood Cleaners/	Staff Tox	0.5	150.00		75.00
SLIC		D. Lewis			Plaza	Senior Tox		157.00		0.00
					Workplan HRA	Assoc Tox		124.00		0.00
						Office Tech	3	62.00		186.00
						AGPA	1	103.00		103.00
						Subtotal:	4.5		0.00	364.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-523
For the Period of February 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Feb '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18051	2050023	Central Valley	R5-03-39		AmeriPride Unfrm Svcs	Senior Tox		157.00		0.00
SLIC		S. Timm			BHRA Work Plan	Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
16661	GAFB-	Victorville	R6-03-25		George AFB	Staff Tox		150.00		0.00
DOD	16661	J. Cass			Rememdn Goals	Senior Tox	0.5	157.00		78.50
						Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	0.5		0.00	78.50
18091	2090004	San Diego	R9-03-04		NASSCO Marine	Staff Tox		150.00		0.00
SLIC		T. Alo			Shipyard (San Diego)	Senior Tox	4.25	157.00		667.25
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	4.25		0.00	667.25
18091	2090005	San Diego	R9-03-04		Southwest Marine	Staff Tox		150.00		0.00
SLIC		T. Alo			Shipyard	Senior Tox	4.25	157.00		667.25
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	4.25		0.00	667.25
						TOTAL:	127.0		0.0	$18,431.50

* Includes work performed prior to receipt of cancellation notification.
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Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

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DIVISION OF FINANCIAL ASSISTANCE
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH	INVOICE NO: OEH525
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM	DATE: Apr-19-04

FOR INTERAGENCY AGREEMENT SWRCB #03-055-550-0/ OEHHA #C03-E0003
FOR THE MONTH OF MARCH 2004

ACTUAL CHARGES	$ 36,965.64
AMOUNT DUE	**$ 36,965.64**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-03-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100	OEH525	03 880	1200 85000	991913.20	00010000	$36,965.64

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-525
For the Period of March 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Mar '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18011	201004	North Coast	R1-03-21		Sierra Pac Arcata Div	Staff Tox		150.00		0.00
SLIC		D. Prat			Workplan; HH&ERA	Senior Tox	0.5	157.00		78.50
						Assoc Tox		124.00		0.00
						AGPA		103.00		0.00
						Subtotal:	0.5		0.00	78.50
18011	1811900	North Coast	R1-03-27	Mar-04	Gaddis Nursery	Staff Tox		150.00		0.00
SLIC		J. Bentz			HHRA	Senior Tox		157.00		0.00
						Assoc Tox		124.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18031	2030300	Central Coast	R3-03-18	Mar-04	Unocal Pipeline	Staff Tox		150.00		0.00
SLIC		D. Kukol			Tank Farm Road	Senior Tox		157.00		0.00
					On-call assistance	Office Tech		62.00		0.00
					w/Correction Action Plan	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18031	2030100	Central Coast	R3-03-19		Unocal Tank Farm Road	Staff Tox		150.00		0.00
SLIC		D. Kukol			Bulk Storage	Senior Tox	5	157.00		785.00
					On-call assistance	Office Tech		62.00		0.00
					w/HHRA	AGPA		103.00		0.00
						Subtotal:	5		0.00	785.00
18041	2040095	Los Angeles	R4-03-01		Witco Southwest	Assoc Tox		124.00		0.00
SLIC		A. Castaneda			HHRA Areas 1-4	Senior Tox	2.5	157.00		392.50
						Supv Tox	2	165.00		330.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	5		0.00	774.00
18041	204GTOO	Los Angeles	R4-03-06		Honeywell Intl. Gardena	Staff Tox	3	150.00		450.00
SLIC		A.Siddiqui			Site (Lot 6)	Senior Tox		157.00		0.00
					Carryover #R4-02-44/	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	3.5		0.00	501.50
18041	204GTOO	Los Angeles	R4-03-09		Honeywell Intl. Gardena	Staff Tox		150.00		0.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-525
For the Period of March 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Mar '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
SLIC		A.Siddiqui			Site (Lots 1-5)	Senior Tox		157.00		0.00
					Carryover #R4-02-56/	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2040800	Los Angeles	R4-03-13		Unisys Corp (Westlake	Staff Tox	4	150.00		600.00
SLIC		P. Raftery			Village)	Senior Tox		157.00		0.00
					Site Investigation &	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	4.5		0.00	651.50
18041	2048Y00	Los Angeles	R4-03-22		99-NLF Newhall & Farm	Staff Tox	40	150.00		6,000.00
SLIC		M. Zaidi			HHRA & Closure Rpt	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	40		0.00	6,000.00
18041	2047800	Los Angeles	R4-03-28		Allied Signal/Honeywell	Staff Tox	42	150.00	132.07	6,432.07
SLIC		A. Siddiqui			(El Segundo) HHRA	Senior Tox		157.00		0.00
					Site Project Mtg (3/30/04)	Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	42		132.07	6,432.07
18041	204EJOO	Los Angeles	R4-03-34		Honeywell Intl. Torrance	Staff Tox	12	150.00	132.07	1,932.07
SLIC		D.Rasmussen			Soil Investigation	Senior Tox		157.00		0.00
					Site Project Mtg (3/30/04)	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	12.5		132.07	1,983.57
18041	2041400	Los Angeles	R4-03-36	Mar-04	Emery/Textron	Staff Tox	1	150.00		150.00
SLIC		P. Raftery			Thousand Oaks	Senior Tox	8.5	157.00		1,334.50
					Site Closure	Office Tech	4	62.00		248.00
						AGPA	0.5	103.00		51.50
						Subtotal:	14		0.00	1,784.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-525
For the Period of March 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Mar '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18901		Los Angeles	R4-03-37		Boeing C-1, Area C	Staff Tox	10	150.00		1,500.00
		J. Geroch			(Long Beach) Soil Inv &	Senior Tox	2.5	157.00		392.50
					Screen Lvl HHRA	Office Tech		62.00		0.00
						AGPA	1	103.00		103.00
						Subtotal:	13.5		0.00	1,995.50
18041	2040071	Los Angeles	R4-03-38		Powerine/Cenco	Staff Tox	58	150.00		8,700.00
SLIC		S. Hariri			Stanta Fe Springs	Senior Tox	6.6	157.00		1,036.20
					Rem Action Plan & HRA	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	65.1		0.00	9,787.70
18041	204GCOO	Los Angeles	R4-03-41		Savoy Dry Cleaners	Staff Tox		150.00		0.00
SLIC		D. Rasmussen			Screening HHRA	Senior Tox	7.4	157.00		1,161.80
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	7.9		0.00	1,213.30
18051	2053800	Central Valley	R5-03-31	Mar-04	KMEP-Balfour	Staff Tox		150.00		0.00
SLIC		M. Serra			Brentwood	Senior Tox		157.00		0.00
					HHRA	Assoc Tox	6	124.00		744.00
						Office Tech	4	62.00		248.00
						AGPA	0.5	103.00		51.50
						Subtotal:	10.5		0.00	1,043.50
18051	2050023	Central Valley	R5-03-39		AmeriPride Unfrm Svcs	Senior Tox		157.00		0.00
SLIC		S. Timm			BHRA Work Plan	Assoc Tox		124.00		0.00
						Staff Tox	5	150.00		750.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	5		0.00	750.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-525
For the Period of March 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Mar '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18051 SLIC	1858400	Central Valley A. Terrell	R5-03-40		John Taylor Fertilizer Rev RA Workplan	Senior Tox		157.00		0.00
						Assoc Tox		124.00		0.00
						Staff Tox	4	150.00		600.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	4.5		0.00	651.50
18051 SLIC	1861600	Central Valley B. Taylor	R5-03-42		Lewis Cleaners (Davis) Indoor Air Sampling & Analysis	Staff Tox		150.00		0.00
						Senior Tox		157.00		0.00
						Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
16661 DOD	GAFB-16661	Victorville J. Cass	R6-03-25		George AFB Rememdn Goals 880095.02	Staff Tox		150.00		0.00
						Senior Tox	0.5	157.00		78.50
						Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	1		0.00	130.00
18091 SLIC	2090004	San Diego T. Alo	R9-03-04		NASSCO Marine Shipyard (San Diego)	Staff Tox		150.00		0.00
						Senior Tox	7	157.00		1,099.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	7		0.00	1,099.00
18091 SLIC	2090005	San Diego T. Alo	R9-03-04		Southwest Marine Shipyard	Staff Tox		150.00		0.00
						Senior Tox	7	157.00		1,099.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	7		0.00	1,099.00
						TOTAL:	250.5		$264.14	$36,965.64

* Includes work performed prior to receipt of cancellation notification.
** For a description of project site status activities refer to SWRCB Work Transmittal Form (WTF) number on OEHHA monthly status reports.

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-525
For the Period of March 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Mar '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost

Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

Office of Environmental Health Hazard Assessment

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Terry Tamminen
Agency Secretary

Arnold Schwarzenegger
Governor

ATTENTION: ANGIE N. ZAMORA
TELEPHONE: (916) 324-1252

RAFAELA PADILLA
SPILLS LEAKS INVESTIGATION & CLEANUP PROGRAM
DIVISION OF FINANCIAL ASSISTANCE
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH529
DATE: May-11-04

FOR INTERAGENCY AGREEMENT SWRCB #03-055-550-0/ OEHHA #C03-E0003
FOR THE MONTH OF APRIL 2004

ACTUAL CHARGES	$ 33,267.40
AMOUNT DUE	**$ 33,267.40**

**NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-03-001-90-F**

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100	OEH529	03 880	1200 85000	991913.20	00010000	$33,267.40

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-529
For the Period of April 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	April '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18031	2030005	Central Coast	R3-03-17		Unocal Avila Tank Farm	Staff Tox		150.00		0.00
SLIC		D. Kukol			On-call assistance w/HHRA	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18031	2030100	Central Coast	R3-03-19		Unocal Tank Farm Road	Staff Tox		150.00		0.00
SLIC		D. Kukol			Bulk Storage	Senior Tox	3	157.00		471.00
					On-call assistance	Office Tech		62.00		0.00
					w/HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	3.5		0.00	522.50
18041	2040095	Los Angeles	R4-03-01		Witco Southwest	Assoc Tox		124.00		0.00
SLIC		A. Castaneda			HHRA Areas 1-4	Senior Tox		157.00		0.00
						Supv Tox		165.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	204GTOO	Los Angeles	R4-03-06		Honeywell Intl. Gardena	Staff Tox		150.00		0.00
SLIC		A.Siddiqui			Site (Lot 6)	Senior Tox		157.00		0.00
					Carryover #R4-02-44/	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	204GTOO	Los Angeles	R4-03-09		Honeywell Intl. Gardena	Staff Tox		150.00		0.00
SLIC		A.Siddiqui			Site (Lots 1-5)	Senior Tox		157.00		0.00
					Carryover #R4-02-56/	Office Tech		62.00		0.00
					HHRA	AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-529
For the Period of April 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	April '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18041	2042400	Los Angeles	R4-03-11	Apr-04	Dominguez/Compton	Staff Tox		150.00		0.00
SLIC		P. Cho			Wilmington	Senior Tox		157.00		0.00
					Carryover #R4-02-60	Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2048Y00	Los Angeles	R4-03-22		99-NLF Newhall & Farm	Staff Tox		150.00		0.00
SLIC		M. Zaidi			HHRA & Closure Rpt	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2040115	Los Angeles	R4-03-26	Apr-04	City of LA Staples Arena	Staff Tox		150.00		0.00
SLIC		D. Young			Grand & Venice Housing	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18041	2047800	Los Angeles	R4-03-28		Allied Signal/Honeywell	Staff Tox	18	150.00		2,700.00
SLIC		A. Siddiqui			(El Segundo) HHRA	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	18.5		0.00	2,751.50
18041	204EJOO	Los Angeles	R4-03-34		Honeywell Intl. Torrance	Staff Tox	1	150.00		150.00
SLIC		D.Rasmussen			Soil Investigation	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	1.5		0.00	201.50
18901		Los Angeles	R4-03-37	Apr-04	Boeing C-1, Area C	Staff Tox	28	150.00		4,200.00
		J. Geroch			(Long Beach) Soil Inv &	Senior Tox		157.00		0.00
					Screen Lvl HHRA	Office Tech	4	62.00		248.00
						AGPA	0.5	103.00		51.50
						Subtotal:	32.5		0.00	4,499.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-529
For the Period of April 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	April '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18041	2040071	Los Angeles	R4-03-38	Apr-04	Powerine/Cenco	Staff Tox	32	150.00		4,800.00
SLIC		S. Hariri			Stanta Fe Springs	Senior Tox		157.00		0.00
					Rem Action Plan & HRA	Office Tech	4	62.00		248.00
						AGPA	0.5	103.00		51.50
						Subtotal:	36.5		0.00	5,099.50
18041	204GCOO	Los Angeles	R4-03-41		Savoy Dry Cleaners	Staff Tox		150.00		0.00
SLIC		D. Rasmussen			Screening HHRA	Senior Tox	6.7	157.00		1,051.90
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	7.2		0.00	1,103.40
18041	2040144	Los Angeles	R4-03-43		Los Angeles AFB - Area C	Supv Tox	2	147.00		294.00
SLIC		J. Hu			(Note: For work performed	Senior Tox	30	141.00		4,230.00
					02/01/04-04/30/04)	Office Tech		55.00		0.00
						AGPA		92.00		0.00
						Subtotal:	32		0.00	4,524.00
18051	2050023	Central Valley	R5-03-03	Apr-04	AmeriPride Unfrm Svcs	Senior Tox		157.00		0.00
SLIC		S. Timm			On-Call Assistance	Assoc Tox		124.00		0.00
						Staff Tox		150.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
18051	2053800	Central Valley	R5-03-20	Apr-04	KMEP-Balfour	Staff Tox		150.00		0.00
SLIC		M. Serra			Brentwood	Senior Tox		157.00		0.00
					On-call assistance	Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-529
For the Period of April 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	April '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18051	2050023	Central Valley	R5-03-39		AmeriPride Unfrm Svcs	Senior Tox		157.00		0.00
SLIC		S. Timm			BHRA Work Plan	Assoc Tox		124.00		0.00
						Staff Tox	23	150.00		3,450.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	23		0.00	3,450.00
18051	1858400	Central Valley	R5-03-40		John Taylor Fertilizer	Senior Tox		157.00		0.00
SLIC		A. Terrell			Rev RA Workplan	Assoc Tox		124.00		0.00
						Staff Tox	22	150.00		3,300.00
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	22		0.00	3,300.00
18051	1861600	Central Valley	R5-03-42		Lewis Cleaners (Davis)	Staff Tox	40	150.00		6,000.00
SLIC		B. Taylor			Indoor Air Sampling &	Senior Tox	3	157.00		471.00
					Analysis	Assoc Tox		124.00		0.00
						Office Tech		62.00		0.00
						AGPA	1	103.00		103.00
						Subtotal:	44		0.00	6,574.00
18091	2090004	San Diego	R9-03-04		NASSCO Marine	Staff Tox	2.25	150.00		337.50
SLIC		T. Alo			Shipyard (San Diego)	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.25	103.00		25.75
						Subtotal:	2.5		0.00	363.25
18091	2090005	San Diego	R9-03-04		Southwest Marine	Staff Tox	2.25	150.00		337.50
SLIC		T. Alo			Shipyard	Senior Tox		157.00		0.00
						Office Tech		62.00		0.00
						AGPA	0.25	103.00		25.75
						Subtotal:	2.5		0.00	363.25
18091	2092300	San Diego	R9-03-23	Apr-04	Ketema Aerospace	Staff Tox		150.00		0.00
SLIC		L. Walsh			Electronics Facility	Senior Tox		157.00		0.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice #03OEH-529
For the Period of April 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	April '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
						Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	0.5		0.00	51.50
						TOTAL:	230.7		0.0	$33,267.40

* Includes work performed prior to receipt of cancellation notification.
** For a description of project site status activities refer to SWRCB Work Transmittal Form (WTF) number on OEHHA monthly status reports.
Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

Office of Environmental Health Hazard Assessment

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Terry Tamminen
Agency Secretary

Arnold Schwarzenegger
Governor

ATTENTION: ANGIE N. ZAMORA
TELEPHONE: (916) 324-1252

RAFAELA PADILLA
SPILLS LEAKS INVESTIGATION & CLEANUP PROGRAM
DIVISION OF FINANCIAL ASSISTANCE
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH600
DATE: Sep-17-04

FOR INTERAGENCY AGREEMENT SWRCB #03-055-550-0/ OEHHA #C03-E0003
FOR THE MONTH OF JUNE 2004

ACTUAL CHARGES	$	8,206.10
AMOUNT DUE	**$**	**8,206.10**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-03-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100 OEH600 03 880 1200 85000 991913.20 00010000 $8,206.10

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice # 03OEH-600
For the Period of June 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	June '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18011	201004	North Coast	R1-03-21	Closed per	Sierra Pac Arcata Div	Staff Tox		150.00		0.00
SLIC		D. Prat		SWRCB	Workplan; HH&ERA	Senior Tox	15.5	157.00		2,433.50
				Request		Assoc Tox		124.00		0.00
						AGPA		103.00		0.00
						Subtotal:	15.5		0.00	2,433.50
18031	2030005	Central Coast	R3-03-17	Closed per	Unocal Avila Tank Farm	Staff Tox		150.00		0.00
SLIC		D. Kukol		SWRCB	On-call assistance w/HHRA	Senior Tox	6.5	157.00		1,020.50
				Request		Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	6.5		0.00	1,020.50
18041	2047800	Los Angeles	R4-03-28	Closed per	Allied Signal/Honeywell	Staff Tox	6	150.00		900.00
SLIC		A. Siddiqui		SWRCB	(El Segundo) HHRA	Senior Tox		157.00		0.00
				Request		Office Tech		62.00		0.00
						AGPA	0.5	103.00		51.50
						Subtotal:	6.5		0.00	951.50
18041	204GCOO	Los Angeles	R4-03-41	Closed per	Savoy Dry Cleaners	Staff Tox		150.00		0.00
SLIC		D. Rasmussen		SWRCB	Screening HHRA	Senior Tox	2.8	157.00		439.60
				Request		Office Tech	2	62.00		124.00
						AGPA	0.5	103.00		51.50
						Subtotal:	5.3		0.00	615.10

Recvd: Sept. 17, 2004

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 03-055-550-0 / OEH 03-E0003
OEHHA Invoice # 03OEH-600
For the Period of June 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	June '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18051 SLIC	2050023	Central Valley S. Timm	R5-03-39	Jun-04	AmeriPride Unfrm Svcs BHRA Work Plan	Senior Tox		157.00		0.00
						Assoc Tox		124.00		0.00
						Staff Tox		150.00		0.00
						Office Tech	2	62.00		124.00
						AGPA		103.00		0.00
						Subtotal:	2		0.00	124.00
18091 SLIC	2090004	San Diego T. Alo	R9-03-04	Closed per SWRCB Request	NASSCO On-call assistance.	Staff Tox		150.00		0.00
						Senior Tox	9.75	157.00		1,530.75
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	9.75		0.00	1,530.75
18091 SLIC	2090005	San Diego T. Alo	R9-03-04	Closed per SWRCB Request	Southwest Marine Shipyard On-call assistance.	Staff Tox		150.00		0.00
						Senior Tox	9.75	157.00		1,530.75
						Office Tech		62.00		0.00
						AGPA		103.00		0.00
						Subtotal:	9.75		0.00	1,530.75
						TOTAL:	55.3		$ -	$ 8,206.10

* Includes work performed prior to receipt of cancellation notification.

** For a description of project site status activities refer to SWRCB Work Transmittal Form (WTF) number on OEHHA monthly status reports.

Office Tech = Secretarial and records management support.

AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

Recvd: Sept. 17, 2004

Office of Environmental Health Hazard Assessment

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Mailing Address: P.O. Box 4010 • Sacramento, California 95812-4010
Oakland Office • Mailing Address: 1515 Clay Street, 16th Floor • Oakland, California 94612

Terry Tamminen
Agency Secretary

Arnold Schwarzenegger
Governor

ATTENTION: ANGIE N. ZAMORA
TELEPHONE: (916) 324-1252

RAFAELA PADILLA
SPILLS LEAKS INVESTIGATION & CLEANUP PROGRAM
DIVISION OF FINANCIAL ASSISTANCE
STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH613
DATE: Jan-20-05

FOR INTERAGENCY AGREEMENT SWRCB #04-010-550-0/ OEHHA #C04-E0004
FOR THE MONTH OF NOVEMBER 2004

ACTUAL CHARGES $ 22,417.25

AMOUNT DUE $ 22,417.25

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-04-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100	OEH613	04 880	1200 85000	991913.20	00010000	$22,417.25

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 04-010-550-0 / OEH# 04-E0004
OEHHA Invoice # 04OEH-#613
For the Period of November 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Assigned Toxicologist	Nov '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18011	1811900	North Coast	R1-04-08		Gaddis Nursery	Staff Tox			159.00		0.00
SLIC		J. Bentz			Addendum HHRA (Rev 1.0)	Assoc Tox	K Randle	10.0	131.00		1,310.00
						Senior Tox			166.00		0.00
						Office Tech			66.00		0.00
						AGPA			110.00		0.00
						Subtotal:		10.0		0.00	1,310.00
					North Coast R1 Subtotal:			10.0		$0.0	$1,310.00
18031	2030005	Central Coast	R3-04-02		Unocal Avila Tank Farm	Senior Tox	Carlisle	13.0	166.00		2,158.00
SLIC		D. Kukol			On-call Assistance	Staff Tox			159.00		0.00
						Office Tech			66.00		0.00
						AGPA			110.00		0.00
						Subtotal:		13.0		0.00	2,158.00
					Central Coast R3 Subtotal:			13.0		$0.0	$2,158.00
18041	2041YOO	Los Angeles	R4-04-01		HR Textron, Inc. (Valencia)	Staff Tox	Salinas	4.0	159.00		636.00
SLIC		P. Raftery			Closure Plan	Senior Tox			166.00		0.00
						Office Tech			66.00		0.00
						AGPA			110.00		0.00
						Subtotal:		4.0		0.00	636.00
18041	204DN00	Los Angeles	R4-04-09	Nov-04	Price Pfister	Staff Tox	Salocks	26.0	159.00	438.75	4,572.75
SLIC		M. Zaidi			Remedial Action Plan &	Senior Tox			166.00		0.00
					Remedial Investigation Rpt;	Office Tech		2.0	66.00		132.00
					Attend 11/8/04 Public Mtg	AGPA		1.0	110.00		110.00
						Subtotal:		29.0		438.75	4,814.75
18041	2048900	Los Angeles	R4-04-10	Nov-04	Cerro Metal Products	Staff Tox	Hristov	7.5	159.00		1,192.50
SLIC		P. Guha-Niyogi			HHRA, Feasibility Study &	Senior Tox	Carlisle	2.0	166.00		332.00
					Remedial Action Plan	Office Tech		4.0	66.00		264.00
						AGPA		0.5	110.00		55.00
						Subtotal:		14.0		0.00	1,843.50
18041	2040400	Los Angeles	R4-04-12		Hugo Neu - Proler	Staff Tox	Black	36.0	159.00		5,724.00
SLIC		P. Guha-Niyogi			Monitoring & Reporting	Senior Tox			166.00		0.00
					Program	Office Tech			66.00		0.00
						AGPA			110.00		0.00
						Subtotal:		36.0		0.00	5,724.00
18041	2047800	Los Angeles	R4-04-17		Allied Signal/Honeywell	Staff Tox	Salinas	16.0	159.00		2,544.00
SLIC		A. Siddiqui			(El Segundo)	Senior Tox			166.00		0.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 04-010-550-0 / OEH# 04-E0004
OEHHA Invoice # 04OEH-#613
For the Period of November 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Assigned Toxicologist	Nov '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
					Remedial Action Plan	Office Tech			66.00		0.00
						AGPA			110.00		0.00
						Subtotal:		16.0		0.00	2,544.00
18041	2042400	Los Angeles	R4-04-19		Dominguez, Compton &	Staff Tox			159.00		0.00
SLIC		P. Cho			Wilmington	Senior Tox			166.00		0.00
					PEA HRA	Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		0.50		0.00	55.00
18041	204CFOO	Los Angeles	R4-04-20		BNSF Mission Tower	Staff Tox	Hristov	11.0	159.00		1,749.00
SLIC		A. Heath			Site Characterization & HHRA	Senior Tox			166.00		0.00
						Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		11.50		0.00	1,804.00
						Los Angeles R4 Subtotal:		111.0		$438.8	$17,421.25
16906	1695100	Central Valley	R5-04-15	Nov-04	Titan Missile 1A	Staff Tox			159.00		0.00
DOD		B. Taylor			Human Health & Eco RA	Senior Tox	Carlisle	2.5	166.00		415.00
					880060.01	Office Tech		2.0	66.00		132.00
						AGPA		0.5	110.00		55.00
						Subtotal:		5.0		0.00	602.00
18051	1863700	Central Valley	R5-04-16	Nov-04	Natomas Airpark	Staff Tox	Hristov	2.0	159.00		318.00
SLIC		A. Terrell			Scoping Meeting	Senior Tox	Carlisle	1.0	166.00		166.00
					880061.02	Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		3.5		0.00	539.00
						Central Valley R5 Subtotal:		8.5		$0.0	$1,141.00
18091	2090004	San Diego	R9-04-18		NASSCO	Staff Tox			159.00		0.00
SLIC		T. Alo			Draft Documents	Senior Tox	Brodberg	1.0	166.00		166.00
						Office Tech			66.00		0.00
						AGPA		0.25	110.00		27.50
						Subtotal:		1.25		0.00	193.50
18091	2090005	San Diego	R9-04-18		SW Marine	Staff Tox			159.00		0.00
SLIC		T. Alo			Draft Documents	Senior Tox	Brodberg	1.0	166.00		166.00
						Office Tech			66.00		0.00
						AGPA		0.25	110.00		27.50
						Subtotal:		1.25		0.00	193.50

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 04-010-550-0 / OEH# 04-E0004
OEHHA Invoice # 04OEH-#613
For the Period of November 2004

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Assigned Toxicologist	Nov '04 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
					San Diego R9 Subtotal:			2.5		$0.00	$387.00
					November 2004 TOTAL:			145.0		$438.8	$22,417.25

* Includes work performed prior to receipt of cancellation notification.

** For a description of project site status activities refer to SWRCB Work Transmittal Form (WTF) number on OEHHA monthly status reports.

Office Tech = Secretarial and records management support.

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1252

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STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH
YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH624
DATE: Apr-12-05

FOR INTERAGENCY AGREEMENT SWRCB #04-010-550-0/ OEHHA #C04-E0004
FOR THE MONTH OF MARCH 2005.

ACTUAL CHARGES	$ 19,800.00
AMOUNT DUE	**$ 19,800.00**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-04-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100	OEH624	04 880	1200 85000	991913.20	00010000	$19,800.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 04-010-550-0 / OEH# 04-E0004
OEHHA Invoice # 04OEH-624
For the Period of March 2005

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Assigned Toxicologist	Mar '05 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18011	2014800	North Coast	R1-04-27		G & R Metals	Staff Tox			159.00		0.00
SLIC		J. Goebel			Eureka	Assoc Tox	Randles		131.00		0.00
					On-call assistance	Senior Tox	Carlisle		166.00		0.00
						Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		0.5		0.00	55.00
18011	2010036	North Coast	R1-09-30		Georgia-Pacific Fort Bragg	Staff Tox	Salinas	8.0	159.00		1,272.00
SLIC		C. Hunt			Sawmill	Assoc Tox			131.00		0.00
					Scoping Meeting	Senior Tox	Carlisle	2.5	166.00		415.00
						Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		11.0		0.00	1,742.00
					North Coast R1 Subtotal:			11.5		0.00	1,797.00
18041	2047800	Los Angeles	R4-04-17		Allied Signal/Honeywell	Staff Tox	Salinas	1.0	159.00		159.00
SLIC		A. Siddiqui			El Segundo	Senior Tox	Carlisle	5.0	166.00		830.00
					Rem Act Plan, Env Grd Plan,	Office Tech			66.00		0.00
					IRM Soil Removal Act	AGPA		1.0	110.00		110.00
						Subtotal:		7.0		0.00	1,099.00
18041	2042400	Los Angeles	R4-04-19		Dominguez, Compton &	Staff Tox	Black		159.00		0.00
SLIC		P. Cho			Wilmington	Senior Tox			166.00		0.00
					Carson	Office Tech			66.00		0.00
					PEA HRA	AGPA		0.5	110.00		55.00
						Subtotal:		0.5		0.00	55.00
18041	204CFOO	Los Angeles	R4-04-20		BNSF Mission Tower	Staff Tox	Hristov		159.00		0.00
SLIC		A. Heath			Los Angeles	Senior Tox	Carlisle		166.00		0.00
					Site Characterization & HHRA	Office Tech		4.0	66.00		264.00
						AGPA			110.00		0.00
						Subtotal:		4.0		0.00	264.00
18041	204DNOO	Los Angeles	R4-04-23		Price Pfister	Staff Tox	Salocks	22.0	159.00		3,498.00
SLIC		M. Zaidi			Pacoima	Senior Tox	Carlisle		166.00		0.00
					Response to Comments;	Office Tech			66.00		0.00
					Teleconferences	AGPA			110.00		0.00
						Subtotal:		22.0		0.00	3,498.00
18041	204AD00	Los Angeles	R4-04-24		Dominguez Energy LP &	Staff Tox	Hristov	5.0	159.00		795.00
SLIC		T. Tintut-Williams			Properties LP	Senior Tox	Carlisle	3.0	166.00		498.00
					Carson	Office Tech		2.0	66.00		132.00
					Health Based Cleanup	AGPA		0.5	110.00		55.00
						Subtotal:		10.5		0.00	1,480.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 04-010-550-0 / OEH# 04-E0004
OEHHA Invoice # 04OEH-624
For the Period of March 2005

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Assigned Toxicologist	Mar '05 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18041	2048900	Los Angeles	R4-04-25		Cerro Metal Products Co.	Staff Tox	Hristov	40.0	159.00		6,360.00
SLIC		P. Guha-Niyogi			Response to Comments;	Senior Tox	Carlisle	7.0	166.00		1,162.00
					Avendt Memo	Office Tech			66.00		0.00
						AGPA			110.00		0.00
						Subtotal:		47.0		0.00	7,522.00
18041	204GUOO	Los Angeles	R4-04-26		Hillcrest Cleaners	Staff Tox	Hristov	25.0	159.00		3,975.00
SLIC		P. Guha-Niyogi			Northridge	Senior Tox			166.00		0.00
					Soil and Groundwater	Office Tech			66.00		0.00
						AGPA			110.00		0.00
						Subtotal:		25.0		0.00	3,975.00
18041	204GTOO	Los Angeles	R4-04-29		Honeywell Intl Gardena	Staff Tox	Salinas		159.00		0.00
SLIC		A. Siddiqui			Site Lot 6	Senior Tox			166.00		0.00
					Soil Closure & Remediation	Office Tech			66.00		0.00
						AGPA		0.50	110.00		55.00
						Subtotal:		0.50		0.00	55.00
						Los Angeles R4 Subtotal:		116.5		0.00	17,948.00
18091	2090004	San Diego	R9-04-18		NASSCO Marine	Staff Tox			159.00		0.00
SLIC		T. Alo			Shipyard (San Diego)	Senior Tox			166.00		0.00
					Draft HHRA	Office Tech			66.00		0.00
						AGPA		0.25	110.00		27.50
						Subtotal:		0.25		0.00	27.50
18091	2090005	San Diego	R9-04-18		Southwest Marine	Staff Tox			159.00		0.00
SLIC		T. Alo			Shipyard	Senior Tox			166.00		0.00
					Draft HHRA	Office Tech			66.00		0.00
						AGPA		0.25	110.00		27.50
						Subtotal:		0.25		0.00	27.50
						San Diego R9 Subtotal:		0.5		0.00	55.00
						March 2005 TOTAL:		128.5		$0.00	$19,800.00

* Includes work performed prior to receipt of cancellation notification.

** For a description of project site status activities refer to SWRCB Work Transmittal Form (WTF) number on OEHHA monthly status reports.
Office Tech = Secretarial and records management support.
AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

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STATE WATER RESOURCES CONTROL BOARD
P.O. BOX 944212
SACRAMENTO, CA 94244-2120

INVOICE

PLEASE RETURN COPY OF INVOICE WITH YOUR REMITTANCE TO ADDRESS AT TOP OF FORM

INVOICE NO: OEH642
DATE: Jul-21-05

FOR INTERAGENCY AGREEMENT SWRCB #04-010-550-0/ OEHHA #C04-E0004 FOR THE MONTH OF JUNE 2005.

ACTUAL CHARGES	$ 21,513.39
AMOUNT DUE	**$ 21,513.39**

NO WARRANT CLAIM SCHEDULE CREDIT:
0001-3980-04-001-90-F

CC: DAVID SIEGEL
ARLENE NISHMURA

1400/8100 OEH642 04 880 1200 85000 991913.20 00010000 $21,513.39

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 04-010-550-0 / OEH# 04-E0004
OEHHA Invoice # 04OEH-642
For the Period of JUN 2005

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Assigned Toxicologist	Jun '05 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18011	1811900	North Coast	R1-04-08	Jun-05	Gaddis Nursery	Staff Tox			159.00		0.00
SLIC		J. Bentz			Santa Rosa	Assoc Tox	Randles	3.0	131.00		393.00
					Addendum HHRA	Senior Tox			166.00		0.00
						Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		3.5		0.00	448.00
18011	2010004	North Coast	R1-04-14	FY 04-05	Sierra Pacific Arcata	Senior Tox	Brodberg	0.0	166.00		0.00
SLIC		D. Prat		Closed Out	Scoping Eco & HHRA; TBN	Staff Tox			159.00		0.00
					Document	Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		0.5		0.00	55.00
18011	2016400	North Coast	R1-04-21	FY 04-05	Abex Corp, Remco Hydraulics	Senior Tox		0.00	166.00		0.00
SLIC		J. Goebel		Closed Out	475 E. San Francisco Ave,	Staff Tox			159.00		0.00
					Willits	Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		0.50		0.00	55.00
18011	2014800	North Coast	R1-04-27	FY 04-05	G & R Metals	Senior Tox	Brodberg	0.00	166.00		0.00
SLIC		K. Ashley		Closed Out	Scoping Mtg; HRA	Staff Tox			159.00		0.00
						Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		0.50		0.00	55.00
18011	2010036	North Coast	R1-04-30	Jun-05	Georgia Pacific, Fort Bragg	Senior Tox	Carlisle	16.0	166.00	300.96	2,956.96
SLIC		C. Hunt			Scoping, Project/Site Mtg;	Staff Tox	Salinas	16.0	159.00	246.43	2,790.43
					On-call assistance.	Office Tech			66.00		0.00
						AGPA		1.0	110.00		110.00
						Subtotal:		33.00		547.39	5,857.39
						North Coast R1 Subtotal:		38.00		547.39	6,470.39
18031	2030005	Central Coast	R3-04-02	FY 04-05	Unocal Avila Tank Farm	Senior Tox	Carlisle	0.0	166.00		0.00
SLIC		D. Kukol		Closed Out	On-call Assistance	Staff Tox			159.00		0.00
						Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		0.5		0.00	55.00
18031	2030100	Central Coast	R3-04-03	FY 04-05	Unocal Bulk Storage -Tank	Staff Tox			159.00		0.00
SLIC		D. Kukol		Closed Out	Farm Road	Senior Tox	Carlisle		166.00		0.00
					On-call Assistance	Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		0.5		0.00	55.00
18031	2030300	Central Coast	R3-04-04	FY 04-05	Unocal Pipeline -Tank Farm	Staff Tox			159.00		0.00
SLIC		D. Kukol		Closed Out	Road	Senior Tox	Carlisle		166.00		0.00
					On-Call Assistance	Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		0.5		0.00	55.00
						Central Coast R3 Subtotal:		1.50		0.00	165.00

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 04-010-550-0 / OEH# 04-E0004
OEHHA Invoice # 04OEH-642
For the Period of JUN 2005

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Assigned Toxicologist	Jun '05 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
18041	2047800	Los Angeles	R4-04-17	Jun-05	Allied Signal/Honeywell	Staff Tox	Salinas	4.0	159.00	0.00	636.00
SLIC		A. Siddiqui			El Segundo	Senior Tox		0.0	166.00		0.00
					Rem Act Plan, Env Grd Plan,	Office Tech		2.0	66.00		132.00
					IRM Soil Removal Act	AGPA		0.5	110.00		55.00
						Subtotal:		6.5		0.00	823.00
18041	204DNOO	Los Angeles	R4-04-23	FY 04-05	Price Pfister	Staff Tox	Salocks	15.0	159.00		2,385.00
SLIC		M. Zaidi		Closed Out	Pacoima	Senior Tox			166.00		0.00
					HRA; Teleconferences	Office Tech		4.0	66.00		264.00
						AGPA		0.5	110.00		55.00
						Subtotal:		19.5		0.00	2,704.00
18041	204AD00	Los Angeles	R4-04-24	Jun-05	Dominguez Energy LP &	Staff Tox	Hristov	12.0	159.00		1,908.00
SLIC		T. Tintut-Williams			Properties LP	Senior Tox			166.00		0.00
					Carson	Office Tech		4.0	66.00		264.00
					Health Based Cleanup	AGPA		1.0	110.00		110.00
						Subtotal:		17.0		0.00	2,282.00
18041	204GUOO	Los Angeles	R4-04-26	FY 04-05	Hillcrest Cleaners	Staff Tox	Hristov	16.0	159.00		2,544.00
SLIC		P. Guha-Niyogi		Closed Out	Northridge	Senior Tox			166.00		0.00
					Soil and Groundwater	Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		16.5		0.00	2,599.00
						Los Angeles R4 Subtotal:		59.5		0.00	8,408.00
18081	2080046	Santa Ana	R8-04-33	FY 04-05	Westgate Center	Staff Tox	Salinas	40.0	159.00		6,360.00
SLIC		D. Lass		Closed Out	Anaheim	Senior Tox			166.00		0.00
					Risk Assessment	Office Tech			66.00		0.00
						AGPA		0.5	110.00		55.00
						Subtotal:		40.5		0.00	6,415.00
						Santa Ana R8 Subtotal:		40.5	0.0	0.00	6,415.00
18091	2090004	San Diego	R9-04-18	FY 04-05	NASSCO	Staff Tox		0.0	159.00		0.00
SLIC		T. Alo		Closed Out	Human Health Cleanup &	Senior Tox	Brodberg		166.00		0.00
					Abatement Order	Office Tech			66.00		0.00
						AGPA		0.25	110.00		27.50
						Subtotal:		0.25		0.00	27.50
18091	2090005	San Diego	R9-04-18	FY 04-05	S W Marine	Staff Tox		0.0	159.00		0.00
SLIC		T. Alo		Closed Out	Human Health Cleanup &	Senior Tox	Brodberg		166.00		0.00
					Abatement Order	Office Tech			66.00		0.00
						AGPA		0.25	110.00		27.50
						Subtotal:		0.25		0.00	27.50
						R9 Subtotal:		0.5	0.0	0.0	55.0

State Water Resources Control Board/Office of Environmental Health Hazard Assessment
Interagency Agreement SWRCB# 04-010-550-0 / OEH# 04-E0004
OEHHA Invoice # 04OEH-642
For the Period of JUN 2005

SWRCB PCA	SWRCB Site ID #	Region / Project Mgr.	SWRCB WTF # *	Date Site Review Completed	Project Site Name **	OEHHA Staff	Assigned Toxicologist	Jun '05 Hours	Hourly Rate	Direct OEE / Travel Cost	Total Cost
					Jun 2005 TOTAL:			140.00		547.39	21,513.39

* Includes work performed prior to receipt of cancellation notification.

** For a description of project site status activities refer to SWRCB Work Transmittal Form (WTF) number on OEHHA monthly status reports.

Office Tech = Secretarial and records management support.

AGPA = Administrative Support (contract management/status reports/process WTFs/invoices)

Unreimbursed Staff Costs

Unreimbursed Staff Services Costs

Fiscal Year	Total Unreimbursed Staff Cost
2003-2004	$63,946
2004-2005	$12,950
2005-2006	$128,178
2006-2007	$64,181
2010-2011	$130,838
	$400,094

Fiscal Year 2003-2004

Staff	Position	Hours	Hourly Rate	Total
Ott	Water Resources Control Engineer	39	$48	$1,867
Alo	Water Resources Control Engineer	112	$48	$5,362
Barker	Supervising Water Resource Control Engineer	4	$100	$398
Monji	Environmental Scientist	24	$40	$961
Alo	Water Resources Control Engineer	99	$48	$4,740
Carlisle	Senior Engineering Geologist	11	$74	$818
Alo	Water Resources Control Engineer	102	$48	$4,883
Barker	Supervising Water Resource Control Engineer	23	$100	$2,291
Monji	Environmental Scientist	77	$40	$3,084
Alo	Water Resources Control Engineer	139	$48	$6,655
Ott	Water Resources Control Engineer	38	$48	$1,819
Carlisle	Senior Engineering Geologist	29	$74	$2,158
Alo	Water Resources Control Engineer	2	$48	$96
Barker	Supervising Water Resource Control Engineer	20	$100	$1,992
Carlisle	Senior Engineering Geologist	30	$74	$2,232
Ott	Water Resources Control Engineer	14	$48	$670
Alo	Water Resources Control Engineer	76	$48	$3,639
Carlisle	Senior Engineering Geologist	54	$74	$4,018
Carlisle	Senior Engineering Geologist	24	$74	$1,786
Ott	Water Resources Control Engineer	8	$48	$383
Monji	Environmental Scientist	23	$40	$921
Ott	Water Resources Control Engineer	8	$48	$383
Monji	Environmental Scientist	26	$40	$1,041
Monji	Environmental Scientist	13	$40	$521
Monji	Environmental Scientist	13	$40	$521
Ott	Water Resources Control Engineer	31	$48	$1,484
Monji	Environmental Scientist	57	$40	$2,283
Carlisle	Senior Engineering Geologist	9	$74	$670
Alo	Water Resources Control Engineer	131	$48	$6,272
				$63,946

Fiscal Year 2004-2005

Staff	Position	Hours	Hourly Rate	Total
Carlisle	Senior Engineering Geologist	22	$90	$1,989
Ott	Water Resources Control Engineer	18	$48	$862
Tobler	Water Resources Control Engineer	92	$48	$4,405
Carlisle	Senior Engineering Geologist	47	$90	$4,249
Carlisle	Senior Engineering Geologist	16	$90	$1,446
				$12,950

Fiscal Year 2005-2006

Staff	Position	Hours	Hourly Rate	Total
Tobler	Water Resources Control Engineer	83	$48	$3,974
Gorham-Test	Environmental Scientist	9	$74	$669
Brown-Homna	Environmental Scientist	35	$74	$2,601
Gorham-Test	Environmental Scientist	18	$74	$1,338
Tobler	Water Resources Control Engineer	69	$48	$3,303
Brown-Homna	Environmental Scientist	73	$74	$5,426
Carlisle	Senior Engineering Geologist	40	$90	$3,616
Brown-Homna	Environmental Scientist	64	$74	$4,757
Tobler	Water Resources Control Engineer	78	$48	$3,734
Gorham-Test	Environmental Scientist	61	$74	$4,534
Carlisle	Senior Engineering Geologist	52	$90	$4,701
Carlisle	Senior Engineering Geologist	90	$90	$8,136
Tobler	Water Resources Control Engineer	87	$48	$4,165
Gorham-Test	Environmental Scientist	18	$74	$1,338
Carlisle	Senior Engineering Geologist	66	$90	$5,966
Gorham-Test	Environmental Scientist	9	$74	$669
Carlisle	Senior Engineering Geologist	32	$90	$2,893
Brown-Homna	Environmental Scientist	12	$74	$892
Gorham-Test	Environmental Scientist	21	$74	$1,561
Carlisle	Senior Engineering Geologist	29	$90	$2,622
Carlisle	Senior Engineering Geologist	16	$90	$1,446
Tobler	Water Resources Control Engineer	99	$48	$4,740
Brown-Homna	Environmental Scientist	50	$74	$3,716
Brown-Homna	Environmental Scientist	37	$74	$2,713
Tobler	Water Resources Control Engineer	8	$48	$383
Brown-Homna	Environmental Scientist	60	$74	$4,460
Gorham-Test	Environmental Scientist	15	$74	$1,115
Tobler	Water Resources Control Engineer	26	$48	$1,245
Brown-Homna	Environmental Scientist	97	$74	$7,172
Tobler	Water Resources Control Engineer	138	$48	$6,607
Tobler	Water Resources Control Engineer	87	$48	$4,165
Tobler	Water Resources Control Engineer	58	$48	$2,777
Carlisle	Senior Engineering Geologist	74	$90	$6,690
Gorham-Test	Environmental Scientist	31	$74	$2,304
Carlisle	Senior Engineering Geologist	130	$90	$11,752
				$128,178

Fiscal Year 2006-2007

Staff	Position	Hours	Hourly Rate	Total
Carlisle	Senior Engineering Geologist	71	$116	$8,251
Brown-Homna	Environmental Scientist	109	$89	$9,670
Carlisle	Senior Engineering Geologist	62	$116	$7,205
Brown-Homna	Environmental Scientist	53	$89	$4,657
Gorham-Test	Environmental Scientist	6	$89	$532
Tobler	Water Resources Control Engineer	102	$59	$6,060
Carlisle	Senior Engineering Geologist	14	$116	$1,627
Brown-Homna	Environmental Scientist	40	$89	$3,549
Carlisle	Senior Engineering Geologist	16	$116	$1,859
Tobler	Water Resources Control Engineer	75	$59	$4,456
Tobler	Water Resources Control Engineer	9	$59	$535
Carlisle	Senior Engineering Geologist	48	$116	$5,578
Brown-Homna	Environmental Scientist	60	$89	$5,323
Brown-Homna	Environmental Scientist	55	$89	$4,879
				$64,181

Fiscal Year 2010-2011

Staff	Position	Hours	Hourly Rate	Total Cost
K. Dorsey	Engineering Geologist	5.5	$140	$770
L. Honma	Environmental Scientist	276.5	$95	$26,254
J. Odermatt	Senior Engineering Geologist	2	$164	$328
J. Chan	Supervising Engineering Geologist	198	$164	$32,398
D. Barker	Supervising Water Resource Control Engineer	324	$164	$53,015
F. Melborn	Water Resources Control Engineer	128.75	$139	$17,935
T. Alo	Water Resources Control Engineer	1	$139	$139
				$130,838

SPILLS, LEAKS, INVESTIGATIONS, AND CLEANUPS (SLIC) PROGRAM
BILLING COST EXPLANATION

FY 2003-2004

Employee Salary and Benefits by Classification[1]	ABR.	SALARY SCALE
Associate Governmental Program Analyst	AGPA	4581 - 5568
Engineering Geologist	EG	3830 - 6598
Environmental Program Manager I (Supervisory)	EMP I	6535 - 7887
Environmental Program Manager II	EMP II	8336 - 9194
Environmental Scientist	ES	3204 - 5946
Office Assistant	OA	2160 - 2884
Office Technician	OT	2748 - 3341
Principal Water Resources Control Eng.,	PWRCE	7940 - 8756
Sanitary Engineering Associate	SEA	5165 - 6276
Sanitary Engineering Technician	SET	3557 - 4962
Senior Engineering Geologist	SEG	5952 - 7232
Senior Environmental Scientist	SRES	5675 - 6849
Senior Water Resources Control Engineer	SWRCE	5952 - 7232
Staff Environmental Scientist	SES	5670 - 6846
Staff Counsel	SC	4272 - 8230
Student Assistant	SA	1594 - 2123
Student Assistant Engrng.	SAE	2085 - 3120
Supervising Water Resources Control Eng.,	SUWRCE	7224 - 7968
Water Resources Control Engineer	WRCE	3830 - 6590

Indirect Charges[2]

Indirect costs	100% of salaries and benefits
State Board accounting administrative costs	15% of salaries and benefits
Regional Board administrative costs	20% of salaries and benefits

Billing Example

Water Resources Control Engineer Salary:	$ 6,590
Indirect costs:	$ 6,590
State Board accounting administrative costs	$ 988
Regional Board administrative costs	$ 1,318
Total Cost per month	$ 15,486

Divided by 176 hours per month equals per hour: $ 87.99
(Due to the various classifications that expend SLIC resources, an average of $ 90.00 per hour can be used for projection purposes.)

[1] The name and classification of employees performing oversight work will be listed on the invoice you receive.
[2] The examples are estimates based on recent billings. Actual charges may be slightly higher or lower.

SPILLS, LEAKS, INVESTIGATIONS, AND CLEANUPS (SLIC) PROGRAM
BILLING COST EXPLANATION

FY 2004-2005

Employee Salary and Benefits by Classification[1]	ABR.	SALARY SCALE
Associate Governmental Program Analyst	AGPA	4581 - 5568
Engineering Geologist	EG	3830 - 6598
Environmental Program Manager I (Supervisory)	EMP I	6535 - 7887
Environmental Program Manager II	EMP II	8336 - 9194
Environmental Scientist	ES	3204 - 5946
Office Assistant	OA	2160 - 2884
Office Technician	OT	2748 - 3341
Principal Water Resources Control Eng.,	PWRCE	7940 - 8756
Sanitary Engineering Associate	SEA	5165 - 6276
Sanitary Engineering Technician	SET	3557 - 4962
Senior Engineering Geologist	SEG	5952 - 7232
Senior Environmental Scientist	SRES	5675 - 6849
Senior Water Resources Control Engineer	SWRCE	5952 - 7232
Staff Environmental Scientist	SES	5670 - 6846
Staff Counsel	SC	4272 - 8230
Student Assistant	SA	1594 - 2123
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SPILLS, LEAKS, INVESTIGATIONS, AND CLEANUPS (SLIC) PROGRAM
BILLING COST EXPLANATION

FY 2005-2006

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Associate Governmental Program Analyst	AGPA	4581 - 5568
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Environmental Program Manager II	EMP II	8336 - 9194
Environmental Scientist	ES	3204 - 5946
Office Assistant	OA	2160 - 2884
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Senior Environmental Scientist	SRES	5675 - 6849
Senior Water Resources Control Engineer	SWRCE	5952 - 7232
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Student Assistant Engrng.	SAE	2085 - 3120
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Divided by 176 hours per month equals per hour: $ 87.99
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FY 2006-2007 **Enclosure 1**

SPILLS, LEAKS, INVESTIGATIONS, AND CLEANUPS (SLIC) PROGRAM
BILLING COST EXPLANATION

Employee Salary and Benefits by Classification [1]	ABR	SALARY SCALE
Associate Governmental Program Analyst	AGPA	5,468 - 6,646
Engineering Geologist	EG	4,753 - 8,316
Environmental Scientist	ES	3,824 - 7,097
Office Assistant	OA	2,578 - 3,442
Office Technician	OT	3,338 - 4,056
Principal Water Resources Control Engineer	PWRCE	9,476 - 10,451
Sanitary Engineering Associate	SEA	6,165 - 7,491
Sanitary Engineering Technician	SET	4,245 - 5,922
Senior Engineering Geologist	SEG	7,650 - 9,297
Senior Environmental Scientist	SRES	6,774 - 9,823
Senior Water Resources Control Engineer	SWRCE	7,650 - 9,297
Staff Counsel	STCOUN	5,099 - 9,823
Staff Counsel III	STCOUNIII	9,185 - 11,334
Staff Counsel IV	STCOUNIV	10,141 - 12,522
Staff Environmental Scientist	SES	6,767 - 8,172
Student Assistant	SA	1,812 - 2,413
Student Assistant Engineer	SAE	2,488 - 3,723
Supervising Water Resources Control Engineer	SUWRCE	8,622 - 10,206
Water Resources Control Engineer	WRCE	4,753 - 8,298

Indirect Charges[2]

Indirect costs	100% of salaries and benefits
Accounting administrative costs	15% of salaries and benefits
Regional Board administrative costs	20% of salaries and benefits

Billing Example

Water Resources Control Engineer		
Salary:	$	8,298
Overhead (indirect costs):	$	8,298
Admin.: State Board	$	1,245
Regional Board	$	1,660
Total Cost per month	$	19,501

Divided by 176 hours per month equals per hour: $ 110.80
(Due to the various classifications that expend SLIC resources. An average of $ 110.00 per hour can be used for projection purposes.)

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[1] The name and classification of employees performing oversight work will be listed on the invoice you receive.
[2] The examples are estimates based on recent billings. Actual charges may be slightly higher or lower.

SPILLS, LEAKS, INVESTIGATIONS, AND CLEANUPS (SLIC) PROGRAM
BILLING COST EXPLANATION

Employee Salary and Benefits by Classification [1]	ABR	SALARY SCALE
Associate Governmental Program Analyst	AGPA	5,468 - 6,646
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Staff Counsel III	STCOUNIII	9,185 - 11,334
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Student Assistant Engineer	SAE	2,488 - 3,723
Supervising Water Resources Control Engineer	SUWRCE	8,622 - 10,206
Water Resources Control Engineer	WRCE	4,753 - 8,298

Indirect Charges[2]

Indirect costs	100% of salaries and benefits
Accounting administrative costs	15% of salaries and benefits
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Billing Example

Water Resources Control Engineer		
Salary:	$	8,298
Overhead (indirect costs):	$	8,298
Admin.: State Board	$	1,245
Regional Board	$	1,660
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Divided by 176 hours per month equals per hour: $ 110.80
(Due to the various classifications that expend SLIC resources. An average of $ 110.00 per hour can be used for projection purposes.)

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[2] The examples are estimates based on recent billings. Actual charges may be slightly higher or lower.

Attachment 1

FY 2008-2009

SITE CLEANUP PROGRAM (SCP)
BILLING COST EXPLANATION

Employee Salary and Benefits by Classification [1]	ABR	SALARY SCALE
Associate Governmental Program Analyst	AGPA	5,852 – 7,113
Engineering Geologist	EG	5,691 – 10,173
Environmental Scientist	ES	4,092 - 7,596
Office Assistant (G)	OA	2,758 - 3,684
Office Assictant (T)	OA	2,850 – 3,759
Office Technician (G)	OT	3,509 - 4,268
Office Technician (T)	OT	3,572 - 4,341
Principal Water Resources Control Engineer	PWRCE	13,090 - 14,434
Sanitary Engineering Associate	SEA	6,597 - 8,016
Sanitary Engineering Technician	SET	4,543 - 6,339
Senior Engineering, Water Resources	SWRCE	9,811 – 13,090
Senior Engineering Geologist	SEG	9,811 – 11,923
Senior Environmental Scientist	SRES	7,248 - 8,749
Staff Counsel	STCOUN	6,216 – 10,411
Staff Counsel III	STCOUNIII	10,217 – 12,606
Staff Counsel IV	STCOUNIV	11,286 – 13,934
Staff Environmental Scientist	SES	7,242 - 8,745
Student Assistant	SA	2,663 - 2,938
Student Assistant Engineer	SAE	2,663 - 3,985
Supervising Engineering Geologist	SUEG	10,769 - 13,090
Supervising Water Resources Control Engineer	SUWRCE	10,769 – 13,090
Water Resources Control Engineer	WRCE	7,883 - 10,131

Indirect Charges[2]

Indirect costs	100% of salaries and benefits
Accounting administrative costs	15% of salaries and benefits
Regional Board administrative costs	20% of salaries and benefits

Billing Example

Water Resources Control Engineer		
Salary:	$	10,131
Overhead (indirect costs):	$	10,131
Admin.: State Board	$	1,520
Regional Board	$	2,026
Total Cost per month	$	23,808

Divided by 176 hours per month equals per hour: $ 135.27
(Due to the various classifications that expend SLIC resources. An average of $ 135. per hour can be used for projection purposes.)

[1] The name and classification of employees performing oversight work will be listed on the invoice you receive.
[2] The examples are estimates based on recent billings. Actual charges may be slightly higher or lower.

Attachment 1

FY 2009-2010

SITE CLEANUP PROGRAM (SCP)
BILLING COST EXPLANATION

Employee Salary and Benefits by Classification [1]	ABR	SALARY SCALE
Associate Governmental Program Analyst	AGPA	5,852 – 7,113
Engineering Geologist	EG	9,213 – 11,201
Environmental Scientist	ES	4,092 – 7,596
Office Assistant (G)	OA	2,758 – 3,684
Office Assistant (T)	OA	2,850 – 3,759
Office Technician (G)	OT	3,509 – 4,268
Office Technician (T)	OT	3,572 – 4,341
Principal Water Resources Control Engineer	PWRCE	13,090 – 14,434
Sanitary Engineering Associate	SEA	6,597 – 8,016
Sanitary Engineering Technician	SET	4,543 – 6,339
Senior Engineering, Water Resources	SWRCE	9,811 – 13,090
Senior Engineering Geologist	SEG	10,802 – 13,127
Senior Environmental Scientist	SRES	7,248 – 8,749
Senior Water Resources Control Engineer	SRWRCE	10,802 – 13,127
Staff Counsel	STCOUN	6,216 – 10,411
Staff Counsel III	STCOUNIII	10,217 – 12,606
Staff Counsel IV	STCOUNIV	11,286 – 13,934
Staff Environmental Scientist	SES	7,242 – 8,745
Student Assistant	SA	2,663 – 2,938
Student Assistant Engineer	SAE	2,663 – 3,985
Supervising Engineering Geologist	SUEG	10,769 – 13,090
Supervising Water Resources Control Engineer	SUWRCE	10,769 – 13,090
Water Resources Control Engineer	WRCE	7,883 – 11,144

Operating Expenses and Equipment [2] (both Headquarters and Regional Board offices)

Indirect Costs (Overhead – cost of doing business) 135%

Billing Example

Water Resources Control Engineer		
Salary:	$	11,144
Overhead (indirect costs):	$	15,044
Total Cost per month	$	26,188.

Divided by 176 hours per month equals per hour: $ 148.80
(Due to the various classifications that expend SCP resources. An average of $ 150. per hour can be used for projection purposes.)

[1] The name and classification of employees performing oversight work will be listed on the invoice you receive.
[2] The examples are estimates based on recent billings. Actual charges may be slightly higher or lower.

Revised – 01-29-09

Attachment 1

FY 2010-2011

SITE CLEANUP PROGRAM (SCP)
BILLING COST EXPLANATION

Employee Salary and Benefits by Classification [1]	ABR	SALARY SCALE	
Associate Governmental Program Analyst	AGPA	5,852 –	7,113
Engineering Geologist	EG	9,213 –	11,201
Environmental Scientist	ES	4,092 –	7,596
Office Assistant (G)	OA	2,758 –	3,684
Office Assistant (T)	OA	2,850 –	3,759
Office Technician (G)	OT	3,509 –	4,268
Office Technician (T)	OT	3,572 –	4,341
Principal Water Resources Control Engineer	PWRCE	13,090 –	14,434
Sanitary Engineering Associate	SEA	6,597 –	8,016
Sanitary Engineering Technician	SET	4,543 –	6,339
Senior Engineering, Water Resources	SWRCE	9,811 –	13,090
Senior Engineering Geologist	SEG	10,802 –	13,127
Senior Environmental Scientist	SRES	7,248 –	8,749
Senior Water Resources Control Engineer	SRWRCE	10,802 –	13,127
Staff Counsel	STCOUN	6,216 –	10,411
Staff Counsel III	STCOUNIII	10,217 –	12,606
Staff Counsel IV	STCOUNIV	11,286 –	13,934
Staff Environmental Scientist	SES	7,242 –	8,745
Student Assistant	SA	2,663 –	2,938
Student Assistant Engineer	SAE	2,663 –	3,985
Supervising Engineering Geologist	SUEG	10,769 –	13,090
Supervising Water Resources Control Engineer	SUWRCE	10,769 –	13,090
Water Resources Control Engineer	WRCE	7,883 –	11,144

Operating Expenses and Equipment [2] (both Headquarters and Regional Board offices)

Indirect Costs (Overhead – cost of doing business) 135%

Billing Example

Water Resources Control Engineer		
Salary:	$	11,144
Overhead (indirect costs):	$	15,044
Total Cost per month	$	26,188.

Divided by 176 hours per month equals per hour: $ 148.80
(Due to the various classifications that expend SCP resources. An average of $ 150. per hour can be used for projection purposes.)

[1] The name and classification of employees performing oversight work will be listed on the invoice you receive.
[2] The examples are estimates based on recent billings. Actual charges may be slightly higher or lower.

Attachment 1

FY 2011-2012

SITE CLEANUP PROGRAM (SCP)
BILLING COST EXPLANATION

Employee Salary and Benefits by Classification [1]	ABR	SALARY SCALE	
Associate Governmental Program Analyst	AGPA	5,852 –	7,113
Engineering Geologist	EG	9,213 –	11,201
Environmental Scientist	ES	4,092 –	7,596
Office Assistant (G)	OA	2,758 –	3,684
Office Assistant (T)	OA	2,850 –	3,759
Office Technician (G)	OT	3,509 –	4,268
Office Technician (T)	OT	3,572 –	4,341
Principal Water Resources Control Engineer	PWRCE	13,090 –	14,434
Sanitary Engineering Associate	SEA	6,597 –	8,016
Sanitary Engineering Technician	SET	4,543 –	6,339
Senior Engineering, Water Resources	SWRCE	9,811 –	13,090
Senior Engineering Geologist	SEG	10,802 –	13,127
Senior Environmental Scientist	SRES	7,248 –	8,749
Senior Water Resources Control Engineer	SRWRCE	10,802 –	13,127
Staff Counsel	STCOUN	6,216 –	10,411
Staff Counsel III	STCOUNIII	10,217 –	12,606
Staff Counsel IV	STCOUNIV	11,286 –	13,934
Staff Environmental Scientist	SES	7,242 –	8,745
Student Assistant	SA	2,663 –	2,938
Student Assistant Engineer	SAE	2,663 –	3,985
Supervising Engineering Geologist	SUEG	10,769 –	13,090
Supervising Water Resources Control Engineer	SUWRCE	10,769 –	13,090
Water Resources Control Engineer	WRCE	7,883 –	11,144

Operating Expenses and Equipment [2] (both Headquarters and Regional Board offices)

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[1] The name and classification of employees performing oversight work will be listed on the invoice you receive.
[2] The examples are estimates based on recent billings. Actual charges may be slightly higher or lower.

NASSCO Unpaid Invoices

STATE WATER RESOURCES CONTROL BOARD
SITE CLEANUP PROGRAM
INVOICE FOR OVERSIGHT COSTS
FOR THE PERIOD ENDING: 06/30/11

Date: 09/13/2011 **Account Number:** 2090004

Regional Board: San Diego Region **Invoice Number:** 73111

***Responsible Party #*:** 1562

NASSCO
ATTEN: Michael Chee
P O Box 85278
San Diego CA 92186-5278

***Site Location*:**

NATIONAL STEEL AND SHIPBUILDING COM
HARBOR DRIVE AND 28th STREET
SAN DIEGO CA 92113

Payment(s) received as of 09/13/11:	$830,929.67
***Balance Forward*:**	$278,771.55
***** New Charges - Billing Period 04/01/11-06/30/11:***	$95,965.72
***TOTAL AMOUNT DUE*:**	$374,737.27

** See itemized list of new charges on reverse or subsequent page (s)

The Porter-Cologne Water Quality Control Act (Section 13365) allows the Regional Water Quality Control Board to recover reasonable expenses from the responsible party for overseeing cleanup of illegal discharges, contaminated properties, and other unregulated releases adversely affecting the State's waters. When your site was put in the cost recovery program, you received a letter explaining that the State Water Resources Control Board would bill you for the Regional Board's costs of cleanup oversight.

If you desire a more detailed explanation for labor hours expended by any Regional Board staff member, you should contact John Anderson (858) 467-2975. If there are disputed charges for activities which you cannot resolve with the program manager, you should discuss them with the Executive Officer of the Regional Board.

For information regarding payments call: Carmen Rios at (916) 341-5659 or crios@waterboards.ca.gov

PAYMENT IS DUE IN 30 DAYS

PLEASE RETURN CHECK IN ENVELOPE PROVIDED

TO ENSURE PROPER CREDITING OF YOUR ACCOUNT: INCLUDE YOUR RESPONSIBLE PARTY NUMBER, ACCOUNT NUMBER AND INVOICE NUMBER ON YOUR CHECK. IF PAYING MULTIPLE INVOICES, ALL ACCOUNT NUMBERS MUST BE LISTED ON YOUR CHECK. MAKE CHECKS PAYABLE TO: SWRCB

RP #: 1562 **Account Number:** 2090004 **Invoice Number:** 73111 **Amount Due:** $374,737.27

SEND PAYMENTS TO:

State Water Resources Control Board
SCP Program
P.O. Box 944212
Sacramento, CA 94244-2120

REGIONAL BOARD NUMBER: 9 PROGRAM COST ACCOUNT: 2090004

INVOICE NUMBER: 73111

DATE	NAME	CLASS	ACT	HOURS
04/01/11	Rodriguez, Vicente	WRCE	EO	4
04/01/11	Carlisle, Craig	SEG	EO	2
04/04/11	Carlisle, Craig	SEG	EO	2
04/04/11	Rodriguez, Vicente	WRCE	EO	4.5
04/04/11	Loflen, Chad	ES	RR	8
04/05/11	Alo, Tom	WRCE	IC	0.75
04/05/11	Loflen, Chad	ES	RR	5
04/05/11	Rodriguez, Vicente	WRCE	EO	4.5
04/05/11	Loflen, Chad	ES	IC	1.5
04/05/11	Carlisle, Craig	SEG	EO	4
04/06/11	Alo, Tom	WRCE	RR	2
04/06/11	Rodriguez, Vicente	WRCE	EO	4.5
04/06/11	Carlisle, Craig	SEG	EO	4
04/07/11	Melbourn, Frank	WRCE	WC	1
04/07/11	Chan, Julie	SR.EG	IC	3
04/07/11	Alo, Tom	WRCE	RR	4.5
04/07/11	Carlisle, Craig	SEG	EO	4
04/08/11	Melbourn, Frank	WRCE	WC	0.75
04/08/11	Carlisle, Craig	SEG	EO	3
04/11/11	Chan, Julie	SR.EG	RR	0.5
04/11/11	Melbourn, Frank	WRCE	WC	1
04/11/11	Carlisle, Craig	SEG	EO	2
04/12/11	Melbourn, Frank	WRCE	WC	2
04/12/11	Carlisle, Craig	SEG	EO	2
04/12/11	Rodriguez, Vicente	WRCE	EO	4.5
04/13/11	Carlisle, Craig	SEG	EO	2
04/13/11	Rodriguez, Vicente	WRCE	EO	4.5
04/14/11	Carlisle, Craig	SEG	EO	2
04/14/11	Chan, Julie	SR.EG	RR	1
04/15/11	Chan, Julie	SR.EG	RR	1
04/15/11	Rodriguez, Vicente	WRCE	EO	4
04/15/11	Carlisle, Craig	SEG	EO	2
04/18/11	Carlisle, Craig	SEG	EO	2
04/18/11	Rodriguez, Vicente	WRCE	EO	4.5
04/19/11	Carlisle, Craig	SEG	EO	2
04/19/11	Rodriguez, Vicente	WRCE	EO	4.5
04/20/11	Rodriguez, Vicente	WRCE	EO	4.5
04/21/11	Carlisle, Craig	SEG	EO	2
04/21/11	Rodriguez, Vicente	WRCE	EO	4.5
04/22/11	Carlisle, Craig	SEG	EO	2
04/25/11	Carlisle, Craig	SEG	EO	2
04/26/11	Alo, Tom	WRCE	IC	0.5
04/26/11	Loflen, Chad	ES	IC	1.5
04/26/11	Carlisle, Craig	SEG	EO	2
04/26/11	Rodriguez, Vicente	WRCE	EO	3
04/27/11	Rodriguez, Vicente	WRCE	EO	4.5
04/28/11	Rodriguez, Vicente	WRCE	EO	4.5
04/28/11	Carlisle, Craig	SEG	EO	2
04/29/11	Rodriguez, Vicente	WRCE	EO	4
04/29/11	Carlisle, Craig	SEG	EO	2

05/02/11	Carlisle, Craig	SEG	EO	3
05/02/11	Rodriguez, Vicente	WRCE	EO	4.5
05/02/11	Loflen, Chad	ES	TC	1.5
05/02/11	Melbourn, Frank	WRCE	RR	3.25
05/03/11	Carlisle, Craig	SEG	EO	3
05/03/11	Melbourn, Frank	WRCE	RR	1.75
05/03/11	Rodriguez, Vicente	WRCE	EO	4.5
05/04/11	Chan, Julie	SR.EG	TC	0
05/04/11	Carlisle, Craig	SEG	EO	3
05/04/11	Loflen, Chad	ES	TC	8
05/04/11	Rodriguez, Vicente	WRCE	EO	3.75
05/05/11	Carlisle, Craig	SEG	EO	3
05/05/11	Chan, Julie	SR.EG	TC	0
05/05/11	Rodriguez, Vicente	WRCE	EO	4.5
05/05/11	Melbourn, Frank	WRCE	RR	1.88
05/05/11	Loflen, Chad	ES	RR	2
05/06/11	Carlisle, Craig	SEG	EO	3
05/09/11	Rodriguez, Vicente	WRCE	EO	4.5
05/09/11	Alo, Tom	WRCE	EO	1
05/10/11	Rodriguez, Vicente	WRCE	EO	4.5
05/10/11	Melbourn, Frank	WRCE	WC	0.75
05/11/11	Carlisle, Craig	SEG	EO	2
05/11/11	Rodriguez, Vicente	WRCE	EO	4.5
05/12/11	Carlisle, Craig	SEG	EO	2
05/12/11	Rodriguez, Vicente	WRCE	EO	4.5
05/13/11	Loflen, Chad	ES	RR	2
05/13/11	Carlisle, Craig	SEG	EO	2
05/13/11	Melbourn, Frank	WRCE	WC	1.25
05/13/11	Rodriguez, Vicente	WRCE	EO	4
05/16/11	Melbourn, Frank	WRCE	WC	4
05/16/11	Rodriguez, Vicente	WRCE	EO	4.5
05/16/11	Chan, Julie	SR.EG	IC	0
05/17/11	Melbourn, Frank	WRCE	WC	2.5
05/17/11	Rodriguez, Vicente	WRCE	EO	4.5
05/17/11	Alo, Tom	WRCE	EO	4.5
05/18/11	Rodriguez, Vicente	WRCE	EO	4.5
05/18/11	Alo, Tom	WRCE	EO	3.5
05/18/11	Melbourn, Frank	WRCE	WC	3.25
05/19/11	Alo, Tom	WRCE	EO	4.5
05/19/11	Carlisle, Craig	SEG	EO	1
05/23/11	Alo, Tom	WRCE	EO	4
05/23/11	Carlisle, Craig	SEG	EO	4
05/24/11	Alo, Tom	WRCE	EO	0.5
05/24/11	Chan, Julie	SR.EG	IC	0
05/24/11	Carlisle, Craig	SEG	EO	4
05/24/11	Rodriguez, Vicente	WRCE	EO	4.5
05/24/11	Melbourn, Frank	WRCE	WC	2
05/24/11	Alo, Tom	WRCE	EO	4
05/25/11	Rodriguez, Vicente	WRCE	EO	4.5
05/25/11	Alo, Tom	WRCE	EO	4.5
05/26/11	Melbourn, Frank	WRCE	RR	4
05/26/11	Rodriguez, Vicente	WRCE	EO	4.5
05/26/11	Alo, Tom	WRCE	EO	4.5

05/27/11	Alo, Tom	WRCE	EO	4.5
05/27/11	Rodriguez, Vicente	WRCE	EO	4
05/31/11	Carlisle, Craig	SEG	EO	4
05/31/11	Melbourn, Frank	WRCE	RR	4
05/31/11	Rodriguez, Vicente	WRCE	EO	4.5
05/31/11	Loflen, Chad	ES	IC	1.5
06/01/11	Alo, Tom	WRCE	EO	4.5
06/01/11	Loflen, Chad	ES	RR	6
06/01/11	Loflen, Chad	ES	IC	2
06/01/11	Carlisle, Craig	SEG	EO	4
06/01/11	Melbourn, Frank	WRCE	RR	4
06/01/11	Griffey, Beatrice	EG	RR	2.5
06/01/11	Rodriguez, Vicente	WRCE	EO	4.5
06/01/11	Odermatt, John	SEG	EO	1.5
06/02/11	Becker, Eric	WRCE	EO	8
06/02/11	Rodriguez, Vicente	WRCE	EO	4.5
06/02/11	Melbourn, Frank	WRCE	WC	2
06/02/11	Carlisle, Craig	SEG	EO	3
06/02/11	Becker, Eric	WRCE	EO	8
06/02/11	Loflen, Chad	ES	IC	2
06/02/11	Melbourn, Frank	WRCE	RR	2
06/02/11	Loflen, Chad	ES	RR	6
06/03/11	Carlisle, Craig	SEG	EO	3
06/03/11	Alo, Tom	WRCE	EO	4.5
06/03/11	Melbourn, Frank	WRCE	WC	3
06/03/11	Chan, Julie	SR.EG	EO	3
06/06/11	Alo, Tom	WRCE	EO	4
06/06/11	Odermatt, John	SEG	IC	0.5
06/06/11	Carlisle, Craig	SEG	EO	4
06/06/11	Quach, Dat	WRCE	EO	4
06/06/11	Melbourn, Frank	WRCE	WC	3.75
06/06/11	Rodriguez, Vicente	WRCE	EO	4.5
06/07/11	Melbourn, Frank	WRCE	WC	4
06/07/11	Carlisle, Craig	SEG	EO	4
06/07/11	Quach, Dat	WRCE	EO	4
06/07/11	Loflen, Chad	ES	IC	2
06/07/11	Loflen, Chad	ES	RR	6
06/07/11	Alo, Tom	WRCE	EO	4.5
06/07/11	Odermatt, John	SEG	EO	0.5
06/07/11	Griffey, Beatrice	EG	ADM	3
06/07/11	Rodriguez, Vicente	WRCE	EO	4.5
06/08/11	Becker, Eric	WRCE	EO	8
06/08/11	Becker, Eric	WRCE	EO	8
06/08/11	Griffey, Beatrice	EG	ADM	6
06/08/11	Melbourn, Frank	WRCE	WC	4
06/08/11	Carlisle, Craig	SEG	EO	3
06/08/11	Chan, Julie	SR.EG	EO	3
06/08/11	Rodriguez, Vicente	WRCE	EO	4.5
06/08/11	Quach, Dat	WRCE	EO	4
06/08/11	Alo, Tom	WRCE	EO	4.5
06/08/11	Odermatt, John	SEG	EO	1.5
06/09/11	Odermatt, John	SEG	IC	2
06/09/11	Rodriguez, Vicente	WRCE	EO	4.5
06/09/11	Becker, Eric	WRCE	EO	4
06/09/11	Griffey, Beatrice	EG	ADM	7
06/09/11	Melbourn, Frank	WRCE	WC	4

06/09/11	Carlisle, Craig	SEG	EO	4
06/09/11	Loflen, Chad	ES	IC	2
06/09/11	Loflen, Chad	ES	RR	3
06/09/11	Becker, Eric	WRCE	EO	4
06/09/11	Barker, David	SUWRCE	EO	4
06/09/11	Alo, Tom	WRCE	EO	4.5
06/10/11	Loflen, Chad	ES	RR	6.5
06/10/11	Melbourn, Frank	WRCE	WC	3.5
06/10/11	Carlisle, Craig	SEG	EO	4
06/10/11	Becker, Eric	WRCE	EO	8
06/10/11	Quach, Dat	WRCE	EO	2
06/10/11	Becker, Eric	WRCE	EO	8
06/10/11	Loflen, Chad	ES	IC	1.5
06/10/11	Alo, Tom	WRCE	EO	4.5
06/13/11	Becker, Eric	WRCE	EO	8
06/13/11	Becker, Eric	WRCE	EO	8
06/13/11	Melbourn, Frank	WRCE	WC	4
06/13/11	Carlisle, Craig	SEG	EO	4
06/13/11	Rodriguez, Vicente	WRCE	EO	4.5
06/14/11	Odermatt, John	SEG	EO	1
06/14/11	Carlisle, Craig	SEG	EO	4
06/14/11	Chan, Julie	SR.EG	EO	4
06/14/11	Melbourn, Frank	WRCE	WC	4
06/14/11	Rodriguez, Vicente	WRCE	EO	4.5
06/14/11	Barker, David	SUWRCE	EO	4
06/14/11	Odermatt, John	SEG	EO	2
06/14/11	Loflen, Chad	ES	RR	8
06/15/11	Becker, Eric	WRCE	EO	8
06/15/11	Alo, Tom	WRCE	EO	4.5
06/15/11	Barker, David	SUWRCE	EO	4
06/15/11	Melbourn, Frank	WRCE	RR	4
06/15/11	Odermatt, John	SEG	IC	2.5
06/15/11	Rodriguez, Vicente	WRCE	EO	4.5
06/15/11	Becker, Eric	WRCE	EO	8
06/16/11	Loflen, Chad	ES	RR	4
06/16/11	Odermatt, John	SEG	IC	1
06/16/11	Loflen, Chad	ES	EO	4
06/16/11	Alo, Tom	WRCE	EO	4.5
06/16/11	Barker, David	SUWRCE	EO	4
06/16/11	Carlisle, Craig	SEG	EO	3
06/17/11	Carlisle, Craig	SEG	EO	4
06/17/11	Odermatt, John	SEG	IC	0.5
06/17/11	Alo, Tom	WRCE	EO	4.5
06/17/11	Barker, David	SUWRCE	EO	4
06/17/11	Odermatt, John	SEG	IC	1
06/20/11	Chan, Julie	SR.EG	EO	3.5
06/20/11	Odermatt, John	SEG	EO	1.5
06/20/11	Melbourn, Frank	WRCE	RR	2.5
06/20/11	Alo, Tom	WRCE	EO	4
06/20/11	Busse, Lillian	ES	RR	4
06/20/11	Carlisle, Craig	SEG	EO	4
06/21/11	Alo, Tom	WRCE	EO	4.5
06/21/11	Melbourn, Frank	WRCE	RR	4

06/21/11	Carlisle, Craig	SEG	EO	3
06/21/11	Chan, Julie	SR.EG	EO	5
06/22/11	Loflen, Chad	ES	EO	5.5
06/22/11	Komeylyan, Chehreh	WRCE	RR	5
06/22/11	Becker, Eric	WRCE	EO	8
06/22/11	Alo, Tom	WRCE	EO	4.5
06/22/11	Becker, Eric	WRCE	EO	8
06/22/11	Carlisle, Craig	SEG	EO	4
06/23/11	Komeylyan, Chehreh	WRCE	RR	5
06/23/11	Becker, Eric	WRCE	EO	8
06/23/11	Rodriguez, Vicente	WRCE	EO	2.5
06/23/11	Melbourn, Frank	WRCE	RR	1
06/23/11	Carlisle, Craig	SEG	EO	4
06/23/11	Loflen, Chad	ES	EO	8
06/23/11	Becker, Eric	WRCE	EO	8
06/23/11	Chan, Julie	SR.EG	EO	7
06/24/11	Carlisle, Craig	SEG	EO	4
06/27/11	Carlisle, Craig	SEG	EO	4
06/27/11	Loflen, Chad	ES	EO	8
06/27/11	Melbourn, Frank	WRCE	RR	2
06/27/11	Odermatt, John	SEG	RR	1.5
06/27/11	Rodriguez, Vicente	WRCE	EO	4.5
06/27/11	Smith, James	EO	EO	8
06/27/11	Busse, Lillian	ES	RR	4
06/28/11	Odermatt, John	SEG	IC	0.75
06/28/11	Melbourn, Frank	WRCE	IC	0.5
06/28/11	Melbourn, Frank	WRCE	RR	3.5
06/28/11	Becker, Eric	WRCE	EO	8
06/28/11	Rodriguez, Vicente	WRCE	EO	4.5
06/28/11	Carlisle, Craig	SEG	EO	4
06/28/11	Becker, Eric	WRCE	EO	8
06/28/11	Busse, Lillian	ES	RR	2
06/29/11	Melbourn, Frank	WRCE	IC	0.5
06/29/11	Rodriguez, Vicente	WRCE	EO	4.5
06/29/11	Loflen, Chad	ES	EO	8
06/29/11	Carlisle, Craig	SEG	EO	4
06/29/11	Melbourn, Frank	WRCE	RR	3.5
06/29/11	Smith, James	EO	EO	2
06/29/11	Alo, Tom	WRCE	EO	4.5
06/30/11	Alo, Tom	WRCE	EO	4.5
06/30/11	Carlisle, Craig	SEG	EO	4
06/30/11	Rodriguez, Vicente	WRCE	EO	4.5
06/30/11	Becker, Eric	WRCE	EO	8
06/30/11	Becker, Eric	WRCE	EO	8
06/30/11	Melbourn, Frank	WRCE	RR	2.5

TOTAL HOURS: 960.38

REGIONAL BOARD NUMBER: 9

PROGRAM COST ACCOUNT: 2090004

INVOICE NUMBER: 73111

TOTAL HOURS:	960.38
TOTAL LABOR CHARGES	$58,042.18
TRAVEL EXPENSES:	$0.00
EQUIPMENT:	$0.00
CONTRACT CHARGES:	$0.00
OVERHEAD:	$33,147.80
STATE BOARD PROGRAM ADMIN CHARGE:	$3,790.74
REGIONAL BOARD PROGRAM ADMIN CHARGE:	$985.00
TOTAL NEW CHARGES:	$95,965.72

Please be advised that the billing period for this invoice may not reflect all hourly charges due to time con

ACTIVITY CODES AND DESCRIPTIONS (ACT)

RR - Report review (e.g., Work plan, site assessment, remediation and monitoring reports)
SI - Site inspections
TC - Technical consultation (e.g., meetings/telephone conversations with RP or representative)
EO - Preparation of enforcement order
WC - Written correspondence to the RP or representative
IC - Internal RB communication regarding specific sites, memos, meetings, phone calls, etc.
ADM - Administrative billing inquiries/disputes
EST - Preparation of estimation letter
ADJ - Adjustment to previous Invoices
CP - Contract Payment
SC - Staff Counsel - Legal consultation

CEQA

Ernest J. Dronenburg, Jr.

COUNTY OF SAN DIEGO
ASSESSOR/RECORDER/COUNTY CLERK

ASSESSOR'S OFFICE
1600 Pacific Highway, Suite 103
San Diego, CA 92101-2480
Tel. (619) 236-3771 * Fax (619) 557-4056

www.sdarcc.com

RECORDER/COUNTY CLERK'S OFFICE
1600 Pacific Highway, Suite 260
P.O. Box 121750 * San Diego, CA 92112-1750
Tel. (619)237-0502 * Fax (619)557-4155

Transaction #: 257095320110921
Deputy: VESQUIVE
Location: COUNTY ADMINISTRATION BUILDING
21-Sep-2011 08:13

FEES:

50.00	Qty of 1 Fish and Game Filing Fee for Ref# NOA
50.00	TOTAL DUE

PAYMENTS:

50.00	Check
50.00	TENDERED

SERVICES AVAILABLE AT OFFICE LOCATIONS

* Tax Bill Address Changes
* Records and Certified Copies:
  Birth/ Marriage/ Death/ Real Estate
* Fictitious Business Names (DBAs)
* Marriage Licenses and Ceremonies
* Assessor Parcel Maps
* Property Ownership
* Property Records
* Property Values
* Document Recordings

SERVICES AVAILABLE ON-LINE AT www.sdarcc.com

* Forms and Applications
* Frequently Asked Questions (FAQs)
* Grantor/ Grantee Index
* Fictitious Business Names Index (DBAs)
* Property Sales
* On-Line Purchases
  Assessor Parcel Maps
  Property Characteristics
  Recorded Documents

42. References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Polychlorinated Biphenyls (PCBs). U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Toxicology/Toxicology Information Branch, Atlanta, GA. November 2000.

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological Profile for Copper. U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Toxicology/Toxicology Information Branch, Atlanta, GA. September 2004.

American Society for Testing and Materials (ASTM). 2000. Standard Guide for Determination of the Bioaccumulation of Sediment-Associated Contaminants by Benthic Invertebrates. Method E1688-00a. In Annual Book of ASTM Standards, Vol 11.05. Philadelphia, PA, pp 1039-1092. American Society for Testing and Materials.

Barrick, R., S. Becker, L. Brown, H. Beller, and R. Pastorok. 1988. Volume 1. Sediment Quality Values Refinement: 1988 Update and Evaluation of Puget Sound AET. EPA Contract No. 68-01-4341. PTI Environmental Services, Bellevue, WA, 144 pp.

Bay, Steve. 2007. Email to Craig Carlisle, San Diego Regional Water Quality Control Board. “Subject: Data Request.” Including Excel file attachment “TriadData_SDBay.xls.” Southern California Coastal Water Research Project, Costa Mesa, CA. December 18, 2007.

Bay, Steve. 2009. Email to Tom Alo, San Diego Regional Water Quality Control Board. “Subject: SD Bay Database.” Southern California Coastal Water Research Project, Costa Mesa, CA. May 20, 2008

Bevington, P.R. and D.K. Robinson. 1992. Data Reduction and Error Analysis for the Physical Sciences. Second Edition. McGraw-Hill Inc., U.S. 328 pp. (Third Edition published in 2002.)

Bjorndal, K.A. 1980. Nutrition And Grazing Behavior Of The Green Turtle (*Chelonia mydas*). Mar. Biol. 56:147-154.

Brodberg, R. K., and G. A. Pollock. 1999. Prevalence of Selected Target Chemical Contaminants in Sport Fish from Two California Lakes: Public Health Designed Screening Study, Final Project Report. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Pesticide and Environmental Toxicology Section, Sacramento, CA. June 1999.

Brodberg, R. 2004. Memorandum to T. Alo, San Diego Water Board, regarding “Review of the Exponent, NASSCO, and Southwest Marine Detailed Sediment Investigation.” California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Pesticide and Environmental Toxicology Section, Sacramento, CA. April 29, 2004.

Brown, J.S., and S. A. Steinert. 2004. DNA Damage and Biliary PAH Metabolites in Flatfish from Southern California Bays and Harbors, and Channel Islands. Ecological Indicators, Vol. 3, Issue 4, pp. 263-274. January 2004.

Buchman, M.F. 1999. NOAA Screening Quick Reference Tables. NOAA HAZMAT Report 99-1. National Oceanic and Atmospheric Administration, Coastal Protection and Restoration Division, Seattle, WA. September 1999.

Bermudez, H. 2005. E-mail to C. Gorham-Test, San Diego Water Board, regarding "RE: Mouth of Chollas, Paleta, and Switzer Creek Stakeholder Work Group Meeting." National Steel and Shipbuilding Company, San Diego, CA. December 15, 2005.

California Code of Regulations, Title 22, Chapter 11, Section 66261.24. Characteristic of Toxicity.

California Environmental Protection Agency (Cal EPA). 2004. Intra-Agency Environmental Justice Strategy. State of California, California Environmental Protection Agency. August 2004. http://www.calepa.ca.gov/EnvJustice/Documents/2004/Strategy/Final.pdf

Calscience Environmental Laboratories (CEL). 2005. Analytical Report for City of San Diego – Sampson St. (cover letter and analytical reports). Garden Grove, CA. October 12, 2005.

Carlin, E. 2003. Letter to T. Alo and A. Monji, San Diego Water Board, regarding "Selecting a Pool of Reference Stations for San Diego Bay." Prepared for the San Diego Bay Council, San Diego, CA. April 30, 2003.

Chadwick, B., J. Leather, K. Richter, S. Apitz, D. Lapota, D. Duckwork, C. Katz, V. Kirtay, B. Davidson, A. Patterson, P. Wang, S. Curtis. 1999. Sediment Quality Characterization Naval Station San Diego: Final Summary Report. U.S. Navy and SPAWAR Systems Center San Diego. Technical Report No. 1777. SSC San Diego, San Diego, CA. January 1999.

Chapman, P.M., F. Wang, J.D. Germano, and G. Batley. 2001. Pore Water Testing and Analysis: The Good, The Bad, And The Ugly. Marine Pollution Bulletin, Article No. 1773. October 6, 2001.

Chee, M. 2004. E-mail to T. Alo, San Diego Water Board, regarding "RE: Maintenance Dredging at NASSCO and SWM." National Steel and Shipbuilding Company, San Diego, CA. January 7, 2004.

Chevron. 2005. Preliminary Comments of Chevron U.S.A., Inc. on Tentative Cleanup and Abatement Order No. R9-2005-0126. Submitted for Public Workshop on June 29, 2005. Submitted by C.J. McNevin of Pilsbury, Winthrop, Shaw, Pittman LLP, Los Angeles, CA. June 15, 2005.

Chichester, R. 2006. E-mail to L. Walsh, San Diego Water Board, regarding "Storm Drain Outfalls Chollas Creek." U.S. Navy, Command Navy Region Southwest, Environmental Department, San Diego, CA. February 21, 2006.

City of San Diego. 2004a. Report for the Investigation of Exceedances of the Sediment Quality Objective at National Steel and Shipbuilding Company. Prepared for Regional Water Quality Control Board, San Diego, CA. City of San Diego Storm Water Pollution Prevention Program, San Diego, CA. July 15, 2004.

City of San Diego. 2004b. Report for the Investigation of Exceedances of the Sediment Quality Objectives at Southwest Marine. Prepared for Regional Water Quality Control Board, San Diego, CA. City of San Diego Storm Water Pollution Prevention Program, San Diego, CA. July 15, 2004.

Cornelius, S.E. 1986. The Sea Turtles of Santa Rosa National Park. M.V. Garcia (ed). Fundacion de Parques Nacionales, Costa Rica.

County of San Diego. 1990. San Diego Bay Health Risk Study. San Diego County Department of Health Services, Environmental Health Services. Prepared for the Port of San Diego. San Diego, CA. June 12, 1990.

DTSC. 1996. Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities. Part A: Overview. California Department of Toxic Substances Control, Human and Ecological Risk Division. July 4, 1996.

DTSC. 2000. HERD Ecological Risk Assessment (ERA) Note Number 4. California Department of Toxic Substances Control, Human and Ecological Risk Division. Sacramento, CA. December 8, 2000.

Dunning, Jr., J.B. (ed). 1993. CRC Handbook Of Avian Body Masses. CRC Press, Boca Raton, FL.

Eisler, R. 1987. Polycyclic Aromatic Hydrocarbon Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. Biological Report 85(1.11). Contaminant Hazard Reviews Report No. 11. U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Lauren, MD.

ENV America. 2004a. Site Assessment Report Landside Tidelands Lease Area Silver Gate Power Plant. Prepared for San Diego Gas and Electric Company, San Diego, CA. ENV America Inc., San Diego, CA. July 14, 2004.

ENV America. 2004b. Technical Report for RWQCB Investigation Order R9-2004-026. Prepared for San Diego Gas and Electric Company, San Diego, CA. ENV America Inc., San Diego, CA. July 14, 2004.

Environmental Health Coalition (EHC). 2005. Survey of Fishers on Piers in San Diego Bay, Results and Conclusions. San Diego, CA. March 2005. http://www.environmentalhealth.org/CBCPierFishersSurveyReport.htm

Exponent. 2001a. Work Plan for the NASSCO and Southwest Marine Detailed Sediment Investigation. Prepared for NASSCO and Southwest Marine. Exponent, Bellevue, WA. July 2001.

Exponent. 2001b. Technical Memorandum 1: Phase 1 Sediment Chemistry Data for the NASSCO and Southwest Marine Detailed Sediment Investigation. Prepared for Regional Water Quality Control Board, San Diego, CA. Exponent, Bellevue, WA. October 2001.

Exponent. 2002. Technical Memorandum 4, Phase 1 Bioaccumulation Data, Ecological Receptor Species, and Receptor Parameters for the NASSCO and Southwest Marine Detailed Sediment Investigation. Prepared for NASSCO and Southwest Marine by Exponent, Bellevue, WA. January 2002.

Exponent. 2003. NASSCO and Southwest Marine Detailed Sediment Investigation Volumes I, II, and III. Prepared for NASSCO and Southwest Marine, San Diego, CA. Exponent, Bellevue, WA. October 2003.

Exponent. 2004. Letter to T. Alo, San Diego Water Board, regarding the "Responses to NOAA Comments of the NASSCO and Southwest Marine Sediment Investigation Report Project No. 8601718.002 and 8601731.002." Prepared for Regional Water Quality Control Board, San Diego, CA. by Exponent, Bellevue, WA. June 11, 2004.

Exponent. 2005. External Memorandum from D. Nielsen (Exponent) to S. Halvax (Southwest Marine) and M. Chee (NASSCO) regarding "Responses to Tom Alo's Questions on Pore Water Regressions." Exponent, Bellevue, WA. February 1, 2005.

Fairey, R., C. Bretz, S. Lamerdin, J. Hunt, B. Anderson, S. Tudor, C. Wilson, F. La Caro, M. Stephenson, M. Puckett, and E. Long. 1996. Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay Region, Final Report. California State Water Quality Control Board, Sacramento, Ca. September 1996.

Fairey, R., E.R. Long, C.A. Roberts, B.A. Anderson, B.M. Phillips, J.W. Hunt, H.R. Puckett, and C.W. Wilson. 2001. An Evaluation of Methods for Calculating Mean Sediment Quality Guideline Quotients as Indicators of Contamination and Acute Toxicity to Amphipods by Chemical Mixtures. Environmental Toxicology and Chemistry, Vol. 20, No. 10, pp. 2276-2286. October 2001.

GlobalSecurity.org. 2005. Military Paint. Web page last modified April 27, 2005. http://www.globalsecurity.org/military/systems/ship/systems/paint.htm

Gonzales, V. 2005. Letter to J. Robertus, San Diego Water Board, regarding "Tentative Cleanup & Abatement Order No. R9-2005-0126 Issued by the San Diego Regional Water Quality Control Board ("RWQCB"), on April 29, 2005 ("Order")." Sempra Energy, Los Angeles, CA. June 15, 2005.

Greenstein, D., S. Bay, and D. Young. 2005. Sediment Toxicity Identification Evaluation for the Mouths of Chollas and Paleta Creeks, San Diego, Draft Report. Southern California Coastal Water Research Project, Westminster, CA. September 2005.

Haddad, R.I. 2005. Forensic Geochemical Analysis of TPH and PAH Data Collected from Sediments at Southwest Marine, Inc., San Diego, CA. Prepared for BP West Coast Products, LLC. Prepared by Applied Geochemical Strategies, Inc., Arroyo Grande, CA.

Halvax, S. 2004. E-mail to T. Alo, San Diego Water Board, regarding "RE: Maintenance Dredging at NASSCO and SWM." BAE Systems, Inc., San Diego, CA. January 7, 2004.

Haumschilt, Lynwood P. 1991. Letter to San Diego Water Board regarding NPDES Permit No. CA0107671, Order No. 85-05. NASSCO, San Diego, CA. December 18, 1991.

International Agency for Research on Cancer (IARC). 1989. Diesel Fuels. IARC Summary & Evaluations, Volume 45. http://www.inchem.org/pages/iarc.html

IT Corporation. 2000. Draft Corrective Measures Implementation Report, Building 6 Sump. Prepared for NASSCO, San Diego, CA. IT Corporation.

Jamieson, Jon. 2002. Raw Sewage to Reclaimed Water, The History of Sewerage Systems in the Metropolitan San Diego – Tijuana Region. Nimbus Press, Chapters 5 and 6. March 2002.

Johnson, L. 2000. An Analysis in Support of Sediment Quality Thresholds for Polycyclic Aromatic Hydrocarbons (PAHs) to Protect Estuarine Fish. National Oceanic and Atmospheric Administration, Northwest Fisheries Science Center, Seattle, WA. July 24, 2000.

Katz, C.N., A. Carlson-Blake, and D.B. Chadwick. 2003. Spatial and Temporal Evolution of Storm Water Plumes Impacting San Diego Bay. Poster presented at the Estuarine Research Federation National Conference in 2003 at St. Pete's Beach, FL. Marine Environmental Quality Branch, SPAWAR Systems Center, San Diego, CA. April 8, 2003.

Klimas, D. 2004. Letter to T. Alo, San Diego Water Board, regarding comments on "Necropsy and Histopathology of Spotted Sea Bass Sampled from San Diego Harbor" (Marty, 2003) and Sections 8.2 and 8.3 of the "NASSCO and Southwest Marine Detailed Sediment Investigation" (Exponent, 2003). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response & Restoration, Coastal Protection and Restoration Division, Sacramento, CA. April 20, 2004.

Kolb, R. 2005a. E-mail to L. Honma, San Diego Water Board, regarding "Re: Questions regarding catch basin near SWM." City of San Diego, Department of General Services, Storm Water Pollution Prevention Program, San Diego, CA. November 21, 2005.

Kolb, R. 2005b. Fax to C. Carlisle, San Diego Water Board, regarding "Sampson Street Investigation" (Map and Field Notes). City of San Diego, Department of General Services, Storm Water Pollution Prevention Program, San Diego, CA. November 22, 2005.

List, E.J. 2005. Evaluation of Polycyclic Aromatic Hydrocarbons and Metals in the San Diego Shipyard Site Sediments. Prepared for Chevron by Flow Science Incorporated, Pasadena, CA. Report No. FSI SC054052.

Long, E. R. 1989. The Use of the Sediment Quality Triad in Classification of Sediment Contamination. As published in National Research Council, Commission on Engineering and Technical Systems, Marine Board, Committee on Contaminated Marine Sediments, Report on Contaminated Marine Sediments – Assessment and Remediation. National Academy Press, Washington, D.C. Pp. 78-99.

Long, E.R. and L.G. Morgan. 1990. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. NOAA Technical Memorandum NOS OMA 52. Seattle, Washington. March 1990.

Long, E.R., D.D. MacDonald, S.L. Smith, and F.D. Calder. 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. Environmental Management, Vol. 19, No. 1, pp. 81-97.

Long, E.R., L.J. Field, and D.D. MacDonald. 1998. Predicting Toxicity in Marine Sediments with Numerical Sediment Quality Guidelines. Environmental Toxicology and Chemistry, Vol. 17, No. 4, pp. 714-727. April 1998.

LFR Levine-Fricke. 2004. Technical Data Report Chevron San Diego Terminal. Prepared for Chevron Products Company and Chevron, San Diego, CA. LRF Levine-Fricke, Costa Mesa, CA. July 13, 2004.

MacDonald, D.D., L.M. DiPinto, J. Field, C.G. Ingersoll, E.R. Long, and R.C. Swartz. 2000. Development and Evaluation of Consensus-based Sediment Effect Concentrations for Polychlorinated Biphenyls. Environmental Toxicology and Chemistry, Vol. 19, No. 5, pp. 1403-1413. May 2000.

MacDonald, D. 2005. E-mail to C. Carlisle regarding “Post-Remed Area Wt Averages” with attachment AreaWtAvgSummarySF.xls. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response & Restoration, Coastal Protection and Restoration Division, Seattle, WA. June 2, 2005.

MacDonald, D. 2005. E-mail to C. Carlisle, San Diego Water Board, regarding “Re: Shipyard Cleanup” with attachment BAPScenarios072105.pdf. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response & Restoration, Coastal Protection and Restoration Division, Seattle, WA. July 21, 2005.

MacDonald, D. 2006. Ambient Concentrations of Select Metals in the Surficial Sediment of San Diego Bay. Poster presented at the Society of Environmental Toxicology and Chemistry conference. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response & Restoration, Coastal Protection and Restoration Division, Seattle, WA, 2006.

MacDonald, D., and D. Klimas. 2003. An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response & Restoration, Coastal Protection and Restoration Division, Sacramento, CA. January 16, 2003.

MacDonald, D. and B. Shorr. 2005. Memorandum to T. Alo and C. Carlisle, San Diego Water Board, regarding “Calculation of Dredging Volumes at the NASSCO and Southwest Marine Shipyards for Alternative Remedial Scenarios.” U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response & Restoration, Coastal Protection and Restoration Division, Seattle, WA. February 23, 2005.

Magar, V. and Wenning, R.J. 2006. The Role of Monitored Natural Recovery in Sediment Remediation. Integr. Environ. Assess. Manage. 2006, 2 (1), pp. 66-74.

Magar, V.S., D.B. Chadwick, T.S. Bridges, P.C. Fuchsman, J.M. Conder, T.J. Dekker, J.A. Steevens, K.E. Gustavson, and M.A. Mills. 2009. Technical Guide: Monitored Natural Recovery at Contaminated Sediment Sites. ESTCP Project ER-0622. U.S. Department of Defense, Environmental Security Technology Certification Program, May 2009.

Marty, G.D. 2003. Necropsy and Histopathology of Spotted Sea Bass Sampled from San Diego Harbor in September 2002 – Final Report. Fish Pathology Services, Davis, CA. March 25, 2003.

Meador, James P., 2000. An Analysis in Support of Tissue and Sediment Based Threshold Concentrations of Polychlorinated Biphenyls (PCBs) to Protect Juvenile Salmonids Listed by the Endangered Species Act. Northwest Fisheries Science Center, National Oceanic and Atmospheric Administration. October 13, 2000.

Myers, S. M., C. M. Stehr, P. Olson, L. L. Johnson, B. B. McCain, S. Chan, and U. Varanasi. 1994. Relationships between Toxicopathic Hepatic Lesions and Exposure to Chemical Contaminants in English Sole (*Pleuronectes vetulus*), Starry Flounder (*Platichthys stellatus*), and White Croaker (*Genyonemus lineatus*). Environmental Health Perspectives, Vol. 102, No. 2, pp. 200-215. February 1994.

Myers, S. M., L.L. Johnson, P. Olson, C.M. Stehr, B.H. Horness, T. Collier, and B.B. McCain. 1998. Toxicopathic Hepatic Lesions as Biomarkers of Chemical Contaminant Exposure and Effects in Marine Bottomfish Species from the Northeast and Pacific Coasts, USA. Marine Pollution Bulletin, Vol. 37, No. 1-2, pp. 92-113. January-February 1998.

Nagy, K.A., I.A. Gierard, and T.K. Brown. 1999. Energetics of Free-Ranging Mammals, Reptiles, and Birds. Ann. Rev. Nutr. 19:247-277.

Nagpal, N.K. 1993. Ambient Water Quality Criteria for Polycyclic Aromatic Hydrocarbons (PAHs). Government of British Columbia, Canada, Ministry of Environment, Lands and Parks, Environmental Protection Division. August 13, 1993. http://www.env.gov.bc.ca/wat/wq/BCguidelines/pahs/pahs_over.html

National Marine Fisheries Service (NMFS). 2005. Southern California Eelgrass Mitigation Policy (revision 11). National Marine Fisheries Service, Southwest Regional Office, Long Beach, CA. Adopted on July 31, 1991, Last Revised on August 30, 2005. http://swr.nmfs.noaa.gov/hcd/policies/EELPOLrev11_final.pdf

National Oceanic and Atmospheric Administration (NOAA). 1999. Sediment Quality Guidelines Developed for the National Status and Trends Program. National Oceanic and Atmospheric Administration, Office of Response and Restoration. June 12, 1999. http://response.restoration.noaa.gov.

National Research Council (NRC). 1997. Contaminated Sediments in Ports and Waterways, Cleanup Strategies and Technologies. National Research Council, Commission on Engineering and Technical Systems, Marine Board, Committee on Contaminated Marine Sediments. National Academy Press, Washington, D.C.

NRC. 2001. A Risk-Management Stractegy for PCB-Contaminated Sediments. National Research Council. National Academy Press, Washington, D.C. **Not relied upon.**

NRC. 2007. Sediment Dredging at Superfund Megasites. Assessing the Effectiveness. Committee on Dredging at Superfund Megasites, National Research Council of the National Academies. National Academy Press, Washington, D.C.

Office of Environmental Health Hazard Assessment (OEHHA). 2001. Chemicals in Fish: Consumption of fish and shellfish in California and the United States, Final Report. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Pesticide and Environmental Toxicology Section, Oakland, CA. October 2001.

OEHHA. 2003. Methylmercury in Sport Fish: Information for Fish Consumers. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Pesticide and Environmental Toxicology Section, Oakland, CA. June 2003. http://www.oehha.ca.gov/fish/hg/index.html

OEHHA. 2006. PCBs in Sport Fish: Answers to Questions on Health Effects. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Sacramento, CA. Downloaded on February 14, 2006 from the following website: http://www.oehha.ca.gov/fish/pcb/index.html

OEHHA. 2008. Development of fish contamination goals and advisory tissue levels for common contaminants in California sport fish: Chlordane, DDTs, Dieldrin, methylmercury, PCBs, selenium, and Toxaphene. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Pesticide and Environmental Toxicology Branch. June 2008. http://www.oehha.ca.gov/fish/gtlsv/pdf/FCGsATLs27June2008.pdf.

Palermo, M.R., J.E. Clausner, M.P. Rollings, G.L. Williams, T.E. Myers, T.J. Fredette, and R.E. Randall. 1998. Guidance for Subaqueous Dredged Material Capping, US Army Corps of Engineers, Technical Report DOER-1. U.S. Army Corps of Engineers, Waterways Experiment Station, Dredging Operations and Environmental Research Program, Washington, D.C., June 1998. http://el.erdc.usace.army.mil/elpubs/pdf/trdoer1.pdf

Peng, J., E. Zeng, T-L Ku, and S Luo. 2003. Significance of Sediment Resuspension and Tidal Exchange to Reduction of Polychlorinated Biphenyl Mass in San Diego Bay. Pp 101-109. In: Southern California Coastal Research Project Biennial Report 2001-2002. First edition. Southern California Coastal Water Research Project Authority.

Peterson, J., M. MacDonell, L. Haroun, and F. Monette. 2005. Radiological and Chemical Fact Sheets to Support Health Risk Analyses for Contaminated Areas. U.S. Department of Energy, Argonne National Laboratory, Environmental Science Division, DuPage County, IL. August 2005. http://www.ead.anl.gov/pub/dsp_detail.cfm?PubID=1472

Phillips, B.M., J.W. Hunt, B.S. Anderson, H.M. Puckett, R. Fairey, C.J. Wilson, and R. Tjeerdema. 2001. Statistical Significance of Sediment Toxicity Test Results: Threshold Values Derived by the Detectable Significance Approach. Environmental Toxicology and Chemistry, Vol. 20, No. 2, pp. 371-3733. February 2001.

Ranasinghe, A.J., D.E. Montagne, R.W. Smith, T.K. Mikel, S.B. Weisberg, D.B. Cadien, R.G. Velarde, and A. Dalkey. 2003. Southern California Bight 1998 Regional Monitoring Program, Benthic Macrofauna, Volume VII. Southern California Coastal Water Research Project, Westminster, CA. March 2003.

Rand, G.M., 1995. Fundamentals of Aquatic Toxicology, Effects, Environmental Fate, and Risk Assessment, Second Edition. Taylor and Francis, Washington, D.C., pp. 38-39.

Regional Water Quality Control Board (RWQCB). 1972. Wastes Associated with Shipbuilding and Repair Facilities in San Diego Bay. State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA. June 1972.

RWQCB. 1976a. Letter to Gary Higgins of San Diego Marine Construction Corporation regarding delay of Water Pollution Control Plan implementation. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA. November 23, 1976.

RWQCB. 1976b. Letter to Gary Higgins of San Diego Marine Construction Corporation regarding delay of Water Pollution Control Plan implementation. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA. December 29, 1976.

RWQCB. 1985. Order No. 85-05, NPDES Permit No. CAO107671, Waste Discharge Requirements for NASSCO Shipyard, San Diego County. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1987a. Inspection Form for BAE Systems – Industrial Discharger dated March 3, 1987. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1987b. Note to BAE Systems File dated March 18, 1987. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1988a. Inspection Form for BAE Systems – Industrial Discharger dated November 9, 1988. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1988b. Inspection Form for BAE Systems – Industrial Discharger dated November 15, 1988. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1989a. Inspection Form – Industrial Discharger dated August 1989. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1989b. Addendum No. 1 to Order No. 85-05. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1989c. Inspection Form for BAE Systems – Industrial Discharger dated February 27, 1989. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1989d. Inspection Form for BAE Systems – Industrial Discharger dated August 18, 1989. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1991. Facilities Inspection Report. Inspection date October 16, 1991. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 1994. Water Quality Control Plan for the San Diego Basin. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA. September 8, 1994.

RWQCB. 1997. Order No. 97-36, NPDES Permit No. CAG039001, Waste Discharge Requirements for Discharges from Ship Construction, Modification, Repair, and Maintenance Facilities and Activities Located in the San Diego Region. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 2001a. Guidelines for Assessment and Remediation of Contaminated Sediments in San Diego Bay at NASSCO & Southwest Marine Shipyards. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA. June 1, 2001.

RWQCB. 2001b. Municipal Stormwater Permit Order No. 2001-01. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 2002a. Letter to M. Chee (NASSCO) and S. Halvax (Southwest Marine) regarding "Assessment of Bioaccumulation and Risk to Fish Health from Sediment Contaminants at NASSCO and Southwest Marine Shipyards." California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA. July 16, 2002.

RWQCB. 2002b. NPDES PERMIT NO. CA0109151, Waste Discharge Requirements for Southwest Marine, Order No. 2002-0161. California Environmental Protection Agency, State

Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 2003a. A Compilation of Water Quality Goals. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, Central Valley Region, Sacramento, CA. August 2003. http://www.waterboards.ca.gov/centralvalley/available_documents/wq_goals/wq_goals_2003.pdf

RWQCB. 2003b. Letter to M. Chee (NASSCO), S. Halvax (BAE Systems), B. Chadwick (SPAWAR), and S. Bay (SCCWRP) regarding "Regional Board Final Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations." California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA. June 9, 2003

RWQCB. 2003c. Waste Discharge Requirements for NASSCO, Order No. 2003-005. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, San Diego Region, San Diego, CA.

RWQCB. 2005. Total Maximum Daily Loads for Toxic Pollutants in Ballona Creek Estuary. California Environmental Protection Agency, State Water Resources Control Board, Regional Water Quality Control Board, Los Angeles Region, Los Angeles, CA. July 7, 2005.

San Diego Unified Port District (SDUPD). 2004. Historical Study, San Diego Bay Waterfront, Sampson Street to 28th Street, San Diego, California. Document by S. E. Booth in response to RWQCB Investigation Order Nos. R9-2004-0026 and 0027 on behalf of the San Diego Unified Port District. San Diego Unified Port District, San Diego, CA. June 30, 2004.

Savard, J. P., D. Bordage, and A. Reed. 1998. Surf Scoter (*Melaniita perspicillata*). In: The Birds of North America, No. 363. A. Poole and F. Gill (eds). The Birds of North America, Inc., Philadelphia, PA.

Southern California Coastal Water Research Project (SCCWRP). 2003. Southern California Bight 1998 Regional Monitoring Program. Southern California Coastal Water Research Project, Westminster, CA. March 2003.

SCCWRP and MBC. 1994. Santa Monica Bay Seafood Consumption Study: Final Report. Southern California Coastal Water Research Project, Westminster, CA and MBC Applied Environmental Sciences, Costa Mesa, CA. June 1994.

SCCWRP and U.S. Navy. 2004. Sediment Assessment at the Mouths of Chollas Creek and Paleta Creek, Phase 1 Results, Powerpoint presentation to the Regional Board. Southern California Coastal Water Research Project, Westminster, CA and U.S. Navy Region Southwest, San Diego, CA. May 11, 2004.

SCCWRP and U.S. Navy. 2005a. Sediment Assessment Study for the Mouths of Chollas and Paleta Creek, Phase 1 Results, PowerPoint presentation to the Regional Board. Southern

California Coastal Water Research Project, Westminster, CA and U.S. Navy Region Southwest, San Diego, CA. January 18, 2005.

SCCWRP and U.S. Navy. 2005b. Sediment Assessment Study for the Mouths of Chollas and Paleta Creek, San Diego, Phase 1 Final Report. Southern California Coastal Water Research Project, Westminster, CA and Space and Naval Warfare Systems Center, U.S. Navy, San Diego, CA. May 2005.

Schiff, K., S. Bay, and D. Diehl. 2003. Stormwater Toxicity in Chollas Creek and San Diego Bay, California. Environmental Monitoring and Assessment, Vol. 81, pp. 119-132.

SECOR. 2004. Historical Site Assessment Report Atlantic Richfield Facility No. 33-T. Prepared for ARCO, La Palma, CA. SECOR, San Diego, CA. July 16, 2007.

Snider, Thomas. 1992. Letter regarding Regional Board Inspection of February 27, 1992. NASSCO, San Diego, CA. May 1, 1992.

Storer, R.W. and G.L. Nuechterlein. 1992. Western and Clark's grebe. In: The Birds of North America, No. 26. A. Poole, P. Stettenheim, and F. Gill (eds). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, DC.

State Water Resources Control Board (SWRCB). 1968. Resolution No. 68-16 – Statement of Policy with Respect to Maintaining High Quality of Waters in California. California Environmental Protection Agency, State Water Resources Control Board, Sacramento, CA. October 28, 1968.

SWRCB. 1996. Resolution No. 92-49 - Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304 (As Amended on April 21, 1994 and October 2, 1996). California Environmental Protection Agency, State Water Resources Control Board, Sacramento, CA. October 2, 1996.

SWRCB. 1997. Water Quality Control Plan: Ocean Waters of California. California Environmental Protection Agency, State Water Resources Control Board, Sacramento, CA.

SWRCB. 2001. California Ocean Plan. California Environmental Protection Agency, State Water Resources Control Board, Sacramento, CA.

SWRCB. 2005. Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. California Environmental Protection Agency, State Water Resources Control Board, Sacramento, CA.

SWRCB. 2008. Draft Staff Report – Water Quality Control Plan for Enclosed Bays and Estuaries, Part 1. Sediment Quality. CA Environmental Protection Agency, State Water Resources Control Board, Sacramento, CA. July 18, 2008.

SWRCB. 2009. Water Quality Control Plan for Enclosed Bays and Estuaries, Part 1. Sediment Quality. CA Environmental Protection Agency, State Water Resources Control Board, Sacramento, CA. August 25, 2009.

Swartz, R.C. 1999. Consensus Sediment Quality Guidelines for Polycyclic Aromatic Hydrocarbon Mixtures. Environmental Toxicology and Chemistry, Vol. 18, No. 4, pp. 780-787. April 1999.

TAMS/Gradient Corporation. 2000. Phase 2 Report, Further Site Characterization and Analysis, Volume 2F – Revised Human Health Risk Assessment, Hudson River PCBs Reassessment RI/FS. TAMS Consultants, Inc. and Gradient Corporation.

Thompson, B.C., J.A. Jackson, J. Burger, L.A. Hill, E.M. Kirsh, and J.L. Atwood. 1997. Least Tern (*Sterna antillarum*). In: The Birds of North America, No. 290. A. Poole and F. Gill (eds). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Thursby, G.B., J. Heltshe, and K. J. Scott. 1997. Revised Approach to Toxicity Test Acceptability Criteria Using a Statistical Performance Assessment. Environmental Toxicology and Chemistry, Vol. 16, No. 6, pp. 1322-1329. June 1997.

TN & Associates, Inc. 2006. Underground Storage Tank Closure Report, Silvergate Power Plant, 1348 Sampson Street, San Diego, California 92113. TN & Associates, Inc. November 13, 2006.

U.S. Army Corps of Engineers (U.S. ACE). 2008a. Technical Guidelines for Environmental Dredging of Contaminated Sediments. U.S. Army Corps of Engineers Environmental Laboratory, Vicksburg, MS. ERDC/EL TR-08-29 September 2008. Available on the web at http://www.epa.gov/superfund/health/conmedia/sediment/pdfs/dredging_guidance.pdf

U.S. ACE, 2008b. The Four Rs of Environmental Dredging: Resuspension, Release, Residual, and Risk. U.S. Army Corps of Engineers. Engineer Research and Development Center, Vicksburg, MS. ERDC/EL TR-08-4, February, 2008. Available on the web at http://www.epa.gov/superfund/health/conmedia/sediment/pdfs/summaryreport.pdf

U.S. Code of Federal Regulations (CFR). Title 40: Protection of Environment, Part 300 – National Oil And Hazardous Substances Pollution Contingency Plan (NCP), Section 300.430, Remedial Investigation/Feasibility Study and Selection of Remedy.

U.S. Environmental Protection Agency (U.S. EPA). 1989a. EPA Superfund Record of Decision: Commencement Bay, Near Shore/Tide Flats. EPA/ROD/R10-89/020. U.S. Environmental Protection Agency, Region X, Seattle, WA. September 30, 1989.

U.S. EPA. 1989b. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final. EPA-540-1-89-002. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. December 1989.

U.S. EPA. 1992a. Sediment Classification Methods Compendium. EPA-823-R-92-006. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C. September 1992.

U.S. EPA. 1992b. Proceedings of EPA's Contaminated Marine Sediment Management Strategy Forums. EPA-823-R-92-007. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C. September 1992.

U.S. EPA. 1993a. Wildlife Exposures Factors Handbook, Volumes 1 and 2. EPA-600-R-93-187a. U.S. Environmental Protection Agency, Office of Research and Development, Office of Health and Environmental Assessment, Washington, DC. December 1993.

U.S. EPA. 1993b. Selecting Remediation Techniques for Contaminated Sediment. EPA-823-B93-001. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C. and Office of Research and Development, Cincinnati, OH. June 1993.

U.S. EPA. 1994a. Assessment and Remediation of Contaminated Sediment (ARCS) Program, Assessment Guidance Document. EPA-905-B94-002. U.S. Environmental Protection Agency, Great Lakes National Program Office, Chicago, Ill. July 1994.

U.S. EPA. 1994b. Selecting and Using Reference Information in Superfund Ecological Risk Assessments. EPA 540-F-94-050. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response Hazardous Site Evaluation Division (5204G). September 1994.

U.S. EPA. 1995. National Primary Drinking Water Regulations, Copper. Consumer Version. EPA 811-F-95-002i-C. U.S. Environmental Protection Agency, Office of Water. October 1995. The information contained in the above reference was found at the following webpage, updated on February 28, 2006: http://www.epa.gov/safewater/dwh/c-ioc/copper.html

U.S. EPA. 1997a. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final. EPA 540-R-97-006, OSWER 9285.7-25, PB97-963211. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. June 1997.

U.S. EPA. 1997b. EPA Superfund Explanation of Significant Differences: Commencement Bay, Near Shore/Tide Flats. EPA/ESD/R10-97/059. U.S. Environmental Protection Agency, Region X, Seattle, WA. July 28, 1997.

U.S. EPA. 1997c. Profile of the Shipbuilding and Repair Industry. EPA-310-R-97-008. U.S. Environmental Protection Agency, Office of Enforcement and Compliance Assurance, Washington, D.C. September 1997. Compliance Assistance Web Page at http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/ship.html

U.S. EPA. 1997d. The Incidence and Severity of Sediment Contamination in Surface Waters of the United States, Volume 1, National Sediment Quality Survey. EPA-823-R-98-006. U.S. Environmental Protection Agency, Office of Science and Technology, Washington, D.C. September 1997.

U.S. EPA. 1997e. Mercury Study Report to Congress, Volume V: Health Effects of Mercury and Mercury Compounds. EPA-452-R-97-007. U.S. Environmental Protection Agency, Office of Air Quality Planning & Standards, Research Triangle Park, NC and Office of Research and

Development Cincinnati, OH. December 1997. The report was found at the following webpage: http://www.epa.gov/mercury/report.htm

U.S. EPA. 1998a. Methods for Assessing Sediment Bioaccumulation in Marine/Estuarine Benthic Organisms. National Sediment Bioaccumulation Conference Proceedings, September 11-13, 1996, Bethesda, MD. EPA-823-R-98-002. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. February 1998.

U.S. EPA. 1998b. Guidelines for Ecological Risk Assessment. EPA-630-R-95-002F. U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, D.C. May 14, 1998.

U.S. EPA. 1998c. Assessment and Remediation of Contaminated Sediment (ARCS) Program Guidance for In-Situ Subaqueous Capping of Contaminated Sediments http://www.epa.gov/glnpo/sediment/iscmain

U.S. EPA. 2000a. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule. 40 CFR Part 131. U.S. Environmental Protection Agency, Region IX, Water Division, San Francisco, CA. May 18, 2000.

U.S. EPA. 2000b. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 2: Risk Assessment and Fish Consumption Limits, Third Edition. EPA 823-B-00-008. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C. November 2000.

U.S. EPA. 2000c. Estuarine and Coastal Marine Waters: Bioassessment and Biocriteria Technical Guidance. EPA-822-B-00-024. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. December 2000.

U.S. EPA. 2000d. Development of a Framework for Evaluating Numerical Sediment Quality Targets and Sediment Contamination in the St Louis River Area of Concern. EPA-905-R-00-008. U.S. Environmental Protection Agency, Great Lakes National Program Office, Chicago, IL. December 2000.

U.S. EPA. 2000e. EPA Superfund Record of Decision: Puget Sound Naval Shipyard Complex EPA ID: WA2170023418 OU 2. Bremerton, WA. U.S. Environmental Protection Agency. EPA/ROD/R10-00/516.

U.S. EPA. 2001a. Draft Implementation Framework for the Use of Equilibrium Partitioning Sediment Guidelines. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C. February 2001.

U.S. EPA. 2001b. Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual. EPA-823-B-01-002. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C. October 2001.

U.S. EPA. 2003a. Integrated Risk Information System (IRIS). All searches conducted in online through Toxnet beginning in 2003. Database developed and maintained by U.S. Environmental

Protection Agency, Office of Research and Development, National Center for Environmental Assessment. Available at: www.epa.gov/iris/.

U.S. EPA. 2003b. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures. EPA-600-R-02-013. U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C. November 2003.

U.S. EPA. 2004a. What You Need to Know About Mercury in Fish and Shellfish, 2004 EPA and FDA Advice For: Women Who Might Become Pregnant, Women Who are Pregnant, Nursing Mothers, and Young Children. U.S. Department of Human Health Services and U.S. Environmental Protection Agency. EPA-823-R-04-005. March 2004. http://www.cfsan.fda.gov/~dms/admehg3.html

U.S. EPA. 2004b. Technical Memorandum – Origin of 1 Meal/Week Noncommercial Fish Consumption Rate in National Advisory for Mercury. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. March 11, 2004.

U.S. EPA. 2005a. Contaminated Sediments in Superfund. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. Webpage can be found at: http://www.epa.gov/superfund/resources/sediment.

U.S. EPA. 2005b. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Metal Mixtures (Cadmium, Copper, Lead, Nickel, Silver, and Zinc). EPA-600-R-02-011. U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C. January 2005.

U.S. EPA. 2006. Background Information on PCB Sources and Regulations. U.S. Environmental Protection Agency, Great Lakes Pollution Prevention and Toxics Reduction. Webpage can be found at: http://www.epa.gov/glnpo/bnsdocs/pcbsrce/pcbsrce.html

U.S. EPA. 2010. Contaminated sediment in Superfund: List of Sediment Sites with Substantial Contamination. Webpage last updated on June 28, 2010. Webpage accessed on June 28, 2010: http://www.epa.gov/superfund/health/conmedia/sediment/sites.htm

U.S. Food and Drug Administration (U.S. FDA). 2004. Mercury Levels in Commercial Fish and Shellfish. U.S. Food and Drug Administration, Department of Health and Human Services, Rockville, MD. March 19, 2004. Downloaded on May 12, 2004 at the following website: http://www.cfsan.fda.gov/seafood1.html.

U.S. Geological Survey. 2000. Mercury in the Environment, Fact Sheet 146-00. U.S. Department of the Interior, U.S. Geological Survey, Denver, CO. October 2000. Webpage last modified September 26, 2002, found at: http://www.usgs.gov/themes/factsheet/146-00/

U.S. Naval Seas Systems Command. 1984. Fleetwide Use of Organotin Antifouling Paint. Washington, D.C. December 1984.

U.S. Navy. 2000. Toxic Hot Spot Assessment Study At Chollas Creek and Paleta Creek, Historical Data Review. U.S. Navy, Navy Region Southwest, SPAWAR Systems Center San Diego, San Diego, CA, pp. 23-27. August 2000.

U.S. Navy. 2004. Historical Naval Activities at National Steel and Shipbuilding Company Shipyard. Prepared for Investigation Order No. R9-2004-0027 for Regional Water Quality Control Board, San Diego, CA. US Navy, San Diego, CA., July 2004.

Vidal, D.E. and S. M. Bay. 2005. Comparative Sediment Quality Guideline Performance For Predicting Sediment Toxicity In Southern California. Southern California Coastal Water Research Project, Westminster, CA. June 2005.

Washington State Department of Ecology (WDOE). 1997. Developing Health-Based Sediment Quality Criteria for Cleanup Sites: A Case Study Report. Ecology Publication No. 97-114. Washington State Department of Ecology.

Whitaker, J.O., Jr. 1997. National Audubon Society Field Guide to North American Mammals. Alfred A. Knopf (Ed.), New York, NY, pp. 937.

Wilson, C. M. 2002. Memorandum to J. Robertus, San Diego Water Board, regarding "Applicability of State Board Resolution 92-49 in Setting Sediment Cleanup Levels." State Water Resources Control Board, Office of Chief Counsel, Sacramento, CA. February 22, 2002.

Woodward-Clyde. 1995. Historical Occupancy Search Southwest Marine, Foot of Sampson Street, San Diego California. Prepared for Southwest Marine, Inc, San Diego, CA. Woodward-Clyde, San Diego, CA.

Zeeman, C.Q.T. 2004. Ecological Risk-Based Screening Levels for Contaminants in Sediments of San Diego Bay Sediments, Technical Memorandum CFWO-EC-TM-04-01. U.S. Fish and Wildlife Service, Carlsbad Fish and Wildlife Office, Environmental Contaminants Division, Carlsbad, CA. December 8, 2004.

Zirkle, C. 2005a. Letter to T. Sanger, SDG&E, regarding "Unauthorized Discharge of Toxic Pollutants into the Municipal Storm Drain System." City of San Diego, Department of General Services, Storm Water Pollution Prevention Program, San Diego, CA. October 14, 2005.

Zirkle, C. 2005b. Letter to K. Rowland, SDG&E, regarding "Extension of Notice of Violation Number 5408 Regarding Unauthorized Discharge of Toxic Pollutants into the Municipal Storm Drain System." City of San Diego, Department of General Services, Storm Water Pollution Prevention Program, San Diego, CA. November 8, 2005.

Zirkle, C. 2006. Letter to J. Robertus, San Diego Water Board Executive Officer, regarding "Comments on the Total Maximum Daily Load for Indicator Bacteria, Project I – Beaches and Creeks in San Diego Region." City of San Diego, Department of General Services, Storm Water Pollution Prevention Program, San Diego, CA. Page 9. February 3, 2006.