



**Matthew Rodriguez**  
Secretary for  
Environmental Protection

# California Regional Water Quality Control Board San Francisco Bay Region

---

1515 Clay Street, Suite 1400, Oakland, California 94612  
(510) 622-2300 • FAX (510) 622-2460  
<http://www.waterboards.ca.gov/sanfranciscobay>



**Edmund G. Brown Jr.**  
Governor

Date: December 7, 2011  
File No. 2119.1044 (ADF)

## PUBLIC NOTICE

**Subject: Tentative Order for Site Cleanup Requirements for the Chevron Products Company, Chevron Richmond Refinery, 841 Chevron Way, Richmond, Contra Costa County**

Dear Interested Party,

Enclosed is a Tentative Order for issuing Site Cleanup Requirements for the Chevron Richmond Refinery. The Tentative Order will be considered by the Regional Board at its February 8, 2012 hearing. The hearing will be held at:

Elihu Harris State Building  
First Floor Auditorium  
1515 Clay Street  
Oakland, CA 94612  
February 8, 2012, 9:00 a.m.

This Order issues that Site investigations be made and that there be continued monitoring of corrective action measures at specified areas of the Refinery.

Comments to the Tentative Order must be submitted in writing to this office by January 13, 2012. Any comments submitted after the deadline may not be considered. Questions regarding this matter should be directed to me at (510) 622-2347, or by e-mail at [afriedman@waterboards.ca.gov](mailto:afriedman@waterboards.ca.gov).

Sincerely,

Alan D. Friedman, P.E.  
Water Resource Control Engineer

Enclosures: Tentative Order  
Mailing List

Mailing List

Leslie Graves, Senior Engineering Geologist  
SWRCB  
1001 I Street  
Sacramento, CA 95812-4025  
[Lgraves@waterboards.ca.gov](mailto:Lgraves@waterboards.ca.gov)

Paul Ryan  
Chevron environmental Management Company  
BR1Y Room 3514  
6111 Bollinger Canyon Road  
San Ramon, CA 94583-2324

John Karachewski, PhD, PG, CHG  
Engineer Geologist  
Brownfields and Environmental Restoration Program  
Department of Toxic Substances Control  
700 Heinz Avenue  
Berkeley, CA 94710

Ronald Leach, Project Manager  
U.S. EPA (WST-5)  
75 Hawthorne St.  
San Francisco, CA 94105

Andrea Kopecky  
San Francisco Baykeeper  
785 Market Street, Suite 850  
San Francisco, CA 94103

Board Meeting Lyris List



**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION**

**TENTATIVE ORDER**

**SITE CLEANUP REQUIREMENTS**

**FOR**

**CHEVRON PRODUCTS COMPANY  
CHEVRON RICHMOND REFINERY  
841 CHEVRON WAY  
RICHMOND, CONTRA COSTA COUNTY**

## **FINDINGS**

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Board, finds that:

### **SITE DESCRIPTION**

1. Chevron Products Company, a subsidiary of Chevron USA Inc. (hereinafter called Chevron or the Discharger) owns and operates the Chevron Richmond Refinery (hereinafter called the refinery). The refinery was built in 1902, and produces a broad range of fuels, lubricants, asphalt and petrochemicals. The 2,900-acre refinery is located along the southern shore of San Pablo Bay in Contra Costa County (Figure 1). The City of Richmond lies to the east of the refinery. To the east and within one mile from the facility are industrial, residential, and commercial land uses.

### **PURPOSE OF ORDER**

2. Pursuant to the California Water Code (CWC), Section 13304, the Site Cleanup Requirements (SCR) in this Order requires Site investigations be made and continued monitoring of corrective action measures implemented at specified areas of the Refinery. This Order requires the Discharger to:
  - Ensure that the remediation systems and respective monitoring programs are operated, evaluated and modified as necessary to ensure the requirements of this Order are met.
  - Continue to evaluate the performance of implemented corrective actions at Pollard Pond, the 250-Foot Channel, S.P. Hill, and the site-wide groundwater control system and hydrocarbon recovery program.

### **REGULATORY HISTORY**

3. On June 16, 2011, the Board issued the Updated Waste Discharge Requirements (WDRs) Order R2-2011-0036, which specified requirements for continued maintenance and monitoring of the inactive and closed waste management units along with requirements for waste management unit corrective action and water quality monitoring programs. This Order shares the same Self Monitoring and Reporting Program with Order R2-2011-0036. Prior to these two Orders, the Board regulated refinery-wide investigations and corrective action activities under Waste Discharge Requirements Order No. 00-043.

Other Orders previously adopted for the refinery are:

93-109	Waste Discharge Requirements
93-016	Site Cleanup Requirements for the S.P. Hill Tankfield
92-092	Site Cleanup Requirements for the Alkane Sector
92-010	Waste Discharge Requirements for Landfill 15
91-098	Cease and Desist Order for Pollard Pond and the Hydropits

90-146	Site Cleanup Requirements for Plant 1/Additives Plant
89-175	Waste Discharge Requirements
89-011	Cease and Desist Order for the Pollard Pond
88-044	Waste Discharge Requirements
83-13	Waste Discharge Requirements
81-55	Waste Discharge Requirements

4. The Board adopted Order No. R2-2011-0049 (NPDES No. CA0005134) on July 13, 2011. This permit regulates the discharge of effluent from the Discharger's wastewater treatment system, and the discharges of all stormwater associated with industrial activity from the refinery to San Pablo and San Francisco Bays.

## **FACILITY DESCRIPTION AND HISTORY**

### **Hydrogeologic Setting**

5. The Richmond Refinery and its tankfields are located on the peninsula of the Potrero-San Pablo Ridge, which is composed of the steeply dipping Franciscan Complex. The refining of the petroleum products generally occurs on the bay fill areas northeast of the ridge. The southwest side of the ridge consists of steep topography where the Franciscan Complex has been terraced for the placement of above ground petroleum storage tanks.
6. Past fluctuations in sea level created a complex sedimentary sequence of interfingering estuarine and alluvial fan deposits overlying the Franciscan Complex bedrock. The uppermost deposits are artificially placed bay fill, ranging from approximately 3 feet to approximately 30 feet in depth. The fill materials overlie bay muds which consist of silt and silty clay with abundant plant matter or peat. The bay muds overlap onto the Franciscan bedrock and thicken bayward.
7. Three hydrogeologic zones have been identified within the top 150 feet of sediments in the flat lying areas of the refinery, the A-Zone, C-Zone and the B-Zone, in order of increasing depth.
  - a. The A-Zone is the first water bearing zone and consists of artificial fill and the naturally occurring peat rich, bay mud. The water table elevation for this zone is within two to ten feet of the ground surface and generally discharges to the Bay.
  - b. The C-Zone is an 80 to 90-foot-thick water bearing zone of interfingering alluvial and estuarine sediments. These sediments generally have low hydraulic conductivity, but sandy, more permeable units occur as channels and lenses. The sand units have not been shown to be contiguous across the site, but do appear to be hydraulically connected. However, based on several years of chemical data there is no indication that the C-Zone groundwater has been significantly impacted. Chevron has concluded that the bay mud has been an effective hydraulic barrier between the A- and C-Zones and has prevented the migration of contaminants in groundwater from the A-Zone to the C-Zone. These results and conclusions were presented to the Regional Water Board in two reports titled C-Zone Investigation - Phase 1 and Phase 2, dated

February 8, 1991 and December 20, 1991 respectively and continue to be supported by groundwater monitoring data collected pursuant to the refinery-wide Self-Monitoring Program.

- c. The B-Zone is a relatively permeable unit at approximately 100 feet below the ground surface. It ranges from 5 to 15 feet thick and contains potable water, but has limited production capacity. The B-Zone occurs under artesian conditions and appears to be hydraulically separate from the overlying zones.
8. As shown in Figure 2, the refinery lies in four geomorphic/geologic settings referred to locally as the "Alluvial," "Flats," "Ridge," and "Transition" Zones.
- a. The **Alluvial Zone** is defined as the broad area of alluvial fan deposits, derived from the Berkeley Hills, east of the Refinery. This zone represents flatland areas in which Bay Mud was not deposited. The upper portion of the alluvial fan deposit is typically clayey with low permeability.
  - b. The **Flats Zone** comprises the flatland marsh area bounded by San Pablo Bay to the north and extending south along the northeast side of Potrero-San Pablo Ridge. For the purpose of the Refinery's investigations, the inland Flats Zone/Alluvial Zone boundary has been defined to be the 5-foot Bay Mud isopach (line of equal thickness). Thus, the Flats Zone is typically underlain by at least five feet of Bay Mud except where removed by excavation or erosion, in local areas of non-deposition, or where displaced by differential settlement of overlying fill.
  - c. The **Ridge Zone** consists primarily of colluvium (slope wash) overlying deformed Franciscan Complex rocks exposed along Potrero-San Pablo Ridge. The boundary of the Ridge Zone is defined as those areas of Potrero-San Pablo Ridge above the 50-foot elevation contour.
  - d. The **Transition Zone** is defined as the area that separates the Flats Zone from the Ridge Zones. As described above, the Flats-Transition boundary is defined as the 5-foot Bay Mud isopach and the Ridge-Transition boundary is defined as the 50-foot elevation contour.

9. Chevron has subdivided the refinery into ten geographic sectors (see Figure 3). Each sector has unique hydrogeology and varying degrees of environmental concern. The sectors are as follows:
- Landfarms/Landfill 15
  - Castro/Plant 1/Additives
  - North Yard
  - Bayside Sector – North
  - Bayside Sector - South
  - Alkane Sector
  - Effluent
  - Reclamation
  - Pollard
  - Interior “C” Zone or Main Yard
10. Sector boundaries are generally defined by a physiographic boundary separating adjacent sectors, or by the refinery property line. The upgradient sector boundaries for the Alkane, North Yard, and Main Yard Sectors correspond to an inferred groundwater drainage divide, which is generally coincident with topographic drainage divides along San Pablo Ridge. The upgradient sector boundaries for the Landfarms/Landfills, Castro, and Reclamation Sectors are generally coincident with the Refinery property line. The Bayside Sectors (North and South) include all Chevron properties on the southwestern side of San Pablo Ridge and adjacent to San Francisco Bay. With the exception of the Bayside Sectors, all sites described in this Order are largely contained by the groundwater protection systems, which are described below.

### **Corrective Action**

11. All sectors have impacted soil and/or groundwater from historic releases and corrective action steps have been implemented. Some of the sectors contain Waste Management Units that are either in the Title 27 Corrective Action Monitoring Program or part of the refinery effluent system; these include the Alkane, Reclamation, North Yard, Effluent, and Landfarms/Landfill sectors. These sectors are regulated by Waste Discharge Requirements contained in Order No. R2-2011-0036. Corrective action occurring at sectors comprised of only impacted soil and/or groundwater from historic releases and not associated with Waste Management Units will be addressed in this Order; these include the Pollard, Castro/Plant 1 Additives, Bayside North, Bayside South and Interior C Zone sectors.
12. Chevron has implemented corrective actions to intercept contaminated groundwater at various locations and thus to prevent migration to San Pablo Bay. The corrective actions include systems comprised of varying combinations of slurry walls, extraction trenches and/or extraction wells for hydraulic control at different locations within the refinery. The systems comprised of slurry walls and/or extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and the Castro/Plant 1 sectors are referred to collectively as the Groundwater Protection Systems (GPS) (see Figure 4). The GPS establishes and maintains a contiguous capture zone which prevents migration of



potentially contaminated A-Zone groundwater past the GPS alignment. The slurry walls were installed where thick and/or highly permeable intervals of A-Zone fill soils are encountered. A low permeability bay mud "floor" inhibits transport of A-Zone contaminants to the underlying C-Zone in the "Flats Zone" of the Refinery (see Figure 13).

13. Approximately 24,700 feet of extraction trench, 18,535 feet of barrier wall, over 200 groundwater extraction sumps, and one groundwater treatment plant have been installed. The extracted groundwater is routed to the refinery's effluent treatment system and discharged in accordance with existing NPDES permit requirements. The GPS extraction trench and barrier wall are illustrated in Figure 13.
14. The Regional Water Board has determined that the GPS comprised of the slurry walls and extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and Castro/Plant 1 sectors is a satisfactory corrective action measure for the containment and removal of contaminated groundwater along the perimeter of the refinery. The corrective action at the Alkane, North Yard, Effluent, Landfarms/Landfill, and the Reclamation sectors are addressed by Waste Discharge Requirements contained in Order No. R2-2011-0036. Activities associated with the Castro/Plant 1 Additives, Pollard, Bayside North, Bayside South and Interior C Zone sectors will be addressed in this SCR. There is a single groundwater monitoring program for all sectors which is contained in both the WDRs and the SCRs.
15. The Refinery reports the following GPS performance by Sector, as of the beginning of 2011. All portions of the GPS are currently performing as intended:

Alkane: A continuous hydraulic depression, which indicates that contaminated groundwater is captured prior to offsite discharge, was present along the Alkane GPS, with an average flowrate of 30,000 gallons per day of groundwater.

Landfill 15: A continuous hydraulic depression was present along the Landfill 15 GPS, with an average flowrate of 36,400 gallons per day of groundwater.

Landfarms 2 (partial) and 5: A continuous hydraulic depression was present along the GPS alignments to the west of Landfarms 2 and 5, with an average flowrate of 16,600 gallons per day of groundwater extracted.

Landfarms 2 (partial) and 3 (partial): A continuous hydraulic depression was present along the GPS alignment north of Landfarms 2 and 3, with an average flowrate of 22,600 gallons per day of groundwater extracted.

North Yard: A continuous hydraulic depression was present along the North Yard GPS, with an average flowrate of 52,000 gallons per day of groundwater.

Landfarm 1: A continuous hydraulic depression was present along the GPS alignments downgradient of Landfarm 1, with an average flowrate of 50,100 gallons per day of groundwater extracted.

Castro and Plant 1 Additives: A continuous hydraulic depression was present along the southern alignment of the Castro GPS, with an average flowrate of 26,400 gallons per day of groundwater extracted.

Reclamation Yard: A hydraulic depression or drawdown was generally present, with an average flowrate of 67,200 gallons per day of groundwater extracted.

Pollard: An inward hydraulic gradient was present along the edge of the former Pollard Landfill, with an average flowrate of 1100 gallons per day of groundwater extracted.

### **Summary of Previous Cleanup Actions**

16. The following is a summary of corrective actions taken pursuant to previous Water Board orders. All of the following orders were rescinded and any remaining open items incorporated into this revised site-wide order.
17. 250-foot Channel: The channel was excavated between 1900 and 1920, and comprised the original ship channel for the refinery until the 1950's. The channel was then dammed and used as part of the effluent treatment system until 1987, and now serves to store stormwater and treated process water. In 2002, interim corrective actions were required by Order No. 00-043 for the petroleum hydrocarbon contaminated soil contained in the channel. These included installation of a HDPE barrier, fencing, bank steepening, vegetation control and removal of perching objects used by birds. They also included continued collection and removal of oil, and vegetation management and wildlife surveys, and lastly water elevation monitoring to assure that there is neither a vertical or lateral gradient allowing for the release of contaminated water to either groundwater outside of the GPS or the Bay. Ongoing monitoring performed in accordance with the *Corrective Action Plan for the 250-Foot Channel* (Chevron, 2002) indicates limited wildlife exposure. Additionally the "A" zone groundwater flow is fully contained by the GPS, and there is largely an upward flow into the Channel for the "C" Zone water.
18. Castro/Plant 1 Additives Plant: Between 1930 and 1970 the Plant 1 Additives Plant was used for pesticide formulating and packaging and the Additives Plant was used for gasoline additives manufacturing. As a result, soil is contaminated with pesticides, lead and petroleum hydrocarbons. Hazardous levels of chlordane, DDT and soluble lead have been detected in onsite soil. Corrective action completed pursuant to Order No. 91-046 included installation of an extraction system for containment of contaminated shallow groundwater (GPS), and covering the site with a combination of the Richmond Parkway, passing directly over a portion of the site, and placement of a geotextile and asphalt cap (or vegetated fill in some areas) over the non-roadway portions. The combined cover provides a low-permeability cap over the site and the encompassing groundwater extraction system prevents contaminated shallow groundwater from leaving the site. No further closure activities are necessary or required for the Plant 1/Additives Plant.

19. Pollard Pond and the Hydrolyzing Pits: The Toxic Pits Cleanup Act (TPCA) required the closure of hazardous waste surface impoundments in two areas of the refinery, with schedules provided in Order No. 91-098. The first impoundment, known as Pollard Pond, was a 3-acre surface impoundment located in the northwestern portion of the refinery (Figure 6) adjacent to San Pablo Bay that contained sludges with a pH less than 2 and Bay Mud dredge spoils from the refinery yacht harbor.

Closure activities included removal of all low-pH hazardous wastes, installation of a GPS groundwater extraction trench at the downgradient boundary of the pond, dismantling of Pollard Dam, and confirmation sampling of petroleum hydrocarbons soil from the bottom of the pond excavation. The remaining 30,000 cubic yards of non-hazardous hydrocarbon contaminated were removed from the site and placed in Landfill 15. Following the clean closure, groundwater in several wells continued to have low pH and elevated nickel and zinc. In November and December 2008, Chevron injected 263,000 gallons of calcium polysulfide into 18 boreholes in an attempt to neutralize remaining soil contamination. Measurable changes to the pH occurred during injection, however the effects were short-lived and groundwater conditions have returned to historic levels.

The second set of impoundments, known as the Hydrolyzing Pits (Hydropits), were three small unlined surface impoundments located on the shore of San Pablo Bay in the Alkane Sector (Figure 7) that received wastewater from the refinery's Alkane Plant until 1986. The most significant constituents of this waste stream were neutralized hydrofluoric acid, fluoride salts, and small amounts of oil containing benzene. Closure involved placing a multi-layer cap and installing the Alkane GPS along the northeastern perimeter of the Hydropits adjacent to Castro Cove. No further closure activities are necessary or required for the Hydropits.

20. Alkane Plant Plume Remediation: Corrective action was required by Order No. 92-092 for shallow groundwater plumes containing benzene, hydrofluoric acid and free-phase petroleum hydrocarbons, in addition to implementation of the GPS to hydraulically contain shallow contaminated groundwater. Chevron operates eight extraction wells to recover floating liquid hydrocarbons and contaminated groundwater. These extraction wells make up the Alkane Plant Groundwater Recovery System. Groundwater and liquid hydrocarbons recovered by the extraction wells are routed to the refinery's effluent treatment system and discharged in accordance with existing NPDES permit requirements.
21. Bayside South/S.P. Hill Tankfield: Corrective action required by Order No. 93-016 consists of the cleanup of contaminated groundwater and removal of free-phase liquid petroleum hydrocarbons under the S.P. Hill Tankfield. Free-phase petroleum hydrocarbons were discovered in 5 wells located in the central portion of the tankfield within a 250-foot radius of each other. Chevron has been recovering free product and some incidental groundwater from these wells since 1994. Free product recovery rates are generally less than one gallon per day. The primary cleanup objective is to recover as much free-phase hydrocarbon product as is technically feasible and cost-effective. Chevron also operates additional extraction wells in Basins 4 and 7 to create a hydraulic depression and capture dissolved petroleum hydrocarbon constituents in groundwater several hundred feet downgradient of the free product recovery system.

22. Bayside North/Point Orient Tankfield: In 1990 aboveground petroleum storage tanks in the Point Orient Tankfield were taken out of service, dismantled, and contaminated soils removed. There was no evidence of an accumulation of free-phase hydrocarbons on the water table along the perimeter of the tankfield, hydrocarbon-contaminated soil was observed beneath the former tanks. Chevron submitted a hydrogeologic investigation for this tankfield on June 23, 1992 which determined that minor soil and groundwater contamination exists at the No.10 Basin. Groundwater monitoring in this area is ongoing.
23. Salt Water Pump Station: In 1998, hydrocarbon sheen was observed on the Bay near the intake of the former Salt Water Pump Station. The source is believed to be from historic pipeline leaks from an adjacent pipeway. In 1999, a soil bentonite barrier was built and two monitoring wells were installed. Chevron continues visual inspections of the shoreline and monitors the two wells for free product as part of the attached monitoring program. Minor amounts of free product are occasionally observed in these wells.

## **MONITORING PROGRAMS**

24. To record the compliance of the corrective actions described above, Chevron is required to implement the attached monitoring program described in these Site Cleanup Requirements.
25. Pursuant to a plan approved by the Regional Board in 2002, Chevron performs a statistical evaluation and trend analysis of groundwater well monitoring results, to establish concentration trends and note the overall effectiveness of the remedial actions at the Refinery.
26. Chevron also reports on groundwater elevations, flow patterns and velocities, hydrocarbon thicknesses and recovery, and closure unit monitoring, inspection and maintenance activities as part of their monitoring program.

## **BASIN PLAN**

27. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board, Office of Administrative Law and the U.S. EPA, where required.
28. State Board Resolution No. 68-16: State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background shall be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated

beneficial uses of such water, and not result in exceedance of applicable water quality objectives.

29. State Board Resolution No. 92-49: State Water Resources Control Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under California Water Code Section 13304," establishes policies and procedures to be used by the Board when:

- Determining when a person is required to investigate, cleanup, or abate a discharge;
- Concurring with a discharger's selection of cost-effective investigation and remedial measures;
- Overseeing implementation of investigation and remedial measures; and
- Determining schedules for investigation and remedial measures.

30. Board Resolution No. 89-39: The Basin Plan provides that all groundwaters are considered suitable, or potentially suitable, for municipal or domestic water supply (MUN) and that, in making any exceptions, the Board will consider the criteria referenced in Regional Board Resolution No. 89-39, "Sources of Drinking Water", where:

- i) The total dissolved solids exceed 3,000 mg/l (5,000  $\mu$ S/cm, electrical conductivity), and it is not reasonably expected by the Board that the groundwater could supply a public water system, or
- ii) There is contamination, either by natural processes or human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using best management practices or best economically achievable treatment practices, or
- iii) The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

31. Basis for California Water Code Section 13304 Order: The Discharger has caused or permitted, causes or permits, or threatens to cause or permit waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of contamination or nuisance.

## **BENEFICIAL USES**

32. Shallow groundwater beneath the "Flats Zone" which comprises the flatland marsh area bounded by the San Pablo Bay to the north and extending south along the northeast side of the Potrero-San Pablo Ridge has Total Dissolved Solids (TDS) that is significantly higher than the 3000 mg/l (5000  $\mu$ S/cm electrical conductivity) level which the Board (Regional Board Resolution No. 89-39)) set as a maximum for a municipal or domestic water supply in the Sources of Drinking Water Policy. There is no historical, existing or planned use of groundwater as a source of drinking water in either the shallow (A- and C-Zone) or deeper (B-Zone) aquifers in this part of the refinery.

Groundwater beneath the "Ridge Zone," which is bounded on the south by San Francisco Bay and extends northwest up to the top of the Potrero-San Pablo Ridge (Bayside sectors), is primarily contained in fractured bedrock of the Franciscan Complex. Based on hydraulic conductivity data collected during hydrogeologic investigations of the tankfields in the Bayside North and Bayside South sectors, it is unlikely that a single well could produce an average sustained yield of 200 gallons per day for drinking water supply purposes (State Board Resolution No. 88-63, exemption criterion 1(c) and Regional Board Resolution No. 89-39). There is no historical, existing or planned use of unconfined groundwater as a source of drinking water in this part of the refinery.

There is the potential, however, for groundwater on either side of the Potrero-San Pablo Ridge to discharge into San Francisco and San Pablo Bays at the shoreline groundwater/surface water interface. Therefore, the surface water beneficial uses named in the Basin Plan for these bodies of water are applicable to groundwater in point-of compliance monitoring wells near the shoreline interface.

33. The existing and potential beneficial uses of groundwater underlying the site which is not contained in bedrock and is greater than 100 feet below ground surface are:
  - a. Industrial process and service supply
  - b. Agricultural water supply
  - c. Municipal and domestic supply  
(however due to the proximity of the Bay, groundwater at the site contains elevated TDS levels, which render the groundwater nonpotable).
  
34. The existing and potential beneficial uses of San Francisco and San Pablo Bays are:
  - a. Ocean, commercial, and sport fishing;
  - b. Shellfish harvesting;
  - c. Estuarine habitat;
  - d. Fish migration;
  - e. Preservation of rare and endangered species;
  - f. Fish spawning;
  - g. Wildlife habitat;
  - h. Water contact recreation;
  - i. Non-contact water recreation;
  - j. Industrial service supply;
  - k. Industrial process supply; and
  - l. Navigation.

## **CALIFORNIA ENVIRONMENTAL QUALITY ACT**

35. This site has previously been subject to cleanup requirements under Regional Water Board Order Nos.93-016, 92-092, and 90-146. This Order only requires that the requirements first imposed by these previous orders be continued. Continuing activities previously imposed does not have the potential for significant impacts on the environment. As such, the general rule that the California Environmental Quality Act (“CEQA) only applies to projects which have the potential for causing a significant effect on the environment (the “common sense” exemption) applies and no environmental document needs to be prepared in connection with the adoption of this Order. [Cal. Code Regs., tit. 14, § 15061(b)(3)]. Furthermore, this Order does not approve any specific cleanup plan beyond those already imposed by the previous orders, and it is generally the first imposition of a cleanup plan that might result in impacts to the environment. This further supports the application of the “common sense” exemption for adoption of this Order. When a specific cleanup proposal is submitted to the Assistant Executive Officer for approval, such proposal must and will be evaluated under CEQA prior to approval.

## **NOTICE AND MEETING**

36. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to amend the Waste Discharge Requirements, and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
37. The Board, at a public meeting, heard and considered all comments pertaining to this issuance of Site Cleanup Requirements.

**IT IS HEREBY ORDERED**, pursuant to Section 13304 of the California Water Code, that the Discharger (or its agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

## **PROHIBITIONS**

1. The discharge of wastes or hazardous substances in a manner that will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.
2. Migration of pollutants through subsurface transport to waters of the State outside of the GPS is prohibited.
3. There shall be no discharge of wastes or hazardous substances to surface waters except as permitted under NPDES Permit R2-2011-0049.
4. Activities associated with the subsurface investigation and cleanup that will cause significant adverse migration of wastes or hazardous substances are prohibited.
5. The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in California Water Code Section 13050(m).
6. The Discharger shall not cause the following conditions to exist in waters of the State at any place outside of the GPS:
  - a. Surface Waters
    - i. Floating, suspended, or deposited macroscopic particulate matter or foam;
    - ii. Bottom deposits or aquatic growth;
    - iii. Adversely altered temperature, turbidity, or apparent color beyond natural background levels;
    - iv. Visible, floating, suspended or deposited oil or other products of petroleum origin; or
    - v. Toxic or other deleterious substances to be present in concentrations or quantities which may cause deleterious effects on aquatic biota, wildlife or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.
  - b. Groundwater
    - i. Further degradation of groundwater quality and/or substantial worsening of existing groundwater impacts;
    - ii. Subsurface migration of pollutants associated with Chevron's operations to Waters of the State is prohibited.

## **TASKS**

**ALL REQUIRED SUBMITTALS MUST BE ACCEPTABLE TO THE EXECUTIVE OFFICER (SEE PROVISION NO. 1 COMPLIANCE)**

## **GPS Requirements**



1. Chevron shall continue to extract water from the Groundwater Protection System (GPS) at a rate which eliminates or reverses the bayward migration of contaminants in the uppermost water bearing zone (the "A" zone). Chevron shall also operate the GPS so as to prevent significant threats to the second water bearing zone (the "C" zone). Chevron shall install, if practicable, a physical barrier downgradient of any extraction well(s) or extraction trenches that are producing Bay water at volumes deemed to be unacceptable by the Executive Officer.

COMPLIANCE DATE: Immediately.

### **Hydraulic Containment**

2. Chevron shall continue to monitor the "A Zone" for contaminants on the downgradient side of the GPS trench/barrier and groundwater levels on both sides of the GPS trench/barrier for the primary purpose of evaluating the effectiveness of the GPS. Chevron shall demonstrate compliance with Task 1 above by submitting, pursuant to the Self-Monitoring and Reporting Program of WDR Order R2-2011-0036 attached to this Order, potentiometric water elevation contour maps which graphically demonstrate maintenance of an inward hydraulic gradient into the GPS.

COMPLIANCE DATE: Immediately.

3. Chevron shall continue to operate the GPS as a corrective action measure for remediation of groundwater contamination along the San Pablo Bay side of the Refinery for at least one year after compliance has been achieved with the Maximum Allowable Concentration Limits established by this Order before any reduction or termination of groundwater extraction will be considered.

COMPLIANCE DATE: Immediately, for at least one year after full compliance with the relevant MACLS.

4. If it is determined by the Executive Officer, based on groundwater monitoring information, that water quality impairment downgradient of the GPS is not improving, or continues to degrade, Chevron will be required to submit additional site- specific groundwater corrective action proposals.

COMPLIANCE DATE: Six months after notification from the Executive Officer.

5. Components of the GPS Engineering Report pertaining to operation of the system may be amended as appropriate to incorporate changes in technology that will improve operational efficiency. All proposed changes shall be submitted in writing to the Executive Officer for review and approval.

COMPLIANCE DATE: As needed.

### **Alkane Plant Plume Remediation**

6. Chevron shall continue extracting free-phase hydrocarbons and to remediate dissolved benzene in groundwater from the central portion of the Alkane Plant plume area such that contaminants do not migrate further from the source. The contaminant extraction shall be performed until the cleanup levels outlined in the *Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001), are achieved and it is demonstrated that further recovery and remediation are no longer technically feasible or cost-effective and that termination of the program will not allow further subsurface migration of either free-phase or dissolved constituent plumes or any other adverse impacts to groundwater or surface water quality.

COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

### **S.P. Hill Tankfield Groundwater Cleanup Requirements**

7. Chevron shall continue to operate the S.P. Hill Hydrocarbon Recovery System as provided by the *S.P. Hill Tankfield FPLH Recovery Facilities Installation and Startup Report and Remediation Monitoring Plan* (Chevron Products Company, 1994). An operational change to the S.P. Hill FPLH Recovery System was presented in a letter to the Regional Water Board dated July 8, 2009. Chevron will continue to operate the Recovery System until it receives written approval from the Executive Officer to cease operations. To be eligible for this approval, Chevron must submit a written request that includes adequate supporting documentation demonstrating that free-phase liquid hydrocarbon recovery is no longer technically feasible and cost-effective in this part of the refinery.

COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

8. Chevron shall continue to operate the S.P. Hill Groundwater Recovery Systems in Basins 4 and 7 until it receives written approval from the Executive Officer to cease operations. To be eligible for this approval Chevron must submit a written request certifying that the Maximum Allowable Concentration Limits (MACLs) for the Bayside Sector - South have not been exceeded in any groundwater monitoring wells sampled per the attached Self-Monitoring Program for at least four consecutive reporting periods.

COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

### **Salt Water Pump Station Monitoring Program**

9. Chevron shall continue the monitoring and inspection program for the Salt Water Pump Station Area as outlined in the *No. 3 Salt Water Pump Station Monitoring Program* (Chevron Products Company, 1998).

COMPLIANCE DATE: Immediately.

### **Corrective Action Work Plan 250-foot Channel**

10. Chevron shall continue to implement the plan, dated November 2002, for interim corrective action measures for petroleum hydrocarbon contaminated sediment in the 250 Foot Channel site. The plan evaluated risks to potential human and ecological receptors at this site and included corrective action alternatives designed to minimize any identified risks.

COMPLIANCE DATE: Immediately.

### **Free-Phase Liquid Petroleum Hydrocarbon (FPLH) Recovery**

11. Chevron shall continue to perform recovery activities, as needed, to remove FPLH from beneath the refinery if they are found in significant and recoverable quantities during routine groundwater well monitoring, in accordance with the *Free Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan* (Chevron USA, 2000). The GPS, where present, is designed to function as a groundwater containment system that captures and prevents offsite migration of dissolved constituents; it is not intended to perform FPLH source control. FPLH recovery may be necessary to reduce the source for dissolved constituents that are introduced via the free-phase.

COMPLIANCE DATE: Immediately.

### **Spill Reporting and Documentation of Cleanup**

12. Chevron shall notify this Board of any reportable quantity (42 gallons or more) of petroleum as defined in Health & Safety Code Chapter 6.67 *Above Ground Storage of Petroleum* that is either spilled or leaked to any unlined ground surface (any surface not protected by a barrier which is impermeable to petroleum products or other constituents which may cause adverse water quality impacts). Verbal notification shall be within one working day of knowledge of the spill and shall be followed by a written description to include the nature, location and volume of the spill, and the total area and/or soil volume affected. In addition, the written report shall include a map which identifies the location of the spill and photographic documentation of the spill area before and after cleanup.

COMPLIANCE DATE: One day for verbal notification, five for written.

### **Update Groundwater Self-Monitoring Program**

13. Following implementation of each task described above, the Discharger shall review WDR Order No. R2-2011-0036 Self-Monitoring Program and propose any necessary updates to incorporate new groundwater monitoring wells, extraction systems, and/or sampling parameters. All sampling protocols and reporting requirements shall be consistent with those described in WDR Order No. R2-2011-0036 (see Attachment A).

COMPLIANCE DATE: As needed.

14. Revision of the Self-Monitoring Program: The Discharger shall submit a plan for the revision of the monitoring locations, parameters, frequency and MACLs contained within the

Self-Monitoring Program (SMP) attached to this Order (Part B). This plan is to be immediately upon Executive Officer approval.

COMPLIANCE DATE: December 15, 2011.

### **Pollard Pond Corrective Action**

15. Pollard Pond Remedial Action Plan: The Discharger shall submit a plan, acceptable to the Executive Officer, proposing remedial plans to meet all MACLs at the point of compliance for the Pollard Pond.

COMPLIANCE DATE: May 31, 2012

### **PROVISIONS**

1. Compliance: The Discharger shall comply immediately, or as prescribed by the time schedule below, with all Prohibitions, Specifications, and Provisions of this Order. All required submittals must be acceptable to the Executive Officer. The Discharger must also comply with all conditions of these Site Cleanup Requirements. Violations may result in enforcement actions, including Water Board Orders or court Orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of this Order by the Board. [CWC Section 13261, 13262, 13265, 13267, 13268, 13300, 13300, 13301, 13304, 13350].
2. Authority to Request Technical Reports: All technical and monitoring reports required by this Order are requested pursuant to Section 13267 of the CWC. Failure to submit reports in accordance with schedules established by this Order or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer may subject the Discharger to enforcement action pursuant to Section 13268 of the CWC.
3. All reports submitted pursuant to this Order shall be prepared under the supervision of and signed by a California registered civil engineer, registered geologist, and/or certified engineering geologist
4. At any time, the Discharger may file a written request (including supporting documentation) with the Executive Officer, proposing modifications to the attached SMP. If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval that incorporates the proposed revisions into the SMP.

5. Modifications to Remedial Action Plan: The Discharger shall notify the Executive Officer at least 60 days prior to proposed major modifications to any approved Remedial Action Plan, Implementation Schedule, or remediation system. The notification shall include the rationale for any proposed modification.
6. Delayed Compliance: If the Discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the required Tasks, the Discharger shall promptly notify the Executive Officer of the delay and reason for the delay and the Board may consider revisions to this Order.
7. Operation and Maintenance (O&M): 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 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. [CWC Section 13263(f)]
8. Availability: A copy of these site cleanup requirements shall be maintained by the Discharger and shall be made available by the Discharger to all employees or contractors performing work necessary to comply with the Tasks set forth in this Order. [CWC Section 13263]
9. Change in Ownership: In the event of any change in control or ownership of the facility presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to the Board upon a final change in ownership.

To assume operation of this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of this Order within 30 days of the change of ownership. The request must contain the requesting entity's full legal name, mailing address, electronic address, and telephone number of the persons responsible for contact with the Board. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. [CWC Sections 13267 and 13263]

Due Date: 30 days after a change in facility control or ownership

10. Stormwater: The Discharger shall comply with the site's NPDES permit (Order No. R2-2011-0049) for the management, monitoring and discharge of stormwater and wastewater effluent.
11. Reporting of Hazardous Substance Release: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it probably will be discharged in or on any waters of the State, the Discharger shall:
  - a. Report such discharge to the following:

- i. The Water Board by calling (510) 622-2300 during regular office hours (Monday through Friday, 8 a.m. – 5 p.m.); and to
  - ii. The California Emergency Management Agency at (800) 852-7550.
- b. A written report shall be filed with the Water Board within five working days. The report shall describe:
  - i. The nature of the waste or pollutant.
  - ii. The estimated quantity involved.
  - iii. The duration of the incident.
  - iv. The cause of the release.
  - v. The estimated size of the affected area, and nature of the effect.
  - vi. The corrective actions taken or planned and a schedule of those measures.
  - vii. The persons/agencies notified.

This reporting is in addition to reporting to the California Emergency Management Agency that is required pursuant to the Health and Safety Code.

12. Contractor/Consultant Qualifications: All technical documents shall be signed by and stamped with the seal of a California professional geologist, a California certified professional geologist or hydrogeologist, or a California registered civil engineer.
13. Lab Qualifications: All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g., temperature).
14. Document Distribution: Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following entities:
  - a) The Board, and
  - b) The Department of Toxic Substances Control.The Executive Officer may modify this distribution list as needed.

15. Submittal Revisions: Where a Discharger becomes aware that it failed to submit any relevant facts in a report or submitted incorrect information in any report to the Board, it shall promptly submit such facts or information. [CWC Sections 13260 and 13267]
16. Severability: Provisions of these site cleanup requirements are severable. If any provisions of these requirements are found invalid, the remainder of these requirements shall not be affected. [CWC 9213]
17. Geotracker Requirements: The State Board has adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:  
[http://www.waterboards.ca.gov/water\\_issues/programs/ust/electronic\\_submittal/index.shtml](http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml)  
Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit over the internet, the following information electronically to Geotracker:
  - a. Groundwater analytical data;
  - b. Surveyed locations of monitoring wells;
  - c. Boring logs describing monitoring well construction; and
  - d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. Individual Regional Water Boards may require direct submittal of electronic reports and correspondence in addition to the State Board's Geotracker requirements.

18. Entry and Inspection: The Discharger shall allow the Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:
  - a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
  - b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
  - c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
  - d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the CWC, any substances or parameters at any location. [CWC Section 13267]

19. Maintenance of Records: The Discharger shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer. Records of monitoring information shall include:
- The date, exact place, and time of sampling or measurements;
  - The individuals who performed the sampling or measurements;
  - The date(s) analyses were performed;
  - The individuals who performed the analyses;
  - The analytical techniques or method used; and
  - The results of such analyses.

20. Report Certification: All application reports or information to be submitted to the Executive Officer shall be signed and certified as follows:

- For a corporation – by a principal Executive Officer or the level of vice president.
- For a partnership or sole proprietorship – by a general partner or the proprietor, respectively.
- For a municipality, state, federal, or other public agency – by either a principal Executive Officer or ranking elected official.

A duly authorized representative of a person designated in this provision may sign documents if all of the following are met:

- The authorization is made in writing by a person described in paragraph (a) of this provision;
- The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity; and
- The written authorization is submitted to the Executive Officer.

Any person signing a document under this Section shall make the following certification:

“I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.” [CWC Sections 13263, 13267, and 13268]

21. Cost Recovery: The Discharger (as applicable) shall be liable, pursuant to California Water Code Section 13304 and Health and Safety Code Section 25270.9 to the Board for all reasonable costs actually incurred by the 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. If the Site addressed by this Order is enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by



the Discharger (as applicable) over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.

22. Periodic Site Cleanup Requirements (SCR) Order Review: The Board will review this Order periodically and may revise it when necessary. The Discharger (as applicable) may request revisions and upon review the Executive Officer may recommend that the Board revise these requirements.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on .

---

Bruce H. Wolfe  
Executive Officer

=====

**FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY  
SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO:  
IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE  
SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR  
INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY**

=====

Attachments:

Figures:

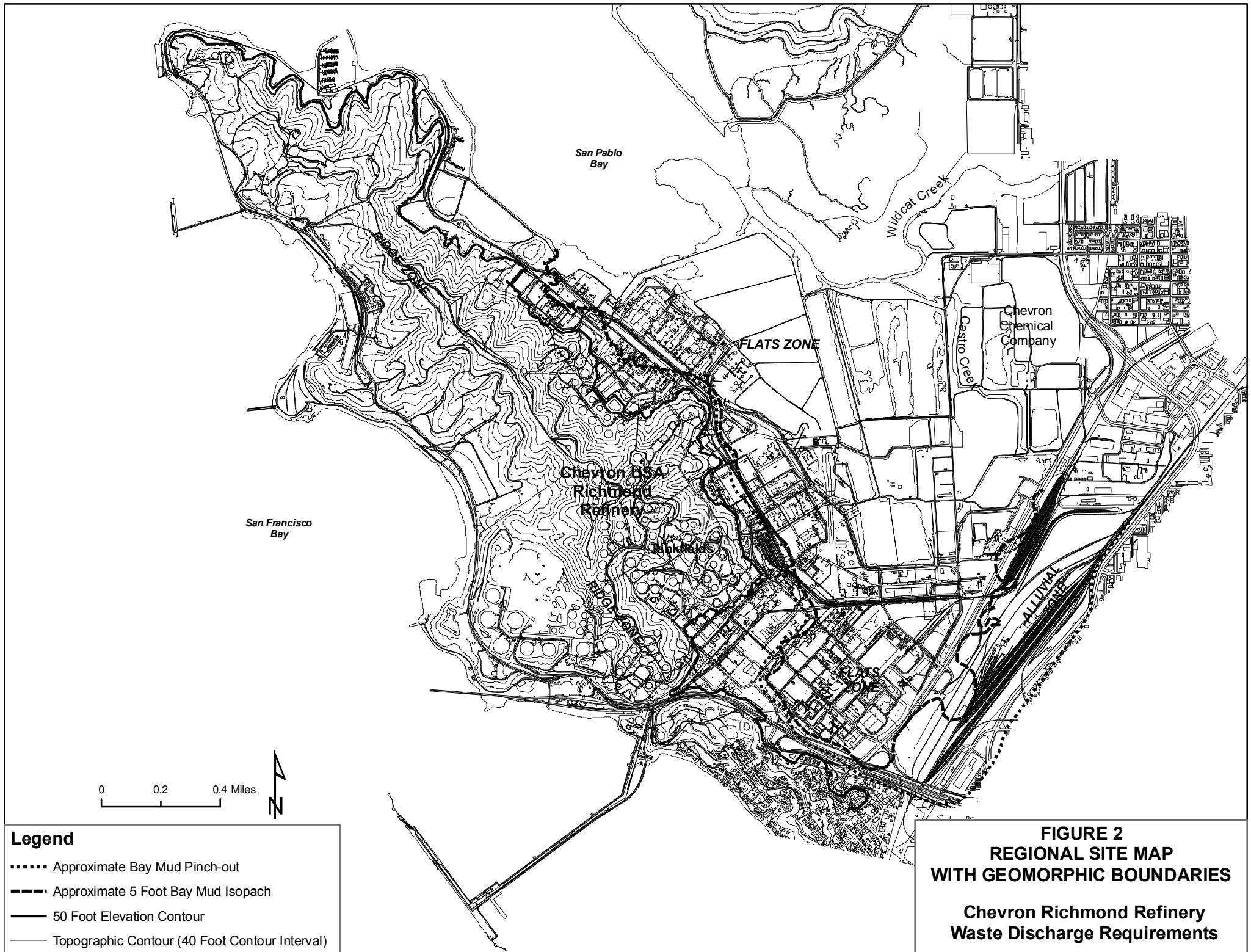
- Figure 1 - Location Map
- Figure 2 - Regional Site Map with Geomorphic Boundaries
- Figure 3 - Sector Boundaries
- Figure 4 - Groundwater Protection System Location Map
- Figure 5 - Plant 1 / Additives Plant Cap
- Figure 6 - Pollard Sector
- Figure 7 - Alkane Sector
- Figure 8 - Landfarm/Landfill Sector
- Figure 9 - Bayside Sector
- Figure 10 - Effluent Sector
- Figure 11 - Reclamation Sector
- Figure 12 - North Yard Sector
- Figure 13 - Groundwater Protection System

Attachment: Self-Monitoring and Reporting Program, WDR Order R2-2011-0036



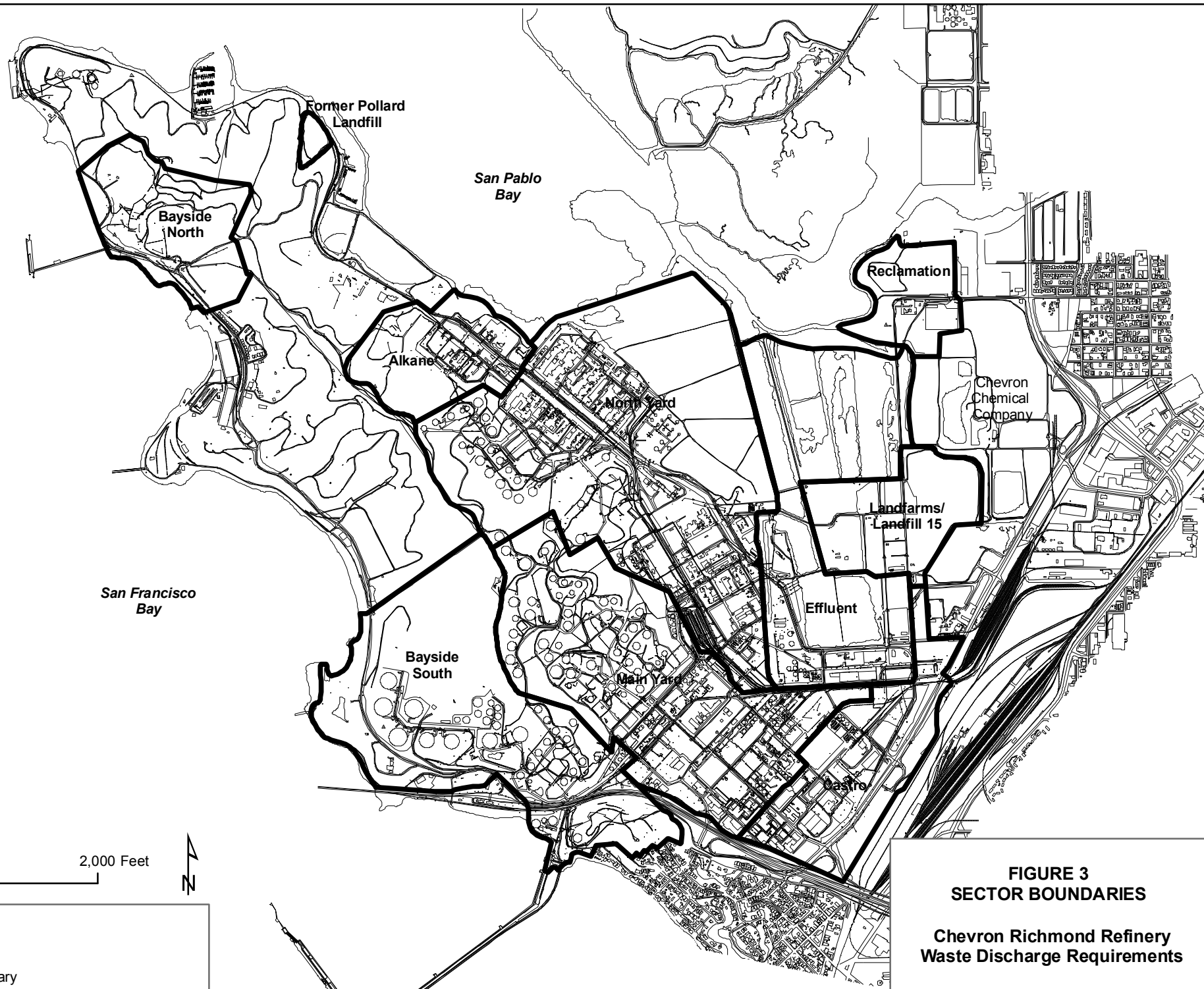
**FIGURE 1  
LOCATION MAP**

**Chevron Richmond Refinery  
Waste Discharge Requirements**




**FIGURE 2  
REGIONAL SITE MAP  
WITH GEOMORPHIC BOUNDARIES**

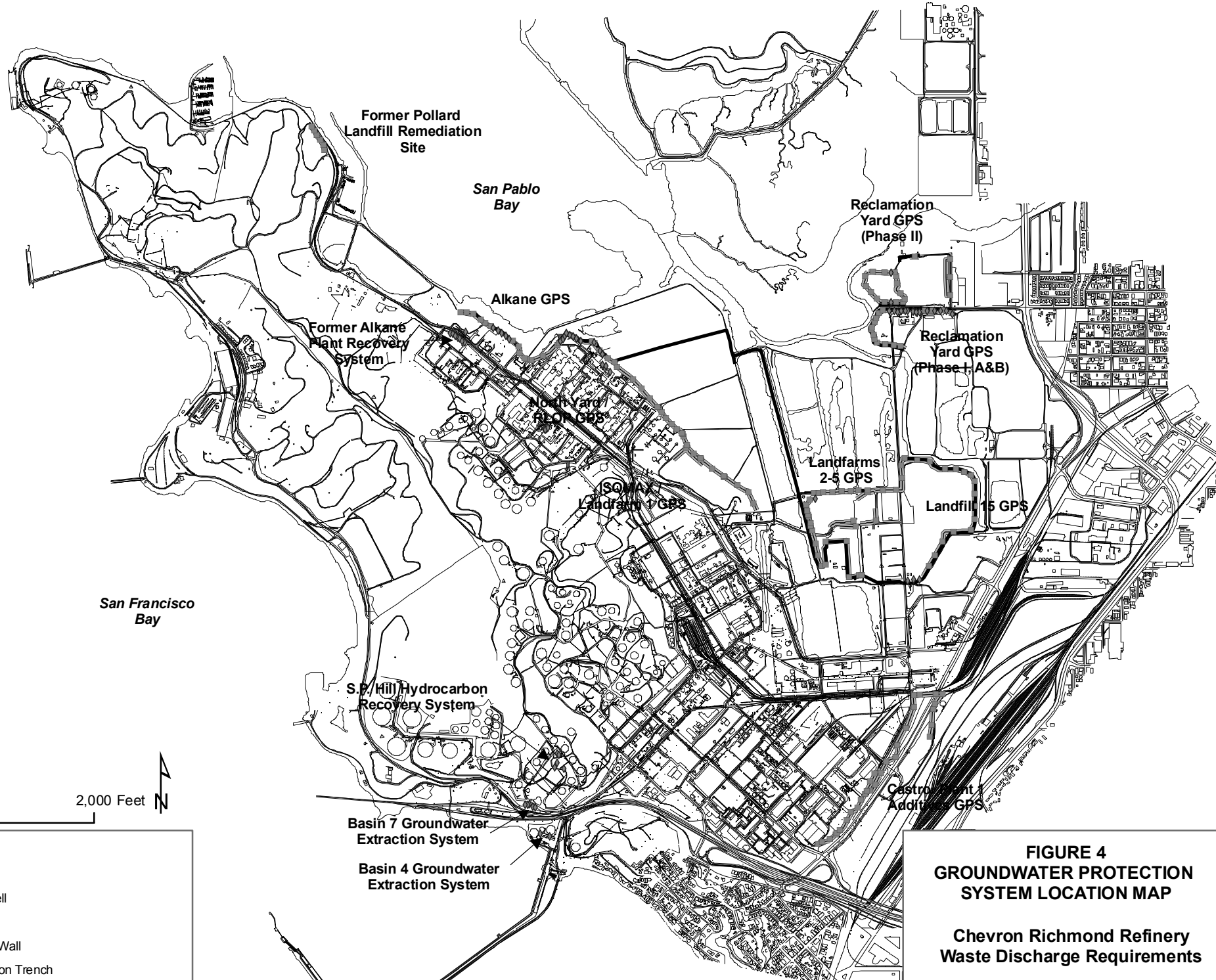
**Chevron Richmond Refinery  
Waste Discharge Requirements**



**FIGURE 3  
SECTOR BOUNDARIES**

**Chevron Richmond Refinery  
Waste Discharge Requirements**

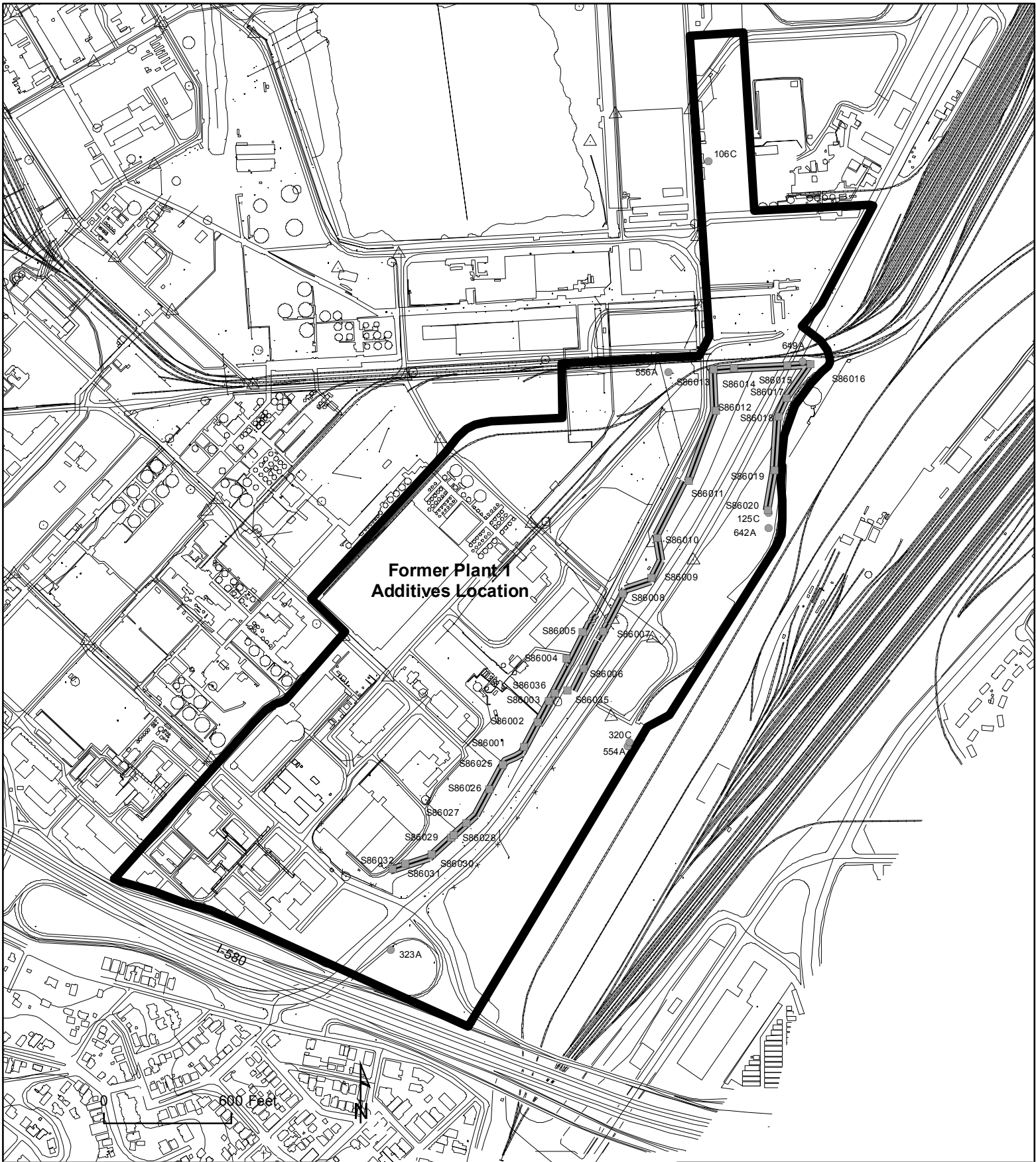
**Legend**  
 Sector Boundary



**FIGURE 4  
GROUNDWATER PROTECTION  
SYSTEM LOCATION MAP**

**Chevron Richmond Refinery  
Waste Discharge Requirements**

- Legend**
- ◆ Recovery Well
  - GPS Sump
  - GPS Barrier Wall
  - == GPS Extraction Trench

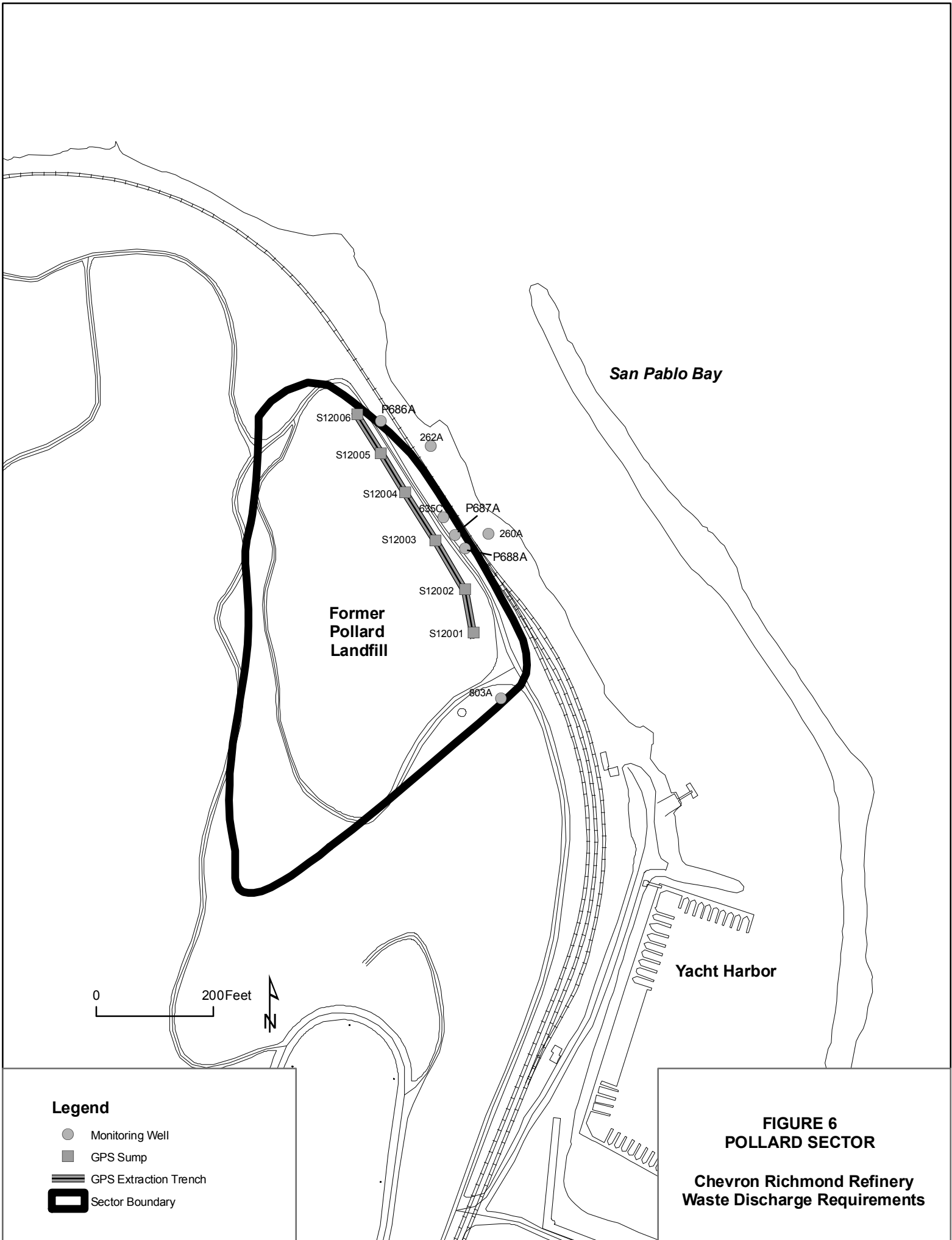


**Legend**

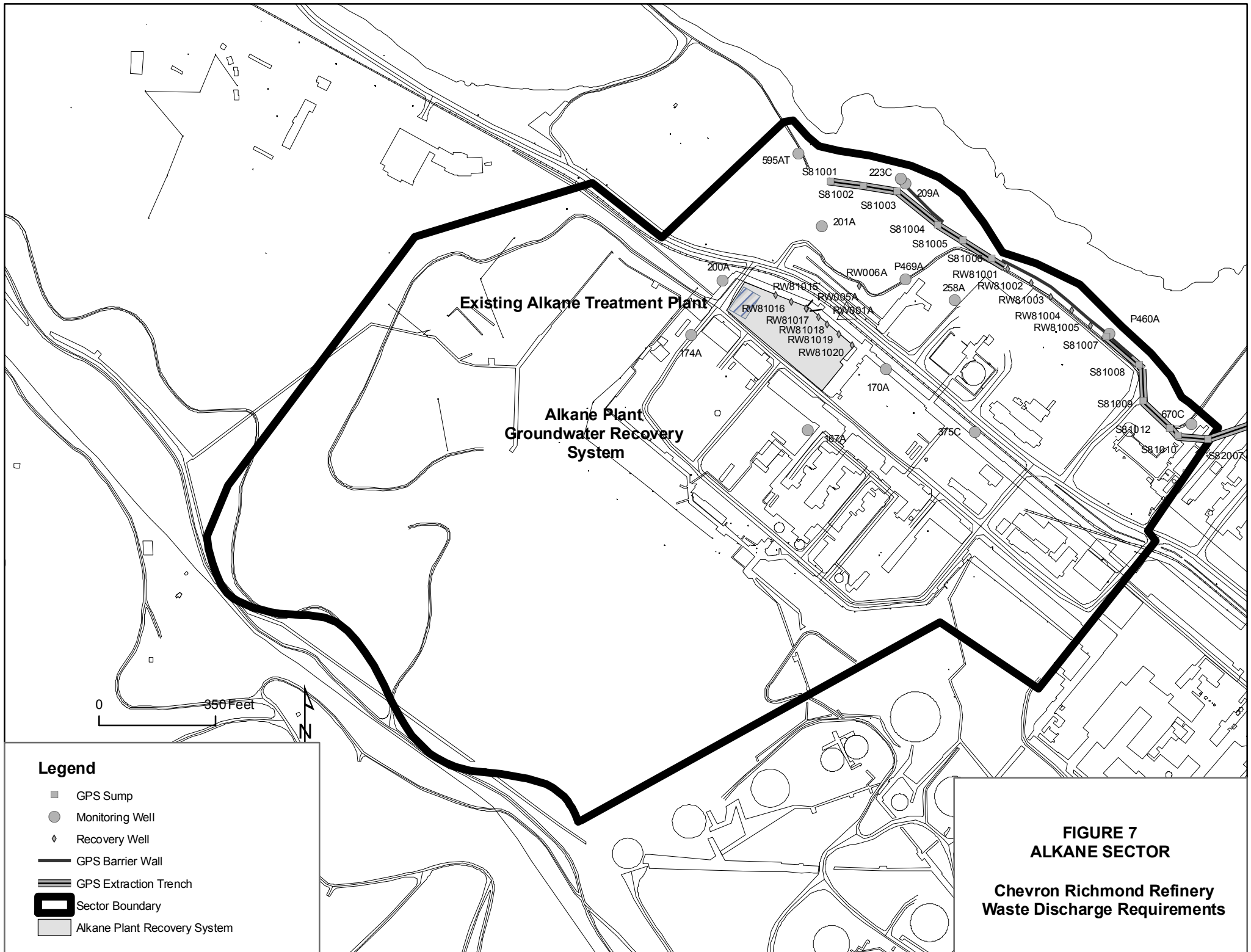
- GPS Sump
- Monitoring Well
- ▬ GPS Extraction Trench
- ▭ Sector Boundary

**FIGURE 5  
PLANT 1 / ADDITIVES PLANT CAP**

**Chevron Richmond Refinery  
Waste Discharge Requirements**



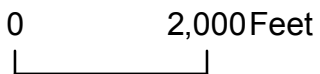
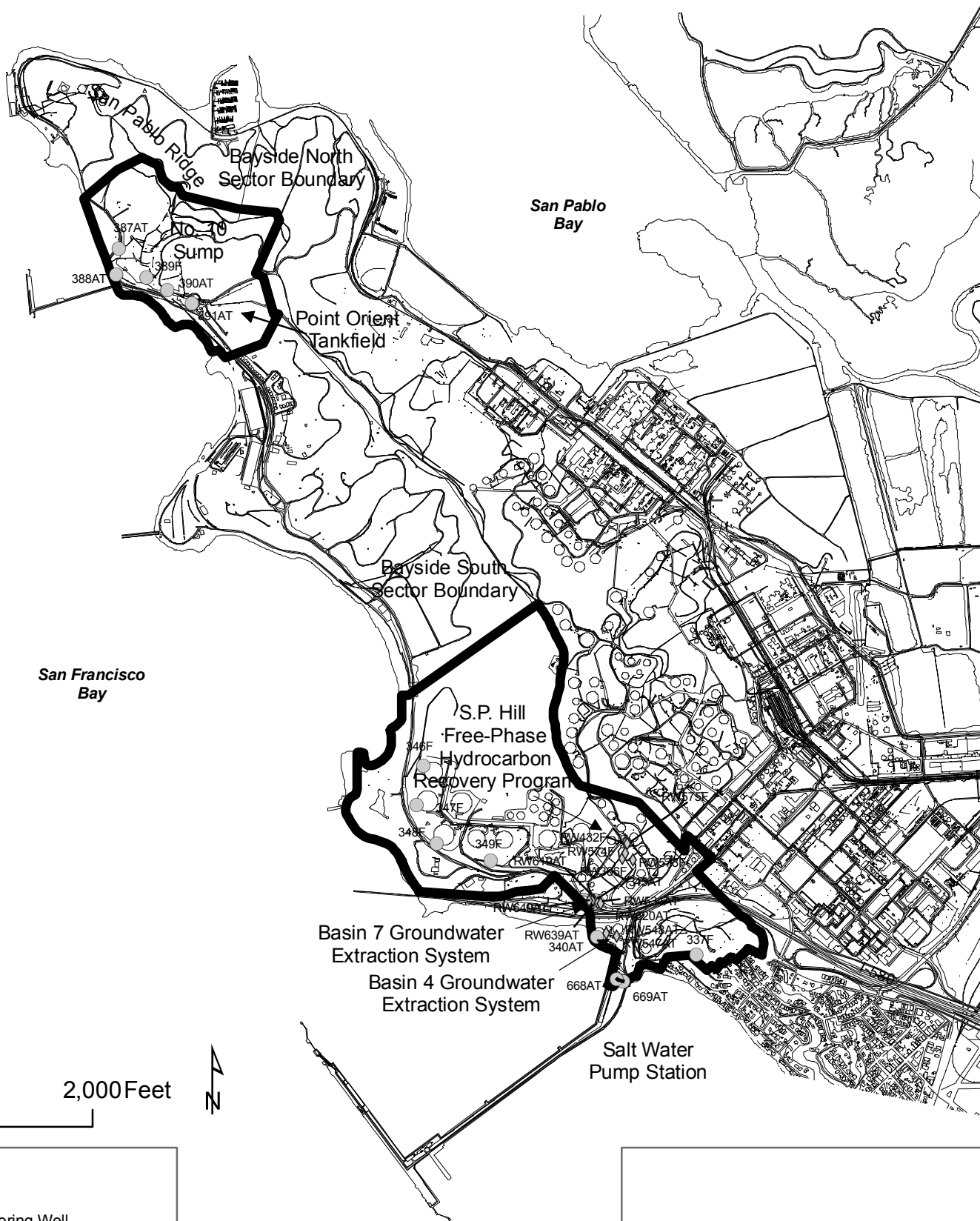




**FIGURE 7  
ALKANE SECTOR**

**Chevron Richmond Refinery  
Waste Discharge Requirements**



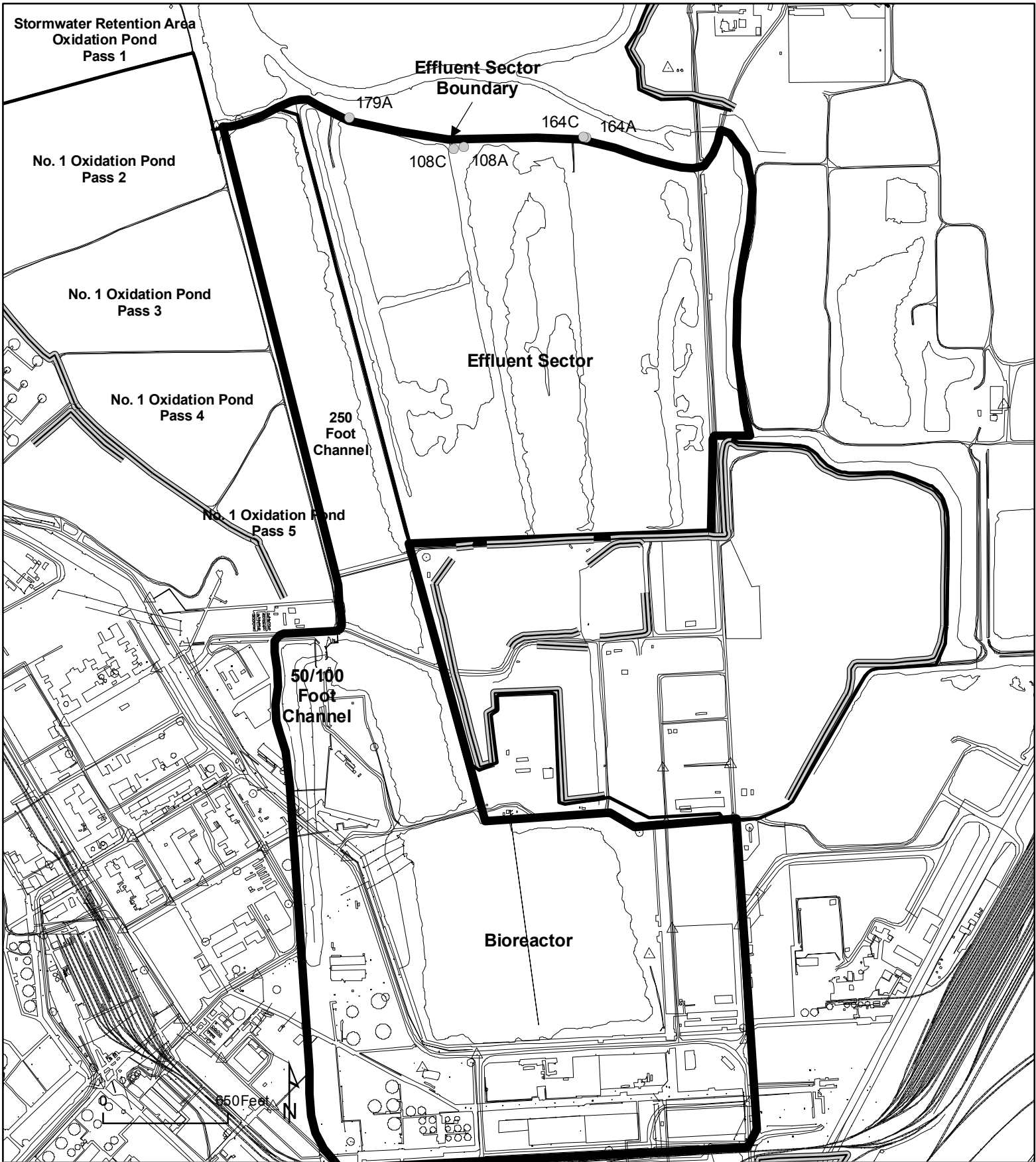


**Legend**

- Monitoring Well
- ◇ Bayside Recovery Well
- GPS Barrier Wall
- ▭ Sector Boundary

**FIGURE 9  
BAYSIDE SECTOR**

**Chevron Richmond Refinery  
Waste Discharge Requirements**

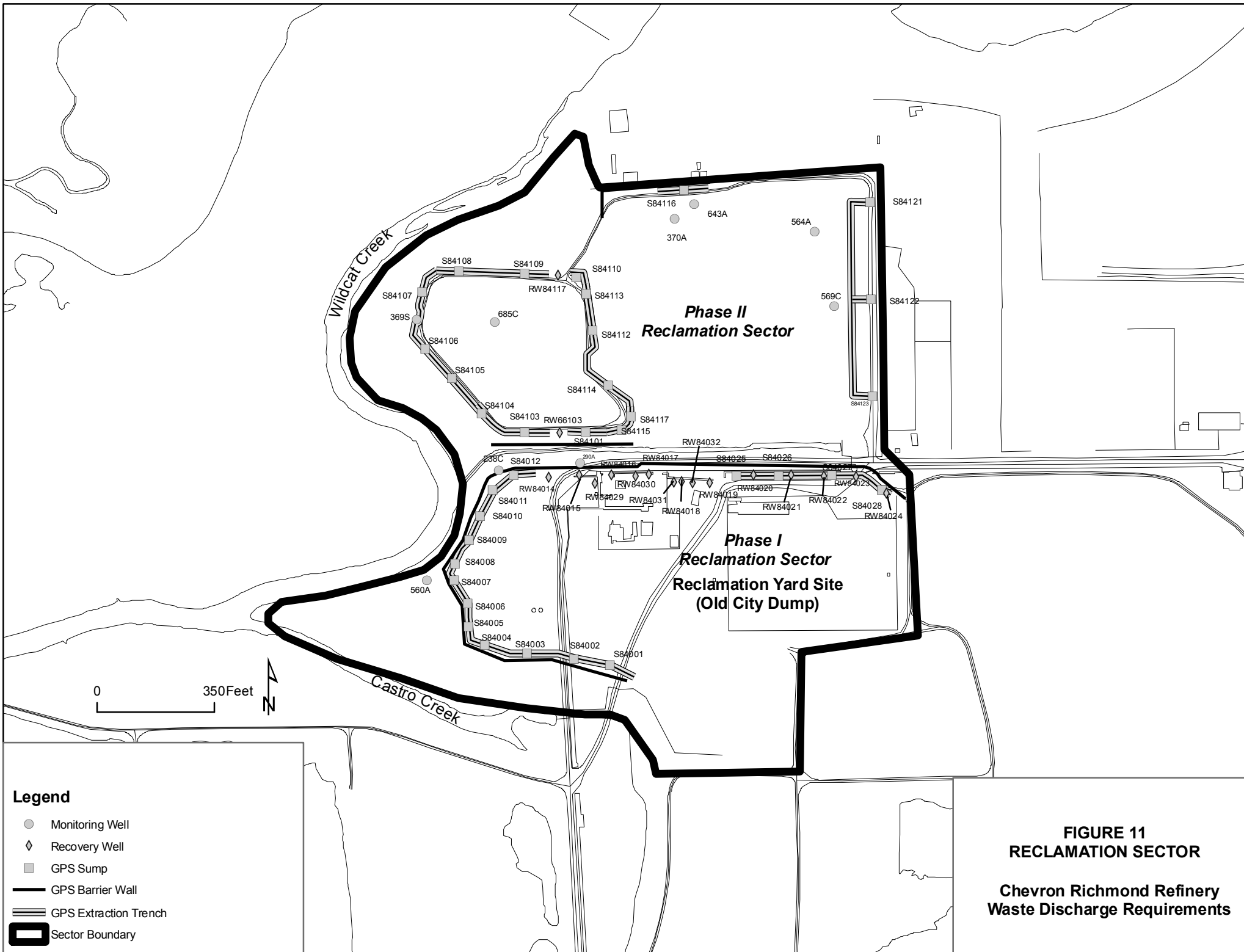


**Legend**

- Monitoring Well
- GPS Barrier Wall
- ≡ GPS Extraction Trench
- ▭ Sector Boundary

**FIGURE 10  
EFFLUENT SECTOR**

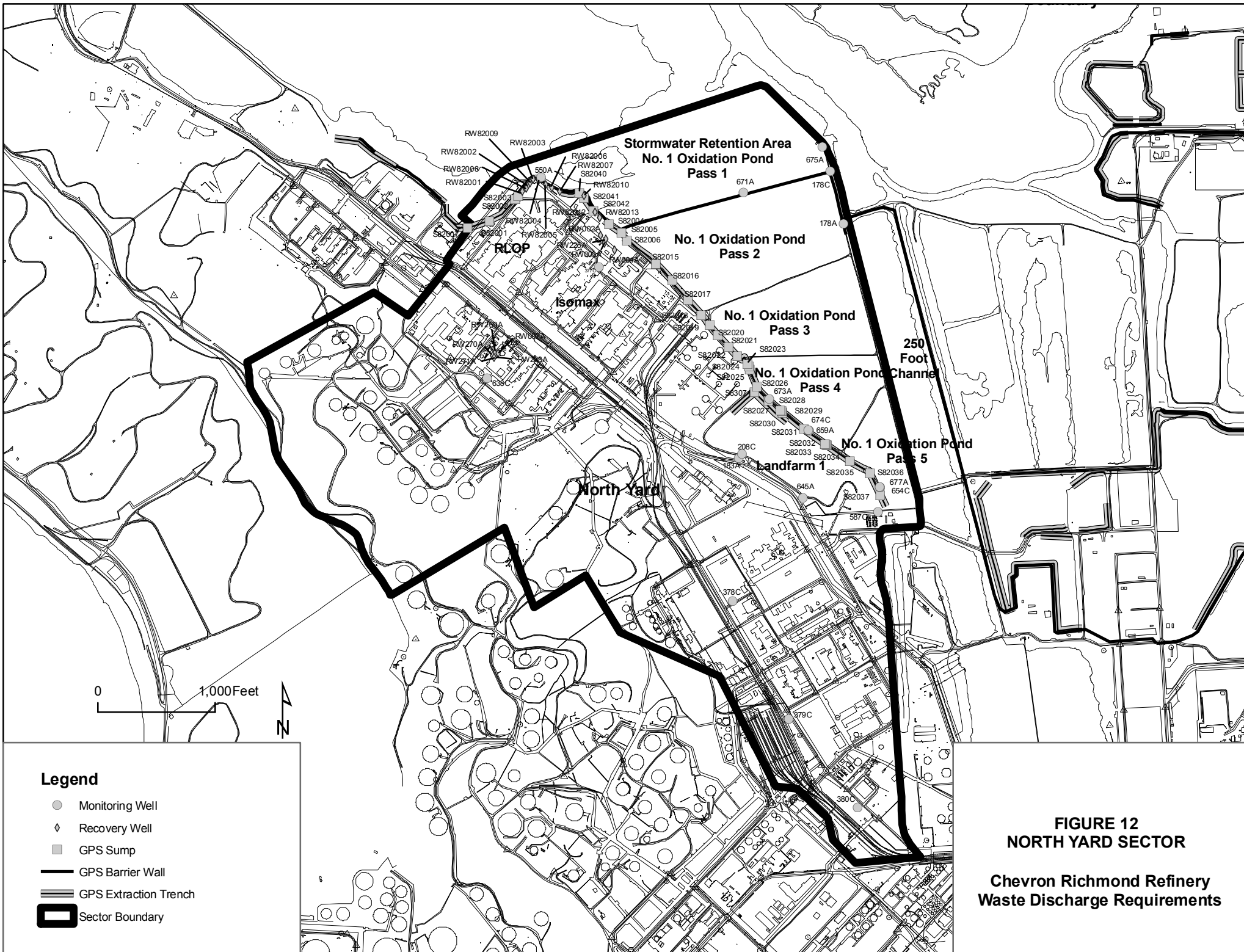
**Chevron Richmond Refinery  
Waste Discharge Requirements**



**Legend**

- Monitoring Well
- ◇ Recovery Well
- GPS Sump
- GPS Barrier Wall
- ≡ GPS Extraction Trench
- ▭ Sector Boundary

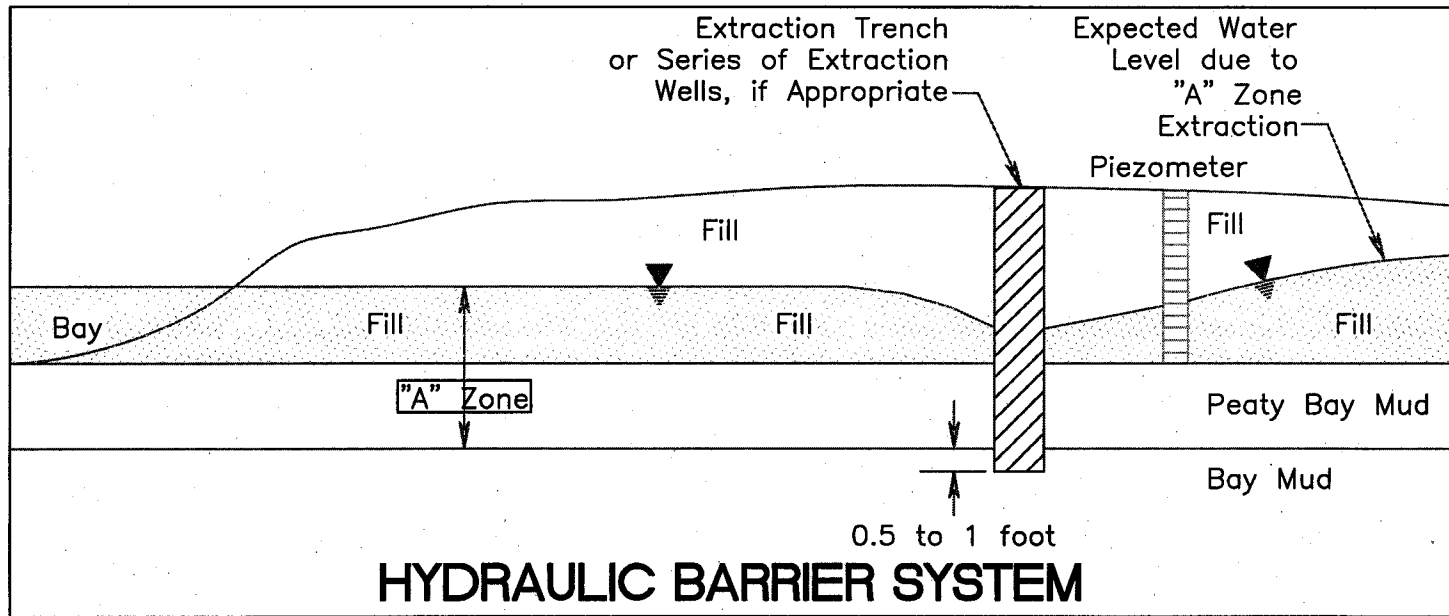
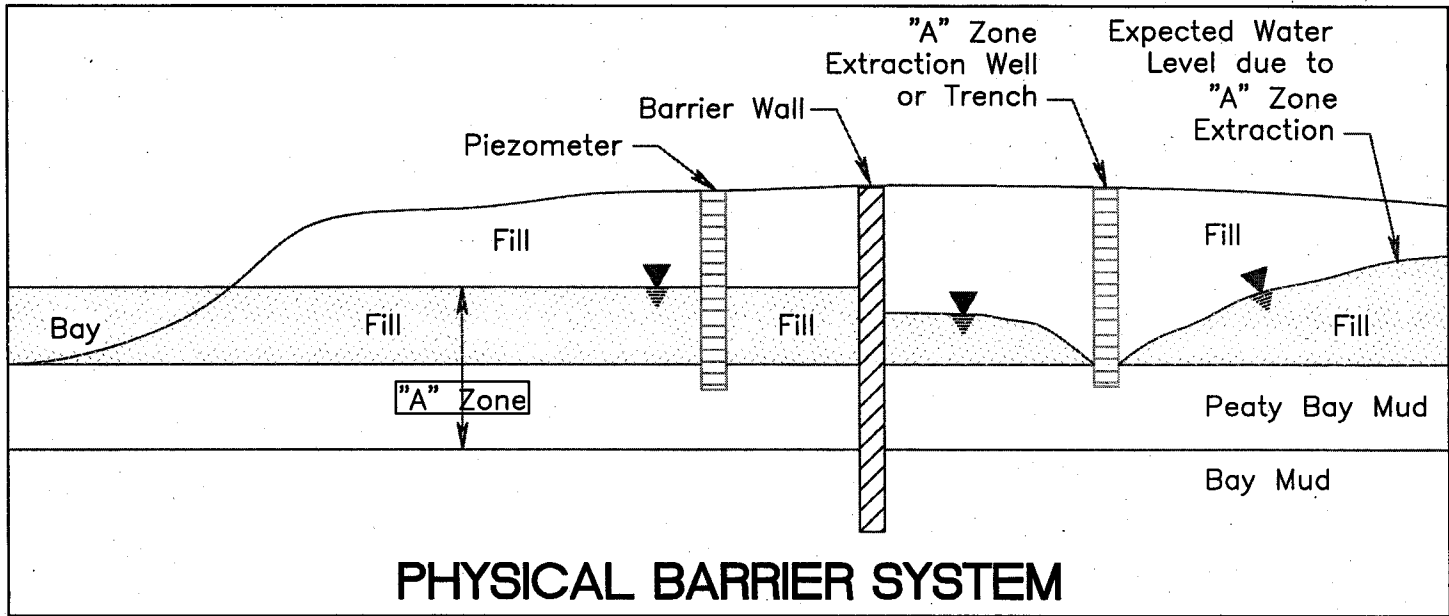
**FIGURE 11  
RECLAMATION SECTOR**  
**Chevron Richmond Refinery  
Waste Discharge Requirements**



**Legend**

- Monitoring Well
- ◇ Recovery Well
- GPS Sump
- GPS Barrier Wall
- GPS Extraction Trench
- ▭ Sector Boundary

**FIGURE 12  
NORTH YARD SECTOR**  
**Chevron Richmond Refinery  
Waste Discharge Requirements**



**GROUNDWATER PROTECTION SYSTEM**

Chevron Richmond Refinery  
Waste Discharge Requirements

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION**

**SELF-MONITORING AND REPORTING PROGRAM**

**FOR**

**CHEVRON PRODUCTS COMPANY  
CHEVRON RICHMOND REFINERY  
841 CHEVRON WAY  
RICHMOND, CONTRA COSTA COUNTY**

**TENTATIVE ORDER**

**CONSISTS OF PART A AND PART B**



## PART A

This combined Self-Monitoring Program (SMP) specifies monitoring and reporting programs necessary to fulfill obligations under the Waste Discharge Requirements (WDRs) and Site Cleanup Requirements (SCRs), including:

- (a) General monitoring requirements for landfills and waste management units under the WDRs (Part A);
- (b) General monitoring requirements related to cleanup activities performed under the SCRs (Part A);
- (c) Self-monitoring report content and format (Part A);
- (d) Self-monitoring report submittal frequency and schedule (Part B);
- (e) Monitoring locations, parameters, analytes and frequency for programs under the WDRs (Part B); and
- (f) Monitoring locations, parameters, analytes and frequency for programs under the SCRs (Part B).

### **A. AUTHORITY AND PURPOSE**

For discharges of waste to land, water quality monitoring is required pursuant to the California Code of Regulations (CCR), Division 2, Title 27, Subdivision 1, Chapter 3, Subchapter 3, sections 20380 through 20435. The principal purposes of an SMP include: 1) to document compliance with WDRs and prohibitions established by the Regional Water Board, 2) to facilitate self-policing by the discharger in the prevention and abatement of pollution arising from the waste discharge, 3) to develop or assist in the development of effluent standards of performance and toxicity standards, and 4) to assist the discharger in complying with the requirements of Title 27. Additionally, under California Water Code (CWC) Section 13304, Chevron is required to implement corrective actions and monitor the effectiveness of the implemented corrective actions under this combined SMP.

### **B. MONITORING REQUIREMENTS**

Monitoring refers to the observation, inspection, measurement, and/or sampling of environmental media, waste management units (WMUs), containment and control facilities, and waste disposed in each WMU. The monitoring programs designed to evaluate the potential release of wastes from WMUs are included in the WDRs Monitoring Program described in this combined SMP. Monitoring programs designed to evaluate the effectiveness of corrective actions implemented under CWC Section 13304 are also described in the combined SMP. The following defines the types of monitoring that may be required.

#### **Monitoring of Environmental Media**

The Regional Water Board may require monitoring of groundwater, surface water, vadose zone, stormwater, leachate, and any other environmental media that may pose a threat to water quality or provide an indication of a water quality threat at the refinery.

Sample collection, storage, and analyses shall be performed according to the most recent version of U.S. EPA-approved methods or in accordance with Groundwater Monitoring Program Standard Operating Procedures (SOP) or subsequent revisions approved by Regional Water Board staff. Analytical testing of environmental media required by this SMP shall be performed by a California State-approved laboratory for the required analyses. The director of the laboratory whose name appears on the certification shall be responsible for supervising all analytical work in his/her laboratory and shall have signing authority for all laboratory data reports or may designate signing of all such data included in reports submitted to the Regional Water Board.

All monitoring instruments and devices used to conduct monitoring in accordance with this SMP shall be maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once every two years.

Receiving waters refer to any surface water which actually or potentially receives surface or groundwater that pass over, through, or under waste materials or impacted soils. In this case, the groundwater beneath and adjacent to the WMU areas and the surface runoff from the refinery site are considered receiving waters.

### **Standard Observations**

Standard observations refer to observations within the limits of each WMU, at their perimeter, and of the receiving waters beyond their limits. Standard observations include:

1. Waste Management Units:
  - a. Evidence of ponded water at any point on the WMU;
  - b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
  - c. Evidence of erosion and/or daylighted waste.
  
2. Perimeter of Waste Management Units:
  - a. Evidence of liquid leaving or entering the WMU, estimated size of affected area and flow rate (show affected area on map);
  - b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
  - c. Evidence of erosion and/or daylighted waste.
  
3. Receiving Waters:
  - a. Floating and suspended materials of waste origin, including their presence or absence, source, and size of affected area;
  - b. Discoloration and turbidity: description of color, source, and size of affected area;
  - c. Evidence of odors, presence or absence, characterization, source, and distance of travel from source;
  - d. Evidence of beneficial use, such as presence of water associated with wildlife;
  - e. Estimated flow rate; and

- f. Weather conditions, such as estimated wind direction and velocity, total precipitation.

### **Facilities Inspections**

Facilities inspections refer to the inspection of all containment and control structures and devices associated with the environmental monitoring of the refinery. Containment and control facilities may include the following:

1. Intermediate and final covers; and
2. Storm-water management system elements such as perimeter drainage and diversion channels, ditches and downchutes, and detention and sedimentation ponds or collection tanks;

### **Quality Assurance/Quality Control (QA/QC) Sample Monitoring**

Chevron shall collect duplicate, field blank, equipment blank (if appropriate) and trip blank samples for each monitoring event at the frequency specified in the latest version of the Groundwater Monitoring Program SOP.

### **C. REPORTING REQUIREMENTS**

Reporting responsibilities of waste dischargers under WDRs and SCRs are specified in CWC sections 13225(a), 13267(b), 13383, and 13387(b) and this Regional Water Board's Resolution No.73-16 and Title 27. At a minimum, each Self-Monitoring Report (SMR) shall include the following information:

1. Transmittal Letter: A cover letter transmitting the essential points of the monitoring report shall be included with each monitoring report. The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall also certify the completion of all monitoring requirements. The letter shall be signed by the Discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.
2. Graphic Presentation: The following maps, figures, and graphs (if applicable) shall be included in each SMR to visually present data collected pursuant to this SMP:
  - a. Plan-view maps showing all monitoring and sampling locations, WMUs, containment and control structures, treatment facilities, surface water bodies, and site/property boundaries;
  - b. Groundwater level/piezometric surface contour maps for each groundwater-bearing zone of interest showing inferred groundwater gradients and flow directions under/around each WMU, based upon the past and present water level elevations and pertinent visual observations; and
  - c. Any other maps, figures, photographs, cross-sections, graphs, and charts necessary to visually demonstrate the appropriateness and effectiveness of sampling, monitoring, characterization, investigation, or remediation activities relative to the goals of this SMP.

3. Tabular Presentation: The following data (if applicable) shall be presented in tabular form and included in each SMR to show a chronological history and allow quick and easy reference:
  - a. Well designation;
  - b. Well location coordinates (latitude and longitude);
  - c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
  - d. Groundwater depths;
  - e. Groundwater elevations;
  - f. Current analytical results (including analytical method and detection limits for each constituent);
  - g. Historical analytical results (including at least the past five years in the annual report unless otherwise requested); and
  - h. Measurement dates.
  
4. Compliance Evaluation Summary and Discussion:
  - a. A summary and certification of completion of all environmental media monitoring, standard observations, and facilities inspections;
  - b. The quantity and types of wastes captured by the GPS and hydrocarbon recovery program, and the location these wastes were disposed of during the reporting period, if applicable;
  - c. A description of the waste stream, if applicable;
  - d. The signature of the laboratory director or his/her designee in laboratory data deliverables indicating that he/she has supervised all analytical work in his/her laboratory; and
  - e. A discussion of the field and laboratory results that includes the following information:
    - (1) Data interpretations (including of trends, especially in the context of potential correlation to the modified waste acceptance criteria);
    - (2) Conclusions;
    - (3) Recommendations;
    - (4) Newly implemented or planned investigations and remedial measures;
    - (5) Data anomalies;
    - (6) Variations from protocols;
    - (7) Condition of wells; and
    - (8) Effectiveness of leachate monitoring and control facilities.
  
5. Appendices: The following information shall be provided as appendices in electronic format only unless requested otherwise by Regional Water Board staff and unless the information is already contained in an SAP or SOP approved by Regional Water Board staff:
  - a. New boring and well logs;
  - b. Method and time of water level measurements;
  - c. Purging methods and results including the type of pump used, pump placement in the well, pumping rate, equipment and methods used to monitor field pH, temperature, and electrical conductivity, calibration of the field equipment, pH temperature, conductivity, and turbidity measurements, and method of disposing of the purge water;

- d. Sampling procedures, field, equipment, and travel blanks, number and description of duplicate samples, type of sample containers and preservatives used, the date and time of sampling, the name of the person actually taking the samples, and any other relevant observations; and
- e. Documentation of laboratory results, analytical methods, detection limits and reporting limits, and Quality Assurance/Quality Control (QA/QC) procedures for the required sampling.

## **D. ANNUAL REPORTING**

The Discharger shall submit an annual self-monitoring report to the Regional Water Board covering the previous calendar year. The annual report must summarize all monitoring, investigation, and remedial activities that have occurred in the previous year. The annual report shall include the following information for each monitoring event during the year required pursuant to this SMP, in addition to the transmittal letter and appendices described in Sections C.1, C.2, and C.3 of this SMP:

### **1. Graphic Presentation**

Include site maps (plot plans) for each aquifer or water-bearing zone monitored that are drawn to a scale that remains constant from reporting period to reporting period. Line or bar graphs are helpful to illustrate variations in groundwater elevations, phase-separated product thickness, and dissolved chemical concentrations with time. These maps and graphs shall include the following information:

- a. Known or probable contaminant sources;
- b. Well locations;
- c. Groundwater elevation contours;
- d. Inferred groundwater flow direction(s);
- e. Identify wells containing phase-separated product;
- f. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps, etc.); and
- g. Appropriate analytical results.

Geologic cross sections are required if new data is available and/or the previous interpretation of subsurface conditions has changed. When required, geologic cross sections shall include the following:

- i. Vertical and lateral extent of contamination;
- ii. Contaminant sources;
- iii. Geologic structures;
- iv. Soil lithology;
- v. Water table/piezometric surfaces;
- vi. Sample locations;
- vii. Sample analytical results; and
- viii. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

### **2. Tabular Presentation**

Present all of the following data in one or more tables to show a chronological history and allow quick and easy reference. The table(s) shall include the following information:

- a. Well designations;
- b. Well location coordinates (latitude and longitude);
- c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
- d. Groundwater depths;
- e. Groundwater elevations;
- f. Horizontal groundwater gradients;
- g. Vertical groundwater gradients (including comparison wells from different zones);
- h. Phase-separated product elevations;
- i. Phase-separated product thickness;
- j. Current analytical results (including analytical method and detection limits for each constituent);
- k. Historical analytical results for the most recent four sampling events;
- l. Measurement dates;
- m. Groundwater extraction, including:
  - i. Average daily extraction rate;
  - ii. Total volume extracted for monitoring period;
  - iii. Annual cumulative total volume extracted; and
- n. Estimate of contaminant volume extracted (reported in gallons) including:
  - i. Average daily removal rate;
  - ii. Total volume removed for monitoring period;
  - iii. Annual cumulative total volume removed.

### 3. Discussion

Provide a discussion of the field and laboratory results that includes the following information:

- a. Data Interpretations;
- b. Conclusions;
- c. Recommendations;
- d. Newly implemented or planned investigations and remedial measures;
- e. Data anomalies;
- f. Variations from protocols; and
- g. Conditions of wells.

## E. CONTINGENCY REPORTING

1. The Discharger shall report any seepage from the surface of any WMU or discharge prohibited in the WDRs or SCRs immediately after it is discovered to the Regional Water Board by calling the Spill Hotline at 1-800-852-7550 and by sending an email to [Rb2SpillReports@waterboards.ca.gov](mailto:Rb2SpillReports@waterboards.ca.gov). The Discharger shall submit a written report with the Regional Water Board within five days of discovery of any discharge. The written report shall contain, at a minimum, the following information:

- a. A map showing the location(s) of discharge;
  - b. Approximate flow rate;
  - c. A description of the nature of the discharge; and
  - d. Corrective measures underway or proposed.
2. The Discharger shall submit a written report to the Regional Water Board within seven working days of determining that a statistically significant difference occurred in the sample result compared against the historical dataset and above an approved WQPS in a perimeter segment-monitoring well. In addition, evaluation of GPS performance will be reviewed to examine the effectiveness of hydraulic control.
- a. Chevron shall immediately re-sample at the compliance point where the exceedence was observed, evaluate the result against the historical dataset and re-analyze if results are not consistent with historical trends.
  - b. If re-sampling and analysis confirm the exceedence through statistical analysis, Chevron shall document this in the text of the next Annual Report and notify the Regional Water Board in writing within 21 days of re-sampling. In this letter, Chevron shall evaluate whether any re-sampling or additional corrective measures need to be implemented.

## **F. ELECTRONIC REPORTING**

### **1. Geotracker Requirements**

The State Water Board has adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:

[http://www.waterboards.ca.gov/water\\_issues/programs/ust/electronic\\_submittal/index.shtml](http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml)

Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit over the internet, the following information electronically to Geotracker:

- a. Groundwater analytical data;
- b. Surveyed locations of monitoring wells;
- c. Boring logs describing monitoring well construction; and
- d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

### **2. Data Tables**

Upon request, monitoring results shall also be provided electronically in Microsoft Excel® or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board

staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report.

Electronic tables shall include the following information:

- a. Well designations;
- b. Well location coordinates (latitude and longitude);
- c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
- d. Groundwater depths and elevations (water levels);
- e. Phase-separated product thicknesses and elevations;
- f. Current analytical results by constituent of concern (including detection limits for each constituent);
- g. Historical analytical results (including the past four sampling events); and
- h. Measurement dates.

#### **G. MAINTENANCE OF WRITTEN RECORDS**

The Discharger shall maintain information required pursuant to this SMP for a minimum of five years. The five-year period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board.



## **PART B: MONITORING AND OBSERVATION SCHEDULE**

### **1. DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS**

#### **A. GROUNDWATER MONITORING:**

**Semi-Annual Reports:       Due August 31 and March 1 of each year**  
**Annual Report:             Due March 1 of each year**

Groundwater shall be sampled and analyzed as detailed in Tables 2 and 4. Monitoring well locations are listed in Tables 1 and 3. Groundwater analyses shall include the following field measurements: pH, temperature, specific conductance, water level, volume purged, number of casings volumes purged, and whether the well went dry during sampling (including measures taken to ensure accuracy of analyses given this condition). Groundwater monitoring wells installed in the future will be sampled and analyzed as detailed in Tables 2 and 4 and on a quarterly basis until a statistically significant dataset is established.

#### **B. FACILITIES MONITORING - Observe quarterly, report semi-annually**

**Semi-Annual Report:       Due August 31 and March 1 of each year**  
**Annual Report:             Due March 1 of each year**

The Discharger shall inspect all facilities to ensure proper and safe operation and report semi-annually. The facilities to be monitored shall include, but not be limited to:

1. Waste Containment systems;
2. Waste treatment systems;
3. Surface water retention basins;
4. Leak detection systems (where applicable); and
5. Leachate/groundwater management facilities and secondary containment where applicable.

### **2. GPS PERFORMANCE MONITORING**

Chevron shall measure the water level in each GPS corrective action monitoring well and in a sufficient number of wells or piezometers both upgradient and downgradient of the GPS to demonstrate continuous maintenance of a hydraulic depression in the GPS trenches (inward hydraulic gradient). To demonstrate the effectiveness of the GPS, Chevron shall include the following for each refinery sector in the semi-annual SMRs:

- a. contour maps of 1st and 3rd quarter GPS groundwater elevation data;

- b. hydrographs showing water level data (measured at least once per week) at each operating extraction sump or recovery well;
- c. a narrative summary of the GPS performance during the reporting period; and,
- d. an estimate of the volume of groundwater extracted during the reporting period.

### **3. ON-SITE OBSERVATIONS/POST-CLOSURE MAINTENANCE AND MONITORING**

Closed WMUs (Plant 1/Additives Plant, Landfill 15, Landfarms 1-5, the Hydropits, Parr-Richmond Landfill and the Gertrude Street Site) shall be inspected annually by a registered California engineer or geologist prior to the onset of the rainy season. These annual inspections shall include identification of areas of the final covers where the soil has become eroded, attacked by rodents, or otherwise damaged, or where the paved areas have become damaged. Chevron shall perform appropriate repairs for these areas prior to the rainy season. In addition, Chevron shall monitor runoff/run-on control facilities for their effectiveness and overall condition as needed according to weather conditions during the winter months (November through April) and as prescribed in the approved post-closure maintenance/monitoring plan for each individual WMU. Chevron shall maintain records of all inspections and repairs and summarize in each semi-annual monitoring report any repairs made during the corresponding reporting period.

### **4. ALKANE PLANT PLUME REMEDIATION MONITORING**

Chevron shall continue to monitor the Alkane Plant Plume remediation effort in accordance with *the Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001). The monitoring components of this plan include measuring potentiometric water levels, liquid hydrocarbon thickness, and benzene and fluoride concentrations. Benzene and fluoride concentrations will continue to be measured annually in samples collected from 6 wells (listed in Table 1), located around the perimeter of the plume to verify containment of the plume.

### **5. FREE-PHASE LIQUID HYDROCARBON (FPLH) RECOVERY SUMMARY**

Chevron shall include a map in each semi-annual SMR that shows the locations of all wells within the refinery that contain FPLH. The measured thickness of the FPLH in each well should be indicated on the map next to the well. Recovery of FPLH will be performed in accordance with the procedures described in the *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, Chevron Richmond Refinery* (URS, 2000). In addition, the SMR shall include a description of FPLH recovery method used, recovery volume data for the reporting period and cumulative recovery data for each active recovery well or system.

### **6. CHEMICAL CONSTITUENT MONITORING**

- a. Refinery-Wide Groundwater Monitoring Program: Chevron shall sample the Refinery-Wide Corrective Action Groundwater Monitoring Program compliance monitoring points listed in Table 1 for the analytical parameters and at the frequencies listed in Table 2. All monitoring activities, including analytical and QA/QC procedures will be conducted in

accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

- b. Landfarm Post-Closure Monitoring Program: Chevron shall sample the Landfarms Post-Closure Monitoring Program monitoring points listed in Table 3 for the analytical parameters and at the frequencies listed in Table 4. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure. Monitoring events for constituents of concern and Appendix IX analyses shall alternate between periods of highest and lowest groundwater levels.
- c. Chevron shall sample new wells installed to monitor Landfarms 1 through 5 for COCs and MPs listed in Table 4 over eight consecutive quarters. Within the first year after installation, Chevron shall analyze new wells for the Appendix IX constituents listed in Table 4. Chevron shall add any new compounds detected in new wells to the list of COCs in Table 4.
- d. Chevron shall sample the monitoring points listed in Table 3 regardless of the presence of nonaqueous phase liquid as follows:
  - i. For monitoring points with persistent nonaqueous phase liquid (e.g., more than two consecutive quarters), Chevron shall collect samples every other year for COCs and Appendix IX (if well is POC). For monitoring points with intermittent nonaqueous phase liquid (e.g., not detected during consecutive quarters), Chevron shall collect samples semi-annually.
  - ii. Chevron shall obtain samples for dissolved phase analysis after purging nonaqueous phase liquid from the well, by low-flow sampling, or by another appropriate method.
  - iii. Chevron shall follow the most recent version of the Chevron Groundwater Monitoring Program Standard Operating Procedure.
- e. Chevron shall monitor "A" Zone monitoring points in Table 3 under a corrective action monitoring program (22 CCR 66264.100).
- f. Chevron shall monitor "C" Zone monitoring points in Table 3 under a detection monitoring program (22 CCR 66264.98).

Attachments:

- Table 1: List of Monitoring Wells by Sector, Refinery-Wide Groundwater Monitoring Program
- Table 2: Maximum Allowable Concentration Limits for Constituents of Concern and Monitoring Parameters for the Refinery-Wide Groundwater Monitoring Program
- Table 3: Landfarm Area Monitoring Well Network

Table 4: Landfarm Post-Closure Monitoring Program, Monitoring Parameters, Constituents of Concern and MACLs

**Table 1: List of Monitoring Wells by Sector  
Refinery-Wide Groundwater Monitoring Program  
Chevron Richmond Refinery**

<b>Alkane Sector</b>	<b>Castro and Plant 1/Add. Sector</b>	<b>Landfarms /Landfill 15 Sector</b>	<b>North Yard Sector</b>	<b>Reclamation Yard Sector</b>	<b>Pollard Sector</b>	<b>Effluent Sector</b>	<b>Bayside North</b>	<b>Bayside South</b>	<b>Interior "C" Zone</b>
209A	323A	232A	178A	290A	260A	108A	387AT	346F	208C
P460A	642A	233A	675A	643A	262A	164A	388AT	347F	638C
595AT	554A	234A	550A	370A	803A	179A	389F	348F	378C
223C	556A	240A	377C	560A	635C	108C	390AT	349F	379C
375C	106C	244A	178C	685C		164C	391AT	351CT	380C
670C	125C		671A	238C				345AT	138C
167A*	320C	551A		369S				340AT	382C
170A*	649A	552A		564A				337F	
174A*		232C		569C				RW619AT#	
200A*		234C						RW534AT#	
201A*		235C							
258A*		236C							

Notes:

\* Wells associated with Alkane Plant Plume Remediation Monitoring

# Wells with Remediation Monitoring Plan, S.P. Hill Tankfield

**Table 2: Maximum Allowable Concentration Levels (MACLS) for  
Constituents of Concern and Monitoring Parameters for the Chevron  
Refinery -Wide Groundwater Monitoring Program**

Constituents of concern	MACL ( $\mu\text{g/l}$ ) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
TPH-Gas	1200	*	S	S	S	S	S	S	S	S	S	S
TPH- Diesel	640	*	S	S	S	S	S	S	S	S		S
Benzene	46	*	S	S	S	S	S	S	S	S	B	S
MTBE	1800	*	S	S	S	S	S	S	S	S	B	S
Acenaphthene	40	*	B	B	B	B	B	B	B	B	B	
Acenaphthylene	307	*	B	B	B	B	B	B	B	B	B	
Anthracene	21	*	B	B	B	B	B	B	B	B	B	
Benzo(a)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(b)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(g,h,i)perylene		*	B	B	B	B	B	B	B	B	B	
Benzo(k)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Chrysene	0.049	*	B	B	B	B	B	B	B	B	B	
Dibenzo(a,h)anthracene	0.049	*	B	B	B	B	B	B	B	B	B	
Fluoranthene	7.1	*	B	B	B	B	B	B	B	B	B	
Fluorene	39	*	B	B	B	B	B	B	B	B	B	
Indeno(1,2,3-cd)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Naphthalene	194	*	B	B	B	B	B	B	B	B	B	
Phenanthrene	19	*	B	B	B	B	B	B	B	B	B	
Pyrene	10	*	B	B	B	B	B	B	B	B	B	
Chlordane	0.00059	*		B						B		
G-BHC (Lindane)	0.063	*		B						B		
Dieldrin	0.0019	*		B						B		
Selenium	5.0	*	B	B	B			S	B	B	B	
Arsenic	36	*	S	B					B	S		
Cadmium	9.3	*	B	B	B			B	B	B	S	B
Chromium VI	50	*	B	B	B			B	B	B	B	B
Lead	5.6	*	S	S	S	S	S	S	S	S		B
Mercury	0.025	*	B						B	B		
Nickel	8.2	*	S	B	S			S	B	S	S	S

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
Zinc	71	*	S	B	B			B	B	B	S	B
Fluoride	2400	*						S				
Un-ionized Ammonia-N	25	*							B	B		
pH	6.5 to 8.5	*	S	S	S	S	S	S	S	S	S	S
Turbidity (NTUs)	N/A	N/A	S	S	S	S	S	S	S	S	S	S
Temperature	N/A	N/A	S	S	S	S	S	S	S	S	S	S

Notes:

\* MACLs to be reviewed and updated by the Discharger per Task 13

S = Monitoring Parameter per Sector (analyzed semi-annually)

B= Constituent of concern per Section (analyzed during summer/fall reporting period every 2 years (even-numbered years))

N/A = not applicable

(NTUs) = Nephelometric Turbidity Units

**Table 3**  
**Landfarm Area Monitoring Well Network**

<b>Monitoring Wells for Landfarm Area</b>
<b>“A” Zone Wells</b>
183A (POC)
610A (POC)
645A
657A
659A (POC)
672A
673A
677A
P284A (POC)
P384A
P386A
<b>“C” Zone Wells</b>
251C (POC)
506C (POC)
587C
654C (POC)
655C (POC)
674C
678C (POC)
679C (POC)
680C (POC)

Notes:

POC indicates that well is a point of compliance well.



**Table 4**  
**Landfarms Post-Closure Monitoring Program**  
**Monitoring Parameters, Constituents of Concern and MACLs**

Constituent	MACL µg/l (2)	MACL Source	“A” zone Well Monitoring Frequency (5)	“C” zone Well Monitoring Frequency (5)
<b>Monitoring Parameters</b>				
pH	6.5 to 8.5	1	S	S
Specific Conductivity	N/A	N/A	S	S
Turbidity	N/A	N/A	S	S
Temperature	N/A	N/A	S	S
Arsenic	36	*	S	S
Lead	5.6	*	S	S
Nickel	8.2	*	S	S
Zinc	71	*	S	S
TPH-Gasoline	1200	*	S	S
TPH-Diesel	640	*	S	S
TPH-Diesel Silica Gel	640	*	S	S
Benzene	46	*	S	S
MTBE	1800	*	S	S
Toluene	5000	*	S	S
Phenolics (Total)	50	*	S	S
<b>Constituents of Concern</b>				
Cadmium, Dissolved	9.3	*	B	B
Chromium VI, Dissolved	50	*	B	B
Mercury, Dissolved	0.025	*	B	B
Selenium, Dissolved	5	*	B	B
Dissolved sulfide	100	*	B	B
Methylene Chloride	1600	*	B	B
Acenaphthene	40	*	B	S
Acenaphthylene	307	*	B	S
Anthracene	21	*	B	S
Benzo(a)anthracene	2.2	*	B	S
Benzo(a)pyrene	0.96	*	B	S
Benzo(b)fluoranthene	0.049	*	B	S
Benzo(g,h,i)perylene	X	*	B	S
Benzo(k)fluoranthene	0.049	*	B	S
Chysene	0.049	*	B	S
Dibenzo(a,h)anthracene	0.049	*	B	S
Fluoranthene	7.1	*	B	S
Fluorene	39	*	B	S
Indeno(1,2,3-cd)pyrene	0.049	*	B	S
Naphthalene	194	*	B	S
Phenanthrene	19	*	B	S

Pyrene	10	*	B	S
Pentachlorophenol	7.9	*	B	B
<b>Constituent</b>	<b>MACL µg/l (2)</b>	<b>MACL Source</b>	<b>“A” zone Well Monitoring Frequency (5)</b>	<b>“C” zone Well Monitoring Frequency (5)</b>
Benzenethiol	5	*	B	B
Benzyl Butyl phthalate	5200	*	B	B
Bis 2-ethylhexyl phthalate	6	*	B	B
Chromium, dissolved	50	*	B	B
Di-n-butyl phthalate	12000	*	B	B
2,4-dimethylphenol	110	*	B	B
Ethylbenzene	29000	*	B	B
1-methylnaphthalene	75	*	B	B
7,12-dimethyl benzo(a)anthracene	X	*	B	B
2-methylphenol	XX	*	B	B
3,4-methylphenol	XX	*	B	B
Phenol	2560	*	B	B
Trichloroethene	381	*	B	B
1,1,1-trichloroethane	62	*	B	B
Chlorobenzene	21000	*	B	B
Methyl chrysene	X	*	B	B
Total Xylenes	13	*	B	B
2-methylnaphthalene	2.1	*	B	B
Acetophenone		*	B	B
Barium	1000	*	B	B
Cobalt	3	*	B	B
Copper	3.1	*	B	B
N-Nitrosopiperidine		*	B	B
Silver	0.19	*	B	B
Vanadium	19	*	B	B
Vinyl chloride	3.8	*	B	B
<b>Appendix IX Parameters (3)</b>				
Metals (Methods 6010,7060, 7470)	N/A	N/A	(4)	N/A
SVOCs (Method 8270)	N/A	N/A	(4)	N/A
VOCs (Method 8260)	N/A	N/A	(4)	N/A

Notes:

\* MACLs to be reviewed and updated by the Discharger per Task 13

- SF Bay Basin Plan, 2010
- MACL is the maximum allowable concentration limit. Applicable to A-Zone wells only. C-Zone wells evaluated based on background concentrations of inorganic constituents and practical quantization limits for organic constituents.
- Parameters are listed in Appendix IX to 22CFR 66264 for analysis via Methods 6010, 7060, 7470, 8260, 8270. Appendix IX parameters that are detected, but are not COCs, will be added to the list of COCs for all wells.
- Bi-annually at POC wells. Every five years at all other wells. Within first year in new wells.
- Monitoring for COCs and Appendix IX parameters will alternate between highest and lowest groundwater levels.

X=Total PAH concentration less than 0.015 mg/l  
XX=Total phenolics concentration less than 0.05 mg/l  
PAHS are polynuclear aromatic hydrocarbons  
POC is point of compliance  
B is biennial or monitoring every other year for non-POC wells  
S is semi-annual monitoring at all wells  
N/A is not applicable