CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

TECHNICAL REPORT

FOR

TENTATIVE
RESOLUTION NO. R9-2016-0148

A RESOLUTION AMENDING THE *WATER QUALITY CONTROL PLAN FOR THE SAN DIEGO BASIN* TO INCORPORATE SITE-SPECIFIC WATER EFFECT RATIOS INTO WATER QUALITY OBJECTIVES FOR TOXIC POLLUTANTS AND TOTAL MAXIMUM DAILY LOADS FOR COPPER AND ZINC IN CHOLLAS CREEK

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

I. INTRODUCTION

The purpose of this technical report is to describe the scientific and regulatory basis for an amendment to the Water Quality Control Plan for the San Diego Basin (Basin Plan). The amendment updates water effect ratios (WERs) used in adopted Total Maximum Daily Loads (TMDLs) from a default value of 1.0 to site-specific values of 6.998 for dissolved copper and 1.711 for dissolved zinc in Chollas Creek. Updating WERs calibrates the California Toxics Rule (CTR) water quality criteria,[1] which are expressed as hardness-based equations, to account for site-specific physical and chemical water column conditions. Site-specific WERs adjust the maximum concentrations for dissolved copper and dissolved zinc, but remain protective of beneficial uses in Chollas Creek based on site-specific conditions.

Pursuant to California Water Code section 13240, the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) has primary responsibility for adoption and amendment of the Basin Plan. The Basin Plan designates (1) beneficial uses to be protected for waters within specified areas, (2) water quality objectives (WQOs) for the reasonable protection of the beneficial uses and prevention of nuisance,[2] and (3) a program of implementation needed for achieving the WQOs. Basin Plan amendments are subject to a hearing process prior to adoption by the San Diego Water Board and amendments must also be approved by the State Water Resources Control Board (State Water Board), State Office of Administrative Law (OAL), and United States Environmental Protection Agency (USEPA).

The Basin Plan was amended in 2008 to include TMDLs for dissolved metals (copper, lead, and zinc) in Chollas Creek. When these TMDLs were developed, equations based on the CTR were included to calculate the highest concentrations of metals that could be present in Chollas Creek and remain protective of aquatic life.[3,4] These maximum concentrations are referred to as water quality criteria in the CTR.[5]

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[1] Under State law, water boards establish WQOs in their water quality control or basin plans. In federal Clean Water Act parlance, including in the CTR, State WQOs are referred to as water quality “criteria.” Throughout this document, the relevant term is used based on the State or federal statutory scheme.

[2] Under State law, water boards establish WQOs in their water quality control or basin plans. Together with an anti-degradation policy, these beneficial uses and WQOs serve as water quality standards under the Clean Water Act.

[3] In this report, any reference to metals indicates metals in dissolved form unless otherwise stated.

[4] Federal water quality criteria for toxic pollutants have been established by the USEPA CTR. The CTR water quality criteria are referenced in Chapter 3 of the Basin Plan and are applicable WQOs for waters assigned aquatic life or human health beneficial use classifications.

[5] The terms CTR water quality criteria, numeric targets, and loading capacities are equivalent in this technical report and may be used interchangeably.

CTR water quality criteria may take into account pollutant- and site-specific data, when they are available, to establish a site-specific WER that is representative of water body conditions. A site-specific WER refines the CTR water quality criteria by taking into account the bioavailability of the pollutant in the specific water body. However, at the time the TMDLs were developed, data was not available to quantify site-specific WERs so a default value of 1.0 was used to calculate the CTR water quality criteria for metals. Since that time, the City of San Diego has collected Chollas Creek data to develop site-specific WERs that can now be incorporated into the CTR water quality criteria equations.

II. BACKGROUND

The following provides some general background information on Chollas Creek, its existing TMDLs for metals, and site-specific WERs. This information is intended to provide context for the more detailed discussion in subsequent sections.

A. Site Description

Chollas Creek is an urban coastal stream in southern San Diego County, and a tributary to San Diego Bay. The watershed of Chollas Creek encompasses 16,273 acres. The north fork (draining 9,276 acres) and the south fork (draining 6,997 acres) converge less than one mile upstream of where the creek discharges into San Diego Bay.

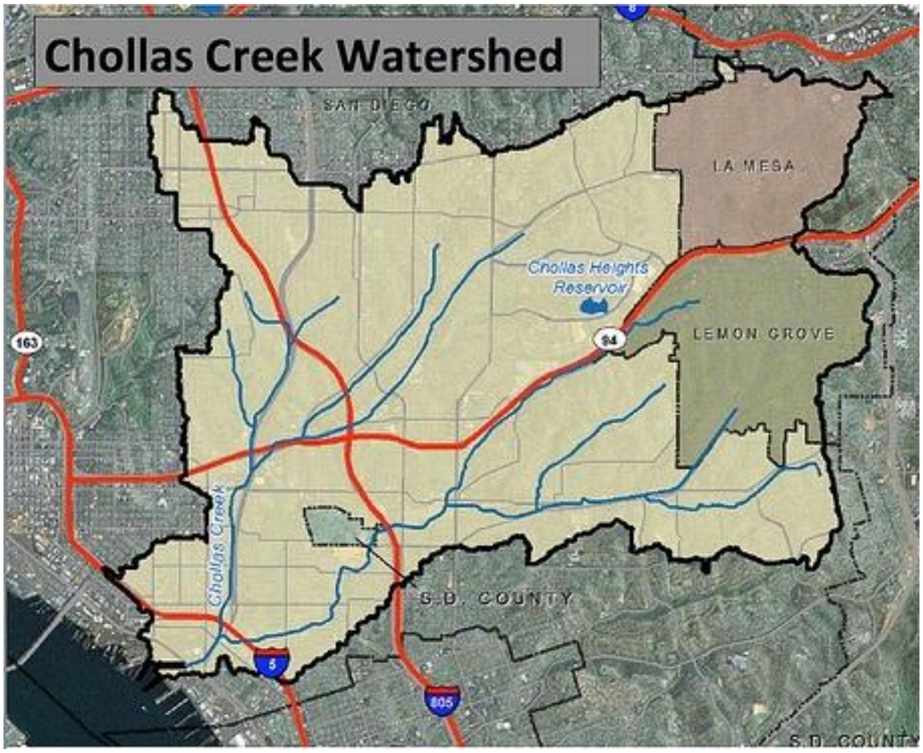

Figure 1. Chollas Creek Watershed

Flows in Chollas Creek are highly variable. The highest flow rates are associated with storm events. Extended periods with no surface flows occur during dry weather, although pools of standing water may be present. Much of the creek has been channelized and concrete lined, but some sections of earthen creek bed remain. The mouth of the creek is located on the eastern shoreline of the central portion of San Diego Bay.

Land use within the watershed is predominantly residential, with some commercial, institutional, and industrial use. Portions of the cities of San Diego, Lemon Grove, and La Mesa are located within the Chollas Creek watershed. A significant portion of the remainder of the watershed consists of roadways, while the rest is open space. A small portion of the watershed consists of “tidelands” immediately adjacent to San Diego Bay. Some of this tideland area is under the jurisdiction of the San Diego Unified Port District (Port); the remainder is under the jurisdiction of the U.S. Navy. San Diego County also holds jurisdiction over a small portion of the watershed.

B. Metals TMDLs for Chollas Creek

The San Diego Water Board placed Chollas Creek on the CWA section 303(d) List of Water Quality Limited Segments List (303(d) List) in 1996 for impairments caused by metals. Laboratory analyses of copper, lead, and zinc in Chollas Creek indicated that concentrations present exceeded standards for acute and chronic toxicity.[6] The San Diego Water Board subsequently developed TMDLs for these metals as required by the CWA for water quality limited segments. The TMDLs are based on CTR standards. The CTR prescribes equations that are based on the concentration of hardness in water to calculate numeric water quality criteria for metals. These equations may also take into account the bioavailability of the pollutant in the specific water body; this is quantified as a WER. However, not enough data was available to determine pollutant- and site-specific WERs when the TMDLs were developed and therefore, a default WER value of 1.0 was used to calculate TMDLs.

On June 13, 2007, the San Diego Water Board adopted Resolution No. R9-2007-0043, amending the Basin Plan to incorporate the Chollas Creek Metals TMDLs. The Chollas Creek Metals TMDLs were subsequently approved by the State Water Board through Resolution No. 2008-0054 on July 15, 2008. OAL approved the Chollas Creek Metals TMDLs on October 22, 2008 as File No. 2008-0909-01. USEPA approved the Chollas Creek Metals TMDLs on December 18, 2008. The effective date for these TMDLs, based on the OAL approval date, began on October 22, 2008.

More details on the TMDLs for metals in Chollas Creek are presented in section IV.

C. Site-specific WERs for Chollas Creek

After the TMDLs went into effect, the City of San Diego conducted a study to develop site-specific WERs for copper and zinc in Chollas Creek. A WER for lead was not pursued.[7] In October 2014, the City of San Diego finalized a report that included an evaluation of the study's data and associated recommendations for copper and zinc WER values. These WER values were calculated based on USEPA's *Interim Guidance on Determination and Use of Water Effect Ratios* (USEPA Office of Water, USEPA-823-B-94-001, February 1994) in accordance with the CTR.

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[6] Impairments caused by metals threaten the beneficial uses of warm freshwater habitat (WARM) and wildlife habitat (WILD). However, this technical report refers specifically to copper, lead, and zinc and the impairments that have been evaluated, acute and chronic toxicity, which are also the focus of the associated TMDLs. Although, the City of San Diego evaluated recalculating lead criteria, the San Diego Water Board is not recommending adjusting lead criteria for Chollas Creek at this time.

[7] Dissolved lead testing would not be relevant due to neutral pH conditions and low concentrations of lead detected in Chollas Creek. Lead is very insoluble in water so a lower pH would be required in site water and laboratory water for lead to be present in dissolved phase; lowering pH could have potentially added confounding factors to the WER tests and therefore, lead was not considered.

Site-specific WERs produce TMDL calculations that are more representative of actual site conditions than the default WER used in the original TMDLs. Updating these WER values in the TMDL calculations triggers a Basin Plan amendment since the original Chollas Creek Metals TMDLs, once in effect, were incorporated into the Basin Plan.

More details on site-specific WERs for Chollas Creek are presented in section V.

III. WATER QUALITY OBJECTIVES FOR TOXIC POLLUTANTS

The Chollas Creek Metals TMDLs were developed because dissolved copper, lead, and zinc concentrations in Chollas Creek violate their respective numeric water quality criteria promulgated in the CTR and the narrative objective for toxicity in the Basin Plan. Observed concentrations of these metals in Chollas Creek threaten and impair the designated beneficial uses of warm freshwater habitat (WARM) and wildlife habitat (WILD).

The Basin Plan establishes the following narrative WQOs for toxicity:

> *All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.*
>
> *The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with requirements specified in USEPA, State Water Resources Control Board or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay.*
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> *In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.*

The Basin Plan establishes these numeric WQOs as follows:

> *The USEPA promulgated a final rule prescribing water quality criteria for toxic pollutants in inland surface waters, enclosed bays, and estuaries in California on May 18, 2000 (The California Toxics Rule or "CTR;" [40 CFR 131.38]). CTR criteria constitute applicable water quality criteria in California. In addition to the CTR, certain criteria for toxic pollutants in the National Toxics Rule [40 CFR 131.36] constitute applicable water quality criteria in California as well.*

In addition, the Basin Plan WQOs for toxic pollutants refer to the CTR, which includes the calculations to quantify the pollutant- and site-specific WQOs.

IV. EXISTING TMDLs

The purpose of the Chollas Creek Metals TMDLs contained in Chapter 7 of the Basin Plan is to restore and protect the beneficial uses of Chollas Creek by attaining compliance with WQOs for toxicity in Chapter 3 of the Basin Plan. TMDLs represent a strategy for meeting WQOs by allocating quantitative limits for point and non-point pollution sources. A TMDL is defined as the sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for non-point sources and natural background such that the capacity of the water body to assimilate pollutant loading (i.e., the loading capacity) is not exceeded. If loading capacity is exceeded, wasteload reductions are required.

In the case of Chollas Creek, metals contributions from non-point source discharges are insignificant and therefore did not receive LAs or reductions. The source analysis identified land uses and activities associated with freeways and commercial/industrial land uses as the major contributors, and the vast majority of the copper, lead, and zinc loads to Chollas Creek are attributed to the Municipal Separate Stormwater Sewer Systems (MS4s). WLAs and load reductions were assigned to these point sources.[8] In addition, a margin of safety is included to account for uncertainty in the analysis. The margin of safety was incorporated by setting the WLAs equal to 90 percent of the total loading capacity as generated from the CTR equations for copper, lead, and zinc. The relationships between the CTR water quality criteria, numeric targets, loading capacities, TMDLs, and WLAs are as follows:

CTR water quality criteria = numeric targets = loading capacities[9]

TMDLs = WLAs = CTR water quality criteria x 0.9

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[8] The TMDLs and WLAs are equivalent for metals in Chollas Creek. The terms may be used interchangeably in this technical report.

[9] These are equivalent terms and the TMDLs (and WLAs) are equal to 90% of the value these terms represent.

The original Chollas Creek Metals TMDLs established the following CTR water quality criteria for copper, lead, and zinc:

Table 1. CTR Water Quality Criteria/Numeric Targets for Acute Conditions

Copper	(1) * (0.96) * {e^ [0.9422 * ln (hardness) - 1.700]}
Lead	(1) * {1.46203 – [0.145712 * ln (hardness)]} * {e^ [1.273 * ln (hardness) - 1.460]}
Zinc	(1) * (0.978) * {e^ [0.8473 * ln (hardness) + 0.884]}

Table 2. CTR Water Quality Criteria/Numeric Targets for Chronic Conditions

Copper	(1) * (0.96) * {e^[0.8545 * ln (hardness) - 1.702]}
Lead	(1) * {1.46203 – [0.145712 * ln (hardness)]} * {e^[1.273 * ln (hardness) - 4.705]}
Zinc	(1) * (0.986) * {e^[0.8473 * ln (hardness) + 0.884]}

Pursuant to 40 CFR 131.38(b)(2) and (c)(4)(iii), the CTR describes the method for calculating acute and chronic WQOs for metals, which are a function of hardness and a WER. The value of 1.0 at the beginning of each equation above represents the default WER value that was used in the absence of site-specific data to develop a site-specific WER. Adoption of site-specific WERs greater than 1 would result in less stringent numeric water quality criteria for the metals. However, these water quality criteria would be no less protective of aquatic life. The water quality criteria would simply be more representative of actual conditions than a default WER based on laboratory conditions.

The WLAs are 90 percent of the water quality criteria, allowing for a margin of safety. The interim goal for achieving WLAs is an allowable exceedance of 20 percent of the WLAs through compliance year 10 (2018). Between compliance year 10 and 20 (2018 to 2028), the allowable exceedance must then be reduced to eventually reach the WLAs by compliance year 20 (2028). The TMDL technical report identified responsible parties for WLA implementation. These WLAs are implemented through incorporating them into Waste Discharge Requirements (WDRs), primarily National Pollutant Discharge Elimination System (NPDES) permits, in the Chollas Creek watershed. The table below summarizes the status of WDR updates.

Table 3. Implementation of Chollas Creek Metals TMDLs

Responsible Party	WDR Updates
Municipal Stormwater Dischargers	TMDL requirements are included in Order No. R9-2013-0001 (effective June 2013) as amended by Order Nos. R9-2015-0001 (effective April 2015) and R9-2015-0100 (effective January 2016). This is the Regional MS4 Permit for all the Phase I MS4s in the San Diego Region. Any future Phase II small MS4 dischargers in the Chollas Creek watershed should be enrolled under Order No. 2013-

Responsible Party	WDR Updates
	0001-DWQ. At this time, all MS4 dischargers in the watershed are Phase I dischargers.
Caltrans	TMDL requirements are included in Caltrans statewide Order No. 2012-0011-DWQ; effective July 2013.
U.S. Navy	TMDL and Phase II Small MS4 requirements are included in Order No. R9-2013-0064 for Naval Base San Diego Complex; effective November 2013.
Industrial Stormwater Dischargers	Statewide Order No. 2014-0057-DWQ for stormwater discharges from industrial facilities went into effect July 2015. The permit should be updated to include TMDL requirements. In 2016, the San Diego Water Board submitted proposed language for TMDLs for this permit. The State Board intends to consider incorporating the TMDL language sometime in 2017.
Construction Stormwater Dischargers	TMDL requirements should be included in the next update of statewide Order No. 2009-0009-DWQ as amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ for stormwater discharges from construction sites.
Landfill Dischargers	The only landfill in the Chollas Creek watershed is the South Chollas Landfill. Statewide Order No. 2014-0057-DWQ for stormwater discharges from industrial facilities, including landfills, went into effect in July 2015 but this landfill is not regulated under this permit since it meets the exemption criteria for required closure activities. Storm water discharges associated with the South Chollas Landfill are regulated by General Order No. R9-2012-0001. Monitoring requirements for metals are currently regulated through semi-annual monitoring requirements found in General Monitoring and Reporting Program No. R9-2012-0002.
Groundwater Extraction Dischargers	TMDL requirements are included in Order No. R9-2015-0013 for groundwater extraction discharges to surface waters; effective October 1, 2015.

V. SITE-SPECIFIC WERs

When the Chollas Creek Metals TMDLs were developed, the San Diego Water Board used a default WER value of 1.0 because data was not available to determine a site-specific WER. Because the default WER is not based on site-specific conditions, the resulting TMDLs are not representative of actual site conditions compared to TMDLs incorporating site-specific WER values. The conditions of a water body, such as dissolved organic carbon (DOC) content, suspended solids, pH, and other physicochemical factors affect bioavailability. Metals that are less bioavailable are less toxic. Thus, a WER represents the correlation between a metal's concentration in a receiving water and its concentration biologically available and toxic to aquatic life.

WERs are generally computed as a specific pollutant's acute or chronic toxicity value measured in water from the site divided by the respective acute or chronic toxicity value in laboratory dilution water. The CTR allows for pollutant- and site-specific WERs to be determined as set forth in the *Interim Guidance on Determination and Use of Water Effect Ratios* or alternatively, other scientifically defensible methods adopted by the State as part of its water quality standards program and approved by USEPA. Based on this 1994 USEPA guidance, the City of San Diego conducted a study that began in 2010 and was completed in 2014, then produced a report on the study titled *Development of Site-Specific Water Quality Objectives for Trace Metals in Chollas Creek: Water-Effect Ratio Study for Copper and Zinc, and Recalculation of Lead* (WER Study), dated October 28, 2014 (see Appendix A).

Results of the WER Study demonstrate that the physicochemical conditions in Chollas Creek make copper and zinc less bioavailable and therefore, less toxic at a given concentration. The City of San Diego recommended replacing the default WER value of 1.0 with site-specific WERs of 6.998 for copper and 1.711 for zinc, based on the WER Study results. Because the recommended WER values are greater than 1.0, the current CTR water quality criteria based on a default value of 1.0 are more stringent than what is necessary to protect aquatic life beneficial uses in Chollas Creek. Therefore, site-specific WQOs for Chollas Creek can be set based on these WER values without compromising protection of aquatic life. As explained in the WER study, the site-specific WERs were developed for wet weather conditions and do not apply to dry weather conditions. Wet weather is typically defined in applicable monitoring requirements. It is commonly defined as a storm event with greater than 0.1 inch of rainfall. During dry weather, WERs are considered to be equal to the national and statewide default WER value of 1.0.

Generally speaking, copper and zinc can potentially threaten beneficial uses in ways other than aquatic toxicity effects. Development of site-specific WQOs specifically focused on aquatic toxicity since these are the impairments that have been identified in the TMDL process. However, the site-specific WQOs are intended to provide protection for all beneficial uses for Chollas Creek.

Establishing accurate WQOs has important implications for identifying appropriate management measures. Including the revised WER values into the numeric targets for the Chollas Creek Metals TMDLs will allow dischargers to plan for and properly size and construct any structural best management practices (BMPs) that may be necessary to achieve the WLAs that will protect the beneficial uses of Chollas Creek.

VI. PROPOSED BASIN PLAN AMENDMENT

The proposed Basin Plan amendment would update:

1) Chapter 3 of the Basin Plan to clarify the application of WERs in the CTR for developing site-specific WQOs; and
2) Chapter 7 of the Basin Plan to update the WER values and associated water quality criteria calculations.

A. Revisions to Chapter 3

Proposed revisions to the WQO discussion under Toxic Pollutants in Chapter 3 of the Basin Plan are shown below (text in blue underline indicates inserted text).

TOXIC POLLUTANTS

The USEPA promulgated a final rule prescribing water quality criteria for toxic pollutants in inland surface waters, enclosed bays, and estuaries in California on May 18, 2000 (The California Toxics Rule or “CTR;” [40 CFR 131.38]). CTR criteria constitute applicable water quality criteria in California. In addition to the CTR, certain criteria for toxic pollutants in the National Toxics Rule [40 CFR 131.36] constitute applicable water quality criteria in California as well.

Pursuant to 40 CFR 131.38(b)(2) and (c)(4)(iii), the CTR describes the method for calculating acute and chronic water quality objectives for metals, which are a function of hardness and a water effect ratio (WER). The default value of the WER is 1, unless a pollutant-specific and site-specific WER is established in a manner consistent with State and Federal law.

Site-Specific Water Quality Objectives for Toxic Pollutants:

Pollutant-specific and site-specific WERs have been established for the following water body and shall be used to establish site-specific objectives for pollutants contributing to acute and chronic toxicity. These site-specific objectives shall be calculated in accordance with the criteria maximum concentration (CMC) and criteria continuous concentration (CCC) methods set forth in the CTR.

Table 3-7. Pollutant-Specific Water Effect Ratios for Specific Water Bodies

Water Body	*Hydrologic Unit Basin Number*	*Applicable Extent*	*Constituent*	*Water Effect Ratio*
Chollas Creek[1]	*908.22*	*North and South Forks of Creek*	*Dissolved Copper*	*6.998*
			Dissolved Zinc	*1.711*

[1] The site-specific WER applies during "wet weather" as defined in applicable monitoring requirements. This is commonly defined as a storm event with greater than 0.1 inch of rainfall. During dry weather, the WERs are equal to 1.0.

Shelter Island Yacht Basin TMDL:

The Shelter Island Yacht Basin portion of San Diego Bay is designated as an impaired water body for dissolved copper pursuant to Clean Water Act section 303(d). A Total Maximum Daily Load (TMDL) has been adopted to address this impairment. See Chapters 2, Table 2-3, Beneficial Uses of Coastal Waters, San Diego Bay, footnote 3 and Chapter 7, Total Maximum Daily Loads.

Chollas Creek Metals TMDLs:

Chollas Creek is designated as a water quality limited segment for dissolved copper, lead, and zinc pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapters 2, Table 2-2, *Beneficial Uses of Inland Surface Waters, Footnote 3* and Chapter 7, Total Maximum Daily Loads. Pollutant-specific and site-specific WERs from Table 3-7 above are included in Chapter 7 for TMDLs for copper and zinc in Chollas Creek.

B. Revisions to Chapter 7

The Chollas Creek Metals TMDLs in Chapter 7 of the Basin Plan include equations in Table 7-21 used to express the CTR water quality criteria (numeric targets). These equations should be updated to replace the WERs set at 1 with a variable WER that allows for pollutant- and site-specific values. Proposed changes are shown below (text in red strikeout indicates deleted text, and text in blue underline indicates inserted text).

Table 7-21a. Water Quality Criteria /Numeric Targets for dissolved metals in Chollas Creek[1]

Metal	**Numeric Target for Acute Conditions: Criteria Maximum Concentration**	**Numeric Target for Chronic Conditions: Criteria Continuous Concentration**
Copper	~~(1)~~ WER * (0.96) * {e^ [0.9422 * ln (hardness) - 1.700]}	~~(1)~~ WER * (0.96) * {e^[0.8545 * ln (hardness) - 1.702]}
Lead	~~(1)~~ WER * {1.46203 – [0.145712 * ln (hardness)]} * {e^ [1.273 * ln (hardness) - 1.460]}	~~(1)~~ WER * {1.46203 – [0.145712 * ln hardness)]} * {e^[1.273 * ln (hardness) - 4.705]}
Zinc	~~(1)~~ WER * (0.978) * {e^ [0.8473 * ln (hardness) + 0.884]}	~~(1)~~ WER * (0.986) * {e^[0.8473 * ln (hardness) + 0.884]}

[1] The site-specific WER applies during “wet weather” as defined in applicable monitoring requirements. This is commonly defined as a storm event with greater than 0.1 inch of rainfall. During dry weather, the WERs are equal to 1.0.

Table 7-21b. Wet weather site-specific WERs for dissolved metals in Chollas Creek

Metal	**Site-Specific WER**
Copper	6.998
Zinc	1.711

C. Rationale for Basin Plan Amendment

The CTR water quality criteria, as incorporated into the Chollas Creek Metals TMDLs, utilize a default WER and do not currently incorporate site-specific WERs. Appendix H of the Technical Report for Resolution No. R9-2007-0043 states, “*If and when site-specific copper, lead, and zinc water quality objectives are developed for Chollas Creek, this TMDL will be modified accordingly*.” The City of San Diego WER Study provides the data to support the establishment of site-specific WQOs for copper and zinc in Chollas Creek using the recommended WERs.

A Basin Plan amendment is required to update the WER values and associated water quality criteria calculations for the Chollas Creek Metals TMDLs (Chapter 7 of Basin Plan). These updated water quality criteria calculations, based on site-specific WERs, will result in site-specific WQOs. In addition, the changes proposed for Chapter 3 will clarify the application of WERs in the CTR for developing site-specific WQOs since there may be other situations where the default CTR criteria are inappropriate for a particular water body.

The site-specific WQO approach for the Chollas Creek Metals TMDLs follows the process outlined in the CTR, and therefore, the proposed changes to the Basin Plan Chapter 7 do not compromise the CTR's criteria to protect against acute and chronic toxicity effects on aquatic life. The only difference is that the Chollas Creek site-specific WERs take into account the bioavailability of the pollutants and thus offer us a better understanding of what the highest protective in-stream concentrations of pollutants actually are.[10] Moreover, the WER procedure is consistent with the narrative toxicity WQOs in Chapter 3 of the Basin Plan. The objective of site-specific WERs is to protect against acute and chronic toxicity effects on aquatic life. Site-specific WERs simply provide a better understanding of protective concentrations of toxic substances.

VII. REGULATORY CONSIDERATIONS

This section discusses regulatory considerations required for the adoption of this Basin Plan amendment. The site-specific WQOs must be developed in a manner consistent with State and federal law and regulations. In accordance with the State's Porter-Cologne Water Quality Control Act (Division 7 of the Water Code), objectives must provide for the reasonable protection of beneficial uses based on consideration of the factors listed in Water Code Section 13241. In accordance with federal law (Clean Water Act) and regulations (40 CFR 131.11, revised as of July 1, 1997), the objectives must be based on sound scientific rationale and methods appropriate to the situation, and must protect the designated beneficial uses of the receiving water.

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[10] From the CTR:
CMC (Criteria Maximum Concentration) is the water quality criteria to protect against acute effects in aquatic life and is the highest in-stream concentration of a priority toxic pollutant consisting of a short-term average not to be exceeded more than once every three years on the average.

CCC (Continuous Criteria Concentration) is the water quality criteria to protect against chronic effects in aquatic life and is the highest in stream concentration of a priority toxic pollutant consisting of a 4-day average not to be exceeded more than once every three years on the average.

The subsections below discuss the project's compliance with federal requirements to consider downstream water quality, California Water Code section 13241 requirements, scientific peer review requirements of Health and Safety Code section 57004, California Environmental Quality Act (CEQA) requirements, and federal and State antidegradation policies.

A. Downstream Water Quality Considerations

Applicable federal regulations at 40 CFR 131.10(b) require that the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.

Chollas Creek discharges to San Diego Bay. The existing beneficial uses of San Diego Bay include the following:

- industrial service supply (IND),
- navigation (NAV),
- water contact recreation (REC-1),
- non-contact water recreation (REC-2),
- commercial and sport fishing (COMM),
- preservation of biological habitats of special significance (BIOL),
- estuarine habitat (EST),
- wildlife habitat (WILD),
- rare, threatened, or endangered species (RARE),
- marine habitat (MAR),
- migration of aquatic organisms (MIGR),
- spawning, reproduction, and/or early development (SPWN); and
- shellfish harvesting (SHELL).[11]

Although copper and zinc can potentially affect some of these beneficial uses, no Creek mouth or bay-wide impairments have been linked specifically to copper or zinc.

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[11] Beneficial uses of the coastal waters of the San Diego Region are contained in Table 2-3 of Chapter 2 in the Basin Plan.

Source Studies for Aquatic Toxicity

San Diego Bay at the mouth of Chollas Creek is listed as impaired for sediment toxicity and benthic community effects on the 303(d) List. Several toxicity studies have been performed at the mouth of Chollas Creek. One that evaluated chronic effects using sea urchin fertilization tests during wet weather was performed in 2000. Results indicated that copper and zinc at that time were present in sufficient concentrations to cause chronic toxicity measured in the heart of a runoff plume and in in-channel samples (Schiff et al, 2001). However, subsequent studies continued to explore the sources of toxicity and in 2011, SCCWRP finalized a report that included a more comprehensive evaluation of the chemicals likely to be causing toxicity at the mouth of Chollas Creek. This was based on a three-part study, including a joint sediment assessment with the U.S. Navy (2005). The study evaluated toxicity due to metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls, and pesticides in sediment and pore water (acute effects), and in the water column (chronic effects). The toxicity identification evaluations (TIEs) from the study indicated that most of the toxicity observed was associated with organic compounds and that Chlordane and PAHs, specifically, were probable causes of sediment toxicity. In addition, the chemical analyses from the study indicated that the bioavailability of metals in sediment and pore water was very low.

Bioavailability and Toxicity of Copper and Zinc

USEPA's Office of Water recommends the use of dissolved metal concentrations to set and measure compliance with water quality standards because dissolved metal concentrations more closely approximate the bioavailable fraction of metal in the water column than do total metal concentrations (USEPA, 1997). For both copper and zinc, the dissolved fraction, and hence the bioavailability and toxicity, is inversely related to the amount of DOC, suspended solids, pH, and other physicochemical factors. When DOC, suspended solids, or pH are higher in the water, copper and zinc are less toxic to aquatic life. Chollas Creek contains naturally high DOC concentrations, high suspended solids, and a neutral pH. These water quality characteristics of Chollas Creek reduce the potential for deleterious effects on aquatic life. The WER Study confirmed the low toxicity of copper and zinc as evidenced by WERs greater than 1.

The low toxicity of copper in Chollas Creek is also consistent with predictions based on the Biotic Ligand Model (BLM) for copper (USEPA, 2007).[12] BLM results for Chollas Creek, which are presented in the WER Study, confirmed that the proposed site-specific WER for copper is protective of aquatic life in Chollas Creek.

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[12] The BLM is a conceptual framework for estimating effects of certain metals to aquatic organisms. In 2007, the BLM became the basis for USEPA's recommended freshwater criteria for copper. The BLM has also been applied to zinc for development of water quality criteria, but has not yet been approved by USEPA for use for derivation of site-specific water quality criteria.

The assessment of bioavailability in the WER Study was on based freshwater conditions since the TMDLs apply to Chollas Creek itself, not to the mouth of Chollas Creek. However, the bioavailability of copper and zinc at the mouth of the creek can be evaluated qualitatively based on conditions that influence the partitioning of metals. Hydrologic and water quality conditions at the mouth of Chollas Creek promote reduced bioavailability of copper and zinc. Chollas Creek flow is primarily wet weather driven, which results in short duration, high flows that mix rapidly with Bay waters. Oxygenation during the mixing process promotes sorption of the metals to suspended sediments as carbonates, hydroxides, and other insoluble forms. Metals bound to sediments are not readily bioavailable to benthic organisms or other aquatic life because of the neutral pH and presence of natural agents that tightly bind these metals. And as noted previously, the low toxicity of copper and zinc in sediments at the mouth of Chollas Creek was demonstrated in studies aimed at identifying chemicals that cause toxicity at the Creek mouth.

In a recent study examining stormwater mixing dynamics and toxicity at the mouth of Chollas Creek and nearby outfalls to San Diego Bay, the U.S. Navy and Environmental Security Technology Certification Program (ESTCP) funded a demonstration of the Sediment Ecotoxicity Assessment Ring (SEA Ring) technology that included an assessment of toxicity and trace metal concentrations during a large storm event that occurred in San Diego in March 2014. Results of this study indicated no toxicity to embryo development of the Mediterranean mussel (Mytilus galloprovincialis) exposed both in the laboratory and in situ at a location that was most directly influenced by stormwater runoff from Chollas Creek (Rosen et al., 2015). The lack of toxicity using a sensitive early life stage test demonstrated that concentrations of copper and zinc were not bioavailable at toxic concentrations at the mouth indicating, at least in this particular instance, that proposed site-specific WQOs for Chollas Creek will also be protective of the downstream waters.

Site-Specific WQOs for Copper and Zinc

Adoption of site-specific WERs greater than 1 would result in less stringent numeric water quality criteria for the metals. However, these water quality criteria would be no less protective of aquatic life. The water quality criteria would simply be more representative of actual conditions than a default WER based on laboratory conditions. Site-specific WQOs would still require significant reductions of copper and zinc concentrations in the discharges from the Chollas Creek watershed to San Diego Bay compared to current copper and zinc discharges, which do not appear to be a source of aquatic toxicity in Chollas Creek or at the creek mouth under existing conditions. The load reductions are expected to result in reduced copper and zinc concentrations in the water column and sediments, which would be further protective of aquatic life in Chollas Creek and at the creek mouth.

San Diego Water Board Investigative Order No. R9-2015-0058 was adopted October 26, 2015 and requires sediment quality monitoring at the mouth of Chollas Creek. Although metals in sediments are not likely to compromise its beneficial uses, if these or other monitoring results or any future risk assessments reveal that copper or zinc at concentrations prescribed by the CTR do indeed compromise beneficial uses at the mouth of Chollas Creek, the TMDLs for metals in Chollas Creek would have to be revisited. However, as discussed above, this is not likely to be the case.

B. California Water Code Section 13241 Considerations

California Water Code section 13241 identifies six factors that must be considered when establishing a WQO.

1. Past, present and probable beneficial uses of water;
2. Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;
3. Water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area;
4. Economic considerations;
5. The need for developing housing within the region; and
6. The need to develop and use recycled water.

Each of these six factors is discussed below.

Past, Present and Probable Beneficial Uses of Water

The existing beneficial uses of Chollas Creek are non-contact water recreation (REC-2), warm freshwater habitat (WARM), and wildlife habitat (WILD) beneficial uses. Chollas Creek has also been identified as having a water contact recreation (REC-1) potential beneficial use.[13]

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[13] Development of site-specific WQOs specifically focused on aquatic toxicity since these are the impairments that have been identified in the TMDLs. Aquatic toxicity ties into warm freshwater habitat (WARM) and wildlife habitat (WILD) beneficial uses. Given the TMDL constituents and concentrations found in Chollas Creek, it is expected site-specific WQOs for copper and zinc would also be protective of non-contact water recreation (REC-2) and potential water contact recreation (REC-1) beneficial uses.

Incorporating site-specific WERs for copper and zinc in Chollas Creek are expected to support these existing and potential beneficial uses when the CTR values are achieved. USEPA recognizes that the national criteria for dissolved metals, including those for copper and zinc, might be more or less protective than anticipated, depending on the site-specific water quality conditions, such as DOC, suspended solids, and pH. As a consequence, USEPA developed several procedures for deriving site-specific WQOs for metals, including the WER procedure used to derive site-specific WQOs for copper and zinc in Chollas Creek.

The WER procedure compares the toxicity of a range of metal concentrations in the site water with the toxicity observed in the type of laboratory water relied on by USEPA to derive the national metals criteria and used in the CTR criteria. The side-by-side WER testing indicates whether the metal is more or less toxic in the site water as compared to the CTR criteria. The WER Study demonstrated that dissolved copper and zinc in Chollas Creek water are non-toxic to sensitive aquatic species at concentrations approximately 7 times and 1.7 times the original TMDL concentrations for copper and zinc, respectively. These original TMDL concentrations did not take into account conditions in Chollas Creek to develop site-specific WERs as there was not enough information available at the time. Instead, the TMDLs relied on default WERs of 1.0. Derivation of WQOs that take site-specific WERs into account does not change the intended level of protection prescribed by the CTR.

Information provided in aforementioned studies support the conclusion that the copper and zinc site-specific WQOs are not expected to have a negative impact on existing and potential beneficial uses when the CTR values are achieved. The load reductions that would be required with the proposed site-specific WQOs are expected to result in reduced copper and zinc concentrations in the water column and sediments, which would be further protective of aquatic life in Chollas Creek and at the creek mouth.

Environmental Characteristics of the Hydrographic Unit

The Chollas Creek watershed encompasses approximately 69.7 km^2 (17,223 acres) of the Pueblo San Diego Hydrologic Unit in the cities of San Diego, Lemon Grove, and La Mesa. The watershed is highly urbanized. Land use within the Chollas Creek watershed is predominantly residential with some commercial and military uses. A small portion of the watershed includes “tidelands” located immediately adjacent to San Diego Bay under the jurisdiction of the Port of San Diego and the U.S. Navy (Naval Base San Diego). The County of San Diego has jurisdiction over a small portion (less than 1.0 percent) of the watershed. A significant portion of the remaining watershed area is dominated by roadways and freeways.

Chollas Creek is an urban creek with highly variable flows. The highest flow rates are associated with storm events. Extended periods with no surface flows occur during dry weather, although pools of standing water may be present. The average annual rainfall in the watershed (from January 1948 through February 2006) measured in the City of La Mesa is approximately 12.9 inches (Western Regional Climate Center, 2006). Rainfall statistics for the San Diego International Airport (Lindbergh Field, located approximately 4 miles northwest of Chollas Creek, near San Diego Bay) indicate that an average of 18 storms occur each year (Weston Solutions, 2008).

Much of Chollas Creek has been channelized and concrete lined, but some sections of earthen creek bed remain. The presence of multiple degraded benthic communities was the basis for the State Water Board identifying Chollas Creek as a moderate priority candidate toxic hot spot in its Consolidated Toxic Hotspots Cleanup Plan (State Water Board, 1999). As discussed previously, the mouth of Chollas Creek, which is located on the eastern shoreline of the central portion of San Diego Bay, is also on the 303(d) List due to sediment toxicity and degraded benthic community impairments.

The environmental characteristics of the Chollas Creek watershed were considered in developing this Basin Plan amendment. The WER procedure inherently incorporates effects of DOC, suspended solids, pH, and other physicochemical factors that are known to affect the toxicity of metals such as copper and zinc. The lower toxicity of copper and zinc observed in Chollas Creek water as compared to laboratory water is indicative of the presence of these water quality constituents that decrease the bioavailability of metals. Achieving the CTR values for dissolved copper and zinc that incorporate the site-specific WERs for Chollas Creek proposed in this Basin Plan amendment are expected to improve the current environmental conditions of the water column and sediments within and downstream of the Chollas Creek watershed. However, if future monitoring results, e.g., from Investigative Order No. R9-2015-0058, or any future risk assessments reveal that these concentrations do compromise beneficial uses in Chollas Creek or at the creek mouth, TMDLs for metals in Chollas Creek must be revisited.

Water Quality Conditions That Could Reasonably Be Achieved

Water quality conditions that reasonably could be achieved through the coordinated control of factors affecting water quality in the area have been considered. Incorporating site-specific WERs for copper and zinc in Chollas Creek are expected to make achieving the CTR-based toxic pollutant WQOs more achievable. As noted previously, the WER procedure is designed to provide reasonable and adequate protection of aquatic life beneficial uses that is based on well documented relationships between certain natural water quality characteristics and the bioavailability and toxicity of these metals. Attainment of the dissolved copper and zinc WLAs through the compliance options identified in the Chollas Creek Metals TMDLs is a reasonably achievable water quality condition for the watershed. The Chollas Creek Metals TMDLs are implemented through regulatory mechanisms available to the San Diego Water Board, including but not limited to NPDES permits, waste discharge requirements (WDRs), Basin Plan prohibitions, conditional waivers, and enforcement actions. Use of site-specific WERs is expected to facilitate compliance with WQOs and implementation of the Chollas Creek Metals TMDLs.

Economic Considerations

Costs for attaining the dissolved copper and zinc CTR values that incorporate the site-specific WERs were considered in developing this Basin Plan amendment. The proposed amendments to incorporate the site-specific copper and zinc WERs into the CTR-based toxic pollutants WQOs and the Chollas Creek Metals TMDLs are expected to result in a reduction in the number and size of structural BMPs that dischargers select to implement to achieve the WLAs. Therefore, the potential costs from implementing the reasonably foreseeable methods of compliance for the Chollas Creek Metals TMDLs are expected to decrease as a result of the proposed amendments. As noted above, reductions in metals will still be needed to achieve the site-specific WQOs for Chollas Creek. This will include ongoing source reduction strategies and implementation of BMPs to reduce the contribution of metals to receiving waters. Adoption of the site-specific WQOs will result in the appropriate level of BMP implementation and associated costs, as well as allowing for prioritization of limited resources to address other water quality problems in the region.

Need for Developing Housing with the Region

The need for developing housing within the region has been considered. The incorporation of site-specific copper and zinc WERs into the CTR-based toxic pollutant WQOs and the Chollas Creek Metals TMDLs are not expected to have an impact on the need for developing housing in the Chollas Creek watershed or the San Diego Region. The requirement to meet site-specific WQOs would not require increased costs for homeowners to manage stormwater. In fact, the site-specific WQOs are expected to result in a reduction in the number and size of structural BMPs that dischargers are required to implement to achieve the WLAs. Therefore, compliance requirements that may affect housing development are expected to be less demanding.

Need to Develop and Use Recycled Water

The need for developing and using recycled water has been considered. Currently, there are no authorized recycled water discharges to Chollas Creek. The difference in the allowable copper and zinc concentrations with or without considering site-specific WERs is not significant relative to potential impacts on the development or use of recycled water. In addition, any future authorized discharges would also have to meet CTR objectives and TMDL requirements. Therefore, the incorporation of site-specific copper and zinc WERs into the CTR-based toxic pollutant WQOs and the Chollas Creek Metals TMDLs are not expected to have an impact on the need to develop and use recycled water in the Chollas Creek watershed or elsewhere in the San Diego Region.

C. Scientific Peer Review

The scientific basis for the Chollas Creek Metals TMDLs went through an external scientific peer review pursuant to Health and Safety Code section 57004.

The scientific basis of the Chollas Creek Metals TMDLs is the CTR. The CTR was promulgated by the USEPA and allows for the development and incorporation of site-specific WERs in accordance with USEPA's *Interim Guidance on Determination and Use of Water Effect Ratios for Metals.* The City of San Diego conducted its WER Study for Chollas Creek following the procedures in this guidance and based on sound scientific processes.

The proposed Basin Plan amendment, WER Study, and CEQA documents also went through a scientific peer review consistent with the requirements of Health and Safety Code section 57004. The San Diego Water Board has considered and responded to all comments submitted by the peer reviewers and has revised this technical report accordingly, as appropriate. Peer reviewer comments and San Diego Water Board responses are provided in Appendix B.

D. CEQA Analysis

CEQA Public Resources Code (PRC) Section 21000 et seq., and the CEQA Guidelines require the San Diego Water Board to analyze and disclose potential adverse environmental effects of a proposed Basin Plan amendment. Pursuant to PRC section 21080.5, the Resources Agency has approved the regional water boards' basin planning process as a "certified regulatory program" that satisfies the CEQA requirements for preparing environmental documents (California Code of Regulations, Title 14 (14 CCR) section 15251(g) and 23 CCR section 3775).

Because CEQA has specific provisions governing the adoption of regulations such as the regulatory provisions of basin plans that establish "performance standards" or treatment, the San Diego Water Board previously prepared "substitute environmental documents" for the Chollas Creek Metals TMDLs project.[14] The substitute environmental documents satisfied the requirements on the CEQA provisions to perform an environmental analysis of the reasonably foreseeable methods of compliance with the TMDLs prior to the adoption of the Basin Plan amendment (23 CCR section 3777). Specifically, the San Diego Water Board had to provide at least the following:

1. A summary of the proposed TMDL Basin Plan amendment including an analysis of issues voiced by the public during the course of the TMDL Basin Plan development;
2. Identification of any reasonably foreseeable environmental effects, using the Environmental Checklist Form, and an analysis of the impacts of implementation methods that may be employed to comply with the TMDL Basin Plan amendment;
3. An analysis of the reasonably foreseeable feasible mitigation measures relating to the environmental effects; and
4. An analysis of reasonably foreseeable alternatives to the proposed TMDL Basin Plan amendment.

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[14] 14 CCR section 21065 defines a "project" as an activity which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and which is any of the following:

a. An activity directly undertaken by any public agency.
b. An activity undertaken by a person which is supported, in whole or in part, through contracts, grants, subsidies, loans, or other forms of assistance from one or more public agencies.
c. An activity that involves the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more public agencies.

The substitute environmental documents that provided this required documentation consist of the Technical Report and Resolution No. R9-2007-0043 for the Chollas Creek Metals TMDLs. In preparing these substitute environmental documents, the San Diego Water Board considered the requirements of PRC section 21159 and 14 CCR section 15187, and intended those documents to serve as a tier 1 environmental review. The "tier" approach allows the San Diego Water Board to limit its review analysis to the broad environmental issues at the Basin Plan amendment adoption stage. The San Diego Water Board is not required, at the Basin Plan amendment adoption stage, to evaluate environmental issues associated with specific projects to be undertaken later to comply with the requirements of the Basin Plan amendment. The previous substitute environmental documents contained significant environmental analysis and numerous findings related to the reasonably foreseeable methods of compliance, the impacts of such methods of compliance, feasible mitigation measures, and alternative means of compliance.

The environmental analysis of this current proposed Basin Plan amendment, performed pursuant to 14 CCR section 15164, constitutes an "addendum" to the previously prepared substitute environmental documents for the establishment of the Chollas Creek Metals TMDLs. This addendum addresses potential environmental effects of changes to the project; those that pertain to establishment of site-specific WQOs for copper and zinc by incorporating their respective site-specific WERs into CTR-based TMDL calculations.

On September 24, 2015, the San Diego Water Board held a CEQA scoping meeting to provide information on the proposed Basin Plan amendment and gather public input on the addendum. The only environmental concern raised at the meeting was the potential for downstream impacts at the mouth of Chollas Creek and in San Diego Bay due to less stringent numeric water quality criteria for the metals. San Diego Water Board staff and City of San Diego technical consultants explained that these water quality criteria would be no less protective of aquatic life. The San Diego Water Board has determined that the incorporation of site-specific WERs will not worsen or exacerbate downstream impacts because the WER-adjusted WQOs are not expected to result in metals accumulation in the water column or sediments at levels that compromise protection of the beneficial uses. Furthermore, incorporation of site-specific WERs are unlikely to result in any additional implementation actions for the reasons discussed below.

BMPs

The proposed Basin Plan amendment will not result in implementation actions that impact the environment. The BMPs to comply with the proposed revised TMDLs are anticipated to be of similar nature to BMPs required to comply with the original TMDLs; in the case of structural BMPs, fewer may be needed and/or they may be sized smaller to achieve site-specific WQOs. The reduction in the number and size of structural BMPs will reduce the severity of potential effects on the environment. Therefore, the potential impacts to the environment from the reasonably foreseeable methods of compliance for the site-specific WQOs and the Chollas Creek Metals TMDLs are expected to decrease as a result of the proposed amendments. Moreover, no additional reasonably foreseeable methods of compliance warrant environmental analysis pursuant to PRC section 21159 and 14 CCR section 15187. The adoption of the site-specific WQOs will result in the appropriate level of BMP implementation based on site-specific characteristics of the water body (water quality characteristics and sediment quality) and support the prioritization of management efforts.

Analyses conducted as part of the 2016 Water Quality Improvement Plan (WQIP) for San Diego Bay indicate that adoption of the site-specific WQOs will still require load reductions (San Diego Bay Responsible Parties, 2016). Zinc will require the greatest load reduction (29.1 percent). As discussed in the WQIP, strategies that are targeted to reduce zinc will result in corresponding load reductions for copper, lead, and other associated pollutants. Thus, even with the adoption of site-specific WQOs, non-structural and structural BMPs will still need to be implemented to reduce loadings to the receiving waters, albeit at a reduced level as compared to non-site-specific WQO required load reductions. Additionally, source control efforts for lead (banned in products such as gasoline for decades) and copper (brake pad legislation) are expected to also reduce metal loadings in the watershed. Therefore, even though the site-specific WERs will result in higher numeric values for WQOs, WLAs, and WQBELs, management actions in the watershed are expected to reduce current loadings rather than increase concentrations and all beneficial uses will still be protected. The adoption of the site-specific WQOs will simply result in the appropriate level of BMP implementation based on site-specific characteristics of the water body and support the prioritization of management efforts.

Receiving Water Concentrations

The site-specific WQOs are lower than current concentrations in Chollas Creek so implementing the site-specific WQOs will reduce metals concentrations in Chollas Creek. Although these site-specific WQOs are higher than the WQOs in the original Chollas Creek Metals TMDLs, they are not expected to result in new significant effects or increase the severity of previously identified significant effects because these WQOs are no less protective of beneficial uses. The proposed site-specific WQOs, which were developed in accordance with the CTR, would simply be more representative of actual conditions.

A response to the concern raised at the CEQA scoping meeting was provided in writing and posted on the San Diego Water Board web site on February 5, 2016. It is also addressed in section VII.B of this report. If future monitoring in Chollas Creek or its mouth at San Diego Bay do demonstrate that the beneficial uses are not being achieved, then the WER, as well as reasonably foreseeable compliance methods, will be re-evaluated at that time.

Necessity for Subsequent Environmental Documents

Consistent with 14 CCR section 15162, the San Diego Water Board has determined that no subsequent environmental documents are necessary because the proposed amendment does not appear to involve new significant environmental effects, a substantial increase in the severity of previously identified significant effects, or mitigation measures or alternatives that are considerably different from those analyzed in the previous substitute environmental documentation. Additionally, the CEQA addendum has undergone external peer review to, in part, give third party experts an opportunity to advise if they believe this Basin Plan amendment could result in previously unidentified significant environmental effects, mitigation measures, or alternatives. Neither peer reviewer noted areas of concern related to the scientific rationale used to support the CEQA addendum, which consists of a discussion in the technical report, a standard CEQA checklist, and the response to comments concerning potential downstream impacts (see Appendix B).

Accordingly, the San Diego Water Board may rely on this addendum in conjunction with the existing substitute environmental documents for the Chollas Creek Metals TMDLs to provide CEQA compliance in adopting the proposed Basin Plan amendment.

E. Antidegradation

This Basin Plan amendment conforms with the federal Antidegradation Policy described in 40 CFR 131.12, and State Water Board Resolution No. 68-16, *Statement of Policy with Respect to Maintaining High Quality Waters in California*. The Basin Plan amendment has the potential to allow degradation to water quality because use of site-specific WERs increases the permissible copper and zinc loadings in Chollas Creek.

The San Diego Water Board has the discretion to authorize degradation if the degradation is consistent with the conditions established in federal and State antidegradation policies. An antidegradation analysis must consider the following:

1. Whether a reduction in water quality will be consistent with maximum benefit to people of the State;
2. Whether a reduction in water quality will not unreasonably affect actual or potential beneficial uses; and
3. Whether water quality will fall below WQOs set to protect beneficial uses as prescribed in the Basin Plan.

The implementation of the site-specific WQOs is expected to consider these antidegradation factors based on the following:

Maximum Benefit to People of the State

Any reduction in water quality from the adoption of a site-specific WER will be consistent with maximum benefit to people of the State because it promotes achieving the WQOs in the Chollas Creek Metals TMDLs. Existing WQOs reflect lab conditions and are overly conservative in light of actual site conditions. Compliance with existing WQOs is costly and results in marginal benefit to water quality at concentrations lower than the site-specific objectives. By adjusting WQOs with a site-specific WER, there will be reduced costs and reduced associated impacts due to implementation of the site-specific WQOs as compared to the existing WQOs because fewer BMPs will need to be implemented.

Other water quality improvement projects could benefit from the money saved by applying the site-specific WQOs. The proposed site-specific WQOs provide a level of protection equivalent to the original TMDL WLAs at a reduced level of water quality improvement project implementation. Because of this, public funds can be spent on other water quality improvement projects. A decrease in water quality improvement project implementation costs will reduce the burden on local economy, and money that would have been spent on copper and/or zinc control measures may be shifted to other priorities and/or may reduce the significant funding obligations public agencies will face in meeting water quality requirements for copper and zinc. The decrease in costs due to the application of the site-specific WQOs will help reduce costs the communities would face from the implementation of BMPs to comply with the existing TMDL WLAs.

Moreover, there will be reduced potential environmental impacts resulting from the construction of fewer structural BMPs as a result of applying the site-specific WQOs, including reduced energy use and greenhouse gas emissions, which will support reduction goals for greenhouse gases outlined in AB32. Implementation of water quality improvement projects has potential adverse impacts to the environment arising from the installation, operation, and maintenance of structural BMPs and ongoing activities related to nonstructural BMPs. Adverse environmental impacts that are likely to occur during the installation of structural BMPs include increased traffic, noise, air pollution, and land disturbance. Implementation of the TMDLs with site-specific WQOs will reduce the number and size of BMPs required to meet the TMDLs and, given the significant or potentially significant effect on the environment associated with BMP implementation, reduced levels of BMP implementation will also reduce potential adverse environmental impacts.

Beneficial Uses & Prescribed WQOs

The reduction in water quality caused by application of the site-specific WQOs will not unreasonably affect actual or potential beneficial uses nor will water quality fall below WQOs set to protect beneficial uses as prescribed in the Basin Plan. While the proposed site-specific WQOs allow for an increase in copper and zinc loading and higher in-stream concentrations above existing WQOs, they are not expected to adversely affect existing or potential beneficial uses of Chollas Creek or downstream waters. The WER procedures, developed by USEPA and used as the basis for the proposed modifications, are designed to result in site-specific WQOs that are equally protective of aquatic life (and as a result equally protective of all other beneficial uses) as intended for the national criteria. Additionally, all San Diego Water Board actions affecting the Chollas Creek Watershed will continue to require an independent antidegradation analysis before a discharge can be authorized by the San Diego Water Board.

PUBLIC PARTICIPATION

Public participation is an important component of basin planning projects. The federal regulations at 40 CFR 25 and State law at California Water Code section 13244 require that basin planning projects be subject to public review. Public participation was provided through the San Diego Water Board's Basin Plan amendment process, which included a public workshop and CEQA scoping meeting, a formal public comment period, and a public hearing. These public meetings and hearings have been conducted, as required for all programs under the Clean Water Act, consistent with 40 CFR 25.5 and 25.6. The public participation and major milestones were as follows:

Date	Event
August 29, 2015	Notice of public workshop and CEQA scoping meeting
September 24, 2015	Public workshop and CEQA scoping meeting
September 28, 2016	Tentative resolution, draft Basin Plan amendment, and draft technical report available for public review
September 28, 2016 to October 31, 2016	Public comment period
September 29, 2016	Notice of public hearing
October 31, 2016	Notice of filing
December 14, 2016	Public hearing

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APPENDIX A

CHOLLAS CREEK
COPPER AND ZINC
WATER-EFFECT RATIO STUDY

Item 10
Supporting Document No. 2
December 14, 2016

Development of Site-Specific Water Quality Objectives for Trace Metals in Chollas Creek: Water-Effect Ratio Study for Copper and Zinc, and Recalculation for Lead

October 28, 2014

Submitted by:

think BLUE
SAN DIEGO

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Table of Contents

List of Tables

List of Figures

Appendices

Acronyms and Abbreviations

APHA	American Public Health Association
BLM	Biotic Ligand Model
BMP	Best Management Practice
CCC	Criteria Continuous Concentration
CMC	Criteria Maximum Concentration
COC	Chain-of-Custody
CRG	CRG Marine Laboratories, Inc.
CRM	Certified reference material
CTR	California Toxics Rule
CWA	Clean Water Act
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
DMW	Dilute Mineral Water
FACR	Final Acute–Chronic Ratio
FAV	Final Acute Value
GC-MS	Gas Chromatography-Mass Spectrometry
GMAV	Genus Mean Acute Value
HDPE	High Density Polyethylene
ICP-MS	Inductively Coupled Plasma-Mass Spectrometry
LC50	Median Lethal Concentration
LDPE	Low Density Polyethylene
LWA	Larry Walker Associates
MDR	Minimum Data Requirement
MLS	Mass Loading Station
MS4	Municipal Separate Storm Sewer System
NEXRAD	Next Generation Radar
PAH	Polycyclic Aromatic Hydrocarbon

PCB	Polychlorinated Biphenyl
POTW	Publically Owned Treatment Works
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QPF	Quantitative Precipitation Forecast
Regional Board	California Regional Water Quality Control Board, San Diego Region
RPD	Relative Percent Difference
SMACR	Species Mean Acute–Chronic Ratio
SM	Standard Methods
SMAV	Species Mean Acute Value
SMACR	Species Mean Acute–Chronic Ratio
SOPs	Standard Operating Procedures
SRM	Standard Reference Material
SSO	Site-Specific Objective
State Board	California State Water Resource Control Board
TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
WER	Water-Effect Ratio
WESTON	Weston Solutions, Inc.
WGS 84	World Geodetic System 1984
WLA	Waste Load Allocation
WQC	Water Quality Criteria
WQO	Water Quality Objective

Units of Measure

cfs	cubic feet per second
°C	degrees Celsius
ft	feet or foot
in	inches
L	liter
µg/L	microgram per liter
mg/L	milligram per liter
mL	milliliter
ng/L	nanogram per liter
ppb	parts per billion

EXECUTIVE SUMMARY

The Site-Specific Water Quality Objectives for Trace Metals in Chollas Creek: Water-Effect Ratio Study for Copper and Zinc, and Recalculation for Lead Study (Chollas Creek SSO Study or Study) was conducted to develop site-specific water quality objectives (WQOs) for Chollas Creek in accordance with the California Toxics Rule (CTR) for dissolved metals. The CTR was used for the basis of the Chollas Creek Dissolved Copper, Lead, and Zinc Total Maximum Daily Load (Metals TMDL), which incorporated a provision for developing site-specific objectives (SSOs). The development of SSOs is applicable when there is reason to believe that either natural water quality conditions and/or the types of biota that can occur at the site are different from those that were used to derive the national criteria. In the case of Chollas Creek, the current hardness-based CTR criteria for copper and zinc were identified as potentially overprotective because of the water quality characteristics of the site water. The SSO is a scientifically developed WQO that takes into account all chemical factors present (e.g., total organic carbon, alkalinity, sulfate, and pH), and not only hardness, to assess the bioavailability of a given metal (USEPA 1994a, 1997). This report presents the results of a series of Water-Effect Ratio (WER) tests conducted to develop proposed site-specific WQOs for copper and zinc in Chollas Creek. A proposed site-specific objective for lead was also derived using the recalculation procedure developed. The recalculation procedure takes into account new or revised toxicity testing results for aquatic species exposed to lead to develop up-to-date criteria.

WER studies can result in more or less protective criteria depending on site-specific conditions of the given waterbody. The United States Environmental Protection Agency (USEPA) recommends a WER procedure (i.e., a criteria adjustment factor accounting for the effect of site-specific water characteristics on pollutant bioavailability and toxicity to aquatic life) for determining site-specific values in the 1994 *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals* [Interim Guidance] (EPA-823-B-94-001). Specifically, use of the WER Procedure is to account for any difference that exists between the toxicity of a pollutant in laboratory dilution water and its toxicity in site water (USEPA 1994b; Regional Board 2007).

The CTR WQO equations are currently based on the inverse relationship between hardness and toxicity. The CTR lists a criteria maximum concentration (CMC) (i.e., acute criteria) and criteria continuous concentration (CCC) (i.e., chronic criteria) calculated using hardness concentrations from each sampling event to determine the WQOs for each dissolved metal (Regional Board 2007). In the Metals TMDL, the San Diego Regional Water Quality Control Board (Regional Board) indicated it was the responsibility of the named dischargers to develop the WER and SSO, if determined feasible. In the case of Chollas Creek, the potential cost of treatment best management practices (BMP) were estimated to be significant to comply with the existing water quality criteria, thus it was determined by the dischargers that investigation of a WER(s) and SSO(s) were necessary as an integral step in developing a protective and cost-effective TMDL implementation strategy.

The objective of the Chollas Creek SSO Study was to conduct the science to, if appropriate, establish SSOs for dissolved copper, lead, and zinc, for Chollas Creek. The Chollas Creek SSO Study was conducted in accordance with USEPA’s Interim Guidance. WER sampling sites were located near the mouth of the north and south forks of Chollas Creek (SD8(1) and DPR2, respectively). The two sites are located at the TMDL compliance monitoring stations. An additional program objective was to determine whether these two sites demonstrate statistically different WERs and whether or not a single WER and SSO can be applied to the whole watershed. Confirmation testing with a secondary species was performed for both copper and zinc. Finally, testing was completed on samples that combined copper and zinc to test whether additivity or synergism of the metals would affect WER results. The results of the WER component of the Study are presented in Table ES-1 for dissolved copper and dissolved zinc.

Table ES-1. Final Dissolved Copper and Zinc Water-Effect Ratios for SD8(1) – North Fork and DPR2 – South Fork of Chollas Creek (Geometric Mean)

Station	Copper WER	Zinc WER
SD8(1) –North Fork (n=4)	9.307	2.223
DPR2 –South Fork (n=4)	6.998	1.711

Lead WERs were not pursued because of the insolubility of lead in neutral waters, such as are found in Chollas Creek. Lead solubility curves indicate that significant lowering of hydrogen ion concentration (pH) would be required to solubilize the lead in laboratory test solutions. As an alternative to a WER, USEPA's recalculation procedure was used as an updated toxicity dataset was available from USEPA. On the basis of the available USEPA aquatic toxicity data, new freshwater CMC and CCC criteria for dissolved lead were developed as part of this study and resulted in the following hardness based criteria equations:

$$\text{Final Acute Equation}_{\text{Dissolved}} = (1.46203 - \ln(\text{hardness}) * 0.145712) * e^{1.466*\ln(\text{hardness})-1.882}$$

$$\text{Final Chronic Equation}_{\text{Dissolved}} = (1.46203 - \ln(\text{hardness}) * 0.145712) * e^{1.466*\ln(\text{hardness})-3.649}$$

Evaluation of Results

Historical data for both SD8(1) and DPR2 collected during wet weather as part of the TMDL compliance monitoring program were evaluated to compare the number of exceedances of existing criteria in the TMDL to new site-specific criteria based on the copper and zinc WERs and the lead recalculation. Based on the evaluation and comparison to historical results, there were no exceedances in the south fork site DPR2 for any metal. In the north fork, there was one exceedance of the chronic dissolved copper criteria and no other exceedances.

Recommendations

The lead recalculation and WER values for copper and zinc derived from studies on storm water from Chollas Creek present scientifically based SSOs that are protective of beneficial uses following the recommendations of the CTR for metals criteria. On the basis of this information, a recommendation is made to incorporate these values in the TMDL for Chollas Creek as shown in Table ES-2.

Table ES-2. Recommended Numeric Targets for Specified Metals in the Chollas Creek Watershed

	CMC (acute)	CCC (chronic)
Dissolved Copper[1]	(WER)*(0.96)*{e^[(0.9422*ln(hardness))-1.700]}*0.9	(WER)*(0.96)*{e^[(0.8545*ln(hardness))-1.702]}*0.9
Dissolved Lead	(WER)*(1.46203 – ln(hardness) * 0.145712) * {e^(1.466*ln(hardness)-1.882)}	(WER)*(1.46203 – ln(hardness) * 0.145712) * {e^(1.466*ln(hardness)-3.649)}
Dissolved Zinc[1]	(WER)*(0.978)*{e^[(0.8473*ln(hardness))+0.884]}*0.9	(WER)*(0.986)*{e^[(0.8473*ln(hardness)) +0.884]}*0.9

Notes: ln = natural log function; e = exponential function

1. During wet weather, the WERs for dissolved copper and dissolved zinc are 6.998 and 1.711, respectively. During dry weather the WERs are equal to 1.

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1 INTRODUCTION

The Site-Specific Water Quality Objectives for Trace Metals in Chollas Creek: Water-Effect Ratio Study for Copper and Zinc, and Recalculation for Lead Study (Chollas Creek SSO Study or Study) was conducted to develop site-specific water quality objectives (WQOs) for Chollas Creek in accordance with the California Toxics Rule (CTR) for dissolved metals (USEPA 2000). The CTR is used for the basis of the Chollas Creek Dissolved Copper, Lead, and Zinc Total Maximum Daily Load (Metals TMDL), which incorporates a provision for developing site-specific objectives (SSOs). A Water-Effect Ratio (WER) Work Plan (Weston 2010) and initial report of results (Weston 2011) were submitted previously the San Diego Regional Water Quality Control Board (Regional Board). The following presents an update to the initial analysis, includes additional testing results, and presents the final results and recommendations of the Study.

1.1 Site Description

Chollas Creek flows through the City of San Diego, California, and empties to the eastern shoreline of San Diego Bay. The Chollas Creek watershed encompasses approximately 16,270 acres consisting predominately of urbanized land within San Diego County (Figure 1-1). The area draining to the north fork of the watershed (9,276 acres) is larger than the south fork (6,997 acres). The upper drainage area of the Chollas Creek watershed includes the cities of Lemon Grove and La Mesa.

Land use in the Chollas Creek watershed is predominantly residential (48%) and roads (22%), as shown in Figure 1-2.The remaining watershed land uses consist of commercial and industrial facilities and landfills (7%), open space (7%), freeways and highways (5%), schools (3.5%), cemeteries (1.5%), and other miscellaneous land uses. The Chollas Creek watershed includes Chollas Lake, a 16-acre waterbody located north of Highway 94 in the northeast portion of the watershed.

As a consequence of these diverse land uses, numerous sources discharge to Chollas Creek. Residential, industrial, and commercial discharges to Chollas Creek are associated with the portions of the cities of San Diego, Lemon Grove, and La Mesa located within the watershed. In addition, Caltrans is responsible for discharges from the California State Highway System, which possesses its own Municipal Separate Storm Sewer System (MS4) Permit (Order No. 2012-0011-DWQ) (State Board 2012). The Port of San Diego (Port), the Navy, and San Diego County each hold jurisdiction over approximately 1 percent of the Chollas Creek watershed. A small portion of the watershed consists of tidelands immediately adjacent to San Diego Bay. Some of this tideland area is under the jurisdiction of the Port, and the remainder falls under the jurisdiction of the Navy. The apportionment of Chollas Creek watershed by discharger is presented in Table 1-1.

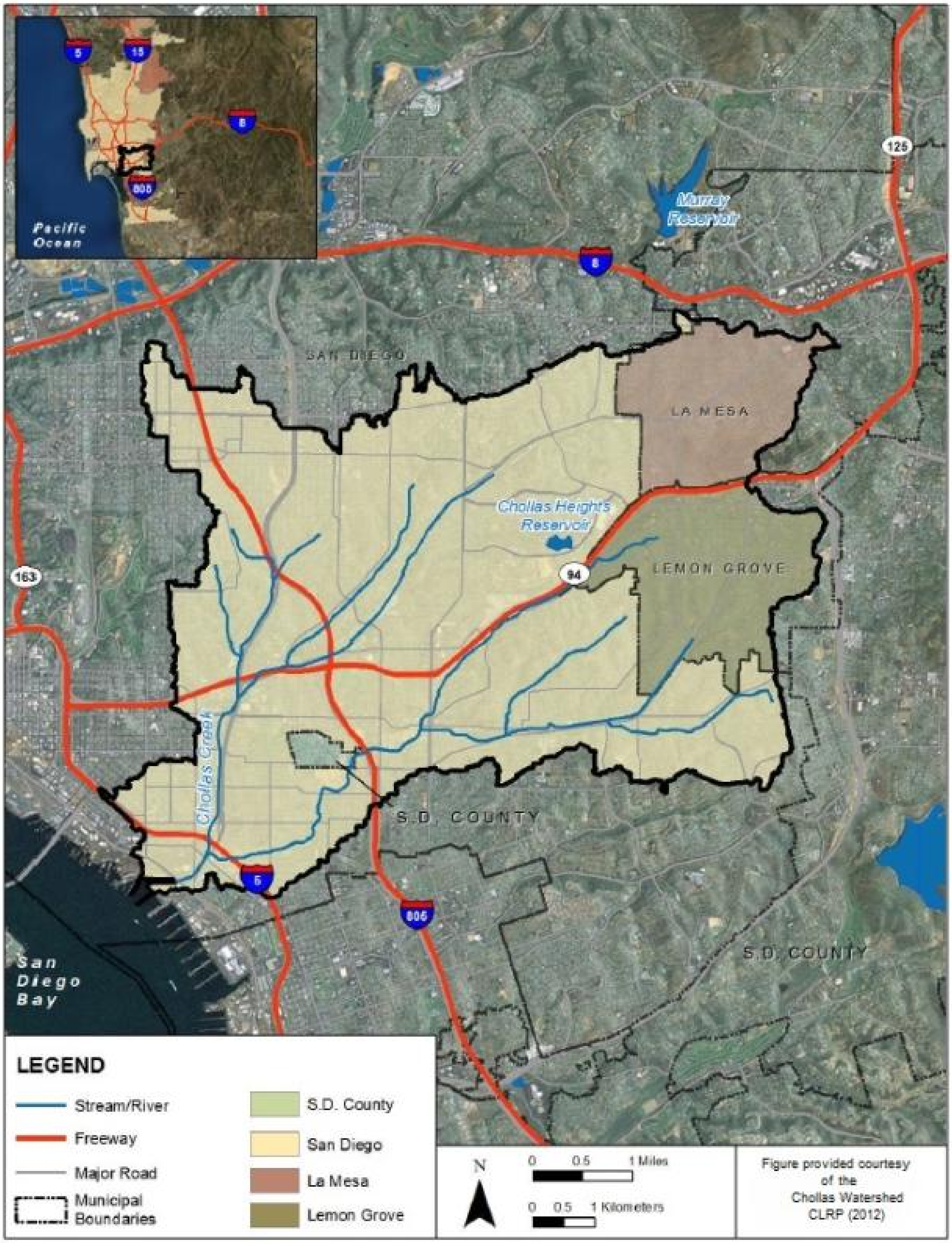


Figure provided courtesy of the Chollas Watershed CLRP (2012)

Figure 1-1. Aerial View of the Chollas Creek Watershed

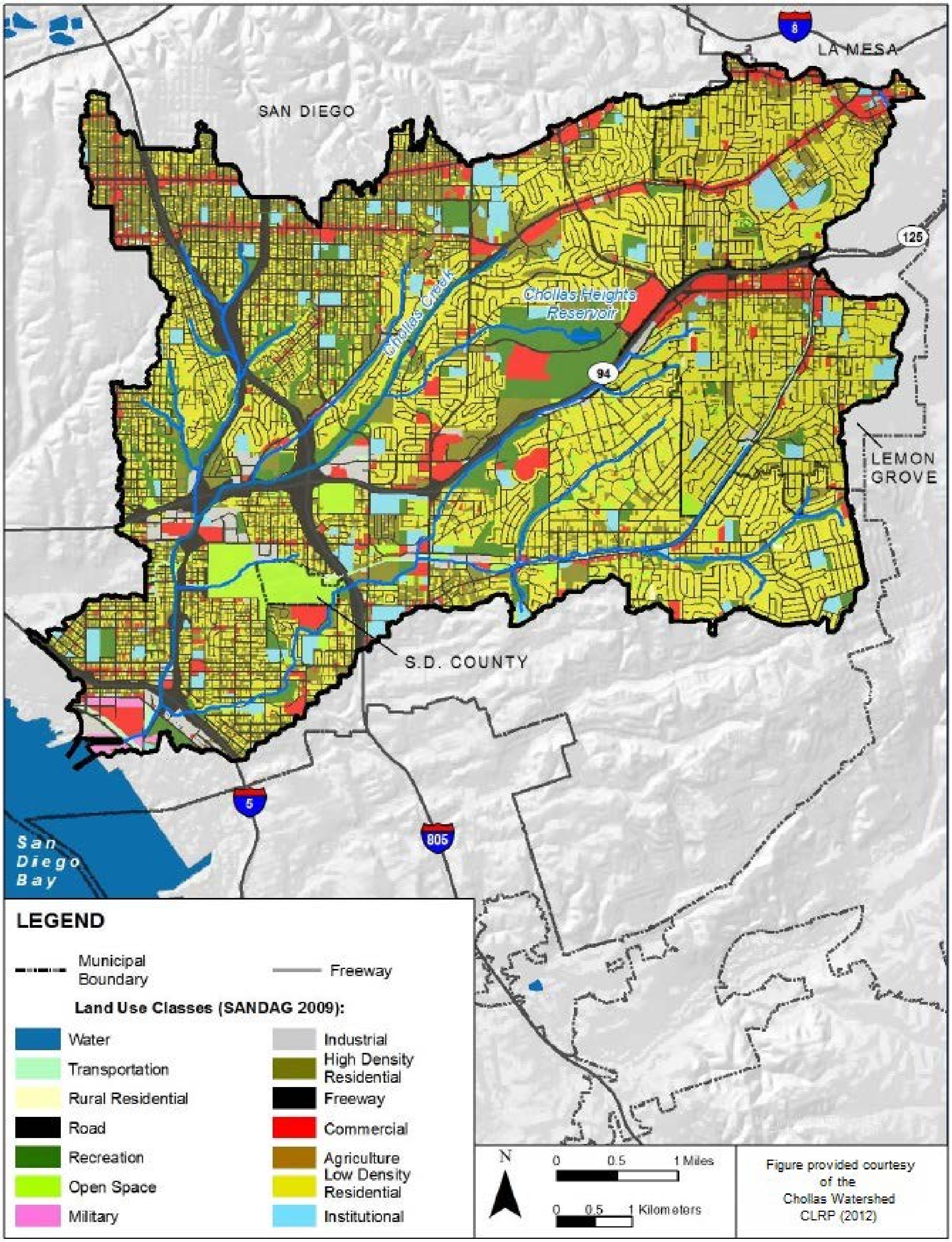


Figure 1-2. Chollas Creek Vicinity and Land Use Map

Table 1-1. Jurisdictional Apportionment of the Chollas Creek Watershed

Discharger	**Portion (%) of the Chollas Creek Watershed**[1]
Caltrans	5
City of San Diego	72
City of Lemon Grove	12
City of La Mesa	9
County of San Diego	1
Port of San Diego	1
Navy	1

[1] Approximately 3.5% of the Chollas Creek watershed is under the jurisdiction of other agencies not named in the 2007 version of the Dissolved Metals TMDL. This Table has not distinguished the jurisdictions of the Dischargers named in the Dissolved Metals TMDL and other agencies.

1.2 Rainfall, Soil Permeability, and Chollas Creek Flows

Rainfall, low soil permeability, and heavy urbanization significantly influence the flows in Chollas Creek. The annual rainfall at Lindbergh Field, a rain gauge located outside of the Chollas Creek watershed, demonstrates an average of only 10.23 inches, based on a century of historical data. In addition to low rainfall, the Chollas Creek watershed is generally characterized by poorly draining soils and compacted urban lands based on United States Department of Agriculture Natural Resources Conservation Service surveys (Figure 1-3). Geotechnical investigations conducted by the City of San Diego in 2007 in the Chollas Creek watershed indicated that soils within the upper 10–20 feet of the surface in the mesa areas generally have a very low permeability, with only soils along the creek demonstrating higher permeability. The topography of the watershed is characterized by generally built-out urbanized mesas with steep-side slopes that drain to open canyons (Figure 1-4). The heavy urbanization of the mesas and abundant freeway infrastructure have altered flow characteristics through a significant increase in impervious surfaces and reduced storage and retention of these flows, resulting in increased volume and velocity of storm water flows in Chollas Creek.

Because of low rainfall in the area, Chollas Creek is a dry channel with intermittent inputs of urban runoff from groundwater seeps, lawn watering, and other activities under ambient conditions. During rainfall events in the Watershed, Chollas Creek flows respond in a relatively short time frame (i.e., hours). Peak flows occur rapidly (i.e., short time of maximum flow volume and velocity) during the rainfall event and then return back to little or no flow, usually within 2 days. Most rain events and associated flows occur between October and March with little to no rain from April to September.

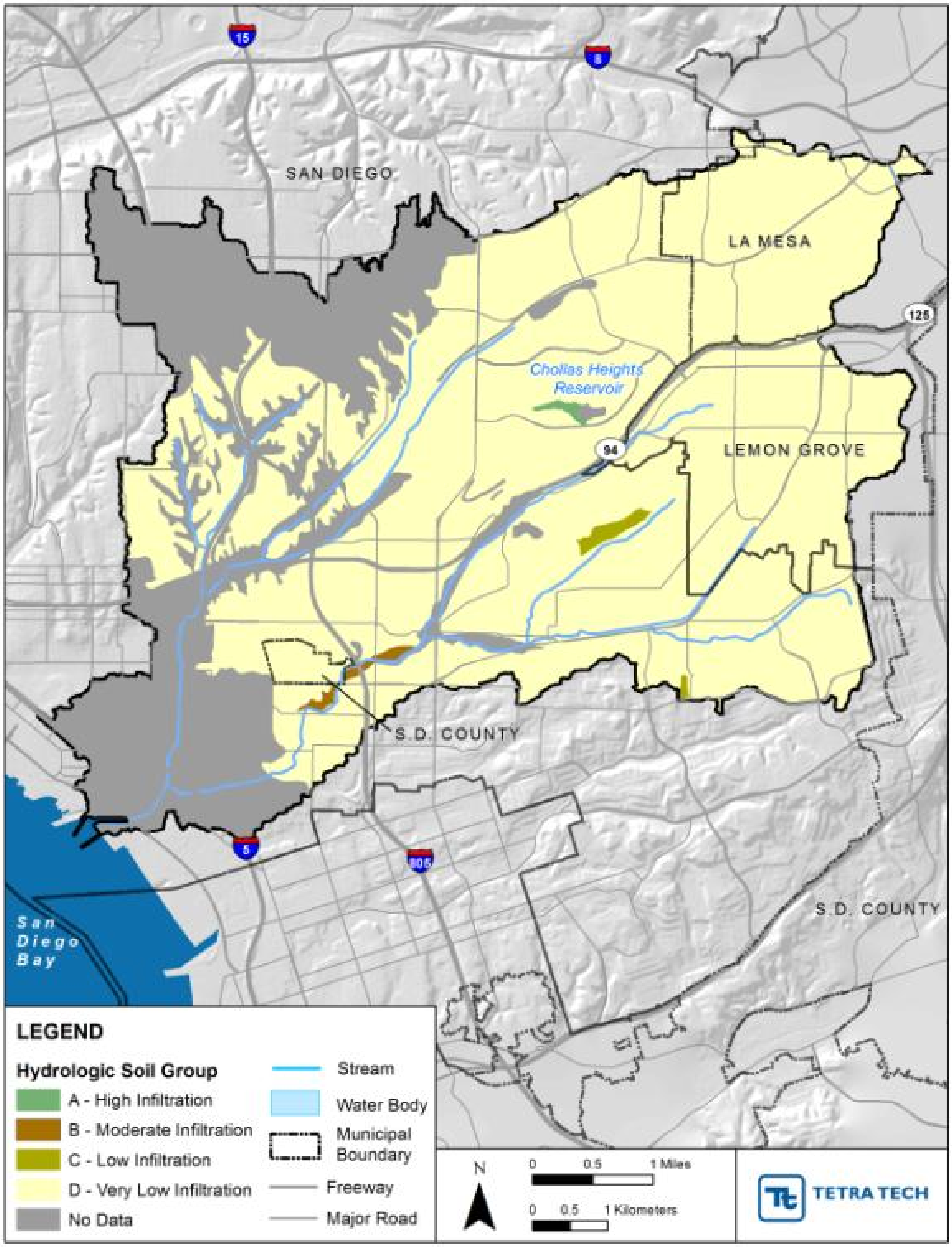


Figure 1-3. Chollas Creek Watershed Soil Permeability

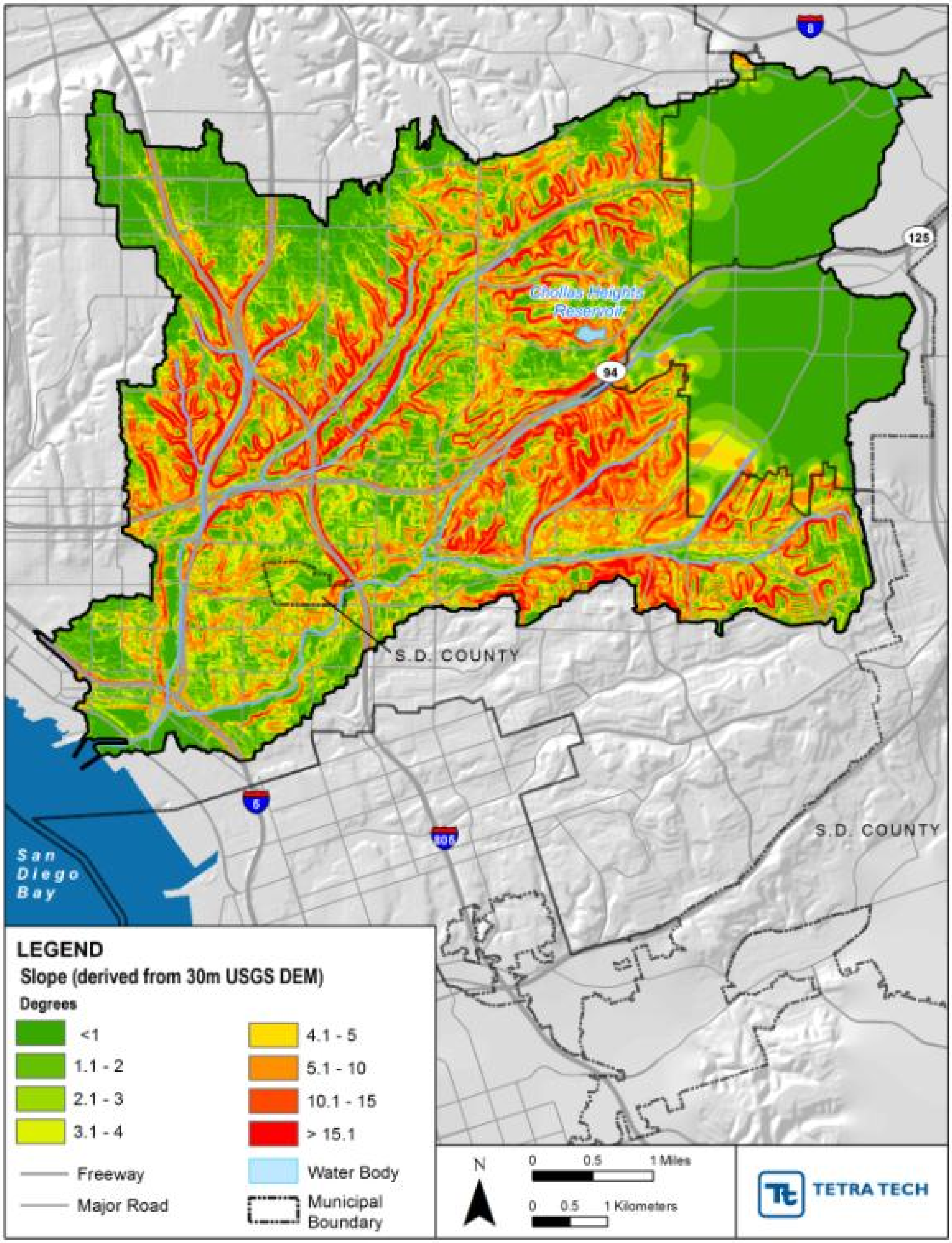
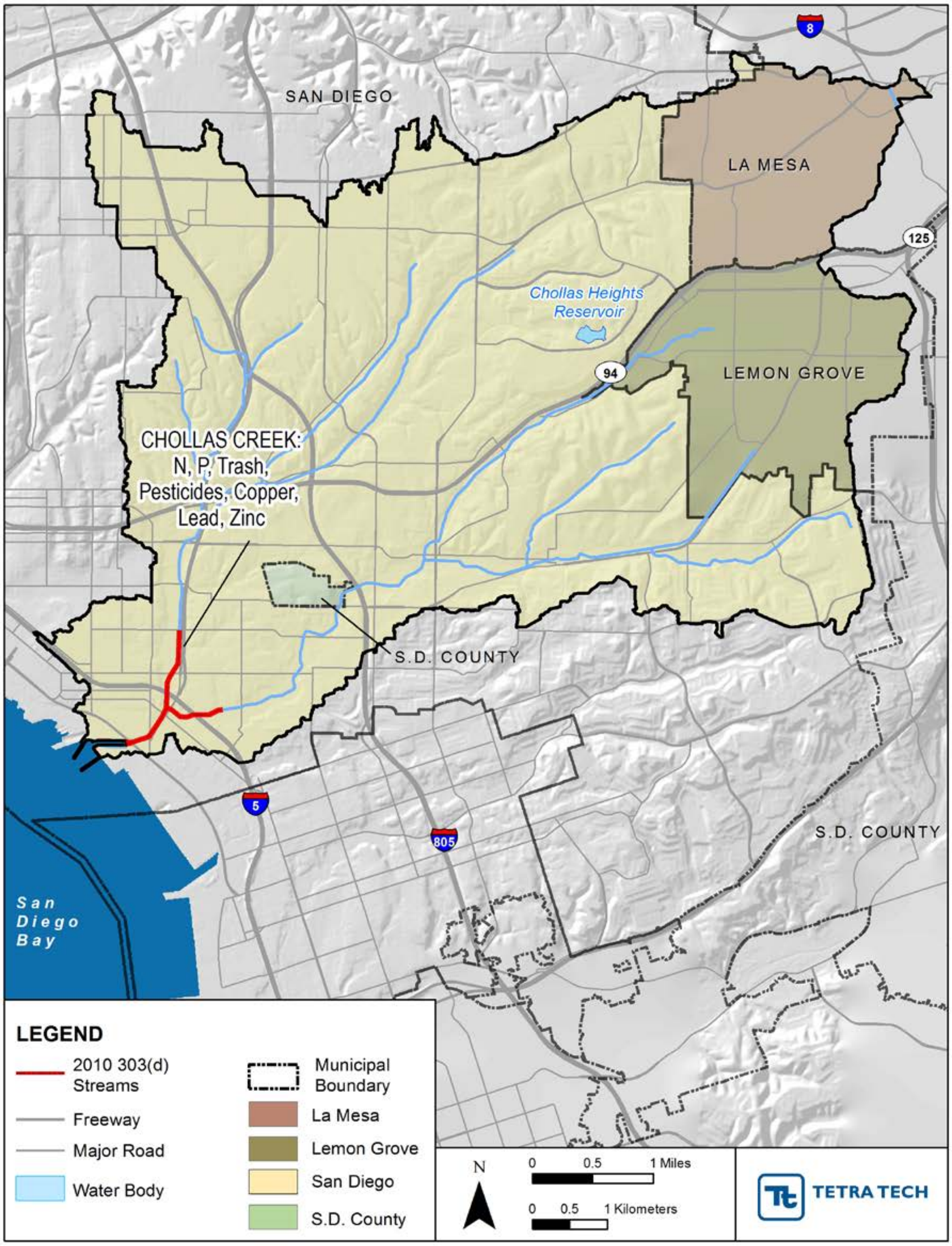


Figure 1-4. Chollas Creek Watershed Slopes

1.3 Chollas Creek 303(d) Listings and Total Maximum Daily Loads

Section 303(d) of the Clean Water Act (CWA) requires that states identify and list water quality-limited segments that do not comply with WQOs. TMDLs must then be developed to attain applicable WQOs and to restore the beneficial uses of these impaired waters. Consequently, in 1996 the Regional Board and State Water Resources Control Board (State Board) placed the lowest 1.2 miles of Chollas Creek Figure 1-5) on the Section 303(d) list for diazinon, dissolved cadmium, dissolved copper, dissolved lead, and dissolved zinc for results above the CTR criteria (in the case of metals) and because of observed toxicity in storm water. In 2002, the watershed was also listed for indicator bacteria (State Board 2002). However, cadmium was removed from the 2006 Section 303(d) list based on a re-evaluation of the data used for the original listing. The 2010 Section 303(d) list also includes phosphorus, total nitrogen as N, and trash (State Board 2010).

In accordance with federal law, the Regional Board has developed, or is in the process of developing, a number of TMDLs for listed constituents. A TMDL for diazinon in Chollas Creek was adopted by the Regional Board on August 14, 2002 (Resolution No. R9-2002-0123) and became effective on September 11, 2003. Implementation of the Chollas Creek TMDL for Diazinon (Diazinon TMDL) was initiated with a phase-out and subsequent full ban on non-agricultural use of diazinon-based pesticides and fertilizers. Results from this phase-out indicate that the ban has been effective and diazinon concentrations are trending downward below WQOs. TMDLs for dissolved copper, lead, and zinc were also adopted by the Regional Board on June 13, 2007 (Resolution No. R9-2007-0043) and became effective on October 22, 2008. TMDLs for indicator bacteria in Chollas Creek and other regional watersheds were adopted by the Regional Board on February 10, 2010 (Resolution No. R9-2010-0001) and became effective on April 4, 2011.



(Data from the 2006 State Water Resources Control Board Section 303(d) Geographical Information Systems Layer)

Figure 1-5. Extent of Section 303(d) Listings Overlain with Extent of Total Maximum Daily Loads in the Chollas Creek Watershed

1.4 Chollas Creek Numeric Targets and Waste Load Allocations in the Dissolved Metals Total Maximum Daily Load

USEPA has established water quality criteria for toxic pollutants, which through promulgation of the CTR, were used to develop applicable WQOs for dissolved metals including copper, lead, and zinc. These hardness-dependent WQOs are the basis for the Metals TMDL (Table 1-2). The waste load allocations (WLAs) presented in the Metals TMDL are concentration-based and include an explicit 10 percent margin of safety that takes into account any uncertainties in the TMDL calculation. The WLAs for dissolved copper, lead, and zinc are set equal to 90 percent of the CTR chronic and acute criteria (Table 1-3). The TMDL also includes an implicit margin of safety due to the conservative assumptions used in developing the criteria for the CTR (Stephan et al. 1985). As a concentration-based TMDL, compliance is not driven by total loads (i.e., flow-based), but rather by a measured concentration in the waterbody for which the TMDL applies. Unlike loads, which typically apply in the downstream portions of the watershed, these concentration-based WLAs apply to the entire receiving waters of the Chollas Creek watershed.

Table 1-2. Water Quality Objectives and Numeric TMDL Targets for Specified Metals in the Chollas Creek Watershed

Metal	Numeric Target for Acute (Criteria Maximum Concentration [CMC]) Conditions	Numeric Target for Chronic (Criteria Continuous Concentration [CCC]) Conditions
Copper (dissolved)	WER * (0.96) * {e^ [0.9422 * ln (hardness) - 1.700]	WER * (0.96) * {e^[0.8545 * ln (hardness) - 1.702]
Lead (dissolved)	WER * {1.46203 – [0.145712 * ln (hardness)]} * {e^ [1.273 * ln (hardness) - 1.460]}	WER * {1.46203 – [0.145712 * ln (hardness)]} * {e^[1.273 * ln (hardness) - 4.705]}
Zinc (dissolved)	WER * (0.978) * {e^ [0.8473 * ln (hardness) + 0.884]}	WER * (0.986) * {e^[0.8473 * ln (hardness) + 0.884]}

Notes:
WER: The Water Effect Ratio is assumed to be 1.0 unless a site-specific WER is developed and approved.
Hardness is expressed as milligrams per liter.
ln = natural log function; e = exponential function

Table 1-3. Waste Load Allocations (WLAs) for Specified Metals in the Chollas Creek Watershed

Metal	WLAs for Acute (Criteria Maximum Concentration [CMC]) Conditions	WLAs for Chronic (Criteria Continuous Concentration [CCC]) Conditions
Copper (dissolved)	90% * WER * (0.96) * {e^ [0.9422 * ln (hardness) - 1.700]	90% * WER * (0.96) * {e^[0.8545 * ln (hardness) - 1.702]
Lead (dissolved)	90% * WER * {1.46203 – [0.145712 * ln (hardness)]} * {e^ [1.273 * ln (hardness) - 1.460]}	90% * WER * {1.46203 – [0.145712 * ln (hardness)]} * {e^[1.273 * ln (hardness) - 4.705]}
Zinc (dissolved)	90% * WER * (0.978) * {e^ [0.8473 * ln (hardness) + 0.884]}	90% * WER * (0.986) * {e^[0.8473 * ln (hardness) + 0.884]}

Notes:
WER: The Water Effect Ratio is assumed to be 1.0 unless a site-specific WER is developed and approved.
Hardness is expressed as milligrams per liter.
ln = natural log function; e = exponential function

The CTR WQO equations are based on the known inverse relationship between hardness and toxicity. Hardness is a measure of the quantity of divalent ions (i.e., salts with two positive charges) such as calcium and magnesium in water. The TMDL numeric targets for dissolved copper, lead, and zinc are based on the CTR criteria for metals. The CTR lists a Criteria Maximum Concentration (CMC) and Criteria Continuous Concentration (CCC) that are calculated using hardness concentrations collected from each sample event to determine the WQOs for each dissolved metal. The CCC and CMC equations for chronic and acute conditions, respectively, are as follows (USEPA 2000):

General Criteria Continuous Concentration

$\text{CCC} = (\text{WER}) * (\text{CF}_\text{C}) * \{e\text{^}[(m_\text{C} * \ln \text{hardness}) + b_\text{C}]\}$

Where:

CCC = Criteria Continuous Concentration

WER = Water-Effect Ratio; default value of 1 (most conservative) is used when a site-specific objective has not been determined.

CF_C = Conversion Factor for freshwater chronic criteria

m_C = slope factor for chronic criteria

b_C = y intercept for chronic criteria

The subscript "C" stands for "chronic" and designates a variable in the CCC equation. The natural log and exponential functions are represented as "ln" and "e," respectively [40 CFR 131.38(b)(2)].

General Criteria Maximum Concentration

$\text{CMC} = (\text{WER}) * (\text{CF}_\text{A}) * \{e\text{^}[(m_\text{A} * \ln \text{hardness}) + b_\text{A}]\}$

Where:

CMC = Criteria Maximum Concentration

WER = Water-Effect Ratio; default value of 1 (most conservative) is used when a site-specific objective has not been determined.

CF_A = Conversion Factor for freshwater chronic criteria

m_A = slope factor for acute criteria

b_A = y intercept for acute criteria

The subscript "A" stands for "acute" and designates a variable in the CMC equation. The natural log and exponential functions are represented as "ln" and "e," respectively [40 CFR 131.38(b)(2)].

As shown in the equations above and further described in the following section, the WER is a variable of the CCC and CMC equations which can be used to develop an SSO. Specifically, upon determination of a final WER, SSOs can then be calculated by substituting the final WER value into the CCC and CMC equations for the calculation of site-specific criteria.

2 RATIONALE FOR STUDY

USEPA recognizes that the national criteria for dissolved metals, including those for copper, lead, and zinc, might be more or less protective than anticipated, depending on the site-specific characteristics such as diversity of aquatic life and water quality characteristics (i.e., hardness, pH, dissolved organic matter, total suspended particulates, and concentrations of contaminants of concern) (USEPA 1994b). As a consequence, USEPA has developed several procedures for deriving an SSO for metals.

As specified in the Metals TMDL, the Regional Board acknowledged that the development of an SSO is an acceptable step in determining appropriate targets for dissolved copper, lead, and zinc in Chollas Creek. The Regional Board also indicated that there are site-specific conditions that could lead to over- or under-protection of the beneficial uses of waterbodies, such as Chollas Creek, if national criteria are used. The TMDL further indicates that if WER studies and scientific evidence indicate that SSOs are appropriate, the TMDL will be modified accordingly.

2.1 USEPA Site-Specific Objective Guidance

USEPA publishes national water quality criteria (WQC) for the protection of aquatic life consisting of a concentration, an averaging period, and a return frequency. The WQC for the protection of aquatic life are calculated mostly from laboratory-derived toxicity data. USEPA compiles data from acceptable toxicity tests, which have been conducted in laboratory or well-characterized dilution water, from a wide range of species. Criteria are developed from the compiled data using the approach outlined in *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (Criteria Guidelines) (USEPA 1985b). The Criteria Guidelines provide methods for calculating both acute and chronic criteria.

National WQC are intended to be protective of all waters of the United States. However, the Code of Federal Regulations (CFR) 40 CFR 131.11(b)(1)(ii) allows states to establish WQC that are "… modified to reflect site-specific conditions." The *Water Quality Standards Handbook* (USEPA 1994a) states that:

> "*Site-specific criteria, as with all water quality criteria, must be based on a sound scientific rationale in order to protect the designated use. Existing guidance and practice are that EPA will approve site-specific criteria developed using appropriate procedures.*"

Site-specific criteria are intended to provide the same level of protection intended for aquatic life as the national criteria but at a specific site, which may be defined as state, region, watershed, waterbody, or segment of waterbody (USEPA 1994a). Hence, derivation of site-specific criteria does not change the intended level of protection. Two procedures for deriving site-specific criteria were used in the Study (USEPA 1994b):

- **Water-Effect Ratio Procedure**: This method provides for the use of a water-effect ratio (WER) to take into account observed differences between the toxicity of metals in laboratory dilution water and in site water.
- **Recalculation Procedure**: This method is intended to take into account relevant differences between the sensitivity of species in the national dataset and those that could or have occurred at the site. Recalculation also consists of any updates or revisions in the national data set (not necessarily site specific updates) such that it is effectively an update to the national WQC.

The following subsections provide additional information about the two procedures used in the Study.

2.1.1 Water-Effect Ratio Procedure

USEPA, through the Water Quality Standards Handbook (USEPA 1994a), developed a WER procedure for deriving site-specific criteria. Details of the WER procedure are found in the Interim Guidance on Determination and Use of Water-Effect Ratios for Metals (Interim Guidance) (USEPA 1994b). The Interim Guidance presents detailed protocols for adjusting the concentration portion of national metals WQC to reflect site-specific receiving water conditions using the WER method (USEPA 1994b). A WER is a factor that can be used under USEPA's system of WQC to customize national aquatic life criteria, which include the CTR aquatic life criteria established by USEPA in 2000 and used in the Metals TMDL, to reflect site-specific water column conditions. A WER is used to derive site-specific criteria that maintain the level of protection of aquatic life intended by the Criteria Guidelines and CTR. If the value of the WER exceeds 1.0, the site water reduces the toxic effects of the pollutant being tested. Conversely, if the WER value is less than 1.0, the toxic effects of the pollutant in site water would be greater than those in laboratory water and the site-specific WQC should be less than the CTR WQC. For example, if a WER developed using Chollas Creek water is greater than 1.0, the CTR metals WQC are more stringent than what is necessary to protect aquatic life in Chollas Creek. Therefore, a SSO for Chollas Creek could be set at a higher concentration than the CTR WQC and still be as protective of aquatic life beneficial uses as the CTR WQC. The site-specific acute and chronic criteria are calculated by multiplying USEPA's ambient WQC values by the site-specific WER obtained from testing.

The WER method requires rigorous parallel toxicity tests using USEPA-specified laboratory water and site water to determine whether physical and chemical characteristics in the site water affect the bioavailability and, therefore, the toxicity of trace metals to aquatic organisms. Site water generally consists of receiving water, effluent, or simulated downstream water. Simulated downstream water is site water prepared by mixing upstream receiving water and effluent in a known ratio. As the focus of the Study was on in-stream conditions, only receiving water was collected and used for the Study. The quotient between site water and lab water toxicity values is expressed as a WER (toxicity obtained in the site water divided by toxicity in the lab water). A WER is expected to account for (1) the site-specific toxicity of a metal and (2) synergism, antagonism, and additivity with other constituents present in the site water (USEPA 1994a). Acute toxicity is measured as an EC50, which represents an estimate of the concentration of metal at which 50 percent of the test organisms are adversely affected (i.e., mortality).

In March 2001, USEPA published a streamlined national procedure for developing a WER for copper in freshwater bodies (USEPA 2001). Because of the numerous copper WER studies that have been performed throughout the country since the mid-1990s, USEPA determined that sufficient data existed to develop a more straightforward testing approach for situations where copper concentrations are elevated primarily by continuous point source effluents—such as a publicly owned treatment works (POTW) outfall. This USEPA protocol, referred to as the "Streamlined Procedure", specifies sample collection methods, lists the analyses to perform, requires toxicity tests on only one aquatic species, and reduces the number of samples to be collected relative to the Interim Guidance. Although the Streamlined Procedure is specifically applicable to situations where copper concentrations are elevated primarily by continuous point source effluents, portions of the Streamlined Procedure provide useful and updated information that can be used to supplement the Interim Guidance. This study is based on procedures and methods outlined in the 1994 Interim Guidance. However, the Study incorporated one aspect of the Streamlined Procedure because it resulted in a lower copper WER value (see Section 4.6.3 for a detailed description and Section 6.2.1 for a comparison to the Interim Guidance).

2.1.2 Recalculation Procedure

The Recalculation Procedure provides a method for adjusting the national dataset used to develop criteria based on more recent studies and/or for species that are present in the waterbody. Appendix B of the Interim Guidance outlines the procedure (USEPA 1994b). The Recalculation Procedure generally consists of corrections and additions to the national toxicity dataset if available, deletion of species that are not capable of being present at the site (optional), generation of additional data if the new dataset does not satisfy the applicable Minimum Data Requirements (MDRs), and calculation of new criterion maximum concentration and/or criterion continuous concentration.

2.2 Biotic Ligand Model

The biotic ligand model (BLM) is a conceptual framework for estimating effects of certain metals to aquatic organisms (Di Toro et al. 2001; Santore et al. 2001). This framework has been used to develop predictive toxicity models for a number of species and several divalent metals, including copper, lead, and zinc (e.g., Santore et al. 2001; De Schamphelaere and Janssen 2002; De Schamphelaere et al. 2002; Heijerick et al. 2002; HDR|HydroQual 2011; also, see Paquin et al. 2002 for an overview of the BLM). The BLM considers the effects of metal speciation, including inorganic and organic complexation, and the effect of competition with cations for binding at idealized biotic ligands on the organism surface or gill tissue (in the case of fish).

In 2007 the copper BLM became the basis for USEPA’s recommended freshwater water quality criteria for copper (USEPA 2007). The BLM has also been applied to zinc for development of water quality criteria (HydroQual 2006), but has not yet been approved by USEPA for use for derivation of site-specific water quality criteria. A BLM for lead has recently been developed (HDR|HydroQual 2011) and will soon be publicly available.

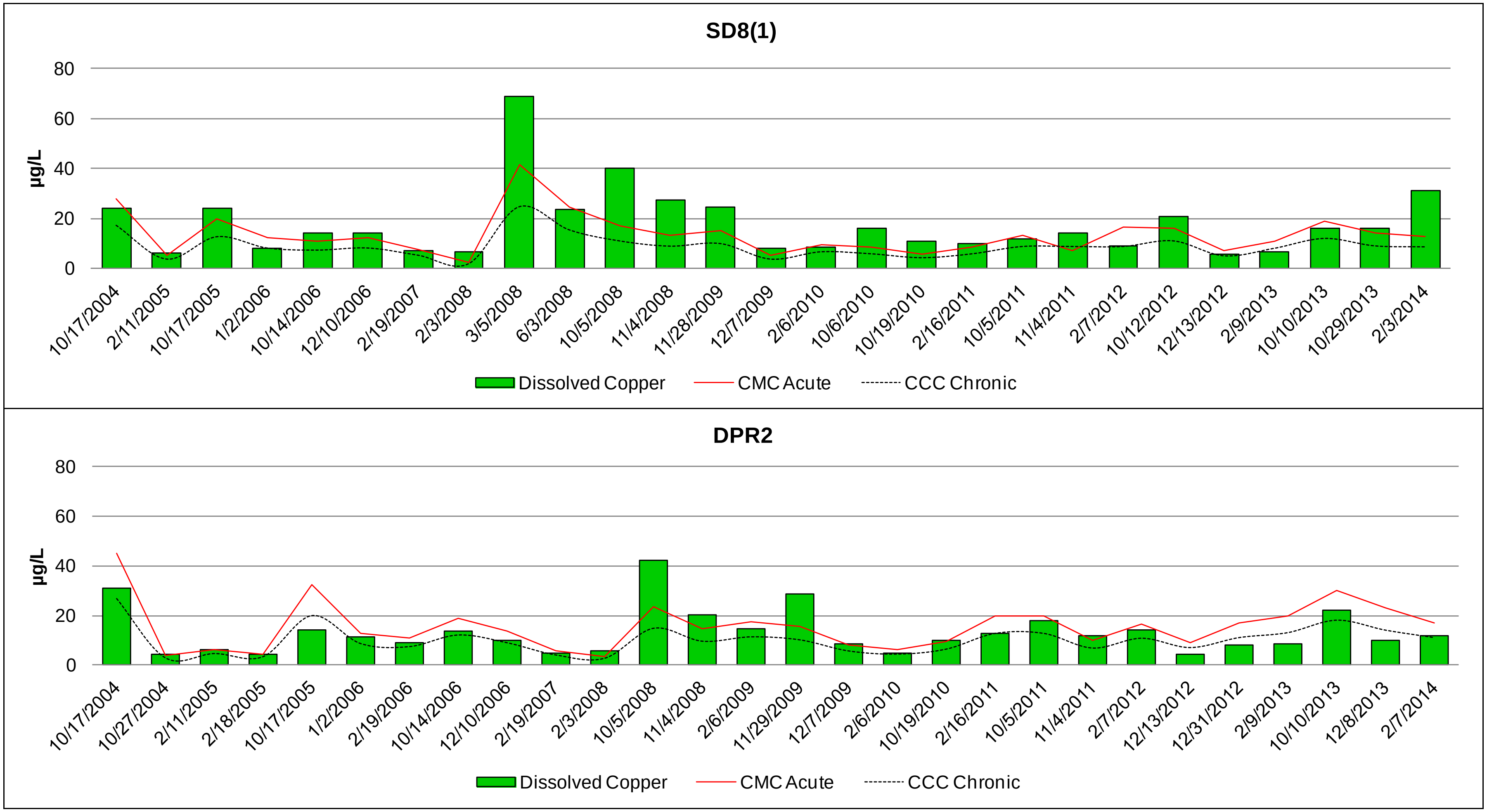
The BLM was used in the early phases of this study to provide another site-specific line of evidence that validates the bioavailability and potential risks associated with dissolved copper, lead, and zinc of Chollas Creek. However, as the BLM is not used to set site-specific objectives in California, model results are not discussed within the main body of the report. However, model results are presented in Appendix H, for reference.

2.3 Historical Metals Exceedances in Chollas Creek

Dissolved metals concentrations, monitored for more than a decade in Chollas Creek, indicate metal-specific exceedances of CTR values. Since 1994, dissolved copper concentrations in the north fork of Chollas Creek (site SD8(1)) have often exceeded both acute and chronic criteria. More recent values collected during wet weather as part of the TMDL compliance monitoring program over the past ten years are plotted and shown in Figure 2-1 for comparison. While there also have been dissolved copper exceedances of both acute and chronic criteria in the south fork (site DPR2), they occur less frequently and the magnitude of the exceedance is typically less than those in the north fork.

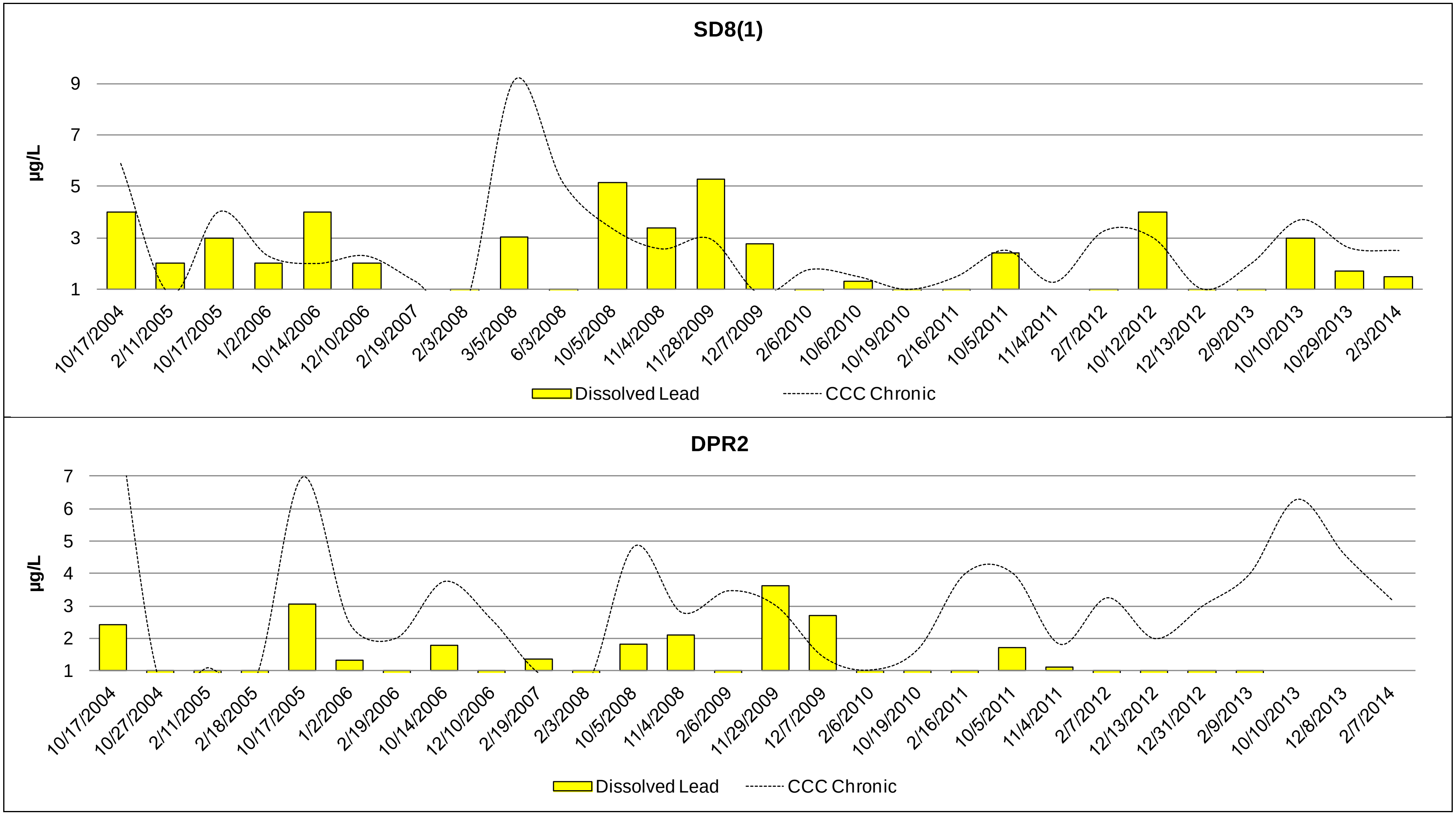
Similar to copper, there have been numerous exceedances of dissolved lead concentrations in the north fork of Chollas Creek. However, lead exceedances have only occurred for the chronic CTR criteria (Figure 2-2). The acute CTR criterion is excluded from the graph because these values are much greater than all reported concentrations. In the south fork, only two dissolved lead exceedances of the chronic criterion have occurred since 2004.

There have also been numerous exceedances of dissolved zinc in the north fork of Chollas Creek for both the acute and chronic criteria since 1994. More recent values collected during wet weather as part of the TMDL compliance monitoring program over the past ten years are shown in Figure 2-3 for comparison. Dissolved zinc concentrations have not exceeded the acute or chronic criteria in the south fork during the past 10 years.



Notes:
Measured dissolved copper concentrations are compared to acute (Criteria Maximum Concentration, or CMC) and chronic (Criteria Continuous Concentration, or CCC) dissolved copper water quality objective values adjusted for hardness.
µg/L = micrograms per liter.

Figure 2-1. Historical Trends - Dissolved Copper Concentrations at SD8(1) and DPR2

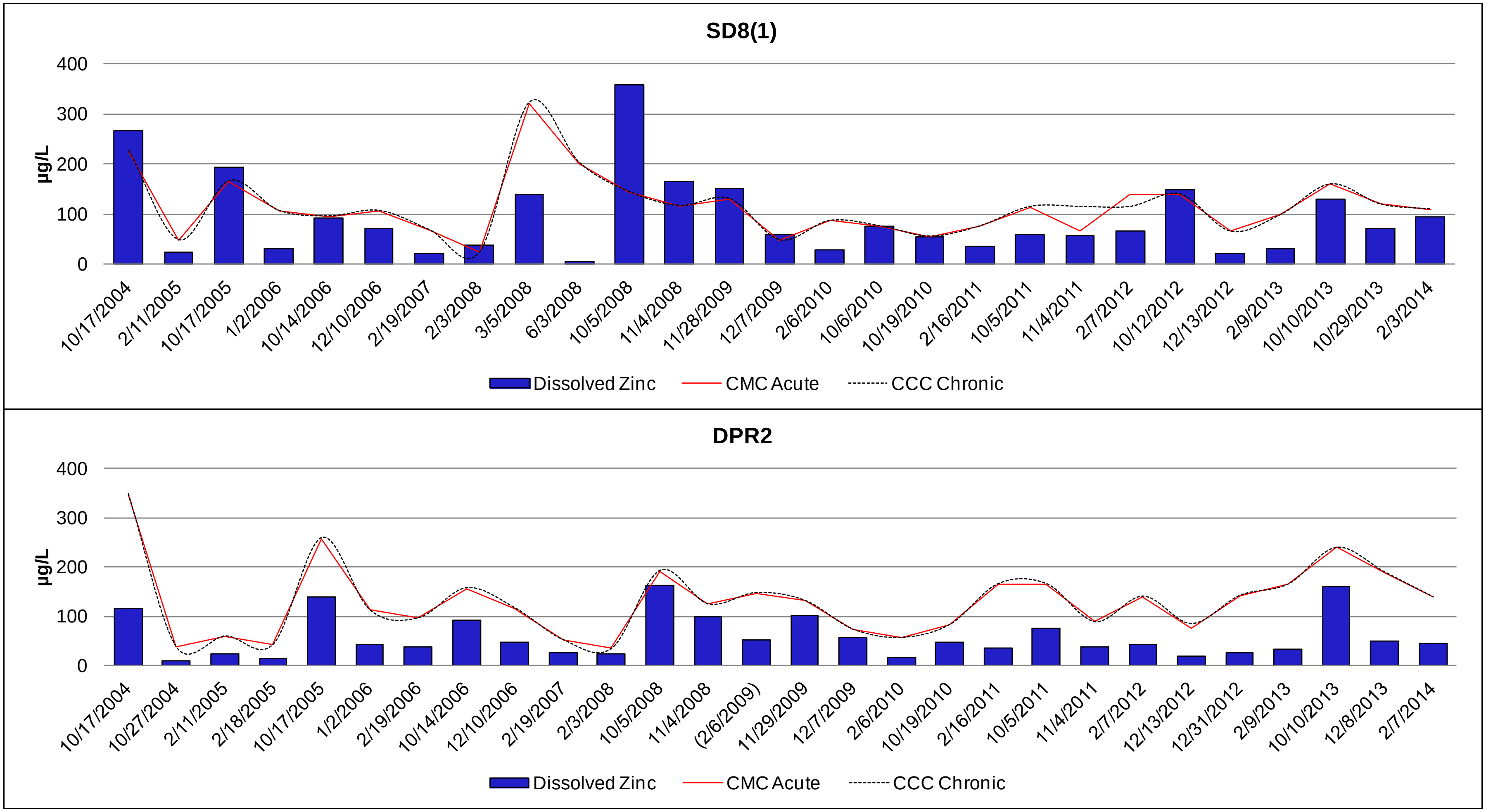


Notes:

Measured dissolved lead concentrations are compared to chronic dissolved lead criteria (Criteria Continuous Concentration, or CCC) water quality objective values adjusted for hardness. Note that Criteria Maximum Concentration (Acute) criteria are not included because these values are much greater than all reported concentrations.

µg/L = micrograms per liter; WQO = water quality objective

Figure 2-2. Historical Trends - Dissolved Lead Concentrations at DPR2 and SD8(1)



Notes:

Measured dissolved zinc concentrations are compared to acute (Criteria Maximum Concentration, or CMC) and chronic (Criteria Continuous Concentration, or CCC) dissolved zinc water quality objective values adjusted for hardness.

µg/L = micrograms per liter

Figure 2-3. Historical Trends - Dissolved Zinc Concentrations at DPR2 and SD8(1)

2.4 Results of Previous Copper, Lead, and Zinc WER Studies

Numerous WER studies have been conducted nationally to determine SSOs for copper, lead, and zinc. The majority of studies were focused on copper (Carlson et al. 1986; S. R. Hansen & Associates 1992; USEPA 1992; Diamond et al. 1997a; Diamond et al. 1997b; City of San Jose 1998; CH2M Hill 2002; Nautilus Environmental 2005; Rosen et al. 2005; LWA 2006; Earley et al. 2007; LWA 2014a). However, there were several studies which determined WERs for multiple metals, including lead and zinc (USEPA 1992; Diamond et al. 1997b; CH2M Hill 2002; LWA 2008). Results of the reviewed copper WER studies and most of the lead and zinc WER studies demonstrated final WER values that were greater than 1.0. Four of the copper WER studies conducted in California were focused in Southern California. The dissolved copper WER studies most relevant to the Study were conducted in the Los Angeles River (LWA 2006, 2014a). Results of the Los Angeles River watershed studies demonstrated geometric mean WERs ranging from 1.32 to 9.69 for the freshwater invertebrate *Ceriodaphnia dubia*. These results, together with historical water quality data, suggested that a WER for Chollas Creek storm water might result in values of greater than 1.0.

3 OBJECTIVE

As described above, extensive WER testing has been completed for copper and zinc throughout the country since the mid-1990s. Given that previous studies demonstrated that copper and zinc WERs developed using USEPA protocols could be successfully determined, the approach for these two metals in this study is to use the WER approach.

During the development of the Work Plan for the Study, and based on results from the range-finder tests, it was evident that dissolved lead testing would not be relevant to the low concentrations detected in Chollas Creek. Lead is very insoluble in water and it would require a lower site water and laboratory water pH for lead to be present in solution (i.e., the dissolved phase). However, lowering pH would potentially add confounding factors to the WER tests and would not be relevant to the Study. Additionally, a revision to the ambient aquatic life water quality criteria for lead was drafted by the Great Lakes Environmental Center (Traverse City, MI) for USEPA (2008). The draft *Ambient Aquatic Life Water Quality Criteria for Lead* (USEPA 2008) includes tables containing acute and chronic toxicity data acceptable for criteria derivation. USEPA is required to publish water quality criteria guidance that accurately reflect the latest scientific knowledge on the identifiable effects on health and welfare that might be expected from the presence of pollutants in any body of water. The Interim Guidance states that a list of approved toxicity data will be available from USEPA for constituents for which USEPA has developed criteria. The draft 2008 criteria provide such a dataset. These data were also provided by USEPA for the recently completed Los Angeles River Lead Recalculation Report (LWA 2014b) Therefore, in lieu of performing additional sample collection and testing for development of a WER for lead in Chollas Creek, recalculated lead criteria were evaluated.

3.1 Technical Advisory Committee

A Technical Advisory Committee (TAC) was assembled to provide an outside, independent review of the study design and initial study results. Members of the TAC and their areas of expertise are listed in Table 3-1. The TAC reviewed the initial draft report (Weston 2011) and their comments were incorporated and addressed in subsequent versions of the report. Comments and responses related to the initial draft report are provided in Appendix A.

Table 3-1. Members of the Technical Advisory Committee

TAC Member	Organization	Area of Expertise
Steven Bay	Southern California Coastal Water Research Project	Aquatic Toxicology
Robert Santore	HDR | Hydroqual, Inc.	Metal Bioavailability & Chemistry
Peter Schafer	City of San Jose	Biologist, Water-Effect Ratio

4 MATERIALS and METHODS

4.1 Chollas Creek Copper and Zinc WER Testing

The Chollas Creek SSO Study was conducted in accordance with the Interim Guidance (USEPA 1994b). This document provided two methods for conducting WERs. In Chollas Creek, there are multiple non-point source discharges dominated entirely by urban runoff and storm water and in which ambient conditions might be completely dry. Based on the lack of POTW-type discharges in the Chollas Creek watershed, and multiple influences that vary over time, ambient sampling at targeted integrator sites was considered to be the appropriate approach for this study.

One of the selected sampling stations (SD8(1)) is on the north fork of Chollas Creek, just upstream of its confluence with the south fork. Storm water flows in the south fork are comprised of runoff from the CWA Section 303(d)-listed urbanized upstream areas north of this station. The second station (DPR2) is on the south fork of Chollas Creek, just upstream of its confluence with the north fork where flows represent storm water and urban runoff from urbanized and more natural upstream areas northeast of this station (which also are CWA Section 303(d)-listed). The north and south fork sampling sites within Chollas Creek were selected because (1) they likely reflect separate sources of contamination and water quality, (2) water quality is well understood, and (3) a large database of historical data already exists. Additionally, these two stations are listed as the compliance storm water monitoring stations for the Chollas Creek TMDL Implementation Plan, as indicated in Regional Board Order R9-2004-0277. An additional objective of this program was to determine whether these two stations demonstrate different WERs and, consequently, whether or not a single WER and SSO can be applied to the watershed area.

USEPA guidance suggests that the sampling design for a WER study takes into account variability of samples that might occur due to flow (high versus low), season, and water quality characteristics. Chollas Creek is a dry channel under ambient conditions, with most flow occurring between October and March, which is rainfall-dependent. As a consequence, sampling for this study occurred during storm events of varying flows based on rainfall (both high and low flows were captured as part of flow-weighted composite techniques). Three sampling events, including a preliminary range-finding event, occurred in winter and spring 2010 (1/18/2010, 2/27/2010, and 4/1/2010) and two additional sampling events occurred in fall 2010 (10/30/2010 and 12/20/2010) for a total of five flow events at SD8(1) and four flow events at DPR2. This design was able to successfully capture site-specific variability associated with temporal seasonality and flow. A follow-up sampling event also occurred on April 2–3, 2014, to confirm the protectiveness of derived WERs using a secondary species and to evaluate metal mixture conditions using the primary species.

4.2 Overview of Copper and Zinc WER Testing

To determine WERs for dissolved copper and zinc, each metal was individually spiked as a series in representative receiving water samples from Chollas Creek, and concurrently in clean, filtered laboratory dilution water. Toxicity tests were then performed on each metal spiked dilution series. The USEPA-suggested species and tests that was used for this investigation was an acute 48-hour survival test using the freshwater cladoceran *Ceriodaphnia dubia* (*C. dubia*). Specific details on WER testing methods are provided in Section 4.4. Because of its documented sensitivity to dissolved metals, *C. dubia* has also been used in numerous studies to establish acute and chronic WERs (USEPA 1994b; Carlson et al. 1986; Diamond et al. 1997b; CH2M Hill 2002; LWA 2006; LWA 2008; LWA 2014a). As described in the USEPA’s Interim Guidance, the most important factor when considering which test and species to use is the sensitivity of the test; of less importance is the duration, species, life-stage, or adverse effect used.

Other USEPA-suggested acute test species (e.g., *Pimephales promelas*) are much less sensitive to copper and zinc than *C. dubia*.

During the range-finding and all definitive WER sampling events in 2010, subsamples of the composited water from Chollas Creek were submitted for analysis of a comprehensive list of physical parameters and known chemicals of potential concern (trace metals and organics) to determine if there might be other potential confounding constituents or factors that are not related to metals. During the 2014 WER confirmation event, subsamples from Chollas Creek were submitted for analysis of pyrethroid insecticides only (in addition to copper, zinc, total organic carbon [TOC], dissolved organic carbon [DOC], alkalinity, hardness, and anions/cations) based on historical data indicating the increased potential for toxic effects over time related to these pesticides.

4.2.1 WER Confirmation Testing

The Interim Guidance includes considerations for multiple test species (primary and secondary) as well as for situations where WERs for multiple metals will be developed. The following describes "confirmation" testing completed to address the Interim Guidance considerations.

Secondary Species

The Interim Guidance recommends conducting a test on a secondary species to confirm the results of the WERs developed using a primary species. Note that this requirement was removed in the more recent USEPA Streamlined Procedure "because the additional test has not been found to have value" (USEPA 2001). The Streamlined Procedure is specific to copper but does mention that the methods may apply to other metals (e.g., zinc) provided that sufficient background information supports the use of the approach. For this reason, the initial report by Weston (2011) did not include a secondary species test. However, subsequent to submittal of the 2011 report, it was suggested that a secondary species test be conducted to meet the requirements of the Interim Guidance, given the concern that zinc has not had the same level of single species testing as copper. Additional samples were collected from Chollas Creek during a storm in April 2014 and tested side-by-side with the primary species (*C. dubia*) and a secondary species (*P. promelas*) in a series of site water-spiked copper and zinc concentrations to confirm the appropriateness of using *C. dubia* WER results.

Metal Mixtures

The Interim Guidance states that in a multiple-metal situation, if a WER is determined for each metal individually, one or more additional toxicity tests must be conducted at the end to demonstrate that the combination of all metals at their proposed new site-specific criteria is acceptable (to account for additive and synergistic effects). A confirmatory test mixing copper and zinc in combinations at the proposed WERs was conducted on Chollas Creek samples collected during a storm event in April 2014.

4.3 Field Collection Program

The following describes the sample locations as well as the field collection program for the copper and zinc WER tests.

4.3.1 Sample Locations

Sampling locations for WER testing are presented in Table 4-1 and consisted of two sites, SD8(1) and DPR2, on the north and south forks of Chollas Creek, respectively (Figure 4-1). These two sample locations are also the compliance monitoring points for the Metals TMDL.

Table 4-1. Sample Locations Within Chollas Creek

Location	Site ID	Latitude (WGS 84)	Longitude (WGS 84)
Chollas Creek, North Fork	SD8(1)	32.70493°	-117.12132°
Chollas Creek, South Fork	DPR2	32.69130°	-117.11682°

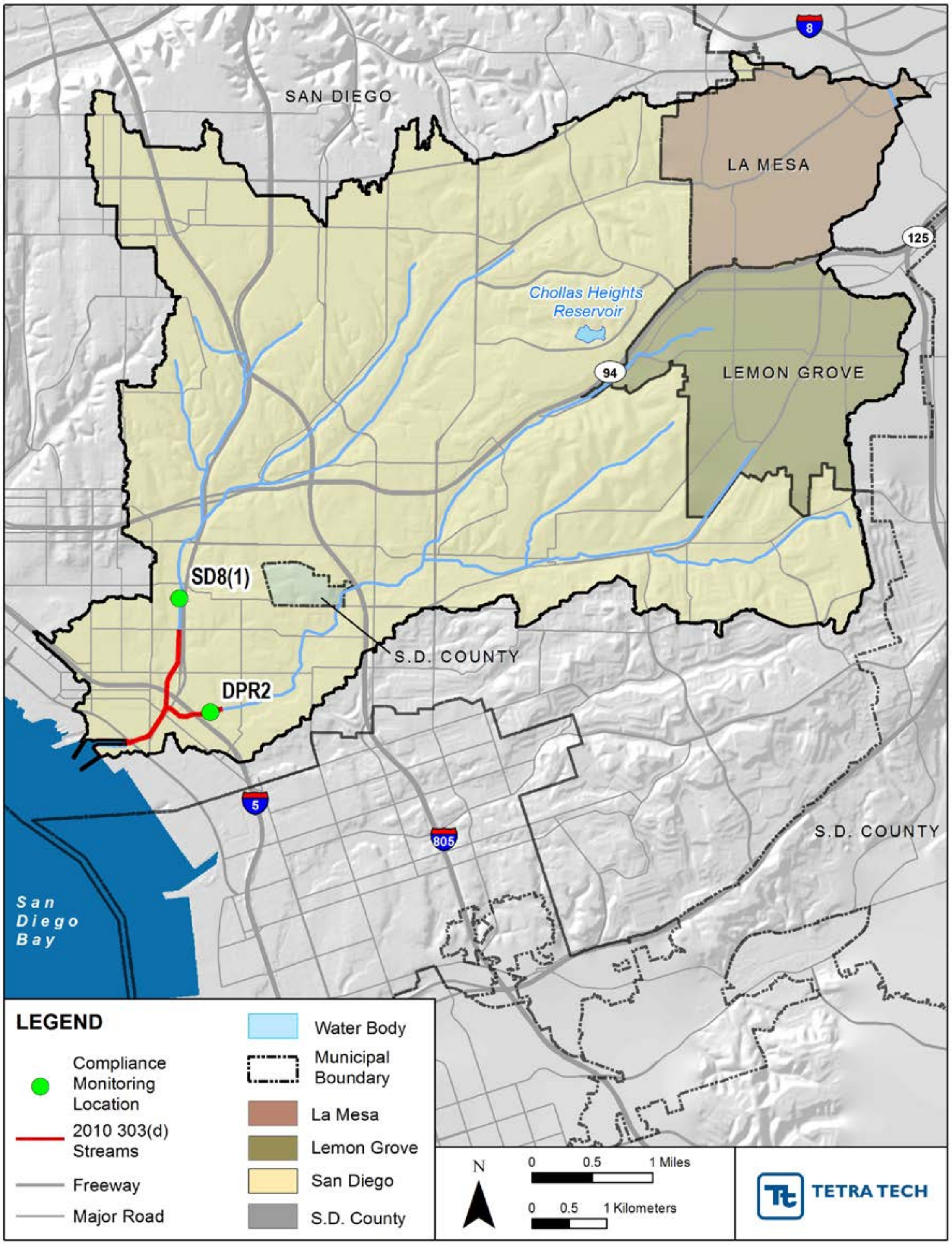


Figure 4-1. Chollas Creek TMDL Compliance/Copper and Zinc Water-Effect Ratio Monitoring Sites

4.3.2 Sampling Event Selection for WER Testing

A total of five wet-weather monitoring events were conducted by Weston in 2010 to develop WERs for the two Chollas Creek locations. The first event was conducted only at site SD8(1) as a preliminary range-finding test and was not used for the final WER calculations. The first three wet-weather sampling events occurred during the winter and spring of 2010 and two events occurred during the fall of 2010 (Table 4-2). Follow-up confirmation tests were performed during a single storm occurring in April 2014. Consistent with the goals and requirements for development of WER values, samples were collected over a range of high-flow events at the two WER monitoring sites over the course of the definitive component of WER sampling in 2010 (0.23- to 1.0-inch cumulative storm rainfall among the different events). The storm monitored for the confirmation tests in 2014 was during a similar flow event (0.28 inches of rain over 2 days). Hydrographs of each storm are provided in Section 5.0. Criteria for wet-weather events included a minimum of 72 hours of antecedent dry weather and a minimum of 0.10 inch of rain forecasted within the runoff area.

The National Weather Service website (http://www.wrh.noaa.gov/sgx/) was used to forecast storms. The posted forecasts, discussions, and quantitative precipitation forecast (QPF) were used to determine if a storm might meet the criteria of a wet-weather monitoring event. Mobilization to collect samples for the WER tests were based on a QPF of greater than 0.10 inch at the coast the day before a rain event or within 48 hours of a weekend event. Infrared satellite imagery, live streaming Next Generation Radar (NEXRAD), and pressure gradient maps were also used to verify the QPFs.

Table 4-2. WER Testing Event Summary

WER Tests	Sample Collection	Toxicity Testing Laboratory	Analytical Chemistry Laboratory	Sample Collection Date
Range-finding WER Event	Weston	Weston	CRG/Enviromatrix	1/18/10
Definitive WER Event 1	Weston	Weston	CRG/Enviromatrix	2/27/10
Definitive WER Event 2	Weston	Weston	CRG/Enviromatrix	4/01/10
Definitive WER Event 3	Weston	Weston	Weck/Enviromatrix	10/30/10
Definitive WER Event 4	Weston	Weston	Weck/Enviromatrix	12/20/10
Confirmation WERs	AMEC	Nautilus	Weck/Physis	4/03/14

4.3.3 Water Quality Sampling and Handling

All water quality samples collected in support of the Study were collected in accordance with the approved Quality Assurance Project Plan (QAPP; Appendix B). Further details specific to those events monitored are provided below.

Chain-of-Custody (COC) Documentation

COC procedures were initiated during sample collection. A COC record was provided with each sample or sample group. Each person who had custody of the samples signed the form and ensured that the samples were not left unattended unless properly secured. Minimum documentation of sample handling and custody included the following:

- Sample identification.

- Sample collection date and time.
- Any special notations on sample characteristics.
- Initials of the person who collected the sample.
- Date the sample was sent to the laboratory.
- Shipping company and waybill information.

Each completed COC form was placed in a sealable plastic envelope that travelled inside the ice chest containing the listed samples. The COC form was signed by the person transferring custody of the samples. The condition of the samples was recorded by the receiver. COC records were included in the final analytical report prepared by the laboratory and were considered an integral part of that report.

Samples were considered to be in custody if they were: (1) in the custodian's possession or view, (2) retained in a secured place (under lock) with restricted access, or (3) placed in a secured container. The principal documents used to identify samples and to document possession were COC records, field log books, and field tracking forms. COC procedures were used for all samples throughout the collection, transport, and analytical process, and for all data and data documentation, whether in hard copy or electronic format.

Shipping

Prior to shipping, sample containers were placed in sealable plastic bags and securely packed inside coolers with ice. COC forms were completed, and the original signed COC forms were inserted in a sealable plastic bag and placed inside the cooler. The cooler lids were securely taped shut and subsequently shipped or delivered to the analytical laboratories listed in Table 4-3.

Table 4-3. Analytical Laboratories and Shipping Information

Laboratory	Volume	Analyses Performed	Point of Contact	Shipping Information
Weston Solutions, Inc.	10 L for *C. dubia* testing	Bioassay testing (Primary WER tests)	Dr. Brian Mastin and Ms. Amy Margolis	2433 Impala Dr., Carlsbad, CA 92010
Nautilus Environmental Inc.	10 L for *C. dubia* testing	Bioassay testing (Confirmation WER tests)	Ms. Adrienne Cibor	4340 Vandever Avenue, San Diego, CA 92120
CRG Marine Laboratories	9.25 L in accordance with Table 4-2	Water chemistry (Primary WER tests)	Mr. Eugene Chae	2020 Del Amo Blvd., Suite 200 Torrance, CA 90501
Weck Laboratories, Inc.	9.25 L in accordance with Table 4-4	Water chemistry (Confirmation WER tests)	Ms. Hai Van Nguyen	14859 E. Clark Avenue, Industry, CA 91745
Physis Laboratories, Inc.	2.0 L	Pyrethroids (Confirmation WER tests)	Ms. Misty Mercier	1904 E. Wright Circle, Anaheim, CA 92806

Range-finding and Definitive WER Sample Collections

Samples for range-finding and definitive WER tests were collected by Weston in 2010. Samples comprised of flow-weighted composites with sample collection initiated at the onset of the storm event (i.e., first flush) and throughout the hydrograph to best represent each entire wet-weather runoff event. Between 5 and 10 individual grab samples were collected and composited over a period of up to 14 hours during each storm. Concurrent sampling for compliance monitoring was conducted at both forks of Chollas Creek comprised of continuous flow-weighted samples, consistent with the standard compliance monitoring methodology. The following sampling protocol outlines the procedures used to collect flow-weighted samples. The final sampling methodology was subject to comment from the Regional Board and was outlined in the QAPP (Appendix B).

Automated flow and sampling equipment was installed at the site to assist in the collection of flow-weighted composite samples during storm events. An America Sigma flow meter with a pressure transducer or bubbler was installed to measure velocity and stage height. The inflow flow sensor was installed on the channel bottom as close to the center of the channel as possible. Using the data collected by the flow meter, collection intervals for the WER samples were set to capture a total of approximately 20 liters (L) of water over the duration of the sampling period (up to 14 hours). The sample intake point was adjacent to the flow meter on the channel bottom as close to the center of the channel as possible. An American Sigma automated sampler using a peristaltic pumping mechanism was used to collect 1-L sample aliquots at a sampling rate dependent on measured flow within the Creek. One-liter aliquots were pumped through a Teflon® intake device and Teflon tubing into a 20-L borosilicate glass sample bottle for subsequent testing. The sample bottle was set inside an open container that was filled with ice during the storm event. Field crews maintained and replaced the sampling jugs as they filled to capacity.

All water samples were logged on a COC form and placed in a cooler on ice until delivered to Weston for all range-finding and definitive WER studies. Completed COC forms are included in Appendix C. Upon receipt at Weston, each composite sample was subsampled in accordance with Table 4-4 for delivery to the appropriate laboratories for chemistry and toxicity analyses. Toxicity analyses were conducted by Weston's in-house laboratory in Carlsbad, California. Chemistry analyses were conducted by CRG Marine Laboratories, Inc. (CRG), in Torrance, California; Weck Laboratories, Inc. (Weck), in the City of Industry, California; and Enviromatrix Analytical, Inc., in San Diego, California. Samples were stored at 4 degree Celsius (°C) in the dark until shipped or delivered to the laboratory. All water samples were shipped within 24 hours of collection in the field.

A field data log was completed by the field team over the course of each storm (Appendix D). The field data log includes empirical observations regarding the site and the storm event (e.g., meteorological conditions, odor, color, turbidity, floating materials, and trash). Field measurements of pH, conductivity, and temperature were captured in situ using a hand-held Oakton CON10 multi-meter.

Confirmation WER Sample Collection

Samples for confirmation WER tests were collected by AMEC in April 2014. Test material for the WER confirmation tests likewise consisted of representative samples collected from the same two mass-loading stations in the Chollas Creek watershed (SD8(1) and DPR2). Each initial sample was collected as a continuous flow-weighted composite over the duration of the storm event; samples were collected using a Sigma SD900 automated peristaltic pump with Teflon tubing into multiple 20-L glass containers. It was discovered following collection and prior to testing that the composite for site SD8(1) was compromised by two water main leaks that occurred upstream within the Chollas Creek watershed during the storm, resulting in elevated chlorine levels in the sample. As a contingency to account for limited rainfall and runoff, a bulk grab sample was collected at site SD8(1) at the beginning of the storm. All other water quality characteristics (pH, conductivity, etc.) were similar between the storm composite and bulk grab sample, and consistent with that recorded during prior storm events. It was therefore determined that the grab sample from SD8(1) was sufficiently representative of the site during the storm and was deemed acceptable for use in this study.

Upon receipt at AMEC each composite sample was subsampled in accordance with Table 4-5 for delivery to the appropriate laboratories for chemistry and toxicity analyses. Toxicity analyses were conducted by Nautilus Environmental, Inc. (Nautilus), in San Diego, California. Chemistry analyses were conducted by Weck in the City of Industry, California, and Physis Environmental Laboratories, Inc. (Physis), in

Anaheim, California. Samples were stored at 4°C in the dark until shipped or delivered to the laboratory. All water samples were shipped within 24 hours of collection in the field.

Field water quality parameters of pH, conductivity, temperature, and dissolved oxygen were recorded using portable hand held YSI meters.

Table 4-4. Sample Volume, Container, and Preservative for Laboratory Chemical Analysis of Range-finding and Definitive WER Samples from Chollas Creek in 2010

Analysis	Volume (mL)	Container	Preservative	Filtering Required
Total Suspended Solids	1,000	HDPE	Cool to 4°C	No
Total Dissolved Solids				
Total Organic Carbon	250	Amber Glass	Cool to 4°C; H_3PO_4	No
Dissolved Organic Carbon	250	Amber Glass	Cool to 4°C	Yes*
Ammonia	250	Amber Glass	Cool to 4°C; H_2SO_4	No
Chloride	500	HDPE	Cool to 4°C	No
Alkalinity				
Sulfate				
Total Hardness	1,000	HDPE	Cool to 4°C; HNO_3**	No
Total Calcium				
Total Magnesium				
Total Sodium				
Total Potassium				
Total Copper				
Total Lead				
Total Zinc				
Dissolved Calcium			Cool to 4°C	Yes*
Dissolved Magnesium				
Dissolved Sodium				
Dissolved Potassium				
Dissolved Copper				
Dissolved Lead				
Dissolved Zinc				
Organophosphorus Pesticides	6 X 1,000	6 Amber Glass	Cool to 4°C	No
Organochlorine Pesticides				
PCB Congeners				
Synthetic Pyrethroids				
PAHs				
48-Hour *C. dubia* Test	10,000	LDPE Cubitainer	Cool to 4°C	No

Notes:
* Filtering occurred in the laboratory upon receipt for dissolved metals and DOC analysis.
**Total metals were acidified in the laboratory at CRG.
HDPE = high-density polyethylene; LDPE = low-density polyethylene; PAHs = polycyclic aromatic hydrocarbons;
PCB = polychlorinated biphenyl

Table 4-5. Sample Volume, Container, and Preservative for Laboratory Chemical Analysis of Confirmation WER Samples from Chollas Creek in 2014

Analysis	Volume (mL)	Container	Preservative	Filtering Required
Total Organic Carbon	250	Amber Glass	Cool to 4°C; H_3PO_4	No
Dissolved Organic Carbon	250	Amber Glass	Cool to 4°C	Yes*

Analysis	Volume (mL)	Container	Preservative	Filtering Required
Chloride	500	HDPE	Cool to 4°C	No
Alkalinity				
Sulfate				
Total Hardness	1,000	HDPE	Cool to 4°C	No
Total Calcium				
Total Magnesium				
Total Sodium				
Total Potassium				
Total Copper	1,000	HDPE	Cool to 4°C; HNO_3**	No
Total Zinc				
Dissolved Copper	1,000	HDPE	Cool to 4°C	Yes*
Dissolved Zinc				
Synthetic Pyrethroids	2,000	Amber Glass	Cool to 4°C	No
C. dubia Acute Toxicity	10,000	LDPE Cubitainer	Cool to 4°C	No
P. promelas Acute Toxicity	10,000	LDPE Cubitainer	Cool to 4°C	No

Notes:
* Filtering occurred in the laboratory upon receipt for dissolved metals and DOC analysis.
**Total metals were acidified in the laboratory at Weck.
HDPE = high-density polyethylene; LDPE = low-density polyethylene

4.4 Water-Effect Ratio Toxicity Testing

To develop WERs for Chollas Creek, bioassay tests were conducted using *C. dubia* and *P. promelas* (secondary species confirmation test only) consistent with the requirements of the Interim Guidance and in accordance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition* (USEPA 2002). Acute 48-hour survival tests with *C. dubia* were conducted with copper and zinc (separately) dissolved in storm water runoff from sites SD8(1) and DPR2, and in laboratory dilution water. Acute 48-hour survival tests with *P. promelas* were conducted with copper and zinc (separately) dissolved in storm water runoff from sites SD8(1) and DPR2, and in laboratory dilution water. A summary of the metal spiking tests to develop the WERs are summarized in Table 4-6. A summary of confirmation tests performed to further support and confirm the definitive WERs is provided in Table 4-7.

Table 4-6. Summary of Range-finding and Definitive WER Toxicity Tests for Chollas Creek using *C. dubia*

Test Type	**Sample**
Rangefinder WER Tests (1/18/10)	
Copper Spike	Lab dilution water
	Chollas Creek water SD8(1)
Zinc Spike	Lab dilution water
	Chollas Creek water SD8(1)
Definitive WER Tests (02/27/10, 04/01/10, 10/30/10, and 12/20/10)	
Copper Spike	Lab dilution water
	Chollas Creek water SD8(1)
	Chollas Creek water DPR2
Zinc Spike	Lab dilution water
	Chollas Creek water SD8(1)
	Chollas Creek water DPR2
Standard Reference Toxicant Tests (Concurrent on all test dates)	
Copper Spike	Lab dilution water

Table 4-7. Summary of Follow-up WER Confirmation Studies Tests for Chollas Creek using *C. dubia* and *P. promelas*

Test Type	**Sample**[1]
Metal Mixture Studies (*C. dubia*)	
Copper Spike	Lab dilution water
	Chollas Creek water SD8(1)
	Chollas Creek water DPR2
Zinc Spike	Lab dilution water
	Chollas Creek water SD8(1)
	Chollas Creek water DPR2
Copper + Zinc Spike Mixtures	Lab dilution water
	Chollas Creek water SD8(1)
	Chollas Creek water DPR2
Spike Confirmation Tests (*P. promelas*)	
Copper Spike	Lab dilution water
	Chollas Creek water SD8(1)
	Chollas Creek water DPR2
Zinc Spike	Lab dilution water
	Chollas Creek water SD8(1)
	Chollas Creek water DPR2
Reference Toxicant Tests – April (*C. dubia* and *P. promelas*)	
Copper Spike	Lab Dilution Water

[1] All confirmation tests conducted on samples collected April 2, 2014.

4.4.1 Acute Toxicity Test Methods

Acute 48-hour toxicity tests with *C. dubia* and *P. promelas* (secondary species confirmation test only) were conducted in accordance with USEPA procedures (2002). Testing for samples used to calculate the WERs were initiated within 36 hours of sample collection for all definitive WER sampling events. During each event, test organisms were exposed for 48 hours to a control and multiple concentrations of copper and zinc spiked separately in laboratory dilution water (or in combination for the confirmation mixture study), and water from the north and south forks of Chollas Creek (sites SD8(1) and DPR2, respectively). The control and each test concentration contained four replicates with five organisms each. A total of five to eight single-metal spiked concentrations were tested among all range-finding, definitive WER, and single-metal spike confirmation WER tests to bracket expected dose responses. A total of 12 copper/zinc metal mixture combinations were tested for the confirmation study using *C. dubia*. Water quality parameters of pH, dissolved oxygen (DO), temperature, and conductivity were recorded daily in each test concentration. In addition, water samples were collected from the control and each test concentration at test initiation and completion for metals analyses as described in Section 4.3.3. Toxicity test methods and conditions are summarized in Table 4-8 and Table 4-9 for *C. dubia* and *P. promelas*, respectively.

A 48-hour reference toxicant test was conducted concurrently with each WER test series to evaluate the relative sensitivity of the test organisms relative to that historically observed. The reference toxicant tests were performed using copper sulfate with a spiked laboratory control and five total copper concentrations ranging between 3 and 80 micrograms per liter (µg/L) for *C. dubia* and 15 to 240 µg/L for *P. promelas*. At test termination, the median lethal effect concentration (LC50) was calculated and compared to historical laboratory reference toxicant test data for each species.

Table 4-8. Test Conditions for the Acute 48-Hour Toxicity Test with *C. dubia*

Test Species		***Ceriodaphnia dubia***
Test Procedures		USEPA (2002)
Age/Size Class		Less than 24 hours
Test Type/Duration		Acute static non-renewal/48-hours
Sample Storage Conditions		4°C, dark, minimal head space
Holding Time		36 hours for effluents (EPA 2002); 96 hours maximum for WERs (EPA 1994)
Control Water Source		Diluted mineral water (Moderately hard lab water 80–100 mg/L $CaCO_3$)
Recommended Water Quality Parameters	Temperature	20 ± 1°C
	Dissolved Oxygen	≥ 4.0 mg/L
	pH	6.0–9.0
Photoperiod		16 hours light, 8 hours dark
Test Chamber		100 mL
Exposure Volume		50 mL
Concentrations		5 to 8, and a control for each metal based on the results of the range-finder tests
Replicates/Sample		4
No. of Organisms/Replicate		5
Aeration		None, unless DO falls below 4.0 mg/L (head space aeration)
Feeding		*Selenastrum* and cereal leaf extract *ad libitum* at least 2 hours prior to test initiation
Statistical Analysis		ToxCalc™ v1.1.2 rev H 5.0 or CETIS™ version 1.8.4.23 statistical software
Test Acceptability Criterion		90% or greater survival in controls
Reference Toxicant		Copper chloride (48- or 96-hour exposure)
Test Protocol		EPA-821-R-02-012 (USEPA 2002)

Table 4-9. Test Conditions for the Acute 48-Hour Toxicity Test with *P. promelas*

Test Species		***Pimephales promelas***
Test Procedures		USEPA (2002)
Source, Age/Size Class		Aquatic Biosystems (Fort Collins, CO), 4 days old at initiation
Test Type/Duration		Acute static non-renewal/48-hours
Sample Storage Conditions		4°C, dark, minimal head space
Holding Time		36 hours for effluents (EPA 2002); 96 hours maximum for WERs (EPA 1994)
Control Water Source		Diluted mineral water (Moderately hard lab water 80–100 mg/L $CaCO_3$)
Recommended Water Quality Parameters	Temperature	20 ± 1°C
	Dissolved Oxygen	≥ 4.0 mg/L
	pH	6.0–9.0
Photoperiod		16 hours light, 8 hours dark
Test Chamber		500 mL plastic cup
Exposure Volume		250 mL
Concentrations		7 and a control for each metal based on the results of the range-finder tests
Replicates/Sample		4
No. of Organisms/Replicate		5
Aeration		None, unless DO falls below 4.0 mg/L (head space aeration)
Feeding		*Artemia* prior to test initiation. No feeding during test.
Statistical Analysis		CETIS™ statistical software, version 1.8.4.23.
Test Acceptability Criterion		90% or greater survival in controls
Reference toxicant		Copper chloride (96-hour exposure)
Test Protocol		EPA-821-R-02-012 (USEPA 2002)

4.4.2 Trace Metal Spiking and Subsampling

Metal stocks were prepared in Nanopure-filtered water using J.T. Baker Brand ACS reagent grade copper chloride and zinc sulfate salts purchased from Sigma-Aldrich® (Ricca Chemical Company, CAS # 7758-99-8) and zinc sulfate (Sigma Aldrich, CAS # 7446-20-0), both relatively soluble forms of these metals that are similar to the metal salts used in USEPA’s criteria development.

All primary working stock solutions were subsampled and analytically verified before use. Test solutions for the WER tests were prepared by adding appropriate volumes of stock metal solutions into glass volumetric flasks. All stock solutions were measured using volumetric pipettes. The lab or site water was then added to the fill line on the volumetric flask, mixed thoroughly, and each solution then poured back out into a separate clean, labeled low-density polyethylene (LDPE) plastic cubitainer. Nominal target test concentrations are provided in Appendix E-1.

The test solutions were manually mixed immediately upon preparation, allowed to sit for a minimum of 3 hours to enable metal partitioning to reach equilibrium with test water constituents, and manually mixed again before being distributed to test chambers. Initial water quality parameters including pH, DO, temperature, and conductivity were recorded for each test concentration before test initiation. After mixing, all dilutions were acclimated to the appropriate temperatures before being used for test initiations and renewals.

Using “clean” sampling techniques (USEPA 1995), subsamples of each test concentration were collected immediately before test initiation and again at test termination to determine dissolved and total metal fractions. If complete mortality was observed in any test concentration, subsamples for dissolved fractions were collected on the same day. Sterile disposable 250 milliliter (mL) VWR® Bottle Top Filtration Units were used to filter samples for dissolved metals analysis. Filter material consisted of a 0.45-micrometer (µm) hydrophilic polyethersulfone (PES) membrane. A single filter unit was used for each site/metal combination to avoid contamination between concentrations. Solutions were thoroughly mixed immediately before subsampling. Each filter unit was rinsed thoroughly with de-ionized (DI) water, and the first 10 to 20 mL sample water to go through the filters was disposed of. Each dissolved metals fraction was then immediately poured into a clean, pre-labeled 250 mL HDPE bottle prepared by the analytical lab with high-purity nitric acid to preserve the samples. The remaining sample was poured into the pre-labeled 250 mL trace clean VWR bottle and capped. Subsamples were immediately recorded on a chain of custody form and stored at 4ºC until transfer to the analytical laboratory.

Subsamples selected for analysis were placed within an insulated cooler on ice for shipment via same-day courier to the analytical chemistry laboratories.

4.4.3 Range-finder Toxicity Tests

Before conducting the definitive WER testing, range-finder toxicity tests were performed to determine a more precise range of spiked concentrations to bracket a complete dose response and enable an accurate calculation of LC50 values and the associated WERs. Test concentrations were prepared by spiking both laboratory and site water (SD8(1) only) during the first event (1/18/2010) with known concentrations of reagent-grade ionic metal salt solutions following the methods described in Section 4.4.2. Multiple (at least six, including a control) metal concentrations were used for each range-finder test.

As part of the range-finder testing, an appropriate hardness of laboratory control water was verified before conducting the definitive WER tests. The hardness of the matched laboratory water was not greater than the hardness of the site water in accordance with the Interim Guidance, unless the hardness of the site water was less than 50 mg/L (as $CaCO_3$).

4.4.4 WER Definitive Tests

Based on the initial dose response results obtained from the range-finder tests for copper and zinc in water from Chollas Creek, more refined spike concentrations were selected for definitive WER tests on creek samples collected during four storms in 2010. Nominal total metals and associated measured total and dissolved copper and zinc concentrations for each test dilution are provided in Appendix E-1. Toxicity test methods and subsampling for metals analysis followed those procedures in Sections 4.4.1 and 4.4.2.

4.4.5 WER Confirmation Toxicity Tests

Follow-up tests to confirm definitive WER results developed from tests conducted in 2010 included testing a secondary species (*P. promelas*) and a study of the effects of the mixing copper and zinc together on *C. dubia*. A series of copper and zinc mixtures tests were conducted; these included revised WQO concentrations based on proposed final WERs for each metal (added together) and site hardness. An additional 11 combinations based on a range of WER values below and above the final proposed WER adjusted criteria were also tested for comparison purposes. Secondary species single-metal spike confirmation tests were performed using the fathead minnow (*P. promelas*) tested side-by-side with *C. dubia*. These tests were conducted at Nautilus in San Diego on samples collected from Chollas Creek on April 2–3, 2014. Toxicity test methods and subsampling for metals analysis followed those procedures in Sections 4.4.1 and 4.4.2. A complete stand-alone report from Nautilus with more detailed methods, results, and all associated raw data is provided in Appendix G.

4.4.6 Physical and Chemical Analyses

Because of known historical detections of synthetic pyrethroids, diazinon, and other potential confounding factors not related to metals, water samples collected from Stations SD8(1) and DPR2 were analyzed for a suite of physical parameters and a comprehensive list of chemical constituents of potential toxicological concern during WER range-finding and definitive tests (Appendix E-1). Physical parameters included total suspended solids (TSS), total dissolved solids (TDS), pH, alkalinity, cations, anions, hardness, conductivity, TOC, and DOC. Toxic constituents of concern included trace metals, ammonia, organophosphorous pesticides, organochlorine pesticides and polychlorinated biphenyls (PCBs), pyrethroid pesticides, and polycyclic aromatic hydrocarbons (PAHs). Pyrethroid pesticides, along with a number of physical parameters (TOC, DOC, pH, alkalinity, hardness, cations, ions, and conductivity) were also measured in Chollas Creek samples collected for the WER confirmation tests.

The control waters used for toxicity tests at Weston and Nautilus were analyzed for pH, alkalinity, hardness, DOC, and a suite of cations and anions (i.e., sodium, calcium, magnesium, potassium, and chloride). All analytical methods used to obtain chemical concentrations followed USEPA or Standard Methods (SM) (APHA 1998). A summary of the analytical constituent list, including methods, is presented in Appendix E-1.

Analyses of trace metals (copper and zinc) and cations (calcium, magnesium, sodium, and potassium) were conducted using an inductively coupled plasma emissions spectrometer equipped with a mass detector (ICP-MS) after acid solubilization in accordance with USEPA Method 200.8. To determine dissolved metal analytes, aqueous samples were filtered through a 0.45-µm membrane prior to acid solubilization and analysis in accordance with USEPA Method 200.8. Trace organics (PAHs, synthetic pyrethroids, organophosphorus pesticides, organochlorine pesticides, and PCB congeners) in water were analyzed using gas chromatography and mass spectrometry (GC-MS) in accordance with USEPA Method 625 following serial liquid-liquid extraction with methylene chloride.

Solids were measured by glass fiber filtration of water samples, where the non-filterable residue was dried to a constant at 103–105°C and quantified as total suspended solids in accordance with SM 2540-D. The filtrate was evaporated to a constant dryness at 180°C and quantified as TDS in accordance with SM 2540-C. Organic carbon was measured by catalytic combustion or wet chemical oxidation as TOC in accordance with USEPA 415.1. For the determination of DOC, aqueous samples were filtered through a 0.45-µm membrane prior to analysis by USEPA 415.1. Ammonia was measured by the spectrophotometric phenate method in accordance with SM 4500-NH3 F. Chloride was measured by the automated ferricyanide method in accordance with SM 4500-Cl E. Sulfate was measured using the turbimetric method in accordance with 4500-SO42- E. Total hardness was determined by calculation using concentrations of calcium and magnesium determined by ICP-MS. Alkalinity was measured by autoanalyzer in accordance with USEPA 310.2.

4.5 Quality Assurance / Quality Control

4.5.1 Toxicity Testing

Practices to ensure reliable, high-quality results for the tests conducted for this project are described in the project-specific QAPP (Appendix B). The objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Water sampling and handling
- Source and condition of test organisms
- Condition of equipment

- Test conditions
- Instrument calibration
- Use of reference toxicants
- Record keeping
- Data evaluation

Each test series conducted for all preliminary, definitive, and confirmatory WERs included concurrent reference toxicant tests to evaluate the health and sensitivity of each batch of organisms relative to that historically observed in each laboratory using a single common toxicant—copper. Water quality measurements were monitored to ensure that they fell within prescribed limits; corrective actions (USEPA-recommended) were taken, if necessary. All limits established for this program meet or exceed those recommended by USEPA.

The methods employed in every phase of the bioassay testing program are detailed in laboratory-specific Standard Operating Practices (SOPs). These SOPs have been audited and approved by an independent, USEPA-recommended laboratory and placed in the quality assurance (QA) files and the laboratory files. All toxicity test staff members receive regular, documented training in all SOPs and test methods.

Finally, all data collected and produced as a result of these analyses were recorded on approved data sheets and became part of the permanent data record of the program.

4.5.2 Toxicity Test Quality Assurance Summary

To ensure the quality of the toxicity tests used for the WER calculations, the following analyses were conducted to verify the data.

Holding Times, Control Responses, and Dose Responses

All samples were received by the laboratories under appropriate conditions and within the recommended temperature range of 0–6° C. All samples for the four definite WER tests were initiated within 36 hours of receipt. During the confirmation WER, tests were initiated within 36 hours of sample receipt for sample DRP2. The confirmation tests conducted on sample SD8(1) were initiated between 51 and 54 hours past collection at test initiation, but were within the maximum holding time of 96 hours post-collection allowed for WER testing purposes (USEPA 1994b, 2001).

Mean control responses met minimum test acceptability criteria for all range-finding WER tests and confirmation WER tests. One control test during the first definitive WER event (2/28/10) failed control acceptability (mean survival of 75 percent). However, a concurrent control test on the same day met the criteria (mean of 95 percent), and several of the lower spiked zinc concentrations in the test series also had high survival (90–100 percent). Concurrent reference toxicant test results also indicated that the test organisms were healthy and their sensitivity fell within historical control chart limits. Based on these observations, the tests initiated with zinc on 2/28/10 are flagged, but are deemed acceptable for reporting purposes and derivation of WER values. Mean control survival met or exceeded the minimum USEPA criteria in all other definite WER tests.

All metal spike dose-response relationships were carefully reviewed according to USEPA guidance (USEPA 1994b, 2000, 2001) to evaluate reliability of results. No anomalous dose responses or excessive variability among replicates were observed in any of the WER tests. On the basis of these observations, all reported data were deemed reliable for WER calculations.

Reference Toxicant Testing

Reference toxicant tests were conducted concurrent to all rounds of tests using both *C. dubia* and *P. promelas* to assess the health and sensitivity of tested organisms to a single toxicant (copper chloride), relative to historic results obtained in the toxicity testing laboratories. All reference toxicant tests met applicable test acceptability criteria and the calculated effect concentrations were within two standard deviations of the historical means, indicating that the organisms' sensitivity to copper was typical and the tested organisms were healthy. Reference toxicant test results are summarized at the end of the laboratory reports by Weston and Nautilus, presented in Appendix G.

4.5.3 Analytical Chemistry

Detailed descriptions of quality assurance/quality control (QA/QC) procedures for the chemical analyses of samples for this project are presented in the QAPP (Appendix B) and summarized in this section. QA objectives for chemical analyses conducted by the participating analytical laboratories are detailed in their Laboratory QA Manual(s). These objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Methods and SOPs
- Calibration methods and frequency
- Data analysis, validation, and reporting
- Internal QC
- Preventive maintenance
- Procedures to ensure data accuracy and completeness

Results of laboratory QC findings, qualifications, and exceptions were reported with the final data. Laboratory accuracy was indicated by analyses of matrix spikes, blank spikes, certified reference material (CRM), and/or recovery surrogates. Matrix spike analyses assess the effect that a particular sample matrix had on the accuracy of a measurement. Blank spikes demonstrated performance of the preparation method on a clean matrix, void of potential interferences. CRMs or Standard Reference Materials (SRMs) are pre-homogenized materials of various matrices for which compositional information has been certified by a recognized authority and were used to provide a quantitative assessment of the accuracy of an analytical method or procedure. Where CRMs were unavailable, the recovery of an analyte was estimated by studying the recovery of an added compound or element that was regarded as a pure analyte surrogate for the native analyte, most often used with organic analytical procedures.

Precision was determined by analyses of duplicate matrix spikes, blank spikes, recovery surrogate spikes, and/or duplicate test sample analysis. Laboratory contamination introduced during method use was assessed through the analyses of procedural/method blanks. Holding times were also evaluated to determine any effect on the analyte's measured concentration. Any QC samples that failed to meet the specified QC criteria in the methodology or QAPP were identified and the corresponding data were appropriately qualified in the final report.

All QA/QC records for the various testing programs were kept on file.

4.6 Data Review, Management, and Analysis

4.6.1 Data Review

All data were reviewed and verified by participating team laboratories to determine whether all data quality objectives had been met and that appropriate corrective actions had been taken, when necessary.

4.6.2 Data Management

All laboratories supplied analytical results in both hard copy and electronic formats. Laboratories had the responsibility of ensuring that both forms were accurate. After completion of the data review by participating team laboratories, hard copy results were placed in the project file. The results in electronic format were imported into the City of San Diego's database system.

4.6.3 Data Analysis

For each metal and flow event, initial and final dissolved metal measurements were averaged for each concentration used to calculate an LC50 endpoint, in accordance with the Interim Guidance. LC50 values or point estimates for each WER test conducted were determined using ToxCalc™ v1.1.2 rev H 5.0; or Comprehensive Environmental Toxicity Information System (CETIS)™ version 1.8.4.23 statistical software (both produced by Tidepool Scientific Software, McKinley, California). Statistical assessments of toxicity were performed at the 95 percent confidence level ($\alpha = 0.05$) and assumptions regarding equality of variance and distribution were evaluated at the 99 percent confidence level ($\alpha = 0.01$). Probit or Spearman-Karber analyses were used to calculate LC50 values. Both laboratory and site water LC50 values used to calculate a WER value were determined using the same type of statistical analysis for consistency.

Per the Interim Guidance, WER values were calculated for each site for each event by dividing each site water LC50 by its corresponding laboratory water LC50 for each WER event, metal analyte, and species. In addition, based on comments from the TAC, WER values for dissolved copper were also calculated using the WER calculation method presented in the Streamline Procedure where the site water LC50 is divided by the higher of the lab water LC50 or the hardness-adjusted USEPA species mean acute value (SMAV) for *C. dubia*. The use of the Streamlined Procedure WER calculation method is more conservative in that it resulted in a lower WER value (see Section 6.2.1 for a comparison).

5 MONITORING SUMMARY

Monitoring in Chollas Creek was conducted during five individual storm events from January 2010 through December 2010. Confirmation WER sampling took place in April 2014.

5.1 Rainfall and Flow Data

Estimation of a representative storm event in San Diego County was based on an evaluation of the long-term data records from the National Weather Service rain gauge located at Lindbergh Field. A typical storm event at Lindbergh Field ranges from 0.19- to 0.57-inch of rain and lasts 6 to 12 hours. Because the depth and duration of a typical storm event varies depending on the monitoring station's location within San Diego County, storm events that were preceded by at least 72 hours of dry weather and were forecast to be greater than 0.10 inch were considered viable events for monitoring.

Event-specific rainfall for the Chollas Creek WER Study at SD8(1) and DPR2 are shown in Table 5-1. The watershed received approximately 11.7 inches of rain during the water sampling component of the Study period based on the rain gauge at DPR2 (October 1, 2009 through February 28, 2011). The average daily rainfall for the Chollas Creek watershed during the range-finding and definitive WER sampling events is shown on Figure 5-1. Monitored storm events are signified by raindrops in the figure.

Table 5-1. Rainfall Totals for Monitored Events at SD8(1) and DPR2

Storm Event Date	SD8(1) (inches)	DPR2 (inches)	Event Type
01/18/2010	1.00 *	NS	Rangefinder Test for SD8(1)
02/27/2010	0.60	0.71	WER Event No. 1
04/01/2010	0.54	0.52	WER Event No. 2
10/30/2010	0.25	0.23	WER Event No. 3
12/20/2010	0.70	0.66	WER Event No. 4
04/02/2014	0.28**	0.28**	WER Confirmation Studies

Notes:
* The rain gauge was inoperable in January 2010. Data for DPR2 were used during this period. NS = not sampled
** Rainfall results for both locations derived from a single nearby weather station located in Logan Heights.

Hydrographs depicting flow rates, rainfall, and sample times for the five storm events monitored at SD8(1) and four storm events monitored at DPR2 during the range-finding and definitive WER periods are presented in Figure 5-2 and Figure 5-3, respectively. Hydrographs depicting flow rates, rainfall, and sample times monitored at SD8(1) and DPR2 during the confirmation WER sampling are presented in Figure 5-4.

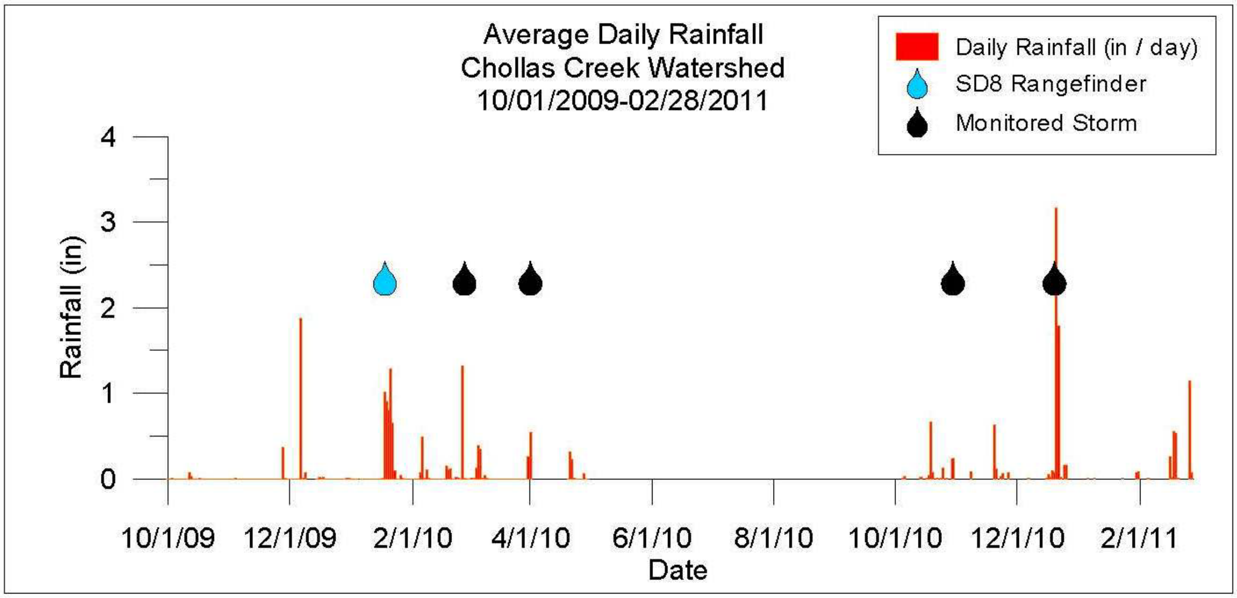


Figure 5-1. 2009–2011 Average Daily Rainfall Totals for the Chollas Creek Watershed During the Rangefinder and Definitive WER Testing Events

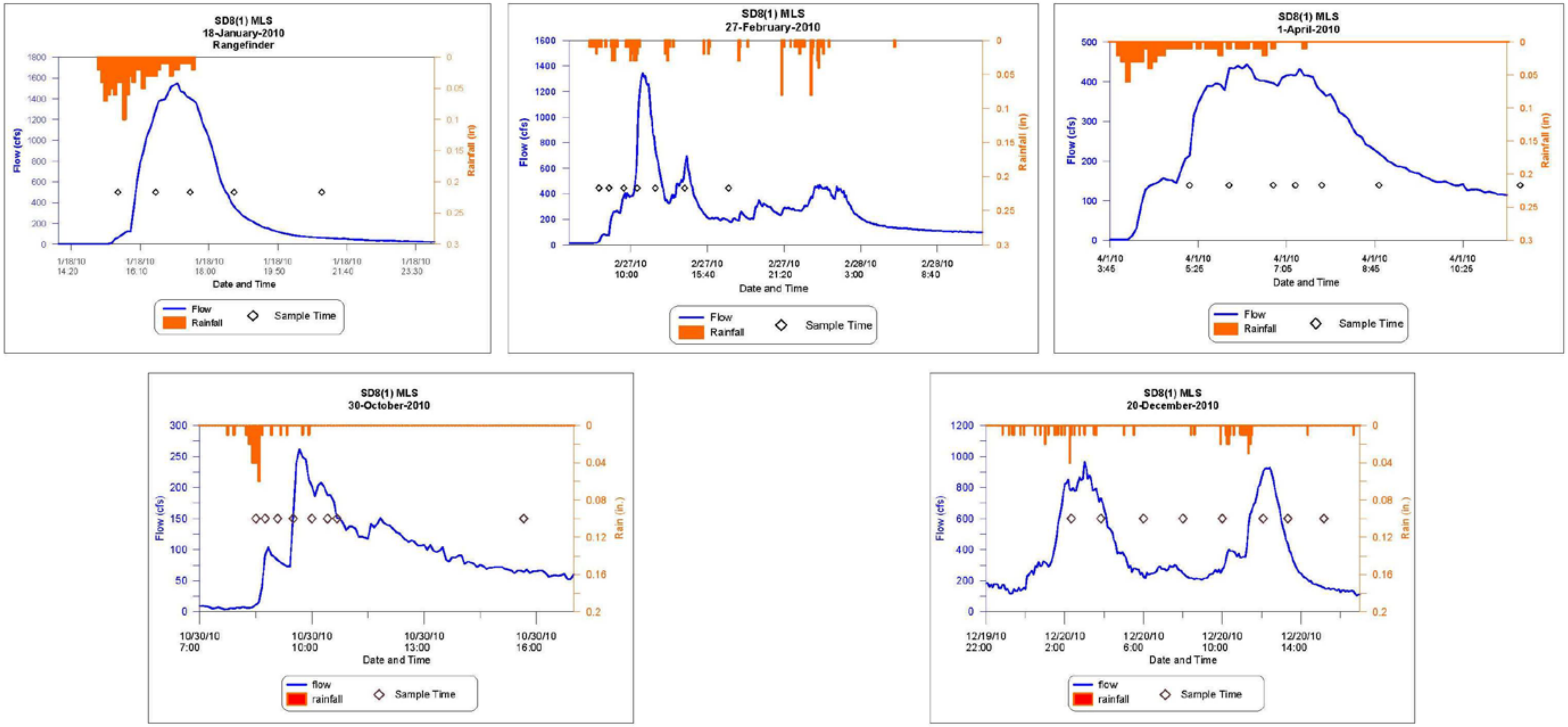


Figure 5-2. 2009–2010 Storm Hydrographs for SD8(1) Mass Loading Station (MLS)

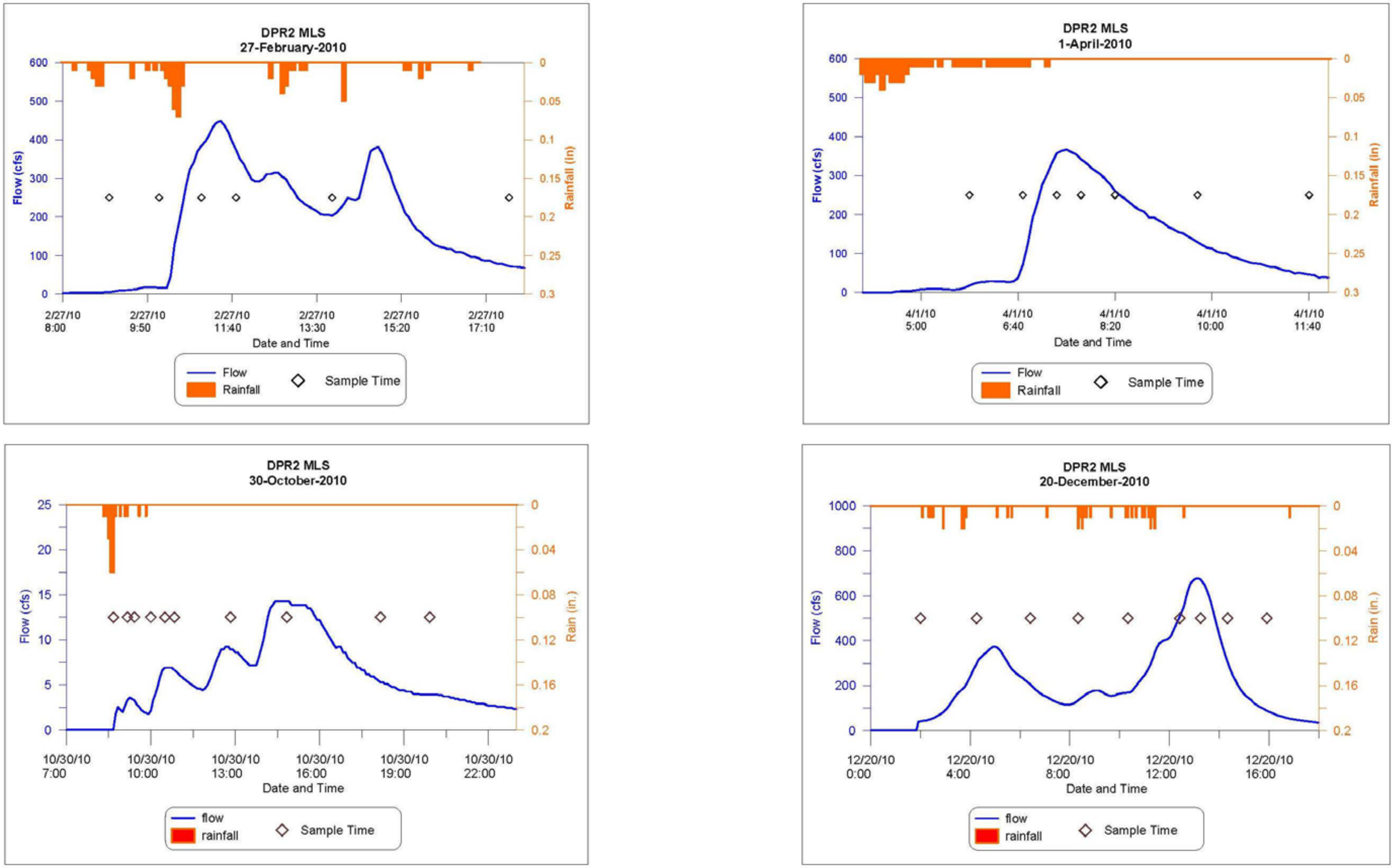
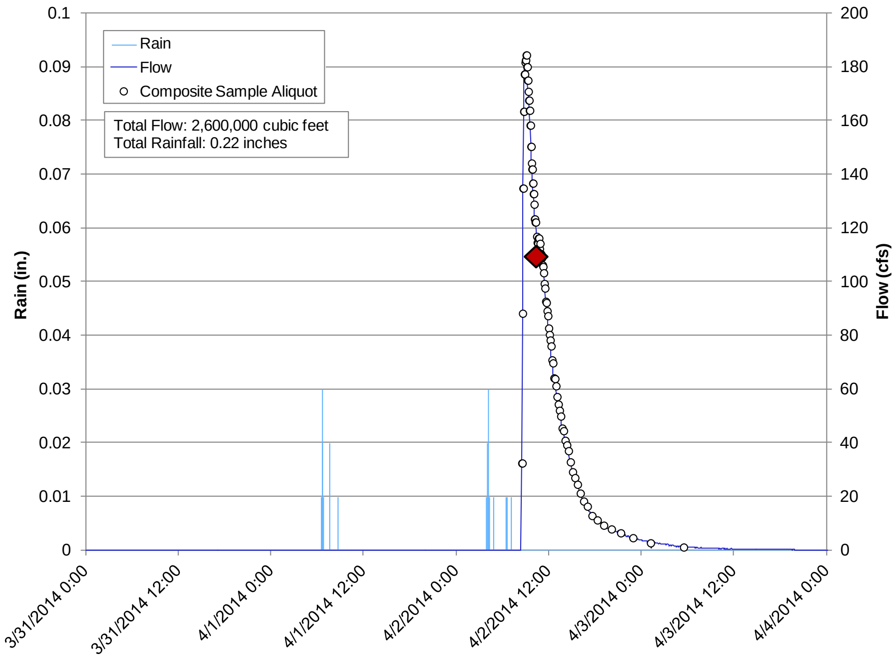
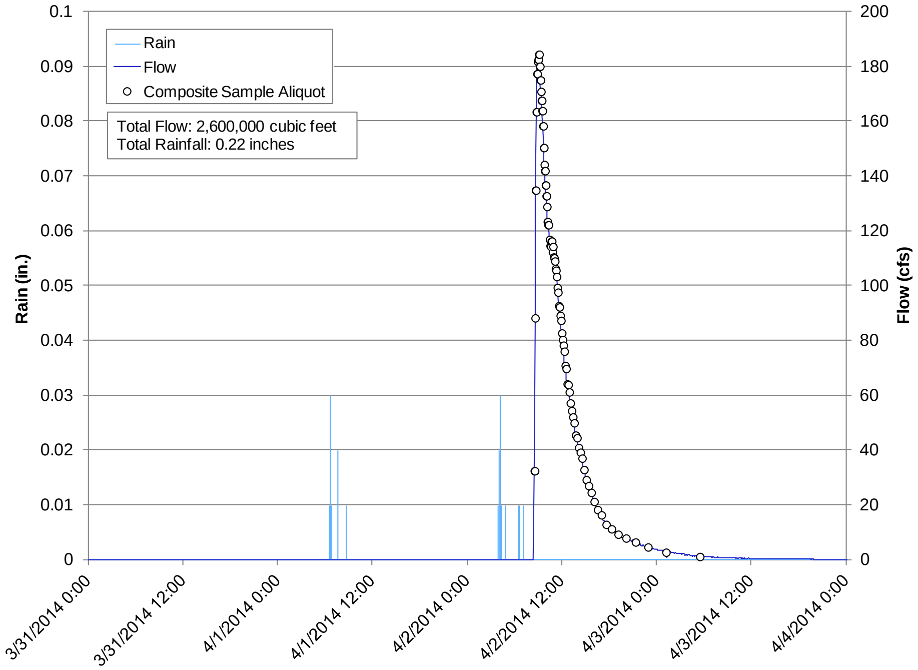


Figure 5-3. 2009–2010 Storm Hydrographs for DPR2 Mass Loading Station (MLS)



SD8(1) WER Hydrograph



DPR2 WER Hydrograph

◆ The red triangle depicts the time when the grab sample was collected from site SD8(1) for testing. The flow-weight composite was not tested because of subsequent City of San Diego water main breaks and the detection of chlorine in the final composite for this location. The flow-weight composite was tested for DPR2, uncompromised by the line breaks.

Figure 5-4. Storm Hydrographs for SD8(1) and DPR2 – April 2014 Confirmation WER Sampling Event

6 RESULTS

6.1 Analytical Chemistry Results

The goal of the analytical monitoring was to assess the concentration at which dissolved copper, lead, and zinc influences *C. dubia* toxicity. Analytical chemistry results from the monitored events and laboratory dilutions are presented in Appendix E. Results are presented for the site sample water and for the WER dilutions for each metal.

6.1.1 Site Sample Water Results

As mentioned above, raw sample results by event are presented in Appendix E. General chemistry summary statistics are shown in Table 6-1. General chemistry parameters were marginally greater in samples collected from site DPR2 in the south fork of Chollas Creek than at site SD8(1) in the north fork, with the exception of sediments (TSS).

Table 6-1. General Chemistry Summary Statistics from Site Water Collected from Chollas Creek During Definitive WER Sampling Events (n=4) and WER Confirmation tests (n=1)

General Chemistry Analyte	Site SD8(1)				Site DPR2			
	WER Definitive Tests 2010			Conf. WER 2014	WER Definitive Tests 2010			Conf. WER 2014
	Min	Max	Mean		Min	Max	Mean	
pH	6.93	7.51	7.28	7.21	6.96	7.65	7.27	7.33
Ammonia-N	0.2	0.5	0.3	NM	0.1	0.5	0.2	NM
Chloride by IC	12.5	27.8	19.5	39	36.0	86.7	65.1	93
Dissolved Organic Carbon	3.9	25.2	11.2	12	4.5	28.5	13.1	21
Sulfate by IC	10.4	19.8	14.9	23	15.0	35.6	26.3	35
Total Alkalinity	26.0	35.0	31.4	31	38.0	66.0	49.8	53
Total Dissolved Solids	89.0	140	125	NM	140	278	215	NM
Total Hardness as $CaCO_3$	22.1	52.0	39.9	58.8	53.0	103	80.9	101
Total Organic Carbon	4.7	28.6	12.2	13	5.5	31.3	14.5	20
Total Suspended Solids	46.0	322	127	NM	7.0	113	57.6	NM

Notes:
All concentrations in mg/L
NM = Not measured in April 2014 confirmation samples

Results of the dissolved copper, lead, and zinc analyses during the WER sampling events in 2010 and 2014 were compared to historical concentrations measured in both forks of Chollas Creek to ensure the samples were representative of historical concentrations. Results are presented as box-whisker dot plots in Figure 6-1. The boxes show the 25th and 75th percentiles of the data, while the whiskers show the minimum and maximum values of the data set. The mean is shown as the line in between the upper and lower percentiles of the data. Each dot represents the results from a single monitoring event. As shown in Figure 6-1, the concentrations of dissolved copper, lead, and zinc measured in samples collected for the WER studies were within the expected range of the data and were determined to be statistically representative of the historical results. However, the concentrations of total hardness at SD8(1) for the Study samples were on the lower end of the range of historical data which would suggest the Study results and comparisons represent a conservative approach to assessing the SSO.

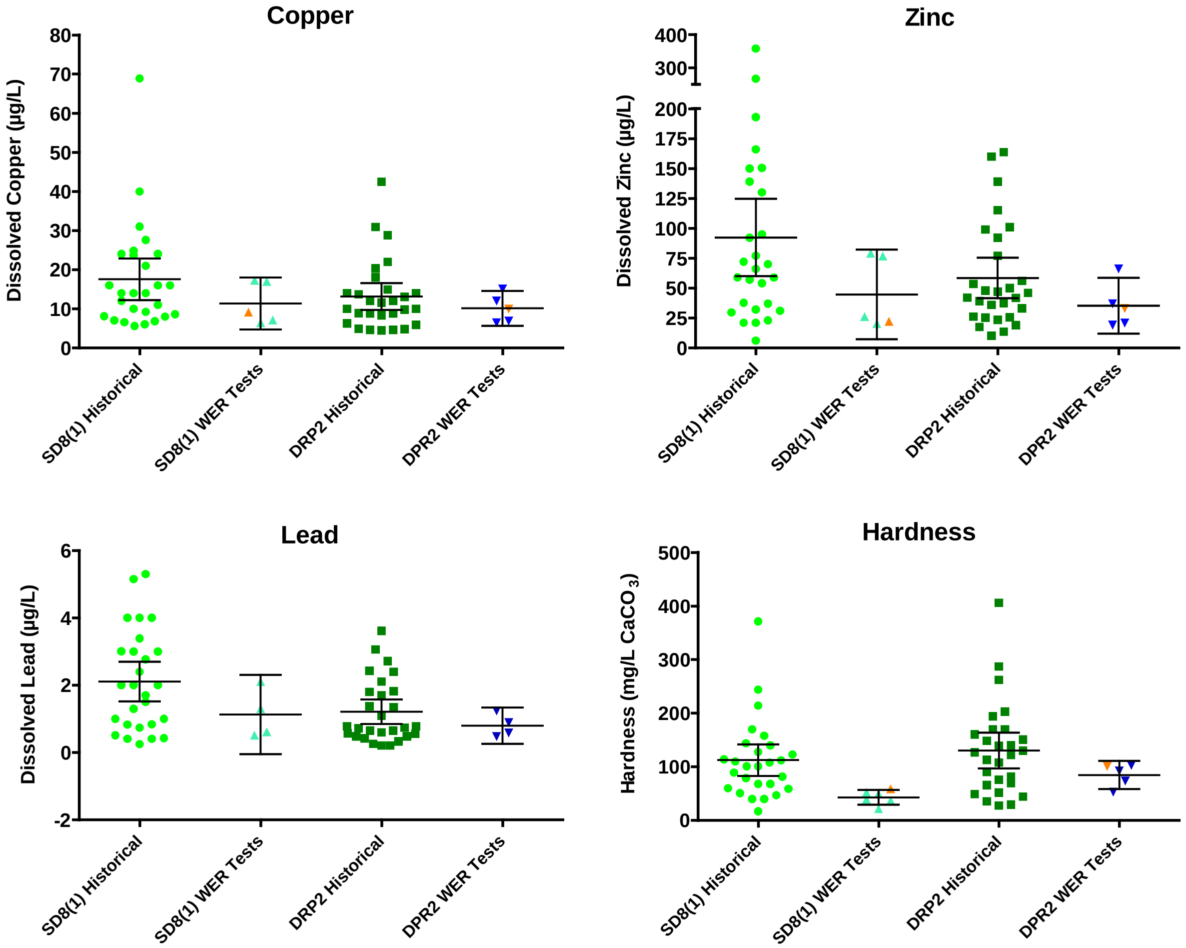


Figure 6-1. Box and Whisker Dot Plots of Dissolved Copper, Lead, Zinc, and Total Hardness for Historical Concentrations (2004–2014) and WER Samples (Definitive in 2010 and Confirmation in 2014)

Notes:
Bars indicate mean with 95% confidence interval
Orange symbols indicate values from the most recent confirmation sampling event (April 2–3, 2014).

6.1.2 Water-Effect Ratio Toxicity Test Dilution Series Results

The WER toxicity test results were based on preparing a concentration series for each individual metal for each site water sample. A stock spiking solution was prepared and the initial test and final test metal concentrations (total and dissolved) were measured for each concentration. To calculate LC50s, the average of the initial and final dissolved metal concentrations was calculated consistent with the Interim Guidance. Sample results from each event are presented in Appendix E. During Event 2, the copper and zinc concentration series were not high enough to induce 50 percent mortality for site DPR2. Therefore, the dilution series was repeated and additional higher range concentrations were included in a re-test.

As a QA/QC verification check on the spiking and exposure test methods for each test dilution series, an assessment of the variability of metals concentrations in each dilution was evaluated between the beginning and end of the test by calculating the relative percent difference (RPD) between the two values. RPD is the relative change in a quantity over a specified time period and the relative percent difference was calculated for each chemical analyte concentration using the following equation:

$$\% \text{ RPD} = \frac{(X1 - X2) \times 100}{(X1+X2)/2}$$

where:

X1 = measured value of a given analyte from the initial measurement

X2 = measured value of a given analyte from the duplicate measurement

(X1 + X2)/2 represents the average of the two values

Concentrations of dissolved copper and zinc never decreased by more than 50 percent in any of the site water samples tested. A decrease of more than 50 percent was observed in a few of the lower copper dilutions spiked in laboratory dilute mineral water (DMW), however in all cases these values were close to the method reporting limit of 1.0 µg/L (<10x), resulting in a bias where small differences can cause elevated RPDs.

6.1.3 Analytical Quality Assurance Summary

Analytical quality assurance/quality results are included in Appendix E-2. A summary of flags related to blank samples and duplicates is provided herein and detailed further in the Appendix. Matrix spike results are all included in the Appendix with appropriate flags noted where appropriate. All of the analytical data used for definitive WER calculations was deemed valid for reporting purposes.

- There were some detections of trace metals noted in the blank samples; however, results did not suggest that bias was a concern in relation to the spiking samples used for the analyses due to the low concentrations detected in the blanks relative to those concentrations bracketing toxic dose responses in the lab and site water samples used for WER calculations.
- Duplicate sample results were considered within an acceptable range of precision if the RPD is less than 20 percent. RPDs for total metals were all less than 20 percent with the exception of one sample for copper in Event No. 3 and zinc in Event No. 4. The maximum RPD calculated for dissolved metals was 11.76 percent, suggesting a high level of precision for the sample dilution series analysis.

Please refer to the QA/QC summary provided in Appendix E-2 for more specific details.

6.2 Toxicity Results

Toxicity results (normalized to a hardness of 100 mg/L $CaCO_3$) are presented in the following subsections for each of the four WER sampling events conducted in 2010. The choice of a standard hardness of 100 mg/L $CaCO_3$ for normalization is consistent with how metals criteria are presented by USEPA, recognizing these values are hardness-dependent with references to chemical-specific calculations to adjust criteria based on site-specific hardness. The choice of a standard hardness of 100 mg/L as $CaCO_3$ is arbitrary and does not affect the calculation of WER values. Complete bioassay results for all monitoring events are included in Appendix G.

6.2.1 Dissolved Copper Water-Effects Ratios

In evaluating the toxicity results for dissolved copper, it was observed that the LC50s in laboratory water were lower than those values identified by USEPA for *C. dubia*, potentially resulting in an artificially high WER for Chollas Creek. Therefore, as recommended by the TAC, the use of the more conservative approach presented in USEPA's Streamlined Procedure for copper is also used. Table 6-2 and Table 6-3 present the WERs for each site calculated using both the Interim Guidance and Streamlined Procedure calculation methods. As shown in Table 6-2 and Table 6-3, the Streamlined Procedure calculation method results in lower WERs in all cases.

Dissolved copper WER values for site SD8(1) ranged from 6.512 to 16.98 among the four sets of WER tests conducted on samples collected between February 27, 2010 and December 20, 2010 (Table 6-2). The geometric mean of the four individual WERs for SD8(1) was 9.307.

Dissolved copper WER values for site DPR2 ranged from 6.596 to 10.30 among the four sets of WER tests conducted on samples collected between February 27, 2010 and December 20, 2010. The geometric mean of the four individual WERs for site DPR2 was 6.998.

Because the geometric mean dissolved copper WER calculated for site DPR2 was lower than the geometric mean WER observed for site SD8(1), the WER for DPR2 (6.998) is recommended as the final WER value for use as a protective copper WER for the Chollas Creek watershed.

Table 6-2. Hardness Normalized Dissolved Copper WERs and 48-Hour *C. dubia* LC50 for Laboratory Water (DMW) and Chollas Creek Site SD8(1)

WER event	DMW LC50 (µg/L)	SMAV[1] (µg/L)	SD8(1) LC50 (µg/L)	WER Calculated Using DMW	WER Calculated Using SMAV
No. 1 (02/27/2010)	3.542	22.11	174.3	49.20	7.882
No. 2 (04/01/2010)	7.934	22.11	375.4	47.32	16.98
No. 3 (10/30/2010)	4.969	22.11	190.4	38.31	8.610
No. 4 (12/20/2010)	3.913	22.11	144.0	36.80	6.512
Geometric mean (± standard deviation)				40.39 (±6.26 SD)	9.307 (±4.74 SD)

Notes:
[1] USEPA 2001
LC50 and SMAV values have been normalized to a hardness of 100 mg/L $CaCO_3$.

Table 6-3. Hardness Normalized Dissolved Copper WERs and 48-Hour *C. dubia* LC50 for Laboratory Water (DMW) and Chollas Creek Site DPR2

WER event	DMW LC50 (µg/L)	SMAV[1] (µg/L)	DPR2 LC50 (µg/L)	WER Calculated Using DMW	WER Calculated Using SMAV
No. 1 (02/27/2010)	3.542	22.11	109.5	30.90	4.951
No. 2 (04/01/2010)	7.934	22.11	227.7	28.70	10.30
No. 3 (10/30/2010)	4.969	22.11	145.8	29.35	6.596
No. 4 (12/20/2010)	3.913	22.11	157.6	40.29	7.130
Geometric Mean (± standard deviation)				32.00 (±5.40 SD)	6.998 (±2.24 SD)

Notes:
[1] USEPA 2001

LC50 and SMAV values have been normalized to a hardness of 100 mg/L $CaCO_3$.

6.2.2 Dissolved Zinc Water-Effects Ratios

Dissolved zinc WER values for site SD8(1) ranged from 1.780 to 3.182 among the four sets of WER tests conducted on samples collected between February 27, 2010 and December 20, 2010 (Table 6-4). The geometric mean of the four individual WERs for SD8(1) was 2.223.

Dissolved zinc WER values for site DPR2 ranged from 1.183 to 2.205 among the four sets of WER tests conducted on samples collected between February 27, 2010 and December 20, 2010. The geometric mean of the four individual WERs for site DPR2 was 1.711. Similar to what was observed for copper, the dissolved zinc WER calculated for site DPR2 was lower than that calculated for site SD8(1) and is recommended as the final WER value for use as a protective zinc WER for the Chollas Creek watershed.

Table 6-4. Hardness Normalized Dissolved Zinc WERs and 48-Hour *C. dubia* LC50s for Laboratory Water (DMW) and Chollas Creek Sites (SD8(1) and DPR2)

WER event	DMW LC50 (µg/L)	SD8(1) LC50 (µg/L)	SD8(1) WER	DPR2 LC50 (µg/L)	DPR2 WER
No. 1 (02/27/2010)	204.5	363.9	1.780	339.0	1.658
No. 2 (04/01/2010)	224.0	712.9	3.182	493.9	2.205
No. 3 (10/30/2010)	281.5	608.8	2.163	333.0	1.183
No. 4 (12/20/2010)	171.2	341.5	1.995	339.1	1.980
Geometric Mean (± standard deviation)			2.223 (±0.62 SD)	-	1.711 (±0.44 SD)

Note:
LC50 values have been normalized to a hardness of 100 mg/L $CaCO_3$.

6.2.3 Secondary Species WER Confirmation Study

Samples were collected at sites SD8(1) and DPR(2) during a storm event on April 2–3, 2014 to test a secondary freshwater aquatic species per the Interim Guidance. As described previously, *P. promelas* was used as the secondary species, as suggested in the Interim Guidance, to confirm toxicity test results obtained using *C. dubia* for both copper and zinc. A toxicity test report with a summary of methods, results, and all of the associated raw toxicity and chemistry data from this study are included in a stand-alone toxicity report by Nautilus, provided in Appendix G. The Interim Guidance indicates that a WER obtained with a primary test is considered confirmed if either or both of the following are true (USEPA 1994b, p. 61):

a. The WERs obtained with the primary and secondary tests are within a factor of 3.
b. The test, regardless of whether it is the primary or secondary test, that gives a higher endpoint in the laboratory dilution water also gives the larger WER.

Side-by-side tests with *C. dubia* and *P. promelas* were conducted in which a range of copper and zinc concentrations were spiked into site waters from SD8(1) and DPR2 collected during the April 2–3 storm event. These results were used to calculate hardness-normalized WERs for each test and the differences between the two species were compared by calculating a ratio between the two WERs (*C. dubia* WER / *P. promelas* WER). Results of these tests are presented in Table 6-5 and Table 6-6. The primary and secondary species WERs are within a factor of 3 for both copper and zinc; thus, they meet requirement #1 above to ensure both species result in a similar outcome.

Table 6-5. Comparison of Primary and Secondary Water-Effect Ratio Tests for Copper at Chollas Creek Sites SD8(1) and DPR2 During the April 2014 Confirmation Event

WER Event	**SD8(1)**			**DPR2**		
	***C. dubia* WERs[1]**	***P. promelas* WER**	**Ratio between Primary and Secondary WER Tests**	***C. dubia* WERs[1]**	***P. promelas* WER**	**Ratio between Primary and Secondary WER Tests**
No. 1 (02/27/2010)	7.88	7.87	1.00	4.95	13.2	0.37
No. 2 (04/01/2010)	16.98		2.16	10.3		0.78
No. 3 (10/30/2010)	8.61		1.09	6.60		0.50
No. 4 (12/20/2010)	6.51		0.83	7.13		0.54
Geometric Mean	9.31		1.18	7.00		0.53

Note:
[1] WERs based on recommended calculation method of site water LC50 divided by the Species Mean Acute Value.

Table 6-6. Comparison of Primary and Secondary Water-Effect Ratio Tests for Zinc at Chollas Creek Sites SD8(1) and DPR2 During the April 2014 Confirmation Event

WER Event	**SD8(1)**			**DPR2**		
	***C. dubia* WERs[1]**	***P. promelas* WER**	**Ratio between Primary and Secondary WER Tests**	***C. dubia* WERs[1]**	***P. promelas* WER**	**Ratio between Primary and Secondary WER Tests**
No. 1 (02/27/2010)	1.78	2.14	0.79	1.66	2.50	0.64
No. 2 (04/01/2010)	3.18		1.42	2.20		0.84
No. 3 (10/30/2010)	2.16		0.96	1.18		0.45
No. 4 (12/20/2010)	2.00		0.89	1.98		0.76
Geometric Mean	2.22		0.99	1.71		0.66

Note:
[1] WERs based on recommended calculation method of site water LC50 divided by the DMW LC50.

6.2.4 Copper and Zinc Mixture Water-Effect Ratio Study

Per the Interim Guidance (USEPA 1994b; p. 135), when a WER is conducted for more than one metal, a confirmation toxicity test must be conducted with both metals at concentrations calculated using the WER-adjusted criteria. Per Interim Guidance, one option for testing the effect of multiple metals WERs is to conduct an additional toxicity test demonstrating that the combination of all metals at their proposed new site-specific criteria does not result in unacceptable toxicity.

Samples were collected during a storm event on April 2–3, 2014, to evaluate the effects on *C. dubia* of mixing both copper and zinc at their proposed adjusted criteria concentrations based on the final WERs calculated in this study. Using data from the previous sampling events, mixtures were created at concentrations consistent with potential copper- and zinc-adjusted criteria to ensure that Chollas Creek would still be protected at these concentrations and that no additive or synergistic effects would be experienced which could affect the proposed adjusted criteria. Multiple mixtures were created by spiking samples at concentrations at or above SSOs based on the proposed WERs reported in Table 6-2 through Table 6-4, to evaluate whether metals mixed together at or above the WER-adjusted criteria would be protective. A toxicity report with a summary of methods, results, and all of the associated raw toxicity and chemistry data from this study is included in Appendix G.

The results in Table 6-7 present the WER combinations, at or above the proposed copper and zinc WERs, which had no observable effect on *C. dubia*. Additive effects were not observed in this study, as substantiated by copper LC50 values that remained very similar with increasing zinc concentrations. Results of these tests demonstrate that aquatic life in Chollas Creek will remain protected based on the final proposed wet-weather copper and zinc WERs of 6.998 and 1.711, respectively.

Table 6-7. Copper and Zinc WER Combinations with No Observed Effect on *C. dubia*

Metal Mixture	SD8(1)	DPR2
Copper Zinc	9.8 1.9	9.6 1.6
Copper Zinc	9.7 2.3	7.7 1.9
Copper Zinc	9.7 2.8	10.3 2.4

6.3 WER Summary

USEPA methods for the development of WERs were followed to calculate copper and zinc WERs for the north and south forks of Chollas Creek. Table 6-8 presents a summary of the copper and zinc WERs calculated for Chollas Creek sites SD8(1) and DPR2.

Table 6-8. Summary of Copper and Zinc Water-Effect Ratios for Chollas Creek Sites SD8(1) and DPR2

WER event	Copper WERs[1]		Zinc WERs	
	SD8(1)	DPR2	SD8(1)	DPR2
No. 1 (02/27/2010)	7.882	4.951	1.780	1.658
No. 2 (04/01/2010)	16.98	10.30	3.182	2.205
No. 3 (10/30/2010)	8.610	6.596	2.163	1.183
No. 4 (12/20/2010)	6.512	7.130	1.995	1.980
Geometric mean (± standard deviation)	9.307 (±4.74 SD)	6.998 (±2.24 SD)	2.223 (±0.62 SD)	1.711 (±0.44 SD)

Note:
[1] WERs based on recommended calculation method of site water LC50 divided by the Species Mean Acute Value.

7 LEAD RECALCULATION

In lieu of performing sample collection and testing for development of a WER for lead in Chollas Creek, it was recommended that a comprehensive review and subsequent analysis of the proposed water quality criteria for lead be performed. The review included a recalculation of the lead ambient aquatic life water quality criteria, based on the draft update of *Ambient Aquatic Life Water Quality Criteria for Lead* (USEPA 2008). The following presents background information on lead water quality criteria and details on the recalculation of the lead criteria.

7.1 State of the Science in Deriving the 1984 Lead Water Quality Criteria

In 1984 USEPA believed that a measurement such as “acid-soluble” lead would provide a more scientifically correct basis upon which to establish criteria for metals (USEPA 1985a). However, at the time, no USEPA-approved methods for such a measurement were available to implement the criteria through the Agency’s regulatory programs. USEPA was considering development and approval of methods for a measurement such as “acid-soluble” lead. Until available, however, USEPA recommended applying the criteria using the total-recoverable method. This had two impacts: (1) certain species of some metals could not be analyzed directly because the total recoverable method did not distinguish between individual oxidation states and (2) these criteria might be overly protective when based on the total recoverable metal.

Expressing aquatic life criteria for lead in terms of the acid-soluble measurement had both toxicological and practical advantages. On the other hand, because no measurement was known to be ideal for expressing aquatic life criteria for lead or for measuring lead in ambient water or aqueous effluents, measurement of both acid-soluble lead and total-recoverable lead in ambient water or effluent or both might be useful. For example, there might be cause for concern if total recoverable lead is greater than an applicable limit, even though acid-soluble lead was below the limit.

In 1985 Stephan et al. provided an understanding of how USEPA WQC guidelines were typically applied:

a. Acute toxicity test data must be available for species from a minimum of eight diverse taxonomic groups.

b. The final acute value (FAV) was derived by extrapolation or interpolation to a hypothetical genus more sensitive than 95 percent of all tested genera. The FAV, which represents an LC50, was divided by two in order to obtain an acute criterion protective of nearly all individuals in such a genus.

c. Chronic toxicity test data (i.e., survival, growth, or reproduction) must be available for at least three taxa. Most often the chronic criterion is set by determining an appropriate acute-chronic ratio and applying that ratio to the acute value of the hypothetical genus more sensitive than 95 percent of all tested genera. If sufficient data are available to meet the eight diverse taxonomic group minimum, then the chronic value is derived using the same procedure as used for derivation of the FAV.

d. When necessary, the acute and/or chronic criterion may be lowered to protect recreationally or commercially important species.

e. When evaluating time-variable ambient concentrations generally, 1-hour average concentration is considered to be appropriate for comparison with the acute criterion, and 4-day averages with the chronic criterion.

f. The allowable frequency for exceeding a criterion is set at once every 3 years, on the average.

USEPA concluded that freshwater aquatic organisms and their uses should not be affected unacceptably if the 4-day average concentration (in µg/L) of lead did not exceed the numerical value given by e(1.273[ln(hardness)]-4.705) more than once every 3 years on the average and if the 1-hour average concentration (in µg/L) did not exceed the numerical value given by e(1.273[ln(hardness)-1.460) more than once every 3 years on the average. For example, at hardness values of 50, 100, and 200 mg/L (as $CaCO_3$), the 4-day average concentrations of lead are 1.3, 3.2, and 7.7 µg/L, respectively, and the 1-hour average concentrations are 34, 82, and 200 µg/L.

7.2 Background on Revised Lead Criterion

USEPA publishes national WQC for the protection of aquatic life calculated mostly from laboratory-derived toxicity data. USEPA compiles data from acceptable toxicity tests, which have been conducted in laboratory or well-characterized dilution water, from a wide range of species. Acute and chronic criteria are developed from the compiled data using the approach outlined in Criteria Guidelines (USEPA 1985a).

Following the publication of WQC documents, studies continue to be conducted that provide additional information for previously tested species and new information on additional species or water quality conditions that affect the criteria. These studies, and the additional aquatic toxicity data reported therein, occasionally create the need to update the national WQC. In this case, the lead WQC have not been revised since 1984 (30 years), include comparatively few genus mean acute values (GMAVs); therefore, they need to be revised. The draft *Ambient Aquatic Life Water Quality Criteria for Lead* (USEPA 2008) represents an update to the science contained in the CTR lead criteria, which is based on a 1984 USEPA water quality criteria document.

As USEPA has not moved forward with finalizing the 2008 draft lead criteria, the Recalculation Procedure provides a method for adjusting the national dataset used to develop criteria based on the inclusion of more recent studies. Appendix B of Interim Guidance and the 1997 updates to the Recalculation Procedure (*A Change in the Recalculation Procedure and Optional Consideration of Life Stage When the Recalculation Procedure is Used* (USEPA 1997),[1] outline the Recalculation Procedure, which consists of the following six steps.

A. Corrections are made to the national dataset. Note that only corrections approved by USEPA may be made.

B. Additions are made to the national dataset. Note that only additions approved by USEPA may be made.

C. The deletion process may be applied if desired.

D. If the new dataset does not satisfy the applicable Minimum Data Requirements (MDRs), additional pertinent data must be generated; if the new data are approved by USEPA, the Recalculation Procedure must be started again at step B with the addition of the new data.

E. The new CMC or CCC, or both, are determined. The CMC and CCC are generally referred to as the acute and chronic criterion, respectively.

F. A report is written.

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[1] The 1997 update to the Recalculation Procedure addresses considerations for deleting species from the dataset. This update was reviewed, but did not result in any additional changes because no species were deleted from the USEPA 2008 dataset.

The first four steps (A, B, C, and D) are used to develop an appropriate dataset that satisfies the MDRs as outlined in the Criteria Guidance. Steps A and B are required, while step C is optional and can be used if desired for further modification of the dataset. Steps E and F are the process of using the dataset to generate new WQC and a report for review, respectively.

The primary mechanism for metals toxicity (including lead) to organisms that live in the water column is by interaction with the gills. Additionally, metal toxicity is affected by calcium and magnesium cations. These effects are primarily accounted for by using hardness as a surrogate to modify toxicity estimates for many metals (USEPA 2005, 2008). Given these two factors, the CTR presents the CMC and CCC as dissolved criteria equations based on hardness. The dissolved criteria equations include a conversion factor (CF), as the lead toxicity data used to calculate the criteria were primarily reported as total recoverable metal. The lead CF is hardness-dependent.[2]

The Interim Guidance states that a list of approved toxicity data will be available from USEPA for constituents for which USEPA has developed criteria. This effort included accessing the USEPA references available for developing or revising aquatic life criteria for lead presented in the draft *Ambient Aquatic Life Water Quality Criteria for Lead* (USEPA 2008). Recalculations were then performed to develop revised freshwater dissolved CMC and CCC equations.

The following sections describe the updated toxicity data (also referred to as the approved dataset) as well as the calculation of both the CMC and CCC criteria using the criteria calculation procedures outlined in the Criteria Guidelines, per the Recalculation Procedure. These calculations were performed to recalculate the lead criteria. Additionally, since the time of the 2008 draft lead criteria update, several deficiencies have been identified in the dataset and/or calculations and corrected herein. Differences between the 2008 draft lead criteria update and this effort are summarized below. The corrected datasets are provided in Appendix F.

7.3 Recalculation of Dissolved Lead Final Acute Value

As stated previously, the CTR provides the following equation for the calculation of the dissolved lead CMC, also referred to as the acute criterion:

$$\text{CMC}_{\text{Dissolved Lead}} = \text{WER x (Acute Conversion Factor) x } (e^{(\text{mA}[\ln(\mathit{hardness})]+\text{bA})})$$

Where:

CMC = Criterion Maximum Concentration for dissolved lead

WER = Water-Effect Ratio equal to 1 in the absence of a site-specific study

Acute Conversion Factor = 1.46203 – ln(hardness)*0.145712

m_A= pooled slope

b_A = criterion maximum intercept

The recalculation approach can result in an update to each of the factors within the CMC equation except for the WER, which must be based on a site-specific study. The following discusses the use of the revised 2008 USEPA dataset in recalculating the CTR acute criterion.

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[2] For lead, the acute and chronic conversion factor equations are the same.

7.3.1 Updated Acute Dataset

The 1984 lead criteria document identified 23 acceptable measured freshwater acute data points (LC50s or EC50s[3]). By comparison, acceptable data on the acute effects of lead in freshwater for 18 species of invertebrates and 14 species of fish is available in the data provided by USEPA (2008). The approved dataset includes 103 measured freshwater acute values from 45 studies, including data for 39 species. A table presenting the USEPA-approved acute data, with updates based on those described herein, is in Appendix F. Data were determined to be "acceptable" when the acute tests met the requirements of the Criteria Guidelines and SMAVs could be calculated. These species satisfy the eight different family requirements specified in the Criteria Guidelines. No species were deleted from the USEPA-approved acute dataset to conduct the lead recalculation in this study.

7.3.2 Updated Acute Hardness Relationship

Correlation with water hardness is the primary quantitative correction factor used to modify toxicity estimates for many metals (USEPA 2008; USEPA 2005). Water hardness is used as a surrogate for the cations calcium and magnesium, which affect the results of toxicity tests on lead. Because water hardness is a surrogate, the numbers obtained through this correction are approximations of the true toxicity. To estimate the relationship between lead toxicity and water hardness, an analysis of covariance was performed on the approved dataset using the S-Plus (Insightful Corporation, Seattle, Washington) software program. This analysis was used to calculate the pooled slope for hardness using the natural logarithm of the total lead acute value as the dependent variable, species as the treatment or grouping variable, and the natural logarithm of hardness as the covariate or independent variable. The analysis of covariance model was fit to the data for the five species for which definitive acute values were available over a range of hardness values. The range in hardness was one in which the highest hardness in test water for a given species was at least three times the lowest hardness tested for that species, and where the highest hardness value in test water was at least 100 mg/L higher than the lowest hardness value in test water. An F-test showed that, under the assumption of equality of slopes, the probability of obtaining five slopes as dissimilar as these by chance is *p*=0.8988. This was interpreted as indicating that it is reasonable to assume that the slopes for these five species are the same (see Table 7-1). On the basis of these results, the pooled slope of 1.466 was used to adjust all acute values to a common hardness (i.e., 50 mg/L as $CaCO_3$). Test results for all other species either did not meet the above data requirements or did not show any hardness toxicity trends because of differences in exposure methods, age, etc.

Table 7-1. Results of Covariance Analysis of Freshwater Acute Toxicity versus Hardness

Species	n	Slope	Comment	95% Confidence Limits	Degrees of Freedom
Daphnia magna	8	0.8415		-0.8872, 2.5702	6
Rainbow trout	5	1.8868		-1.7323, 5.5059	3
Fathead minnow	4	1.5492		0.1314, 2.9670	2
Bluegill	2	1.0108		(Cannot be calculated)	0
Carp	5	1.5619		-0.1397, 3.2635	3
All of the above	24	1.4658	a	0.8735, 2.0581	18

[a] p = 0.8988 for equality of slopes

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[3] The EC50 is the 50% (Median) Effect Concentration, i.e., the concentration which adversely affects 50% of the test species.

7.3.3 Recalculated Acute Criterion

Sections IV and V of the Criteria Guidelines present the approach to determining the FAV and final acute equation, respectively. The first eight steps of determining the FAV focus on developing an appropriate dataset. As the entire USEPA-approved acute dataset was used, with the modifications discussed above, the process for calculating the FAV for this effort starts at the ninth step (step I in Section IV of the Criteria Guidelines, and renumbered below) as follows:

- **Step I**: For each species for which at least one acute value is available, the SMAV should be calculated as the geometric mean[4] of the results.
- **Step J**: For each genus for which one or more SMAVs are available, the GMAV should be calculated as the geometric mean of the SMAVs available for the genus.
- **Step K**: Order the GMAVs from high to low.
- **Step L**: Assign ranks, R, to the GMAVs from "1" for the lowest to "N" for the highest. If two or more GMAVs are identical, arbitrarily assign them successive ranks.
- **Step M**: Calculate the cumulative probability, P, for each GMAV as R/(N+1).
- **Step N**: Select the four GMAVs that have cumulative probabilities closest to 0.05 (if there are fewer than 59 GMAVs, these will always be the four lowest GMAVs).
- **Step O**: Using the selected GMAVs and Ps, calculate the FAV based on equations specified in the Criteria Guidelines (listed for convenience in Figure 7-1).
- **Step P**: If for a commercially or recreationally important species the geometric mean of the acute values from flow-through tests in which the concentrations of the test material were measured is lower than the FAV, then that geometric mean should be used as the FAV instead of the calculated FAV.

The CMC is then set equal to one-half of the FAV (CMC = FAV/2) as stated in Section XI of the Criteria Guidelines, as a safety factor to avoid lethality during short-term exposures.[5] A final acute equation is developed when enough data are available to show that acute toxicity to two or more species (represented by at least one fish and one invertebrate) are similarly related to a water quality characteristic (e.g., hardness). Table 7-2 and Table 7-3 present the ranked GMAVs. Following the tables, Figure 7-1 presents the calculations of the FAV for total lead at a hardness of 50 mg/L. An analysis of covariance was performed and a pooled slope was determined to adjust acute toxicity values on the basis of hardness for each individual data point before calculating the GMAV.

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[4] The geometric mean of N numbers is the N^{th} root of the product of the N numbers.

[5] Per the Criteria Guidelines, the CMC is intended to protect 95% of a group of diverse genera. Dividing the FAV by 2 is intended to result in a concentration that will not severely adversely affect too many of the organisms (USEPA 1985a, p. 17).

Table 7-2. GMAVs for Total Lead at Hardness of 50 mg/L

Genus	GMAV[a] (µg/L)	Rank	P	$\sqrt{P}$	$\ln GMAV$	$(\ln GMAV)^2$
Diaptomus	72.07	*1*	*0.0345*	*0.1857*	*4.278*	*18.30*
Gammarus	144.3	*2*	*0.0690*	*0.2627*	*4.972*	*24.72*
Ceriodaphnia	147.4	*3*	*0.1034*	*0.3216*	*4.993*	*24.93*
Lecane	164.7	*4*	*0.1379*	*0.3713*	*5.104*	*26.05*
Daphnia	174.9	5	0.1724	0.4152	5.164	26.67
Cyclops	215.2	6	0.2069	0.4549	5.372	28.85
Hyalella	227.3	7	0.2414	0.4913	5.426	29.44
Micropterus	548.6	8	0.2759	0.5252	6.307	39.78
Lumbriculus	892.5	9	0.3103	0.5571	6.794	46.16
Aplexa	1,001	10	0.3448	0.5872	6.909	47.73
Thymallus	1,092	11	0.3793	0.6159	6.996	48.94
Pimephales	2,533	12	0.4138	0.6433	7.837	61.42
Oncorhynchus	3,154	13	0.4483	0.6695	8.056	64.91
Salvelinus	4,945	14	0.4828	0.6948	8.506	72.35
Xyrauchen	22,440	15	0.5172	0.7192	10.02	100.4
Gila	22,440	16	0.5517	0.7428	10.02	100.4
Ptychocheilus	22,440	17	0.5862	0.7656	10.02	100.4
Crangonyx	27,600	18	0.6207	0.7878	10.23	104. 6
Tubifex	34,436	19	0.6552	0.8094	10.45	109.1
Cyprinus	36,591	20	0.6897	0.8305	10.51	110.4
Benacus	39,768	21	0.7241	0.8510	10.59	112.2
Lepomis	47,235	22	0.7586	0.8710	10.76	115.8
Chironomus	51,757	23	0.7931	0.8906	10.85	117.8
Oreochromis	55,971	24	0.8276	0.9097	10.93	119.5
Poecilla	78,931	25	0.8621	0.9285	11.28	127.2
Carassius	120,695	26	0.8966	0.9469	11.70	136.9
Tanytarsus	237,815	27	0.9310	0.9649	12.38	153.2
Procambarus	1,589,277	28	0.9655	0.9826	14.28	203.9

[a] GMAV is for total lead at a total hardness of 50 mg/L, CMCs at other hardness concentrations are presented in Table 7-4 and Table 7-8.

Per the Criteria Guidelines, the FAV recalculation was performed using the four GMAVs which have the cumulative probabilities closest to 0.05 (which in this case are the four lowest GMAVs in Table 7-2) as well as total number of GMAVs (N=28; see Table 7-2). These data and calculations are then used to calculate the FAV. FAV calculations are presented in Table 7-3 and Figure 7-1.

Table 7-3. Four lowest GMAVs for use in Calculating Acute Criterion (CMC) for Total Lead

Genus	GMAV[a] (µg/L)	Rank	P	$\sqrt{P}$	$\ln GMAV$	$(\ln GMAV)^2$
Diaptomus	72.07	1	0.0345	0.1857	4.278	18.30
Gammarus	144.3	2	0.0690	0.2627	4.972	24.72
Ceriodaphnia	147.4	3	0.1034	0.3216	4.993	24.93
Lecane	164.7	4	0.1379	0.3713	5.104	26.05
SUM			0.3448	1.141	19.35	94.00

$$S^2 = \frac{\sum((\ln GMAV)^2) - ((\sum(\ln GMAV))^2/4)}{\sum(P) - ((\sum(\sqrt{P}))^2/4)} = \frac{94.00 - (19.35^2/4)}{0.3448 - (1.141^2/4)} = 22.10$$

$$S = \sqrt{22.10} = 4.701$$

$$L = (\sum(\ln GMAV) - S(\sum(\sqrt{P})))/4 = (19.35 - (4.701 * 1.141))/4 = 3.495$$

$$A = S(\sqrt{0.05}) + L = 4.701(\sqrt{0.05}) + 3.495 = 4.546$$

$$FAV = e^{A} = e^{4.545} = 94.25$$

Where:
S = the slope of the geometric mean functional relationship between ln GMAV and sqrt(P). The ln-transformation of the GMAV is used to reduce skewedness and the sqrt(P) is used to provide the best estimate corresponding to P = 0.05.
L = the intercept on the GMAV axis (y axis)
A = the ln-transformed toxicity value corresponding to P = 0.05

Figure 7-1. Equations used for Calculating the FAV

Per the Criteria Guidelines, the resulting FAV is then used to calculate the CMC as follows:

$$\text{CMC}_{\text{Total Lead at a Hardness of 50 mg/L}} = \text{FAV}/2 = 94.25/2 = \boxed{\textbf{47 µg/L}}$$

Because enough data are available to show the acute toxicity of two or more species is similarly related to hardness, a criteria equation was developed as follows for total lead, per Section V of the Criteria Guidelines:

$$\text{Final Acute Equation}_{\text{Total}} = e^{\text{(pooled slope)*ln(hardness)+ln(criterion maximum intercept)}}$$

Where:

Pooled Slope = 1.466

ln(criterion maximum intercept) = ln(CMC) – (slope * ln(50))

$$\text{Final Acute Equation}_{\text{Total}} = e^{1.466\text{*ln(hardness)}-1.882}$$

The CTR criteria are presented as dissolved criteria; however, the acute lead toxicity data used to calculate the criteria were primarily reported as total recoverable metal. Thus, to convert the total lead criteria into dissolved criteria, the CTR (USEPA 2000) CF for lead is used. The lead CF is hardness dependent, as represented below, and is the same for both acute and chronic lead criteria. An example is shown for a hardness of 50 mg/L.

Acute Conversion Factor Lead = 1.46203 – ln(hardness) * 0.145712

Acute Conversion Factor Lead at 50 hardness = 1.46203 – ln(50) * 0.145712

Acute Conversion Factor Lead at 50 hardness = 0.892

The final acute dissolved criterion equation is as follows:

$$\text{Final Acute Equation}_{\text{Dissolved}} = \text{Acute CF} * \text{Final Acute Equation}_{\text{Total}}$$

Where, from above:

Acute Conversion Factor (CF) = 1.46203 – ln(hardness) * 0.145712

$$\text{Final Acute Equation}_{\text{Total}} = e^{1.466*\ln(\text{hardness})-1.882}$$

Resulting in:

$$\text{Final Acute Equation}_{\text{Dissolved}} = (1.46203 - \ln(\text{hardness}) * 0.145712) * e^{1.466*\ln(\text{hardness})-1.882}$$

Table 7-4 presents a summary of the acute dissolved lead criteria values for a range of hardness concentrations, which encompasses a range likely measured in Chollas Creek.

Table 7-4. Summary of Acute Dissolved Lead Water Quality Criterion Values (CMCs) Resulting from Recalculation Using the Updated 2008 Draft Lead Criteria Dataset

Hardness (mg/L)	CMC (µg/L)
50	42
100	103
200	248
300	411
400	585

7.4 Recalculation of Dissolved Lead Final Chronic Value

As stated previously, the CTR provides the following equation for the calculation of the dissolved lead CCC, also referred to as the chronic criterion:

$$\text{CCC}_{\text{Dissolved Lead}} = \text{WER x (Chronic Conversion Factor) x } (e(m_C[\ln(\text{hardness})]+b_C)$$

Where:

CCC = Criterion Continuous Concentration for dissolved lead

WER = Water-Effect Ratio equal to 1 in the absence of a site-specific study

Chronic Conversion Factor = 1.46203– ln(hardness)*0.145712

m_C= pooled slope

b_C = final chronic intercept

The recalculation approach can result in an update to each of the factors within the CCC equations except for the WER, which must be based on a site-specific study. The following discusses the use of the 2008 USEPA data set in recalculating the CTR chronic criterion.

7.4.1 Updated Chronic Dataset

The 1984 lead criteria document identified seven measured freshwater chronic data points (i.e., chronic values), expressed as the geometric mean of the no-observed and lowest-observed effect concentrations from an appropriate chronic toxicity test per the Criteria Guidelines. USEPA-approved updated dataset added seven additional chronic values from seven studies, including data for an additional six species. Acceptable data on the chronic effects of lead to freshwater organisms are available for six invertebrate species (two snails, two cladocerans, an amphipod, and a midge) and four fish species. USEPA-approved chronic data, with updates based on those described herein, is presented in Table 2 of Appendix F. No species were deleted from the chronic dataset to conduct the lead recalculation for Chollas Creek.

7.4.2 Updated Chronic Hardness Relationship

Some studies have shown that the reported chronic toxicity values for lead generally increase with increasing hardness levels (e.g., Chapman et al. manuscript), but the overall relationship is relatively weak. There are currently insufficient data to further develop a relationship between hardness and the chronic toxicity of lead. Thus, similar to the CTR chronic lead criterion, the acute pooled slope was used to develop the chronic criterion equation. This was appropriate because the CTR chronic value was derived from the acute toxicity data.

7.4.3 Recalculated Chronic Criterion

Sections VI and VII of the Criteria Guidelines present the approach to determining the final chronic value (FCV) and final chronic equation, respectively. The approach to calculating the FCV is dependent on the available chronic toxicity data. The FCV may be calculated in the same manner as the FAV, or, if chronic toxicity data are not available for species of eight families as required by the Criteria Guidelines, by using the Final Acute-to-Chronic Ratio (FACR). If the chronic toxicity dataset does not meet the minimum data requirements (8 different families) as required by the Criteria Guidelines, the final chronic value must be calculated using the FAV divided by the FACR per the Criteria Guidelines. An Acute-to-Chronic Ratio (ACR) is a way of relating the acute and chronic toxicity of a pollutant to aquatic organisms. ACRs are calculated by dividing the acute toxicity value by the chronic toxicity value for tests conducted on the same species, preferably within the same study. However, allowances are provided if the acute tests were not conducted as part of the same study (see pages 40–41 in the Criteria Guidelines). The ACR represents the ratio of the concentration of a constituent that is acutely toxic to that which results in chronic toxicity. When using the FACR approach to calculate a CCC, the FCV is simply the FAV divided by the FACR. The CCC is then set equal to the FCV (CCC = FCV) as stated in Section XI of the Criteria Guidelines.

The 1984 lead WQC used a FACR of 51.29 to calculate an FCV. This FACR was based on the geometric mean of the four available ACRs, because the range of the four values was considered small enough (i.e., within a factor of 10 of one another).

The 2008 draft lead criteria update dataset was evaluated using Section VI of the Criteria Guidelines and it was determined that the ACR method was most appropriate for calculating the CCC, as data were not available from the eight families. ACRs are available for five freshwater species and include at least one fish, one invertebrate, and one acutely sensitive species. The Species Mean Acute-Chronic Ratios (SMACRs) range from 4.769 to 61.97, and differ by a factor of approximately 13 times (Table 7-5 and Table 3 of Appendix F). A review of the data indicates that the SMACRs seem to increase as the SMAV increases, and, as recommended by the Criteria Guidelines, when this is the pattern, the SMACRs for species whose SMAVs are closest to the FAV should be used to calculate the FACR. Of the test species for which SMACRs were available, the SMAVs at a hardness value of 50 mg/L for *Ceriodaphnia dubia* (115.4 µg/L) and *Daphnia magna* (160.0 µg/L) were closest. The SMAVs for the other species for which SMACRs were available were significantly higher: *Oncorhynchus mykiss* (719.3 µg/L*), Salvelinus fontinalis* (4,945 µg/L), and *Pimephales promelas* (2,533 µg/L). Thus, the geometric mean of the *Ceriodaphnia dubia* and *Daphnia magna* SMACRs (4.769 and 28.69, respectively – see Appendix F) were used and yield a freshwater FACR of 11.70.

Table 7-5. Acute and Chronic Data for Calculating SMACRs

Species	**Species Mean**		
	Acute Value	**Chronic Value**	**Acute-Chronic**
	(Total µg/L)	**(Total µg/L)**	**Ratio[a]**
Brook trout, *Salvelinus fontinalis*	4,100	83.08	49.35
Rainbow trout, *Oncorhynchus mykiss*	1,170	18.88	61.97
Fathead minnow, *Pimephales promelas*	2,100	329.0	6.383
Cladoceran, *Daphnia magna*	517	10.33	28.68[b]
	843	103.9	
	1580	27.19	
Cladoceran, *Ceriodaphnia dubia*	248.0	52.00	4.769

[a] ACR is calculated using acute and chronic values at their test hardness.

[b] Geometric mean of the three ACRs.

Calculations to determine the FCV (CCC) are provided below at a hardness of 50 mg/L.

FCV = FAV/FACR

FAV = final acute value

FACR = geometric mean of the species ACR = **11.70**

$CCC_{\text{Total Lead at a Hardness of 50 mg/L}} = FCV = 94.25/11.70 = \boxed{\mathbf{8.1\ \mu g/L}}$

Per Section VII of the Criteria Guidelines, the final chronic equation for total lead is as follows:

$\text{Final Chronic Equation}_{\text{Total}} = e^{\text{(pooled slope)*ln(hardness)+ln(final chronic intercept)}}$

Where:

Pooled Slope = 1.466

ln(final chronic intercept) = ln(FCV) – (slope * ln(50))

$\text{Final Chronic Equation}_{\text{Total}} = e^{1.466\text{*ln(hardness)-3.649}}$

Similar to the CTR lead criteria, the acute pooled slope is used in developing the final chronic equation and is appropriate because the chronic value is derived from the acute toxicity data. An example calculation for the chronic WQC is shown below using a hardness of 50 mg/L $CaCO_3$.

Chronic Conversion Factor Lead = 1.46203 – ln(hardness) * 0.145712

Chronic Conversion Factor Lead at 50 hardness = 1.46203 – ln(50) * 0.145712

Chronic Conversion Factor Lead at 50 hardness = 0.892

The final chronic dissolved criterion equation is as follows:

$\text{Final Chronic Equation}_{\text{Dissolved}} = \text{Chronic CF} * \text{Final Chronic Equation}_{\text{Total}}$

Where:

Chronic Conversion Factor (CF) = 1.46203 – ln(hardness) * 0.145712

Resulting in:

$\text{Final Chronic Equation}_{\text{Dissolved}} = (1.46203 - \ln(\text{hardness}) * 0.145712) * e^{1.466*\ln(\text{hardness})-3.649}$

Table 7-6 presents a summary of the chronic dissolved lead criterion values (CCCs) for a range of hardness concentrations encompassing those likely found in Chollas Creek.

Table 7-6. Summary of Chronic Dissolved Lead Water Quality Criterion Values (CCCs) Resulting from Recalculation Using the Updated 2008 Draft Lead Criteria Dataset and New FACR

Hardness (mg/L)	CCC (µg/L)
50	7.2
100	18
200	42
300	70
400	100

7.5 Evaluation of Recalculated Criteria

Per the Criteria Guidelines (Section IV.A, p. 26), "in some cases, if the SMAV of a commercially or recreationally important species is lower than the calculated FAV, then the SMAV replaces the calculated FAV in order to provide protection for that important species." Similarly, for the FCV (Section VI.M, p. 42), "If the Species Mean Chronic Value (SMCV) of a commercially or recreationally important species is lower than the calculated FCV, then that SMCV should be used as the FCV instead of the calculated FCV." Additionally, per the Recalculation Procedure, "The calculated FAV, CMC, and/or CCC must be lowered, if necessary, to (1) protect an aquatic plant, invertebrate, amphibian, or fish species that is a critical species at the Site, and (2) ensure that the criterion is not likely to jeopardize the continued existence of any endangered or threatened species listed under Section 4 of the Endangered Species Act or result in the destruction or adverse modification of such species' critical habitat."

A thorough review of available biological surveys at the "Site" defined as the urbanized areas of the Chollas Creek watershed, and as illustrated in Figure 1-1, indicates there are no commercially or recreationally important species, or endangered or threatened species, present at the site (California Natural Diversity Database (CNDDB), USFWS, and SanBios online datasets). Based on this review, the recalculated CMC and CCC presented in Section 7.3 and Section 7.4, respectively, were not adjusted.

7.6 Differences between the 2008 USEPA Draft Update and Chollas Recalculation

The recalculation presented in this document is based on data presented in the draft *Ambient Aquatic Life Water Quality Criteria for Lead* (USEPA 2008). However, based on a review of the toxicity data, several questions were identified and are discussed below. In addressing the questions, the dataset used in the recalculation presented herein is slightly different than what is presented in the draft *Ambient Aquatic Life Water Quality Criteria for Lead* (USEPA 2008). Because of the differences in the dataset, the acute and chronic criteria vary in several ways from the draft *Ambient Aquatic Life Water Quality Criteria for Lead* (USEPA 2008) and result in lower recalculated criteria. Table 7-7 presents a comparison of the 1984, Draft 2008, and recalculated WQC. The following discusses the four areas identified in the dataset and calculations, and the approach to addressing the concerns.

Table 7-7. Comparison of 1984, Draft USEPA 2008, and Recalculated Criteria (µg/L)

Hardness (mg/L)	**1984**				**Draft USEPA 2008**				**Recalculation**			
	CMC		**CCC**		**CMC**		**CCC**		**CMC**		**CCC**	
	Diss	**Total**	**Diss**	**Total**	**Diss**	**Total**	**Diss**	**Total**	**Diss**	**Total**	**Diss**	**Total**
50	24	34	0.9	1.3	43	50	9.2	11	42	47	7.2	8.1
100	49	82	1.9	3.2	116	155	25	33	103	130	18	22
200	99	197	3.8	7.7	316	486	68	105	248	360	42	61
300	146	331	5.7	13	567	960	122	206	411	652	70	111
400	191	477	7.4	18	859	1565	185	336	585	994	100	170

Notes:
CMC = Criterion Maximum Concentration (a.k.a. acute criterion)
CCC = Criterion Continuous Concentration (a.k.a. chronic criterion)

First, the 48-hour (acute) lead LC50s reported in Table 1 of USEPA's 2008 draft lead criteria update for *D. magna* from the Chapman et al. manuscript (manuscript, p. 10) and used in the 1984 criteria (USEPA 1985b) were calculated on the basis of initial test concentrations only (612, 952, and 1,910 µg/L total lead at test water hardness levels of 54, 110, and 150 mg/L as $CaCO_3$, respectively). These values were replaced herein with the LC50s (also provided in the manuscript) calculated based on the geometric mean concentration of test treatment water measured at the beginning and ending of the test. These values were reported as 517, 843, and 1,580 µg/L total lead at test water hardness levels of 54, 110, and 150 mg/L as $CaCO_3$, respectively. The values were replaced, because it is most common to include the LC50s derived using the mean (arithmetic or geometric) of the measured test concentrations at the beginning and end of an acute test rather than using only the concentration at the beginning of the test, because the mean concentration more closely approximates the true exposure experienced by the test organisms over the duration of the test. This edit resulted in a change to the hardness slope (based on 8 data points) for *D. magna* in the USEPA 2008 dataset from 0.7245 to 0.8415. Replacing the *D. magna* data resulted in a recalculation of the pooled slope to be 1.466 (versus the USEPA 2008 pooled slope of 1.442). Changing the pooled slope made it necessary to recalculate the hardness-adjusted SMAVs in the 2008 draft lead criteria update dataset because the pooled slope is used in the hardness-normalizing equation. The update is presented in Table 1 of Appendix F.

Second, in the Chapman et al. manuscript the maximum acceptable toxicant concentration (MATC) reported as the chronic value for *D. magna* at the test water hardness level of 52 mg/L as $CaCO_3$ (value of 12.26 µg/L total lead) was based on individual fecundity, whereas mean fecundity was used as the chronic endpoint upon which the MATCs at test water hardness levels of 102 and 151 mg/L as $CaCO_3$ were based. The MATC reported for *D. magna* at the test water hardness level of 52 mg/L as $CaCO_3$ was edited in the dataset to use the mean fecundity instead of individual fecundity, in part because mean fecundity was the chronic test effect measure/endpoint used as the basis for the MATC reported for *D. magna* at the water hardness levels of 102 and 151 mg/L as $CaCO_3$ (and so, the MATCs are more consistently represented in the chronic dataset for this test species). Furthermore, mean fecundity takes into account survival of exposed parents (thereby accounting for chronic effects related to mortality and fecundity), whereas individual fecundity does not account for mortality. Using the raw mean fecundity data, EC20 values were calculated and used instead of MATCs, as this is USEPA's preferred method for calculating chronic endpoints when the appropriate data is available. The 1999 Ambient WQC document for ammonia (USEPA 1999) and the 2007 Ambient WQC document for copper (USEPA 2007) both considered EC20s in determining chronic values. Additionally, the USEPA 1985 Guidelines state "a chronic value may be obtained by calculating the geometric mean of the lower and upper chronic limits from a chronic test or by analyzing chronic data using regression analysis" (such as ECx values). These edits changed the MATCs from 12.26, 119.0, and 128.2 µg/L total lead to EC20s of 10.32, 103.9, and 27.19 µg/L total lead, which resulted in a different acute to chronic ratios (ACRs) (particularly at the 151 mg/L hardness level) for *D. magna* than those used in the USEPA 2008 draft criteria, as shown below:

Changes to *Daphnia magna* ACRs

Hardness	2008 ACR	Recalculation ACR
52	49.92	50.05
102	8.013	8.114
151	14.91	58.11
SMACR	18.13	28.68

Third, an incorrect LC50 value was presented in the USEPA 2008 updated dataset. The incorrect value was the LC50 value of 1,460 µg/L total lead included for rainbow trout (*Oncorhynchus mykiss*) in the flow-through, measured 96-hour test by Goettl et al. (1972), Davies and Everhart (1973), and Davies et al. (1976). It was confirmed by reviewing the original paper that this value presented in the USEPA 2008 draft update dataset for lead was misreported as 1,170 µg/L dissolved lead. Thus, the current value of 1,460 µg/L total lead was replaced with the correct LC50 value for the study of 1,170 µg/L total lead. The SMACR for *O. mykiss* changes from 77.33 back to 61.97, as it was originally reported in 1984. This change had no effect on the recalculation.

The results of the revisions discussed above are a change to the pooled slope from 1.442 to 1.466 and the final ACR (FACR[6]) from 9.299 to 11.70.

Finally, a modification should be made to the use of the conversion factor for total to dissolved lead criteria. It is important to maintain the conversion factor equation when considering criteria at different hardness values. The conversion factor is hardness dependent and therefore should be preserved in the final equations to accurately represent the toxicity data used to develop the criteria equations. The USEPA 2008 draft lead criteria update used a hardness of 50 mg/L to calculate a conversion factor of 0.892, which was then used to convert the total lead FAV to a dissolved lead FAV. The dissolved lead FAV was then used to develop the final dissolved lead criterion equation. Instead, the conversion factor equation should be incorporated into the final dissolved lead criterion equation, as discussed in the sections below.

[6] Acute-chronic ratios (ACRs) are calculated for each set of parallel acute and chronic tests by dividing the acute value by the chronic value. That is, ACR = Acute Value ÷ Chronic Value. At least three species with a specified taxonomic diversity must be addressed by studies with parallel testing to calculate a valid final ratio. An FACR is then the geometric mean of the acute-chronic ratios for each species.

7.7 Recalculation Summary

USEPA methods for the Recalculation Procedure and criteria derivation (via the Criteria Guidelines) were followed to calculate an updated lead FAV and FCV and provide updates to the corresponding criteria equations. By applying the Final Acute and Chronic Equations, it is possible to calculate CMC and CCC values at alternative hardness concentrations. Table 7-8 presents examples of CMC and CCC values at varying hardness concentrations similar to those observed in Chollas Creek. The dissolved criteria were converted to total criteria by using the default CTR conversion factor. Should a site-specific translator be developed for Chollas Creek, that translator could be applied to the dissolved equation to develop total lead criteria or TMDL targets.

$$\text{Final Acute Equation}_{\text{Dissolved}} = (1.46203 - \ln(\text{hardness}) * 0.145712) * e^{1.466*\ln(\text{hardness})-1.882}$$

$$\text{Final Chronic Equation}_{\text{Dissolved}} = (1.46203 - \ln(\text{hardness}) * 0.145712) * e^{1.466*\ln(\text{hardness})-3.649}$$

Table 7-8. Summary of Dissolved Lead Water Quality Criteria Resulting from Recalculation

Hardness (mg/L)	Acute/CMC (µg/L)	Chronic/CCC (µg/L)
50	42	7.2
100	103	18
200	248	42
300	411	70
400	585	100

8 SUMMARY AND RECOMMENDATIONS

8.1 Summary

Based on the information presented in the preceding sections, the following summary can be made:

Dissolved Copper:

- Dissolved copper WERs derived using *C. dubia* for the north fork of Chollas Creek (Site SD8(1)) ranged from 6.512 to 16.98 among four samples collected between February 27, 2010 and December 20, 2010. The geometric mean of the four individual WERs for site SD8(1) was 9.3071.
- Dissolved copper WERs derived using *C. dubia* for the south fork of Chollas Creek (Site DPR2) ranged from 4.951 to 10.30 among four samples collected between February 27, 2010 and December 20, 2010. The geometric mean of the four individual WERs for site DPR2 was 6.998.
- The recommended conservative final WER for dissolved copper is 6.998, if a single value is used for Chollas Creek.
- The results of the secondary test with *P. promelas* confirmed that *C. dubia* is an appropriate test species for deriving final dissolved copper WERs for Chollas Creek.

Dissolved Zinc:

- Dissolved zinc WERs derived using *C. dubia* for the north fork of Chollas Creek (site SD8(1)) ranged from 1.780 to 3.182 among four samples collected between February 27, 2010 and December 20, 2010. The geometric mean of the four individual WERs for site SD8(1) was 2.223.
- Dissolved zinc WERs derived using *C. dubia* for the south fork of Chollas Creek (site DPR2) ranged from 1.183 to 2.205 among four samples collected between February 27, 2010 and December 20, 2010. The geometric mean of the four individual WERs for site DPR2 was 1.711.
- The recommended conservative final WER for dissolved zinc is 1.711, if a single value is used for Chollas Creek.
- The results of the secondary test with *P. promelas* confirmed that *C. dubia* is an appropriate test species for deriving final dissolved zinc WERs for Chollas Creek.

Mixed Metal Testing:

- The results of the mixed metals testing confirmed that concentrations of dissolved copper and dissolved zinc at the proposed WER adjusted criteria for each metal would be protective of Chollas Creek.

Dissolved Lead:

- Based on a USEPA provided lead toxicity testing data set revised freshwater acute and chronic criteria were calculated.
- A new freshwater criterion maximum concentration (CMC or Acute) for dissolved lead (µg/L) was developed, as follows:

  $\text{Final Acute Equation}_{\text{Dissolved}} = (1.46203 – \ln(\text{hardness}) * 0.145712) * e^{1.466*\ln(\text{hardness})-1.882}$
- A new freshwater criterion continuous concentration (CCC or Chronic) for dissolved lead (µg/L) was developed, as follows:

Final Chronic Equation $_{\text{Dissolved}}$ = (1.46203 – ln(hardness) * 0.145712) * $e^{1.466*\ln(\text{hardness})-3.649}$

8.2 Recommendations

- The WERs measured in these experiments and the revised lead criteria should be incorporated into the TMDL for Chollas Creek through a Basin Plan amendment using the updated criteria presented in Table 8-1. These values present scientifically based SSOs that are protective of beneficial uses following the recommendations of the CTR for metals criteria.
- To add a layer of conservatism, it is recommended that the final WER from DPR2 be used for development of copper and zinc SSOs for both forks of the watershed: 6.998 for dissolved copper and 1.711 for dissolved zinc.
- Periodic confirmation of the WERs is recommended in USEPA’s 1994 Interim Guidance and the National Toxics Rule. Given the potential impacts of a floating WER adjusted CTR value on BMP planning and implementation and compliance with TMDL WLAs and corresponding effluent limitations, it is recommended that the WER be revaluated in 2029 (one year following the final compliance date of October 22, 2028 for the Chollas Creek Metals TMDL). Reevaluation at that time will allow for a determination of whether additional actions are needed to meet a reduced SSO or if the level of implementation can be reduced to meet a higher SSO.

Table 8-1. Recommended Numeric Targets for Specified Metals in the Chollas Creek Watershed

Criteria	Dissolved Copper[1]	Dissolved Lead	Dissolved Zinc[1]
CMC (Acute)	(WER)*(0.96)*{e^[(0.9422*ln(hardness))-1.700]}*0.9	(WER)*(1.46203 – ln(hardness)*0.145712) * {e^(1.466*ln(hardness)-1.882)}	(WER)*(0.978)*{e^[(0.8473*ln(hardness))+0.884]}*0.9
CCC (Chronic)	(WER)*(0.96)*{e^[(0.8545*ln(hardness))-1.702]}*0.9	(WER)*(1.46203 – ln(hardness)*0.145712) * {e^(1.466*ln(hardness)-3.649)}	(WER)*(0.986)*{e^[(0.8473*ln(hardness)) +0.884]}*0.9

Notes: ln = natural log function; e = exponential function

1. During wet weather, the WERs for dissolved copper and dissolved zinc are 6.998 and 1.711, respectively. During dry weather the WERs are equal to 1.

8.3 Compliance Comparison

The historical water quality data collected during wet weather as part of the TMDL compliance monitoring program for site SD8(1) in the north fork were evaluated to compare the number of exceedances using existing criteria to occurrences using site-specific criteria (Table 8-2). Results show that exceedances based on comparison to the site-specific criteria were limited to one occurrence of the dissolved copper criterion.

The historical water quality data collected during wet weather as part of the TMDL compliance monitoring program for site DPR2 in the south fork were re-evaluated to compare the number of exceedances using existing criteria to occurrences using site-specific criteria (Table 8-3). Results show that there were no exceedances for any of the three dissolved metals based on comparison to the site-specific criteria.

Table 8-2. Dissolved Copper, Lead, and Zinc Acute and Chronic Historical Exceedances Compared to Exceedances After Site-Specific Adjustments Applied at Site SD8(1) (2004-2014)

Dissolved CMC (Acute)	Total Exceedances Using Current Criteria (n=27)	Total Exceedances with Copper and Zinc WERs and Lead Recalculation Lead (n=27)*

Copper	17	0
Lead	0	0
Zinc	9	0
Dissolved CCC (Chronic)	**Total Exceedances Using Current Criteria (n=27)**	**Total Exceedances with Copper and Zinc WERs and Lead Recalculation Lead (n=27)***
Copper	25	1
Lead	9	0
Zinc	9	0

Notes:
*WER is based on a proposed value of 6.998 for copper and 1.711 for zinc. Lead is based on recalculated lead criteria.

Table 8-3. Dissolved Copper, Lead, and Zinc Acute and Chronic Historical Exceedances Compared to Exceedances After Site-Specific Adjustments Applied at Site DPR (2004-2014)

Dissolved CMC (Acute)	**Total Exceedances Using Current Criteria (n=28)**	**Total Exceedances with Copper and Zinc WERs and Lead Recalculation Lead (n=28)***
Copper	8	0
Lead	0	0
Zinc	0	0
Dissolved CCC (Chronic)	**Total Exceedances Using Current Criteria (n=28)**	**Total Exceedances with Copper and Zinc WERs and Lead Recalculation Lead (n=28)***
Copper	21	0
Lead	3	0
Zinc	0	0

Notes:
*WER is based on a proposed value of 6.998 for copper and 1.711 for zinc. Lead is based on recalculated lead criteria.

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Item 10
Supporting Document No. 2
December 14, 2016

APPENDIX A

Response to Reviewer’s Comments

Weston Chollas Creek WER Report (2010)

Responses were provided on the Draft Final Report provide to the Third Party Review Team. Weston Solutions, Inc. responses were inserted after each comment in Blue Font to differentiate from the reviewers comments.

Review of Chollas Creek Copper, Lead, Zinc WER Study Draft WER Report; March 30, 2011
Reviewer: Peter Schafer

Thank you for the opportunity to review the City of San Diego Draft WER Report dated 3/30/11, which addresses the metals (copper, lead, & zinc) TMDL for Chollas Creek. The City of San Diego, Weston Solutions, and project scientists are to be commended for the present work which appropriately and successfully addresses TMDL targets for metals concentrations in Chollas Creek. It is obvious that a lot of work went into the project and into the preparation of the draft WER report. It is generally well written and easy to read. There are instances in which additional discussion would be helpful in clarifying specific issues addressed in the report, which I will summarize as best I can. I also have several suggestions that are meant to (hopefully) make the report easier to read and understand. I also raise a couple of issues (species selection, protection of (95% of) all species, and analytical chemistry) that I believe are important to address, discuss, and ultimately resolve. In my opinion, the report does not contain any fatal flaws or outstanding issues that cannot be resolved in some manner. The report is comprehensive and it appears that most issues have been addressed. My comments raise issues that I believe require further clarification or work.

With a few exceptions, my comments are generally presented in order of occurrence in the report. Further, I have not separated specific issues from general ones, nor did I separate important issues from less important ones. In general, I bring up “issues” at the point where they first occur in the report and then cite other line numbers (if appropriate) as further examples of the same issue. **I highlighted important or critical issues in bold text** below so that they stand out from less critical errors or issues. I used line, table, and figure numbers to indicate where my comments apply within the draft report document.

Weston Solutions, Inc. Response: We thank you for taking the time to provide such thorough review of the draft document. Our responses are provided below. It should be noted that the line number references listed below are no longer applicable for those reviewing the final document as the line numbers have changed from the draft document.

Review Comments:

Line 221-222: EC50 and LC50 terms are interchanged throughout the report. LC50 is defined under Acronyms and Abbreviations (page v.). Since the endpoint is *Ceriodaphnia dubia* survival, I prefer LC50. In any event, it is best to use a single term for clarity and to be consistent.

Weston Solutions, Inc. Response: We changed EC_{50} to LC_{50} throughout document for consistency. However, LC_{50} is used to describe the lethal endpoint tests such as survival, whereas EC_{50} is used to describe effect concentrations in growth or reproduction tests which are non-lethal endpoints.

Lines 242 & 361: At the end of this sentence, there should be a reference to Fig. 4-1. I was very surprised that the map showing the location of the study sites was not up front in the report. Without any reference at the end of the sentence in line 242, the map of the study sites was hard to find.

Weston Solutions, Inc. Response: We added a Figure 4-1 reference.

Line 242-245: The choice of only two WER monitoring sites appears at first to be a design flaw. This issue was discussed during the Workplan review. However, the use of water quality of upstream sites to run the Biotic Ligand Model to some extent makes up for this lack of more than one WER sampling site on each branch of the creek. To the extent that the TMDL document discusses the potential location of WER sites (the same as TMDL monitoring sites), this should be discussed more fully in the report. For example, if the Regional Water Board agreed to the design of a single WER monitoring site on each branch, this "agreement", whether implicit or explicit, should be stated and discussed in the WER report.

Weston Solutions, Inc. Response: We added justification for adding the two upstream sites for the BLM modeling in Section 8.0. We also added Figure 4-1 and Table 4-1 identifying Lemon Grove and La Mesa in the map and their respective locations.

Line 341, Table ES-1: This should actually be Table ES-2 (not ES-1) since Table ES-1 occurs at line 250. The acute criterion is shown as CCC. It should be CMC. In addition to the hardness-dependent criteria equations, it may be more illustrative to show the actual criteria at ambient (mean) hardness. If the current (CTR) copper criterion is also shown at a comparable hardness (e.g. 50 or 100 ppm), the differences between the CTR and proposed site-specific criteria would be even more apparent.

Weston Solutions, Inc. Response: We edited the table for content. The hardness varies by site and may provide a value that is misapplied in the future. The table was developed to be consistent with the table in the TMDL technical report.

Line 391: The discussion in Sec. 1.2 concerning soil permeability is very helpful in understanding the different water chemistries for the two WER sites presented later in the report.

Weston Solutions, Inc. Response: Thank you for the comment!

Line 457: The word "targets" should be replaced with "criteria." The EPA promulgates criteria (and occasionally Water Quality Standards such as the CTR). EPA criteria may be TMDL concentration targets. It might also be helpful to some readers if it is mentioned in the report that EPA acute and chronic criteria (i.e. CMC, CCC) are termed Water Quality Objectives (WQOs) in California. You define these 3 acronyms in the report but you do not show the relationship between objectives and criteria (i.e. they are synonymous).

Weston Solutions, Inc. Response: "Targets" was replaced with "criteria" as necessary throughout the report.

Line 470, Table 1-2 title: The word TMDL should come before "Targets". Table 1-2 contains criteria or objectives. The TMDL concentration-based targets reported in Table ES-1 (which should be numbered ES-2) at line 341 indicates that the TMDL targets are 90% of the acute and chronic criteria values. It may be confusing to readers to use the terms targets and criteria interchangeably, especially since they are not equal (i.e. the targets contain a 10% margin of safety).

Weston Solutions, Inc. Response: We moved TMDL; we revised the definition.

Line 478: Hardness is a measurement of Ca and Mg ions. Please delete the reference to iron (Fe) as it is confusing.

Weston Solutions, Inc. Response: We deleted the iron reference.

Lines 480-481: Please state explicitly either in the text or in the Table 1-2 headings that the equations are for the CMC (acute) and CCC (chronic) and that the targets are 90% of these criteria values determined by the hardness-dependent equations.

Weston Solutions, Inc. Response: We revised the headings.

Lines 485 & 498: This is a small point but “criteria” (plural) should be “criterion” (singular). Different criteria (CMC, CCC) have different equations.

Weston Solutions, Inc. Response: We revised criteria to criterion throughout document.

Line 593, Figure 2-1: The red lines in both figures lean slightly downward to the left and, as a result, are slightly below 1 (unity). I found this confusing at first. I assume that it was “manually” added as a drawing object (?). Figure 2-3 does not have this problem. Please remove any confusion by placing the red line so that it completely covers the black line indicating the ratio of 1.

Weston Solutions, Inc. Response: We moved highlighted red line (ratio = 1) to be on the graph properly and not slightly under.

Line 634, Section 2.3 in its entirety: The discussion in this section concerning past WERs appears out of place since the report demonstrates the empirical and modeled results for the current WERs for Chollas Creek. Whether or not there were other successful WERs in the past for other water bodies around the country does not add or subtract from the integrity or appropriateness of the current work. It is sufficient to note that the CTR allows for a WER multiplier that is appropriately derived. I would suggest deleting or reducing this section considerably.

Weston Solutions, Inc. Response: We revised the summaries of previous work by reducing this section. We felt it was important to demonstrate that other WERs have been successful and adopted.

Line 664: The dissolved copper WER for South San Francisco Bay was not 2.5; it was 2.771. The national chronic criterion (CCC) for copper was adjusted using six laboratory results for Mytilus sp., derived by the City of San Jose, which adjusted the national criterion from 3.1 to 2.5 ppb, prior to applying the WER of 2.771. The product of 2.5 (the adjusted national criterion) and the WER of 2.771 is 6.9 ppb, the SSO for South San Francisco Bay.

Weston Solutions, Inc. Response: See comment above, we reduced the summary as previously recommended.

There is one further point worth noting here. Following the 1985 EPA guidelines for deriving numeric water quality criteria (national or site-specific), intermediate calculations (such as FWERs) should be rounded to four significant digits (e.g. 2.771) and final criteria should be rounded to two significant digits (e.g. 3.1, 2.5, 6.9) as indicated in the above San Jose examples.

Weston Solutions, Inc. Response: Comment noted.

Line 754: I could not find GLEC 2007 in the References section.

Weston Solutions, Inc. Response: The reference was corrected to USEPA, 2008 and added in the references section.

Line 847: Following the word “varying” the word “flows” (?) is missing.

Weston Solutions, Inc. Response: We added “flows”.

Line 864: The report states “The acute test with this species [*Ceriodaphnia dubia*] is often used because it is more sensitive than chronic tests with the same species.” This statement is not referenced and I don’t believe that it is well taken. The 2007 revision of the EPA copper criteria document (referenced in the report) indicates that the Acute-Chronic Ratio for this species is 2.85. If the CCC and CMC were equivalent, the ACR should be roughly 2. Further, the endpoint for the *C. dubia* short-term chronic test takes into consideration mortality of the test species since reproduction is determined for all animals, whether or not they survive. The acute test is often used in WERs and other monitoring studies more likely because of the intensive resources and sample collection and holding issues associated with a 7-day test. If the monitoring program has observed acute and chronic C. dubia test results to be equivalent, please discuss this data in the report. Please reference or qualify this statement or remove it.

Weston Solutions, Inc. Response: We removed sensitivity statements as recommended.

Line 866-873: The report should mention in this section that the WER test endpoint should be near to but above the criterion it seeks to modify. This is due to the fact that WERs tend to increase as species sensitivity increases (LC50 decreases). This is largely why the EPA guidance does not require secondary species per se, because they are usually less sensitive species (e.g. fish) and produce lower, inappropriate WERs. WERs with sensitive species are (more) appropriate because they best reflect the bioavailability of the metal at the criterion concentration. For this reason, using the acute test endpoint to modify both the acute and chronic criteria (CMC and CCC, respectively) is conservative.

It would have been very helpful to list and discuss the sensitive species in the EPA criteria documents for each metal (copper, zinc) for which WERs were derived. It is not clear why this was not done because it is very likely that the study scientists discussed this issue at some length prior to initiation of the study. Furthermore, once a WER has been derived using a given species, it is important to go back to the database and make some determination that the other sensitive species are protected by the modified criterion. This was not done in this study and it is a significant shortcoming of the study, especially with respect to copper, as discussed in a later comment.

Weston Solutions, Inc. Response: The choosing of *C. dubia* as the species was done for several reasons as discussed in the QAPP during the initiation of the program. The TMDL uses *C. dubia* as the test species which is more sensitive than other organisms as options. Fish (e.g. fathead minnow) are less sensitive, are not found in Chollas Creek, and would have resulted in higher WERs that are less protective. Additionally, we know through other studies in Chollas Creek that *H. azteca* toxicity is persistent in Chollas Creek due to synthetic pyrethroids that have been identified through toxicity identification evaluations (TIEs) (County of San Diego 2006-2007 Annual Monitoring Report, 2008). When these samples were filtered (one of the many TIE treatments), toxicity was removed 100% which also demonstrates metals were not a source of the toxicity at the levels observed.

We incorporated language as suggested; As suggested, we compared our laboratory organism responses to USEPA's database and determined our *C. dubia* in DMW exposures were sensitive to copper compared to previous work. It was suggested that we use the SMAV as our WER denominator for these calculations to increase conservatism and overall site-specific protection. These adjustments were made throughout the report.

Line 923: The report should describe what was actually done, not what will be done. Parts of the report read as if they have been copied from the Workplan. Please describe in the report what was actually done. This last sentence of the paragraph does not make sense. What was the final sampling methodology and did the Regional Board approve it?

Weston Solutions, Inc. Response: We changed the report tense as necessary.

Line 931: If the sampling period was 8 hours, how can you say that samples were collected on the rising limb of the storm?

Weston Solutions, Inc. Response: The samples were collected as flow-weighted composites. We removed "rising limb" to avoid confusion.

Line 1004: Were all study events "low-flow" events? Please revise this sentence to reflect the magnitude of each storm event.

Weston Solutions, Inc. Response: Monitoring events captured both low and high flow events. Text was revised.

Line 1014: Redundant sentence.

Weston Solutions, Inc. Response: Deleted redundant sentence.

Line 1035: I believe that 20 animals were exposed to each test concentration (4 replicates of 5 animals each) not 5 as stated. Also see lines 1037 and 1038 where 4 replicates are mentioned.

Weston Solutions, Inc. Response: Edited text.

Line 1049: The "Feeding" parameter describes the food as Selenastrum and cereal leaf extract. Should "cereal leaf extract" be replaced with YCT (Yeast-Cerophyll- Trout Chow) or is this correct as written?

Weston Solutions, Inc. Response: This is correct as written.

Line 1068, Table 4-5: This table lists the Control water as EPA synthetic. Elsewhere, the report states that DMW (i.e. diluted mineral water) was used. Please clarify. The use of synthetic water would presumably have allowed for a more accurate adjustment of the lab water to match site water hardness. The use of synthetic water would actually have allowed for the adjustment of Ca and Mg to exactly match site water. This would have been preferred since these two elements ameliorate the toxicity of metals to different degrees (Calcium being more effective, I believe).

Weston Solutions, Inc. Response: We clarified the laboratory water source.

Lines 1206 and 1216: Does the word species in these lines refer to metals speciation or to organisms. There was only one species tested. If this is taken from the Workplan, please report what analyses were actually performed rather than those that were initially proposed to be performed.

Weston Solutions, Inc. Response: We changed the tense, clarified use of species.

Line 1333: I suggest that you change “data historically” to “historical data.”

Weston Solutions, Inc Response: Revised as recommended.

Line 1345: “These detections of Malathion may have played a role in enhancing the toxicity observed at both monitoring sites, thereby resulting in more conservative WERs being developed during the study.” It is not correct to say that a given WER is conservative simply because other toxicants are found at WER study sites. Rather, since a WER takes into consideration the additive and synergistic effects of all potential pollutants, the level of protection reached is neither over – nor under-protective. It is the appropriate and intended level of protection as stated in the EPA WER guidance (quoted below). Thus, the use of the words ‘confounding results” on line 1351 concerning diazinon is also misleading. The results may be confounding with regard to comparison to the Biotic Ligand Model which takes only the bioavailability of a given metal into consideration. But if other toxicants are above effects levels (to C. dubia), one would expect a lower (predicted or actual) metal WER. It is not confounding if it can be explained through additivity or synergism.

Because a WER is expected to appropriately take into account (a) the site-specific toxicity of the metal, . and (b) synergism, antagonism, and additivity with other constituents of the site water, using a WER is more likely to provide the intended level of protection than not using a WER.

The presence of pyrethroids at the WER study sites should therefore be a concern since high metals WERs (e.g. copper) may not protect resident species that are sensitive to both metals and pyrethroids.

Weston Solutions, Inc. Response: We changed the section to reflect the potential for additive/synergistic effects. We removed “conservative”. We added language as suggested to discuss level of protection.

Line 1410: The blank contamination reported in Table 6-2 is a serious matter. For example, the dissolved copper blank contamination and the measured LC50 for laboratory water for

Event 1 were both 3 ppb. This issue needs further explanation and evaluation if the results are to be used to establish site-specific criteria. The short statement on Line 1407 that "results did not suggest that bias was a concern in relation to the spiking samples used for the analysis" does not adequately address this issue.

Weston Solutions, Inc. Response: Did not use these DMW results in the WER derivation. However, an additional QA/QC review was performed to look for similar analytical discrepancies.

Line1430: It would be easier to follow the lab and site water LC50s and calculated WERs if Tables 6-4 and 6-5 were combined. I think there is room for two more columns in Table 6-4. I kept having to flip the pages back and forth

Weston Solutions, Inc. Response: We merged Tables 6-4, 6-5, and 6-6 as suggested.

Line 1436: The entire Section 6.3.1 is tediously and unnecessarily long. If you combine tables 6-4 and 6-5, most of this text can be eliminated.

Weston Solutions, Inc. Response: We eliminated most of the text as suggested.

Lines 1448, 1461, 1485, and 1495: The geometric mean of all WER values is assumed to be the Final WER (FWER). This requires some discussion of the merits of using all study WERs to determine a FWER. For example, the magnitude and duration of the storm events should be compared to the magnitude of the copper WERs. It also appears that First Flush events may have lower WERs (less protection perhaps due to other pollutants). Substituting the North Fork WER for the FWER for both forks does not necessarily take away the relevance or necessity of doing this exercise. The question is, is there a temporal or storm condition component to the WERs?

Weston Solutions, Inc. Response: We added discussion about using SD8(1) as the most conservative WER as the FWER instead of separate WERs. This is a management decision as the two separate WERs are valid for the separate forks. We added the use of 5 events across several conditions to account for changes in water quality.

Line 1794, Table 8-1: The chemistry results for the two sites indicates that the decision to apply the SD8(1) site WERs to both forks of the creek is appropriate since the more ameliorative and higher water quality characteristics found at DPR2 are not found at SD8(1). This is likely related to the amount of impervious surface found in the North Fork watershed, as discussed in the report.

Weston Solutions, Inc. Response: Thank you for the comment.

Line 1887, Table 9-1: The CMC and CCC copper and zinc WERs in the table headings (for site SD8(1)) are different. They should be the same.

Weston Solutions, Inc. Response: We edited the headings.

Line 1890, Table 9-2: I believe the copper and zinc WERs reported in this table should be 30.2 and 1.6, respectively, rather than 27.0 and 1.5.

Weston Solutions, Inc. Response: We removed these and recalculated the values using USEPA SMAV. See comments from Bob Santore (HDR|HydroQual, Inc.).

Line 1963, Table 9-3: the Acute criterion should be CMC, not CCC.

Weston Solutions, Inc. Response: We revised to CMC.

Line 1947, Recommendations: Yes, the California Toxics Rule does authorize WERs, appropriately derived. In determining the appropriateness of the study FWER for copper, two important steps were not addressed in the report. First, the magnitude of the copper FWER is very great (19.9). The 1994 WER guidance suggests that for WERs of 5 or greater, the variability of the water quality characteristics over time should be evaluated to determine whether the FWER is protective over time and under different circumstances (i.e. storm events). I believe there is moderate uncertainty in the protectiveness of the FWER that should be explicitly addressed in the report.

The second concern I have is also related to the uncertainty surrounding the protectiveness of the copper FWER. One final evaluation step that should be incorporated into every WER study, is to go back to the EPA criteria document database (from which the test species was selected for its sensitivity to the metal in question) to determine whether the WER and the site-specific criteria derived from it are protective of other sensitive species. Again, my concern is that the copper WER is sufficiently large for *Ceriodaphnia dubia* that other sensitive species (perhaps slightly less sensitive) may not be protected by the SSO. This is the one circumstance under which it might be worthwhile to test a secondary species. In the case of copper, the uncertainty can be addressed by current or future copper WER testing with *Hyalella Azteca*.

I am not familiar with the life history and ecology of *H. azteca*. However, if this species is a resident species of the study site, it must be protected. I believe that secondary testing with this species would address both of my concerns, the magnitude of the WER and the protectiveness of the WER for sensitive, resident species (or their surrogates). As noted in the report, *H. azteca* is sensitive to pyrethroid pesticides which are found at significant levels at the study site. More importantly, it is ranked as the 7th most sensitive species in the 2007 Copper Criteria Revision acute database. Its Species Mean Acute Value is 12.07 ppb, exactly twice that of C. dubia whose SMAV is 5.93 ppb. If spiked copper testing with *H. azteca* indicated that this species is protected by the FWER (and resultant SSO), even when site water contains pyrethroid pesticides below threshold levels, this would be a convincing demonstration (in my opinion) of the protectiveness of the recommended FWER of 19.9 for copper. Obviously, if pyrethroid pesticides are above acute effects levels for *H. azteca*, any low copper WER results may be invalidated.

This is an interesting issue. The protectiveness of the copper FWER to *H. azteca* when site waters contain pyrethroids below threshold levels for acute effects should be of interest to the project scientists, regulators, and environmental stakeholders alike. It is not clear what the

results would be for a copper WER study with *H. azteca*. Nevertheless, I believe it would clearly demonstrate the protectiveness of the proposed copper FWER of 19.9. A single study event may be sufficient to demonstrate this "protectiveness" because the WER study with *C. dubia* was comprehensive. I believe this is an idea that has merit and utility.

Weston Solutions, Inc. Response: The initial objectives included a lead WER. However, due to solubility issues and test comparability, the WER would not be representative of site conditions; we opted to perform a criterion evaluation in lieu of a WER based on the draft water quality criteria for lead (GLPO, 2011). The data set is final, the criteria is not. For the *H. azteca* comment, please refer to the comment above (line 866-873) regarding *H. azteca*.

Once again, I would like to commend the study scientists for the completion of a very large and important study to address the TMDL targets for Chollas Creek. I hope you find my comments helpful. If you have any questions concerning my comments, please let me know. I would welcome the opportunity to discuss my comments via telephone conference at the appropriate time.

Regards,
Peter Schafer
Aquatic Toxicologist
City of San Jose

HDR ONE COMPANY | Many Solutions℠

HDR | HydroQual

May 11, 2011

To: David S. Renfrew
Project Manager
Weston Solutions, Inc.

Re: Comments on Chollas Creek Copper, Lead, and Zinc Water-Effect Ratio Study, Draft Report

Dear Mr. Renfrew:

I've completed my review of your draft report regarding the Chollas Creek Copper, Lead, and Zinc Water-Effect Ratio Study prepared for the City of San Diego. In general I found this to be a well thought out experimental design and well written summary of the results. My comparison of your zinc results with other WER studies as well as with BLM calculations suggests that your proposed WER values of 1.4 for the North Fork and 1.6 for the South Fork are appropriate and justified given the toxicity test results and the resulting site specific objective (SSO) will be protective for sensitive aquatic organisms. The recalculated acute and chronic criteria for lead have also been conducted in a manner that is consistent with US EPA methodology and makes appropriate use of new data that have become available since the last update published by US EPA.

My one major concern, however, is that I do not think the WER values for copper is defensible. The suggested values of 19.94 for the North Fork and 30.18 for the South Fork, are unusually high for site waters with characteristics similar to Chollas Creek. I believe your own toxicity data suggests an SSO based on this WER will not be protective for sensitive invertebrates. After working through all the data supporting the development of the SSO, I believe the large value obtained for the copper WER is due to very low LC50 values for the reference waters used in your study. Since the WER value is calculated as the ratio of [site water LC50] / [reference water LC50], a low value for the reference water will produce a high value for the WER. If the reference water value is too low, the corresponding WER value will be too high. In this specific case, I do believe the reference water LC50 values are too low, and in fact are unsupportable. My rationale for coming to this conclusion includes comparison of the measured reference water LC50s to the Species Mean Acute Value (SMAV) for *Ceriodaphnia dubia* used in the most recent US EPA water quality criterion for copper, as well as comparison of the measured reference water LC50 to predicted reference water LC50s using the Biotic

Ligand Model (BLM). Similar evaluation of the copper LC50 values in sites waters, and zinc LC50 values in both reference and site waters do not suggest that these values have any similar bias. These comparisons are detailed in the comments that follow.

Evaluation of Copper LC50 Values

The copper toxicity as determined by LC50 values for *C. dubia* in reference waters used in the Chollas Creek WER study are summarized in Table 1. Measured copper LC50 values for reference waters ranged from 3.1 to 5.2 µg/L. These values are considerable lower (on average about 4 times lower) than BLM predicted copper toxicity to *C. dubia* in these same source waters (which ranges from 13.4 to 20.8 µg/L) and in most cases they are also below BLM derived CMC and CCC values (which correspond to US EPA acute and chronic criteria). It is not clear why the LC50 values in the laboratory waters are so consistently low, but low values for reference waters used in WER studies can be problematic, since they result in less protective WER-adjusted criteria.

Of course, LC50 values are derived from biological concentration-response data and the many factors that can contribute to variation in measured toxicity is not always clear. These low LC50 values are not necessarily an indication that there was anything wrong with these specific tests, but only raise the potential concern that low estimates of toxicity in reference waters can lead to high WER values. Therefore, the protectiveness of the final WER needs to be considered as part of the analysis.

Table 1: Summary of observed and predicted copper toxicity values in laboratory waters used in the Chollas Creek WER study

Sample	Date	Reported LC50 (Table 6-4) µg / L	BLM Predicted *C. dubia* LC50 (from Table 8-2) µg / L	BLM CMC (from Table 8-2) µg / L	BLM CCC (from Table 8-2) µg / L
DMW	28-Feb-10	3.05	20.8	7.1	4.4
DMW	2-Apr-10	5.22	13.4	4.4	2.7
DMW	31-Oct-10	4.59	14.8	4.8	3.0
DMW	21-Dec-10	3.77	19.4	6.6	4.1
DMW	average	4.1	16.8	5.6	3.5

A similar comparison of site water LC50 values, on the other hand, shows that there is good agreement between measured values and BLM predicted values, and the BLM calculated CMC and CCC for site water samples are always well below the measured LC50 values (Table 2).

Table 2: Summary of observed and predicted copper toxicity values in site waters used in the Chollas Creek WER study

Sample	Date	Reported LC50 (Table 6-4) µg / L	BLM Predicted *C. dubia* LC50 (from Table 8-2) µg / L	BLM CMC (from Table 8-2) µg / L	BLM CCC (from Table 8-2) µg / L
DPR2	27-Feb-10	82.4	157.5	51.3	31.9
DPR2	1-Apr-10	235.0	308.0	95.0	59.0
DPR2	30-Oct-10	136.2	135.2	41.8	26.0
DPR2	20-Dec-10	86.7	30.2	9.0	5.6
SD8(1)	27-Feb-10	67.6	111.5	35.2	21.8
SD8(1)	1-Apr-10	195.0	310.7	97.3	60.4
CC-SD8(1)	30-Oct-10	102.8	87.8	27.0	16.8
CC-SD8(1)	20-Dec-10	59.3	23.0	6.8	4.2
DPR2	average	123.0	118.6	36.8	22.9
SD8(1)	average	94.7	91.5	28.2	17.5

Since WER values are calculated as the ratio of LC50s in site water to LC50 in reference waters, a low estimate of reference water LC50s can create high values for the WER.

The US EPA WER guidance documents do suggest that high WER values may result from low estimates of reference water LC50s. For example in the 1994 interim guidance[1] the following recommendation specifically relates to large WER values that might result from a low laboratory water LC50 estimate.

> "If the WER is larger than 5, it should be investigated.
>
> 1. If the endpoint obtained using the laboratory dilution water was lower than previously reported lowest value or was more than a factor of two lower than an

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[1] U.S. EPA. 1994. Interim guidance on determination and use of water-effect ratios for metals. EPA-823-B-94-001.

> existing Species Mean Acute Value in a criteria document, additional tests in the laboratory dilution water are probably desirable."

The US EPA streamlined guidance[2] for copper further reinforces this point.

> "If the hardness-normalized EC50 in laboratory water is less than the documented SMAV for the species, then use the SMAV in place of the laboratory water EC50 in the dominator of the WER."

Species mean acute values for *C. dubia* recommended in the streamlined guidance document is 11.5 µg/L for waters with a hardness of 50 mg/L as $CaCO_3$, and 22.11 µg/L for waters with a hardness of 100 mg/ L as $CaCO_3$. These values are considerably higher than the reference water LC50s shown above. Since hardness values for the site waters in Chollas Creek are typically between 50 and 100, an intermediate value could be used in place of the reference water LC50, as recommended in the Appendix B of the streamlined guidance. I believe a revised WER calculated in this way would be considerably lower than is currently proposed in the draft WER study report but will still be well above a value of 1, suggesting that a site-specific SSO is justified for Chollas Creek.

I appreciate the opportunity to provide you with this review and would be happy to discuss these comments further at your convenience.

Very truly yours,

HDR|HydroQual, INC.

Robert Santore
Professional Associate

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[2] U.S. EPA. 2001. Streamlined Water-Effect Ratio Procedure for Discharges of Copper. EPA-822-R-01-005

Weston Solutions, Inc. Response: We thank you for taking the time to review this document and made modifications as follows: In light of the high copper WERs determined for both SD8(1) and DPR2, the higher (more conservative) SMAV LC_{50} of 22.1 ug/L at a hardness of 100 mg $CaCO_3$/L was used to replace the lab derived LC_{50} for copper. The average hardness value for the lab waters was 92.8 mg $CaCO_3$/L. This change resulted in copper WERs of 4.64 for the North Fork Site SD8(1) and 5.56 for the South Fork Site DPR2, and are considerably lower than the original values reported. Additionally, when recalculating the CTR compliance criteria, the values fall in line with the LC_{50}s determined for the site waters. The report was modified and the final conservative value of 4.64 was recommended for use as the FWER based on a management decision.

Review of Chollas Creek Copper, Lead, and Zinc Water-Effect Ratio Study

Steven Bay, Southern California Coastal Water Research Project
April 19, 2011

This review is based on the March 30, 2011 draft report.

Overall Comments:
This report describes the results of a one-year field and laboratory study to measure water quality at various locations in Chollas Creek and to calculate toxicity-based water effects ratios (WERs) for copper, zinc, and lead. My overall comments are summarized below, with specific references to the report in following sections:

- The report is written well in general and provides good descriptions of the project background, site, and study design. The study and analyses conducted are consistent with the intent and scope of the work plan previously approved by the Technical Advisory Committee (TAC). The primary objectives of the study were successfully accomplished.

Weston Solutions, Inc. Response: We thank you for taking the time to provide such thorough review of the draft document. It should be noted that while the sampling and analysis occurred over a one-year period, the planning, coordination, execution, and reporting occurred over a two-year period.

- The report is incomplete in several aspects that are needed to support thorough technical review and provide a more useful product to support use by regulatory agencies. These deficiencies include: 1) incomplete presentation of toxicity test data (e.g., dose-response plots), 2)lack of statistical evaluation of test results (e.g., no confidence limits for LC50s, no correlations between toxicity and chemistry, no statistical evaluation of WERs between sites), and 3) no interpretation/discussion of the results relative to other WER studies. Without presentation of the toxicity results in greater detail, the quality of the analyses cannot be evaluated.

Weston Solutions, Inc. Response: 1) All bioassay lab reports were added to Appendix G. A reference to the appendix was included in Section 6.2. Dose response data was tabulated and included in Appendix G so that the WERs for each site and event can easily be traced back to the raw data. 2) Confidence limits were added to the WERs in the results section to provide a measure of variability of the results. Because the copper WERs were high, and based on comments from other reviewers (See comments from Mr. Peter Shafer and Mr. Robert Santore) the WERs were calculated using more conservative SMAV values for the laboratory control water LC_{50} as recommended in the EPA WER Guidance documents and as described in the final report. 3) The toxicity results were provided in the appendix. There is no need to compare results to other WER studies as WERs are a site-specific process. There is no requirement or notation in the WER guidance document that suggests comparison to other WERs is needed. Additionally, another commenter noted: “The discussion in this section concerning past WERs appears out of place since the report demonstrates the empirical and modeled results for the current WERs for Chollas Creek. Whether or not there were other successful WERs in the past for other water bodies around the country does not add or subtract from the integrity or appropriateness of the current work. It is sufficient to note that the CTR allows for a WER multiplier that is appropriately derived.”

- Insufficient justification is presented to recommend a specific WER value for use as a site specific objective. This recommendation should either be supported by additional statistical analysis and discussion in the report or be removed.

Weston Solutions, Inc. Response: The process of conducting a WER is for the purpose of determining site-specific objectives. The study results were performed in accordance with the EPA WER Guidance and based on more recent scientific studies. Statistical analyses were added in the form of Box-whisker plots for the north fork sites and the south fork sites (comparing sites between forks and throughout the watershed). The data did not suggest sites were statistically different from each other. Additionally, the biotic ligand model (EPA approved method for comparison of results) also supported the developed WERs. As noted in the report, the application of the more conservative WER for application to the TMDL is a management decision to support a protective and scientifically defensible site-specific objective.

Specific comments (referenced to page and line number):

1. (vii, 212-224) The equations incorrectly refer to bC and bA as correlation coefficients; this error was noted in a previous review.

Weston Solutions, Inc. Response: The Chollas Metals TMDL was used as the basis for the legend (which was incorrect). The legend was corrected to reflect the slope factor (bC) and y intercept (bA) for acute and chronic, respectively.

2. (ix, 295) Inadequate information is presented in this report to support the statement that the toxicity monitoring results corroborate the WER results. A straightforward summary of toxicity monitoring results by date for each fork of the creek, with a comparison to diazinon TUs is needed.

Weston Solutions, Inc. Response: The sentence was removed.

3. (x, 339) A rationale for how the recommended WER provides a layer of conservatism for the north fork of Chollas Creek is needed.

Weston Solutions, Inc. Response: A rationale was provided to explain the layer of conservatism for the North Fork.

4. (10, 499-516) Same errors in definition of regression parameters as correlation coefficients as was identified a year ago.

Weston Solutions, Inc. Response: The legend was corrected as noted in comment #1 above.

5. (11, 586) Figure 2-6 is not an adequate representation of prior toxicity test results. This figure appears to have mislabeled axes and does not provide any indication as to whether toxicity is currently detected at the study sites during storm flows.

Weston Solutions, Inc. Response: The axis was relabeled. The graph (and associated text) demonstrates that toxicity in Chollas Creek was primarily driven by elevated Diazinon concentrations. The measurement of toxicity is provided in the Chollas Creek TMDL Compliance and Special Studies Reports.

Toxicity to *C. dubia* is infrequently measured in Chollas Creek storm water samples (as exemplified by 100% survival in the WER baseline site samples) and is no longer identified as persistent.

6. (13-14) Figures 2-1 to 2-3 are not formatted properly for printing.

Weston Solutions, Inc. Response: Formatting reduced the quality of the figures. We left the Figures at 11 x 17.

7. (19, 699-736) No information is provided to support the statement suggesting that Chollas Creek water quality data indicates that Cu, Pb and Zn WERs >1 are likely.

Weston Solutions, Inc. Response: The statement was removed.

8. (24, 927) No mention of stations LM and LG is included in the study design, yet the results for these stations are featured in the study. Provide a description of these sites and how they relate to the study objectives. Otherwise, I suggest diminishing their prominence in the report.

Weston Solutions, Inc. Response: We added a paragraph to section 8.0 describing use of LM and LG in Biotic Ligand Model analyses. We also added the locations to the site map and site location table.

9. (38, 1231) Results of the correlation analyses should be described in the report. Do these results have an influence on the recommendation to use a specific WER value for the site?

Weston Solutions, Inc. Response: The compliance sites are SD8(1) and DPR2. We also compared other stations (e.g. LM-1 and LG-1) to their downstream counterparts which showed they were not different in terms of water quality.

10. (39,1243) A citation or additional description needs to be provided to describe how the BLM calculations were conducted (e.g., was EPA software used for the calculations, or were they done by a consultant?).

Weston Solutions, Inc. Response: A citation was added.

11. (21, 791) The Pb BLM calculations seem to be very preliminary at this point, additional discussion is needed to clarify whether this version of the model is "final". The study objectives did not include calculation of Pb WERs, why is this calculation being emphasized in the report?

Weston Solutions, Inc. Response: The initial objectives included a lead WER; we opted to perform a criterion evaluation in lieu of a WER based on the draft water quality criteria for lead (GLPO, 2011). The data set is final, the criteria is not.

12. (44, 1367) Statements regarding malathion and pyrethroids influencing the results are not supported by any toxicity data. Provide a figure/table showing the level of baseline

toxicity observed during the study. The influence of this toxicity resulting in "more conservative WERs" should be discussed in the report.

Weston Solutions, Inc. Response: There was no baseline toxicity, observed, therefore the statement was removed.

13. Figure 6-1 does not print properly (relative to image displayed on computer).

Weston Solutions, Inc. Response: The figure was formatted for printing.

14. (50) The 95% confidence limits of the WERs for each metal and site should also be calculated so that one can better assess whether there are differences between sites and make a more informed choice regarding the use of a specific WER.

Weston Solutions, Inc. Response: The 95% confidence limits were not produced. The recommendation for one WER (the most conservative value) for both forks of Chollas Creek is a management decision only. The guidelines suggest a separate WER for each fork. This distinction was made in the report.

15. (51, 1498) The Cu WERs appear to be markedly higher that reported for similar WER studies. There should be some comparison of these results to other studies and a discussion as to why the values are so different.

Weston Solutions, Inc. Response: This issue was driven by the low LC_{50}s determined in the lab control waters. This issue is described in the EPA WER Guidance Document (for WERs >5) and was a significant issue noted by other reviewers. Therefore, the WERs were re-calculated based on USEPA SMAV values listed in the EPA Streamlined WER Guidance Document at a hardness of 100 mg $CaCO_3$/L (same hardness of lab waters). The WERs for copper were significantly reduced to a more protective level in line with the guidance document (4.64 for SD8(1) and 5.56 for DPR2).

16. (54,1628) Unclear why bioconcentration factors for lead are relevant to this study.

Weston Solutions, Inc. Response: This was deleted.

17. (55,1686) I'm assuming that this section is summarizing analyses conducted by others. If not, then conversion between total and dissolved lead should be based on site-specific data, not a general factor.

Weston Solutions, Inc. Response: This summarizes others work.

18. Figure 7-2 does not print properly.

Weston Solutions, Inc. Response: Figure was reformatted for printing.

19. (58, 1778) Figures 8-1 to 8-4 are complex and therefore difficult to interpret, inclusion of fewer symbol types would help make the figure more effective. The use of a log y-axis is likely to mislead some readers into thinking that there are smaller differences between BLM and other calculations that are shown in the tables. The apparent correlation

between the site concentration of copper or zinc and the WER is suspicious, some discussion is needed to interpret this finding; does it indicate that site contamination is influencing the WER values?

Weston Solutions, Inc. Response: Further evaluation was included, but work was done by HydroQual – developer of the BLM for these applications. A citation was added.

20. (59, 1812). It is unclear why the LG and LM data are included in this study. Include a description of the role of these sites and discuss the significance of the findings if you intend to keep them in the report.

Weston Solutions, Inc. Response: Additional introduction and discussion about LM-1 and LG-1 was added in the site location map and to Section 8.0.

21. (68, 1850) The conclusions section is primarily a summary of the findings, you might want to change the title. It would be helpful to include some conclusions regarding use of the BLM approach, relative to WERs, for developing SSOs. Is there a significance between the laboratory-derived and BLM site-specific objectives?

Weston Solutions, Inc. Response: The title was changed to summary and conclusions. Statistics were not performed on BLM derived and SSOs developed using the WER.

Review of Chollas Creek Copper, Lead, and Zinc Water-Effect Ratio Study

Data Appendices

Steven Bay, Southern California Coastal Water Research Project
May 6, 2011

This review is based on draft appendices for the March 30, 2011 draft WER report.

Overall Comments:
1. The chemistry data appendices appear to be complete and provide a comprehensive description of the chemical composition of each of the field and laboratory samples. The QAQC evaluation of the chemistry data is also complete, and the results of the QC evaluations are clearly documented in the associated data tables.

Weston Solutions, Inc. Response: Thank you for the review and comment.

2. Three deviations or inconsistencies are evident in the QAQC results. First, the QAQC summary incorrectly states that holding times were met for all analyses; the report should be revised to state that holding times for the event 3 pyrethroid analyses did not meet holding time limits. Second, low extraction efficiency for the Weck Labs pyrethroid analyses are properly documented, but the data tables for events 3 & 4 should also be qualified to indicate that the results may be biased low due to poor extraction efficiency. Third, errors and inconsistencies exist between the acceptable % recovery ranges listed in Table 7 of the QAPP and those listed in the surrogate recovery results (Table 3, Appendix E2). For example multiple analytes have recovery ranges listed as below the minimum of 50% listed in the QAPP. Of particular note are ranges of 0.1-154% for chlorinated hydrocarbons for Weck Labs. These errors and inconsistencies should be corrected in the final report.

Weston Solutions, Inc. Response: Edits were made in final report.

3. The data appendices for the toxicity analyses are incomplete (nonexistent, actually). As stated in the QAPP, a report should be available that presents the toxicity data for each analysis and also an evaluation of the reference toxicant results relative to historical lab performance. The survival and reproduction results for each treatment (e.g., mean and SD) should be tabulated or plotted by event and station so that any questions regarding toxicity in the unspiked site water or the nature of the dose-response curve can be addressed.

Weston Solutions, Inc. Response: All bioassay lab reports were added to Appendix G. A reference to the appendix was included in Section 6.2. Dose response data was tabulated and included in Appendix G so that the WERs for each site and event can easily be traced back to the raw data.

4. Two versions (2007 and 2010) of the CRG QAPP are included. Is this intentional?

Weston Solutions, Inc. Response: The 2007 QAPP version from CRG was removed.

APPENDIX B

Chollas WER Quality Assurance Project Plan
Weston 2010

DRAFT QUALITY ASSURANCE PROJECT PLAN

For

Chollas Creek Copper, Lead, and Zinc Water-Effect Ratio Study

Prepared for:

City of San Diego
9370 Chesapeake Drive, Suite 100, MS 1900
San Diego, CA 92123

January 2010

WESTON SOLUTIONS
2433 Impala Drive, Carlsbad, CA 92010

GROUP A:
PROJECT MANAGEMENT

ELEMENT 1.0 TITLE SHEET

Quality Assurance Project and Monitoring Plan

For

Chollas Creek
Copper, Lead, and Zinc
Water-Effect Ratio Study

January 2010

City of San Diego

ELEMENT 2.0 TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

APHA	American Public Health Association
BPJ	best professional judgement
CCC	criteria continuous concentration
CD	compact disk
CMC	criteria maximum concentration
COC	chain of custody
CRG	CRG Marine Laboratories, Inc.
CTR	California Toxics Rule
DO	dissolved oxygen
DOC	dissolved organic carbon
DQO	data quality objective
ELAP	Environmental Laboratory Accreditation Program
GC-MS	gas chromatography-mass spectrometry
HDPE	high-density polyethylene
ICP-MS	inductively coupled plasma-mass spectrometry
LC_{50}	median lethal concentration
LPDE	low-density polyethylene
MS	matrix spike
MSD	matrix spike duplicate
MS4	Municipal Separate Storm Sewer System
OAL	Office of Administrative Law
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
pH	hydrogen ion concentration
QA	quality assurance
QAM	Quality Assurance Manual
QAPP	Quality Assurance Project Plan
QC	quality control
RPD	relative percent difference
Regional Board	San Diego Regional Water Quality Control Board
SOP	standard operating procedure
SM	Standard Methods
SSO	site specific objective
SWAMP	Surface Water Ambient Monitoring Program
TDS	total dissolved solids
TMDL	total maximum daily load
TOC	total organic carbon
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
WER	water-effect ratio
WESTON®	Weston Solutions, Inc.
WQO	water quality objectives

ELEMENT 3.0 DISTRIBUTION LIST

Table 1 identifies those individuals who will receive one (1) copy of the approved Quality Assurance Project Plan (QAPP).

Table 1. QAPP Distribution List

Title	Name (affiliation)	Telephone No.
City of San Diego Project Manager	Ruth Kolb (City of San Diego)	(858) 541-4328
Contractor Project Manager	Dave Renfrew (Weston Solutions, Inc.)	(760) 795-6903
Contractor Field Team Lead	Jennifer Schollee (Weston Solutions, Inc.)	(760) 795-6921
Contractor Project Quality Assurance (QA) Officer	Satomi Yonemasu (Weston Solutions, Inc.)	(760) 795-6907
Contractor Toxicity Lead	Wendy Hovel (Weston Solutions, Inc.)	(760) 795-6984
Contractor Data Manager	Andrea Crumpacker (Weston Solutions, Inc.)	(760) 795-6987
Chemistry Lab QA Officer	Kathy Burney (CRG Marine Laboratories, Inc.)	(310) 533-5190 Ext. 108

ELEMENT 4.0 PROJECT/TASK ORGANIZATION

Involved Parties and Roles

Weston Solutions, Inc. (WESTON®) is a for-profit environmental consulting firm contracted by the City of San Diego to conduct a dissolved copper, lead, and zinc water-effect ratio (WER) study in the north and south forks of Chollas Creek. WESTON will organize field sampling logistics and equipment, provide sample collection and laboratory analysis of samples, perform data analysis, and provide a report of the WER study results.

Ruth Kolb, is the City of San Diego Project Manager. She will be responsible for project administration and will serve as the lead contact at the City of San Diego (Table 2, Figure 1).

Dave Renfrew is the Project Manager for WESTON. He will be responsible for all aspects of the project, including the organization of field staff, scheduling of sampling days, installation and maintenance of field sampling equipment, reporting, and coordination with the laboratories. Mr. Renfrew will also be responsible for overall project management, organization, and oversight.

Jennifer Schollee will act as the Field Team Lead and will support the Project Manager on aspects of the project, including interaction and organization of field staff, scheduling of sampling events, data analysis, and report writing.

Satomi Yonemasu is the project Quality Assurance (QA) Officer. She will be responsible for guaranteeing the overall QA and quality control (QC) procedures and will ensure that data reported by WESTON have been generated in compliance with the Quality Assurance Manual (QAM) and the appropriate protocols. Ms. Yonemasu will also work with the project laboratories to ensure proper QC procedures are followed.

Andrea Crumpacker is WESTON's Data Manager. She will be responsible for maintaining a database of project data and generating data tables for the project report.

Wendy Hovel is WESTON's Toxicity Lead. She will ensure that toxicity samples submitted to WESTON's laboratories are analyzed in accordance with methods and QA requirements found in this QAPP. The Toxicity Lead will act as a technical resource to the Project Manager.

Kathy Burney is CRG Marine Laboratory's (CRG's) QA Officer. Ms. Burney will be responsible for providing chemistry analytical data in an approved and quality-controlled format.

Table 2. Contractor Personnel Responsibilities and Contact Information

Name	Organizational Affiliation	Title	Contact Information (telephone number, fax number and email address)
Ruth Kolb	City of San Diego	Project Manager	(858) 541-4328 (telephone) rkolb@sandiego.gov
Dave Renfrew	Weston Solutions, Inc.	Project Manager	(760) 795-6903 (telephone) (760) 931-1580 (fax) dave.renfrew@westonsolutions.com
Jennifer Schollee	Weston Solutions, Inc.	Field Team Lead	(760) 795-6921 (telephone) (760) 931-1580 (fax) jennifer.schollee@westonsolutions.com
Satomi Yonemasu	Weston Solutions, Inc.	QA Officer	(760) 795-6907 (telephone) (760) 931-1580 (fax) satomi.yonemasu@westonsolutions.com
Wendy Hovel	Weston Solutions, Inc.	Toxicity Lead	(760) 795-6984 (telephone) (760) 931-1580 (fax) wendy.rose@westonsolutions.com
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Kathy Burney	CRG Marine Laboratory, Inc.	Chemistry Lab QA Officer	(310) 533-5190 Ext. 108 (telephone) (310) 320-1276 (fax) kburney@crglabs.com

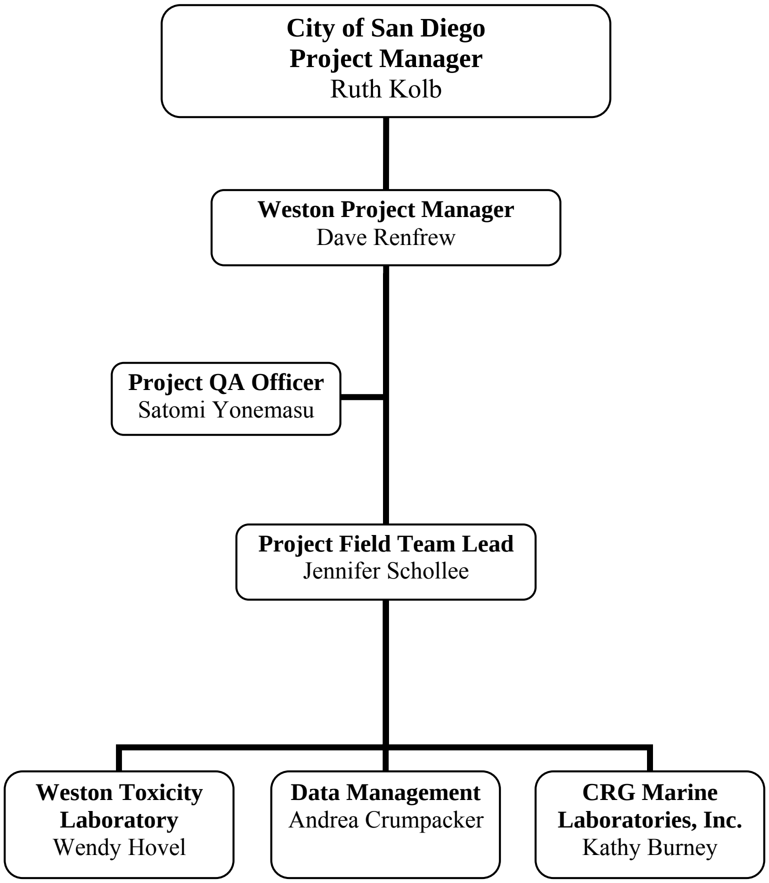


Figure 1. Project Organizational Chart

Quality Assurance Officer Role

The QA officers are responsible for guaranteeing the overall quality of the data produced and reported by WESTON. Specific duties of the QA officers include conducting audits of ongoing tests, data packages, and completed reports; conducting audits of the routine QC documentation of laboratory procedures; communicating potential QC problems to the staff and assuring that any problems are resolved. They are responsible for issuing QA reports to management, maintaining a current QAM, and issuing QAPPs as required. The QA officers also ensure that data reported by WESTON have been generated in compliance with the QAM and the appropriate protocols. The laboratory QA officers are responsible for maintaining laboratory operations in accordance with the quality system standards defined under the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP).

Satomi Yonemasu is the project QA Officer. She will be responsible for the overall QA and QC procedures found in this plan as part of the sampling and field analysis. She will also work directly with the QA officer of the contract analytical laboratory identified in the plan to ensure proper QC procedures are followed.

Ms. Yonemasu will also review and assess procedures during the life of the project against plan requirements. She will report findings to Dave Renfrew, including any requests for corrective action. Ms. Yonemasu or Mr. Renfrew may stop actions conducted by WESTON if there are significant deviations from required practices or if there is evidence of a systematic failure. The laboratory QA officers will also have the same authority for laboratory-related operations.

Persons Responsible for Plan Update and Maintenance

Changes and updates to this QAPP may be made after a review of the evidence for change by WESTON’s Project Manager and QA Officer with the concurrence of the City of San Diego Project Manager. WESTON’s Project Manager, with input from the QA Officer will be responsible for making the changes, submitting drafts for review, and preparing a final amended copy of the plan. Any proposed changes will be approved by the City of San Diego Project Manager before being finalized.

ELEMENT 5.0 PROBLEM DEFINITION/BACKGROUND

Problem Statement

The Chollas Creek Watershed is highly urbanized land located within San Diego County and encompasses approximately 16,270 acres (Figure 2). The drainage area to the northern fork of the watershed (9,276 acres) is larger than that to the southern fork (6,997 acres). The upper drainage area of the Chollas Creek Watershed includes the cities of Lemon Grove and La Mesa. Chollas Creek flows through the City of San Diego and empties to the eastern shoreline of San Diego Bay. In 1996, the lowest 3.5 miles of Chollas Creek was placed on the Section 303(d) list by the San Diego Regional Water Quality Control Board (Regional Board) for dissolved copper, dissolved lead, and dissolved zinc for toxicity in storm water. Consequently, a total maximum daily load (TMDL) for dissolved copper, lead, and zinc was adopted for inclusion in the Basin Plan in 2008 by the Office of Administrative Law (OAL) and United States Environmental Protection Agency (USEPA).

The Chollas Creek TMDL numeric targets for dissolved copper, lead, and zinc are based on the California Toxic Rule (CTR) criteria for metals. The CTR lists a criteria maximum concentration (CMC or acute criteria) and criteria continuous concentration (CCC or chronic criteria) that are calculated using hardness concentrations collected from each sample event to determine the water quality objectives (WQO) for each dissolved metal. The CMC is the highest concentration that will protect aquatic life from acute effects. The CCC is the highest concentration that will protect aquatic life from chronic effects. Most water quality criteria are based on studies using laboratory water and therefore do not account for the differences in bioavailability and toxicity of a contaminant that may exist between receiving waters and laboratory water.

The WER is a variable in the CCC and CMC equations in the CTR and can be used to develop a site specific objective (SSO). Because hardness and other parameters that complex metals are different in each waterbody, the bioavailability of copper, lead, and zinc may vary and is an allowable factor that can be developed for a specific water body. Currently, a WER has not been developed for Chollas; therefore, a default value of one is used in the numeric target equations and is not shown in the TMDL numeric targets. The Chollas Creek Dissolved Copper, Lead, and Zinc TMDL Technical Document indicates that it may be appropriate to investigate a SSO for dissolved copper, lead, and zinc for Chollas Creek. The TMDL may also be revised upon the new

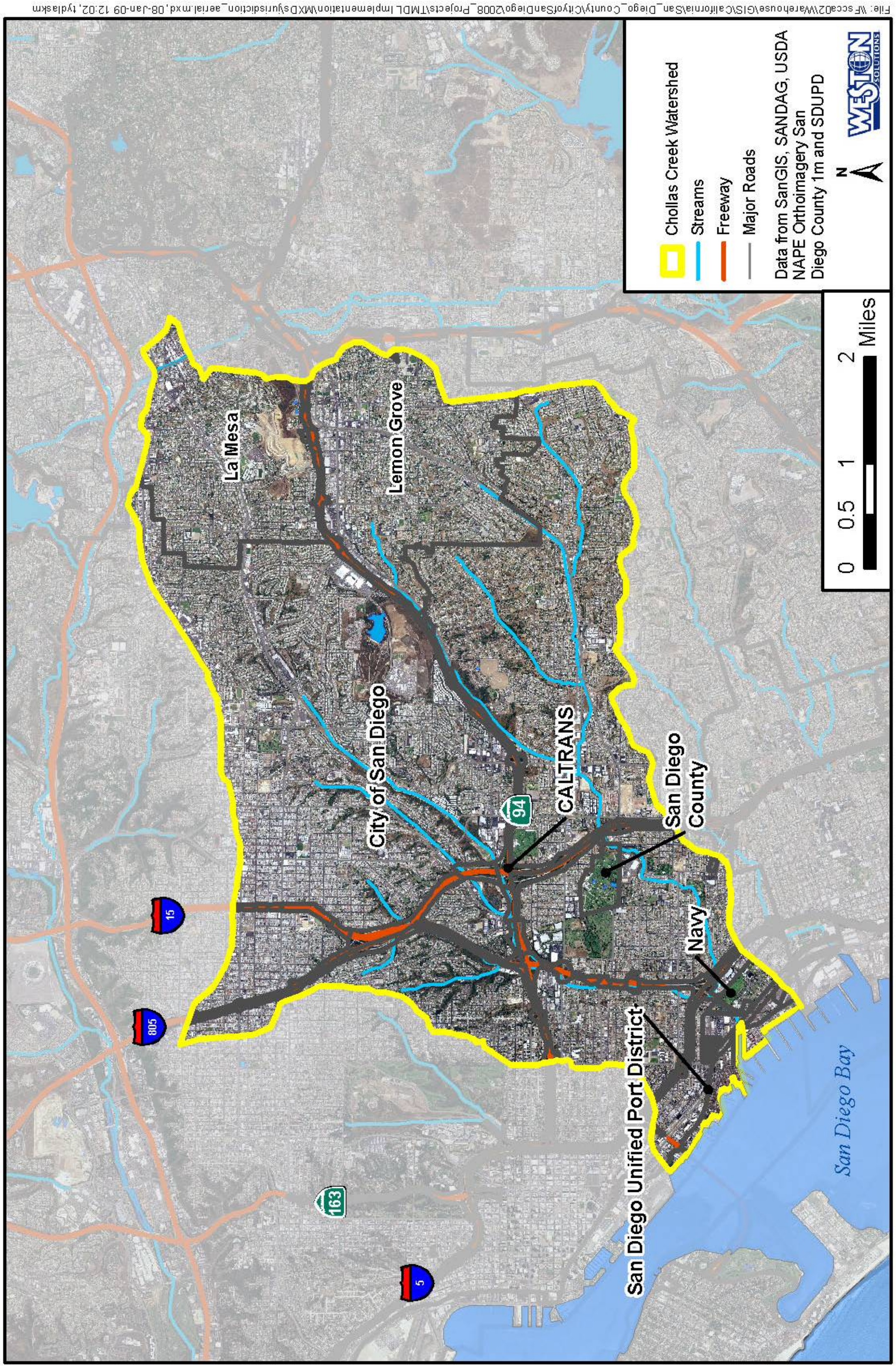


Figure 2. Aerial View of the Chollas Creek Watershed.

Study Objective

The objective of this study is to establish WERs and SSOs for dissolved copper, lead, and zinc, separately, for Chollas Creek. The underlying goal is to determine how much dissolved lead, copper and zinc can be present in Chollas Creek site water without lowering the intended level of protection for Chollas Creek beneficial uses. The Chollas Creek WER study will be conducted in accordance with the *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals* (USEPA, 1994).

ELEMENT 6.0 PROJECT/TASK DESCRIPTION

The WER study is separated into the following seven tasks:

- Task 1 – Site Reconnaissance and Stream Survey.
- Task 2 – Rangefinder Tests.
- Task 3 – Low Flow Event Sampling.
- Task 4 – High Flow Event Sampling.
- Task 5 – Bioassay Testing.
- Task 6 – Physical and Chemical Analyses.
- Task 7 – Data Analysis and Reporting.

Each task is described in detail in the following paragraphs.

TASK 1 – Site Reconnaissance and Stream Survey

WESTON will visit the sampling sites provided in Table 3 to determine sampling logistics. Field staff will provide detailed site descriptions, including specific locations for the monitoring equipment at each site.

A stream survey will be conducted at the sampling sites to develop a flow equation specific to each site. The site characteristics will be applied to stream stage data to calculate flows during wet weather events. A tripod-mounted laser level and stadia rod will be used to determine the stream cross-sectional channel profile and the stream gradient. The stream rating will be based on a Manning’s trapezoidal channel equation or other incremental equation based on the wetted area of the cross section. Stream ratings using portable velocity sensors are not recommended for Chollas Creek as the channel is typically dry during non-flow events, or too hazardous during flow events. Detailed stream survey techniques are described in Element 10.

Table 3. Sampling Sites within Chollas Creek

SITE	LOCATION	LATITUDE (WGS 84)	LONGITUDE (WGS 84)
SD8(1)	Chollas Creek North Fork	32.70493	-117.12132
DPR2	Chollas Creek South Fork	32.69227	-117.11232

TASK 2 – Rangefinder Tests

Prior to conducting the WER study, WESTON will conduct rangefinder tests to determine the appropriate range of metal concentrations to use in toxicity tests. To do this, six rangefinder toxicity tests will be performed (Table 4). Specifically, for toxicity test species, *Ceriodaphnia dubia*, three rangefinder tests for copper, lead, and zinc will be performed using laboratory dilution water and three rangefinder tests for copper, lead, and zinc will be performed using Chollas Creek water. Results of the rangefinder tests will be used to determine a more precise range of concentrations for the actual WER testing and should result in a more accurate calculation of the median lethal concentration (LC_{50}) and the associated WERs.

Table 4. Summary of Rangefinder Tests Conducted for the Chollas Creek WER Study

Test Type	Sample	Test Species *Ceriodaphnia dubia*
Copper Spiking	Dilution Water	X
	Chollas Creek Water	X
Lead Spiking	Dilution Water	X
	Chollas Creek Water	X
Zinc Spiking	Dilution Water	X
	Chollas Creek Water	X

TASK 3 – Low Flow Event Sampling

WESTON will collect one flow weighted composite sample from each of the two monitoring locations during one or two low flow events for the 2010 Wet Weather Monitoring Season. Criteria for the event include a minimum of 72 hours of antecedent dry weather and a minimum of 0.10 inch of rain forecasted within the runoff area. The low flow event will be defined as a storm event between 0.10 inch and 0.50 inch of precipitation and when the flow rate is greater than 20 cfs and the peak flow is less than approximately 500 cfs.

Chemistry and toxicity samples will be collected as flow-weighted composites.

Field parameters will be collected using an Oakton CON10 pH/conductivity/temperature meter. Flow monitoring will be conducted for the duration of the monitoring event and will be logged at five-minute intervals. Flow monitoring equipment will be initialized one day before the sampling event to capture the flow condition and will continue until the end of the event.

TASK 4 – High Flow Event Sampling

WESTON will collect flow weighted composite samples from each of the two monitoring locations during one or two high flow events for the 2010 Wet Weather Monitoring Season. Criteria for this event include a minimum of 72 hours of antecedent dry weather and a minimum of 0.10 inch of rain forecasted within the runoff area. The high flow event will be defined as a storm event between 0.20 inch and up to 2.0 inches of precipitation and when the peak flow rate is expected to be greater than 500 cfs.

Chemistry and toxicity samples will be collected as flow-weighted composites.

Field parameters will be collected using an Oakton CON10 pH/conductivity/temperature meter. Flow monitoring will be conducted for the duration of the monitoring event and will be logged at five-minute intervals. Flow monitoring equipment will be initialized one day before the sampling event to capture the flow condition and will continue until the end of the event.

TASK 5 – Bioassay Testing

To establish the WER for Chollas Creek, WESTON will conduct bioassay tests using *C. dubia*. *C. dubia* 48-hour survival tests will be conducted with copper, lead, and zinc (separately) dissolved in water from the north and south forks of Chollas Creek (Sites SD8[1] and DPR2, respectively), and in laboratory dilution water during three flow events (one or two high flow events and one or two low flow events). Appropriate laboratory control samples will be run with each of the selected test species. Bioassay tests that will be conducted as part of this task are presented in Table 5.

Table 5. Summary of Bioassay Testing for the Chollas Creek Water-Effect Ratio Study

Test Type	Sample	Test Species *Ceriodaphnia dubia*
High Flow Event		
Copper Spiking	Dilution Water	X
	SD8(1)	X
	DPR2	X
Lead Spiking	Dilution Water	X
	SD8(1)	X
	DPR2	X
Zinc Spiking	Dilution Water	X
	SD8(1)	X
	DPR2	X
Low Flow Event		
Copper Spiking	Dilution Water	X
	SD8(1)	X
	DPR2	X
Lead Spiking	Dilution Water	X
	SD8(1)	X
	DPR2	X
Zinc Spiking	Dilution Water	X
	SD8(1)	X
	DPR2	X

TASK 6 – Physical and Chemical Analyses

CRG will analyze water samples collected from Stations SD8(1) and DPR2 for physical and chemical constituents. The list of analytes was selected for comparing other potential toxic effects due to known historical analyte detections of synthetic pyrethroids, Diazinon, and other potential confounding factors not related to metals. In addition to the full suite of constituents analyzed on samples SD8(1) and DPR2, an initial and final sample will be collected from each concentration of each bioassay test for dissolved and total copper, lead, or zinc analysis. The specific metal analyzed will be based on the spiking test. Metal concentrations of bioassay test treatments will be used to calculate LC_{50} values and develop the WER. The control water used in bioassay testing will be analyzed for total dissolved solids (TDS), and cations/anions (i.e., sodium, calcium, magnesium, potassium, sodium, chloride). The specific analytes and methods for physical and chemical analyses are presented in Element 13.0.

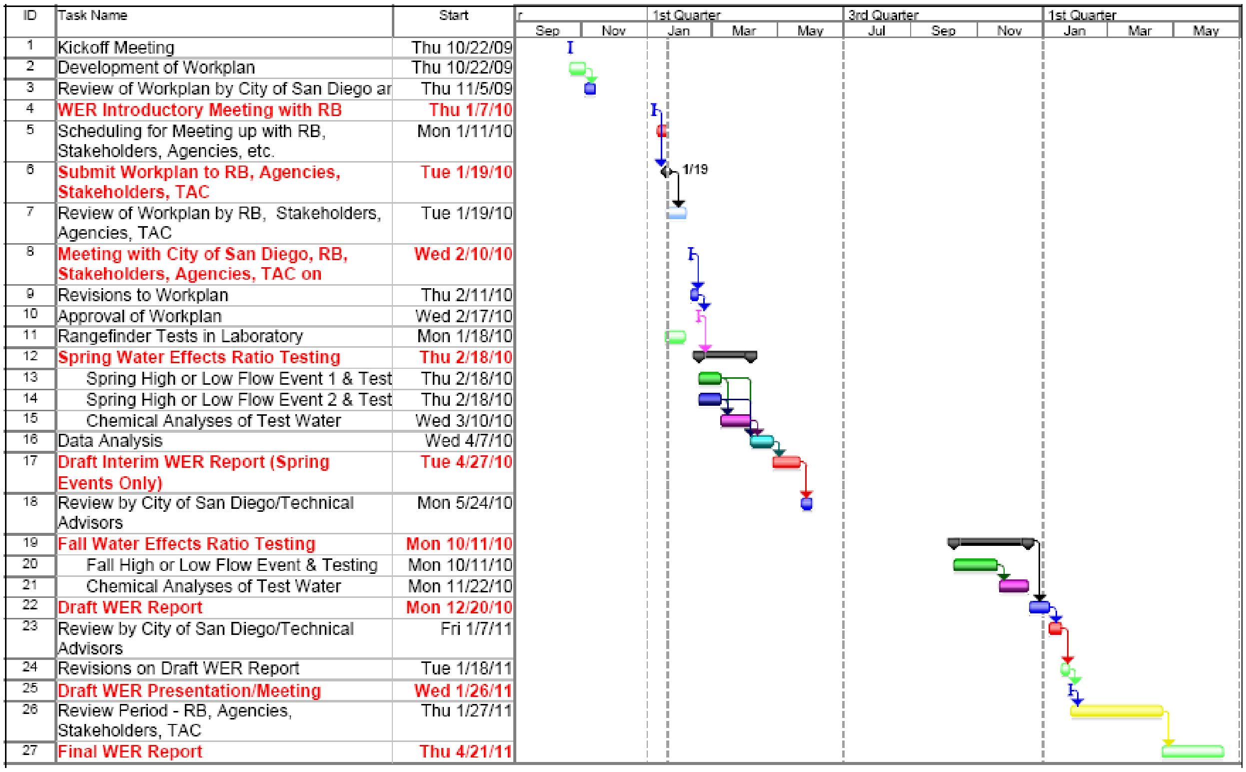
TASK 7 – Data Analysis and Reporting

A draft final project report summarizing project accomplishments will be prepared and submitted to the City of San Diego Project Manager for review and comment. After a reasonable period, comments will be addressed and incorporated into the final project report as appropriate. The report will include the following sections:

- **Introduction** – a statement of purpose, the scope of the project, and a description of the approach and techniques used during the project.
- **Materials and Methods** –a detailed description of field and laboratory methods and procedures used to collect and analyze the samples, maps, and photographs; a description of any statistical procedures used to analyze data; and any QA protocols.
- **Results** – Results of all data collected, including tables summarizing water chemistry for each sampling event, water chemistry for each toxicity test, comparisons to applicable standards, toxicity test data and point estimates, relationship of toxicity to water quality parameters (where applicable), WERs for each event and final WERs, and proposed SSOs.
- **Discussion** – a context to the study results.
- **Conclusions and Recommendations** – an overview of major findings of the study and recommendations for future actions.

Project Timetable

The project schedule is presented below in Figure 3. The schedule is dependent upon the approval date and the actual low flow and high flow rain events that occur after approval.



ID	Task Name	Start
1	Kickoff Meeting	Thu 10/22/09
2	Development of Workplan	Thu 10/22/09
3	Review of Workplan by City of San Diego ar	Thu 11/5/09
4	WER Introductory Meeting with RB	Thu 1/7/10
5	Scheduling for Meeting up with RB, Stakeholders, Agencies, etc.	Mon 1/11/10
6	Submit Workplan to RB, Agencies, Stakeholders, TAC	Tue 1/19/10
7	Review of Workplan by RB, Stakeholders, Agencies, TAC	Tue 1/19/10
8	Meeting with City of San Diego, RB, Stakeholders, Agencies, TAC on	Wed 2/10/10
9	Revisions to Workplan	Thu 2/11/10
10	Approval of Workplan	Wed 2/17/10
11	Rangefinder Tests in Laboratory	Mon 1/18/10
12	Spring Water Effects Ratio Testing	Thu 2/18/10
13	Spring High or Low Flow Event 1 & Test	Thu 2/18/10
14	Spring High or Low Flow Event 2 & Test	Thu 2/18/10
15	Chemical Analyses of Test Water	Wed 3/10/10
16	Data Analysis	Wed 4/7/10
17	Draft Interim WER Report (Spring Events Only)	Tue 4/27/10
18	Review by City of San Diego/Technical Advisors	Mon 5/24/10
19	Fall Water Effects Ratio Testing	Mon 10/11/10
20	Fall High or Low Flow Event & Testing	Mon 10/11/10
21	Chemical Analyses of Test Water	Mon 11/22/10
22	Draft WER Report	Mon 12/20/10
23	Review by City of San Diego/Technical Advisors	Fri 1/7/11
24	Revisions on Draft WER Report	Tue 1/18/11
25	Draft WER Presentation/Meeting	Wed 1/26/11
26	Review Period - RB, Agencies, Stakeholders, TAC	Thu 1/27/11
27	Final WER Report	Thu 4/21/11

Figure 3. Project Schedule

Geographic Setting

The Chollas Creek Watershed encompasses approximately 16,270 acres consisting predominately of urbanized land located within the San Diego County (Figure 2). The drainage area to the northern fork of the watershed (9,276 acres) is larger than that to the southern fork (6,997 acres). The upper drainage area of the Chollas Creek Watershed includes the cities of Lemon Grove and La Mesa. Chollas Creek flows through the City of San Diego and empties to the eastern shoreline of San Diego Bay.

Land Use

The Chollas Creek Watershed is highly urbanized. Land use in the Chollas Creek Watershed is predominantly residential (48%), roads (22%) and freeways and highways (5%), as shown on (Figure 4). The remaining watershed land uses consist of commercial and industrial facilities and landfills (7%), open space (7%), schools (3.5%), cemeteries (1.5%), and other miscellaneous land uses. The Chollas Lake is a 16-acre water body located north of Highway 94, in the northeastern portion of the watershed.

Caltrans is responsible for the California State Highway System (5%), which possesses its own Municipal Separate Storm Sewer System (MS4) Permit (Order No. 99-06-DWQ) (Regional Board, 2007). Portions of the cities of San Diego (72%), Lemon Grove (12%), and La Mesa (9%) are also located within the watershed. The Port, the Navy, and the County of San Diego each hold jurisdiction over approximately 1% of the Chollas Creek Watershed. A small portion of the watershed consists of tidelands immediately adjacent to San Diego Bay. Some of this tideland area is under the jurisdiction of the Port, and the remainder falls under the jurisdiction of the Navy.

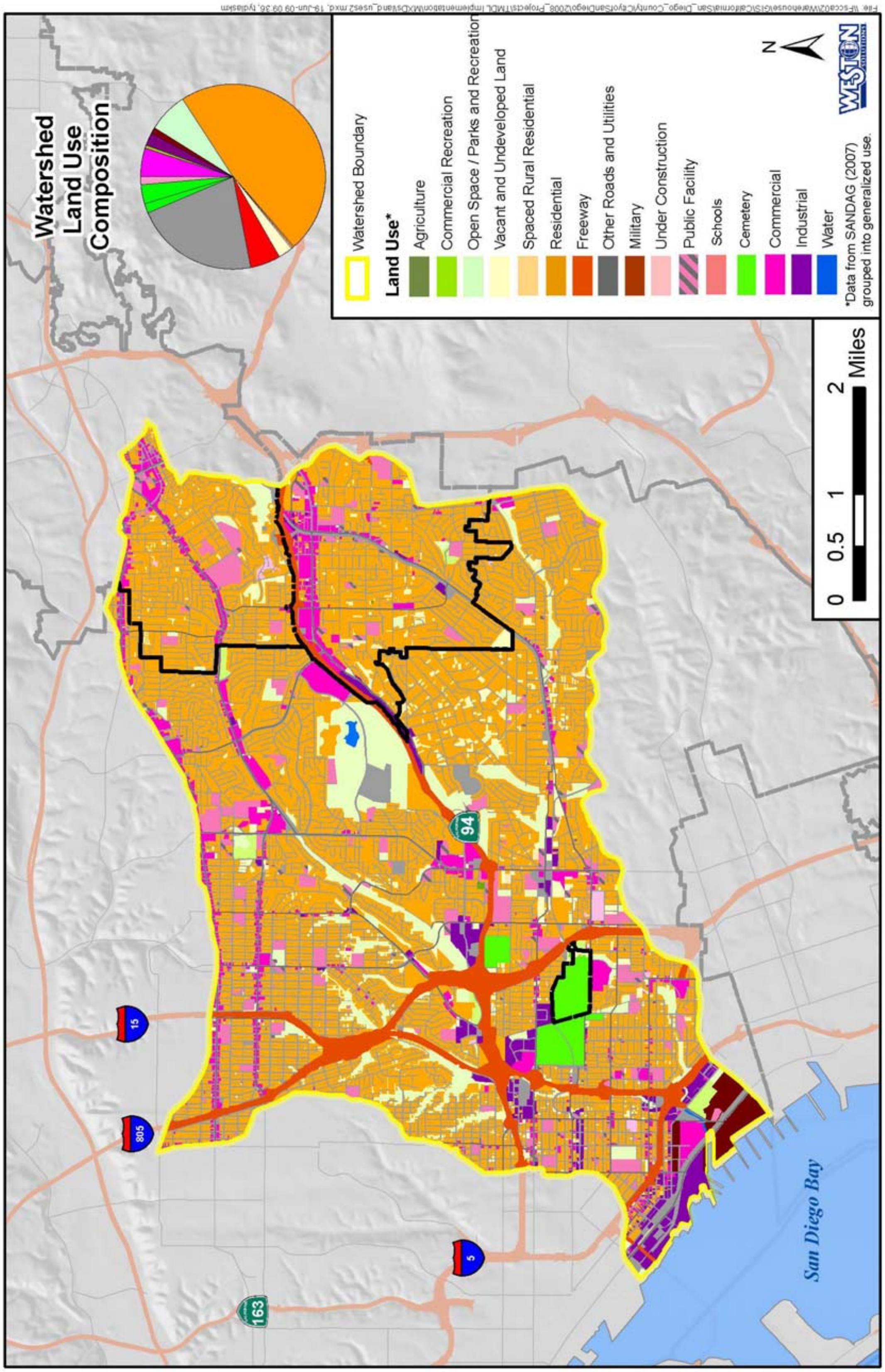


Figure 4. Chollas Creek Vicinity and Land Use Map.

ELEMENT 7.0 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Each laboratory will follow their in-house QA/QC plan, and any deviations will be documented in the analytical reports. Field monitoring instrumentation QC will be checked for accuracy once a month.

Data quality objectives (DQOs) applicable to water samples collected for this project consist of the following (Table 6):

- Field testing.
- Chemistry analyses.
- Toxicity analyses.

Table 6. Summary of Data Quality Objectives

Measurement or Analysis Type	Applicable Measurement Quality Objective
Field testing	Accuracy, precision, and completeness
Chemistry laboratory analyses	Accuracy, precision, recovery, and completeness
Toxicology laboratory analyses	Accuracy, precision, and completeness

These DQOs are also presented in Table 7.

Additional measurements include the following:

- Visual observations (e.g., floating materials including trash, foam, and scum).
- Flow estimate.
- General water quality.
- General water chemistry.

Acceptance criteria will be based on the implementation of acceptable and recognized QA/QC procedures. Acceptable data requires proper sample collection and handling methods, sample preparation and analytical procedures, holding times, stability issues, and QA protocols.

Table 7. Data Quality Objectives for Laboratory and Field Measurements

Analysis Group	Parameter	Accuracy		Precision		Completeness
Laboratory analyses	TDS TSS TOC DOC Ammonia Chloride Total Hardness Alkalinity Sulfate	Certified/Standard Reference Material (CRM/SRM) when available or Laboratory Control Sample (LCS), and Matrix Spike / Matrix Spike Duplicate (MS/MSD)	80–120%	Laboratory Duplicate (LD), Field Duplicate (FD), and MS/MSD	<25%	90%
Laboratory analyses	Metals	SRM/CRM or LCS, MS/MSD	75–125%	LD, FD, and MS/MSD	<25%	90%
Laboratory analyses	Organophosphorus Pesticides, Organochlorine Pesticides, PCB Congeners, PAHs, Synthetic pyrethroids	SRM/CRM or LCS, MS/MSD	50–150% (SRM/CRM 70–130%)	LD, FD, and MS/MSD	<25% (FD per method)	90%
Field testing	Temperature Conductivity pH	2 points per calibration	± 0.1 °C * ± 2 µS/cm * ± 0.2 *	NA	NA	90%

* "Electronic Specs" Accuracy
Note: the above objectives are applicable unless method or manufacturer specifies more stringent requirements

Precision is defined as the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions, calculated as either the range or as the standard deviation. The precision of instrument-related field measurements will be controlled using the same analytical instrument in the field to replicate each field measurement of each water sample three times. The replicated field measurements will be reported as the mean, and the precision will be calculated as the standard deviation of the measurements. The precision of chemistry laboratory measurements will be controlled by comparison of the sample to a duplicate sample or between the laboratory matrix spike (MS) and matrix spike duplicate (MSD). Precision will be measured by the degree of agreement between the sample and the laboratory duplicate or the MS and MSD results. Samples within a ±25% relative percent difference (RPD) will be accepted as unqualified results.

"Bias" is defined as the systematic or persistent distortion of a measurement process that causes errors in one direction. Bias of field measurements will be controlled using best professional judgment (BPJ) to obtain representative samples that reflect field conditions. Bias of laboratory measurements will be controlled by comparison of the sample to a laboratory MS/MSD. Spike concentrations should be at sufficient levels to estimate if bias from matrix effects is occurring.

"Representative" is a qualitative term that expresses "the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition" (ANSI/ASQC, 1994). BPJ will be used in the field to evaluate whether measurements are made and physical samples collected in such a manner that the resulting data appropriately reflect the environment or condition being measured or studied. Sample selection and use of approved/documented analytical methods will control, to the greatest extent possible, the degree to which the measurement data represent the conditions at the investigation site.

An important DQO for the analytical program is to obtain, to the maximum extent practicable, reporting limits at or below the applicable and relevant regulatory criteria for the pollutants being measured. To meet this DQO, the analytical method and reporting limits are below the relevant regulatory criteria for assessment of aquatic health. The purpose of this comparison is to establish that the reporting limits of the analytical techniques used to measure pollutants are sufficiently low to conclude that a non-detect is below the applicable and relevant criteria. As presented in Table 11 through Table 16 the method detection limits are below the SWAMP reporting limits and preliminary benchmarks in accordance with the DQOs.

ELEMENT 8.0 SPECIAL TRAINING NEEDS/CERTIFICATION

Specialized Training or Certifications

Field Sampling

Field personnel have current and relevant experience in the aspects of standard field monitoring, including use of relevant field equipment (e.g., field instruments, surveying equipment, and monitoring equipment). Training will be reviewed in proper field sampling and sample handling techniques prior to wet weather sampling, and only those staff with proficiency will be permitted to conduct field work. These techniques will be reviewed prior to each sampling event. Field personnel are trained and have experience in collection, handling/storage, and chain-of-custody (COC) procedures.

Analytical Laboratory

The WESTON Toxicology Laboratory is accredited by the California Department of Health Services ELAP for the analyses of Whole Effluent Toxicity of Wastewater (ELAP Certificate #2613).

CRG is accredited by the California Department of Health Services ELAP for the analyses of inorganic and organic chemical constituents in wastewater (ELAP Certificate #2261)

Training and Certification Documentation

All personnel are responsible for complying with the QA/QC requirements that pertain to their organizational/technical function. Each technical staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of his/her particular function and a general knowledge of laboratory operations, test methods, QA/QC procedures, and records management.

Field Sampling

The WESTON Project Manager will be responsible for ensuring properly trained field personnel are available and training records are kept up to date. Field personnel training will be documented and records will be kept in the project's files at WESTON's offices.

Analytical Laboratory

The Bioassay Laboratory training program begins with reviewing the Standard Operating Procedure (SOP) for a new task. The Laboratory Manager or a Senior Laboratory Technician demonstrates the procedure to the trainee, shows the appropriate steps in the SOP, and explains the significance of each step. The trainee later performs the procedure under the supervision of the Laboratory Manager or Senior Laboratory Technician. At this time, questions are answered and parts of the procedure may be demonstrated again to the trainee. The trainee continues to work under the direct supervision until he/she can demonstrate the procedure with competence and full understanding. This process may be short or long depending on the procedure. Once the trainee has demonstrated competence, the Laboratory Manager completes a Training form. At this time the employee can work without supervision. This documentation is kept in files organized by individual with a separate form for each task.

Training Personnel

The Project Manager will verify that training is provided for field personnel in proper field sampling techniques prior to work initiation to ensure that consistent and appropriate sampling, sample handling/storage, and COC procedures are followed.

ELEMENT 9.0 DOCUMENTS AND RECORDS

WESTON will document and track aspects of the sample collection process, including generating field logs (Appendix B-1) at each site and COC forms for all samples collected. COC forms will accompany water samples to the analytical laboratory. WESTON's laboratory will perform all toxicity testing. The laboratory will document and track all aspects of sample receipt and storage, analyses, and reporting.

WESTON will maintain a database of information collected in this project. After verification and final database establishment, the raw data files and databases will be copied onto compact disk (CD) for storage on site. All original data sheets, all statistical worksheets, and all reports produced will be accumulated into project-specific files maintained in file cabinets at the WESTON office after the report has been submitted. Final report text and tables are also stored on disk. After data submissions, directories are archived on tape for storage off site. In-house copies of data files are made on CD when submitted. Records will be maintained for at least five years or transferred according to agreement between the company and the client, should the laboratory transfer ownership. All records and analyses pertaining to accreditation are kept for a minimum of five years. If there is a change in company ownership, accreditation records for at least the previous five years must be transferred to the new owner.

WESTON analytical results will be stored in a database system at the laboratory's main office and will be provided to Project Manager electronically and/or by hard copy. Data received from outside contractors shall be kept exactly as received (electronically); data is error checked and processed into WESTON database system.

Persons responsible for maintaining records for this project are as follows: Mr. Renfrew, Project Manager, will oversee the operations of the project, will arbitrate any issues relative to records retention and any decisions to discard records, and will maintain all sample collection, sample transport, COC, and field analyses forms; the laboratory managers will maintain all toxicity and chemistry records; and Ms. Crumpacker, Data Manager, will maintain the data.

Copies of this QAPP will be distributed to the lead contact of the City of San Diego. Updates to this QAPP will be distributed in like manner, and all previous versions will be discarded from the project file.

Copies of the final report, including laboratory results and field records, will be maintained for a minimum of five years after project completion.

GROUP B:
DATA GENERATION AND ACQUISITION

ELEMENT 10.0 SAMPLING PROCESS DESIGN

Station Locations

Sampling locations for the Chollas Creek WER study are presented in Table 8 and shown in Figure 5. This study will be conducted at two sites, SD8(1) and DPR2. These two points are the compliance monitoring points for the Dissolved Copper, Lead, and Zinc TMDL.

Table 8. Sample Locations within Chollas Creek

SITE	LOCATION	LATITUDE	LONGITUDE
SD8(1)	Chollas Creek North Fork	32.70493	-117.12132
DPR2	Chollas Creek South Fork	32.69227	-117.11232

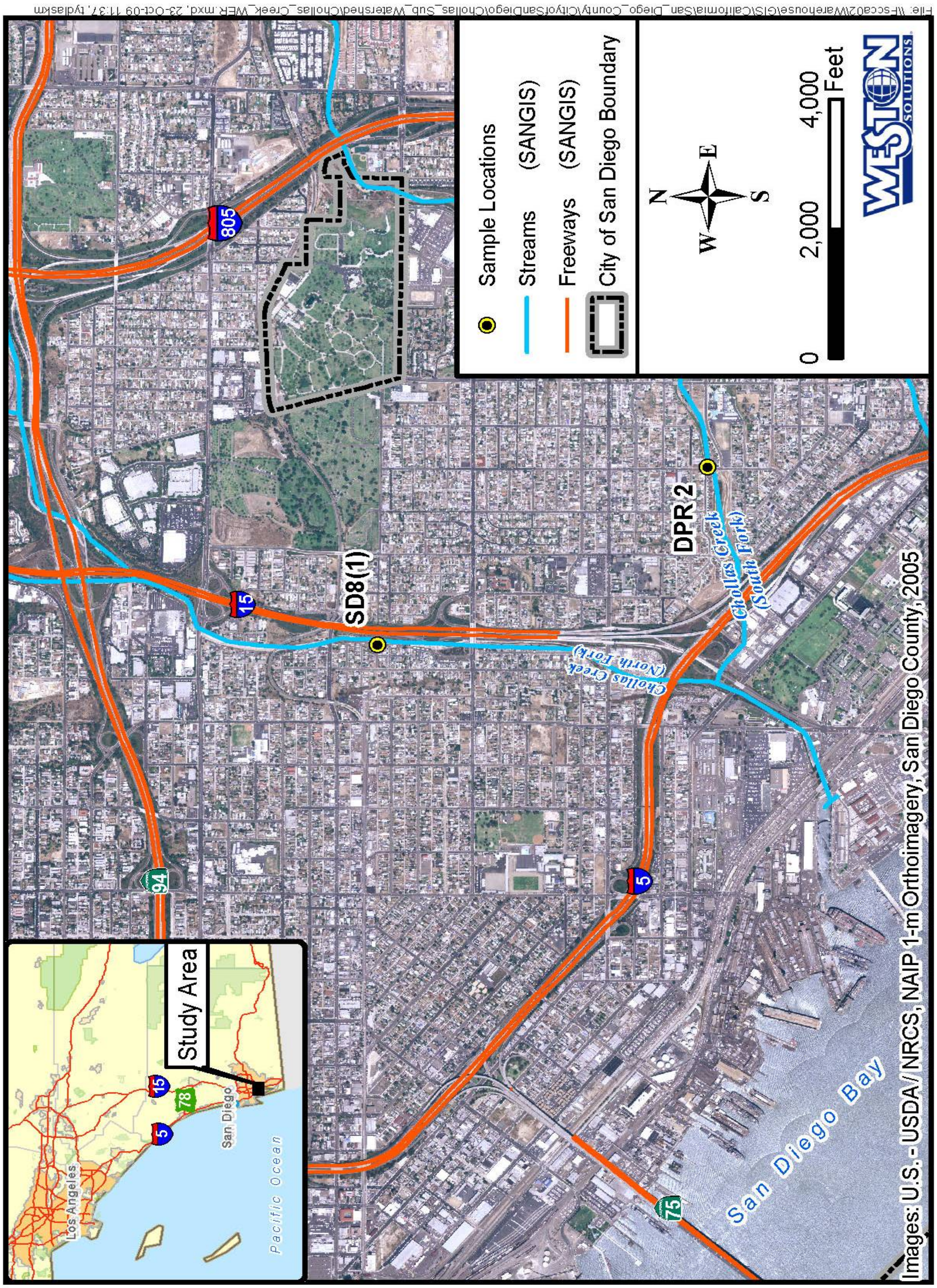


Figure 5. Sampling Locations on the North and South Forks of Chollas Creek.

Wet Weather Sampling

WESTON will conduct three wet weather monitoring events during the 2010 Wet Weather Monitoring Season at two locations in Chollas Creek, presented in Table 8. Samples will be collected during one or two low-flow events and one or two high-flow events at each of the sites. Criteria for wet weather events include a minimum of 72 hours of antecedent dry weather and a minimum of 0.10 inch of rain forecasted within the runoff area. The low-flow event will be defined as a storm event between 0.10 inch and 0.50 inch of precipitation and when the flow rate is greater than 20 cfs and less than 100 cfs. The high flow event will be defined as a storm event between 0.20 inch and up to 2.0 inches of precipitation and when the flow rate is greater than 500 cfs. Samples will be collected as flow-weighted composites on the rising limb of the storm event to ensure adequate metals concentrations are present in the sample for a minimum duration of up to 8 hours.

Flow monitoring will be conducted for the duration of the monitoring event and will be logged at five-minute intervals. Flow monitoring will be initialized one hour before rainfall to capture the base flow condition and will continue until the flow rate returns to within 10% of the base flow or for five days maximum. Rainfall data will be collected onsite with rain gauges for the duration of the monitoring event.

Prior to the three wet weather monitoring events described above, an additional monitoring event will be conducted at one location on Chollas Creek. Samples will be collected according to the same procedures described above and be used for rangefinder testing.

Flow Monitoring

Estimates of continuous flow at each site will be made using a Sigma 950 Flowmeter with a pressure/level transducer or bubbler, depending on site conditions. The water level (stream stage) sensor will be secured to the bottom of the channel at each sampling location. These measurements will be downloaded after a sampling event and will be verified to ensure accuracy. The flowmeter will convert the level data using the head/flow equations developed from the stream survey and stream rating. Level and flow data will then be entered into the data management system. All flow data are copied and archived.

To quantify flow rates based on stream stage, a relationship between flow and stage will be derived using standardized stream rating protocols developed by the USGS (Rantz, 1982). Instantaneous flow measurements will be taken at base flow stages at each site. The measurements will be combined with site-specific survey information to produce a rating curve for the site.

To accurately measure flow in streams, there are three critical elements needed to develop rating curves, as follows:

- An accurate survey of the stream channel cross section and longitudinal slope,
- Accurate level measurements based on a fixed point, and
- Measurements of velocity and flows at base flow conditions.

Stream Survey

Channel Cross Section—Channel cross-section surveys will be conducted at each monitoring site. The cross-section survey involves placing endpoints at the highest point of the channel on each bank. A tape is then stretched between the endpoints such that the zero end of the tape is attached to the endpoint on the left bank of the channel (looking downstream). Channel depth is measured by holding a stadia rod vertical and level from the channel bottom to the stretched tape. The channel depth measurements are recorded incrementally at equal horizontal distances across the channel for a minimum of 20 measurements.

Channel Slope—Using a DeWalt^{TM} Model DW092 transit level, a minimum of three elevations at increasing horizontal distances from the transit level will be recorded in the channel bed. A minimum of five elevations will be measured at sites with irregularly sloped or curved channel surfaces. The average channel slope will be calculated from the survey data.

Stream Rating—To measure instantaneous flow during base flow conditions, a Marsh-McBirney Model 2000 Portable Flowmeter connected via a cable to an electromagnetic open-channel velocity sensor will be used. The velocity sensor is attached to a stainless-steel, top-setting wading rod. To make an instantaneous flow measurement, a tape measure is stretched across the stream, perpendicular to flow, and is secured on both banks of the stream. The tape is positioned suspended approximately 1 ft above the surface of the water. The distance on the tape directly above the waterline (where the water meets the bank) is recorded as the initial point. The first measurement is then made at the first point where there was adequate depth and measurable velocity. At this point, three measurements are made: water depth, velocity, and distance from the bank (i.e., the initial point). Subsequent depth, velocity, and distance measurements are made incrementally across the entire width of the channel so that a minimum of 20 points are measured at the site. Water depth is determined from calibrations on the wading rod in tenths of feet. Velocity measurements are made at each point along the transect by positioning the velocity sensor perpendicular to flow at 60% of the water depth (from the surface) to attain an average velocity. The top-setting wading rod is designed so the sensor can be conveniently positioned at the appropriate depth. Water velocity is measured in feet per second.

Data from the field measurements are entered into a computer spreadsheet that calculates the stream's cross-sectional profile from the depth and distance-from-bank measurements. Total flow across the channel is determined by integrating the velocity measurements over the cross-sectional surface area of the stream channel. The result is an instantaneous flow measurement in cubic feet per second.

Rating Curve

A rating table or curve is a relationship between stage (water level) and flow at a cross section of a river and reflects the particular geometry of the given cross section. The channel survey data will be used with a Manning's Equation to produce a rating curve for each sampling site. Each rating curve is calibrated using instantaneous flow measurements by adjusting the formula roughness coefficient.

Rating curves will be modeled using site-specific survey information with Manning's Equation as defined by the USGS (Rantz, 1982). Using the direct measures of stream discharge collected during the base flow conditions, indirect stream discharge measurements were calculated during wet weather events using Manning's Equation. Manning's Equation is an empirical formula for open channel flow or for flow driven by gravity:

$$Q = VA = \left(\frac{1.49}{n}\right)AR^{\frac{2}{3}}\sqrt{S}$$

where

Q = Flow
n = Manning Roughness coefficient
A= Cross-sectional area
R = Hydraulic radius
S = Hydraulic slope

The hydraulic radius is derived as:

$$R = A/P$$

where

A = Cross-sectional area of flow (ft^2)
P = Wetted perimeter (ft)

The Manning's Equation was developed for conditions of uniform flow in which the water surface profile and energy gradient are parallel to the streambed and the area, hydraulic radius, and depth remain constant throughout the reach. Field surveys of the channel cross section and the channel geometry of each site were conducted to compute the channel characteristics for each monitoring site.

ELEMENT 11.0 SAMPLING METHODS

Water Sampling

Water Sample Collection for Chemistry Analyses

Water samples will be collected with a Sigma 900MAX or SD900 autosampler. An instream strainer and Teflon tubing will be installed to collect samples from the thalweg prior to the monitoring event. The autosampler, using a peristaltic pumping mechanism, will collect 1-L aliquots at a rate dependant on flow, and deposit them into pre-cleaned borosilicate glass 19-L bottles. These bottles will be kept on ice for the duration of the monitoring event and the bottles will be replaced during the monitoring event by field teams as they reach capacity. At the end of the monitoring event, the 19-L bottles will transported to WESTON's in-house laboratory where the sample bottles will be composited and subsampled for delivery to the analyzing laboratories.

Water Sample Collection for Toxicity Analysis

Water samples will be collected with a Sigma 900MAX or SD900 autosampler. An instream strainer and Teflon tubing will be installed to collect samples from the thalweg prior to the monitoring event. The autosampler, using a peristaltic pumping mechanism, will collect 1-L aliquots at a rate dependant on flow, and deposit them into pre-cleaned borosilicate glass 19-L bottles. These bottles will be kept on ice for the duration of the monitoring event and the bottles will be replaced during the monitoring event by field teams as they reach capacity. At the end of the monitoring event, the 19-L bottles will transported to WESTON's in-house laboratory where the sample bottles will be composited and subsampled for delivery to the analyzing laboratories.

Visual Observations

In addition to flow measurements and water sample collection, field personnel will collect visual observational data, including photographic records of the sampling locations and records of the water appearance, odor, color, clarity, floatables, deposits, vegetation, biology, and flow conditions.

Field Water Quality Parameters

Water quality parameters will be collected by the field team once during the monitoring event. Measurements for pH, temperature, and conductivity will be done with an Oakton Waterproof pH/COND/temperature meter. The field team will collect these measurements during the peak of the hydrograph, if possible, and record them in triplicate.

Table 9. Water Sample Volume, Container, and Preservation.

Analysis	Volume (mL)	Container	Preservative	Filtering Required
Field Measurements				
pH	In situ			
Temperature	In situ			
Conductivity	In situ			
Water				
Total Suspended Solids	1000	HDPE	Cool to 4°C	no
Total Dissolved Solids				
Total Organic Carbon	250	Amber Glass	Cool to 4°C; H3PO4	no
Dissolved Organic Carbon	250	Amber Glass	Cool to 4°C	yes*
Ammonia	250	Amber Glass	Cool to 4°C; H2SO4	no

Analysis	Volume (mL)	Container	Preservative	Filtering Required
Chloride	500	HDPE	Cool to 4°C	no
Alkalinity				
Sulfate				
Total Hardness	1000	HDPE	Cool to 4°C; HNO3**	no
Total Calcium				
Total Magnesium				
Total Sodium				
Total Potassium				
Total Copper				
Total Lead				
Total Zinc				
Dissolved Calcium			Cool to 4°C	yes*
Dissolved Magnesium				
Dissolved Sodium				
Dissolved Potassium				
Dissolved Copper				
Dissolved Lead				
Dissolved Zinc				
Organophosphorus Pesticides	6 X 1000	6 Amber Glass	Cool to 4°C	no
Organochlorine Pesticides				
PCB Congeners				
Synthetic Pyrethroids				
PAHs				
48-Hour *C. dubia* Test	10000	LDPE Cubitainer	Cool to 4°C	no

*For dissolved analysis, filtering will occur in laboratory upon receipt.
**Total metals and hardness will be acidified in the laboratory at CRG.

ELEMENT 12.0 SAMPLE HANDLING CUSTODY

Water Quality Samples

Chemistry and toxicity samples will be uniquely identified with sample labels in indelible ink. All sample containers are identified with the project title, appropriate identification number, date and time of sample collection, and preservation method. All samples will be kept on ice from the time of sample collection until delivery to the analytical laboratory. All samples will be transferred to the appropriate laboratory within the method specified holding time (Table 10).

Water chemistry samples will be delivered to CRG by WESTON staff or CRG staff. Water toxicity samples will be delivered to the WESTON Bioassay Laboratory by WESTON staff.

Table 10. Sample Holding Times

Analyte	Holding Time
Field Measurements	
pH	-
Temperature	-
Conductivity	-
Water	
Total Suspended Solids	7 days
Total Organic Carbon	28 days
Dissolved Organic Carbon	24 hrs
Total Dissolved Solids	7 days
Ammonia	28 days
Chloride	28 days
Total Hardness	180 days
Alkalinity	14 days
Total Calcium	24 hrs
Dissolved Calcium	24 hrs
Total Magnesium	24 hrs
Dissolved Magnesium	24 hrs
Total Sodium	24 hrs
Dissolved Sodium	24 hrs
Total Potassium	24 hrs
Dissolved Potassium	24 hrs
Sulfate	24 hrs
Total Copper	180 days
Dissolved Copper	48 hrs
Total Lead	180 days
Dissolved Lead	48 hrs
Total Zinc	180 days
Dissolved Zinc	48 hrs
Organophosphorus Pesticides	7/40 days
Organochlorine Pesticides	7/40 days
PCB congeners	7/40 days

Analyte	Holding Time
Synthetic Pyrethroids	4/40 days
PAHs	7/40 days
C. dubia-48-hour acute test	36 hours

Chain-of-Custody Procedures

All samples are delivered to the laboratory, and analysis is begun as quickly as possible and within the method recommended holding time. COC forms (Appendix B-2) are completed by the sampler for all samples and analytes. COC forms include the following:

- Sample identifier.
- Sample collection date and time.
- Any special notations on sample characteristics or analysis.
- Initials and full name of the person collecting the sample.
- Date the sample was delivered to the analytical laboratory.
- Shipping company and waybill information, if applicable.

Completed COC forms will be placed in a plastic envelope and will be kept inside the same container as the sample. Once delivered to the laboratories, the COC form will be signed by the person receiving the samples. The condition of the samples will be noted and recorded by the receiver. COC records will be included in the final reports prepared by the analytical laboratories and are considered an integral part of the report.

Upon delivery to the laboratory, the Laboratory Manager will inspect the condition of the samples and will reconcile the label information to the COC form. The time of sample collection is noted, and the samples are stored at the appropriate temperature until analysis is begun. At this point, the laboratory has become responsible for sample custody.

Disposal

Upon completion of analysis, any remaining sample material will be stored until the holding time expires. At that point, samples will be disposed of.

ELEMENT 13.0 ANALYTICAL METHODS

The analytical methods for constituents analyzed in a laboratory are listed in Table 11. The specific analyte lists, method detection limits, and reporting limits for organics are presented separately in Table 12, Table 13, Table 14, Table 15, and Table 16.

Table 11. Laboratory Analytical Methods and Detection Limits

Analyte	Method	Method Detection Limit	Reporting Limit	Units
Field Measurements				
pH	YSI Sonde	NA	NA	pH units
Temperature	YSI Sonde	NA	NA	°C
Conductivity	YSI Sonde	NA	NA	mS/cm
Chemistry Laboratory Measurements				
Total Suspended Solids	SM 2540-D	0.5	5	mg/L
Total Organic Carbon	USEPA 415.1	0.1	0.2	mg/L
Dissolved Organic Carbon	USEPA 415.1	0.1	0.2	mg/L
Total Dissolved Solids	SM 2540-C	0.1	5	mg/L
Ammonia	SM 4500-NH3-F	0.03	0.03	mg/L
Chloride	SM 4500-Cl E	0.01	0.05	mg/L
Total Hardness	SM 2340-B	1	5	mg/L
Alkalinity	USEPA 310.2	1	5	mg/L
Total Calcium	USEPA 200.8	0.05	0.1	mg/L
Dissolved Calcium	USEPA 200.8	0.05	0.1	mg/L
Total Magnesium	USEPA 200.8	0.05	0.1	mg/L
Dissolved Magnesium	USEPA 200.8	0.05	0.1	mg/L
Total Sodium	USEPA 200.8	5	10	mg/L
Dissolved Sodium	USEPA 200.8	5	10	mg/L
Total Potassium	USEPA 200.8	5	10	mg/L
Dissolved Potassium	USEPA 200.8	5	10	mg/L
Sulfate	SM 4500-SO4-E	0.01	0.01	mg/L
Total Copper	USEPA 200.8	0.4	0.8	ug/L
Dissolved Copper	USEPA 200.8	0.4	0.8	ug/L
Total Lead	USEPA 200.8	0.05	0.1	ug/L
Dissolved Lead	USEPA 200.8	0.05	0.1	ug/L
Total Zinc	USEPA 200.8	0.1	0.5	ug/L
Dissolved Zinc	USEPA 200.8	0.1	0.5	ug/L
Organophosphorus Pesticides	USEPA 625	Varies per analyte		ng/L
Organochlorine Pesticides	USEPA 625	Varies per analyte		ng/L
PCB congeners	USEPA 625	Varies per analyte		ng/L
Synthetic Pyrethroids	USEPA 625-NCI	Varies per analyte		ng/L
PAHs	USEPA 625	Varies per analyte		ng/L
Toxicology Laboratory Measurements				
C. dubia-48-hour acute test	USEPA (2002)	NA	NA	NA

Table 12. Analyte List for Organophosphorus Pesticides According to Method USEPA 625

Analyte	Method Detection Limits	Reporting Limits	Units
Azinphos-methyl (Guthion)	10	100	ng/L
Bolstar (Sulprofos)	2	4	ng/L
Chlorpyrifos	1	2	ng/L
Demeton	1	2	ng/L
Diazinon	2	4	ng/L
Dichlorvos	3	6	ng/L
Dimethoate	3	6	ng/L
Disulfoton	1	2	ng/L
Ethoprop (Ethoprofos)	1	2	ng/L
Ethyl Parathion	10	20	ng/L
Fenchlorophos (Ronnel)	2	4	ng/L
Fenitrothion	10	100	ng/L
Fensulfothion	1	2	ng/L
Fenthion	2	4	ng/L
Malathion	3	6	ng/L
Merphos	1	2	ng/L
Methamidophos (Monitor)	50	100	ng/L
Methidathion	10	20	ng/L
Methyl Parathion	1	2	ng/L
Mevinphos (Phosdrin)	8	16	ng/L
Phorate	6	12	ng/L
Phosmet	50	100	ng/L
Tetrachlorvinphos (Stirofos)	2	4	ng/L
Tokuthion	3	6	ng/L
Trichloronate	1	2	ng/L

Table 13. Analyte List for Organochlorine Pesticides According to Method USEPA 625

Analyte	Method Detection Limits	Reporting Limits	Units
2,4'-DDD	1	5	ng/L
2,4'-DDE	1	5	ng/L
2,4'-DDT	1	5	ng/L
4,4'-DDD	1	5	ng/L
4,4'-DDE	1	5	ng/L
4,4'-DDT	1	5	ng/L
Aldrin	1	5	ng/L
BHC-alpha	1	5	ng/L
BHC-beta	1	5	ng/L
BHC-delta	1	5	ng/L
BHC-gamma (Lindane)	1	5	ng/L
Chlordane-alpha (Chlordane-cis)	1	5	ng/L
Chlordane-gamma (Chlordane-trans)	1	5	ng/L
DCPA (Dacthal)	5	10	ng/L
Dicofol	50	100	ng/L

Analyte	Method Detection Limits	Reporting Limits	Units
Dieldrin	1	5	ng/L
Endosulfan Sulfate	1	5	ng/L
Endosulfan-I	1	5	ng/L
Endosulfan-II	1	5	ng/L
Endrin	1	5	ng/L
Endrin Aldehyde	1	5	ng/L
Endrin Ketone	1	5	ng/L
Heptachlor	1	5	ng/L
Heptachlor Epoxide	1	5	ng/L
Methoxychlor	1	5	ng/L
Mirex	1	5	ng/L
Nonachlor-cis	1	5	ng/L
Nonachlor-trans	1	5	ng/L
Oxychlordane	1	5	ng/L
Perthane	5	10	ng/L
Toxaphene NCI-GCMS	10	50	ng/L

Table 14. Analyte List for PCB Congeners According to Method USEPA 625

Analyte	Method Detection Limits	Reporting Limits	Units
PCB003	1	5	ng/L
PCB008	1	5	ng/L
PCB018	1	5	ng/L
PCB028	1	5	ng/L
PCB031	1	5	ng/L
PCB033	1	5	ng/L
PCB037	1	5	ng/L
PCB044	1	5	ng/L
PCB049	1	5	ng/L
PCB052	1	5	ng/L
PCB056/60	1	5	ng/L
PCB066	1	5	ng/L
PCB070	1	5	ng/L
PCB074	1	5	ng/L
PCB077	1	5	ng/L
PCB081	1	5	ng/L
PCB087	1	5	ng/L
PCB095	1	5	ng/L
PCB097	1	5	ng/L
PCB099	1	5	ng/L
PCB101	1	5	ng/L
PCB105	1	5	ng/L
PCB110	1	5	ng/L
PCB114	1	5	ng/L
PCB118	1	5	ng/L
PCB119	1	5	ng/L
PCB123	1	5	ng/L

Analyte	Method Detection Limits	Reporting Limits	Units
PCB126	1	5	ng/L
PCB128	1	5	ng/L
PCB138	1	5	ng/L
PCB141	1	5	ng/L
PCB149	1	5	ng/L
PCB151	1	5	ng/L
PCB153	1	5	ng/L
PCB156	1	5	ng/L
PCB157	1	5	ng/L
PCB158	1	5	ng/L
PCB167	1	5	ng/L
PCB168+132	1	5	ng/L
PCB169	1	5	ng/L
PCB170	1	5	ng/L
PCB174	1	5	ng/L
PCB177	1	5	ng/L
PCB180	1	5	ng/L
PCB183	1	5	ng/L
PCB187	1	5	ng/L
PCB189	1	5	ng/L
PCB194	1	5	ng/L
PCB195	1	5	ng/L
PCB200	1	5	ng/L
PCB201	1	5	ng/L
PCB203	1	5	ng/L
PCB206	1	5	ng/L
PCB209	1	5	ng/L

Table 15. Analyte List for Synthetic Pyrethroids According to Method USEPA 625-NCI

Analyte	Method Detection Limits	Reporting Limits	Units
Allethrin	0.5	2	ng/L
Bifenthrin	0.5	2	ng/L
Cyfluthrin	0.5	2	ng/L
Cyhalothrin-lambda	0.5	2	ng/L
Cypermethrin	0.5	2	ng/L
Danitol (Fenpropathrin)	0.5	2	ng/L
Deltamethrin	0.5	2	ng/L
Esfenvalerate	0.5	2	ng/L
Fenvalerate	0.5	2	ng/L
Fluvalinate	0.5	2	ng/L
Permethrin	5	25	ng/L
Prallethrin	0.5	2	ng/L
Resmethrin	5	25	ng/L

Table 16. Analyte List for PAHs According to Method USEPA 625

Analyte	Method Detection Limits	Reporting Limits	Units
1-Methylnaphthalene	1	5	ng/L
1-Methylphenanthrene	1	5	ng/L
2,3,5-Trimethylnaphthalene (1,6,7-trimethylnaphthalene)	1	5	ng/L
2,6-Dimethylnaphthalene	1	5	ng/L
2-Methylnaphthalene	1	5	ng/L
Acenaphthene	1	5	ng/L
Acenaphthylene	1	5	ng/L
Anthracene	1	5	ng/L
Benz[a]anthracene (1,2-benzanthracene)	1	5	ng/L
Benzo[a]pyrene	1	5	ng/L
Benzo[b]fluoranthene (3,4-benzofluoranthene)	1	5	ng/L
Benzo[e]pyrene	1	5	ng/L
Benzo[g,h,i]perylene (1,12-benzoperylene)	1	5	ng/L
Benzo[k]fluoranthene (11,12-benzofluoranthene)	1	5	ng/L
Biphenyl	1	5	ng/L
Chrysene	1	5	ng/L
Dibenz[a,h]anthracene (1,2,5,6-dibenzanthracene)	1	5	ng/L
Dibenzothiophene	1	5	ng/L
Fluoranthene	1	5	ng/L
Fluorene	1	5	ng/L
Indeno[1,2,3-c,d]pyrene	1	5	ng/L
Naphthalene	1	5	ng/L
Perylene	1	5	ng/L
Phenanthrene	1	5	ng/L
Pyrene	1	5	ng/L

Physical and Chemical Analyses

All analytical methods used to obtain chemical concentrations will follow USEPA or Standard Methods (SM) (American Public Health Association [APHA], 1998). A summary of analytical methods and laboratory procedures is presented below.

The analyses of trace metals (copper, lead, zinc) and cations (calcium, magnesium, sodium, potassium) will be conducted using an inductively coupled plasma emissions spectrometer equipped with a mass detector (ICP-MS) after acid solubilization in accordance with USEPA 200.8. For the determination of dissolved metal analytes, aqueous samples will be filtered through a 0.45 μm membrane prior to acid solubilization and analysis by USEPA 200.8. Trace organics (polycyclic aromatic hydrocarbons [PAHs], synthetic pyrethroids, organophosphorus pesticides, organochlorine pesticides, and polychlorinated biphenyl [PCB] congeners) in water will be analyzed using gas chromatography and mass spectrometry (GC-MS) in accordance with USEPA Method 625 following serial liquid-liquid extraction with methylene chloride.

Solids will be measured by glass fiber filtration of water samples, where the nonfilterable residue is dried to a constant at 103-105°C and quantified as total suspended solids (TSS) in accordance with SM 2540-D. The filtrate will be evaporated to a constant dryness at 180°C and quantified as TDS in accordance with SM 2540-C. Organic carbon will be measured by catalytic combustion or wet chemical oxidation as total organic carbon (TOC) in accordance with USEPA 415.1. For the determination of dissolved organic carbon (DOC), aqueous samples will be filtered through 0.45 µm prior to analysis by USEPA 415.1. Ammonia will be measured by the spectrophotometric phenate method in accordance with SM 4500-NH_3 F. Chloride will be measured by the automated ferricyanide method in accordance with SM 4500-Cl E. Sulfate will be measured using the turbimetric method in accordance with 4500-SO_4^{2-} E. Total hardness will be determined by calculation using concentrations of calcium and magnesium determined by ICP-MS. Alkalinity will be measured by autoanalyzer in accordance with USEPA 310.2.

Bioassay Testing

To establish the WER for Chollas Creek, bioassay tests will be conducted using *C. dubia* in accordance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition* (USEPA, 2002).

Prior to conducting the WER study, WESTON will first determine the appropriate range of metal concentrations to use in toxicity tests. To do this, range-finder toxicity tests will be performed. Results of the rangefinder tests will be used to determine a more precise range of concentrations for the actual WER testing and should result in a more accurate calculation of the LC_{50} and the associated WERs. Test concentrations will be prepared by spiking both laboratory and site water with known concentrations of reagent-grade ionic metal salt solutions. Multiple (at least six including a control) metal concentrations will be performed for each test. The chemical forms of metals used in the rangefinder and all other bioassay testing will be copper sulfate, lead nitrate, and zinc sulfate; all relatively soluble forms of these metals that are similar to the metal salts used in the USEPA's criteria development.

The 48-hour acute bioassays with *C. dubia* will be conducted in accordance with USEPA procedures (2002). Testing will be initiated within 36 hours of sample collection. During each flow event, five *C. dubia* will be exposed for 48 hours to a control and seven concentrations of copper, lead, and zinc (separately) dissolved in dilution water and water from the north and south forks of Chollas Creek (Sites SD8[1] and DPR2, respectively). The control and each concentration will contain four replicates. Water quality will be conducted daily and include dissolved oxygen (DO), temperature, hydrogen ion concentration (pH), and salinity. Test conditions are summarized in Table 17. After 48 hours, percent survival will be calculated. The test will be considered acceptable if 90% or greater of the test organisms survive in the controls.

A 48-hour reference toxicity test will be conducted concurrently with the WER study to evaluate the relative sensitivity of test organisms. The reference toxicant test will be performed using copper sulfate at concentrations of 3, 6, 12, 24, and 48 µg/L. At test termination, the LC_{50} will be calculated and compared to historical laboratory reference toxicant test data for this species.

Table 17. Conditions for the 48-Hour Bioassay with *Ceriodaphnia dubia*

Test Conditions 48-Hour Acute Bioassay	
Test Species	***Ceriodaphnia dubia***
Test Procedures	USEPA (2002)

Table 17. Conditions for the 48-Hour Bioassay with *Ceriodaphnia dubia*

Test Conditions		
48-Hour Acute Bioassay		
Age/Size Class		Less than 24 hours
Test Type/Duration		Acute static non-renewal /48-hours
Sample Storage Conditions		4°C, dark, minimal head space
Holding Time		36-hours
Control Water Source		Synthetic water, modified to reflect receiving water hardness
Recommended Water Quality Parameters	Temperature	20 ± 1°C
	Dissolved Oxygen	≥ 4.0 mg/L
	pH	6.0 – 9.0
Photoperiod		16 hours light, 8 hours dark
Test Chamber		100 mL
Concentrations		7 and a control for each metal based on the results of the rangefinder tests
Replicates/Sample		4
No. of Organisms/Replicate		5
Exposure Volume		50 mL
Aeration		None, unless DO falls below 4.0 mg/L (head space aeration)
Feeding		*Selenastrum* and cereal leaf extract *ad libitum* at least two hours prior to test initiation
Water Renewal		None
Test Acceptability Criterion		90% or greater survival in controls

ELEMENT 14.0 QUALITY CONTROL

Water Quality Samples

QC for sampling processes begins with proper collection of the samples to minimize the possibility of contamination or sample bias. All water samples are collected in laboratory-certified, contaminant-free bottles.

Field blanks will be collected at a rate of one sample per sampling event. Field blanks are check samples that monitor contamination originating from the collection, transport, or storage of environmental samples. A field blank is analyte-free water poured into the sample collection device and subsampled for analyses to verify that procedures are adequate and sample handling and transportation does not introduce any analytes of interest. Field blanks will be collected and analyzed for the analytes listed in Table 11.

Once samples are at the laboratory, each laboratory will follow their internal ELAP-approved QC procedures. The labs will also follow the method required minimum QC samples.

ELEMENT 15.0 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Field Sampling

Prior to each wet weather event, field sampling equipment will be checked for proper operation. This responsibility will be overseen by the Field Team Leader or the QC Officer. Field scientists will be responsible for preparing sampling kits, including field logs, COC forms, sample labels, sampling bottles, decontamination equipment, and tools. Field measurement equipment will be checked for operation in accordance with manufacturer specifications. Equipment will be inspected for damage upon delivery by the supplier, when first deployed, and when returned from use. Spare parts will be sourced from the manufacturer or a certified supplier and will be stored in equipment lockers to be transported during installation and maintenance. The Project Manager will be responsible for implementing the field maintenance program. Instrumentation malfunctions are immediately noted in the instrument logbook, and the Project Manager is notified. Senior technical staff with specific in-depth knowledge of the particular instrument will then review the problem and attempt to fix the instrument. Major problems may require trained field service personnel and/or spare parts from the manufacturer. If a critical measurement is found to be out of compliance during analysis, the results of that analysis will not be reported, corrective action will be taken and documented, and the analysis will be repeated. Effectiveness of the corrective action will be assessed by repeating the measurement, recording the corrected result, and documenting the chain of events and actions taken in field logs.

Analytical Laboratory

WESTON’s Bioassay Laboratory maintains its equipment in accordance with its SOPs which include those specified by the equipment manufacturer and those specified by the method. WESTON’s Bioassay QAPP specifies equipment and system evaluations (Appendix B-3).

CRG maintains its equipment in accordance with its SOPs which include those specified by the manufacturer and those specified by the method. CRG’s QAPP specifies equipment and system evaluations (Appendix B-4). CRG’s QAPP has been reviewed by WESTON’s QA Officer and was found to be in compliance with SWAMP criteria.

ELEMENT 16.0 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

The equipment and instruments used at WESTON are operated and calibrated according to manufacturer recommendations as well as according to criteria defined in individual SOPs. Operation and calibration are performed by properly trained personnel. Documentation of routine and special calibration information is recorded in appropriate logbooks and reference files. If a critical measurement is found to be out of compliance during analysis, the results of that analysis will not be reported, corrective action will be taken and documented, and the analysis will be repeated.

Field Equipment

Calibration for the Oakton Waterproof pH/COND meter is done prior to each monitoring event. Prior to calibration, a calibration drift analyses will be conducted. If equipment is found to be out of calibration, it will be replaced immediately.

The Sigma 950 flowmeters are calibrated during the installation of the flow monitoring equipment. Level adjustments are needed to calibrate the pressure sensors. A measuring tape is used to measure the water level, and the level adjustment is made. Velocity measurements are factory calibrated, and only the direction of velocity is required to be adjusted. The volume calibrations for the Sigma 900MAX or SD900 autosamplers are also done during the installation of the equipment.

Analytical Laboratory

WESTON's Bioassay Laboratory calibrates its instrumentation as per certification requirements and at a frequency that ensures the validity of the results. WESTON's calibration procedures follow USEPA guidelines and instrument manufacturer recommendations. WESTON's Bioassay QAP specifies equipment and system evaluations (Appendix B-3) and provides information on WESTON's calibration procedure.

CRG calibrates its instrumentation at a frequency that ensures the validity of the results. CRG's calibration procedures follow USEPA guidelines and instrument manufacturer recommendations. Section 7 of CRG's QAPP (Appendix B-4) provides detailed information on CRG's calibration procedure.

ELEMENT 17.0 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

It is the duty of each staff member responsible for equipment ordering to inspect equipment and materials for quality and report any equipment or materials that do not meet acceptance criteria to the appropriate Laboratory Manager and/or QA Officer. Upon receipt of materials or equipment, a designated employee receives and signs for the materials. The items are reviewed to ensure the shipment is complete, and they are then delivered to the proper storage location. Chemicals are dated upon receipt. Supplies are stored appropriately and are discarded on expiration date. The equipment and supplies purchased for use in field sampling activities will be inspected for damage as they are received. Confirmation that sample bottles are laboratory-certified clean will be made when received.

Critical Supplies and Consumables

Toxicology Sample Bottles

Toxicology sample bottles will be provided by the WESTON's Bioassay Laboratory. They will be stored at WESTON's laboratory and cleaned in accordance with WESTON's Bioassay Laboratory SOP and USEPA guidelines prior to use in the field. The Bioassay Laboratory Manager will oversee this element.

Chemistry Sample Bottles

Chemistry sample bottles will be provided by CRG. They will be shipped to and stored at WESTON's laboratories prior to use in the field. Confirmation that sample bottles are laboratory-certified clean will be made upon receipt from CRG. The Field Task Leader will oversee this element.

Analytical Laboratory

Equipment and material specifications used by WESTON's Bioassay Laboratory are outlined in the laboratory's SOPs and policies (Appendix B-3). Critical supplies and consumables will be overseen by the Bioassay Laboratory Supervisor.

Equipment and material specifications used by CRG are outlined in the laboratory's SOPs and policies (Appendix B-4). Critical supplies and consumables will be overseen by the Laboratory QA Officer.

ELEMENT 18.0 NON-DIRECT MEASUREMENTS

The data collected from the proposed stations will be reviewed and compared to the DQOs listed in Element 7 and adhere to the same data verification and validation procedures outlined in Element 23.

ELEMENT 19.0 DATA MANAGEMENT

Data will be maintained as described in Element 9. The original data sheets, statistical worksheets, and reports produced will be accumulated into project-specific files maintained in locked file cabinets at WESTON's main office.

The centralized database used by WESTON is written in SQL with a Visual Basic query interface. Data sheets, field observations, and COC information will be detailed in the database based on nomenclature developed specifically for this project. Data entry oversight will be the responsibility of the Data Manager, Ms. Crumpacker.

WESTON will document and track the aspects of the sample collection process, including generating field logs at each site and COC forms for the samples collected. COC forms will accompany water samples to the appropriate laboratory for analysis. CRG will perform the chemistry-related analyses. CRG will document and track the aspects of sample receipt and storage, analyses, and reporting. Further details of CRG's data management protocols can be found in Appendix B-4.

WESTON will maintain a database of information and will maintain control documents collected in this project. The Data Manager, Ms. Crumpacker, will maintain this database. After verification and final database establishment, the raw data files and databases are copied onto CD for storage on site. The original data sheets, statistical worksheets, and reports produced are accumulated into project-specific files that are maintained in locked file cabinets at the WESTON testing facility after the report has been submitted. Final report text and tables are also stored on CD. After data submissions, directories are archived on tape for storage off site. In-house copies of data files are made on CD upon submittal. Records will be maintained for at least five years or transferred according to agreement between the company and the client, should the laboratory transfer ownership. The records and analyses pertaining to accreditation are kept for a minimum of five years. If there is a change in company ownership, accreditation records for at least the last five years must be transferred to the new owner.

CRG's laboratory results will be stored in a database system at CRG's main office and will be provided to WESTON both electronically and by hard copy. Data received from outside contractors are kept exactly as received (on original CD) and are copied onto the hard disk for editing, as needed, based on error checking and verification procedures.

Persons responsible for maintaining project records are as follows:

- Mr. Renfrew, Project Manager, will oversee the operations of the project and will arbitrate any issues relative to records retention and any decisions to discard records and will maintain the sample collection, sample transport, COC, and field analysis forms.
- Ms. Crumpacker, Data Manager, will maintain the database.
- Mrs. Hovel, WESTON's Toxicity Lead, will maintain WESTON"s toxicity data.
- Ms. Burney, CRG's Project Manager, will maintain CRG's records.

Software and hardware purchased from outside sources are of adequate quality to sustain confidence in the management of data. To ensure proper quality, the Data Manager will perform appropriate QC on each software package prior to use. It is the responsibility of each staff person performing electronic data entry, validation, and processing to inspect the hardware and software for quality and to report any equipment or materials that do not meet acceptance criteria to the Data Manager and/or QA Officer.

GROUP C:
ASSESSMENT AND OVERSIGHT

ELEMENT 20.0 ASSESSMENTS AND RESPONSE ACTIONS

Corrective Action Plans

An out-of-control event is defined as any occurrence failing to meet pre-established criteria. A nonconformance is a deficiency in characteristic, documentation, or procedure sufficient to make the quality indeterminate or unacceptable. An out-of-control event is a subcategory of nonconformance.

When either situation is identified, it will be categorized as follows:

- **Deficiency** – Recognition that a specific requirement (e.g., program, process, or procedure) has been violated.

- **Observation** – Recognition of an activity or action that might be improved, but is not in violation of a specific requirement. Left unaddressed, the activity or action might develop into a deficiency.

Criteria Used for Determination of an Out-of-Control Event

Factors that affect data quality (e.g., failure to meet calibration criteria, inadequate recordkeeping, improper storage, or preservation of samples) require investigation and corrective action.

When a nonconformance is recognized, each individual involved with the analysis in question has an interactive role and responsibility. These roles and responsibilities are as follows:

- **Technician** – He/she must be able to recognize non-conformances and immediately notify the Laboratory Manager and work with the QA Officer to solve the problem. Each technician is responsible for documenting and correcting problems that might affect quality.

- **Laboratory Manager** – He/she must review all analytical and QC data for reasonableness, accuracy, and clerical errors. In an out-of-control event, the Laboratory Manager works with the analyst and QA Officer to solve the problem and prevents the reporting of suspect data by stopping work on the analysis in question and ensuring that all results that are suspect are repeated, if possible, after the source of the error is determined and remedied. Clients are notified in writing when their work is affected by an out-of-control event or results of an internal audit. In the event that a QC measure is out-of-control and the data are to be reported, qualifiers are reported together with sample results.

- **QA Officer** – In the event that an out-of-control situation occurs unnoticed at the bench or supervisory level, the QA Officer will notify the Laboratory Manager, will help identify and solve the problem where applicable, will ensure the work is stopped on the analysis, and will verify that no suspect data are reported. The QA Officer must review and approve all corrective action reports and must submit them to the Laboratory Manager for review. The QA Officer is responsible for reviewing nonconformance report forms, recommending or approving proposed corrective actions, and verifying that corrective actions have been completed.

Procedures for Stopping Analyses

Whenever the analytical system is out of control, investigation and correction efforts are initiated by all concerned personnel as outlined in Table 18.

If the problem is instrumental or specific only to preparation of a sample batch, samples are reprocessed after the instrument is repaired and recalibrated.

Corrective Action

The need for corrective action may arise from various possible sources: equipment malfunction, failure of internal QA/QC checks, failure of follow up on performance or system audit findings, or noncompliance with QA requirements.

When measurement equipment or analytical methods fail QA/QC requirements, the problem(s) will immediately be brought to the attention of the Laboratory Manager and QA Officer. Corrective measures will depend entirely on the type of analysis, the extent of the error, and whether the error is determinant or not. The corrective action is determined by the Laboratory Manager, technicians, Project Manager, and QA Officer or by all of them in conference, if necessary; but final approval is the responsibility of the QA Officer and/or Project Manager.

If failure is due to equipment malfunction, the equipment will not be used until repaired. Precision and accuracy will be reassessed, and the analysis will be rerun. All attempts will be made to reanalyze all affected parts of the analysis so that at completion, the product is not affected by failure of QC requirements.

When a result in a performance audit is unacceptable, the laboratory will identify the problem(s) and will implement corrective actions immediately. A step-by-step analysis and investigation to determine the cause of the problem shall take place as part of the corrective action program. If the problem cannot be controlled, the laboratory will analyze the impact on the data. Clients will be notified if their data are affected.

When a system audit reveals an unacceptable performance, work shall be suspended until corrective action has been implemented and performance has been proven to be acceptable.

Table 18. Laboratory Corrective Action Plan for Potential Analytical Problems

Problems in Laboratory Area	Actions To Be Taken
Sample Receipt, Log-In, and Labeling	
Sample containers received broken	Notify Laboratory Manager and Project Manager
Sample cannot be located	Notify Laboratory Manager
Samples received without proper refrigeration or preservation	Notify Project Manager
Illegible sample numbers or label missing from sample containers	Notify Project Manager
No instructions received with samples	Notify Project Manager
Shipment container received damaged upon arrival	Notify Laboratory Manager and Project Manager
COC form does not match information indicated on sample label and containers received	Notify Laboratory Manager and Project Manager
Samples received past the holding time requirement	Notify Project Manager
Sample Refrigeration and Preservation	
No indication on the COC form or sample container that the sample was preserved	Notify Project Manager
Discovery of sample storage (i.e., refrigeration) malfunction	Notify Laboratory Manager and Project Manager
Analytical Method	
If at any time staff is not in agreement with the method to be used or some portion of the method	Notify Laboratory Manager
Sample Preparation	
Loss of sample	Notify Laboratory Manager
Knowledge of a mistake in analysis	Notify Laboratory Manager
Calibration mistake	Notify Laboratory Manager
Storage	
Label(s) have come off the storage container	Notify Laboratory Manager
Standard Preparation	
Doubt as to the purity of the standard material	Notify Laboratory Manager
Question whether standard (stock or working) is expired	Check expiration of the standard if available; if not, check SOP on standard expiration Notify Laboratory Manager
Instrument Analysis	
Blank or reference are out of compliance	Check instrument operating condition Perform corrective maintenance Reanalyze affected samples as necessary
Data Review	
Recovery of material from spiked sample not within the limits set prior to analysis (e.g., outside control chart limits)	Notify Laboratory Manager Check standard solutions Check instrument performance If no explanation, re-prepare and reanalyze QC and affected samples
Data are contrary to that expected (i.e., historical background does not agree)	Notify Laboratory Manager and Project Manager

If an external audit (system or performance) report identifies deficiencies that require corrective action, the QA Officer shall notify the responsible supervisor and shall log pertinent information. The QA Officer and the responsible supervisor will ensure corrective action is taken. The QA Officer shall verify that the problem has been corrected. The Laboratory Manager will transmit the response to the external organization, with copies to the QA file.

All incidents of QA failure and corrective action tasks will be documented, and reports will be placed in the appropriate contract file. Also, corrective action will be taken promptly for deficiencies noted during the spot check of raw data. When corrective actions are implemented, evidence of correction of deficiencies will be presented. Corrective action documentation will be forwarded to the QA Officer and the Project Manager for evaluation and approval.

Documenting Corrective Action

If, at any time during analyses, a process is out of control, corrective action shall be taken and documented with regard to the following:

- What actions were taken to bring the process back into control?
- What actions were taken to prevent recurrence of the out-of-control situation?
- What was done with the data obtained while the process was out of control?

Documentation is accomplished by filling out a corrective action form (Appendix B-5). This form is initiated either by the Laboratory Manager, Project Manager, or QA Officer, depending on where the problem is recognized. The corrective action report will include the following information:

- Nature of the problem.
- Sample lot affected.
- Corrective action measure(s) taken and final resolution of the problem.
- Dates (i.e., date recognized, date occurred, and date corrected).
- Signature of the QA Officer, Project Manager, reporter, and Laboratory Manager.

Field Corrective Action

The initial responsibility for monitoring the quality of field measurements lies with the field personnel. The Field Team Leader or Project Manager is responsible for verifying that all QC procedures are followed. This requires that the Field Team Leader or Project Manager assess the correctness of the field methods and the ability to meet QA objectives and make a value judgment regarding the impact a procedure has upon the field objectives and subsequent data quality. If a problem occurs that might jeopardize the integrity of the project, might cause a QA objective to not be met, or might impact data quality, the Field Team Leader will immediately notify the Project Manager or the QA Officer. Corrective action measures will be decided upon and implemented. The Field Team Leader or Project Manager will document the situation, the field objective affected, the corrective action taken, and the results of that action. Copies of the documentation are provided to the Project Manager and/or the QA Officer.

Complaints

Following submission of reports, it is WESTON's policy to follow up with clients to verify receipt of all deliverables and verify expectations have been met. If a complaint is received regarding the quality of data received, the QA Officer shall promptly audit that area of the laboratory or project service area. Documentation of the complaint, audit, and subsequent activities shall be maintained.

ELEMENT 21.0 REPORTS TO MANAGEMENT

The Project Manager is responsible for preparation and submittal of all project reports. Draft and final reports will be prepared to summarize the data collected for this project.

Table 19 outlines the schedule of reports due to the City of San Diego Project Manager.

Table 19. Project Reports

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Dates(s)	Person(s) Responsible for Report Preparation	Report Recipient(s)
Draft Project Report	Once	Tentatively Dec 2010	David Renfrew, WESTON Project Manager	Ruth Kolb, City of San Diego Project Manager
Final Project Report	Once	Within 2 weeks of the receipt of the draft report		

The draft and final project reports will include the following basic elements:

- **Introduction –** A statement of purpose, the scope of the project, and a description of the approach and techniques used during the project.

- **Materials and Methods –** A detailed description of all the field and laboratory methods and procedures used to collect and analyze the samples, maps, and photos showing sampling locations and events; a description of any statistical procedures used to analyze data and any QA protocols.

- **Results** – Results of all data collected, including tables summarizing water chemistry for each sampling event, water chemistry for each toxicity test, comparisons to applicable standards, toxicity test data and point estimates, relationship of toxicity to water quality parameters (where applicable), WERs for each event and final WERs, and proposed SSOs.

- **Discussion –** A context to the study results, including:

  - Review of investigations performed.
  - Conclusions based upon WER testing during each event for each metal separately
  - Conclusions based upon key water quality parameters and effect on WER determination
  - Comparison to results to the Biotic Ligand Model

- **Conclusions and Recommendations –**Final WER study summary and proposed SSOs for dissolved lead, copper, and zinc.

- **Literature Cited – C**itations referenced in the document.
- **Appendices –** Raw data collected during the project.

GROUP D:
DATA VALIDATION AND USABILITY

ELEMENT 22.0 DATA REVIEW, VERIFICATION, AND VALIDATION

Data validation is the process whereby data are filtered and accepted or rejected based on a set of criteria. It is a systematic procedure of reviewing a body of data against a set of criteria to provide assurance of its validity prior to its intended use. Data are checked for accuracy and completeness. The data validation process consists of data generation, reduction, and review (Element 23). Requirements of the ELAP Standard and Good Automated Laboratory Practices (USEPA Document 2185, 1995) are followed for computer processing, manipulation, reporting, storage, and retrieval of data.

Data reduction, validation, and reporting are on-going processes which involve the technicians, laboratory managers, QA personnel, and project team.

ELEMENT 23.0 VERIFICATION AND VALIDATION METHODS

Database Generation

After each survey, the field data sheets will be removed from the field log books, and the sheets will be checked for completeness and accuracy by the Field Team Lead or by the Project QA Officer. Appropriate field sheets must be present. If there are any questions, clarification from the Field Team Leader will be obtained as soon as possible. Field data sheets and the field logbooks will be placed into folders by data type, labeled with the data type and survey number, and filed in the appropriate filing cabinet. Field sheets will also be scanned, and electronic copies are stored in the project folder on WESTON's Carlsbad Server.

In the laboratory, technicians will document sample preparation activities in bound laboratory notebooks or on bench sheets. Data validation includes dated and signed entries by technicians on the data sheets and logbooks used for samples, the use of sample tracking and numbering systems to track the progress of samples through the laboratory, and the use of QC criteria to reject or accept specific data.

The data for laboratory analyses will be entered directly onto data sheets. Data sheets must be filled out in ink and signed by the technician, who is responsible for checking the sheet to ensure completeness and accuracy.

The technician who generates the data has the prime responsibility for the accuracy and completeness of the data. Each technician reviews the data to ensure the following:

- Sample description information is correct and complete.
- Analysis information is correct and complete.
- Results are correct and complete.
- Documentation is complete.

Data sheets are submitted to the Laboratory QA Officer. A Tracking Sheet is initialed when the data are ready for transmittal to a data entry operator. Original data sheets are not allowed to leave WESTON's facilities. If for any reason data entry is performed by an employee, but not at WESTON's facilities, data sheets are copied, and the originals are kept with the Laboratory QA Officer or Laboratory Manager.

Data files are assigned a job number and are given a file name, which will be used when the file is put on CD.

Error Checking and Verification

For large projects, the database establishment program is run. Standard database reduction occurs on the computer during the database establishment program (see SOPs for program names and details). The establishment programs run a number of checks. Error files and a listing of the raw data are printed.

The QA Officer resolves and corrects any errors reported in the files on the data sheets and in the raw data file; the printout is notated with corrections, initialed, and dated.

The raw data file is printed. Ten percent of the stations are selected randomly, and the raw data file is checked against the original data by the QA Officer or designee. If any errors are found in this 10%, these errors are corrected and another 10% is checked. Any errors found are corrected on the raw data printout and on the data entry sheets. If no errors are found, the station checked is marked 'OK'. The process is continued until no errors are found in the check. After the raw data are checked, the top sheet is marked with the date the checking was completed, the percentage of data checked, and the initials of the QA Officer or designee. The raw data printout used for error checking is saved and filed with the data entry sheets. Any errors in the raw data file are corrected, and the establishment program is rerun.

After the database has been established, the data entry copies may be discarded, and the original data entry sheets and raw data printouts will be filed.

Further data validation is performed by the Laboratory Manager. Validation is accomplished through routine audits of the data collection and flow procedures and by monitoring QC sample results.

Data validation includes dated and signed entries by the technicians and Laboratory Manager on the bench sheets and notebooks used for samples, the use of sample tracking and numbering systems to track the progress of samples through the laboratory, and the use of QC criteria to reject or accept specific data.

In the data review process, the data are compared to information (e.g., sample history, sample preparation, and QC sample data) to evaluate the validity of the results. Corrective action is minimized through the development and implementation of routine internal system controls. Analysts are provided specific criteria that must be met for each procedure, operation, or measurement system.

Data Reporting

After the data have been collected, tables summarizing the results will be generated. Tables will be reviewed for any errors or irregularities. If any are found, it may be necessary to correct and reestablish the databases or the dictionaries. Tables will be submitted to the Project Manager for review. The tables and report will be edited by at least two of the following three people: Contractor QA Officer, Project Manager, and technical editor. The report will be returned to the office staff for any corrections, and the final draft will then be reviewed again by the Project Manager. The Project Manager will sign the letter of transmittal for delivery of the report to the City of San Diego Project Manager.

ELEMENT 24.0 RECONCILIATION WITH USER REQUIREMENTS

The QA personnel will review data after each survey to determine whether DQOs have been met. If data do not meet the project's specifications, the QA personnel will review the errors and determine whether the problem is due to calibration/maintenance, sampling techniques, or other factors. They will suggest corrective action. It is expected that the problem would be corrected by retraining, revision of techniques, or replacement of supplies/equipment. If not, then the DQOs will be reviewed for feasibility. If specific DQOs are not achievable, the QA personnel will recommend appropriate modifications. Any revisions need approval by the WESTON Project Manager and the City of San Diego Project Manager.

ELEMENT 25.0 REFERENCES

American Public Health Association (APHA). 1998. Standard methods for the examination of water and wastewater. 19th ed. Washington, D.C. 1325 pp.

ANSI/ASQC (American National Standards Institute / American Society for Quality Control). 1994. *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs.* (ANSI/ASQC E-4).

Rantz, S.E. 1982. *Measurement and Computation of Streamflow, Volume 1, Measurement of Stage and Discharge.* United States Geological Survey Water Supply Paper 2175.

San Diego Regional Water Quality Control Board (Regional Board). 2007. Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay Chollas Creek Watershed. Technical Report. May.

United States Environmental Protection Agency (USEPA). 1994. Interim Guidance on Determination and Use of Water-Effect Ratios for Metals. EPA-823-B-94-001. February.

United States Environmental Protection Agency (USEPA). 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012. October.

APPENDIX B-1

Field Log Sheet

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME	STATION ID	STATION NAME
DATE	TIME STARTED (AT SITE)	TIME FINISHED (AT SITE)
NAV DATUM	LATITUDE	LONGITUDE
FIELD TEAM		RECORDER

MONITORING PERIOD	☐ SUMMER DRY	☐ WINTER DRY	☐ WET WEATHER		RAINFALL AMOUNT (POST-STORM)
WEATHER CONDITIONS	☐ CLEAR	☐ CLOUDY	☐ FOGGY	☐ DRIZZLING	☐ RAINY

SURFACE WATER APPEARANCE	**ODOR**	☐ ROTTEN EGG/H2S	☐ MUSTY	☐ SEWAGE	☐ AMMONIA	☐ GASOLINE/PETROLEUM	
		☐ FISH/DECAY	☐ CHLORINE	☐ NONE	☐ CHEMICAL	☐ OTHER	
	COLOR	☐ YELLOW	☐ GREEN	☐ BLUE	☐ BROWN	☐ RED	
		☐ COLORLESS	☐ OTHER				
	FLOATING MATERIALS	☐ SUDS/FOAM	☐ OILY SHEEN	☐ ORGANIC MATERIAL	☐ SCUM	☐ ALGAE	
	(ALL THAT APPLY)	☐ OTHER (DESCRIBE)					
	TRASH	☐ NONE	☐ VEGETATION	☐ STYROFOAM	☐ WOOD	☐ PLASTIC (CUPS, BOTTLES, BAGS)	☐ OTHER (DESCRIBE)
	TURBIDITY	☐ CLEAR	☐ CLOUDY	☐ HEAVY CLOUDINESS, OPAQUE			

FLOW (one method only)	**STREAM RATING (SEE OTHER SIDE)**	**IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)**		NOTES
		DEPTH	FT IN	
		WIDTH	FT IN	
		VELOCITY (choose one)	FT/SEC IN/SEC	☐ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED: GRAB COLLECTION TIME:

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY
	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

BOTTLE 1 ______ BOTTLE 2 ______ BOTTLE 3 ______ BOTTLE 4 ______

PHOTOS TAKEN: ☐ YES ☐ NO

PHOTO NUMBERS AND NOTES:

TEAM LEADER'S SIGNATURE

APPENDIX B-2

Chain-of-Custody Form

WESTON SOLUTIONS

☐ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

1760

DATE________________ PAGE_____ OF_____

PROJECT NAME / SURVEY / PROJECT NUMBER

PROJECT MANAGER / CONTACT

COMPANY / CLIENT

ADDRESS

PHONE / FAX / EMAIL

							ANALYSIS/TEST REQUESTED									FOR WESTON USE ONLY	
SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER									PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _______________

Container Code: G=glass P=plastic B=bags ☐ O=other _______________

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other _______________

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other _______________

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other _______________

SAMPLED BY: **PRINT** **SIGNATURE**

COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	**Signature**	**Firm**	**Date/Time**	**Print Name**	**Signature**	**Firm**	**Date/Time**
1.							
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

APPENDIX B-3

WESTON Toxicology Laboratory QAPP

APPENDIX B-4

CRG Marine Laboratory QAP

APPENDIX B-5

Corrective Action Form

CORRECTIVE ACTION

Job Number/Project:________________________________

Procedure:___________________________________ Prepared by:___________________________

Description of problem encountered:

Samples affected (Sample ID):

Date Recognized:______________________ By:______________________________________

Date Occurred: _______________________ By:______________________________________

Date Corrected: _______________________ By:______________________________________

Reported to:____

Description of corrective/preventive action taken to remedy problem:

Notification and approval of final corrective action (signatures):

Reporter:____ Date:____________________________

Lab Manager:____ Date:____________________________

QA Officer:____ Date:_____________________________

Program Manager:___________________________________Date:____________________________

Follow up audit date: _________________________________Performed by: ___________________

Problem corrected: ___ Yes ___ No

Corrective action affective: ___Yes ___ No

COMMENTS:____
____

APPENDIX C

Chain-of-Custody Forms

Item 10
Supporting Document No. 2
December 14, 2016

2010

Range-finder and Definitive WERs

WESTON SOLUTIONS

☒ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

30500

DATE 1/19/10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: Chollas Creek WER / 06754.090.008.0005
PROJECT MANAGER / CONTACT: Dave Renfrew
COMPANY / CLIENT:
ADDRESS:
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: C. dubia 48 hr.	ANALYSIS/TEST REQUESTED: acute Rangefinder Test							PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT (FOR WESTON USE ONLY)	WESTON LAB ID (FOR WESTON USE ONLY)
CC-SD 8(1) Comp	CC-SD 8(1) Comp.	1/18/10	2100	SW	10L/G	4	X	X							ICE		

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water
SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ________

Container Code: [✓ G=glass] P=plastic B=bags ☐ O=other ________

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☒ [✓ Client drop off] ☐ Other ________

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day [✓ ☐ Standard] ☐ Other ________

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other ________

SAMPLED BY: PRINT: B. Isham / P. Renfrew SIGNATURE:

COMMENTS / SPECIAL INSTRUCTIONS: Rangefinder Test for Chollas WER.

	RELINQUISHED BY: Print Name	Signature	Firm	Date/Time	RECEIVED BY: Print Name	Signature	Firm	Date/Time
1.	Garth Engelhorn		Weston	1-19-10 1100	V. Hayes	V. Hayes	Weston	1/19/10 1100
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of SD

Project: Chollas Creek WER

Weston Sample ID:	C100119.09a	C100119.09b	C100119.09c
Client Sample ID:	CC-SD8(1)Comp	——	→
Renewal Sample (Y/N):	N	N	N
Date/Time Received:	1/19/10 1100	——	→
Airbill #:	N/A	——	→
Sample Tracking Information Kept for Records: (Y/N)	Y	——	→
Collection Date/Time:	1/18/10 2100	——	→
Condition of Shipping Container:	N/A	——	→
Type and Capacity of Sample Container:	10L glass	——	→
Total Sample Volume (L):	10L	10L	10L
Condition of Sampling Container:	good	good	good
Sample Container Appropriate: (Y/N)	Y	Y	Y
Custody Seals Intact: (Y/N)	N/A	——	→
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	Y
Sampler's Name Present on COC Form: (Y/N)	Y	Y	Y

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	[✓ Conductivity] (mS/cm) or Salinity (ppt)	Hardness (mg CaCO$_3$/L)	Alkalinity (mg CaCO$_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH$_3$/L)	Tech
C100119.09a	13.5	11.6	8.2	0.13	40	26	0.04		am
↓ .09b	12.2	11.6	8.2	0.12	40	24	0.01		am
.09c	12.1	11.3	8.1	0.13	40	24	0.00		am

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of SD

Project: Chollas Creek WER

Weston Sample ID:	C100119.09d		
Client Sample ID:	CESD8(1)Comp		
Renewal Sample (Y/N):	N		
Date/Time Received:	1/19/10 1100		
Airbill #:	N/A		
Sample Tracking Information Kept for Records: (Y/N)	Y		
Collection Date/Time:	1/18/10 2100		
Condition of Shipping Container:	N/A		
Type and Capacity of Sample Container:	10L glass		
Total Sample Volume (L):	10L		
Condition of Sampling Container:	good		
Sample Container Appropriate: (Y/N)	Y		
Custody Seals Intact: (Y/N)	N/A		
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y		
Sampler's Name Present on COC Form: (Y/N)	Y		

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	[✓ Conductivity (mS/cm)] or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C100119.09d	12.0	11.0	8.1	0.13	40	24	0.04		Ahn

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

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CHAIN OF CUSTODY

DATE 2/27/10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: Chollas Water Effects Ratio Study/06754.090.008.0006.01
PROJECT MANAGER / CONTACT: Dave Renfrew
COMPANY / CLIENT: Weston Solutions
ADDRESS: see above
PHONE / FAX / EMAIL: see above

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: Cu Zn WER w/ C. dubia 48 hr. Acute tests	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID (FOR WESTON USE ONLY)
SD8 (1)	SD8 (1)	2/27/10	1715	SW	AL-G	2	X	ICE		
DPR2	DPR2	↓	1740	↓	1GL-G	2	X	↓		

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ____

Container Code: [✓ G=glass] P=plastic B=bags ☐ O=other ____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☒ Other pickup

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☒ Standard ☐ Other ____

Reporting Requirements: ☒ PDF ☒ EDD ☐ Hard Copy ☒ Email ☐ Other ____

SAMPLED BY: PRINT B. Isham SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS

	RELINQUISHED BY				RECEIVED BY			
	Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1.	Dave Renfrew		Weston	2/27/10@2021	Vanessa Hayes		Weston	2/28/10 0830
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

Item 10
Supporting Document No. 2
December 14, 2016

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of San Diego

Project: Chollas WER Study

Weston Sample ID:	C100228.07a	C100228.07b	C100228.08a
Client Sample ID:	SD8(1)	SD8(1)	DPR2
Renewal Sample (Y/N):	N	N	N
Date/Time Received:	2/28/10 0830	2/28/10 0830	2/28/10 0830
Airbill #:	N/A	N/A	N/A
Sample Tracking Information Kept for Records: (Y/N)	Y	Y	Y
Collection Date/Time:	2/27/10 1715	2/27/10 1715	2/27/10 1740
Condition of Shipping Container:	good	good	good
Type and Capacity of Sample Container:	①VH ~~2x~~ 1x 19L jar	①VH ~~2x~~ 1x 19L jar	1x 19L jar
Total Sample Volume (L):	19L	19L	19L
Condition of Sampling Container:	good	good	good
Sample Container Appropriate: (Y/N)	Y	Y	Y
Custody Seals Intact: (Y/N)	N/A	N/A	N/A
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	Y
Sampler's Name Present on COC Form: (Y/N)	Y	Y	Y

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg CaCO$_3$/L)	Alkalinity (mg CaCO$_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH$_3$/L)	Tech
C100228.07a	7.3	10.7	8.3	0.21	80	32	0.04		VH
C100228.07b	8.3	10.3	7.8	0.18	72	32	0.02		↓
C100228.08a	9.1	10.8	7.3	0.40	88	44	0.03		↓
①VH ~~C100228.08b~~									

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

① IE 2/28/10 VH

O:\BLANK FORMS\Bioassay\Forms with Weston Logo\SAMPLE RECEIPT Form- Weston temp.doc
Last printed 1/25/2006 10:55:00 AM

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of San Diego	**Project:** Chollas WER Study		
Weston Sample ID:	C100228.086		
Client Sample ID:	OPR2		
Renewal Sample (Y/N):	N		
Date/Time Received:	9/28/10 0830		
Airbill #:	N/A		
Sample Tracking Information Kept for Records: (Y/N)	Y		
Collection Date/Time:	9/27/10 1740		
Condition of Shipping Container:	Good		
Type and Capacity of Sample Container:	① VH 19 ~~20L~~ jar		
Total Sample Volume (L):	OK ~~38L~~ 19L		
Condition of Sampling Container:	good		
Sample Container Appropriate: (Y/N)	Y		
Custody Seals Intact: (Y/N)	N/A		
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y		
Sampler's Name Present on COC Form: (Y/N)	Y		

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	[✓ Conductivity] ~~(mS/cm)~~ or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C100228.86	8.8	10.8	7.5	0.40	88	44	0.03		VH

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:

① IC 9/28/10 VH

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CHAIN OF CUSTODY

30458

DATE 4/1/10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: Chollas Creek WER / 06754.090.008.0006.02

PROJECT MANAGER / CONTACT: Dave Renfrew

COMPANY / CLIENT: Weston

ADDRESS:

PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: Ceriodaphnia dubia	WER Cu and Zn	chronic Cerio Screen	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
SD 8(1)	SD 8(1)	4/1/10	1100	SW	19-4 Gl	2	X		X	ICE		C100401.06
~~SD8(1)~~	~~SD8(1) Dup~~					~~1~~			~~X~~			
DPR2	DPR2		1140			2	X		X			C100401.07

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water
SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ______

Container Code: G=glass P=plastic B=bags ☐ O=other ______

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other ______

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other ______

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other ______

SAMPLED BY: PRINT SIGNATURE
B. Isham G/Roberts
M. Wertian

COMMENTS / SPECIAL INSTRUCTIONS

	RELINQUISHED BY				RECEIVED BY			
	Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1.	David S. Renfrew		Weston	4/1/10 @ 1340	Kasey Skrivseth	Kasey Skrivseth	Weston	4/1/10 1340
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of San Diego

Project: Chollas Creek WER

Weston Sample ID:	C100401.06a,b,c	C100401.07a,b	
Client Sample ID:	SD8(1)	DPR2	
Renewal Sample (Y/N):	N	N	
Date/Time Received:	4/1/10 1340	4/1/10 1340	
Airbill #:	N/A	N/A	
Sample Tracking Information Kept for Records: (Y/N)	N	N	
Collection Date/Time:	4/1/10 1100	4/1/10 1140	
Condition of Shipping Container:	good	good	
Type and Capacity of Sample Container:	glass 19L × 3	glass 19L × 2	
Total Sample Volume (L):	57 L	38 L	
Condition of Sampling Container:	good	good	
Sample Container Appropriate: (Y/N)	Y	Y	
Custody Seals Intact: (Y/N)	N/A	N/A	
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	
Sampler's Name Present on COC Form: (Y/N)	Y	Y	

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) **(0-6°C) ***	Dissolved Oxygen (mg/L)	pH	[✓ Conductivity] (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C100401.06a	11.6	10.4	7.6	0.23	56	28	0.02	<0.5	rs/NH/DS
C100401.~~07~~06b	11.2	10.3	7.5	0.23	56	26	0.00	0.505	↓
C100401.06c	11.1	10.3	7.5	0.23	56	28	0.03	0.508	
C100401.07a	9.8	10.2	7.3	0.49	108	40	0.02	<0.5	
C100401.07b	9.9	10.4	7.4	0.48	112	42	0.03	0.528	

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

Weston Tox Lab.

WESTON SOLUTIONS

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CHAIN OF CUSTODY

31582

DATE 10-30-10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: City of San Diego / Chollas Creek WER Study / 06754.100.002.0005.01

PROJECT MANAGER / CONTACT: Dave Renfrew

COMPANY / CLIENT: Weston Solutions

ADDRESS: see above

PHONE / FAX / EMAIL: see above

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: C.dubia 48 hr. acute WER for Cu and Zn.								PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
CC-SO8(1)	CC-SO8(1)	10/30/10	1548	SW	G/19L	2	✗								ICE	11.9	C101031.01 a,b
DPR2	DPR2	↓	2005	SW	G/19L	2	✗								ICE	9.5-9.9	C101031.02 a,b

FOR WESTON USE ONLY

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ______

Container Code: [✓ G=glass] P=plastic B=bags ☐ O=other ______

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS [✓ ☐ Client drop off] ☐ Other ______

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day [✓ ☐ Standard] ☐ Other ______

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other ______

SAMPLED BY: PRINT
B. Isham
L. Campagna

SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. Garth Engelhorn		Weston	10-31-10 0810	Kasey Skrivseth	Kasey Skrivseth	Weston	10/31/10 0810
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

BIOASSAY SAMPLE RECEIPT

Client: city of San Diego

Project: Chollas CreekWER Study

Weston Sample ID:	C101031.01 a,b	C101031.02 a, b	
Client Sample ID:	CC-SD8(1)	DPR 2	
Renewal Sample (Y/N):	N	N	
Date/Time Received:	10/31/10 0810	10/31/10 0810	
Airbill #:	N/A	N/A	
Sample Tracking Information Kept for Records: (Y/N)	N/A	N/A	
Collection Date/Time:	10/30/10 1548	10/30/10 2005	
Condition of Shipping Container:	good	good	
Type and Capacity of Sample Container:	glass 20L	glass 20L	
Total Sample Volume (L):	19L x2	19L x 2	
Condition of Sampling Container:	good	good	
Sample Container Appropriate: (Y/N)	Y	Y	
Custody Seals Intact: (Y/N)	N/A	N/A	
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	
Sampler's Name Present on COC Form: (Y/N)	Y	Y	

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	[✓ Conductivity] (mS/cm) or Salinity (ppt)	Hardness (mg CaCO$_3$/L)	Alkalinity (mg CaCO$_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH$_3$/L)	Tech
C101031.01 a	11.9	6.6	7.0	0.18	48	28	0.03	<0.5	KS/JH
C101031.01 b	11.9	7.1	7.1	0.18	48	28	0.05	<0.5	↓
C101031.02 a	9.9	9.0	7.3	0.43	100	52	0.01	<0.5	↓
C101031.02 b	9.5	9.2	7.3	0.43	100	56	0.04	<0.5	↓

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

Item 10
Supporting Document No. 2
December 14, 2016

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CHAIN OF CUSTODY

31790

DATE 12/20/10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: City of SD / Chollas Creek WER / 06754.100.002.0004.02
PROJECT MANAGER / CONTACT: DAVE RENFREW
COMPANY / CLIENT: Weston
ADDRESS:
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: C. dubia 48-hr.	ANALYSIS/TEST REQUESTED: acute WER	ANALYSIS/TEST REQUESTED: Cu + Zn	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
CC-SD 8(I)	CC-SD 8(I)	12/20/10	1520	SW	G-1gL	3	X	X	X	ICE		C101221.01
DPR	DPRZ	↓	1605	SW	↓	2	X	X	X	ICE		C101221.02

FOR WESTON USE ONLY

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ______
Container Code: [✓ G=glass] P=plastic B=bags ☐ O=other ______
Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS [✓ ☐ Client drop-off] ☐ Other ______
Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day [✓ ☐ Standard] ☐ Other ______
Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other ______

SAMPLED BY: PRINT
G. Engelhorn
L. Campagna
SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS
Samples placed in locked Walkin Cooler

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. L. Campagna		Weston	12-21-10 0840	Sean Hasan		weston	0850
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

BIOASSAY SAMPLE RECEIPT

Client: city of San Diego

Project: chollas creek WER

Weston Sample ID:	C101221.01	C101221.02	
Client Sample ID:	CC-SD8(1)	DPR 2	
Renewal Sample (Y/N):	N	N	
Date/Time Received:	12/21/10 0850	12/21/10 0850	
Airbill #:	N/A	N/A	
Sample Tracking Information Kept for Records: (Y/N)	N/A	N/A	
Collection Date/Time:	12/20/10 1520	12/20/10 1605	
Condition of Shipping Container:	good	good	
Type and Capacity of Sample Container:	glass 19L x3	glass 19 L x2	
Total Sample Volume (L):	57 L	38 L	
Condition of Sampling Container:	good	good	
Sample Container Appropriate: (Y/N)	Y	Y	
Custody Seals Intact: (Y/N)	N/A	N/A	
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	
Sampler's Name Present on COC Form: (Y/N)	Y	Y	

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) **(0-6°C)** *	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C101221.01 a	10.4	9.5	7.4	0.14	44	28	0.17	<0.5	ks
〃 b	10.5	9.4	7.5	0.14	44	28	0.00	<0.5	↓
〃 c	10.5	9.2	7.5	0.14	44	28	0.06	<0.5	
C101221.02 a	11.5	9.1	7.4	0.22	48	40	0.00	<0.5	
〃 b	12.1	9.3	7.5	0.22	56	44	0.23	<0.5	

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

Item 10
Supporting Document No. 2
December 14, 2016

2014

Confirmation WERs

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

Date 4/3/14 Page 1 of 1

Sample Collection By:

Report to:

Company AMEC
Address 9210 Sky Park Court, Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company Same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	C. dubia 48-hr acute pre-WER screen	C. dubia 48-hr WER Confirmation Tests (See SOW)	P. promelas 48-hr WER Confirmation Tests (See SOW)								Receipt Temperature (°C)
1	SD8(1) Comp	4/2/14	1925	AQ	20-L Glass	2	Not used due to elevated chlorine level	X	X	X								4.4
2	DPR(3) Comp	4/3/14	0631	AQ	20-L Glass	3		X	X	X								5.0
3	SD8(1) Grab	4/2/14	1320	AQ	20-L Glass	2	Hold for testing if needed - WER	X										5.5
4																		
5																		
6																		
7																		
8																		
9																		
10																		

PROJECT INFORMATION		SAMPLE RECEIPT	
Client:	**AMEC**	**Total No. of Containers**	7
PO No.:	**To forward via email**	**Received Good Condition?**	Y
Shipped Via:	**AMEC _Tommy Wells**	**Matches Test Schedule?**	Y

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)

(Signature) (Time) 1300
(Printed Name) Tommy Wells (Date) 4-3-14
(Company) AMEC

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1300
(Printed Name) Nick Henricks (Date) 4/3/14
(Company) Nautilus Environmental 14-0308 to 0310

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

4d04027 ~~4d03063~~ JG 4/4/14

amec

Chain of Custody

Control Number:

Date: 4/4/14 Page 1 of 1

Project Manager:	Chris Stransky phone: (858) 300-4350
Project Name:	Chollas Creek WER Confirmation Testing
Project Number:	Will follow via email to Hai Van
Laboratory:	Weck

Bill To: Chris Stransky
Company: AMEC Environment and Infrastructure, Inc.
Address: 9210 Sky Park Court, Suite 200
San Diego, CA 92123

Report To: Chris Stransky
Company: AMEC
Address: Same (AMEC) / N/A

Sampler's Name: Tommy Wells, Tommy Arthur

QC Level: Standard TAT: Standard

Lab Use

Preservatives

Sample Data					Matrix										No./Type Containers
Lab/EPA ID	Sample Station ID (AMEC)	Date Collected	Time Collected	Comments	Soil/Sediment	Seawater	Freshwater	TOC (5310B)	DOC (5310B)	Alkalinity (SM 2320B)	Hardness (200.7)	pH	Anions - SO4, Cl (EPA 300.0)	Cations - Ca, Mg, Na, K (EPA 200.7)	
	SD8(1)-Grab	4/2/2014	1320	Flow-weighted Composite			X	X	X	X	X	X	X	X	
	DPR3-Comp	4/3/2014	631	Flow-weighted Composite			X	X	X	X	X	X	X	X	

	Date	Time
Samplers Signature Tommy Wells / Tommy Arthur	4/3/14	1400
Relinquished By:		
Received By:		
Relinquished By: Laurel Lees	4/4/14	11:40
Received By (LAB): Socorro Valenzuela	4-4-14	11:40
Socorro Valenzuela	4-4-14	13:45
Jamalmer	4/4/14	1345

2.8c

For Lab Use

Lab No.:
Does COC match samples: Y or N
Broken container: Y or N
Received within holding time: Y or N
COC seal intact: Y or N
Any other problems: Y or N
If problems, Amec contacted: Y or N
Date contacted: ___/___/___
Temperature (°C): ______

Comments

Provide full copy of results+ EDD to:
(chris.stransky@amec.com).

Note: Include Project name and number on all invoices.

1404002-001

amec

Chain of Custody

Control Number:

Date: 4/4/13 **Page:** 1 of 1

Project Manager: Chris Stransky **Phone:** (858) 300-4350
Project Name: Chollas Creek WER Confirmation
Project Number: Will send via email to Misty

Bill To: NA
Company: AMEC Environment & Infrastructure
Address: 9210 Sky Park Court, Suite 200
San Diego, CA 92123

Report To: NA
Company: AMEC Environment & Infrastructure
Address: Same (AMEC)
(electronic copies only)

Sampler's Name: Tommy Wells, Tommy Arthur
QC Level: NA **TAT:** NA

Lab Use
Preservatives EtOH

Sample Data					Matrix				Analyses	No./Type of Containers
EPA ID	Sample Station ID	Date Collected	Time Collected	Comments	Soil/Sediment	Seawater	Freshwater	Other	Pyrethroids	
	SD8(1)-Grab	4/2/2014	1320				X		X	
	DPR3-Comp	4/3/2014	0631				X		X	

	Date	Time
Samplers Signature Tommy Wells	4/3/14	1600
Relinquished By:	4/4/14	1030
Received By:	4/4/14	10:30
Relinquished By:		
Received By (LAB):		

For Lab Use
Lab No.:
Does COC match samples: Y or N
Broken container: Y or N
Received within holding time: Y or N
COC seal intact: Y or N
Any other problems: Y or N
If problems, Amec contacted: Y or N
Date contacted: ____/____/____
Temperature (°C): ______

Comments

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.

PHYSIS PROJECT ID
1404002-001

SAMPLE RECEIPT SUMMARY

CLIENT: AMEC
Date Received: Apr 4, 2014
Received By: AI
Inspected By: JM

COURIER

☑ PHYSIS ☐ CLIENT ☐ FEDEX ☐ UPS
start 8:30 end 12:00 ☐ OTHER: ____

COOLER

☑ COOLER ☐ BOX total # 1
☐ OTHER: ____

TEMPERATURE

6.9 °C
☐ WET ICE ☑ BLUE ICE
☐ DRY ICE ☐ NONE

SAMPLE INTEGRITY UPON RECEIPT

1. COC(s) included and completely filled out........ ***YES***
2. All sample containers arrived intact........ ***YES***
3. All samples listed on COC(s) are present........ ***YES***
4. Information on containers consistent with information on COC(s)........ ***NO; see notes below***
5. Correct containers and volume for all analyses indicated........ ***YES***
6. All samples received within method holding time........ ***YES***
7. Correct preservation used for all analyses indicated........ ***NO; see notes below***
8. Name of sampler included on COC(s)........ ***YES***

NOTES

Sample ID on bottle says: 2013-WER1-DPR3-C-01 with Sample date being 04/03/14 & Time: 0631
Sample ID on COC says: DPR3-Comp with Sample date being 04/03/14 & Time: 0631.
Because Date & Time matches, we labeled the bottle with Sample ID from COC (DPR3-Comp)
See temperature

Reset Form

Print Form

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

1

4d08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	LW-TDCu-0	4/4/14	1449	FW	250-ml HDPE	1	preserved in HNO3	X		
2	LW-TDCu-1		1451			1		X		
3	LW-TDCu-2		1452			1		X		
4	LW-TDCu-3		1453			1		X		
5	LW-TDCu-4		1455			1		X		
6	LW-TDCu-5		1456			1		X		
7	LW-TDCu-6		1459			1		X		
8	LW-TDCu-7		1500			1		X		
9	LW-TDCu-8pp		1505			1		X		
10	LW-TDCu-9pp		1506			1		X		

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: week courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only

2.1

RECEIVED BY (COURIER)

(Signature) Adan Lugo (Time) 3:05
(Printed Name) Adan Lugo (Date) 4-7-14
(Company) RMS

RECEIVED BY (LABORATORY)

(Signature) [illegible] (Time) [illegible]
(Printed Name) [illegible] (Date) 4/7/14
(Company) [illegible]

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Item 10
Supporting Document No. 2
December 14, 2016

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

2

4d08038

Date 4/7/14 **Page** 1 **of** 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc								
1	DPR-TOCu-0	4/4/14	1510	FW	250mL HDPE	1	preserved in HNO3	X									
2	DPR-TOCu-1		1515			1		X									
3	DPR-TOCu-2		1518			1		X									
4	DPR-TOCu-3		1523			1		X									
5	DPR-TOCu-4		1525			1		X									
6	DPR-TOCu-5		~~1531~~ 1529			1		X									
7	DPR-TOCu-6		1531			1		X									
8	DPR-TOCu-7		1535			1		X									
9	DPR-TOCu-8pp		1537			1		X									
10	DPR-TOCu-9pp		1540			1		X									

ANALYSES REQUIRED

Receipt Temperature (°C)

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:
Total metals subsamples also included (unpreserved) for archive only
2.1

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) Adan Lagro (Date) 4-7-14
(Company) Rel S

RECEIVED BY (LABORATORY)

(Signature) (Time) 1410
(Printed Name) Adam (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental
4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

3

4d08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc
1	SD8(1)-TDCu-0	4/4/14	1803	FW	250 ML HDPE	1	preserved in HNO3	X	
2	SD8(1)-TDCu-1		1806			1		X	
3	SD8(1)-TDCu-2		1812			1		X	
4	SD8(1)-TDCu-3		1814			1		X	
5	SD8(1)-TDCu-4		1816			1		X	
6	SD8/1)-TDCu-5		1820			1		X	
7	SD8(1)-TDCu-6		1822			1		X	
8	SD8(1)-TDCu-7		1825			1		X	
9	SD8(1)-TDCu-8pp		1829			1		X	
10	SD8(1)-TDCu-9pp		1831			1		X	

ANALYSES REQUIRED

Receipt Temperature (°C)

PROJECT INFORMATION

Client:	
PO No.:	
Shipped Via:	Weck courier

SAMPLE RECEIPT

Total No. of Containers	
Received Good Condition?	
Matches Test Schedule?	

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only

2.1

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RECEIVED BY (COURIER)

(Signature) Adan Lugo (Time) 3:05
(Printed Name) Adan Lugo (Date) 4-7-14
(Company) RLLS

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliably (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1810
(Printed Name) Adrian (Date) 4/7/14
(Company) [illegible]

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

4

4d08038

Date 4/7/14 **Page** 1 **of** 1

Sample Collection By: Nautilus

Report to:
Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:
Company same
Address
City/State/Zip
Contact
Phone
Email

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	LW-TOZn-0	4/4/14	1410	FW	250-mL HDPE	1	preserved in HNO3		X	
2	LW-TOZn-1	4/4/14	1413			1			X	
3	LW-TOZn-2	4/4/14	1423			1			X	
4	LW-TOZn-3	4/4/14	1425			1			X	
5	LW-TOZn-4	4/4/14	1428			1			X	
6	LW-TOZn-5	4/4/14	1430			1			X	
7	LW-TOZn-6	4/4/14	1433			1			X	
8	LW-TOZn-7	4/4/14	1435			1			X	
9	LW-TOZn-8	4/4/14	1442			1			X	
10	LW-TOZn-9	4/4/14	1445			1			X	

PROJECT INFORMATION
Client:
PO No.:
Shipped Via: well courier

SAMPLE RECEIPT
Total No. of Containers
Received Good Condition?
Matches Test Schedule?

RELINQUISHED BY (CLIENT)
(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

SPECIAL INSTRUCTIONS/COMMENTS:
Total metals subsamples also included (unpreserved) for archive only
2.1

RECEIVED BY (COURIER)
(Signature) Adam Lage (Time) 3:05
(Printed Name) Adam Lage (Date) 4-7-14
(Company) Rel

RECEIVED BY (LABORATORY)
(Signature) (Time) 1810
(Printed Name) (Date) 4-7-14
(Company)

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

5

4d08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	SD8(1)-T0Zn-0	4/4/14	1545	FW	250-mL HDPE	1	Preserved in HNO3		X	
2	SD8(1)-T0Zn-1		1550			1			X	
3	SD8(1)-T0Zn-2		1554			1			X	
4	SD8(1)-T0Zn-3		1552			1			X	
5	SD8(1)-T0Zn-4		1558			1			X	
6	SD8(1)-T0Zn-5		1600			1			X	
7	SD8(1)-T0Zn-6		1604			1			X	
8	SD8(1)-T0Zn-7		1606			1			X	
9	SD8(1)-T0Zn-8pp		1611			1			X	
10	SD8(1)-T0Zn-9pp		1614			1			X	

ANALYSES REQUIRED

PROJECT INFORMATION

Client:	
PO No.:	
Shipped Via:	Weck Carier

SAMPLE RECEIPT

Total No. of Containers	
Received Good Condition?	
Matches Test Schedule?	

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only.

21

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) Adan Lugo (Time) 3:06
(Printed Name) Adan Lugo (Date) 4-7-14
(Company) RMS

RECEIVED BY (LABORATORY)

(Signature) (Time) 1810
(Printed Name) [illegible] (Date) 4-7-14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

6

4608038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	DPR-TOZn-0	4/4/14	1625	FW	250mL HDPE	1	Preserved in HNO3		X									
2	DPR-TOZn-1		1627			1			X									
3	DPR-TOZn-2		1632			1			X									
4	DPR-TOZn-3		1635			1			X									
5	DPR-TOZn-4		1637			1			X									
6	DPR-TOZn-5		1640			1			X									
7	DPR-TOZn-6		1645			1			X									
8	DPR-TOZn-7		1649			1			X									
9	DPR-TOZn-8pp		1650			1			X									
10	DPR-TOZn-9pp	↓	1652	↓	↓	1			X									

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck carier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only.

2.1

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) Adan Lugo (Date) 4-7-14
(Company) RMS

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) [illegible]
(Printed Name) [illegible] (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

7

4d08038

Date 4/7/14 Page 1 of 2

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	SD8(I)-TOCuZn-0	4/4/14	1545	FW	250-mL HDPE	1	preserved in HNO3	X	X									
2	SD8(I)-TOCuZn-1		1552			1												
3	SD8(I)-TOCuZn-2		1556			1												
4	SD8(I)-TOCuZn-3		1600			1												
5	SD8(I)-TOCuZn-4		1605			1												
6	SD8(I)-TOCuZn-5		1610			1												
7	SD8(I)-TOCuZn-6		1615			1												
8	SD8(I)-TOCuZn-7		1622			1												
9	SD8(I)-TOCuZn-8		1626			1												
10	SD8(I)-TOCuZn-9	↓	1630	↓	↓	1		↓	↓									

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck Courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:
Total metals subsamples also included (unpreserved) for archive only.

2.1

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliab4 (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) Adan Loya (Time) 3:05
(Printed Name) Adan Loya (Date) 4-7-14
(Company) RMS

RECEIVED BY (LABORATORY)

(Signature) (Time) 18:10
(Printed Name) Adrian (Date) 4-7-14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Item 10
Supporting Document No. 2
December 14, 2016

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

8

4208038

Date 4/7/14 Page 2 of 2

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	SD8(1)-TOCuZn-10	4/9/14	1635	FW	250-mL HDPE	1	preserved in	X	X									
2	SD8(1)-TOCuZn-11	↓	1642	↓	↓	1	HNO3	↓	↓									
3	SD8(1)-TOCuZn-12	↓	1645	↓	↓	1												
4																		
5																		
6																		
7																		
8																		
9																		
10																		

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: week courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) Alan Lange (Date) 4-7-14
(Company) RMS

RECEIVED BY (LABORATORY)

(Signature) (Time) 1910
(Printed Name) [illegible] (Date) 4-7-14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

9

4J08038

Date 4/7/14 Page 1 of 2

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									
1	DPR-TDCuZn-0	4/4/14	1710	FW	250 mL HDPE	1	Preserved in	X	X									
2	DPR-TDCuZn-1		~~1620~~ 1720			1	HNO_3	X	X									
3	DPR-TDCuZn-2		1729			1		X	X									
4	DPR-TDCuZn-3		1730			1		X	X									
5	DPR-TDCuZn-4		1735			1		X	X									
6	DPR-TDCuZn-5		1738			1		X	X									
7	DPR-TDCuZn-6		1740			1		X	X									
8	DPR-TDCuZn-7		1744			1		X	X									
9	DPR-TDCuZn-8		1746			1		X	X									
10	DPR-TDCuZn-9		1750			1		X	X									

Receipt Temperature (°C)

PROJECT INFORMATION

Client:	
PO No.:	
Shipped Via:	Weck Courier

SAMPLE RECEIPT

Total No. of Containers	
Received Good Condition?	
Matches Test Schedule?	

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only.

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RECEIVED BY (COURIER)

(Signature) Adam Lugo (Time) 3:05
(Printed Name) Adam Lugo (Date) 4-7-14
(Company) RMS

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1410
(Printed Name) [illegible] (Date) 4-7-14
(Company) [illegible]

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

10

4008038

Date 4/7/14 Page 2 of 2

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc										Receipt Temperature (°C)
1	DPR-TOCuZn-10	4/4/14	1751	FW	250mL HDPE	1	Preserved in	X	X										
2	DPR-TOCuZn-11	↓	1755	↓	↓	1	HNO3	X	X										
3	DPR-TOCuZn-12	↓	1758	↓	↓	1		X	X										
4																			
5																			
6																			
7																			
8																			
9																			
10																			

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: week courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:
Total metals subsamples also included (unpreserved) for archive only

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RECEIVED BY (COURIER)

(Signature) Adam Lupe (Time) 3:05
(Printed Name) Adam Lupe (Date) 4-7-14
(Company) Rus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) [illegible] (Time) [illegible]
(Printed Name) [illegible] (Date) [illegible]
(Company) [illegible]

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

11

4d00038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc
1	LW-Cd48Cu-3	4/5/14	1540	FW	250mL HDPE	1	preserved in	X	
2	LW-Cd48Cu-4	4/5/14	1541			1	HNO3	X	
3	LW-Cd48Cu-5	4/5/14	1542			1		X	
4	LW-Cd48Cu-6	4/5/14	1543			1		X	
5	LW-Cd48Cu-7	4/5/14	1544			1		X	
6	~~DPR-Cd48Cu-7~~	~~4/5/14~~	~~1545~~ AC					~~X~~ AC	
7	SD8(I)-Cd48Cu-5	4/5/14	1546			1		X	
8	SD8(I)-Cd48Cu-6	4/5/14	1547			1		X	
9	SD8(I)-Cd48Cu-7	4/5/14	1548			1		X	
10									

Receipt Temperature (°C)

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:
Total metals subsamples also included (unpreserved) for archive only

21

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RECEIVED BY (COURIER)

(Signature) Adan Lugo (Time) 3:05
(Printed Name) Adan Lugo (Date) 4-7-14
(Company) RMS

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1530
(Printed Name) Adriana (Date) 4/7/14
(Company) [illegible]

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custo

12

4J08038

Date 4/7/14 Page__ of __

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	SD8(1)Cd48Cu-0	4/6/14	1518	FW	250-mL HDPE	1	Preserved in	X		
2	SD8(1)Cd48Cu-1		1520			1	HNO_3	X		
3	SD8(1)Cd48Cu-2		1522			1		X		
4	SD8(1)Cd48Cu-3		1524			1		X		
5	SD8(1)Cd48Cu-4		1526			1		X		
6										
7										
8										
9										
10										

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: WECK courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only. 2.1

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1610
(Printed Name) Adam (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

13

4208038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company: AMEC
Address: 9210 Sky Park Ct., Suite 200
City/State/Zip: San Diego, CA 92123
Contact: Chris Stransky
Phone: 858-300-4350
Email: chris.stransky@amec.com

Invoice To:

Company: same
Address:
City/State/Zip:
Contact:
Phone:
Email:

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	LW-Cd48Cu-0	4/6/14	1533	FW	250mL HDPE	1	Preserved in	X		
2	LWCd48Cu-1	↓	1535	↓	↓	1	HNO3	X		
3	LWCd48Cu-2	↓	1537	↓	↓	1		X		
4										
5										
6										
7										
8										
9										
10										

ANALYSES REQUIRED

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck Courier

SAMPLE RECEIPT

Total No. of Containers:
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only

2.1°C

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) Adam Lugo (Time) 305
(Printed Name) Adam Lugo (Date) 4-7-14
(Company) RMS

RECEIVED BY (LABORATORY)

(Signature) (Time) 1810
(Printed Name) Adam (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

14

4J08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	DPR-Cd48Cu-0	4/6/14	1730	FW	250mL HDPE	1	preserved in HNO_3	X		
2	DPR-Cd48Cu-1		1731			1		X		
3	DPR-Cd48Cu-2		1732			1		X		
4	DPR-Cd48Cu-3		1734			1		X		
5	DPR-Cd48Cu-4		1735			1		X		
6	DPR-Cd48Cu-5		1736			1		X		
7	DPR-Cd48Cu-6	↓	1737		↓	1		X		
8	~~[illegible]~~									
9	DPR-Cd48Cu-7	~~4/6/14~~ 4/5/14	1545	↓	↓	1		X		
10										

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: week courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:
Total metals subsamples also included (unpreserved) for archive only 2.1

RELINQUISHED BY (CLIENT)
(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) Relish (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time) 3:05
(Printed Name) Adam Lugo (Date) 4-7-14
(Company) Rees

RECEIVED BY (LABORATORY)
(Signature) (Time) 1810
(Printed Name) Adam (Date) 4/7/14
(Company) Wen

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

IS

4D08038

Date 4/7/14 Page__ of __

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	LW-Pp48Zn-1	4/6/14	1453	FW	250 mL HDPE	1	preserved in		X	
2	LW Pp48Zn-2		1455			1	HNO3		X	
3	LW Pp48Zn-3		1457			1			X	
4	LW Pp48Zn-4		1459			1			X	
5	LW Pp48Zn-5		1501			1			X	
6	LW Pp48Zn-6		1503			1			X	
7	LW Pp48Zn-7	↓	1505	↓	↓	1			X	
8										
9										
10										

PROJECT INFORMATION

Client:	
PO No.:	
Shipped Via:	Weck courier

SAMPLE RECEIPT

Total No. of Containers	
Received Good Condition?	
Matches Test Schedule?	

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only

2-1

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time) #AC
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Relighn (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) Adan Lugo (Date) 4-7-14
(Company) Rus

RECEIVED BY (LABORATORY)

(Signature) (Time) 1816
(Printed Name) Adra (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Item 10
Supporting Document No. 2
December 14, 2016

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

16

4d08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	LW-Cd48Zn-0	4/6/14	1430	FW	250 mL HDPE	1	preserved in		X	
2	LW-Cd48Zn-1	↓	1431	↓	↓	1	HNO3		X	
3	LW-Cd48Zn-2		1432			1			X	
4	LW-Cd48Zn-3		1434			1			X	
5	LW-Cd48Zn-4		1435			1			X	
6	LW-Cd48Zn-5		1436			1			X	
7	LW-Cd48Zn-6		~~173~~ 1437			1			X	
8	LW-Cd48Zn-7	↓	1439	↓	↓	1			X	
9										
10										

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) Adam (Time) 3:05
(Printed Name) Adam (Date) 4-7-07
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1510
(Printed Name) (Date) 4/7/14
(Company)

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

17

4d08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:
Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:
Company same
Address
City/State/Zip
Contact
Phone
Email

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	DPR-cd48zn-0	4/6/14	1520	FW	250-mL HDPE	1	preserved in HNO3		X									
2	DPR-cd48zn-1	↓	1522	↓	↓	1			X									
3	DPR-cd48zn-2		1523			1			X									
4	DPR-cd48zn-3		1526			1			X									
5	DPR-cd48zn-4		1527			1			X									
6	DPR-cd48zn-5		1529			1			X									
7	DPR-cd48zn-6		1530			1			X									
8	DPR-cd48zn-7		1531			1			X									
9																		
10																		

PROJECT INFORMATION

Client:	
PO No.:	
Shipped Via:	Weck courier

SAMPLE RECEIPT

Total No. of Containers	
Received Good Condition?	
Matches Test Schedule?	

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only 21°C

RELINQUISHED BY (CLIENT)
(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) Redhaby (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time) 3:05
(Printed Name) Adan Ley (Date) 4-7-14
(Company) Rens

RECEIVED BY (LABORATORY)
(Signature) (Time) 1810
(Printed Name) Adria (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

18

4d08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	DPR-Pp48Zn-1	4/6/14	1550	FW	250mL HDPE	1	preserved in HNO3		X									
2	DPR-Pp48Zn-2	↓	1552	↓	↓	1			X									
3	DPR-Pp48Zn-3		1556			1			X									
4	DPR Pp48Zn-4		1600			1			X									
5	DPR Pp48Zn-5		1602			1			X									
6	DPR Pp48Zn6		1624			1			X									
7	DPR Pp48Zn-7		1634			1			X									
8																		
9																		
10																		

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only. 21

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) Adan Cruz (Date) 4-7-14
(Company) Rels

RECEIVED BY (LABORATORY)

(Signature) (Time) 1810
(Printed Name) Adrian (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

19

4208038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	S08(1)Cd48Zn-0	4/6/14	1736	FW	250 mL HDPE	1	samples preserved		X									
2	S08(1)Cd48Zn-1	|	1738	|	|	1	in HNO_3		X									
3	S08(1)Cd48Zn-2	|	1739	|	|	1			X									
4	S08(1)Cd48Zn-3	|	1740	|	|	1			X									
5	S08(1)Cd48Zn-4	|	1741	|	|	1			X									
6	S08(1)Cd48Zn-5	|	1742	|	|	1			X									
7	S08(1)Cd48Zn-6	|	1743	|	|	1			X									
8	S08(1)Cd48Zn-7	↓	1744	↓	↓	1			X									
9																		
10																		

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: West Courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only.

2.1

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RECEIVED BY (COURIER)

(Signature) (Time) 3:00
(Printed Name) Adam Lugo (Date) 4-7-14
(Company) RMS

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1610
(Printed Name) Adam (Date) 4/7/14
(Company) West

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

20

4d08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	SD8(1) Pp482n-1	4/6/14	1617	FW	250 mL HDPE	1	preserved in		X	
2	SD8(1) Pp482n-2		1623			1	HNO3		X	
3	SD8(1) Pp482n3		1626			1			X	
4	SD8(1) Pp482n-4		1628			1			X	
5	SD8(1) Pp482n5		1634			1			X	
6	SD8(1) Pp482n-6		SM 1640			1			X	
7	SD8(1) Pp482n-7	↓	1643	↓	↓	1			X	
8										
9										
10										

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck Courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only. 2.1

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) (Date) 4.7.14
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1610
(Printed Name) Adam (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

21

4208038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:
Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:
Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	SD8(i)-Pp48Cu-0	4/6/14	1549	FW	250 mL HDPE	1	preserved in	X	X	
2	SD8(i)-Pp48Cu-1		1555			1	HNO3	X		
3	SD8(i)-Pp48Cu-2		1559			1		X		
4	SD8(i)-Pp48Cu-3		1602			1		X		
5	SD8(i)-Pp48Cu-4		1605			1		X		
6	SD8(i)-Pp48Cu-5		1609			1		X		
7	SD8(i)-Pp48Cu-6		1615			1		X		
8	SD8(i) Pp48Cu-7		1617			1		X		
9	~~SD8(i)~~									
10										

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only 2.1

RELINQUISHED BY (CLIENT)
(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time) 3:05
(Printed Name) Adm Long (Date) 4-7-14
(Company) RMS

RECEIVED BY (LABORATORY)
(Signature) (Time) 6:10
(Printed Name) Adm (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

22

4J08038

Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	LWPp48Cu-0	~~3/3~~ 4/6/14	1426	FW	250-mL HDPE	1	preserved in	X	X									
2	LWPp 48Cu-1		1428			1	HNO_3	X										
3	LWPp 48Cu-2		1430			1		X										
4	LWPp 48Cu-3		1432			1		X										
5	LW Pp 48Cu-4		1434			1		X										
6	LW Pp 48Cu-5		1436			1		X										
7	LW Pp 48Cu-6		1438			1		X										
8	LW Pp 48Cu-7	↓	1440	↓	↓	1		X										
9																		
10																		

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Weck courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only.

2.1°C

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) Adan Lugo (Date) 4-7-14
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1610
(Printed Name) Adan (Date) 4/7/14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental
4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

23

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Date 4/7/14 Page 1 of 1

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	DPR-P048Cu-0	4/6/14	1452	FW	250-mL HDPE	1	preserved in	X	X	
2	DPR-P048Cu-1		1455			1	HNO3	X		
3	DPR-P048Cu-2		1500			1		X		
4	DPR-P048Cu-3		1504			1		X		
5	DPR-P048Cu-4		1506			1		X		
6	DPR-P048Cu-5		1509			1		X		
7	DPR-P048Cu-6		1515			1		X		
8	DPR-P048Cu-7	↓	1517	↓	↓	1		X		
9										
10										

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: wech courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:
Total metals subsamples also included (unpreserved) for archive only. 2.1

RELINQUISHED BY (CLIENT)
(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RECEIVED BY (COURIER)
(Signature) (Time) 3:05
(Printed Name) Adam Lueg (Date) 4-7-14
(Company) Reg

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (LABORATORY)
(Signature) (Time) 1810
(Printed Name) Adam (Date) 4/7/0
(Company) Wech

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Item 10
Supporting Document No. 2
December 14, 2016

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

4008038

Chain of Custody

24

Date 4/7/14 Page 1 of 2

Sample Collection By: Nautilus

Report to:

Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:

Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	SD8(1)-48CuZn-1	4/6/14	1645	FW	250-mL HDPE	1	Preserved in	X	X	
2	SD8(1)-48CuZn-2		1650			1	HNO3	X	X	
3	SD8(1)-48CuZn-3		1651			1		X	X	
4	SD8(1)-48CuZn-4		1655			1		X	X	
5	SD8(1)-48CuZn-5		1657			1		X	X	
6	SD8(1)-48CuZn-6		1700			1		X	X	
7	SD8(1)-48CuZn-7		1702			1		X	X	
8	SD8(1)-48CuZn-8		1705			1		X	X	
9	SD8(1)-48-CuZn-9		1706			1		X	X	
10	SD8(1)-48-CuZn-10		1708			1		X	X	

PROJECT INFORMATION

Client:
PO No.:
Shipped Via: Wreck courier

SAMPLE RECEIPT

Total No. of Containers
Received Good Condition?
Matches Test Schedule?

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only.

2.1°

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) (Date) 4-7-14
(Company) Rel

RECEIVED BY (LABORATORY)

(Signature) (Time) 1810
(Printed Name) Adrian (Date) 4-7-14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

25

4d08038

Date 4/7/14 Page 2 of 2

Sample Collection By: Nautilus

Report to:
Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:
Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	SD8(1)-48CuZn-11	4/6/14	1710	FW	250 mL HDPE	1	preserved in	X	X									
2	SD8(1)-48CuZn-12	↓	1712	↓	↓	1	HNO3	X	X									
3	~~SD8(1)-48CuZn-FFP~~																	
4	~~SD8(1)-48CuZn-FFP~~	↓																
5																		
6																		
7																		
8																		
9																		
10																		

PROJECT INFORMATION		SAMPLE RECEIPT	
Client:		Total No. of Containers	
PO No.:		Received Good Condition?	
Shipped Via:	Weck carier	Matches Test Schedule?	

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only

2.1°

RELINQUISHED BY (CLIENT)

(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time) 3:05
(Printed Name) [illegible] (Date) 4.7.14
(Company) Rels

RECEIVED BY (LABORATORY)

(Signature) (Time) 18:10
(Printed Name) Adam (Date) 4.7.14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

26

4d08038

Date 4/7/14 Page 1 of 2

Sample Collection By: Nautilus

Report to:
Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:
Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc	Receipt Temperature (°C)
1	DPR-48CuZn-1	4/6/14	1700	FW	250mL HDPE	1	Preserved in HNO3	X	X	
2	DPR-48CuZn-2		1703			1		X	X	
3	DPR-48CuZn-3		1705			1		X	X	
4	DPR-48CuZn-4		1707			1		X	X	
5	DPR-48CuZn-5		1709			1		X	X	
6	DPR-48CuZn-6		1715			1		X	X	
7	DPR-48CuZn-7		1717			1		X	X	
8	DPR-48CuZn-8		1719			1		X	X	
9	DPR-48CuZn-9		1721			1		X	X	
10	DPR-48CuZn10		1724			1		X	X	

PROJECT INFORMATION

Client:	
PO No.:	
Shipped Via:	Weck Courier

SAMPLE RECEIPT

Total No. of Containers	
Received Good Condition?	
Matches Test Schedule?	

SPECIAL INSTRUCTIONS/COMMENTS:

Total metals subsamples also included (unpreserved) for archive only.

2.1

RELINQUISHED BY (CLIENT)
(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time) 3:05
(Printed Name) Adam Lugo (Date)
(Company) RMS

RECEIVED BY (LABORATORY)
(Signature) (Time) 1810
(Printed Name) Adam T (Date) 4.4.14
(Company) Weck

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

27

4d08038

Date 4/7/14 Page 2 of 2

Sample Collection By: Nautilus

Report to:
Company AMEC
Address 9210 Sky Park Ct., Suite 200
City/State/Zip San Diego, CA 92123
Contact Chris Stransky
Phone 858-300-4350
Email chris.stransky@amec.com

Invoice To:
Company same
Address
City/State/Zip
Contact
Phone
Email

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Dissolved Copper	Dissolved Zinc									Receipt Temperature (°C)
1	DPR-48CuZn-11	4/6/14	1726	FW	250ml HDPE	1	preserved in	X	X									
2	DPR-48CuZn-12	↓	1727	↓	↓	1	HNO_3	X	X									
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

PROJECT INFORMATION

Client:	
PO No.:	
Shipped Via:	Weck courier

SAMPLE RECEIPT

Total No. of Containers	
Received Good Condition?	
Matches Test Schedule?	

SPECIAL INSTRUCTIONS/COMMENTS:
Total metals subsamples also included (unpreserved) for archive only
2.1

RELINQUISHED BY (CLIENT)
(Signature) Adrienne Cibor (Time)
(Printed Name) Adrienne Cibor (Date) 4/7/14
(Company) Nautilus

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) Reliable (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time) 3:05
(Printed Name) Adan Lugo (Date) 4-7-14
(Company) RLLS

RECEIVED BY (LABORATORY)
(Signature) (Time) 1410
(Printed Name) AdrianT (Date) 4.7.10
(Company) Wec

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

APPENDIX D

Field Observation Data Forms

Item 10
Supporting Document No. 2
December 14, 2016

2010

Range-finder and Definitive WERs

Appendix D – Field Data Log

WESTON SOLUTIONS

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME Chollas Creek WER	STATION ID CC-S08(1)	STATION NAME CC-S08(1)
DATE 1-18-10	TIME STARTED (AT SITE) 1500	TIME FINISHED (AT SITE) 2120
NAV DATUM	LATITUDE —	LONGITUDE —
FIELD TEAM BI		RECORDER BI

MONITORING PERIOD: ☐ SUMMER DRY ☐ WINTER DRY ☒ WET WEATHER

RAINFALL AMOUNT (POST-STORM): See flow file

WEATHER CONDITIONS: ☐ CLEAR ☐ CLOUDY ☐ FOGGY ☐ DRIZZLING ☒ RAINY Cold

SURFACE WATER APPEARANCE

ODOR	☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☒ NONE ☐ CHEMICAL ☐ OTHER
COLOR	☐ YELLOW ☐ GREEN ☐ BLUE ☒ BROWN ☐ RED ☐ COLORLESS ☐ OTHER
FLOATING MATERIALS (ALL THAT APPLY)	☐ SUDS/FOAM ☐ OILY SHEEN ☐ ORGANIC MATERIAL ☐ SCUM ☐ ALGAE ☒ OTHER (DESCRIBE) Trash/debris
TRASH	☐ NONE ☐ VEGETATION ☒ STYROFOAM ☐ WOOD ☒ PLASTIC (CUPS, BOTTLES, BAGS) ☑ OTHER (DESCRIBE) Various debris
TURBIDITY	☐ CLEAR ☐ CLOUDY ☒ HEAVY CLOUDINESS, OPAQUE

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE)	IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)		NOTES
—	DEPTH	FT IN	In-stream logger - see flow files
	WIDTH	FT IN	
	VELOCITY (choose one)	FT/SEC IN/SEC	☒ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED:	GRAB COLLECTION TIME:	
See below	1635	flowweighted Comp.

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY
	7.04	15.3	232	—	—
—	pH —	TEMP (degree C) —	CONDUCTIVITY (uS/cm) —	DISSOLVED OXYGEN —	TURBIDITY —

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

Rangefinder Sample

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

BOTTLE 1 1535 BOTTLE 2 1635 BOTTLE 3 1730 BOTTLE 4 1840 #5-2100

#

PHOTOS TAKEN: ☐ YES ☒ NO

PHOTO NUMBERS AND NOTES:

TEAM LEADER'S SIGNATURE

Appendix D – Field Data Log

WESTON SOLUTIONS

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME Chollas Creek KWER	STATION ID CC-S08(1)	STATION NAME CC-S08(1)
DATE 2-27-10	TIME STARTED (AT SITE) 0700	TIME FINISHED (AT SITE) 1720
NAV DATUM	LATITUDE —	LONGITUDE —
FIELD TEAM BI / PR		RECORDER BI

MONITORING PERIOD ☐ SUMMER DRY ☐ WINTER DRY ☒ WET WEATHER

RAINFALL AMOUNT (POST-STORM)

WEATHER CONDITIONS ☐ CLEAR ☐ CLOUDY ☐ FOGGY ☐ DRIZZLING ☒ RAINY

SURFACE WATER APPEARANCE

ODOR ☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☒ NONE ☐ CHEMICAL ☐ OTHER

COLOR ☐ YELLOW ☐ GREEN ☐ BLUE ☒ BROWN ☐ RED ☐ COLORLESS ☐ OTHER

FLOATING MATERIALS (ALL THAT APPLY) ☐ SUDS/FOAM ☐ OILY SHEEN ☐ ORGANIC MATERIAL ☐ SCUM ☐ ALGAE ☒ OTHER (DESCRIBE) Trash/debris

TRASH ☐ NONE ☐ VEGETATION ☐ STYROFOAM ☐ WOOD ☒ PLASTIC (CUPS, BOTTLES, BAGS) ☐ OTHER (DESCRIBE) Various debris.

TURBIDITY ☐ CLEAR ☐ CLOUDY ☒ HEAVY CLOUDINESS, OPAQUE Normal suspended sed.

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE)	IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)		NOTES
✓	DEPTH	FT IN	In-stream logger - see flow files
	WIDTH	FT IN	
	VELOCITY (choose one)	FT/SEC IN/SEC	☒ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED:	GRAB COLLECTION TIME:	
See below	1030	flow weighted Comp.

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY			
	7.44	—	186.2	—	—			
	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY			
—	—	—	—	—	—			

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

BOTTLE 1 0748 BOTTLE 2 0825 BOTTLE 3 0935 BOTTLE 4 1030

#5 - 1150
#6 - 1400
#7 - 1715

PHOTOS TAKEN: ☐ YES ☒ NO

PHOTO NUMBERS AND NOTES:

TEAM LEADER'S SIGNATURE

Appendix D – Field Data Log

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME Chollas Creek WER	STATION ID DPR2	STATION NAME DPR2
DATE 2-27-10	TIME STARTED (AT SITE) 0845	TIME FINISHED (AT SITE) 1750
NAV DATUM	LATITUDE —	LONGITUDE —
FIELD TEAM BI / PR		RECORDER BI

MONITORING PERIOD: ☐ SUMMER DRY ☐ WINTER DRY ☒ WET WEATHER

RAINFALL AMOUNT (POST-STORM): See flow file

WEATHER CONDITIONS: ☐ CLEAR ☐ CLOUDY ☐ FOGGY ☐ DRIZZLING ☒ RAINY

SURFACE WATER APPEARANCE

ODOR: ☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☒ NONE ☐ CHEMICAL ☐ OTHER

COLOR: ☐ YELLOW ☐ GREEN ☐ BLUE ☒ BROWN ☐ RED ☐ COLORLESS ☐ OTHER

FLOATING MATERIALS (ALL THAT APPLY): ☐ SUDS/FOAM ☐ OILY SHEEN ☐ ORGANIC MATERIAL ☐ SCUM ☐ ALGAE ☒ OTHER (DESCRIBE) Trash debris

TRASH: ☐ NONE ☐ VEGETATION ☐ STYROFOAM ☐ WOOD ☒ PLASTIC (CUPS, BOTTLES, BAGS) ☐ OTHER (DESCRIBE)

TURBIDITY: ☐ CLEAR ☒ CLOUDY ☐ HEAVY CLOUDINESS, OPAQUE

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE): —

IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)

DEPTH FT IN

WIDTH FT IN

VELOCITY (choose one) FT/SEC IN/SEC

NOTES: In-stream logger - see flow files

☒ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED: See below

GRAB COLLECTION TIME: 1100

flow weighted comp

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY
	7.62	—	549	—	—
—	—	—			—

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

BOTTLE 1 0900 BOTTLE 2 1005 BOTTLE 3 1100 BOTTLE 4 1145

#5 - 1351
#6 - 1740

PHOTOS TAKEN: ☐ YES ☒ NO

PHOTO NUMBERS AND NOTES:

TEAM LEADER'S SIGNATURE

Appendix D – Field Data Log

WESTON SOLUTIONS

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME Chollas Creek WQR	STATION ID CC-S08(1)	STATION NAME CC-S08(1)	
DATE 4/1/10	TIME STARTED (AT SITE) 0510	TIME FINISHED (AT SITE) 1130	
NAV DATUM —	LATITUDE —	LONGITUDE —	
FIELD TEAM BI/GR		RECORDER BI	

MONITORING PERIOD: ☐ SUMMER DRY ☐ WINTER DRY [✓ ☒ WET WEATHER] RAINFALL AMOUNT (POST-STORM): See flow file

WEATHER CONDITIONS: ☐ CLEAR ☒ CLOUDY ☐ FOGGY ☐ DRIZZLING ☒ RAINY light + wind 50's-60's

SURFACE WATER APPEARANCE

ODOR: ☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☐ NONE ☐ CHEMICAL ☒ OTHER Organic, dirt, odor

COLOR: ☐ YELLOW ☐ GREEN ☐ BLUE [✓ ☒ BROWN] ☐ RED ☐ COLORLESS ☐ OTHER

FLOATING MATERIALS (ALL THAT APPLY): ☐ SUDS/FOAM ☐ OILY SHEEN [✓ ☒ ORGANIC MATERIAL] ☐ SCUM ☐ ALGAE ☐ OTHER (DESCRIBE)

TRASH: ☐ NONE ☐ VEGETATION [✓ ☒ STYROFOAM] ☐ WOOD [✓ ☒ PLASTIC (CUPS, BOTTLES, BAGS)] [✓ ☐ OTHER (DESCRIBE)] debris/sed suspended sed.

TURBIDITY: ☐ CLEAR [✓ ☒ CLOUDY] ☐ HEAVY CLOUDINESS, OPAQUE

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE): —

IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)

DEPTH	FT IN
WIDTH	FT IN
VELOCITY (choose one)	FT/SEC IN/SEC

NOTES: In-stream logger - see flow files

[✓ ☒ FLOW METER PRESENT]

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED: See below

GRAB COLLECTION TIME: 0715

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY
7.33	~~7.33~~	11.7	322	—	—
	pH —	TEMP (degree C) —	CONDUCTIVITY (uS/cm) —	DISSOLVED OXYGEN —	TURBIDITY

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

BOTTLE 1 0515 BOTTLE 2 0600 BOTTLE 3 0650 BOTTLE 4 0715

#5 - 0750
#6 - 0850
#7 - 1100

PHOTOS TAKEN: ☐ YES ☐ NO

PHOTO NUMBERS AND NOTES:

TEAM LEADER'S SIGNATURE

Appendix D – Field Data Log

WESTON SOLUTIONS

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME Chollas Creek WER	STATION ID DPR2	STATION NAME DPR2
DATE 4/1/10	TIME STARTED (AT SITE) 0640	TIME FINISHED (AT SITE) 1015
NAV DATUM —	LATITUDE —	LONGITUDE —
FIELD TEAM AC		RECORDER AC

MONITORING PERIOD: ☐ SUMMER DRY ☐ WINTER DRY ☒ WET WEATHER

RAINFALL AMOUNT (POST-STORM): See flow file

WEATHER CONDITIONS: ☐ CLEAR ☐ CLOUDY ☐ FOGGY ☐ DRIZZLING ☒ RAINY Light Rain on and

SURFACE WATER APPEARANCE

ODOR: ☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☒ NONE ☐ CHEMICAL ☐ OTHER

COLOR: ☐ YELLOW ☐ GREEN ☐ BLUE ☒ BROWN ☐ RED ☐ COLORLESS ☐ OTHER

FLOATING MATERIALS (ALL THAT APPLY): ☐ SUDS/FOAM ☐ OILY SHEEN ☐ ORGANIC MATERIAL ☐ SCUM ☐ ALGAE ☐ OTHER (DESCRIBE)

TRASH: ☐ NONE ☐ VEGETATION ☐ STYROFOAM ☐ WOOD ☐ PLASTIC (CUPS, BOTTLES, BAGS) ☐ OTHER (DESCRIBE)

TURBIDITY: ☐ CLEAR ☐ CLOUDY ☐ HEAVY CLOUDINESS, OPAQUE

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE)	IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)		NOTES
—	DEPTH	FT IN	In-stream logger - see flow files
	WIDTH	FT IN	
	VELOCITY (choose one)	FT/SEC IN/SEC	☒ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED:	GRAB COLLECTION TIME:	
See below		flow weighted Comp.

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY
	7.15	14.4	487	—	—
—	—	—	—	—	—

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

well established vegetation on channel bottom sides of concrete

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

Remote Collection BOTTLE 1 0550 BOTTLE 2 0645 BOTTLE 3 0720 BOTTLE 4 0745

#5 - 0820
#6 - 0945

PHOTOS TAKEN: ☐ YES ☒ NO

PHOTO NUMBERS AND NOTES:

TEAM LEADER'S SIGNATURE

Appendix D – Field Data Log

WESTON SOLUTIONS

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME Chollas Creek WER	STATION ID CC-S08(1)	STATION NAME CC-S08(1)
DATE 10/30/10	TIME STARTED (AT SITE) 0800	TIME FINISHED (AT SITE) 2000
NAV DATUM —	LATITUDE —	LONGITUDE —
FIELD TEAM LC/BI		RECORDER LC/BI

MONITORING PERIOD ☐ SUMMER DRY ☐ WINTER DRY ☒ WET WEATHER

RAINFALL AMOUNT (POST-STORM) See flow file

WEATHER CONDITIONS ☐ CLEAR ☒ CLOUDY ☐ FOGGY ☒ DRIZZLING ☒ RAINY

SURFACE WATER APPEARANCE

ODOR ☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☒ NONE ☐ CHEMICAL ☐ OTHER

COLOR ☐ YELLOW ☐ GREEN ☐ BLUE ☒ BROWN ☐ RED ☐ COLORLESS ☐ OTHER

FLOATING MATERIALS (ALL THAT APPLY) ☐ SUDS/FOAM ☐ OILY SHEEN ☐ ORGANIC MATERIAL ☐ SCUM ☐ ALGAE ☐ OTHER (DESCRIBE)

TRASH ☐ NONE ☒ VEGETATION ☐ STYROFOAM ☐ WOOD ☒ PLASTIC (CUPS, BOTTLES, BAGS) ☒ OTHER (DESCRIBE) assorted debris

TURBIDITY ☐ CLEAR ☐ CLOUDY ☒ HEAVY CLOUDINESS, OPAQUE

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE)	IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)		NOTES
—	DEPTH	FT IN	In-stream logger – see flow files
	WIDTH	FT IN	
	VELOCITY (choose one)	FT/SEC IN/SEC	☒ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED:	GRAB COLLECTION TIME:	
See below	0937	flow weighted composite

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY
	7.13	17.5	184	—	—
	pH —	TEMP (degree C) —	CONDUCTIVITY (uS/cm) —	DISSOLVED OXYGEN —	TURBIDITY —

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

BOTTLE 1 0840 BOTTLE 2 0857 BOTTLE 3 0913 BOTTLE 4 0937

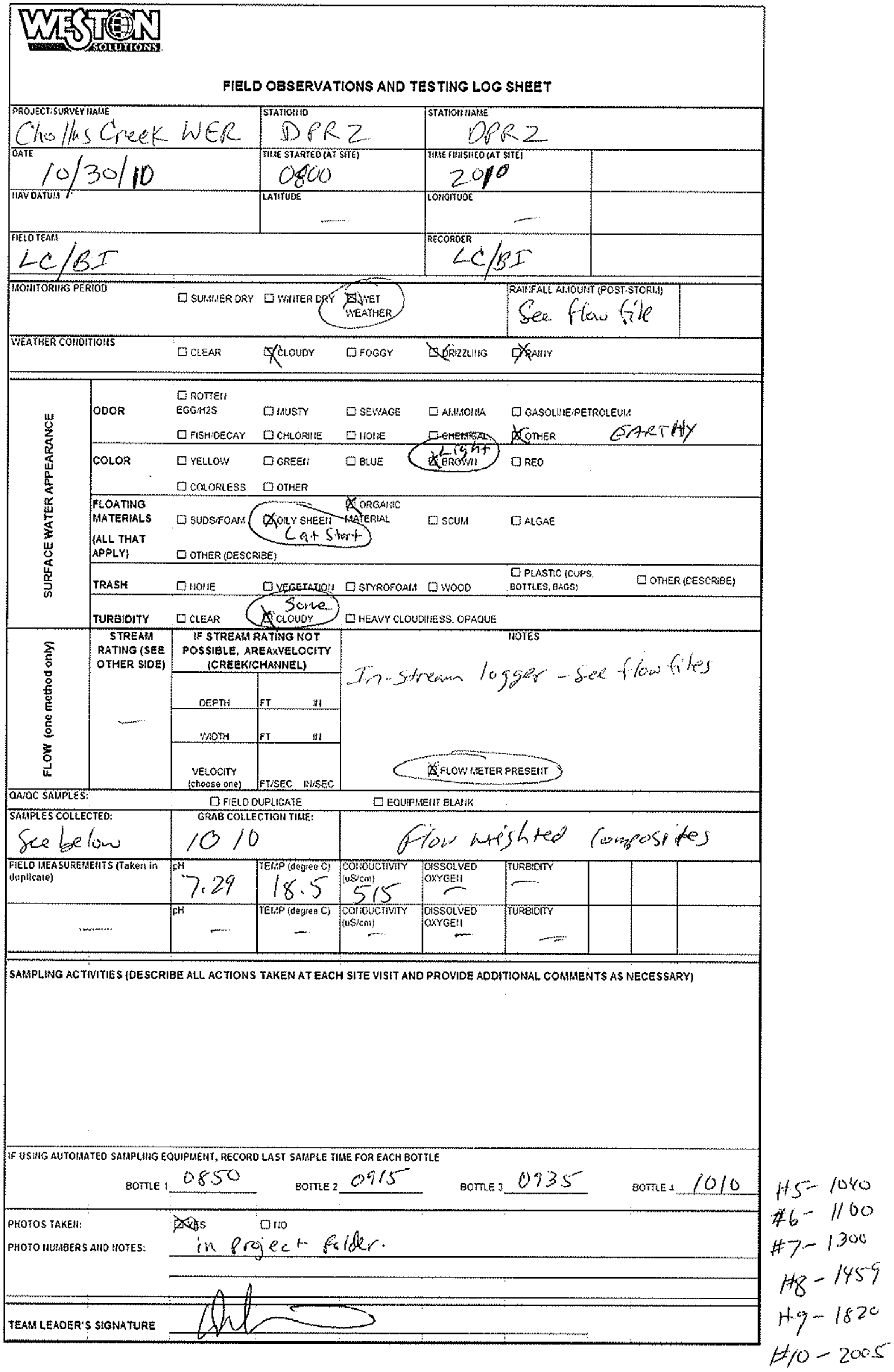
#5 – 1007
#6 – 1034
#7 – 1145
#8 – 1548

PHOTOS TAKEN: ☒ YES ☐ NO

PHOTO NUMBERS AND NOTES: in project folder

TEAM LEADER'S SIGNATURE

Appendix D – Field Data Log



WESTON SOLUTIONS

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME Cholllas Creek WER	STATION ID DPR2	STATION NAME DPR2	
DATE 10/30/10	TIME STARTED (AT SITE) 0800	TIME FINISHED (AT SITE) 2010	
NAV DATUM	LATITUDE —	LONGITUDE —	
FIELD TEAM LC/BI		RECORDER LC/BI	

MONITORING PERIOD: ☐ SUMMER DRY ☐ WINTER DRY ☒ WET WEATHER

RAINFALL AMOUNT (POST-STORM): See flow file

WEATHER CONDITIONS: ☐ CLEAR ☒ CLOUDY ☐ FOGGY ☒ DRIZZLING ☒ RAINY

SURFACE WATER APPEARANCE

ODOR: ☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☐ NONE ☐ ~~CHEMICAL~~ ☒ OTHER EARTHY

COLOR: ☐ YELLOW ☐ GREEN ☐ BLUE ☒ Light BROWN ☐ RED ☐ COLORLESS ☐ OTHER

FLOATING MATERIALS (ALL THAT APPLY): ☐ SUDS/FOAM ☒ OILY SHEEN Lat Start ☒ ORGANIC MATERIAL ☐ SCUM ☐ ALGAE ☐ OTHER (DESCRIBE)

TRASH: ☐ NONE ☐ VEGETATION ☐ STYROFOAM ☐ WOOD ☐ PLASTIC (CUPS, BOTTLES, BAGS) ☐ OTHER (DESCRIBE)

TURBIDITY: ☐ CLEAR ☒ Some CLOUDY ☐ HEAVY CLOUDINESS, OPAQUE

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE)	IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)		NOTES
—	DEPTH	FT IN	In-stream logger - See flow files
	WIDTH	FT IN	
	VELOCITY (choose one)	FT/SEC IN/SEC	☒ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED: See below

GRAB COLLECTION TIME: 10 10

Flow weighted composites

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY			
	7.29	18.5	515	—	—			
—	—	—	—	—	—			

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

BOTTLE 1 0850 BOTTLE 2 0915 BOTTLE 3 0935 BOTTLE 4 1010

#5 - 1040
#6 - 1100
#7 - 1300
#8 - 1459
#9 - 1820
#10 - 2005

PHOTOS TAKEN: ☒ YES ☐ NO

PHOTO NUMBERS AND NOTES: in Project folder.

TEAM LEADER'S SIGNATURE

Appendix D – Field Data Log

WESTON SOLUTIONS

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME: Chollas Creek WER
STATION ID: CC-S08(1)
STATION NAME: CC-S08(1)
DATE: 12/20/10
TIME STARTED (AT SITE): 0130
TIME FINISHED (AT SITE): 1530
NAV DATUM:
LATITUDE: —
LONGITUDE: —
FIELD TEAM: LC
RECORDER: LC

MONITORING PERIOD: ☐ SUMMER DRY ☐ WINTER DRY ☒ WET WEATHER
RAINFALL AMOUNT (POST-STORM):

WEATHER CONDITIONS: ☐ CLEAR ☐ CLOUDY ☐ FOGGY ☐ DRIZZLING ☒ RAINY wind, cold

SURFACE WATER APPEARANCE

ODOR: ☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☒ NONE ☐ CHEMICAL ☐ OTHER

COLOR: ☐ YELLOW ☐ GREEN ☐ BLUE ☒ BROWN ☐ RED ☐ COLORLESS ☐ OTHER

FLOATING MATERIALS (ALL THAT APPLY): ☐ SUDS/FOAM ☐ OILY SHEEN ☐ ORGANIC MATERIAL ☐ SCUM ☐ ALGAE ☒ OTHER (DESCRIBE) Trash / Debris

TRASH: ☐ NONE ☐ VEGETATION ☒ STYROFOAM ☐ WOOD ☒ PLASTIC (CUPS, BOTTLES, BAGS) ☐ OTHER (DESCRIBE)

TURBIDITY: ☐ CLEAR ☐ CLOUDY ☒ HEAVY CLOUDINESS, OPAQUE

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE): —

IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)

DEPTH	FT	IN
WIDTH	FT	IN
VELOCITY (choose one)	FT/SEC	IN/SEC

NOTES: In-stream logger – see flow files

☒ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED: See below
GRAB COLLECTION TIME: 0810
flow weighted comps

FIELD MEASUREMENTS (Taken in duplicate)

	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY
	7.10	16.0	216	—	—
—	—	—	—	—	—

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

12/17/10 dissolved @2110 #1

BOTTLE ~~1~~ 2 ~~2110~~ 0229 BOTTLE ~~2~~ 3 0350 BOTTLE ~~3~~ 4 0610 BOTTLE ~~4~~ 5 0810

#6 – 1610
#7 – 1215
#8 – 1328
#9 – 1520
~~#9~~

PHOTOS TAKEN: ☒ YES ☐ NO

PHOTO NUMBERS AND NOTES:

TEAM LEADER'S SIGNATURE

Appendix D – Field Data Log

WESTON SOLUTIONS

FIELD OBSERVATIONS AND TESTING LOG SHEET

PROJECT/SURVEY NAME Chollas Creek WER	STATION ID DPR2	STATION NAME DPR2	
DATE 12/20/10	TIME STARTED (AT SITE) 0130	TIME FINISHED (AT SITE) 1630	
NAV DATUM —	LATITUDE —	LONGITUDE —	
FIELD TEAM LC/GF		RECORDER LC	

MONITORING PERIOD: ☐ SUMMER DRY ☐ WINTER DRY ☒ WET WEATHER

RAINFALL AMOUNT (POST-STORM):

WEATHER CONDITIONS: ☐ CLEAR ☐ CLOUDY ☐ FOGGY ☐ DRIZZLING ☒ RAINY Wind Cold

SURFACE WATER APPEARANCE

ODOR: ☐ ROTTEN EGG/H2S ☐ MUSTY ☐ SEWAGE ☐ AMMONIA ☐ GASOLINE/PETROLEUM ☐ FISH/DECAY ☐ CHLORINE ☒ NONE ☐ CHEMICAL ☐ OTHER

COLOR: ☐ YELLOW ☐ GREEN ☐ BLUE ☒ BROWN ☐ RED ☐ COLORLESS ☐ OTHER

FLOATING MATERIALS (ALL THAT APPLY): ☐ SUDS/FOAM ☐ OILY SHEEN ☐ ORGANIC MATERIAL ☐ SCUM ☐ ALGAE ☒ OTHER (DESCRIBE) Trash/debris

TRASH: ☐ NONE ☐ VEGETATION ☐ STYROFOAM ☐ WOOD ☐ PLASTIC (CUPS, BOTTLES, BAGS) ☐ OTHER (DESCRIBE)

TURBIDITY: ☐ CLEAR ☐ CLOUDY ☒ HEAVY CLOUDINESS, OPAQUE

FLOW (one method only)

STREAM RATING (SEE OTHER SIDE)	IF STREAM RATING NOT POSSIBLE, AREAxVELOCITY (CREEK/CHANNEL)		NOTES
—	DEPTH	FT IN	In-stream logger - see flow files
	WIDTH	FT IN	
	VELOCITY (choose one)	FT/SEC IN/SEC	☒ FLOW METER PRESENT

QA/QC SAMPLES: ☐ FIELD DUPLICATE ☐ EQUIPMENT BLANK

SAMPLES COLLECTED: See below	GRAB COLLECTION TIME: ~~1030~~ ~~1010~~	1030

FIELD MEASUREMENTS (Taken in duplicate)	pH	TEMP (degree C)	CONDUCTIVITY (uS/cm)	DISSOLVED OXYGEN	TURBIDITY
	7.05 ~~7.05~~	~~16.2~~ 61	223	—	—
—	—	—	—	—	—

SAMPLING ACTIVITIES (DESCRIBE ALL ACTIONS TAKEN AT EACH SITE VISIT AND PROVIDE ADDITIONAL COMMENTS AS NECESSARY)

IF USING AUTOMATED SAMPLING EQUIPMENT, RECORD LAST SAMPLE TIME FOR EACH BOTTLE

12/18/10 BOTTLE 1 1315 discard BOTTLE 2 0207 BOTTLE 3 0426 BOTTLE 4 0637

#5 - 0831
#6 - 1030
#7 - 1235
#8 - 1322
#9 - 1430
#10 - 1605

PHOTOS TAKEN: ☒ YES ☐ NO

PHOTO NUMBERS AND NOTES:

TEAM LEADER'S SIGNATURE

Item 10
Supporting Document No. 2
December 14, 2016

2014

Confirmation WERs

Field Data Log Sheet

Site ID SD8(1 **Field Crew** TW, TA **Date** 4/2/14

Site-Specific Event Wet Weather 1 Wet Weather 2 Wet Weather 3 Data Download WW4 **Time** 1320

ATMOSPHERIC CONDITIONS

Weather Sunny [✓ Partly Cloudy] Overcast Fog Raining

Last Rain > 72 Hours [✓ < 72 Hours] **Rainfall** [✓ None] < 0.1" > 0.1"

RUNOFF CHARACTERISTICS

Odor [✓ None] Musty Rotten Eggs Chemical Sewage Other_____

Color None Yellow [✓ Brown] White Gray Other_____

Clarity Clear [✓ Slightly Cloudy] Opaque Other_____

Floatables None [✓ Trash] Bubbles/Foam Sheen Other_____

Deposits None [✓ Sediment/Gravel] Fine Particles Stains Oily Deposits Other_____

Vegetation [✓ None] Limited Normal Excessive Other_____

Water Flow [✓ Flowing] Ponded Moist Dry

CURRENT CONDITIONS

Upon Arrival: Flowmeter Running? [✓ Y] N **Sampler Running?** [✓ Y] N **Tubing Connected?** [✓ Y] N

Level (in) 2.477 **Velocity (fps)** — **Flow (cfs)** 8.725

Total Flow (cf) – **Total Rainfall (in)** 0 **# of Missed Samples** 0

Flow Meter Battery Voltage 12.0 **# of Successful Samples**

Sampler Battery Voltage **Approx. Sample Volume (L)**

Upon Departure: Flowmeter Running? [✓ Y] N **Sampler Running?** [✓ Y] N **Tubing Connected?** [✓ Y] N

FIELD MEASUREMENTS

Temp(°C) **pH** **Sp Conductivity @ 25°C (µS/cm)**

SAMPLE COLLECTION

Sample Type	Date	Time	Bottle ID	Sample ID
Chemistry				
Toxicity	4/2/14	1320		SD8(1) Grab

POST STORM DATA

Total Flow Volume (cf)	Total Rainfall (in)	Sample Aliquot Count	Total Sample Volume
—	—	—	—

BOTTLE CHANGE

LAST SAMPLE

Chemistry	Toxicity	Chemistry	Toxicity
Date —	Date —	Date —	Date —
Time	Time	Time	Time
Aliquot	Aliquot	Aliquot	Aliquot
Volume	Volume	Volume	Volume
Bottle ID	Bottle ID	Bottle ID	Bottle ID

City of San Diego
Cholias Creek Dissolved Metals TMDL
AMEC Project No. 5025131035

Monitoring Plan
August 2013
(Log Sheet Revised Oct 2013)

Field Data Log Sheet

Site ID DPR3 **Field Crew** TW, TA **Date** 4/3/14

Site-Specific Event Wet Weather 1 Wet Weather 2 Wet Weather 3 Data Downloa WW4 **Time** 631

ATMOSPHERIC CONDITIONS

Weather Sunny [✓ Partly Cloudy] Overcast Fog Raining

Last Rain > 72 Hours [✓ < 72 Hours] **Rainfall** None < 0.1" > 0.1"

RUNOFF CHARACTERISTICS

Odor [✓ None] Musty Rotten Eggs Chemical Sewage Other______

Color None Yellow [✓ Brown] White Gray Other______

Clarity Clear [✓ Slightly Cloudy] Opaque Other______

Floatables None [✓ Trash] [✓ Bubbles/Foam] Sheen Other______

Deposits None [✓ Sediment/Gravel] Fine Particles Stains Oily Deposits Other______

Vegetation None Limited [✓ Normal] Excessive Other______

Water Flow [✓ Flowing] Ponded Moist Dry

CURRENT CONDITIONS

Upon Arrival: **Flowmeter Running?** [✓ Y] N **Sampler Running?** [✓ Y] N **Tubing Connected?** [✓ Y] N

Level (in) 1.657 **Velocity (fps)** 0.04 **Flow (cfs)** 0.961

Total Flow (cf) **Total Rainfall (in)** 0 **# of Missed Samples** 0

Flow Meter Battery Voltage 12.0 **# of Successful Samples**

Sampler Battery Voltage [illegible] — **Approx. Sample Volume (L)**

Upon Departure: **Flowmeter Running?** [✓ Y] N **Sampler Running?** [✓ Y] N **Tubing Connected?** [✓ Y] N

FIELD MEASUREMENTS

Temp(°C) **pH** **Sp Conductivity @ 25°C (µS/cm)**

SAMPLE COLLECTION

Sample Type	Date	Time	Bottle ID	Sample ID
Chemistry				
Toxicity	4/3/14	631		DPR(3)Comp

POST STORM DATA

Total Flow Volume (cf)	Total Rainfall (in)	Sample Aliquot Count	Total Sample Volume
—	—	—	—

BOTTLE CHANGE

LAST SAMPLE

Chemistry	Toxicity	Chemistry	Toxicity
Date —	Date —	Date —	Date —
Time	Time	Time	Time
Aliquot	Aliquot	Aliquot	Aliquot
Volume	Volume	Volume	Volume
Bottle ID	Bottle ID	Bottle ID	Bottle ID

Item 10
Supporting Document No. 2
December 14, 2016

APPENDIX E-1

Analytical Chemistry Tables

2010

Range-finder and Definitive WERs

Item 10
Supporting Document No. 2
December 14, 2016

Field Analytical Chemistry

Parameter	Units	Range Finder Test	Event 1		
		SD8(1)-COMP	DPR2	SD8(1)	DMW
		1/18/2010	2/27/2010	2/27/2010	2/28/2010
General Chemistry					
Ammonia-N	mg/L	NA	0.14	0.16	NA
Chloride by IC	mg/L	12.51	63.81	19.21	2
Dissolved Organic Carbon	mg/L	10.6	8.5	8	NA
Sulfate by IC	mg/L	10.4	26.77B	15.03B	3.72
Total Alkalinity	mg/L	26	48	32	101
Total Dissolved Solids	mg/L	NA	192	138	114
Total Hardness as CaCO3	mg/L	22.1	74	36.6	85.4
Total Organic Carbon	mg/L	10.8	8	6.8	NA
Total Sulfides	mg/L	<0.01	NA	NA	NA
Total Suspended Solids	mg/L	NA	112.5	322	NA
Chlorinated Pesticides					
2,4'-DDD	ng/L	<1	<1	<1	NA
2,4'-DDE	ng/L	<1	<1	<1	NA
2,4'-DDT	ng/L	<1	<1	<1	NA
4,4'-DDD	ng/L	<1	<1	<1	NA
4,4'-DDE	ng/L	<1	<1	<1	NA
4,4'-DDT	ng/L	<1	<1	<1	NA
Aldrin	ng/L	<1	<1	<1	NA
BHC-alpha	ng/L	<1	<1	<1	NA
BHC-beta	ng/L	<1	<1	<1	NA
BHC-delta	ng/L	<1	<1	<1	NA
BHC-gamma	ng/L	<1	<1	<1	NA
Chlordane-alpha	ng/L	32.9	5.6	14.4	NA
Chlordane-gamma	ng/L	27.6	4.9J	13.6	NA
DCPA (Dacthal)	ng/L	<5	<5	<5	NA
Dicofol	ng/L	<50	<50	<50	NA
Dieldrin	ng/L	<1	<1	<1	NA
Endosulfan Sulfate	ng/L	<1	<1	<1	NA
Endosulfan-I	ng/L	<1	<1	<1	NA
Endosulfan-II	ng/L	<1	<1	<1	NA
Endrin	ng/L	<1	<1	<1	NA
Endrin Aldehyde	ng/L	<1	<1	<1	NA
Endrin Ketone	ng/L	<1	<1	<1	NA
Heptachlor	ng/L	<1	<1	<1	NA
Heptachlor Epoxide	ng/L	<1	<1	<1	NA
Methoxychlor	ng/L	<1	<1	<1	NA
Mirex	ng/L	<1	<1	<1	NA
Oxychlordane	ng/L	<1	<1	<1	NA
Perthane	ng/L	<5	<5	<5	NA
Toxaphene	ng/L	<10	<10	<10	NA
cis-Nonachlor	ng/L	8.8	3.1J	5.4	NA
trans-Nonachlor	ng/L	20	6	12.3	NA
Dissolved Metals					
Calcium (Ca)	mg/L	NA	16.46	8.99	20.18
Copper (Cu)	µg/L	7.3	6.5	7.1	<0.4
Lead (Pb)	µg/L	0.97	0.89	1.3	0.1
Magnesium (Mg)	mg/L	NA	7.98	3.44	8.49
Potassium (K)	mg/L	NA	<5	<5	<5
Sodium (Na)	mg/L	NA	41.7	17	<5
Zinc (Zn)	µg/L	33	19.1	20.2	<0.1
Total Metals					
Calcium (Ca)	mg/L	5.25	17.46	11.22	21.65
Copper (Cu)	µg/L	35.1	15.8	22.1	<0.4
Lead (Pb)	µg/L	47.67	10.09	24.19	0.06J
Magnesium (Mg)	mg/L	2.19	8.59	4.22	8.39
Potassium (K)	mg/L	<5	<5	<5	<5
Sodium (Na)	mg/L	10.2	43.1	17.6	<5
Zinc (Zn)	µg/L	222.3	82.3	192.3	<0.1
Organophosphorus Pesticides					
Azinphos Methyl	ng/L	<10	<10	<10	NA
Bolstar (Sulprofos)	ng/L	<2	<2	<2	NA
Chlorpyrifos	ng/L	<1	<1	<1	NA
Demeton	ng/L	<1	<1	<1	NA
Diazinon	ng/L	<2	<2	<2	NA
Dichlorvos	ng/L	<3	<3	<3	NA

Parameter	Units	Range Finder Test	Event 1		
		SD8(1)-COMP	DPR2	SD8(1)	DMW
		1/18/2010	2/27/2010	2/27/2010	2/28/2010
Dimethoate	ng/L	<3	<3	<3	NA
Disulfoton	ng/L	<1	<1	<1	NA
Ethoprop (Ethoprofos)	ng/L	<1	<1	<1	NA
Ethyl Parathion	ng/L	<10	<10	<10	NA
Fenchlorphos (Ronnel)	ng/L	<2	<2	<2	NA
Fenitrothion	ng/L	<10	<10	<10	NA
Fensulfothion	ng/L	<1	<1	<1	NA
Fenthion	ng/L	<2	<2	<2	NA
Malathion	ng/L	<3	153	72.2	NA
Merphos	ng/L	<1	<1	<1	NA
Methamidophos (Monitor)	ng/L	<50	<50	<50	NA
Methidathion	ng/L	<10	<10	<10	NA
Methyl Parathion	ng/L	<1	<1	<1	NA
Mevinphos (Phosdrin)	ng/L	<8	<8	<8	NA
Phorate	ng/L	<6	<6	<6	NA
Phosmet	ng/L	<50	<50	<50	NA
Tetrachlorvinphos (Stirofos)	ng/L	<2	<2	<2	NA
Tokuthion	ng/L	<3	<3	<3	NA
Trichloronate	ng/L	<1	<1	<1	NA
PCB Congeners					
PCB003	ng/L	<1	<1	<1	NA
PCB008	ng/L	<1	<1	<1	NA
PCB018	ng/L	<1	<1	<1	NA
PCB028	ng/L	<1	<1	<1	NA
PCB031	ng/L	<1	<1	<1	NA
PCB033	ng/L	<1	<1	<1	NA
PCB037	ng/L	<1	<1	<1	NA
PCB044	ng/L	<1	<1	<1	NA
PCB049	ng/L	<1	<1	<1	NA
PCB052	ng/L	<1	<1	<1	NA
PCB056/060	ng/L	<1	<1	<1	NA
PCB066	ng/L	<1	<1	<1	NA
PCB070	ng/L	<1	<1	<1	NA
PCB074	ng/L	<1	<1	<1	NA
PCB077	ng/L	<1	<1	<1	NA
PCB081	ng/L	<1	<1	<1	NA
PCB087	ng/L	<1	<1	<1	NA
PCB095	ng/L	<1	<1	<1	NA
PCB097	ng/L	<1	<1	<1	NA
PCB099	ng/L	<1	<1	<1	NA
PCB101	ng/L	<1	<1	<1	NA
PCB105	ng/L	<1	<1	<1	NA
PCB110	ng/L	<1	<1	<1	NA
PCB114	ng/L	<1	<1	<1	NA
PCB118	ng/L	<1	<1	<1	NA
PCB119	ng/L	<1	<1	<1	NA
PCB123	ng/L	<1	<1	<1	NA
PCB126	ng/L	<1	<1	<1	NA
PCB128	ng/L	<1	<1	<1	NA
PCB138	ng/L	<1	<1	<1	NA
PCB141	ng/L	<1	<1	<1	NA
PCB149	ng/L	<1	<1	<1	NA
PCB151	ng/L	<1	<1	<1	NA
PCB153	ng/L	<1	<1	<1	NA
PCB156	ng/L	<1	<1	<1	NA
PCB157	ng/L	<1	<1	<1	NA
PCB158	ng/L	<1	<1	<1	NA
PCB167	ng/L	<1	<1	<1	NA
PCB168+132	ng/L	<1	<1	<1	NA
PCB169	ng/L	<1	<1	<1	NA
PCB170	ng/L	<1	<1	<1	NA
PCB174	ng/L	<1	<1	<1	NA
PCB177	ng/L	<1	<1	<1	NA
PCB180	ng/L	<1	<1	<1	NA
PCB183	ng/L	<1	<1	<1	NA
PCB187	ng/L	<1	<1	<1	NA

Parameter	Units	Range Finder Test	Event 1		
		SD8(1)-COMP	DPR2	SD8(1)	DMW
		1/18/2010	2/27/2010	2/27/2010	2/28/2010
PCB189	ng/L	<1	<1	<1	NA
PCB194	ng/L	<1	<1	<1	NA
PCB195	ng/L	<1	<1	<1	NA
PCB200	ng/L	<1	<1	<1	NA
PCB201	ng/L	<1	<1	<1	NA
PCB203	ng/L	<1	<1	<1	NA
PCB206	ng/L	<1	<1	<1	NA
PCB209	ng/L	<1	<1	<1	NA
Polynuclear Aromatic Hydrocarbons					
1-Methylnaphthalene	ng/L	8.7	5	5.5	NA
1-Methylphenanthrene	ng/L	21	10.2	15.1	NA
2,3,5-Trimethylnaphthalene	ng/L	2.5J	2.8J	3.9J	NA
2,6-Dimethylnaphthalene	ng/L	8.2	4.8J	4.5J	NA
2-Methylnaphthalene	ng/L	22	7.8	7	NA
Acenaphthene	ng/L	2.9J	1J	3J	NA
Acenaphthylene	ng/L	6	3.4J	4.1J	NA
Anthracene	ng/L	25.4	5.7	14.6	NA
Benz[a]anthracene	ng/L	116	20.4	57.6	NA
Benzo[a]pyrene	ng/L	116.4	25.3	61.7	NA
Benzo[b]fluoranthene	ng/L	188.8	42.6	110.2	NA
Benzo[e]pyrene	ng/L	116.1	37.4	96	NA
Benzo[g,h,i]perylene	ng/L	139.9	48	113.8	NA
Benzo[k]fluoranthene	ng/L	61.6	16.8	59.7	NA
Biphenyl	ng/L	8	4.7J	6	NA
Chrysene	ng/L	345.8	64.7	151.9	NA
Dibenz[a,h]anthracene	ng/L	31.9	<1	22.2	NA
Dibenzothiophene	ng/L	49.9	17.8	19.9	NA
Fluoranthene	ng/L	332.5	70.3	221.3	NA
Fluorene	ng/L	8.1	4.9J	5.6	NA
Indeno[1,2,3-c,d]pyrene	ng/L	140.5	19.1	64	NA
Naphthalene	ng/L	28.7B	10.2	11	NA
Perylene	ng/L	38.5	16.5	46.9	NA
Phenanthrene	ng/L	126.1	30.3	90.8	NA
Pyrene	ng/L	290.4	87.1	198.3	NA
Pyrethroids by NCI					
Allethrin by NCI	ng/L	<0.5	<0.5	<0.5	NA
Bifenthrin by NCI	ng/L	172.7	62	89.2	NA
Cyfluthrin by NCI	ng/L	81.5	42.6	66	NA
Cypermethrin by NCI	ng/L	82.2	87.5	90.5	NA
Danitol by NCI	ng/L	2.4	27.3	<0.5	NA
Deltamethrin by NCI	ng/L	156.8	<0.5	<0.5	NA
Esfenvalerate by NCI	ng/L	1.2J,B	25.2	29.4	NA
Fenvalerate by NCI	ng/L	1J	25.4	27	NA
Fluvalinate by NCI	ng/L	<0.5	<0.5	<0.5	NA
L-Cyhalothrin by NCI	ng/L	48.2	25.6	30.7	NA
Permethrin by NCI	ng/L	685.2	305.8	176.8	NA
Prallethrin by NCI	ng/L	11.7	<0.5	<0.5	NA
Resmethrin by NCI	ng/L	<5	NA	NA	NA

< = result are less than the method detection limit

B = Analyte was detected in the associated method blank

J = Detected but below the Reporting Limit; therefore,result is an estimated concentration.

NA = Not Available

Parameter	Units	Event 2		
		DPR2	SD8(1)	DMW
		4/1/2010	4/1/2010	4/2/2010
General Chemistry				
Ammonia-N	mg/L	0.5	0.48	NA
Chloride by IC	mg/L	86.68	27.84	2.18
Dissolved Organic Carbon	mg/L	28.5	25.2	NA
Sulfate by IC	mg/L	35.59B	19.83B	3.8
Total Alkalinity	mg/L	47	31	98
Total Dissolved Solids	mg/L	278	134	122B
Total Hardness as CaCO3	mg/L	103.4	49.9	64.1
Total Organic Carbon	mg/L	31.3	28.6	NA
Total Suspended Solids	mg/L	59	76.5	NA
Chlorinated Pesticides				
2,4'-DDD	ng/L	<1	<1	NA
2,4'-DDE	ng/L	<1	<1	NA
2,4'-DDT	ng/L	<1	<1	NA
4,4'-DDD	ng/L	<1	<1	NA
4,4'-DDE	ng/L	<1	<1	NA
4,4'-DDT	ng/L	<1	<1	NA
Aldrin	ng/L	<1	<1	NA
BHC-alpha	ng/L	<1	<1	NA
BHC-beta	ng/L	<1	<1	NA
BHC-delta	ng/L	<1	<1	NA
BHC-gamma	ng/L	<1	<1	NA
Chlordane-alpha	ng/L	2.9J	5.6	NA
Chlordane-gamma	ng/L	<1	6.7	NA
DCPA (Dacthal)	ng/L	<5	<5	NA
Dicofol	ng/L	<50	<50	NA
Dieldrin	ng/L	<1	<1	NA
Endosulfan Sulfate	ng/L	<1	<1	NA
Endosulfan-I	ng/L	<1	<1	NA
Endosulfan-II	ng/L	<1	<1	NA
Endrin	ng/L	<1	<1	NA
Endrin Aldehyde	ng/L	<1	<1	NA
Endrin Ketone	ng/L	<1	<1	NA
Heptachlor	ng/L	<1	<1	NA
Heptachlor Epoxide	ng/L	<1	<1	NA
Methoxychlor	ng/L	<1	<1	NA
Mirex	ng/L	<1	<1	NA
Oxychlordane	ng/L	<1	<1	NA
Perthane	ng/L	<5	<5	NA
Toxaphene	ng/L	<10	<10	NA
cis-Nonachlor	ng/L	<1	<1	NA
trans-Nonachlor	ng/L	1.5J	8.3	NA
Dissolved Metals				
Calcium (Ca)	mg/L	25.37	13.16	14.15
Copper (Cu)	µg/L	15.1	17.3	<0.4
Lead (Pb)	µg/L	1.24	2.11	0.11
Magnesium (Mg)	mg/L	9.73	4.13	6.99
Potassium (K)	mg/L	5.2J	<5	<5
Sodium (Na)	mg/L	48	20.6	<5
Zinc (Zn)	µg/L	66.2	76.6	0.7
Total Metals				

Parameter	**Units**	**Event 2**		
		DPR2	**SD8(1)**	**DMW**
		4/1/2010	**4/1/2010**	**4/2/2010**
Calcium (Ca)	mg/L	26.43	14.5	14.16
Copper (Cu)	µg/L	24.9	29.4	<0.4
Lead (Pb)	µg/L	8.3	12.27	0.09J
Magnesium (Mg)	mg/L	10.23	4.48	6.97
Potassium (K)	mg/L	5.3J	<5	<5
Sodium (Na)	mg/L	49.2	20.9	<5
Zinc (Zn)	µg/L	115.5	161.1	0.6
Organophosphorus Pesticides				
Azinphos Methyl	ng/L	<10	<10	NA
Bolstar (Sulprofos)	ng/L	<2	<2	NA
Chlorpyrifos	ng/L	<1	<1	NA
Demeton	ng/L	<1	<1	NA
Diazinon	ng/L	<2	<2	NA
Dichlorvos	ng/L	<3	<3	NA
Dimethoate	ng/L	<3	<3	NA
Disulfoton	ng/L	<1	<1	NA
Ethoprop (Ethoprofos)	ng/L	<1	<1	NA
Ethyl Parathion	ng/L	<10	<10	NA
Fenchlorphos (Ronnel)	ng/L	<2	<2	NA
Fenitrothion	ng/L	<10	<10	NA
Fensulfothion	ng/L	<1	<1	NA
Fenthion	ng/L	<2	<2	NA
Malathion	ng/L	578.1	479.8	NA
Merphos	ng/L	<1	<1	NA
Methamidophos (Monitor)	ng/L	<50	<50	NA
Methidathion	ng/L	<10	<10	NA
Methyl Parathion	ng/L	<1	<1	NA
Mevinphos (Phosdrin)	ng/L	<8	<8	NA
Phorate	ng/L	<6	<6	NA
Phosmet	ng/L	<50	<50	NA
Tetrachlorvinphos (Stirofos)	ng/L	<2	<2	NA
Tokuthion	ng/L	<3	<3	NA
Trichloronate	ng/L	<1	<1	NA
PCB Congeners				
PCB003	ng/L	<1	<1	NA
PCB008	ng/L	<1	<1	NA
PCB018	ng/L	<1	<1	NA
PCB028	ng/L	<1	<1	NA
PCB031	ng/L	<1	<1	NA
PCB033	ng/L	<1	<1	NA
PCB037	ng/L	<1	<1	NA
PCB044	ng/L	<1	<1	NA
PCB049	ng/L	<1	<1	NA
PCB052	ng/L	<1	<1	NA
PCB056/060	ng/L	<1	<1	NA
PCB066	ng/L	<1	<1	NA
PCB070	ng/L	<1	<1	NA
PCB074	ng/L	<1	<1	NA
PCB077	ng/L	<1	<1	NA
PCB081	ng/L	<1	<1	NA
PCB087	ng/L	<1	<1	NA

Parameter	Units	Event 2		
		DPR2	SD8(1)	DMW
		4/1/2010	4/1/2010	4/2/2010
PCB095	ng/L	<1	<1	NA
PCB097	ng/L	<1	<1	NA
PCB099	ng/L	<1	<1	NA
PCB101	ng/L	<1	<1	NA
PCB105	ng/L	<1	<1	NA
PCB110	ng/L	<1	<1	NA
PCB114	ng/L	<1	<1	NA
PCB118	ng/L	<1	<1	NA
PCB119	ng/L	<1	<1	NA
PCB123	ng/L	<1	<1	NA
PCB126	ng/L	<1	<1	NA
PCB128	ng/L	<1	<1	NA
PCB138	ng/L	<1	<1	NA
PCB141	ng/L	<1	<1	NA
PCB149	ng/L	<1	<1	NA
PCB151	ng/L	<1	<1	NA
PCB153	ng/L	<1	<1	NA
PCB156	ng/L	<1	<1	NA
PCB157	ng/L	<1	<1	NA
PCB158	ng/L	<1	<1	NA
PCB167	ng/L	<1	<1	NA
PCB168+132	ng/L	<1	<1	NA
PCB169	ng/L	<1	<1	NA
PCB170	ng/L	<1	<1	NA
PCB174	ng/L	<1	<1	NA
PCB177	ng/L	<1	<1	NA
PCB180	ng/L	<1	<1	NA
PCB183	ng/L	<1	<1	NA
PCB187	ng/L	<1	<1	NA
PCB189	ng/L	<1	<1	NA
PCB194	ng/L	<1	<1	NA
PCB195	ng/L	<1	<1	NA
PCB200	ng/L	<1	<1	NA
PCB201	ng/L	<1	<1	NA
PCB203	ng/L	<1	<1	NA
PCB206	ng/L	<1	<1	NA
PCB209	ng/L	<1	<1	NA
Polynuclear Aromatic Hydrocarbons				
1-Methylnaphthalene	ng/L	9.6	9.7	NA
1-Methylphenanthrene	ng/L	7.9	11.1	NA
2,3,5-Trimethylnaphthalene	ng/L	4.7J	7.2	NA
2,6-Dimethylnaphthalene	ng/L	<1	<1	NA
2-Methylnaphthalene	ng/L	11.7	16.6	NA
Acenaphthene	ng/L	<1	<1	NA
Acenaphthylene	ng/L	<1	<1	NA
Anthracene	ng/L	7.4	10.4	NA
Benz[a]anthracene	ng/L	8.5	24.8	NA
Benzo[a]pyrene	ng/L	17	36.8	NA
Benzo[b]fluoranthene	ng/L	33.5	83	NA
Benzo[e]pyrene	ng/L	30	67.3	NA
Benzo[g,h,i]perylene	ng/L	25.3	65.6	NA

Parameter	Units	Event 2		
		DPR2	SD8(1)	DMW
		4/1/2010	4/1/2010	4/2/2010
Benzo[k]fluoranthene	ng/L	10.3	42.5	NA
Biphenyl	ng/L	<1	<1	NA
Chrysene	ng/L	36.6	76.2	NA
Dibenz[a,h]anthracene	ng/L	4.9J	10.9	NA
Dibenzothiophene	ng/L	49	52.6	NA
Fluoranthene	ng/L	45.2	121.3	NA
Fluorene	ng/L	5.1	4.5J	NA
Indeno[1,2,3-c,d]pyrene	ng/L	15.4	47.1	NA
Naphthalene	ng/L	14.3	18.3	NA
Perylene	ng/L	19.6	31.6	NA
Phenanthrene	ng/L	21.7	61.2	NA
Pyrene	ng/L	48.5	118.4	NA
Pyrethroids by NCI				
Allethrin by NCI	ng/L	<0.5	<0.5	NA
Bifenthrin by NCI	ng/L	33	89.4	NA
Cyfluthrin by NCI	ng/L	15.1	33.8	NA
Cypermethrin by NCI	ng/L	22.1	40.1	NA
Danitol by NCI	ng/L	<0.5	<0.5	NA
Deltamethrin by NCI	ng/L	<0.5	<0.5	NA
Esfenvalerate by NCI	ng/L	<0.5	0.5J	NA
Fenvalerate by NCI	ng/L	<0.5	1J	NA
Fluvalinate by NCI	ng/L	<0.5	<0.5	NA
L-Cyhalothrin by NCI	ng/L	4.7	22.8	NA
Permethrin by NCI	ng/L	<5	291.8	NA
Prallethrin by NCI	ng/L	<0.5	<0.5	NA

< = result are less than the method detection limit

B = Analyte was detected in the associated method blank

J = Detected but below the Reporting Limit; therefore,result is an estimated concentration.

NA = Not Available

Parameter	Units	Event 3		
		DPR2	SD8(1)	DMW
		10/30/2010	10/30/2010	10/31/2010
General Chemistry				
Ammonia-N	mg/l	0.12	0.54	NA
Chloride	mg/l	74	23	NA
Dissolved Organic Carbon	mg/l	11	8.2	NA
Sulfate	mg/l	28	17	NA
Total Alkalinity	mg/l	66	35	NA
Total Dissolved Solids	mg/l	250	140	NA
Total Hardness as CaCO3	mg/l	93	52	NA
Total Organic Carbon	mg/l	13	10	NA
Total Suspended Solids	mg/l	7	46	NA
Chlorinated Pesticides				
2,4'-DDD	ng/l	<5	<5	NA
2,4'-DDE	ng/l	<5	<5	NA
2,4'-DDT	ng/l	<5	<5	NA
4,4'-DDD	ng/l	<3	<3	NA
4,4'-DDE	ng/l	<2.5	<2.5	NA
4,4'-DDT	ng/l	<3.1	<3.1	NA
Aldrin	ng/l	<1.5	<1.5	NA
BHC-alpha	ng/l	<1.8	<1.8	NA
BHC-beta	ng/l	<3.1	<3.1	NA
BHC-delta	ng/l	<2.5	<2.5	NA
BHC-gamma	ng/l	<2.1	<2.1	NA
Chlordane-alpha	ng/l	<5	<5	NA
Chlordane-gamma	ng/l	<5	<5	NA
Dieldrin	ng/l	<2.1	<2.1	NA
Endosulfan Sulfate	ng/l	<5	<5	NA
Endosulfan-I	ng/l	<1.7	<1.7	NA
Endosulfan-II	ng/l	<1.9	<1.9	NA
Endrin	ng/l	<2.8	<2.8	NA
Endrin Aldehyde	ng/l	<3	<3	NA
Heptachlor	ng/l	<1.7	<1.7	NA
Heptachlor Epoxide	ng/l	<1.9	<1.9	NA
Methoxychlor	ng/l	<5	<5	NA
Mirex	ng/l	<5	<5	NA
Toxaphene	ng/l	<120	<120	NA
trans-Nonachlor	ng/l	<5	<5	NA
Dissolved Metals				
Copper (Cu)	ug/l	12	17	0.68
Lead (Pb)	ug/l	0.59	0.61	0.024J
Zinc(Zn)	ug/l	37	79	2.2J
Total Metals				
Calcium (Ca)	mg/l	24	13	NA
Copper (Cu)	ug/l	14	64	0.14J
Lead (Pb)	ug/l	2.1	49	<0.017
Magnesium (Mg)	mg/l	8.2	4.5	NA
Potassium (K)	mg/l	3.8	4.2	NA
Sodium (Na)	mg/l	44	18	NA
Zinc (Zn)	ug/l	46	350	0.43J
Organophosphorus Pesticides				
Azinphos Methyl	ug/l	<0.0055	<0.0055	NA
Bolstar (Sulprofos)	ug/l	<0.0046	<0.0046	NA

Parameter	Units	Event 3		
		DPR2	SD8(1)	DMW
		10/30/2010	10/30/2010	10/31/2010
Chlorpyrifos	ug/l	<0.0069	<0.0069	NA
Coumaphos	ug/l	<0.0051	<0.0051	NA
Demeton-o	ug/l	<0.01	<0.01	NA
Demeton-s	ug/l	<0.01	<0.01	NA
Diazinon	ug/l	<0.0052	<0.0052	NA
Dichlorvos	ug/l	<0.0029	<0.0029	NA
Dimethoate	ug/l	<0.0062	<0.0062	NA
Disulfoton	ug/l	<0.01	<0.01	NA
Ethoprop (Ethoprofos)	ug/l	<0.0067	<0.0067	NA
Ethyl Parathion	ug/l	<0.0054	<0.0054	NA
Fenchlorphos (Ronnel)	ug/l	<0.0041	<0.0041	NA
Fensulfothion	ug/l	<0.0029	<0.0029	NA
Fenthion	ug/l	<0.0038	<0.0038	NA
Malathion	ug/l	0.16	0.11	NA
Merphos	ug/l	<0.0058	<0.0058	NA
Methyl Parathion	ug/l	<0.0063	<0.0063	NA
Mevinphos (Phosdrin)	ug/l	<0.0042	<0.0042	NA
Naled	ug/l	<0.0076	<0.0076	NA
Phorate	ug/l	<0.003	<0.003	NA
Tetrachlorvinphos (Stirofos)	ug/l	<0.0031	<0.0031	NA
Tokuthion	ug/l	<0.0078	<0.0078	NA
Trichloronate	ug/l	<0.0067	<0.0067	NA
PCB Congeners				
PCB003	ng/l	<5	<5	NA
PCB008	ng/l	<5	<5	NA
PCB018	ng/l	<5	<5	NA
PCB028	ng/l	<5	<5	NA
PCB031	ng/l	<5	<5	NA
PCB033	ng/l	<5	<5	NA
PCB037	ng/l	<5	<5	NA
PCB044	ng/l	<5	<5	NA
PCB049	ng/l	<5	<5	NA
PCB052	ng/l	<5	<5	NA
PCB056	ng/l	<5	<5	NA
PCB060	ng/l	<5	<5	NA
PCB066	ng/l	<5	<5	NA
PCB070	ng/l	<5	<5	NA
PCB074	ng/l	<5	<5	NA
PCB077	ng/l	<5	<5	NA
PCB081	ng/l	<5	<5	NA
PCB087	ng/l	<5	<5	NA
PCB095	ng/l	<5	<5	NA
PCB097	ng/l	<5	<5	NA
PCB099	ng/l	<5	<5	NA
PCB101	ng/l	<5	<5	NA
PCB105	ng/l	<5	<5	NA
PCB110	ng/l	<5	<5	NA
PCB114	ng/l	<5	<5	NA
PCB118	ng/l	<5	<5	NA
PCB119	ng/l	<5	<5	NA
PCB123	ng/l	<5	<5	NA

Parameter	Units	Event 3		
		DPR2	SD8(1)	DMW
		10/30/2010	10/30/2010	10/31/2010
PCB126	ng/l	<5	<5	NA
PCB128	ng/l	<5	<5	NA
PCB132	ng/l	<5	<5	NA
PCB138	ng/l	<5	<5	NA
PCB141	ng/l	<5	<5	NA
PCB149	ng/l	<5	<5	NA
PCB151	ng/l	<5	<5	NA
PCB153	ng/l	<5	<5	NA
PCB156	ng/l	<5	<5	NA
PCB157	ng/l	<5	<5	NA
PCB158	ng/l	<5	<5	NA
PCB167	ng/l	<5	<5	NA
PCB168	ng/l	<5	<5	NA
PCB169	ng/l	<5	<5	NA
PCB170	ng/l	<5	<5	NA
PCB174	ng/l	<5	<5	NA
PCB177	ng/l	<5	<5	NA
PCB180	ng/l	<5	<5	NA
PCB183	ng/l	<5	<5	NA
PCB187	ng/l	<5	<5	NA
PCB189	ng/l	<5	<5	NA
PCB194	ng/l	<5	<5	NA
PCB195	ng/l	<5	<5	NA
PCB200	ng/l	<5	<5	NA
PCB201	ng/l	<5	<5	NA
PCB203	ng/l	<5	<5	NA
PCB206	ng/l	<5	<5	NA
PCB209	ng/l	<5	<5	NA
Aroclor PCBs				
Aroclor 1016	ng/l	<50	<50	NA
Aroclor 1221	ng/l	<60	<60	NA
Aroclor 1232	ng/l	<100	<100	NA
Aroclor 1242	ng/l	<70	<70	NA
Aroclor 1248	ng/l	<60	<60	NA
Aroclor 1254	ng/l	<40	<40	NA
Aroclor 1260	ng/l	<40	<40	NA
Polynuclear Aromatic Hydrocarbons				
1-Methylnaphthalene	ug/l	<0.02	<0.02	NA
1-Methylphenanthrene	ug/l	<0.02	<0.02	NA
2,6-Dimethylnaphthalene	ug/l	<0.02	<0.02	NA
2-Methylnaphthalene	ug/l	<0.02	<0.02	NA
Acenaphthene	ug/l	<0.02	<0.02	NA
Acenaphthylene	ug/l	<0.02	<0.02	NA
Anthracene	ug/l	<0.02	<0.02	NA
Benz[a]anthracene	ug/l	0.042J	0.024J	NA
Benzo[a]pyrene	ug/l	<0.02	<0.02	NA
Benzo[b]fluoranthene	ug/l	<0.02	<0.02	NA
Benzo[e]pyrene	ug/l	<0.02	<0.02	NA
Benzo[g,h,i]perylene	ug/l	<0.02	<0.02	NA
Benzo[k]fluoranthene	ug/l	<0.02	<0.02	NA
Biphenyl	ug/l	<0.02	<0.02	NA

Parameter	Units	Event 3		
		DPR2	SD8(1)	DMW
		10/30/2010	10/30/2010	10/31/2010
Chrysene	ug/l	0.039J	<0.02	NA
Dibenz[a,h]anthracene	ug/l	<0.02	<0.02	NA
Fluoranthene	ug/l	<0.02	<0.02	NA
Fluorene	ug/l	<0.02	<0.02	NA
Indeno[1,2,3-c,d]pyrene	ug/l	<0.02	<0.02	NA
Naphthalene	ug/l	<0.02	<0.02	NA
Perylene	ug/l	<0.02	<0.02	NA
Phenanthrene	ug/l	<0.02	<0.02	NA
Pyrene	ug/l	<0.02	<0.02	NA
Pyrethroids by NCI				
Allethrin	ng/l	<0.5H*	<0.85*	NA
Bifenthrin	ng/l	2.9H*	<0.79*	NA
Cyfluthrin	ng/l	<0.5H*	<0.83*	NA
Cypermethrin	ng/l	<0.5H*	<0.66*	NA
Danitol	ng/l	<0.5H*	NA	NA
Deltamethrin	ng/l	<0.5H*	<1.9*	NA
Dichloran	ng/l	NA	<0.8*	NA
Esfenvalerate	ng/l	<0.5H*	<0.98*	NA
Fenvalerate	ng/l	<0.5H*	<0.98*	NA
L-Cyhalothrin	ng/l	<0.5H*	<1.2*	NA
Pendimethalin	ng/l	NA	<0.5*	NA
Permethrin	ng/l	<5H*	<5*	NA
Prallethrin	ng/l	<0.5H*	<0.92*	NA
Sumithrin	ng/l	NA	<2.4*	NA
Tefluthrin	ng/l	NA	<0.93*	NA

< = result are less than the method detection limit

J = Detected but below the Reporting Limit; therefore,result is an estimated concentration.

NA = Not Available

H = Sample received and/or analyzed outside of recommended holding time.

* Pyrethroid analysis for DPR2 was performed by Physis due to anomalous data received from Weck Laboratories. Additional sample for DPR2 was sent to Physis outside of holding time. Weck data was used for SD8(1) because there was not enough archived sample remaining to send to Physis. Corrective action was initiated with Weck Laboratories to investigate extraction method differences.

Parameter	Units	Event 4		
		DPR2	SD8(1)	DMW
		12/20/2010	12/20/2010	12/21/2010
General Chemistry				
Ammonia-N	mg/l	0.11	0.15	NA
Chloride	mg/l	36	15	NA
Dissolved Organic Carbon	mg/l	4.5	3.9	NA
Sulfate	mg/l	15	12	NA
Total Alkalinity	mg/l	38	33	NA
Total Dissolved Solids	mg/l	140	89	NA
Total Hardness as CaCO3	mg/l	53	39	NA
Total Organic Carbon	mg/l	5.5	4.7	NA
Total Suspended Solids	mg/l	52	63	NA
Chlorinated Pesticides				
2,4'-DDD	ng/l	<5	<5	NA
2,4'-DDE	ng/l	<5	<5	NA
2,4'-DDT	ng/l	<5	<5	NA
4,4'-DDD	ng/l	<3	<3	NA
4,4'-DDE	ng/l	<2.5	<2.5	NA
4,4'-DDT	ng/l	<3.1	<3.1	NA
Aldrin	ng/l	<1.5	<1.5	NA
BHC-alpha	ng/l	<1.8	<1.8	NA
BHC-beta	ng/l	<3.1	<3.1	NA
BHC-delta	ng/l	<2.5	<2.5	NA
BHC-gamma	ng/l	<2.1	<2.1	NA
Chlordane-alpha	ng/l	<5	<5	NA
Chlordane-gamma	ng/l	<5	<5	NA
Dieldrin	ng/l	<2.1	<2.1	NA
Endosulfan Sulfate	ng/l	<5	<5	NA
Endosulfan-I	ng/l	<1.7	<1.7	NA
Endosulfan-II	ng/l	<1.9	<1.9	NA
Endrin	ng/l	<2.8	<2.8	NA
Endrin Aldehyde	ng/l	<3	<3	NA
Heptachlor	ng/l	<1.7	<1.7	NA
Heptachlor Epoxide	ng/l	<1.9	<1.9	NA
Methoxychlor	ng/l	<5	<5	NA
Mirex	ng/l	<5	<5	NA
Toxaphene	ng/l	<120	<120	NA
trans-Nonachlor	ng/l	<5	<5	NA
Dissolved Metals				
Copper (Cu)	ug/l	6.9	6.4	0.66
Lead (Pb)	ug/l	0.48	0.51	0.032J
Zinc (Zn)	ug/l	21	26	2.3J
Total Metals				
Calcium (Ca)	mg/l	13	11	NA
Copper (Cu)	ug/l	15	18	0.28J
Lead (Pb)	ug/l	8.4	13	0.028J
Magnesium (Mg)	mg/l	4.7	3.1	NA
Potassium (K)	mg/l	3.2	3	NA
Sodium (Na)	mg/l	22	13	NA
Zinc (Zn)	ug/l	67	100	0.70J
Organophosphorus Pesticides				
Azinphos Methyl	ug/l	<0.0055 BS-L	<0.0055 BS-L	NA
Bolstar (Sulprofos)	ug/l	<0.0046	<0.0046	NA

Parameter	Units	Event 4		
		DPR2	SD8(1)	DMW
		12/20/2010	12/20/2010	12/21/2010
Chlorpyrifos	ug/l	<0.0069	<0.0069	NA
Coumaphos	ug/l	<0.0051	<0.0051	NA
Demeton-o	ug/l	<0.01	<0.01	NA
Demeton-s	ug/l	<0.01	<0.01	NA
Diazinon	ug/l	0.0055J	0.0077J	NA
Dichlorvos	ug/l	0.0033J	0.0030J	NA
Dimethoate	ug/l	<0.0062	<0.0062	NA
Disulfoton	ug/l	<0.01	<0.01	NA
Ethoprop (Ethoprofos)	ug/l	<0.0067	<0.0067	NA
Ethyl Parathion	ug/l	<0.0054	<0.0054	NA
Fenchlorphos (Ronnel)	ug/l	<0.0041	<0.0041	NA
Fensulfothion	ug/l	<0.0029	<0.0029	NA
Fenthion	ug/l	<0.0038	<0.0038	NA
Malathion	ug/l	0.11	0.026	NA
Merphos	ug/l	<0.0058	<0.0058	NA
Methyl Parathion	ug/l	<0.0063	<0.0063	NA
Mevinphos (Phosdrin)	ug/l	<0.0042	<0.0042	NA
Naled	ug/l	<0.0076	<0.0076	NA
Phorate	ug/l	<0.003	<0.003	NA
Tetrachlorvinphos (Stirofos)	ug/l	<0.0031	<0.0031	NA
Tokuthion	ug/l	<0.0078	<0.0078	NA
Trichloronate	ug/l	<0.0067	<0.0067	NA
PCB Congeners				
PCB003	ng/l	<5	<5	NA
PCB008	ng/l	<5	<5	NA
PCB018	ng/l	<5	<5	NA
PCB028	ng/l	<5	<5	NA
PCB031	ng/l	<5	<5	NA
PCB033	ng/l	<5	<5	NA
PCB037	ng/l	<5	<5	NA
PCB044	ng/l	<5	<5	NA
PCB049	ng/l	<5	<5	NA
PCB052	ng/l	<5	<5	NA
PCB056	ng/l	<5	<5	NA
PCB060	ng/l	<5	<5	NA
PCB066	ng/l	<5	<5	NA
PCB070	ng/l	<5	<5	NA
PCB074	ng/l	<5	<5	NA
PCB077	ng/l	<5	<5	NA
PCB081	ng/l	<5	<5	NA
PCB087	ng/l	<5	<5	NA
PCB095	ng/l	<5	<5	NA
PCB097	ng/l	<5	<5	NA
PCB099	ng/l	<5	<5	NA
PCB101	ng/l	<5	<5	NA
PCB105	ng/l	<5	<5	NA
PCB110	ng/l	<5	<5	NA
PCB114	ng/l	<5	<5	NA
PCB118	ng/l	<5	<5	NA
PCB119	ng/l	<5	<5	NA
PCB123	ng/l	<5	<5	NA

Parameter	Units	Event 4		
		DPR2	SD8(1)	DMW
		12/20/2010	12/20/2010	12/21/2010
PCB126	ng/l	<5	<5	NA
PCB128	ng/l	<5	<5	NA
PCB132	ng/l	<5	<5	NA
PCB138	ng/l	<5	<5	NA
PCB141	ng/l	<5	<5	NA
PCB149	ng/l	<5	<5	NA
PCB151	ng/l	<5	<5	NA
PCB153	ng/l	<5	<5	NA
PCB156	ng/l	<5	<5	NA
PCB157	ng/l	<5	<5	NA
PCB158	ng/l	<5	<5	NA
PCB167	ng/l	<5	<5	NA
PCB168	ng/l	<5	<5	NA
PCB169	ng/l	<5	<5	NA
PCB170	ng/l	<5	<5	NA
PCB174	ng/l	<5	<5	NA
PCB177	ng/l	<5	<5	NA
PCB180	ng/l	<5	<5	NA
PCB183	ng/l	<5	<5	NA
PCB187	ng/l	<5	<5	NA
PCB189	ng/l	<5	<5	NA
PCB194	ng/l	<5	<5	NA
PCB195	ng/l	<5	<5	NA
PCB200	ng/l	<5	<5	NA
PCB201	ng/l	<5	<5	NA
PCB203	ng/l	<5	<5	NA
PCB206	ng/l	<5	<5	NA
PCB209	ng/l	<5	<5	NA
Aroclor PCBs				
Aroclor 1016	ng/l	<50	<50	NA
Aroclor 1221	ng/l	<60	<60	NA
Aroclor 1232	ng/l	<100	<100	NA
Aroclor 1242	ng/l	<70	<70	NA
Aroclor 1248	ng/l	<60	<60	NA
Aroclor 1254	ng/l	<40	<40	NA
Aroclor 1260	ng/l	<40	<40	NA
Polynuclear Aromatic Hydrocarbons				
1-Methylnaphthalene	ug/l	<0.02	<0.02	NA
1-Methylphenanthrene	ug/l	<0.02	<0.02	NA
2,6-Dimethylnaphthalene	ug/l	<0.02	<0.02	NA
2-Methylnaphthalene	ug/l	<0.02	<0.02	NA
Acenaphthene	ug/l	<0.02	<0.02	NA
Acenaphthylene	ug/l	<0.02	<0.02	NA
Anthracene	ug/l	<0.02	<0.02	NA
Benz[a]anthracene	ug/l	<0.02	<0.02	NA
Benzo[a]pyrene	ug/l	<0.02	<0.02	NA
Benzo[b]fluoranthene	ug/l	<0.02	<0.02	NA
Benzo[e]pyrene	ug/l	<0.02	<0.02	NA
Benzo[g,h,i]perylene	ug/l	<0.02	<0.02	NA
Benzo[k]fluoranthene	ug/l	<0.02	<0.02	NA
Biphenyl	ug/l	<0.02	<0.02	NA

Parameter	Units	Event 4		
		DPR2	SD8(1)	DMW
		12/20/2010	12/20/2010	12/21/2010
Chrysene	ug/l	<0.02	<0.02	NA
Dibenz[a,h]anthracene	ug/l	<0.02	<0.02	NA
Fluoranthene	ug/l	<0.02	<0.02	NA
Fluorene	ug/l	<0.02	<0.02	NA
Indeno[1,2,3-c,d]pyrene	ug/l	<0.02	<0.02	NA
Naphthalene	ug/l	<0.02	<0.02	NA
Perylene	ug/l	<0.02	<0.02	NA
Phenanthrene	ug/l	<0.02	<0.02	NA
Pyrene	ug/l	<0.02	<0.02	NA
Pyrethroids by NCI				
Allethrin	ng/l	<0.5	<0.5	NA
Bifenthrin	ng/l	<0.5	34	NA
Cyfluthrin	ng/l	3.9	9.8	NA
Cypermethrin	ng/l	<0.5	16.4	NA
Danitol	ng/l	<0.5	<0.5	NA
Deltamethrin	ng/l	<0.5	<0.5	NA
Esfenvalerate	ng/l	<0.5	<0.5	NA
Fenvalerate	ng/l	<0.5	<0.5	NA
Fluvalinate	ng/l	<0.5	<0.5	NA
L-Cyhalothrin	ng/l	<0.5	5	NA
Permethrin	ng/l	<5	44.1	NA
Prallethrin	ng/l	<0.5	<0.5	NA

< = result are less than the method detection limit

J = Detected but below the Reporting Limit; therefore,result is an estimated concentration.

NA = Not Available

BS-L - The recovery of this anlayte in the BS/LCS was below the control limit. Sample result is suspect.

Laboratory Analytical Chemistry

Sample ID	Nominal Copper Concentration (µg/L)	Event 1							
		Initial-Lab Measured Concentration 2/28/2010		Final-Lab Measured Concentration 3/2/2010		Average		RPD	
		Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (%)	Dissolved Copper (%)
DPR2	6	17	12	15	10	16	11	12.5	18.2
	35	42	31	31	25	37	28	30.1	21.4
	63	65	45	44	40	55	43	38.5	11.8
	113.4	105	75	75	64	90	70	33.3	15.8
	204.1	173	120	98	96	136	108	55.4	22.2
	367.3	302	178	215	158	259	168	33.7	11.9
SD8(1)	6	19	13	50	10	35	12	89.9	26.1
	35	45	28	63	24	54	26	33.3	15.4
	63	63	47	81	37	72	42	25.0	23.8
	113.4	113	63	130	59	122	61	14.0	6.6
	204.1	168	102	274	88	221	95	48.0	14.7
	367.3	316	166	372	154	344	160	16.3	7.5
Dilute Mineral Water	3	5	1	12	<1	9	1	82.4	66.7*
	6	7	2	5	1	6	2	33.3	66.7
	12	12	5	8	2	10	4	40.0	85.7
	24	45	10	20	8	33	9	76.9	22.2
	48	43	25	40	20	42	23	7.2	22.2

* To calculate the RPD for this sample, half of the MDL was used to represent the non-detect value.

Sample ID	Nominal Copper Concentration (µg/L)	Event 2							
		Initial-Lab Measured Concentration 4/2/2010		Final-Lab Measured Concentration 4/4/2010		Average		RPD	
		Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (%)	Dissolved Copper (%)
DPR2	63	78	71	75	65	77	68	3.9	8.8
	113.4	127	110	110	103	119	107	14.3	6.6
	204.1	216	180	182	170	199	175	17.1	5.7
	367.3	348	299	322	291	335	295	7.8	2.7
	661	636	497	553	463	595	480	14.0	7.1
	1190	1470	808	1540	725	1505	767	4.7	10.8
SD8(1)	35	61	44	49	42	55	43	21.8	4.7
	63	82	72	76	64	79	68	7.6	11.8
	113.4	136	113	129	100	133	107	5.3	12.2
	204.1	219	178	184	162	202	170	17.4	9.4
	367.3	500	297	370	240	435	269	29.9	21.2
Dilute Mineral Water	1.5	3	1	2	<1	3	1	40.0	66.7*
	3	6	2	4	<1	5	1	40.0	120.0*
	6	8	5	5	1	7	3	46.2	133.3
	12	14	10	9	3	12	7	43.5	107.7
	24	24	12	21	10	23	11	13.3	18.2
	48	50	26	42	22	46	24	17.4	16.7

* To calculate the RPD for this sample, half of the MDL was used to represent the non-detect value.

Sample ID	Nominal Copper Concentration (µg/L)	Event 3							
		Initial-Lab Measured Concentration 10/31/2010		Final-Lab Measured Concentration 11/2/2010		Average		RPD	
		Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (%)	Dissolved Copper (%)
DPR2	6	19	15	15	14	17	15	23.5	6.9
	10.8	23	18	19	17	21	18	19.0	5.7
	19.4	29	26	26	24	28	25	10.9	8.0
	35	43	40	38	35	41	38	12.3	13.3
	63	69	63	61	56	65	60	12.3	11.8
	113.4	111	103	96	91	104	97	14.5	12.4
	204.1	190	179	170	154	180	167	11.1	15.0
	367.3	325	303	292	272	309	288	10.7	10.8
	500	436	408	382	355	409	382	13.2	13.9
SD8(1)	6	26	19	22	18	24	19	16.7	5.4
	10.8	30	23	25	20	28	22	18.2	14.0
	19.4	36	29	31	26	34	28	14.9	10.9
	35	52	42	43	37	48	40	18.9	12.7
	63	74	61	59	54	67	58	22.6	12.2
	113.4	122	103	140	86	131	95	13.7	18.0
	204.1	236	165	215	129	226	147	9.3	24.5
	367.3	433	295	335	226	384	261	25.5	26.5
	500	516	382	439	279	478	331	16.1	31.2
Dilute Mineral Water	1.5	3	<1	3	<1	3	<1	0.0	0.0
	3	4	1	5	<1	5	1	22.2	66.7*
	6	6	2	4	<1	5	1	40.0	120.0*
	12	26	4	8	3	17	4	105.9	28.6
	24	37	10	19	6	28	8	64.3	50.0
	48	41	22	39	16	40	19	5.0	31.6

* To calculate the RPD for this sample, half of the MDL was used to represent the non-detect value.

Sample ID	Nominal Copper Concentration (µg/L)	Event 4							
		Initial-Lab Measured Concentration 12/21/2010		Final-Lab Measured Concentration 12/23/2010		Average		RPD	
		Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (µg/L)	Dissolved Copper (µg/L)	Total Copper (%)	Dissolved Copper (%)
DPR2	6	24	10	18	10	21	10	28.6	0.0
	10.8	27	13	20	12	24	13	29.8	8.0
	19.4	33	20	84	17	59	19	87.2	16.2
	35	54	35	92	28	73	32	52.1	22.2
	63	84	52	77	44	81	48	8.7	16.7
	113.4	119	82	123	67	121	75	3.3	20.1
	204.1	204	136	204	113	204	125	0.0	18.5
	367.3	356	223	368	180	362	202	3.3	21.3
	500	503	294	470	223	487	259	6.8	27.5
SD8(1)	6	26	9	27	9	27	9	3.8	0.0
	10.8	81	12	32	11	57	12	86.7	8.7
	19.4	78	17	36	15	57	16	73.7	12.5
	35	54	31	56	25	55	28	3.6	21.4
	63	84	50	83	37	84	44	1.2	29.9
	113.4	133	79	125	55	129	67	6.2	35.8
	204.1	210	129	205	90	208	110	2.4	35.6
	367.3	348	208	326	158	337	183	6.5	27.3
	500	501	261	439	189	470	225	13.2	32.0
Dilute Mineral Water	1.5	12	<1	3	<1	8	<1	120.0	0.0
	3	13	1	4	<1	9	1	105.9	66.7*
	6	14	2	6	2	10	2	80.0	0.0
	12	17	4	9	4	13	4	61.5	0.0
	24	29	9	20	12	25	11	36.7	28.6
	48	49	24	41	26	45	25	17.8	8.0

* To calculate the RPD for this sample, half of the MDL was used to represent the non-detect value.

Sample ID	Nominal Zinc Concentration (µg/L)	Event 1							
		Initial-Lab Measured Concentration		Final-Lab Measured Concentration		Average		RPD	
		2/28/2010		3/2/2010					
		Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (%)	Dissolved Zinc (%)
DPR2	56	206	82	400	103	303	93	64.0	22.7
	100	267	127	372	158	320	143	32.9	21.8
	180	443	244	512	310	478	277	14.5	23.8
	320	934	448	679	621	807	535	31.6	32.4
	560	1,160	796	1,380	1,100	1,270	948	17.3	32.1
SD8(1)	56	245	65	408	92	327	79	49.9	34.4
	100	325	102	471	140	398	121	36.7	31.4
	180	495	175	731	224	613	200	38.5	24.6
	320	720	374	790	548	755	461	9.3	37.7
	560	1,190	667	1,270	1,100	1,230	884	6.5	49.0
Dilute Mineral Water	18	54	27	31	27	43	27	54.1	0.0
	32	93	54	82	69	88	62	12.6	24.4
	56	128	89	94	106	111	98	30.6	17.4
	100	214	159	196	226	205	193	8.8	34.8
	180	366	291	334	393	350	342	9.1	29.8
	320	1,280	504	556	663	918	584	78.9	27.2

Sample ID	Nominal Zinc Concentration (µg/L)	Event 2							
		Initial-Lab Measured Concentration		Final-Lab Measured Concentration		Average		RPD	
		4/2/2010		4/4/2010					
		Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (%)	Dissolved Zinc (%)
DPR2	32	151	80	110	67	131	74	31.4	17.7
	56	173	101	133	88	153	95	26.1	13.8
	100	286	128	174	108	230	118	48.7	16.9
	180	746	198	248	171	497	185	100.2	14.6
	320	411	324	392	296	402	310	4.7	9.0
	560	744	524	581	494	663	509	24.6	5.9
SD8(1)	32	193	88	129	85	161	87	39.8	3.5
	56	383	101	208	102	296	102	59.2	1.0
	100	323	138	247	130	285	134	26.7	6.0
	180	378	184	399	170	389	177	5.4	7.9
	320	507	316	454	285	481	301	11.0	10.3
	560	835	1510*	636	438	736	438*	27.1	-
Dilute Mineral Water	18	24	12	26	12	25	12	8.0	0.0
	32	44	22	35	20	40	21	22.8	9.5
	56	92	56	80	54	86	55	14.0	3.6
	100	110	75	96	73	103	74	13.6	2.7
	180	192	137	196	141	194	139	2.1	2.9
	320	315	266	338	266	327	266	7.0	0.0
	560	611	473	555	450	583	462	9.6	5.0

* Based on best professional judgement, the minimum value was used for the average result for this result due to suspected contamination. The value presents the most conservative value for the determination of the EC$_{50}$.

Sample ID	Nominal Zinc Concentration (μg/L)	Event 3							
		Initial		Final		Average		RPD	
		10/31/2010		11/2/2010					
		Total Zinc (μg/L)	Dissolved Zinc (μg/L)	Total Zinc (μg/L)	Dissolved Zinc (μg/L)	Total Zinc (μg/L)	Dissolved Zinc (μg/L)	Total Zinc (%)	Dissolved Zinc (%)
DPR2	32	78	54	63	46	71	50	21.3	16.0
	56	101	73	80	64	91	69	23.2	13.1
	100	139	106	114	94	127	100	19.8	12.0
	180	220	170	167	152	194	161	27.4	11.2
	320	363	285	305	262	334	274	17.4	8.4
	560	558	474	519	438	539	456	7.2	7.9
	1000	1090	814	912	763	1001	789	17.8	6.5
	1800	2020	1440	1640	1450	1830	1445	20.8	0.7
SD8(1)	32	207	64	188	59	198	62	9.6	8.1
	56	164	82	160	73	162	78	2.5	11.6
	100	218	114	208	86	213	100	4.7	28.0
	180	288	171	207	145	248	158	32.7	16.5
	320	446	254	396	212	421	233	11.9	18.0
	560	663	438	581	391	622	415	13.2	11.3
	1000	1100	762	1040	692	1070	727	5.6	9.6
	1800	2060	1220	1940	962	2000	1091	6.0	23.6
Dilute Mineral Water	18	23	15	21	13	22	14	9.1	14.3
	32	34	27	31	22	33	25	9.2	20.4
	56	56	47	52	40	54	44	7.4	16.1
	100	94	80	364	66	229	73	117.9	19.2
	180	180	148	165	133	173	141	8.7	10.7
	320	317	269	271	227	294	248	15.6	16.9
	560	552	492	515	470	534	481	6.9	4.6
	1000	971	862	831	787	901	825	15.5	9.1

Sample ID	Nominal Zinc Concentration (µg/L)	Event 4							
		Initial		Final		Average		RPD	
		12/21/2010		12/23/2010					
		Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Total Zinc (%)	Dissolved Zinc (%)
DPR2	32	97	36	82	34	90	35	16.8	5.7
	56	120	59	102	49	111	54	16.2	18.5
	100	149	86	176	67	163	77	16.6	24.8
	180	226	138	290	115	258	127	24.8	18.2
	320	347	238	365	203	356	221	5.1	15.9
	560	575	388	582	370	579	379	1.2	4.7
	1000	965	799	1030	608	998	704	6.5	27.1
	1800	1800	1430	1870	1130	1835	1280	3.8	23.4
SD8(1)	32	140	37	117	35	129	36	17.9	5.6
	56	155	56	158	44	157	50	1.9	24.0
	100	186	83	204	63	195	73	9.2	27.4
	180	330	139	250	124	290	132	27.6	11.4
	320	402	243	360	192	381	218	11.0	23.4
	560	580	410	567	333	574	372	2.3	20.7
	1000	1030	736	938	606	984	671	9.3	19.4
	1800	1680	1290	1750	1120	1715	1205	4.1	14.1
Dilute Mineral Water	18	24	14	63	17	44	16	89.7	19.4
	32	34	26	33	27	34	27	3.0	3.8
	56	58	45	57	49	58	47	1.7	8.5
	100	90	77	100	91	95	84	10.5	16.7
	180	181	135	179	163	180	149	1.1	18.8
	320	276	274	326	296	301	285	16.6	7.7
	560	461	436	438	404	450	420	5.1	7.6
	1000	907	890	949	897	928	894	4.5	0.8

Item 10
Supporting Document No. 2
December 14, 2016

2014

Confirmation WERs

Item 10
Supporting Document No. 2
December 14, 2016

Field Analytical Chemistry

General Chemistry Summary Statistics from Site Water Collected from Chollas Creek During WER Confirmation Tests (April 2-3 Storm Event)

General Chemistry Analyte	Units	Laboratory Dilute Mineral Water	Site SD8(1) Grab	Site DPR2 Composite
pH	pH units	7.95	7.21	7.33
Conductivity	µs/cm	201	252	481
Dissolved Oxygen	mg/L	8.0	9.4	9.9
Chlorine	mg/L	<0.01	0.02	0.02
Copper – Dissolved	µg/L	0.32	9.1	10
Zinc - Dissolved	µg/L	0.93	22	33
Total Alkalinity	mg/L	87	31	53
Total Hardness as $CaCO_3$	mg/L	84.8	58.8	101
Total Organic Carbon	mg/L	NM	13	20
Dissolved Organic Carbon	mg/L	NM	12	21
Chloride	mg/L	NM	39	93
Sulfate	mg/L	NM	23	35
Calcium	mg/L	32.3	15.1	25.1
Magnesium	mg/L	1.00	5.15	9.25
Sodium	mg/L	2.2	23	47
Potassium	mg/L	0.16	3.4	5.0

NM – Not measured
*Pyrethroid pesticides were monitored but non-detected in both samples (<0.5 ng/L with the exception of permethrin at < 5.0 ng/L)

Laboratory Analytical Chemistry

Provided in the Appendix A of the Confirmation Testing Bioassay Report by Nautilus (Appendix G of this Report)

APPENDIX E-2

Analytical Chemistry QA/QC

Item 10
Supporting Document No. 2
December 14, 2016

2010

Range-finder and Definitive WERs

Item 10
Supporting Document No. 2
December 14, 2016

Definitive WER Analytical Chemistry

QA/QC Summary

ATTACHMENT 2

QUALITY ASSURANCE SUMMARY FOR CHOLLAS WER CHEMISTRY RESULTS FOR JANUARY 2010 / JANUARY 2011

Quality Assurance / Quality Control Results for Chollas WER Chemistry Results

The process of quality assurance (QA) / quality control (QC) has the following two components:

Quality Assurance——A system used to verify that the entire process is operating within acceptable limits.

Quality Control—Mechanisms established to measure non-conforming method performance.

Generally, analytical results were within corresponding project and/or laboratory QA/QC acceptance ranges and limits. A summary of QA procedures and QC findings, qualifications, and exceptions for the water chemistry results are presented categorically by analyte group in the following sections. The summary of samples analyzed per delivery group and lab by QC type is summarized in Table 1.

Holding Times

All samples were analyzed within recommended method holding times.

Blanks

Laboratory contamination associated with sample processing was assessed through the analysis of procedural or method blanks on a minimum frequency of one per batch or matrix type. Procedural blanks were processed and handled identically to a sample including the addition of the same reagents, contact with the same type of vessels, and processed with the same procedure. All field results associated with laboratory method blanks that contained a detected analyte above the reporting limit are qualified with a 'B' in the report. None of the associated field results are greater than five times the method blank detection; therefore, there is no sign of any potential laboratory contamination.

Field contamination associated with sample collection was evaluated using field blank samples. A field blank was analyzed for each sampling event. There are some potential biased results with the detections of the field blanks and their associated samples.
In event 1 collected February 27, 2010, the SD8(1)-blank contained a detected result for Fenvalerate by NCI, Esfenvalerate by NCI and L-Cyhalothrin by NCI and the associated field samples SD8(1) and SD8(1)-Dup and DPR2 were all potentially bias high, since the results were less than five times that found in the field blank. In event 2 collected April 1, 2010, the Blank contained a detected result for naphthalene and the associated field samples SD8(1), SD8(1)-Dup and DPR2 were all potentially bias high, since the results were less than five times that found in the field blank. In event 3 collected October 30, 2010, the Field Blank contained detections that were all below the reporting limit. In event 4 collected December 20, 2010, the Field Blank contained a detected result

for Permethrin and the associated field samples CC-SD8(1), DPR2, and DPR2-Duplicate were all potentially bias high, since the results were less than five times that found in the field blank. All of these samples were all qualified with a BS-H that is suspect, since the recovery of the associated BS/LCS was over the control limit.
Contamination associated with field blank samples created in the bioassay laboratory are summarized in Table 2. Total copper and total zinc exhibited potential bias, however, the corresponding dissolved concentrations were not affected.

Method Detection Limits (MDLs) / Reporting Limits (RLs)

Laboratory MDLs/RLs for the target analytes measured in the samples met the data quality objectives. At the start of the project after the first event, the original laboratory went out of business due to financial issues. In response, Weston shifted these chemical analyses to EnviroMatrix Analytical and Weck Laboratories Inc. Adjustments in the detection limits had to be made, but the MDLs and the RLs still met the data quality objectives. The Water Quality Bench Marks and the Water Effect Ratio Concentration Curves were well above the detection limits.

Accuracy

A QC summarization of the accuracy of the surrogate results is presented in Table 3 and the accuracy and precision results of matrix spikes are presented in Table 4.

All surrogate results (Table 3) met acceptability limits except the parameters that were qualified in the table.

The surrogate d10-Acenaphthene was below the criteria on sample CC-SD8(1) composite and the surrogate d12-Chrysene exceeded the criteria on sample SD8(1)-dup in sampling on February 27,2010. d12-Chrysene exceeded the criteria on samples DPR2 and SD8(1)-dup in sampling on April 1, 2010. All four of these surrogates were qualified by the laboratory as being out of control due to matrix interference. The samples did not require any other clarification due to the other surrogates meeting the criteria.

For organophosphorus pesticides, the surrogate1,3-Dimethyl-2-NB was below the criteria for sample DPR2 and exceeded the criteria for sample Field Blank-103010. Triphenyl phosphate exceeded the criteria on the following samples CC-SD8 (1), CC-SD8 (1)-DUP, DPR2, and Field Blank-103010. For Polynuclear Aromatic Hydrocarbons (PAHs), the surrogate Terphenyl-dl4 exceeded the criteria on samples CC-SD8 (1)-DUP and DPR2. For Pyrethroids by NCI, the surrogate Triphenyl phosphate was below the criteria for the following samples CC-SD8 (1), CC-SD8 (1) DUP, and DPR2. All of these samples from sampling event 3 (October 30, 2010) were qualified by the laboratory as being out of control due to matrix interference and required no further clarification.

For the Pyrethroids by NCI, the surrogate Triphenyl phosphate exceeded the criteria for the following samples CC-SD8 (1), DPR2, DPR2-Duplicate, and Field Blank-122010 from sampling on December 20, 2010. All of these samples were qualified by the laboratory as being outside of the established control limits due to matrix interference and required no further clarification.

The matrix spike samples (Table 4) met accuracy and precision acceptability requirements with the exception of the parameters that were qualified in the table.

For sampling on April 1, 2010 (event 2), samples DPR2-Zn-E2-I-T-100 and DPR2-Zn-E2-I-T-100 for total zinc and sample DPR2-Zn-E2-I-T-100 for total copper exceeded the acceptance criteria due to sample non-homogeneity and were appropriately qualified.

In sampling events on October 30, 2010 and December 20, 2010,the matrix spike and matrix spike duplicate were analyzed on non project specific samples and were qualified appropriately, which did not require any further qualifications on the project samples.

Precision

A QC summarization of the precision of the lab duplicate results is presented in Table 5, a summary of the field duplicate results is presented in Table 6, and a summary the field duplicate results on the bioassay created samples is presented in Table 7. An insufficient extraction technique was identified for the Pyrethroid method. The laboratory identified the need to use liquid-liquid extraction (EPA 3510) as a possible extraction going forward for this method. The correction action letter is attached as attachment 1.

The laboratory duplicates (Table 5) met the precision acceptability requirements with the exception of the parameters that were qualified in the table.

For laboratory replicates, the relative percent difference (RPD) was high for sulfate by IC for the Blank collected April 1, 2010 (event 2) due to the results being lower than 10 times the MDL. RPDs for the laboratory duplicates were elevated for February 27, 2010 sample DPR2-E1-I-T-O for total copper, lead, and zinc, DPR2-E1-I-T-O for total zinc, and DPR2-Cu-E1-I-T-6 and DPR2-E1-I-T-O for total copper due to non-homogeneity of the samples and were each qualified by the laboratory with QR-02.

For amples collected on April 1, 2010 for total zinc, the RPDs for the laboratory duplicates were elevated for DPR2-Zn-E2-I-T-100, SD8(1)-Zn-E2-F-T-100-DUP, and DPR2-Zn-E2-I-T-100 due to suspected sample contamination for this analyte. Laboratory duplicate RPDs were elevated due to non-homogeneity of the April 1, 2010 samples for DPR2-Zn-E2-I-T-560 for total zinc and copper and for sample SD8(1)-Cu-E2-F-T-367.3 for total copper. Each of these analytes was qualified by the laboratory with QR-02.

For samples collected on October 30, 2010, the RPDs on the laboratory duplicates for total copper for samples DMW-Cu-E3-I-T-12 and SD8(1)-Cu-E3-I-T-204.1 and for total lead for sample SD8(1)-Cu-E3-I-T-204.1 are not valid since both of the results are less than the reporting limit.

For samples collected on December 20, 2010, the RPDs on the laboratory duplicates for total copper, lead, and zinc for sample MB-E4-I-T-1 and for total copper for MB-E4-I-T-1 and SD8(1)-Cu-E4-I-T-10.8, and for total zinc for sample SD8(1)-Cu-E4-I-T-10.8 are not valid since both of the results are less than the reporting limit.

The field duplicates (Table 6) met the precision acceptability requirements with the exception of the parameters that were qualified in the table.

The precision between field duplicate pairs met the project criteria with the following exceptions as noted in Table 6. For SD8(1) and its field duplicates collected on April 1, 2010, PAHs had an elevated RPD for perylene of 35-percent, 2,3,5-trimethylnaphthalene of 69-percent, and benzo[k]fluoranthene of 38-percent. For the same sample, the chlorinated pesticides exceeded the RPD limit for chlordane-alpha of 63-percent and chlordane-gamma of 57-percent, and the pyrethroids by NCI exceeded the RPD limit for Cyfluthrin by NCI of 35-percent, Cypermethrin by NCI of 32-percent, Esfenvalerate by NCI of 82-percent, and L-Cyhalothrin by NCI of 71-percent.

For sample CC-SD8 (1) collected on October 30, 2010, for malathion the RPD was 58-percent and for benzo(a)anthracene was 72-percent.

For sample DPR2 collected on December 20, 2010, for Permethrin the RPD was 31-percent.

Field duplicates of the bioassay generated pairs (Table 7) met the precision acceptability requirements with the exception of the parameters that were qualified in the table.

The precision between the bioassay created field duplicate pairs met the project criteria with the following exceptions as presented in Table 7. Also in April 1, 2010 sample MB-E2-I-T-1 for total copper the RPD was 120-percent, MB-E2-F-T-1 for total copper the RPD was 67-percent and the total zinc was 53-percent.

For October 30, 2010 sample MB-E3-F-T-1 for total lead the RPD was 67-percent and for total zinc the RPD was 52-percent. For total copper the RPD for sample MB-E3-F-T-1 was 60-percent and for MB-E3-I-T-2 the RPD was 40-percent.

For sample MB-E4-I-T-1 collected on December 20, 2010, for total zinc the RPD was 95-percent and for SD8(1)-Zn-E4-I-T-100 for total zinc the RPD was 53-percent.

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W L
Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964

February 15th, 2011

David S. Renfrew
Weston Solutions, Inc.
2433 Impala Drive,
Carlsbad, CA 92010

Dear Mr. Renfrew

An internal investigation was conducted regarding low recoveries and inconsistent results in the analysis of Pyrethroids in water samples submitted by Weston Solutions, Inc.

Two identical sets of samples, including method blank, blank spike and matrix spike (Weston sample was used), were prepared. One set of samples were extracted using liquid-liquid technique (EPA 3510) while another set were extracted using solid phase extraction technique (EPA 3535). Both sets of samples were analyzed by GC/MS with negative CI.

After careful evaluation of the analytical results from both sets of samples, we found that the recoveries of blank spike using both extraction techniques are very similar (> 80%R), while the recoveries of over 70% of the analytes in matrix spike using liquid-liquid extraction are about 50% higher than those using solid phase extraction. For example, the recoveries for Bifenthrin, that was one of the analyte of interest, were 109%R and 43%R in matrix spike for liquid-liquid and solid phase extraction respectively.

Although this investigation may not represent every single sample matrix received in the past, it is evident that solid phase extraction technique was not suitable for water samples, especially for samples with high TSS (Total Suspended Solids).

To help prevent future occurrences of this situation, our SOP has been changed to adopt liquid-liquid extraction (EPA 3510) for analysis of Pyrethroids in water samples by GC/MS with negative CI.

Weck Laboratories deeply regrets and apologizes for the situation that was caused by inefficient extraction technique and will work hard to make the necessary adjustments to prevent their reoccurrence. If there are any further questions or concerns, please do not hesitate to contact me.

Sincerely,

Alan Ching
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Item 10
Supporting Document No. 2
December 14, 2016

Definitive WER QA/QC Tables

Appendix Table E-2-1. Analytical QA/QC Summary for Definitive WER Tests

Batch	Event	Laboratory	Group	Method	Fraction	Blank 1	Blank 2	Lab Control Spike 1	Lab Control Spike 2	Lab Control Spike 3	Lab Control Spike 4	Matrix Spike	Matrix Spike Dup	Lab Duplicate
WST057-10	1	CRG	Aroclor PCBs	EPA 625m	Total	1								
WST057-10	1	CRG	Chlorinated Pesticides	EPA 625m	Total	1		1	1					
WST057-10	1	CRG	Chlorinated Pesticides	EPA 625mNCI	Total	1		1	1					
WST057-10	1	CRG	General Chemistry	EPA 300.0	NA	1		1	1					
WST057-10	1	CRG	General Chemistry	SM 2320 B	NA	1		1	1			1	1	1
WST057-10	1	CRG	General Chemistry	SM 2340 B	NA	1								1
WST057-10	1	CRG	General Chemistry	SM 4500-S2 D	NA	1		1	1			1	1	1
WST057-10	1	CRG	General Chemistry	SM 5310 B	NA	1		1	1					
WST057-10	1	CRG	Organophosphorus Pesticides	EPA 625m	Total	1		1	1					
WST057-10	1	CRG	PCB Congeners	EPA 625m	Total	1		1	1					
WST057-10	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Total	1		1	1					
WST057-10	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Total	1		1	1					
WST057-10	1	CRG	Trace Metals	EPA 200.8m	Dissolved	1						1	1	1
WST057-10	1	CRG	Trace Metals	EPA 200.8m	Total	1								1
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Total	1		1	1					
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625mNCI	Total	1		1	1					
WST057-10b	1	CRG	General Chemistry	EPA 300.0	NA	1	1	1	1	1	1	1	1	1
WST057-10b	1	CRG	General Chemistry	SM 2320 B	NA	1		1	1					
WST057-10b	1	CRG	General Chemistry	SM 2340 B	NA	1								1
WST057-10b	1	CRG	General Chemistry	SM 2540 C	NA	1		1	1					1
WST057-10b	1	CRG	General Chemistry	SM 2540 D	NA	1								1
WST057-10b	1	CRG	General Chemistry	SM 4500-NH3 F	NA	1		1	1			1	1	1
WST057-10b	1	CRG	General Chemistry	SM 5310 B	NA	1		1	1			1	1	1
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Total	1		1	1					
WST057-10b	1	CRG	PCB Congeners	EPA 625m	Total	1		1	1					
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Total	1		1						
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Total	1		1	1					
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Dissolved	1						1	1	1
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Total	1								1
WST057-10c	1	CRG	General Chemistry	EPA 300.0	NA	1		1	1					
WST057-10c	1	CRG	General Chemistry	SM 2320 B	NA	1		1	1					
WST057-10c	1	CRG	General Chemistry	SM 2340 B	NA	1								1
WST057-10c	1	CRG	General Chemistry	SM 2540 C	NA	1		1	1					1
WST057-10c	1	CRG	Trace Metals	EPA 200.8m	Dissolved	1						1	1	1
WST057-10c	1	CRG	Trace Metals	EPA 200.8m	Total	1								1
WST057-10d	2	CRG	Aroclor PCBs	EPA 625m	Total	1								
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Total	1		1	1					
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625mNCI	Total	1		1	1					
WST057-10d	2	CRG	General Chemistry	EPA 300.0	NA	1	1	1	1	1	1	2	2	2
WST057-10d	2	CRG	General Chemistry	SM 2320 B	NA	1		1	1			1	1	1
WST057-10d	2	CRG	General Chemistry	SM 2340 B	NA	1								
WST057-10d	2	CRG	General Chemistry	SM 2540 C	NA	1		1	1					1
WST057-10d	2	CRG	General Chemistry	SM 2540 D	NA	1								1
WST057-10d	2	CRG	General Chemistry	SM 4500-NH3 F	NA	1		1	1					
WST057-10d	2	CRG	General Chemistry	SM 5310 B	NA	1		1	1			1	1	1
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Total	1		1	1					
WST057-10d	2	CRG	PCB Congeners	EPA 625m	Total	1		1	1					
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Total	1		1	1					
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Total	1		1	1					
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Dissolved	1		1	1					
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Total	1	1							
WST057-10e	2	CRG	General Chemistry	EPA 300.0	NA	1		1	1			1	1	1

Appendix Table E-2-1. Analytical QA/QC Summary for Definitive WER Tests

Batch	Event	Laboratory	Group	Method	Fraction	Blank 1	Blank 2	Lab Control Spike 1	Lab Control Spike 2	Lab Control Spike 3	Lab Control Spike 4	Matrix Spike	Matrix Spike Dup	Lab Duplicate
WST057-10e	2	CRG	General Chemistry	SM 2320 B	NA	1		1	1			1	1	1
WST057-10e	2	CRG	General Chemistry	SM 2340 B	NA	1								
WST057-10e	2	CRG	General Chemistry	SM 2540 C	NA	1		1	1					
WST057-10e	2	CRG	Trace Metals	EPA 200.8m	Dissolved	1		1	1			1	1	
WST057-10e	2	CRG	Trace Metals	EPA 200.8m	Total	1								
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.7	Total	1								1
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			1	1	1
10C0052	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10C0052	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			2	2	2
10C0053	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10C0053	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			3	2	2
10C0119	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10C0119	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			2	1	1
10C0120	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10C0120	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			1	1	1
10C0121	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10C0121	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			1	1	1
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.7	Total	1								1
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			2	1	1
10D0127	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1					1
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
10D0130	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10D0130	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			2	1	1
10D0131	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10D0131	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			2	1	1
10D0249rev2	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10D0249rev2	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			2	1	1
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			2	1	1
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	3		3	3			6	3	3
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			3	2	2
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	1		1	1			2	1	1
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	1		1	1			1	1	1
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2

Appendix Table E-2-1. Analytical QA/QC Summary for Definitive WER Tests

Batch	Event	Laboratory	Group	Method	Fraction	Blank 1	Blank 2	Lab Control Spike 1	Lab Control Spike 2	Lab Control Spike 3	Lab Control Spike 4	Matrix Spike	Matrix Spike Dup	Lab Duplicate
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	3		3	3			3	3	3
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Dissolved	2		2	2			2	2	2
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Total	2		2	2			4	2	2
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	NA	2		2				1	1	
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 300.0	NA	1		1				2	2	
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 350.1	NA	1		1				2	2	
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM 2320B	NA	2		2						2
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM2540C	NA	1		1						2
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM2540D	NA	1								2
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM5310C	NA	2		2	1			1	1	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	NA	1		1				1	1	
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	NA	1		1	1					
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	NA	1		1				1	1	
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	NA	1		1	1					
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Total	1		1				1	1	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Dissolved	1		1						
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Total	1		1				2	2	
0K02080	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Dissolved	1		1				1	1	
0K02080	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Total	1		1				1	1	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	NA	1		1	1					
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	NA	1		1				2	2	
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 350.1	NA	1		1				2	2	
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM 2320B	NA	2		2						2
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM2540C	NA	1		1						2
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM2540D	NA	1								2
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM5310C	NA	2		2	1			1	1	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	NA	1		1	1					
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	NA	1		1	1					
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	NA	1		1	1					
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	NA	1		1	1					
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Total	1		1				1	1	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Dissolved	1		1				1	1	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Total	1		1				1	1	
0L29033	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Dissolved	1		1				1	1	
0L29033	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Total	1		1				1	1	
1B03019	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	NA	1		1				2	2	
1B03019	4	Weck Laboratories, Inc	General Chemistry	SM 2320B	NA	1		1						1
1B03019	4	Weck Laboratories, Inc	General Chemistry	SM5310C	NA	1		1	1					
1B03019	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Total	1		1				1	1	
1012004-001	3	Physis	Pyrethroids	EPA625NCI	Total	1		1	1					
1012004-002	4	Physis	Pyrethroids	EPA625NCI	Total	1		1	1					1

Appendix Table E-2-2. Definitive WER Trace Metal Laboratory Blank Results

Sample Date Collected	Copper, Dissolved ug/L	Copper, Total ug/L	Lead, Dissolved ug/L	Lead, Total ug/L	Zinc, Dissolved ug/L	Zinc, Total ug/L
MB-E2-I-D-1 4/2/2010	<1		<1		<0.3	
MB-E2-I-D-1 4/6/2010 (retest)	<1					
MB-E2-I-D-2 4/2/2010	<1		<1		0.8 J	
MB-E2-I-T-1 4/2/2010		4 J		0.2 J		**15** J
MB-E2-I-T-1 4/6/2010 (retest)		8 J				
MB-E2-I-T-2 4/2/2010		1 J		<0.1		**15** J
MB-E2-F-D-1 4/4/2010	<1		<1		<0.3	
MB-E2-F-D-1 4/8/2010 (retest)	<1					
MB-E2-F-D-2 4/4/2010	<1		<1		<0.3	
MB-E2-F-T-1 4/4/2010		2 J		0.2 J		**13** J
MB-E2-F-T-1 4/8/2010 (retest)		3 J				
MB-E2-F-T-2 4/4/2010		1 J		0.2 J		**32**
MB-E3-I-D-1 10/31/2010	<1		<1		1 J	
MB-E3-I-D-2 10/31/2010	<1		<1		1 J	
MB-E3-I-T-1 10/31/2010		2 J		<0.1		6 J
MB-E3-I-T-2 10/31/2010		3 J		.1 J		7 J
MB-E3-F-D-1 11/2/2010	<1		<1		<0.3	
MB-E3-F-D-2 11/2/2010	<1		<1		1 J	
MB-E3-F-T-1 11/2/2010		1 J		.2 J		12 J
MB-E3-F-T-2 11/2/2010		1 J		.1 J		7 J
MB-E4-I-D-1 12/21/2010	<1		<1		1 J	
MB-E4-I-D-2 12/21/2010	<1		<1		.6 J	
MB-E4-I-T-1 12/21/2010		**106**		**12** J		**89** J
MB-E4-I-T-2 12/21/2010		**95** J		**14** J		**251**
MB-E4-F-D-1 12/23/2010	<1		<1		1 J	
MB-E4-F-D-2 12/23/2010	<1		<1		1 J	
MB-E4-F-T-1 12/23/2010		2 J		<0.1		4 J
MB-E4-F-T-2 12/23/2010		<.2		<0.1		3 J

* Method blanks were not collected during Event 1 at Weston's Laboratory .

< = result are less than the method detection limit

J = Detected but below the Reporting Limit; therefore,result is an estimated concentration.

Bold values exceed laboratory QA/QC criteria; howver all apply to total metals concs., not used for WER calculations.

Appendix Table E-2-3. Definitive WER Analytical Surrogate Recoveries

Batch	Event	Laboratory	Group	Method	Parameter	Sample ID	Percent Recovery %	Surrogate Limits (%)	Accuracy Accept	Qualifier
WST057-10	1	CRG	Chlorinated Pesticides	EPA 625m	(PCB030)	CC-SD8(1) Comp	98	41 - 139%	Pass	
WST057-10	1	CRG	Chlorinated Pesticides	EPA 625m	(PCB112)	CC-SD8(1) Comp	80	52 - 144%	Pass	
WST057-10	1	CRG	Chlorinated Pesticides	EPA 625m	(PCB198)	CC-SD8(1) Comp	85	55 - 146%	Pass	
WST057-10	1	CRG	Chlorinated Pesticides	EPA 625m	(TCMX)	CC-SD8(1) Comp	89	27 - 140%	Pass	
WST057-10	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	CC-SD8(1) Comp	50	63 - 111%	Fail	M4
WST057-10	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	CC-SD8(1) Comp	76	61 - 127%	Pass	
WST057-10	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	CC-SD8(1) Comp	114	56 - 139%	Pass	
WST057-10	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	CC-SD8(1) Comp	85	41 - 133%	Pass	
WST057-10	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	CC-SD8(1) Comp	51	30 - 114%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB030)	DPR2	95	41 - 139%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB030)	SD8(1)	99	41 - 139%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB030)	SD8(1)-blank	92	41 - 139%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB030)	SD8(1)-dup	98	41 - 139%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB112)	DPR2	95	52 - 144%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB112)	SD8(1)	93	52 - 144%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB112)	SD8(1)-blank	95	52 - 144%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB112)	SD8(1)-dup	100	52 - 144%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB198)	DPR2	87	55 - 146%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB198)	SD8(1)	90	55 - 146%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB198)	SD8(1)-blank	88	55 - 146%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(PCB198)	SD8(1)-dup	84	55 - 146%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(TCMX)	DPR2	91	27 - 140%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(TCMX)	SD8(1)	99	27 - 140%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(TCMX)	SD8(1)-blank	90	27 - 140%	Pass	
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	(TCMX)	SD8(1)-dup	91	27 - 140%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	DPR2	75	27 - 123%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	SD8(1)	81	27 - 123%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	SD8(1)-blank	74	27 - 123%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	SD8(1)-dup	75	27 - 123%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	DPR2	89	61 - 127%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	SD8(1)	91	61 - 127%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	SD8(1)-blank	83	61 - 127%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	SD8(1)-dup	88	61 - 127%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	DPR2	119	56 - 139%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	SD8(1)	120	56 - 139%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	SD8(1)-blank	118	56 - 139%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	SD8(1)-dup	159	56 - 139%	Fail	M4
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	DPR2	85	41 - 133%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	SD8(1)	94	41 - 133%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	SD8(1)-blank	90	41 - 133%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	SD8(1)-dup	90	41 - 133%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	DPR2	58	30 - 114%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	SD8(1)	66	30 - 114%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	SD8(1)-blank	57	30 - 114%	Pass	
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	SD8(1)-dup	61	30 - 114%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB030)	Blank	96	41 - 139%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB030)	DPR2	112	41 - 139%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB030)	SD8(1)	96	41 - 139%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB030)	SD8(1)-dup	106	41 - 139%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB112)	Blank	92	52 - 144%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB112)	DPR2	107	52 - 144%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB112)	SD8(1)	107	52 - 144%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB112)	SD8(1)-dup	119	52 - 144%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB198)	Blank	80	55 - 146%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB198)	DPR2	83	55 - 146%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB198)	SD8(1)	82	55 - 146%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(PCB198)	SD8(1)-dup	90	55 - 146%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(TCMX)	Blank	89	27 - 140%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(TCMX)	DPR2	101	27 - 140%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(TCMX)	SD8(1)	87	27 - 140%	Pass	
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	(TCMX)	SD8(1)-dup	103	27 - 140%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	Blank	78	27 - 123%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	DPR2	88	27 - 123%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	SD8(1)	79	27 - 123%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Acenaphthene)	SD8(1)-dup	94	27 - 123%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	Blank	87	61 - 127%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	DPR2	98	61 - 127%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	SD8(1)	92	61 - 127%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d10-Phenanthrene)	SD8(1)-dup	102	61 - 127%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	Blank	120	56 - 139%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	DPR2	148	56 - 139%	Fail	M4
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	SD8(1)	134	56 - 139%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Chrysene)	SD8(1)-dup	152	56 - 139%	Fail	M4
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	Blank	83	41 - 133%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	DPR2	89	41 - 133%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	SD8(1)	87	41 - 133%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d12-Perylene)	SD8(1)-dup	91	41 - 133%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	Blank	57	30 - 114%	Pass	

Appendix Table E-2-3. Definitive WER Analytical Surrugate Recoveries

Batch	Event	Laboratory	Group	Method	Parameter	Sample ID	Percent Recovery %	Surrogate Limits (%)	Accuracy Accept	Qualifier
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	DPR2	68	30 - 114%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	SD8(1)	64	30 - 114%	Pass	
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	(d8-Naphthalene)	SD8(1)-dup	78	30 - 114%	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Decachlorobiphenyl	CC-SD8 (1)	54	0.1 - 154	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Decachlorobiphenyl	CC-SD8 (1)-DUP	54	0.1 - 154	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Decachlorobiphenyl	DPR2	56	0.1 - 154	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Decachlorobiphenyl	Field Blank-103010	34	0.1 - 154	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Tetrachloro-meta-xylene	CC-SD8 (1)	71	26 - 131	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Tetrachloro-meta-xylene	CC-SD8 (1)-DUP	72	26 - 131	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Tetrachloro-meta-xylene	DPR2	68	26 - 131	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Tetrachloro-meta-xylene	Field Blank-103010	69	26 - 131	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	1,3-Dimethyl-2-NB	CC-SD8 (1)	117	73 - 136	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	1,3-Dimethyl-2-NB	CC-SD8 (1)-DUP	131	73 - 136	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	1,3-Dimethyl-2-NB	DPR2	60	73 - 136	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	1,3-Dimethyl-2-NB	Field Blank-103010	150	73 - 136	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Triphenyl phosphate	CC-SD8 (1)	458	71 - 150	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Triphenyl phosphate	CC-SD8 (1)-DUP	751	71 - 150	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Triphenyl phosphate	DPR2	676	71 - 150	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Triphenyl phosphate	Field Blank-103010	347	71 - 150	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Fluorobiphenyl	CC-SD8 (1)	68	51 - 139	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Fluorobiphenyl	CC-SD8 (1)-DUP	78	51 - 139	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Fluorobiphenyl	DPR2	75	51 - 139	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Fluorobiphenyl	Field Blank-103010	79	51 - 139	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Nitrobenzene-d5	CC-SD8 (1)	68	51 - 143	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Nitrobenzene-d5	CC-SD8 (1)-DUP	79	51 - 143	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Nitrobenzene-d5	DPR2	73	51 - 143	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Nitrobenzene-d5	Field Blank-103010	79	51 - 143	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Terphenyl-dl4	CC-SD8 (1)	101	19 - 134	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Terphenyl-dl4	CC-SD8 (1)-DUP	145	19 - 134	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Terphenyl-dl4	DPR2	138	19 - 134	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Terphenyl-dl4	Field Blank-103010	115	19 - 134	Pass	
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Triphenyl phosphate	CC-SD8 (1)	14	70 - 130	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Triphenyl phosphate	CC-SD8 (1)-DUP	12	70 - 130	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Triphenyl phosphate	DPR2	17	70 - 130	Fail	S-04
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Triphenyl phosphate	Field Blank-103010	98	70 - 130	Pass	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Decachlorobiphenyl	CC-SD8 (1)	47	0.1 - 154	Pass	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Decachlorobiphenyl	DPR2	46	0.1 - 154	Pass	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Decachlorobiphenyl	DPR2-Duplicate	48	0.1 - 154	Pass	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Decachlorobiphenyl	Field Blank-122010	65	0.1 - 154	Pass	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Tetrachloro-meta-xylene	CC-SD8 (1)	52	26 - 131	Pass	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Tetrachloro-meta-xylene	DPR2	59	26 - 131	Pass	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Tetrachloro-meta-xylene	DPR2-Duplicate	57	26 - 131	Pass	
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	Tetrachloro-meta-xylene	Field Blank-122010	92	26 - 131	Pass	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	1,3-Dimethyl-2-NB	CC-SD8 (1)	107	73 - 136	Pass	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	1,3-Dimethyl-2-NB	DPR2	96	73 - 136	Pass	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	1,3-Dimethyl-2-NB	DPR2-Duplicate	103	73 - 136	Pass	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	1,3-Dimethyl-2-NB	Field Blank-122010	97	73 - 136	Pass	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Triphenyl phosphate	CC-SD8 (1)	97	71 - 150	Pass	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Triphenyl phosphate	DPR2	96	71 - 150	Pass	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Triphenyl phosphate	DPR2-Duplicate	97	71 - 150	Pass	
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Triphenyl phosphate	Field Blank-122010	91	71 - 150	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Fluorobiphenyl	CC-SD8 (1)	71	51 - 139	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Fluorobiphenyl	DPR2	79	51 - 139	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Fluorobiphenyl	DPR2-Duplicate	85	51 - 139	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Fluorobiphenyl	Field Blank-122010	97	51 - 139	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Nitrobenzene-d5	CC-SD8 (1)	68	51 - 143	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Nitrobenzene-d5	DPR2	73	51 - 143	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Nitrobenzene-d5	DPR2-Duplicate	81	51 - 143	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Nitrobenzene-d5	Field Blank-122010	90	51 - 143	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Terphenyl-dl4	CC-SD8 (1)	82	19 - 134	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Terphenyl-dl4	DPR2	87	19 - 134	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Terphenyl-dl4	DPR2-Duplicate	90	19 - 134	Pass	
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Terphenyl-dl4	Field Blank-122010	107	19 - 134	Pass	
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Triphenyl phosphate	CC-SD8 (1)	1400	70 - 130	Fail	S-04
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Triphenyl phosphate	DPR2	872	70 - 130	Fail	S-04
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Triphenyl phosphate	DPR2-Duplicate	769	70 - 130	Fail	S-04
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Triphenyl phosphate	Field Blank-122010	280	70 - 130	Fail	S-04

Glossary of CRG Laboratory Flags

M4 - Spike or surrogate compound recovery was out of control due to matrix interference.

The associated method blank spike or surrogate compound was in control and therefore the sample data was reported without further clarification

Glossary of WECK Laboratory Flags

S-04 - The surrogate recovery for this sample is outside of established control limits due to possible sample matrix effect.

Appendix Table E-2-4. Definitive WER Analytical MS/MSD Recoveries

Batch	Event	Laboratory	Group	Method	Prep Batch ID	Sample Id	Parameter	Fraction	MS (% Rec)	MSD (% Rec)	Accuracy Limit (%)	Accuracy Accept	RPD	Precision Limit (%)	Precision Accept	Qualifier
WST057-10d	2	CRG	General Chemistry	EPA 300.0	7019010	Blank	Sulfate by IC	NA	98	90	70 - 130%	Pass	9	30	Pass	
WST057-10e	2	CRG	General Chemistry	EPA 300.0	7004012	DMW	Chloride by IC	NA	101	122	76 - 117%	Pass	19	30	Pass	
WST057-10e	2	CRG	General Chemistry	EPA 300.0	7019012	DMW	Sulfate by IC	NA	100	103	70 - 130%	Pass	3	30	Pass	
WST057-10d	2	CRG	General Chemistry	EPA 300.0	7004011	SD8(1)	Chloride by IC	NA	98	100	76 - 117%	Pass	2	30	Pass	
WST057-10d	2	CRG	General Chemistry	EPA 300.0	7019011	SD8(1)	Sulfate by IC	NA	94	90	70 - 130%	Pass	4	30	Pass	
WST057-10b	1	CRG	General Chemistry	EPA 300.0	7004002	SD8(1)-blank	Chloride by IC	NA	98	100	76 - 117%	Pass	2	30	Pass	
WST057-10b	1	CRG	General Chemistry	EPA 300.0	7019002	SD8(1)-blank	Sulfate by IC	NA	118	118	70 - 130%	Pass	0	30	Pass	
WST057-10	1	CRG	General Chemistry	SM 2320 B	6927001	CC-SD8(1) Comp	Total Alkalinity	NA	106	102	70 - 130%	Pass	4	30	Pass	
WST057-10e	2	CRG	General Chemistry	SM 2320 B	7227001	DMW	Total Alkalinity	NA	104	104	70 - 130%	Pass	0	30	Pass	
WST057-10d	2	CRG	General Chemistry	SM 2320 B	7027007	SD8(1)	Total Alkalinity	NA	89	95	70 - 130%	Pass	7	30	Pass	
WST057-10b	1	CRG	General Chemistry	SM 4500-NH3 F	7002002	DPR2	Ammonia-N	NA	94	102	70 - 130%	Pass	8	30	Pass	
WST057-10	1	CRG	General Chemistry	SM 4500-S2 D	6920001	CC-SD8(1) Comp	Total Sulfides	NA			60 - 140%	Pass	0	30	Pass	
WST057-10b	1	CRG	General Chemistry	SM 5310 B	7028001	DPR2	Dissolved Organic Carbon	NA	96	96	50 - 150%	Pass	0	30	Pass	
WST057-10d	2	CRG	General Chemistry	SM 5310 B	7028017	SD8(1)	Total Organic Carbon	NA	95	87	50 - 150%	Pass	9	30	Pass	
WST057-10	1	CRG	Trace Metals	EPA 200.8m	22089	CC-SD8(1) Comp	Copper (Cu)	Dissolved	98	98	55 - 132%	Pass	0	30	Pass	
WST057-10	1	CRG	Trace Metals	EPA 200.8m	22089	CC-SD8(1) Comp	Lead (Pb)	Dissolved	108	107	76 - 120%	Pass	1	30	Pass	
WST057-10	1	CRG	Trace Metals	EPA 200.8m	22089	CC-SD8(1) Comp	Zinc (Zn)	Dissolved	104	104	67 - 141%	Pass	0	30	Pass	
WST057-10c	1	CRG	Trace Metals	EPA 200.8m	22144	DMW	Copper (Cu)	Dissolved	102	103	55 - 132%	Pass	1	30	Pass	
WST057-10c	1	CRG	Trace Metals	EPA 200.8m	22144	DMW	Lead (Pb)	Dissolved	104	106	76 - 120%	Pass	2	30	Pass	
WST057-10c	1	CRG	Trace Metals	EPA 200.8m	22144	DMW	Zinc (Zn)	Dissolved	110	110	67 - 141%	Pass	0	30	Pass	
WST057-10e	2	CRG	Trace Metals	EPA 200.8m	23023	QAQC	Copper (Cu)	Dissolved	93	93	55 - 132%	Pass	0	30	Pass	
WST057-10e	2	CRG	Trace Metals	EPA 200.8m	23023	QAQC	Lead (Pb)	Dissolved	110	109	76 - 120%	Pass	0	30	Pass	
WST057-10e	2	CRG	Trace Metals	EPA 200.8m	23023	QAQC	Zinc (Zn)	Dissolved	89	87	67 - 141%	Pass	0	30	Pass	
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	22144	SD8(1)	Copper (Cu)	Dissolved	105	105	55 - 132%	Pass	0	30	Pass	
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	22144	SD8(1)	Lead (Pb)	Dissolved	101	103	76 - 120%	Pass	2	30	Pass	
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	22144	SD8(1)	Zinc (Zn)	Dissolved	114	113	67 - 141%	Pass	1	30	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030122	DMW-E1-I-D-0	Copper, Dissolved	Dissolved	93	94	70 -130	Pass	1	20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030122	DMW-E1-I-D-0	Lead, Dissolved	Dissolved	96	99	75 -125	Pass	3	20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030122	DMW-E1-I-D-0	Zinc, Dissolved	Dissolved	99	100	70 -130	Pass	1	20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030237	DPR2-E1-I-T-O	Copper, Total	Total	88	89	70 -130	Pass	2	20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030237	DPR2-E1-I-T-O	Lead, Total	Total	92	95	70 -130	Pass	3	20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030237	DPR2-E1-I-T-O	Zinc, Total	Total	121	122	70 -130	Pass	0.7	20	Pass	
10C0053	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030122	DMW-E1-I-D-0	Copper, Dissolved	Dissolved	93	94	70 -130	Pass	1	20	Pass	
10C0053	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030237	DPR2-E1-I-T-O	Copper, Total	Total	88	89	70 -130	Pass	2	20	Pass	
10C0053	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030241	DPR2-Cu-E1-I-D-6	Copper, Dissolved	Dissolved	103	101	70 -130	Pass	2	20	Pass	
10C0053	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030312	DPR2-Cu-E1-I-T-6	Copper, Total	Total	94	90	70 -130	Pass	4	20	Pass	
10C0052	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030122	DMW-E1-I-D-0	Zinc, Dissolved	Dissolved	99	100	70 -130	Pass	1	20	Pass	
10C0052	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030237	DPR2-E1-I-T-O	Zinc, Total	Total	121	122	70 -130	Pass	0.7	20	Pass	
10C0052	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0030904	10C0097-04 *	Zinc, Total	Total	81	79	70 -130	Pass	0.9	20	Pass	
10C0052	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0031017	SD8(1)-Zn-E1-I-D-100	Zinc, Dissolved	Dissolved	96	95	70 -130	Pass	0.4	20	Pass	
10C0119	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0031003	DMW-Cu-E1-F- T -3	Copper, Total	Total	92	95	70 -130	Pass	4	20	Pass	
10C0119	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0031023	DPR2-Cu-E1-F- D -6	Copper, Dissolved	Dissolved	97	97	70 -130	Pass	0.3	20	Pass	
10C0120	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0031029	DPR2-Zn-E1-F- T -560	Zinc, Total	Total	87	88	70 -130	Pass	0.4	20	Pass	
10C0120	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0031114	DPR2-Zn-E1-F- D -56	Zinc, Dissolved	Dissolved	109	123	70 -130	Pass	4	20	Pass	
10C0121	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0031029	DPR2-Zn-E1-F- T -560	Zinc, Total	Total	87	88	70 -130	Pass	0.4	20	Pass	
10C0121	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0031114	DPR2-Zn-E1-F- D -56	Zinc, Dissolved	Dissolved	109	123	70 -130	Pass	4	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0040928	DMW-E2-I-D-O	Copper, Dissolved	Dissolved	95	95	70 -130	Pass	0.5	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0040928	DMW-E2-I-D-O	Lead, Dissolved	Dissolved	103	104	75 -125	Pass	1	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0040928	DMW-E2-I-D-O	Zinc, Dissolved	Dissolved	101	102	70 -130	Pass	0.5	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041607	10D0298-01 *	Copper, Total	Total	88	87	70 -130	Pass	0.9	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041607	10D0298-01 *	Lead, Total	Total	89	90	70 -130	Pass	1	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041607	10D0298-01 *	Zinc, Total	Total	86	87	70 -130	Pass	0.4	20	Pass	
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041339	DMW-Zn-E2-F-D-18	Zinc, Dissolved	Dissolved	104	103	70 -130	Pass	0.5	20	Pass	
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041340	DPR2-Zn-E2-I-D-180	Zinc, Dissolved	Dissolved	94	84	70 -130	Pass	2	20	Pass	
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041415	SD8(1)-Zn-E2-F-T-100-DUP	Zinc, Total	Total	105	107	70 -130	Pass	2	20	Pass	
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041417	DPR2-Zn-E2-I-T-100	Zinc, Total	Total	105	172	70 -130	Fail	40	20	Fail	QM-06
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041340	DPR2-Zn-E2-I-D-180	Zinc, Dissolved	Dissolved	94	84	70 -130	Pass	2	20	Pass	
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041417	DPR2-Zn-E2-I-T-100	Zinc, Total	Total	105	172	70 -130	Fail	40	20	Fail	QM-06
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041418	DPR2-Zn-E2-I-T-560	Zinc, Total	Total	110	117	70 -130	Pass	4	20	Pass	
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041535	DPR2-Zn-E2-I-D-320	Zinc, Dissolved	Dissolved	107	85	70 -130	Pass	3	20	Pass	
10D0130	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041331	SD8(1)-Cu-E2-I-D-367.3	Copper, Dissolved	Dissolved	79	111	70 -130	Pass	5	20	Pass	
10D0130	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041418	DPR2-Zn-E2-I-T-560	Copper, Total	Total	93	96	70 -130	Pass	4	20	Pass	
10D0131	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041332	DMW-Cu-E2-F-D-1.5	Copper, Dissolved	Dissolved	92	93	70 -130	Pass	1	20	Pass	
10D0131	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041506	SD8(1)-Cu-E2-F-T-367.3	Copper, Total	Total	95	104	70 -130	Pass	6	20	Pass	
10D0249rev2	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041507	DPR2-Cu-E2-F-T-1190	Copper, Total	Total	85	68	70 -130	Fail	8	20	Pass	QM-06
10D0249rev2	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0041535	DPR2-Zn-E2-I-D-320	Copper, Dissolved	Dissolved	92	88	70 -130	Pass	3	20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110814	DMW-E3-F-T-0	Copper, Total	Total	83	81	70 -130	Pass	2	20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110814	DMW-E3-F-T-0	Lead, Total	Total	86	86	70 -130	Pass	0.3	20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110814	DMW-E3-F-T-0	Zinc, Total	Total	87	85	70 -130	Pass	2	20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111030	DMW-E3-F-D-0	Copper, Dissolved	Dissolved	92	91	70 -130	Pass	1	20	Pass	

Appendix Table E-2-4. Definitive WER Analytical MS/MSD Recoveries

Batch	Event	Laboratory	Group	Method	Prep Batch ID	Sample Id	Parameter	Fraction	MS (% Rec)	MSD (% Rec)	Accuracy Limit (%)	Accuracy Accept	RPD	Precision Limit (%)	Precision Accept	Qualifier
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111030	DMW-E3-F-D-0	Lead, Dissolved	Dissolved	91	94	75 -125	Pass	2	20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111030	DMW-E3-F-D-0	Zinc, Dissolved	Dissolved	97	96	70 -130	Pass	0.8	20	Pass	
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110815	SD8(1)-CU-E3-F-T-113.4	Copper, Total	Total	90	87	70 -130	Pass	3	20	Pass	
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111030	DMW-E3-F-D-0	Copper, Dissolved	Dissolved	92	91	70 -130	Pass	1	20	Pass	
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111032	DPR2-CU-E3-F-D-6	Copper, Dissolved	Dissolved	88	85	70 -130	Pass	2	20	Pass	
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110814	DMW-E3-F-T-0	Copper, Total	Total	83	81	70 -130	Pass	2	20	Pass	
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110815	SD8(1)-CU-E3-F-T-113.4	Zinc, Total	Total	94	91	70 -130	Pass	2	20	Pass	
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110906	SD8(1)-Zn-E3-F-T-56	Zinc, Total	Total	75	89	70 -130	Pass	15	20	Pass	
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111119	DPR2-Zn-E3-F-D-32	Zinc, Dissolved	Dissolved	103	96	70 -130	Pass	3	20	Pass	
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111122	DPR2-Zn-E3-I-D-32	Zinc, Dissolved	Dissolved	76	97	70 -130	Pass	11	20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110906	SD8(1)-Zn-E3-F-T-56	Copper, Total	Total	85	87	70 -130	Pass	3	20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0110907	DMW-Cu-E3-I-T-12	Copper, Total	Total	86	85	70 -130	Pass	0.7	20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111024	SD8(1)-Cu-E3-I-T-204.1	Copper, Total	Total	97	100	70 -130	Pass	2	20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111137	DMW-Cu-E3-I-D-1.5	Copper, Dissolved	Dissolved	94	95	70 -130	Pass	2	20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111138	SD8(1)-Zn-E3-I-D-560	Copper, Dissolved	Dissolved	94	93	70 -130	Pass	0.9	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111024	SD8(1)-Cu-E3-I-T-204.1	Copper, Total	Total	97	100	70 -130	Pass	2	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111024	SD8(1)-Cu-E3-I-T-204.1	Lead, Total	Total	102	101	70 -130	Pass	1	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111024	SD8(1)-Cu-E3-I-T-204.1	Zinc, Total	Total	96	98	70 -130	Pass	2	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111030	DMW-E3-F-D-0	Copper, Dissolved	Dissolved	92	91	70 -130	Pass	1	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111030	DMW-E3-F-D-0	Lead, Dissolved	Dissolved	91	94	75 -125	Pass	2	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111030	DMW-E3-F-D-0	Zinc, Dissolved	Dissolved	97	96	70 -130	Pass	0.8	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0121624	10L0364-21 *	Copper, Total	Total	85	84	70 -130	Pass	2	20	Pass	
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111024	SD8(1)-Cu-E3-I-T-204.1	Zinc, Total	Total	96	98	70 -130	Pass	2	20	Pass	
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111105	DPR2-Zn-E3-I-T-1000	Zinc, Total	Total	92	90	70 -130	Pass	0.7	20	Pass	
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111122	DPR2-Zn-E3-I-D-32	Zinc, Dissolved	Dissolved	76	97	70 -130	Pass	11	20	Pass	
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0111138	SD8(1)-Zn-E3-I-D-560	Zinc, Dissolved	Dissolved	80	77	70 -130	Pass	0.3	20	Pass	
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0122924	DMW-Zn-E4-F-T-18	Zinc, Total	Total	100	101	70 -130	Pass	2	20	Pass	
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0122925	DPR2-Zn-E4-F-T-100	Zinc, Total	Total	100	102	70 -130	Pass	2	20	Pass	
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010526	DMW-Zn-E4-F-D-18	Zinc, Dissolved	Dissolved	108	104	70 -130	Pass	3	20	Pass	
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010622	DMW-Zn-E4-I-D-18	Zinc, Dissolved	Dissolved	112	96	70 -130	Pass	12	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0122925	DPR2-Zn-E4-F-T-100	Copper, Total	Total	91	92	70 -130	Pass	0.6	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0122925	DPR2-Zn-E4-F-T-100	Lead, Total	Total	92	89	70 -130	Pass	3	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0122925	DPR2-Zn-E4-F-T-100	Zinc, Total	Total	100	102	70 -130	Pass	2	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010716	DMW-E4-F-D-0	Copper, Dissolved	Dissolved	92	92	70 -130	Pass	0.3	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010716	DMW-E4-F-D-0	Lead, Dissolved	Dissolved	90	92	75 -125	Pass	2	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010716	DMW-E4-F-D-0	Zinc, Dissolved	Dissolved	104	104	70 -130	Pass	0.5	20	Pass	
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0122925	DPR2-Zn-E4-F-T-100	Copper, Total	Total	91	92	70 -130	Pass	0.6	20	Pass	
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123001	DPR2-Cu-E4-F-T-19.4	Copper, Total	Total	100	100	70 -130	Pass	0.6	20	Pass	
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010628	DMW-Cu-E4-F-D-1.5	Copper, Dissolved	Dissolved	89	96	70 -130	Pass	7	20	Pass	
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010629	DPR2-Cu-E4-F-D-10.8	Copper, Dissolved	Dissolved	92	91	70 -130	Pass	0.6	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123001	DPR2-Cu-E4-F-T-19.4	Copper, Total	Total	100	100	70 -130	Pass	0.6	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123001	DPR2-Cu-E4-F-T-19.4	Lead, Total	Total	117	100	70 -130	Pass	15	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123001	DPR2-Cu-E4-F-T-19.4	Zinc, Total	Total	106	111	70 -130	Pass	5	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123002	MB-E4-I-T-1	Copper, Total	Total	94	85	70 -130	Pass	9	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123002	MB-E4-I-T-1	Lead, Total	Total	94	84	70 -130	Pass	11	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123002	MB-E4-I-T-1	Zinc, Total	Total	98	95	70 -130	Pass	2	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010716	DMW-E4-F-D-0	Copper, Dissolved	Dissolved	92	92	70 -130	Pass	0.3	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010716	DMW-E4-F-D-0	Lead, Dissolved	Dissolved	90	92	75 -125	Pass	2	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010716	DMW-E4-F-D-0	Zinc, Dissolved	Dissolved	104	104	70 -130	Pass	0.5	20	Pass	
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123002	MB-E4-I-T-1	Copper, Total	Total	94	85	70 -130	Pass	9	20	Pass	
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123110	SD8(1)-Cu-E4-I-T-10.8	Copper, Total	Total	91	92	70 -130	Pass	0.7	20	Pass	
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010629	DPR2-Cu-E4-F-D-10.8	Copper, Dissolved	Dissolved	92	91	70 -130	Pass	0.6	20	Pass	
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010716	DMW-E4-F-D-0	Copper, Dissolved	Dissolved	92	92	70 -130	Pass	0.3	20	Pass	
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010717	DMW-Cu-E4-I-D-48	Copper, Dissolved	Dissolved	96	96	70 -130	Pass	0.2	20	Pass	
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	0123110	SD8(1)-Cu-E4-I-T-10.8	Zinc, Total	Total	95	96	70 -130	Pass	0.5	20	Pass	
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010622	DMW-Zn-E4-I-D-18	Zinc, Dissolved	Dissolved	112	96	70 -130	Pass	12	20	Pass	
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010628	DMW-Cu-E4-F-D-1.5	Zinc, Dissolved	Dissolved	98	107	70 -130	Pass	8	20	Pass	
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	1010723	SD8(1)-Zn-E4-I-T-100-Dup	Zinc, Total	Total	87	89	70 -130	Pass	1	20	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Azinphos methyl (Guthion)	NA	133	126	50 -150	Pass	5	25	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Demeton-o	NA	128	137	50 -150	Pass	7	25	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Demeton-s	NA	135	162	50 -150	Fail	18	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Diazinon	NA	232	235	50 -150	Fail	1	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Ethoprop	NA	228	250	50 -150	Fail	9	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Ethyl parathion	NA	130	130	50 -150	Pass	0.3	25	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Fensulfothion	NA	342	267	50 -150	Fail	25	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Methyl parathion	NA	160	149	50 -150	Fail	7	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Mevinphos	NA	199	191	50 -150	Fail	4	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Naled	NA	117	128	5 -150	Pass	9	25	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Tokuthion (Prothiofos)	NA	214	168	50 -150	Fail	24	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Trichloronate	NA	146	122	50 -150	Pass	18	25	Pass	

Appendix Table E-2-4. Definitive WER Analytical MS/MSD Recoveries

Batch	Event	Laboratory	Group	Method	Prep Batch ID	Sample Id	Parameter	Fraction	MS (% Rec)	MSD (% Rec)	Accuracy Limit (%)	Accuracy Accept	RPD	Precision Limit (%)	Precision Accept	Qualifier
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Bolstar	NA	336	298	50 -150	Fail	12	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Chlorpyrifos	NA	198	174	50 -150	Fail	13	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Coumaphos	NA	374	341	50 -150	Fail	9	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Dichlorvos	NA	145	115	50 -150	Pass	24	25	Pass	
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Dimethoate	NA	268	255	50 -150	Fail	5	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Disulfoton	NA	173	200	50 -150	Fail	15	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Fenthion	NA	331	289	50 -150	Fail	14	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Malathion	NA	172	152	50 -150	Fail	6	25	Pass	MS-01
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Merphos	NA	329	256	50 -150	Fail	25	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Phorate	NA	163	182	50 -150	Fail	11	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Ronnel	NA	116	107	50 -150	Fail	8	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	W0K0178	0J22043-01 *	Stirophos	NA	222	224	50 -150	Fail	0.7	25	Pass	Q-08
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Heptachlor	NA	98	106	34 -111	Pass	7	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	gamma-Chlordane	NA	82	86	0 -200	Pass	5	200	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	gamma-BHC (Lindane)	NA	95	99	32 -127	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Heptachlor epoxide	NA	96	92	37 -142	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Endrin aldehyde	NA	29	22	30 -180	Fail	29	30	Pass	MS-05
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Endrin	NA	124	130	30 -147	Pass	5	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Endosulfan sulfate	NA	30	16	26 -144	Fail	61	30	Pass	MS-05
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	delta-BHC	NA	96	92	19 -140	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	beta-BHC	NA	88	92	17 -147	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	4,4´-DDT	NA	79	84	25 -160	Pass	5	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	4,4´-DDE	NA	81	80	30 -145	Pass	0.8	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	4,4´-DDD	NA	97	107	31 -141	Pass	11	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Endosulfan II	NA	33	21	2 -202	Pass	43	30	Fail	MS-05
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Endosulfan I	NA	89	93	45 -153	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Dieldrin	NA	87	89	36 -146	Pass	1	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	alpha-Chlordane	NA	86	90	0 -200	Pass	4	200	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	alpha-BHC	NA	94	98	37 -134	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides and PCBs	EPA 608	W0K0204	0K01002-08 *	Aldrin	NA	87	89	42 -122	Pass	3	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Acenaphthene	NA	85	88	47 -145	Pass	3	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Benzo (a) pyrene	NA	77	70	17 -163	Pass	9	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Benzo (b) fluoranthene	NA	82	68	24 -159	Pass	17	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Benzo (g,h,i) perylene	NA	85	82	0.1 -219	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Fluoranthene	NA	93	84	26 -137	Pass	9	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Fluorene	NA	79	85	59 -121	Pass	7	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Indeno (1,2,3-cd) pyrene	NA	86	84	0.1 -171	Pass	3	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Pyrene	NA	102	92	52 -115	Pass	10	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Acenaphthylene	NA	76	86	33 -145	Pass	12	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Anthracene	NA	81	82	27 -133	Pass	1	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Benzo (a) anthracene	NA	103	81	33 -143	Pass	23	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Benzo (k) fluoranthene	NA	86	85	11 -162	Pass	1	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Chrysene	NA	86	89	17 -168	Pass	3	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Dibenzo (a,h) anthracene	NA	87	85	0.1 -227	Pass	3	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Naphthalene	NA	75	78	21 -133	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	W0K0266	0K01002-02 *	Phenanthrene	NA	93	92	54 -120	Pass	1	30	Pass	
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 350.1	W0K0374	0J28072-01 *	Ammonia as N	Total	103	102	90 -110	Pass	0.9	15	Pass	
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 350.1	W0K0374	0J28072-02 *	Ammonia as N	Total	102	103	90 -110	Pass	0.9	15	Pass	
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W0K0415	0K01068-02 *	Sulfate as SO4	Total	63	75	84 -114	Fail	1	20	Pass	MS-02
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W0K0415	0K01068-02 *	Chloride, Total	Total	95	106	72 -118	Pass	2	20	Pass	
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W0K0415	0K02072-01 *	Sulfate as SO4	Total	81	78	84 -114	Fail	0.6	20	Pass	MS-02
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W0K0415	0K02072-01 *	Chloride, Total	Total	104	100	72 -118	Pass	1	20	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0502	0K01012-01 *	Copper, Total	Total	99	95	70 -130	Pass	4	30	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0502	0K01012-01 *	Lead, Total	Total	97	97	70 -130	Pass	0.05	30	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0502	0K01012-01 *	Zinc, Total	Total	74	67	70 -130	Fail	6	30	Pass	MS-01
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0502	DPR2	Copper, Total	Total	104	106	70 -130	Pass	2	30	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0502	DPR2	Lead, Total	Total	103	103	70 -130	Pass	0.6	30	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0502	DPR2	Zinc, Total	Total	105	111	70 -130	Pass	3	30	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W0K0503	CC-SD8 (1)	Potassium, Total	Total	105	103	70 -130	Pass	2	30	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W0K0503	CC-SD8 (1)	Sodium, Total	Total	106	105	70 -130	Pass	0.8	30	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W0K0503	CC-SD8 (1)	Calcium, Total	Total	96	96	70 -130	Pass	0.02	30	Pass	
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W0K0503	CC-SD8 (1)	Magnesium, Total	Total	98	99	70 -130	Pass	0.6	30	Pass	
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM5310C	W0K0529	0K02030-09 *	Total Organic Carbon (TOC)	Total	102	100	84 -107	Pass	1	20	Pass	
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W0L1174	0L17023-06 *	Sulfate as SO4	Total	77	78	84 -114	Fail	0.3	20	Pass	MS-02
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W0L1174	0L17023-06 *	Chloride, Total	Total	88	86	72 -118	Pass	0.3	20	Pass	
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W0L1174	0L17023-08 *	Chloride, Total	Total	91	92	72 -118	Pass	0.2	20	Pass	
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W0L1174	0L17023-08 *	Sulfate as SO4	Total	83	83	84 -114	Fail	0.07	20	Pass	MS-02
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0L1305	CC-SD8 (1)	Lead, Total	Total	100	101	70 -130	Pass	0.7	30	Pass	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0L1305	CC-SD8 (1)	Zinc, Total	Total	103	103	70 -130	Pass	0.02	30	Pass	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0L1305	CC-SD8 (1)	Copper, Dissolved	Dissolved	123	125	70 -130	Pass	1	30	Pass	

Appendix Table E-2-4. Definitive WER Analytical MS/MSD Recoveries

Batch	Event	Laboratory	Group	Method	Prep Batch ID	Sample Id	Parameter	Fraction	MS (% Rec)	MSD (% Rec)	Accuracy Limit (%)	Accuracy Accept	RPD	Precision Limit (%)	Precision Accept	Qualifier
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0L1305	CC-SD8 (1)	Lead, Dissolved	Dissolved	125	126	70 -130	Pass	0.7	30	Pass	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0L1305	CC-SD8 (1)	Copper, Total	Total	99	101	70 -130	Pass	1	30	Pass	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W0L1306	Field Blank-122010	Potassium, Total	Total	103	101	70 -130	Pass	2	30	Pass	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W0L1306	Field Blank-122010	Magnesium, Total	Total	99	96	70 -130	Pass	3	30	Pass	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W0L1306	Field Blank-122010	Calcium, Total	Total	99	97	70 -130	Pass	1	30	Pass	
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W0L1306	Field Blank-122010	Sodium, Total	Total	104	101	70 -130	Pass	3	30	Pass	
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM5310C	W1A0161	1A04041-01 *	Total Organic Carbon (TOC)	Total	97	95	84 -107	Pass	1	20	Pass	
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 350.1	W0L1027	0L16053-01 *	Ammonia as N	Total	102	112	90 -110	Fail	3	15	Pass	MS-02
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 350.1	W0L1027	0L16053-02 *	Ammonia as N	Total	95	105	90 -110	Pass	2	15	Pass	
1B03019	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W1B0189	1B03055-03 *	Calcium, Total	Total	95	94	70 -130	Pass	0.7	30	Pass	
1B03019	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W1B0189	1B03055-03 *	Potassium, Total	Total	101	100	70 -130	Pass	0.2	30	Pass	
1B03019	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W1B0189	1B03055-03 *	Magnesium, Total	Total	93	94	70 -130	Pass	0.5	30	Pass	
1B03019	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	W1B0189	1B03055-03 *	Sodium, Total	Total	98	99	70 -130	Pass	1	30	Pass	
1B03019	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W1B0199	1B02065-03 *	Chloride, Total	Total	95	94	77 -117	Pass	0.6	20	Pass	
1B03019	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W1B0199	1B02065-03 *	Sulfate as SO4	Total	95	95	84 -114	Pass	0.04	20	Pass	
1B03019	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W1B0199	1B02065-06 *	Chloride, Total	Total	96	95	77 -117	Pass	0.3	20	Pass	
1B03019	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	W1B0199	1B02065-06 *	Sulfate as SO4	Total	97	97	84 -114	Pass	0.2	20	Pass	
0L29033	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W1A0120	DPR2-E4-I-T-O	Copper, Total	Total	102	106	70 -130	Pass	3	30	Pass	
0K02080	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0501	DMW-E3-I-T-0	Copper, Total	Total	108	105	70 -130	Pass	3	30	Pass	
0L29033	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W1A0120	DPR2-E4-I-T-O	Copper, Dissolved	Dissolved	102	106	70 -130	Pass	3	30	Pass	
0L29033	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W1A0120	DPR2-E4-I-T-O	Lead, Total	Total	104	105	70 -130	Pass	0.9	30	Pass	
0L29033	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W1A0120	DPR2-E4-I-T-O	Lead, Dissolved	Dissolved	104	105	70 -130	Pass	0.9	30	Pass	
0L29033	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W1A0120	DPR2-E4-I-T-O	Zinc, Total	Total	102	109	70 -130	Pass	3	30	Pass	
0L29033	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W1A0120	DPR2-E4-I-T-O	Zinc, Dissolved	Dissolved	102	109	70 -130	Pass	3	30	Pass	
0K02080	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0501	DMW-E3-I-T-0	Copper, Dissolved	Dissolved	108	105	70 -130	Pass	3	30	Pass	
0K02080	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0501	DMW-E3-I-T-0	Lead, Total	Total	103	102	70 -130	Pass	2	30	Pass	
0K02080	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0501	DMW-E3-I-T-0	Lead, Dissolved	Dissolved	103	102	70 -130	Pass	2	30	Pass	
0K02080	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0501	DMW-E3-I-T-0	Zinc, Total	Total	103	102	70 -130	Pass	1	30	Pass	
0K02080	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	W0K0501	DMW-E3-I-T-0	Zinc, Dissolved	Dissolved	103	102	70 -130	Pass	1	30	Pass	

* on the sample id indicates the qc was analyzed on non project specific samples.

Glossary of EMA Laboratory Flags

QM-06 - Due to noted non-homogeneity of the QC sample matrix, the MS/MSD did not provide reliable results for accuracy and precision
Samples results for the qc batch were accepted based on LCS/LCS Dup percent recoveries and RPD values

Glossary of WECK Laboratory Flags

Q-08 - High bias in qc sample does not affect sample results since the analyte was not detected or below the reporting limit.
MS-01 - The spike recovery for the QC sample is outside of established control limits possibly due to sample matrix interference
MS-05 - The spike recovery and/or RPD were outside acceptance limits for the MS and/or MSD due to possible matrix interference.
The LCS and/or LCS Dup were within the acceptance limits showing that the laboratory is in control and the data is acceptable.
MS-02 - The RPD and/or percent recovery for this qc spike sample cannot be accurately calculated due to high concentration of the analyte

Item 10
Supporting Document No. 2
December 14, 2016

Appendix Table E-2-5. Definitive WER Laboratory Duplicate Analyses

Batch	Event	Laboratory	Sample Id	Group	Method	Parameter	Fraction	Orig Result	Orig Units	Lab Dup Result	Lab Dup Units	RPD	Precision Limit (%)	Precision Accept	Lab Dup Qualifier
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Zinc (Zn)	Total	222.3	µg/L	224.7	µg/L	1	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Zinc (Zn)	Dissolved	33	µg/L	32.7	µg/L	1	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Potassium (K)	Total	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Sodium (Na)	Dissolved	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Sodium (Na)	Total	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	General Chemistry	SM 2340 B	Total Hardness as CaCO3	NA	85.4	mg/L	85.5	mg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Zinc (Zn)	Dissolved	ND	µg/L	ND	µg/L	0	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Lead (Pb)	Total	47.67	µg/L	47.23	µg/L	1	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Lead (Pb)	Dissolved	0.97	µg/L	0.94	µg/L	3	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Copper (Cu)	Total	35.1	µg/L	36.1	µg/L	3	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Copper (Cu)	Dissolved	7.3	µg/L	7.2	µg/L	1	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Sodium (Na)	Total	10.2	mg/L	10.3	mg/L	1	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Potassium (K)	Total	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Calcium (Ca)	Total	5.25	mg/L	5.19	mg/L	1	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	Trace Metals	EPA 200.8m	Magnesium (Mg)	Total	2.19	mg/L	2.17	mg/L	1	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	General Chemistry	SM 2340 B	Total Hardness as CaCO3	NA	22.1	mg/L	21.9	mg/L	1	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	General Chemistry	SM 4500-S2 D	Total Sulfides	NA	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10	1	CRG	CC-SD8(1) Comp	General Chemistry	SM 2320 B	Total Alkalinity	NA	26	mg/L	24	mg/L	8	30	Pass	
WST057-10b	1	CRG	SD8(1)	General Chemistry	SM 2340 B	Total Hardness as CaCO3	NA	36.6	mg/L	36.9	mg/L	1	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Zinc (Zn)	Dissolved	20.2	µg/L	21.6	µg/L	7	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Zinc (Zn)	Total	192.3	µg/L	194.3	µg/L	1	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Lead (Pb)	Dissolved	1.3	µg/L	1.33	µg/L	2	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Lead (Pb)	Total	24.19	µg/L	24.54	µg/L	1	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Magnesium (Mg)	Dissolved	3.44	mg/L	3.49	mg/L	1	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Magnesium (Mg)	Total	4.22	mg/L	4.27	mg/L	1	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Potassium (K)	Dissolved	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Potassium (K)	Total	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Sodium (Na)	Dissolved	17	mg/L	17.3	mg/L	2	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Sodium (Na)	Total	17.6	mg/L	17.8	mg/L	1	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Calcium (Ca)	Dissolved	8.99	mg/L	9.01	mg/L	0	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Calcium (Ca)	Total	11.22	mg/L	11.45	mg/L	2	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Copper (Cu)	Dissolved	7.1	µg/L	7.1	µg/L	0	30	Pass	
WST057-10b	1	CRG	SD8(1)	Trace Metals	EPA 200.8m	Copper (Cu)	Total	22.1	µg/L	22.6	µg/L	2	30	Pass	
WST057-10b	1	CRG	DPR2	General Chemistry	SM 4500-NH3 F	Ammonia-N	NA	0.14	mg/L	0.13	mg/L	7	30	Pass	
WST057-10b	1	CRG	SD8(1)-blank	General Chemistry	EPA 300.0	Chloride by IC	NA	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10b	1	CRG	SD8(1)-blank	General Chemistry	EPA 300.0	Sulfate by IC	NA	0.08	mg/L	0.1	mg/L	22	30	Pass	
WST057-10b	1	CRG	SD8(1)	General Chemistry	SM 2540 C	Total Dissolved Solids	NA	138	mg/L	184	mg/L	29	30	Pass	
WST057-10b	1	CRG	SD8(1)	General Chemistry	SM 2540 D	Total Suspended Solids	NA	322	mg/L	329	mg/L	2	30	Pass	
WST057-10b	1	CRG	DPR2	General Chemistry	SM 5310 B	Dissolved Organic Carbon	NA	8.5	mg/L	8.9	mg/L	5	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Copper (Cu)	Total	ND	µg/L	ND	µg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Lead (Pb)	Dissolved	0.1	µg/L	0.1	µg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Lead (Pb)	Total	0.06	µg/L	0.07	µg/L	15	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Magnesium (Mg)	Dissolved	8.49	mg/L	8.55	mg/L	1	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Magnesium (Mg)	Total	8.39	mg/L	8.48	mg/L	1	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Potassium (K)	Dissolved	ND	mg/L	ND	mg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Calcium (Ca)	Dissolved	20.18	mg/L	20.15	mg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Calcium (Ca)	Total	21.65	mg/L	21.66	mg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Copper (Cu)	Dissolved	ND	µg/L	ND	µg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	Trace Metals	EPA 200.8m	Zinc (Zn)	Total	ND	µg/L	ND	µg/L	0	30	Pass	
WST057-10c	1	CRG	DMW	General Chemistry	SM 2540 C	Total Dissolved Solids	NA	114	mg/L	148	mg/L	26	30	Pass	
WST057-10d	2	CRG	SD8(1)	General Chemistry	EPA 300.0	Chloride by IC	NA	27.84	mg/L	27.77	mg/L	0	30	Pass	
WST057-10d	2	CRG	Blank	General Chemistry	EPA 300.0	Sulfate by IC	NA	0.04	mg/L	ND	mg/L	120	30	Fail	Q3

Appendix Table E-2-5. Definitive WER Laboratory Duplicate Analyses

Batch	Event	Laboratory	Sample Id	Group	Method	Parameter	Fraction	Orig Result	Orig Units	Lab Dup Result	Lab Dup Units	RPD	Precision Limit (%)	Precision Accept	Lab Dup Qualifier
WST057-10d	2	CRG	SD8(1)	General Chemistry	EPA 300.0	Sulfate by IC	NA	19.83	mg/L	19.78	mg/L	0	30	Pass	
WST057-10d	2	CRG	SD8(1)	General Chemistry	SM 2540 C	Total Dissolved Solids	NA	134	mg/L	134	mg/L	0	30	Pass	
WST057-10d	2	CRG	DPR2	General Chemistry	SM 2540 D	Total Suspended Solids	NA	59	mg/L	56	mg/L	5	30	Pass	
WST057-10d	2	CRG	SD8(1)	General Chemistry	SM 2320 B	Total Alkalinity	NA	31	mg/L	30	mg/L	3	30	Pass	
WST057-10d	2	CRG	SD8(1)	General Chemistry	SM 5310 B	Total Organic Carbon	NA	28.6	mg/L	28.4	mg/L	1	30	Pass	
WST057-10e	2	CRG	DMW	General Chemistry	EPA 300.0	Chloride by IC	NA	2.18	mg/L	2.52	mg/L	14	30	Pass	
WST057-10e	2	CRG	DMW	General Chemistry	EPA 300.0	Sulfate by IC	NA	3.8	mg/L	3.7	mg/L	3	30	Pass	
WST057-10e	2	CRG	DMW	General Chemistry	SM 2320 B	Total Alkalinity	NA	98	mg/L	96	mg/L	2	30	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	10C0021-01*	Trace Metals	EPA 200.7	Hardness (Total)	Total	220	mg CaCO3/L	228	mg CaCO3/L	4	20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	DMW-E1-I-D-0	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	ug/l	ND	ug/l		20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	DMW-E1-I-D-0	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	ND	ug/l	ND	ug/l		20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	DMW-E1-I-D-0	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	ND	ug/l	ND	ug/l		20	Pass	
10C0051	1	EnviroMatrix Analytical, Inc.	DPR2-E1-I-T-O	Trace Metals	EPA 200.8	Copper, Total	Total	12.3	ug/l	41.0	ug/l	107	20	Fail	QR-02
10C0051	1	EnviroMatrix Analytical, Inc.	DPR2-E1-I-T-O	Trace Metals	EPA 200.8	Lead, Total	Total	8.06	ug/l	14.0	ug/l	56	20	Fail	QR-02
10C0051	1	EnviroMatrix Analytical, Inc.	DPR2-E1-I-T-O	Trace Metals	EPA 200.8	Zinc, Total	Total	75.2	ug/l	298	ug/l	119	20	Fail	QR-02
10C0052	1	EnviroMatrix Analytical, Inc.	10C0097-04*	Trace Metals	EPA 200.8	Zinc, Total	Total	0.173	mg/l	0.170	mg/l	2	20	Pass	
10C0052	1	EnviroMatrix Analytical, Inc.	DMW-E1-I-D-0	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10C0052	1	EnviroMatrix Analytical, Inc.	DPR2-E1-I-T-O	Trace Metals	EPA 200.8	Zinc, Total	Total	0.075	mg/l	0.298	mg/l	119	20	Fail	QR-02
10C0052	1	EnviroMatrix Analytical, Inc.	SD8(1)-Zn-E1-I-D-100	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.102	mg/l	0.102	mg/l	0.1	20	Pass	
10C0053	1	EnviroMatrix Analytical, Inc.	DMW-E1-I-D-0	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10C0053	1	EnviroMatrix Analytical, Inc.	DPR2-Cu-E1-I-D-6	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	0.012	mg/l	0.012	mg/l	2	20	Pass	
10C0053	1	EnviroMatrix Analytical, Inc.	DPR2-Cu-E1-I-T-6	Trace Metals	EPA 200.8	Copper, Total	Total	0.017	mg/l	0.034	mg/l	66	20	Fail	QR-02
10C0053	1	EnviroMatrix Analytical, Inc.	DPR2-E1-I-T-O	Trace Metals	EPA 200.8	Copper, Total	Total	0.012	mg/l	0.041	mg/l	107	20	Fail	QR-02
10C0119	1	EnviroMatrix Analytical, Inc.	DMW-Cu-E1-F- T -3	Trace Metals	EPA 200.8	Copper, Total	Total	12.0	ug/l	10.0	ug/l	18	20	Pass	
10C0119	1	EnviroMatrix Analytical, Inc.	DPR2-Cu-E1-F- D -6	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	10.2	ug/l	10.0	ug/l	0.2	20	Pass	
10C0120	1	EnviroMatrix Analytical, Inc.	DPR2-Zn-E1-F- D -56	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	103	ug/l	102	ug/l	0.7	20	Pass	
10C0120	1	EnviroMatrix Analytical, Inc.	DPR2-Zn-E1-F- T -560	Trace Metals	EPA 200.8	Zinc, Total	Total	1380	ug/l	1200	ug/l	13	20	Pass	
10C0121	1	EnviroMatrix Analytical, Inc.	DPR2-Zn-E1-F- D -56	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	103	ug/l	102	ug/l	0.7	20	Pass	
10C0121	1	EnviroMatrix Analytical, Inc.	DPR2-Zn-E1-F- T -560	Trace Metals	EPA 200.8	Zinc, Total	Total	1380	ug/l	1200	ug/l	13	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	10D0206-01RE1*	Trace Metals	EPA 200.7	Hardness (Total)	Total	206	mg CaCO3/L	218	mg CaCO3/L	6	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	10D0298-01*	Trace Metals	EPA 200.8	Copper, Total	Total	15.5	ug/l	17.0	ug/l	10	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	10D0298-01*	Trace Metals	EPA 200.8	Lead, Total	Total	9.35	ug/l	9.00	ug/l	6	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	10D0298-01*	Trace Metals	EPA 200.8	Zinc, Total	Total	64.3	ug/l	70.0	ug/l	9	20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	DMW-E2-I-D-O	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	ug/l	ND	ug/l		20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	DMW-E2-I-D-O	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	ND	ug/l	ND	ug/l		20	Pass	
10D0126	2	EnviroMatrix Analytical, Inc.	DMW-E2-I-D-O	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	ND	ug/l	ND	ug/l		20	Pass	
10D0127	2	EnviroMatrix Analytical, Inc.	S-Cu-E2-I-T-5.09 ppm	Trace Metals	EPA 200.8	Copper, Total	Total	4.64	mg/l	4.68	mg/l	0.7	20	Pass	
10D0127	2	EnviroMatrix Analytical, Inc.	S-Cu-E2-I-T-5.09 ppm	Trace Metals	EPA 200.8	Zinc, Total	Total	0.007	mg/l	0.006	mg/l	5	20	Pass	
10D0128	2	EnviroMatrix Analytical, Inc.	DMW-Zn-E2-F-D-18	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	11.6	ug/l	11.0	ug/l	3	20	Pass	
10D0128	2	EnviroMatrix Analytical, Inc.	DPR2-Zn-E2-I-D-180	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	198	ug/l	195	ug/l	2	20	Pass	
10D0128	2	EnviroMatrix Analytical, Inc.	DPR2-Zn-E2-I-T-100	Trace Metals	EPA 200.8	Zinc, Total	Total	286	ug/l	1510	ug/l	136	20	Fail	QR-07
10D0128	2	EnviroMatrix Analytical, Inc.	SD8(1)-Zn-E2-F-T-100-	Trace Metals	EPA 200.8	Zinc, Total	Total	271	ug/l	1330	ug/l	132	20	Fail	QR-07
10D0129	2	EnviroMatrix Analytical, Inc.	DPR2-Zn-E2-I-D-180	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	198	ug/l	195	ug/l	2	20	Pass	
10D0129	2	EnviroMatrix Analytical, Inc.	DPR2-Zn-E2-I-D-320	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	324	ug/l	321	ug/l	0.7	20	Pass	
10D0129	2	EnviroMatrix Analytical, Inc.	DPR2-Zn-E2-I-T-100	Trace Metals	EPA 200.8	Zinc, Total	Total	286	ug/l	1510	ug/l	136	20	Fail	QR-07
10D0129	2	EnviroMatrix Analytical, Inc.	DPR2-Zn-E2-I-T-560	Trace Metals	EPA 200.8	Zinc, Total	Total	744	ug/l	1000	ug/l	30	20	Fail	QR-02
10D0130	2	EnviroMatrix Analytical, Inc.	DPR2-Zn-E2-I-T-560	Trace Metals	EPA 200.8	Copper, Total	Total	40.4	ug/l	30.0	ug/l	29	20	Fail	QR-02
10D0130	2	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E2-I-D-367.3	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	297	ug/l	288	ug/l	3	20	Pass	
10D0131	2	EnviroMatrix Analytical, Inc.	DMW-Cu-E2-F-D-1.5	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	ug/l	ND	ug/l		20	Pass	
10D0131	2	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E2-F-T-367.3	Trace Metals	EPA 200.8	Copper, Total	Total	370	ug/l	481	ug/l	26	20	Fail	QR-02
10D0249rev2	2	EnviroMatrix Analytical, Inc.	DPR2-Cu-E2-F-T-1190	Trace Metals	EPA 200.8	Copper, Total	Total	1540	ug/l	1400	ug/l	9	20	Pass	
10D0249rev2	2	EnviroMatrix Analytical, Inc.	DPR2-Zn-E2-I-D-320	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	14.1	ug/l	14.0	ug/l	2	20	Pass	

Appendix Table E-2-5. Definitive WER Laboratory Duplicate Analyses

Batch	Event	Laboratory	Sample Id	Group	Method	Parameter	Fraction	Orig Result	Orig Units	Lab Dup Result	Lab Dup Units	RPD	Precision Limit (%)	Precision Accept	Lab Dup Qualifier
10K0163	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-D-0	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-D-0	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-D-0	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.002	mg/l	0.002	mg/l	7	20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-T-0	Trace Metals	EPA 200.8	Copper, Total	Total	0.014	mg/l	0.014	mg/l	0.7	20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-T-0	Trace Metals	EPA 200.8	Lead, Total	Total	0.002	mg/l	ND	mg/l		20	Pass	
10K0163	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-T-0	Trace Metals	EPA 200.8	Zinc, Total	Total	0.066	mg/l	0.073	mg/l	11	20	Pass	
10K0164	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-D-0	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10K0164	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-T-0	Trace Metals	EPA 200.8	Copper, Total	Total	0.014	mg/l	0.014	mg/l	0.7	20	Pass	
10K0164	3	EnviroMatrix Analytical, Inc.	DPR2-CU-E3-F-D-6	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	0.014	mg/l	0.013	mg/l	5	20	Pass	
10K0164	3	EnviroMatrix Analytical, Inc.	SD8(1)-CU-E3-F-T-113.4	Trace Metals	EPA 200.8	Copper, Total	Total	0.140	mg/l	0.126	mg/l	10	20	Pass	
10K0165	3	EnviroMatrix Analytical, Inc.	DPR2-Zn-E3-F-D-32	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.046	mg/l	0.048	mg/l	4	20	Pass	
10K0165	3	EnviroMatrix Analytical, Inc.	DPR2-Zn-E3-I-D-32	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.054	mg/l	0.053	mg/l	1	20	Pass	
10K0165	3	EnviroMatrix Analytical, Inc.	SD8(1)-CU-E3-F-T-113.4	Trace Metals	EPA 200.8	Zinc, Total	Total	0.139	mg/l	0.126	mg/l	10	20	Pass	
10K0165	3	EnviroMatrix Analytical, Inc.	SD8(1)-Zn-E3-F-T-56	Trace Metals	EPA 200.8	Zinc, Total	Total	0.160	mg/l	0.161	mg/l	0.5	20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	DMW-Cu-E3-I-D-1.5	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	DMW-Cu-E3-I-T-12	Trace Metals	EPA 200.8	Copper, Total	Total	0.026	mg/l	0.034	mg/l	27	20	Fail	QR-04
10K0166rev1	3	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E3-I-T-204.1	Trace Metals	EPA 200.8	Copper, Total	Total	0.236	mg/l	0.228	mg/l	3	20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	SD8(1)-Zn-E3-F-T-56	Trace Metals	EPA 200.8	Copper, Total	Total	0.038	mg/l	0.040	mg/l	5	20	Pass	
10K0166rev1	3	EnviroMatrix Analytical, Inc.	SD8(1)-Zn-E3-I-D-560	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	0.014	mg/l	0.014	mg/l	1	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	10L0364-21*	Trace Metals	EPA 200.8	Copper, Total	Total	0.004	mg/l	0.005	mg/l	21	20	Fail	QR-04
10K0167rev2	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-D-0	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-D-0	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	DMW-E3-F-D-0	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.002	mg/l	0.002	mg/l	7	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E3-I-T-204.1	Trace Metals	EPA 200.8	Copper, Total	Total	0.236	mg/l	0.228	mg/l	3	20	Pass	
10K0167rev2	3	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E3-I-T-204.1	Trace Metals	EPA 200.8	Lead, Total	Total	0.013	mg/l	0.010	mg/l	23	20	Fail	QR-04
10K0167rev2	3	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E3-I-T-204.1	Trace Metals	EPA 200.8	Zinc, Total	Total	0.184	mg/l	0.170	mg/l	8	20	Pass	
10K0168	3	EnviroMatrix Analytical, Inc.	DPR2-Zn-E3-I-D-32	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.054	mg/l	0.053	mg/l	1	20	Pass	
10K0168	3	EnviroMatrix Analytical, Inc.	DPR2-Zn-E3-I-T-1000	Trace Metals	EPA 200.8	Zinc, Total	Total	1.09	mg/l	1.10	mg/l	0.5	20	Pass	
10K0168	3	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E3-I-T-204.1	Trace Metals	EPA 200.8	Zinc, Total	Total	0.184	mg/l	0.170	mg/l	8	20	Pass	
10K0168	3	EnviroMatrix Analytical, Inc.	SD8(1)-Zn-E3-I-D-560	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.438	mg/l	0.436	mg/l	0.5	20	Pass	
10L0653	4	EnviroMatrix Analytical, Inc.	DMW-Zn-E4-F-D-18	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.017	mg/l	0.017	mg/l	0.5	20	Pass	
10L0653	4	EnviroMatrix Analytical, Inc.	DMW-Zn-E4-F-T-18	Trace Metals	EPA 200.8	Zinc, Total	Total	0.063	mg/l	0.052	mg/l	19	20	Pass	
10L0653	4	EnviroMatrix Analytical, Inc.	DMW-Zn-E4-I-D-18	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.014	mg/l	0.014	mg/l	2	20	Pass	
10L0653	4	EnviroMatrix Analytical, Inc.	DPR2-Zn-E4-F-T-100	Trace Metals	EPA 200.8	Zinc, Total	Total	0.176	mg/l	0.204	mg/l	14	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	DMW-E4-F-D-0	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	DMW-E4-F-D-0	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	DMW-E4-F-D-0	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.002	mg/l	0.002	mg/l	3	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	DPR2-Zn-E4-F-T-100	Trace Metals	EPA 200.8	Copper, Total	Total	0.027	mg/l	0.027	mg/l	2	20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	DPR2-Zn-E4-F-T-100	Trace Metals	EPA 200.8	Lead, Total	Total	0.002	mg/l	ND	mg/l		20	Pass	
10L0654	4	EnviroMatrix Analytical, Inc.	DPR2-Zn-E4-F-T-100	Trace Metals	EPA 200.8	Zinc, Total	Total	0.176	mg/l	0.204	mg/l	14	20	Pass	
10L0655	4	EnviroMatrix Analytical, Inc.	DMW-Cu-E4-F-D-1.5	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10L0655	4	EnviroMatrix Analytical, Inc.	DPR2-Cu-E4-F-D-10.8	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	0.012	mg/l	0.012	mg/l	3	20	Pass	
10L0655	4	EnviroMatrix Analytical, Inc.	DPR2-Cu-E4-F-T-19.4	Trace Metals	EPA 200.8	Copper, Total	Total	0.084	mg/l	0.084	mg/l	0.8	20	Pass	
10L0655	4	EnviroMatrix Analytical, Inc.	DPR2-Zn-E4-F-T-100	Trace Metals	EPA 200.8	Copper, Total	Total	0.027	mg/l	0.027	mg/l	2	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	DMW-E4-F-D-0	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	DMW-E4-F-D-0	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	DMW-E4-F-D-0	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.002	mg/l	0.002	mg/l	3	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	DPR2-Cu-E4-F-T-19.4	Trace Metals	EPA 200.8	Copper, Total	Total	0.084	mg/l	0.084	mg/l	0.8	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	DPR2-Cu-E4-F-T-19.4	Trace Metals	EPA 200.8	Lead, Total	Total	0.007	mg/l	0.008	mg/l	14	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	DPR2-Cu-E4-F-T-19.4	Trace Metals	EPA 200.8	Zinc, Total	Total	0.126	mg/l	0.128	mg/l	1	20	Pass	
10L0656	4	EnviroMatrix Analytical, Inc.	MB-E4-I-T-1	Trace Metals	EPA 200.8	Copper, Total	Total	0.106	mg/l	0.080	mg/l	28	20	Fail	QR-04
10L0656	4	EnviroMatrix Analytical, Inc.	MB-E4-I-T-1	Trace Metals	EPA 200.8	Lead, Total	Total	0.012	mg/l	0.004	mg/l	102	20	Fail	QR-04

Appendix Table E-2-5. Definitive WER Laboratory Duplicate Analyses

Batch	Event	Laboratory	Sample Id	Group	Method	Parameter	Fraction	Orig Result	Orig Units	Lab Dup Result	Lab Dup Units	RPD	Precision Limit (%)	Precision Accept	Lab Dup Qualifier
10L0656	4	EnviroMatrix Analytical, Inc.	MB-E4-I-T-1	Trace Metals	EPA 200.8	Zinc, Total	Total	0.089	mg/l	0.050	mg/l	56	20	Fail	QR-04
10L0657	4	EnviroMatrix Analytical, Inc.	DMW-Cu-E4-I-D-48	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	0.024	mg/l	0.024	mg/l	0.6	20	Pass	
10L0657	4	EnviroMatrix Analytical, Inc.	DMW-E4-F-D-0	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	ND	mg/l	ND	mg/l		20	Pass	
10L0657	4	EnviroMatrix Analytical, Inc.	DPR2-Cu-E4-F-D-10.8	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	0.012	mg/l	0.012	mg/l	3	20	Pass	
10L0657	4	EnviroMatrix Analytical, Inc.	MB-E4-I-T-1	Trace Metals	EPA 200.8	Copper, Total	Total	0.106	mg/l	0.080	mg/l	28	20	Fail	QR-04
10L0657	4	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E4-I-T-10.8	Trace Metals	EPA 200.8	Copper, Total	Total	0.081	mg/l	0.052	mg/l	43	20	Fail	QR-04
10L0658	4	EnviroMatrix Analytical, Inc.	DMW-Cu-E4-F-D-1.5	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.002	mg/l	0.002	mg/l	23	20	Pass	
10L0658	4	EnviroMatrix Analytical, Inc.	DMW-Zn-E4-I-D-18	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	0.014	mg/l	0.014	mg/l	2	20	Pass	
10L0658	4	EnviroMatrix Analytical, Inc.	SD8(1)-Cu-E4-I-T-10.8	Trace Metals	EPA 200.8	Zinc, Total	Total	0.177	mg/l	0.132	mg/l	29	20	Fail	QR-04
10L0658	4	EnviroMatrix Analytical, Inc.	SD8(1)-Zn-E4-I-T-100-Dup	Trace Metals	EPA 200.8	Zinc, Total	Total	0.320	mg/l	0.228	mg/l	34	20	Fail	QR-02
0K01019	3	Weck Laboratories, Inc	0J26084-01*	General Chemistry	SM 2320B	Alkalinity as CaCO3	NA	313	mg/l	315	mg/l	0.5	15	Pass	
0K01019	3	Weck Laboratories, Inc	0J29056-01*	General Chemistry	SM2540D	Total Suspended Solids	NA	39.0	mg/l	35.0	mg/l	11	20	Pass	
0K01019	3	Weck Laboratories, Inc	0J29062-01*	General Chemistry	SM2540D	Total Suspended Solids	NA	ND	mg/l	ND	mg/l		20	Pass	
0K01019	3	Weck Laboratories, Inc	0K01001-04*	General Chemistry	SM2540C	Total Dissolved Solids	NA	952	mg/l	975	mg/l	2	10	Pass	
0K01019	3	Weck Laboratories, Inc	0K02081-04*	General Chemistry	SM 2320B	Alkalinity as CaCO3	NA	12.4	mg/l	13.4	mg/l	8	15	Pass	
0K01019	3	Weck Laboratories, Inc	DPR2	General Chemistry	SM2540C	Total Dissolved Solids	NA	251	mg/l	255	mg/l	2	10	Pass	
0L21055	4	Weck Laboratories, Inc	0L16048-01*	General Chemistry	SM 2320B	Alkalinity as CaCO3	NA	135	mg/l	137	mg/l	1	15	Pass	
0L21055	4	Weck Laboratories, Inc	0L20053-02*	General Chemistry	SM2540C	Total Dissolved Solids	NA	426	mg/l	419	mg/l	2	10	Pass	
0L21055	4	Weck Laboratories, Inc	0L21106-01*	General Chemistry	SM2540D	Total Suspended Solids	NA	ND	mg/l	ND	mg/l		20	Pass	
0L21055	4	Weck Laboratories, Inc	0L22008-01*	General Chemistry	SM2540C	Total Dissolved Solids	NA	834	mg/l	860	mg/l	3	10	Pass	
0L21055	4	Weck Laboratories, Inc	0L28066-05*	General Chemistry	SM 2320B	Alkalinity as CaCO3	NA	1050	mg/l	1060	mg/l	0.3	15	Pass	
0L21055	4	Weck Laboratories, Inc	DPR2	General Chemistry	SM2540D	Total Suspended Solids	NA	52.0	mg/l	52.0	mg/l	0	20	Pass	
1B03019	4	Weck Laboratories, Inc	1A31040-01*	General Chemistry	SM 2320B	Alkalinity as CaCO3	NA	258	mg/l	260	mg/l	0.5	15	Pass	

Glossary of CRG Laboratory Flags
Q3 - RPD values are not accurate and not applicable because the results for R1 and/or R2 are lower than 10 times the MDL

Glossary of EMA Laboratory Flags
QR-02 - The RPD result exceeded the qc limits due to non-homogeneity of sample.
QR-07 - The RPD limit was exceeded due to the suspected sample contamination for this analyte.
QR-04 - The RPD between the sample and sample duplicate is not valid since both results are below the reporting limit for this analyte.

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
WST057-10b	1	CRG	General Chemistry	SM 2340 B	Total Hardness as CaCO3	SD8(1)	36.6	mg/L	SD8(1)-dup	37	mg/L	-1.09	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Zinc (Zn), Dissolved	SD8(1)	20.2	µg/L	SD8(1)-dup	22.1	µg/L	-8.98	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Zinc (Zn), Total	SD8(1)	192.3	µg/L	SD8(1)-dup	149.8	µg/L	24.85	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Lead (Pb), Dissolved	SD8(1)	1.3	µg/L	SD8(1)-dup	1.35	µg/L	-3.77	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Lead (Pb), Total	SD8(1)	24.19	µg/L	SD8(1)-dup	25.17	µg/L	-3.97	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Magnesium (Mg), Dissolved	SD8(1)	3.44	mg/L	SD8(1)-dup	3.44	mg/L	0.00	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Magnesium (Mg), Total	SD8(1)	4.22	mg/L	SD8(1)-dup	4.15	mg/L	1.67	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Potassium (K), Dissolved	SD8(1)	ND	mg/L	SD8(1)-dup	ND	mg/L	NC	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Potassium (K), Total	SD8(1)	ND	mg/L	SD8(1)-dup	ND	mg/L	NC	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Sodium (Na), Dissolved	SD8(1)	17	mg/L	SD8(1)-dup	17	mg/L	0.00	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Sodium (Na), Total	SD8(1)	17.6	mg/L	SD8(1)-dup	17.5	mg/L	0.57	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Calcium (Ca), Dissolved	SD8(1)	8.99	mg/L	SD8(1)-dup	9.15	mg/L	-1.76	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Calcium (Ca), Total	SD8(1)	11.22	mg/L	SD8(1)-dup	11.27	mg/L	-0.44	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Copper (Cu), Total	SD8(1)	7.1	µg/L	SD8(1)-dup	7.2	µg/L	-1.40	30	Pass
WST057-10b	1	CRG	Trace Metals	EPA 200.8m	Copper (Cu), Total	SD8(1)	22.1	µg/L	SD8(1)-dup	23.1	µg/L	-4.42	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Prallethrin by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Pyrene	SD8(1)	198.3	ng/L	SD8(1)-dup	193.8	ng/L	2.30	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Tetrachlorvinphos (Stirofos)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Tokuthion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625mNCI	Toxaphene	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	trans-Nonachlor	SD8(1)	12.3	ng/L	SD8(1)-dup	11.2	ng/L	9.36	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Trichloronate	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Fenitrothion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB149	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB151	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB153	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB156	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB157	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB158	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB167	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB168+132	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB169	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB170	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB174	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB177	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB180	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB183	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB187	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB189	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB194	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB195	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB200	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB201	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB203	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB206	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB209	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Permethrin by NCI	SD8(1)	176.8	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Perthane	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Perylene	SD8(1)	46.9	ng/L	SD8(1)-dup	47.4	ng/L	-1.06	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Phenanthrene	SD8(1)	90.8	ng/L	SD8(1)-dup	86.5	ng/L	4.85	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Phorate	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Fenthion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Fenvalerate by NCI	SD8(1)	27	ng/L	SD8(1)-dup	25.6	ng/L	5.32	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Fluoranthene	SD8(1)	221.3	ng/L	SD8(1)-dup	212.5	ng/L	4.06	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Fluorene	SD8(1)	5.6	ng/L	SD8(1)-dup	5.2	ng/L	7.41	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Fluvalinate by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Heptachlor	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Heptachlor Epoxide	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Indeno[1,2,3-c,d]pyrene	SD8(1)	64	ng/L	SD8(1)-dup	48.2	ng/L	28.16	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	L-Cyhalothrin by NCI	SD8(1)	30.7	ng/L	SD8(1)-dup	27.5	ng/L	11.00	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Malathion	SD8(1)	72.2	ng/L	SD8(1)-dup	61.4	ng/L	16.17	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Merphos	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Methamidophos (Monitor)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	1-Methylnaphthalene	SD8(1)	5.5	ng/L	SD8(1)-dup	4.8	ng/L	13.59	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	1-Methylphenanthrene	SD8(1)	15.1	ng/L	SD8(1)-dup	14.6	ng/L	3.37	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	2,3,5-Trimethylnaphthalene	SD8(1)	3.9	ng/L	SD8(1)-dup	3.4	ng/L	13.70	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	2,4'-DDD	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	2,4'-DDE	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Methidathion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Methoxychlor	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Methyl Parathion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Mevinphos (Phosdrin)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Mirex	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Naphthalene	SD8(1)	11	ng/L	SD8(1)-dup	8.7	ng/L	23.35	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Oxychlordane	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB003	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB008	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB018	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB028	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB031	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	cis-Nonachlor	SD8(1)	5.4	ng/L	SD8(1)-dup	5.4	ng/L	0.00	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Cyfluthrin by NCI	SD8(1)	66	ng/L	SD8(1)-dup	76.8	ng/L	-15.13	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Cypermethrin by NCI	SD8(1)	90.5	ng/L	SD8(1)-dup	97.4	ng/L	-7.34	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Danitol by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	DCPA (Dacthal)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Deltamethrin by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Demeton	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Diazinon	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Dibenz[a,h]anthracene	SD8(1)	22.2	ng/L	SD8(1)-dup	19.3	ng/L	13.98	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Dibenzothiophene	SD8(1)	19.9	ng/L	SD8(1)-dup	24.6	ng/L	-21.12	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Dichlorvos	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Dicofol	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Dieldrin	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Dimethoate	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Disulfoton	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB033	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	BHC-alpha	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	BHC-beta	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	BHC-delta	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	BHC-gamma	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Bifenthrin by NCI	SD8(1)	89.2	ng/L	SD8(1)-dup	105.1	ng/L	-16.37	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Biphenyl	SD8(1)	6	ng/L	SD8(1)-dup	4.8	ng/L	22.22	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Bolstar (Sulprofos)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Chlordane-alpha	SD8(1)	14.4	ng/L	SD8(1)-dup	12.8	ng/L	11.76	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Chlordane-gamma	SD8(1)	13.6	ng/L	SD8(1)-dup	11.3	ng/L	18.47	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Chlorpyrifos	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Chrysene	SD8(1)	151.9	ng/L	SD8(1)-dup	130.1	ng/L	15.46	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB037	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB044	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB049	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB052	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB056/060	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB066	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB070	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB074	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB077	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB081	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB087	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB095	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	2,4'-DDT	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB097	SD8(1)	ND	ng/L	SD8(1)-dup	3.1	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	2,6-Dimethylnaphthalene	SD8(1)	4.5	ng/L	SD8(1)-dup	3.7	ng/L	19.51	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	2-Methylnaphthalene	SD8(1)	7	ng/L	SD8(1)-dup	8	ng/L	-13.33	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	4,4'-DDD	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	4,4'-DDE	SD8(1)	ND	ng/L	SD8(1)-dup	5.2	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	4,4'-DDT	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Acenaphthene	SD8(1)	3	ng/L	SD8(1)-dup	2.3	ng/L	26.42	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Acenaphthylene	SD8(1)	4.1	ng/L	SD8(1)-dup	3.8	ng/L	7.59	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Aldrin	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Allethrin by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Anthracene	SD8(1)	14.6	ng/L	SD8(1)-dup	16.6	ng/L	-12.82	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Azinphos Methyl	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB099	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB101	SD8(1)	ND	ng/L	SD8(1)-dup	1.8	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB105	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB110	SD8(1)	ND	ng/L	SD8(1)-dup	4.9	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB114	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB118	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB119	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB123	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB126	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB128	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB138	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	PCB Congeners	EPA 625m	PCB141	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benz[a]anthracene	SD8(1)	57.6	ng/L	SD8(1)-dup	48.4	ng/L	17.36	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[a]pyrene	SD8(1)	61.7	ng/L	SD8(1)-dup	64.4	ng/L	-4.28	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[b]fluoranthene	SD8(1)	110.2	ng/L	SD8(1)-dup	112.8	ng/L	-2.33	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[e]pyrene	SD8(1)	96	ng/L	SD8(1)-dup	84.6	ng/L	12.62	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[g,h,i]perylene	SD8(1)	113.8	ng/L	SD8(1)-dup	88.8	ng/L	24.68	30	Pass
WST057-10b	1	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[k]fluoranthene	SD8(1)	59.7	ng/L	SD8(1)-dup	53.9	ng/L	10.21	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Endosulfan Sulfate	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Endosulfan-I	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Endosulfan-II	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Endrin	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Endrin Aldehyde	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Chlorinated Pesticides	EPA 625m	Endrin Ketone	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Pyrethroids by NCI	EPA 625mNCI	Esfenvalerate by NCI	SD8(1)	29.4	ng/L	SD8(1)-dup	25.2	ng/L	15.38	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Ethoprop (Ethoprofos)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Ethyl Parathion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Fenchlorphos (Ronnel)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Fensulfothion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	Organophosphorus Pesticides	EPA 625m	Phosmet	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10b	1	CRG	General Chemistry	SM 4500-NH3 F	Ammonia-N	SD8(1)	0.16	mg/L	SD8(1)-dup	0.14	mg/L	13.33	30	Pass
WST057-10b	1	CRG	General Chemistry	EPA 300.0	Chloride by IC	SD8(1)	19.21	mg/L	SD8(1)-dup	19.22	mg/L	-0.05	30	Pass
WST057-10b	1	CRG	General Chemistry	EPA 300.0	Sulfate by IC	SD8(1)	15.03	mg/L	SD8(1)-dup	15.01	mg/L	0.13	30	Pass
WST057-10b	1	CRG	General Chemistry	SM 2540 C	Total Dissolved Solids	SD8(1)	138	mg/L	SD8(1)-dup	150	mg/L	-8.33	30	Pass
WST057-10b	1	CRG	General Chemistry	SM 2540 D	Total Suspended Solids	SD8(1)	322	mg/L	SD8(1)-dup	300	mg/L	7.07	30	Pass
WST057-10b	1	CRG	General Chemistry	SM 2320 B	Total Alkalinity	SD8(1)	32	mg/L	SD8(1)-dup	33	mg/L	-3.08	30	Pass
WST057-10b	1	CRG	General Chemistry	SM 5310 B	Dissolved Organic Carbon	SD8(1)	8	mg/L	SD8(1)-dup	8.2	mg/L	-2.47	30	Pass
WST057-10b	1	CRG	General Chemistry	SM 5310 B	Total Organic Carbon	SD8(1)	6.8	mg/L	SD8(1)-dup	8	mg/L	-16.22	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Potassium (K), Dissolved	SD8(1)	ND	mg/L	SD8(1)-dup	ND	mg/L	NC	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Sodium (Na), Dissolved	SD8(1)	20.6	mg/L	SD8(1)-dup	20.3	mg/L	1.47	30	Pass
WST057-10d	2	CRG	General Chemistry	SM 2340 B	Total Hardness as CaCO3	SD8(1)	49.9	mg/L	SD8(1)-dup	49.6	mg/L	0.60	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Zinc (Zn), Dissolved	SD8(1)	76.6	µg/L	SD8(1)-dup	75.7	µg/L	1.18	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Calcium (Ca), Dissolved	SD8(1)	13.16	mg/L	SD8(1)-dup	13.14	mg/L	0.15	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Copper (Cu), Dissolved	SD8(1)	17.3	µg/L	SD8(1)-dup	17.1	µg/L	1.16	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Lead (Pb), Dissolved	SD8(1)	2.11	µg/L	SD8(1)-dup	2.02	µg/L	4.36	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Magnesium (Mg), Dissolved	SD8(1)	4.13	mg/L	SD8(1)-dup	4.09	mg/L	0.97	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Potassium (K), Total	SD8(1)	ND	mg/L	SD8(1)-dup	ND	mg/L	NC	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Sodium (Na), Total	SD8(1)	20.9	mg/L	SD8(1)-dup	20.7	mg/L	0.96	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Zinc (Zn), Total	SD8(1)	161.1	µg/L	SD8(1)-dup	160.3	µg/L	0.50	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Calcium (Ca), Total	SD8(1)	14.5	mg/L	SD8(1)-dup	14.34	mg/L	1.11	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Copper (Cu), Total	SD8(1)	29.4	µg/L	SD8(1)-dup	29.8	µg/L	-1.35	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Lead (Pb), Total	SD8(1)	12.27	µg/L	SD8(1)-dup	11.32	µg/L	8.05	30	Pass
WST057-10d	2	CRG	Trace Metals	EPA 200.8m	Magnesium (Mg), Total	SD8(1)	4.48	mg/L	SD8(1)-dup	4.44	mg/L	0.90	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB180	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB183	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB187	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB189	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB177	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB194	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB195	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB200	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB201	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB203	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB206	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB209	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Permethrin by NCI	SD8(1)	291.8	ng/L	SD8(1)-dup	274.9	ng/L	5.96	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Perthane	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Perylene	SD8(1)	31.6	ng/L	SD8(1)-dup	44.8	ng/L	-34.55	30	Fail
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Phenanthrene	SD8(1)	61.2	ng/L	SD8(1)-dup	51.8	ng/L	16.64	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Phorate	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Phosmet	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Prallethrin by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Pyrene	SD8(1)	118.4	ng/L	SD8(1)-dup	102	ng/L	14.88	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Tetrachlorvinphos (Stirofos)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Tokuthion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625mNCI	Toxaphene	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	trans-Nonachlor	SD8(1)	8.3	ng/L	SD8(1)-dup	7.1	ng/L	15.58	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Trichloronate	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	1-Methylnaphthalene	SD8(1)	9.7	ng/L	SD8(1)-dup	11	ng/L	-12.56	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	1-Methylphenanthrene	SD8(1)	11.1	ng/L	SD8(1)-dup	11.5	ng/L	-3.54	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	2,3,5-Trimethylnaphthalene	SD8(1)	7.2	ng/L	SD8(1)-dup	3.5	ng/L	69.16	30	Fail
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	2,4'-DDD	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	2,4'-DDE	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	2,4'-DDT	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	2,6-Dimethylnaphthalene	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	2-Methylnaphthalene	SD8(1)	16.6	ng/L	SD8(1)-dup	16.1	ng/L	3.06	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	4,4'-DDD	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	4,4'-DDE	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	4,4'-DDT	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Acenaphthene	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Acenaphthylene	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Aldrin	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Allethrin by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Anthracene	SD8(1)	10.4	ng/L	SD8(1)-dup	10.2	ng/L	1.94	30	Pass
WST057-10d	2	CRG	Aroclor PCBs	EPA 625m	Aroclor 1016	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Aroclor PCBs	EPA 625m	Aroclor 1221	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Aroclor PCBs	EPA 625m	Aroclor 1232	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Aroclor PCBs	EPA 625m	Aroclor 1242	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Aroclor PCBs	EPA 625m	Aroclor 1248	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Aroclor PCBs	EPA 625m	Aroclor 1254	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Aroclor PCBs	EPA 625m	Aroclor 1260	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Azinphos Methyl	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benz[a]anthracene	SD8(1)	24.8	ng/L	SD8(1)-dup	22.3	ng/L	10.62	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[a]pyrene	SD8(1)	36.8	ng/L	SD8(1)-dup	40.5	ng/L	-9.57	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[b]fluoranthene	SD8(1)	83	ng/L	SD8(1)-dup	77.9	ng/L	6.34	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[e]pyrene	SD8(1)	67.3	ng/L	SD8(1)-dup	65.3	ng/L	3.02	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[g,h,i]perylene	SD8(1)	65.6	ng/L	SD8(1)-dup	70	ng/L	-6.49	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Benzo[k]fluoranthene	SD8(1)	42.5	ng/L	SD8(1)-dup	28.8	ng/L	38.43	30	Fail
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	BHC-alpha	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	BHC-beta	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	BHC-delta	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	BHC-gamma	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Bifenthrin by NCI	SD8(1)	89.4	ng/L	SD8(1)-dup	101.3	ng/L	-12.48	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Biphenyl	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Bolstar (Sulprofos)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Chlordane-alpha	SD8(1)	5.6	ng/L	SD8(1)-dup	10.8	ng/L	-63.41	30	Fail
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Chlordane-gamma	SD8(1)	6.7	ng/L	SD8(1)-dup	12.1	ng/L	-57.45	30	Fail
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Chlorpyrifos	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Chrysene	SD8(1)	76.2	ng/L	SD8(1)-dup	71.1	ng/L	6.92	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	cis-Nonachlor	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Cyfluthrin by NCI	SD8(1)	33.8	ng/L	SD8(1)-dup	48	ng/L	-34.72	30	Fail
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Cypermethrin by NCI	SD8(1)	40.1	ng/L	SD8(1)-dup	55.6	ng/L	-32.39	30	Fail
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Danitol by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	DCPA (Dacthal)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Deltamethrin by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Demeton	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Diazinon	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Dibenz[a,h]anthracene	SD8(1)	10.9	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Dibenzothiophene	SD8(1)	52.6	ng/L	SD8(1)-dup	47.6	ng/L	9.98	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Dichlorvos	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Dicofol	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Dieldrin	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Dimethoate	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Disulfoton	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Endosulfan Sulfate	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Endosulfan-I	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Endosulfan-II	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Endrin	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Endrin Aldehyde	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Endrin Ketone	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Esfenvalerate by NCI	SD8(1)	0.5	ng/L	SD8(1)-dup	1.2	ng/L	-82.35	30	Fail
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Ethoprop (Ethoprofos)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Ethyl Parathion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Fenchlorphos (Ronnel)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Fenitrothion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Fensulfothion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Fenthion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Fenvalerate by NCI	SD8(1)	1	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Fluoranthene	SD8(1)	121.3	ng/L	SD8(1)-dup	103.6	ng/L	15.74	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Fluorene	SD8(1)	4.5	ng/L	SD8(1)-dup	4	ng/L	11.76	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	Fluvalinate by NCI	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Heptachlor	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Heptachlor Epoxide	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Indeno[1,2,3-c,d]pyrene	SD8(1)	47.1	ng/L	SD8(1)-dup	45.8	ng/L	2.80	30	Pass
WST057-10d	2	CRG	Pyrethroids by NCI	EPA 625mNCI	L-Cyhalothrin by NCI	SD8(1)	22.8	ng/L	SD8(1)-dup	10.9	ng/L	70.62	30	Fail
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Malathion	SD8(1)	479.8	ng/L	SD8(1)-dup	506.7	ng/L	-5.45	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Merphos	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Methamidophos (Monitor)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Methidathion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Methoxychlor	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Methyl Parathion	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Organophosphorus Pesticides	EPA 625m	Mevinphos (Phosdrin)	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Mirex	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	Polynuclear Aromatic Hydrocarbons	EPA 625m	Naphthalene	SD8(1)	18.3	ng/L	SD8(1)-dup	15.3	ng/L	17.86	30	Pass
WST057-10d	2	CRG	Chlorinated Pesticides	EPA 625m	Oxychlordane	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB003	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB008	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB018	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB028	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB031	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB033	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB037	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB044	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB049	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB052	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB056/060	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB066	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB070	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB074	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB077	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB081	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB087	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB095	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB097	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB099	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB101	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB105	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB110	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB114	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB118	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB119	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB123	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB126	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB128	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB138	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB141	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB149	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB151	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB153	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB156	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB157	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB158	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB167	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB168+132	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB169	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB170	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	PCB Congeners	EPA 625m	PCB174	SD8(1)	ND	ng/L	SD8(1)-dup	ND	ng/L	NC	30	Pass
WST057-10d	2	CRG	General Chemistry	SM 4500-NH3 F	Ammonia-N	SD8(1)	0.48	mg/L	SD8(1)-dup	0.46	mg/L	4.26	30	Pass
WST057-10d	2	CRG	General Chemistry	EPA 300.0	Chloride by IC	SD8(1)	27.84	mg/L	SD8(1)-dup	27.82	mg/L	0.07	30	Pass
WST057-10d	2	CRG	General Chemistry	EPA 300.0	Sulfate by IC	SD8(1)	19.83	mg/L	SD8(1)-dup	19.84	mg/L	-0.05	30	Pass
WST057-10d	2	CRG	General Chemistry	SM 2540 C	Total Dissolved Solids	SD8(1)	134	mg/L	SD8(1)-dup	144	mg/L	-7.19	30	Pass
WST057-10d	2	CRG	General Chemistry	SM 2540 D	Total Suspended Solids	SD8(1)	76.5	mg/L	SD8(1)-dup	75.5	mg/L	1.32	30	Pass
WST057-10d	2	CRG	General Chemistry	SM 2320 B	Total Alkalinity	SD8(1)	31	mg/L	SD8(1)-dup	30	mg/L	3.28	30	Pass
WST057-10d	2	CRG	General Chemistry	SM 5310 B	Total Organic Carbon	SD8(1)	28.6	mg/L	SD8(1)-dup	27.9	mg/L	2.48	30	Pass
WST057-10d	2	CRG	General Chemistry	SM 5310 B	Dissolved Organic Carbon	SD8(1)	25.2	mg/L	SD8(1)-dup	25.1	mg/L	0.40	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Calcium, Total	CC-SD8 (1)	13	mg/l	CC-SD8 (1)-DUP	14	mg/l	-7.41	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Potassium, Total	CC-SD8 (1)	4.2	mg/l	CC-SD8 (1)-DUP	4.6	mg/l	-9.09	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Magnesium, Total	CC-SD8 (1)	4.5	mg/l	CC-SD8 (1)-DUP	5.1	mg/l	-12.50	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Sodium, Total	CC-SD8 (1)	18	mg/l	CC-SD8 (1)-DUP	18	mg/l	0.00	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Copper, Total	CC-SD8 (1)	64	ug/l	CC-SD8 (1)-DUP	81	ug/l	-23.45	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Copper, Dissolved	CC-SD8 (1)	17	ug/l	CC-SD8 (1)-DUP	16	ug/l	6.06	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Lead, Total	CC-SD8 (1)	49	ug/l	CC-SD8 (1)-DUP	65	ug/l	-28.07	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Lead, Dissolved	CC-SD8 (1)	0.61	ug/l	CC-SD8 (1)-DUP	0.62	ug/l	-1.63	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Zinc, Total	CC-SD8 (1)	350	ug/l	CC-SD8 (1)-DUP	440	ug/l	-22.78	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Zinc, Dissolved	CC-SD8 (1)	79	ug/l	CC-SD8 (1)-DUP	72	ug/l	9.27	30	Pass
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 300.0	Chloride, Total	CC-SD8 (1)	23	mg/l	CC-SD8 (1)-DUP	23	mg/l	0.00	30	Pass
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 300.0	Sulfate as SO4	CC-SD8 (1)	17	mg/l	CC-SD8 (1)-DUP	17	mg/l	0.00	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	2,4´-DDE	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	2,4´-DDT	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	4,4´-DDD	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	alpha-BHC	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Azinphos methyl (Guthion)	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Bolstar	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Chlorpyrifos	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Coumaphos	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Dimethoate	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Disulfoton	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Ethoprop	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Ethyl parathion	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Methyl parathion	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Mevinphos	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Naled	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Phorate	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Demeton-o	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Demeton-s	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Diazinon	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Dichlorvos	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Fensulfothion	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Fenthion	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Malathion	CC-SD8 (1)	0.11	ug/l	CC-SD8 (1)-DUP	0.20	ug/l	-58.06	30	Fail
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Merphos	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Ronnel	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Stirophos	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Tokuthion (Prothiofos)	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Trichloronate	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	1-Methylnaphthalene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	1-Methylphenanthrene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Acenaphthene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Acenaphthylene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Anthracene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (e) pyrene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (g,h,i) perylene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (k) fluoranthene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Fluoranthene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Fluorene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Indeno (1,2,3-cd) pyrene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Phenanthrene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Pyrene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2,6-Dimethylnaphthalene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Methylnaphthalene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (a) anthracene	CC-SD8 (1)	0.024	ug/l	CC-SD8 (1)-DUP	0.051	ug/l	-72.00	30	Fail

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (a) pyrene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (b) fluoranthene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Biphenyl	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Chrysene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Dibenzo (a,h) anthracene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Naphthalene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Perylene	CC-SD8 (1)	ND	ug/l	CC-SD8 (1)-DUP	ND	ug/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM 2320B	Alkalinity as CaCO3	CC-SD8 (1)	35	mg/l	CC-SD8 (1)-DUP	36	mg/l	-2.82	30	Pass
0K01019	3	Weck Laboratories, Inc	General Chemistry	EPA 350.1	Ammonia as N	CC-SD8 (1)	0.54	mg/l	CC-SD8 (1)-DUP	0.64	mg/l	-16.95	30	Pass
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM5310C	Dissolved Organic Carbon	CC-SD8 (1)	8.2	mg/l	CC-SD8 (1)-DUP	8.2	mg/l	0.00	30	Pass
0K01019	3	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Hardness as CaCO3, Total	CC-SD8 (1)	52	mg/l	CC-SD8 (1)-DUP	56	mg/l	-7.41	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-114	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-118	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-119	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-132	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-138	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-141	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-101	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-105	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-110	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-123	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-126	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-128	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-149	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-151	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-153	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-167	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-168	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-169	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-156	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-157	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-158	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-170	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-174	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-177	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-18	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-180	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-183	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-195	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-200	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-201	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-28	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-3	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-31	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-49	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-52	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-56	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-74	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-77	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-8	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-97	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-99	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-187	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-189	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-194	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-203	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-206	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-209	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-33	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-37	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-44	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-60	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-66	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-70	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-81	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-87	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-95	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Allethrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Bifenthrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Cyfluthrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Esfenvalerate	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Fenvalerate	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Prallethrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Sumithrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Tefluthrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Cypermethrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Deltamethrin/Tralomethrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Dichloran	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	L-Cyhalothrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Pendimethalin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Permethrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM2540C	Total Dissolved Solids	CC-SD8 (1)	140	mg/l	CC-SD8 (1)-DUP	130	mg/l	7.41	30	Pass
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM2540D	Total Suspended Solids	CC-SD8 (1)	46	mg/l	CC-SD8 (1)-DUP	54	mg/l	-16.00	30	Pass
0K01019	3	Weck Laboratories, Inc	General Chemistry	SM5310C	Total Organic Carbon (TOC)	CC-SD8 (1)	10	mg/l	CC-SD8 (1)-DUP	11	mg/l	-9.52	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Calcium, Total	DPR2	13	mg/l	DPR2-Duplicate	13	mg/l	0.00	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Zinc, Dissolved	DPR2	21	ug/l	DPR2-Duplicate	21	ug/l	0.00	30	Pass
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	Chloride, Total	DPR2	36	mg/l	DPR2-Duplicate	34	mg/l	5.71	30	Pass
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 300.0	Sulfate as SO4	DPR2	15	mg/l	DPR2-Duplicate	15	mg/l	0.00	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	4,4´-DDD	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	4,4´-DDE	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	4,4´-DDT	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1016	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1221	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1232	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1260	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	beta-BHC	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	2,4´-DDD	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	2,4´-DDE	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	2,4´-DDT	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aldrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	alpha-BHC	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	alpha-Chlordane	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1242	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1248	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1254	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	delta-BHC	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Dieldrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endrin aldehyde	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	gamma-BHC (Lindane)	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Methoxychlor	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Mirex	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endosulfan I	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endosulfan II	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endosulfan sulfate	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	gamma-Chlordane	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Heptachlor	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Heptachlor epoxide	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Toxaphene	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	trans-Nonachlor	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Azinphos methyl (Guthion)	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Demeton-s	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Diazinon	DPR2	0.0055	ug/l	DPR2-Duplicate	0.0054	ug/l	1.83	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Dichlorvos	DPR2	0.0033	ug/l	DPR2-Duplicate	0.0031	ug/l	6.25	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Dimethoate	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Fenthion	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Malathion	DPR2	0.11	ug/l	DPR2-Duplicate	0.096	ug/l	13.59	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Merphos	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Methyl parathion	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Stirophos	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Tokuthion (Prothiofos)	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Trichloronate	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Bolstar	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Chlorpyrifos	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Coumaphos	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Demeton-o	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Disulfoton	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Ethoprop	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Ethyl parathion	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Fensulfothion	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Mevinphos	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Naled	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Phorate	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Organophosphorus Pesticides	625M	Ronnel	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2-Methylnaphthalene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Acenaphthene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (a) pyrene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (b) fluoranthene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (e) pyrene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	1-Methylnaphthalene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	1-Methylphenanthrene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	2,6-Dimethylnaphthalene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Acenaphthylene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Anthracene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (a) anthracene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (g,h,i) perylene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Benzo (k) fluoranthene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Biphenyl	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Fluorene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Indeno (1,2,3-cd) pyrene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Naphthalene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Pyrene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Chrysene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Dibenzo (a,h) anthracene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Fluoranthene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Perylene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Polynuclear Aromatic Hydrocarbons	EPA 8270C-SIM	Phenanthrene	DPR2	ND	ug/l	DPR2-Duplicate	ND	ug/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM 2320B	Alkalinity as CaCO3	DPR2	38	mg/l	DPR2-Duplicate	40	mg/l	-5.13	30	Pass
0L21055	4	Weck Laboratories, Inc	General Chemistry	EPA 350.1	Ammonia as N	DPR2	0.11	mg/l	DPR2-Duplicate	0.12	mg/l	-8.70	30	Pass
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM5310C	Dissolved Organic Carbon	DPR2	4.5	mg/l	DPR2-Duplicate	4.6	mg/l	-2.20	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Hardness as CaCO3, Total	DPR2	53	mg/l	DPR2-Duplicate	53	mg/l	0.00	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-101	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-105	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-110	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-114	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-118	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-119	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-132	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-138	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-141	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-156	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-157	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-158	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-170	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-174	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-177	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-81	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-87	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-77	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-123	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-126	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-128	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-149	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-151	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-153	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-167	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-168	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-169	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-18	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-180	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-8	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-74	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-70	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-66	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-49	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-44	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-37	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-33	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-31	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-3	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-203	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-201	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-200	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-60	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-56	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-52	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-28	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-209	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-206	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-195	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-194	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-189	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-97	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-99	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-187	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-183	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	PCB Congeners	GCMS SIM	PCB-95	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Cypermethrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Deltamethrin/Tralomethrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Dichloran	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	L-Cyhalothrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Pendimethalin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Permethrin	DPR2	31	ng/l	DPR2-Duplicate	15	ng/l	69.57	30	Fail
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Allethrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Bifenthrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Cyfluthrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Esfenvalerate	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Fenvalerate	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Prallethrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Sumithrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	Pyrethroids by NCI	GC/MS NCI-SIM	Tefluthrin	DPR2	ND	ng/l	DPR2-Duplicate	ND	ng/l	NC	30	Pass
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM2540C	Total Dissolved Solids	DPR2	140	mg/l	DPR2-Duplicate	130	mg/l	7.41	30	Pass

Appendix Table E-2-6. Definitive WER Field Sample Duplicate Analytical Results

Batch	Event	Laboratory	Group	Method	Parameter	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Field Dup Results	Field Dup Result Units	RPD	Precision Limit	Precision Accept
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM2540D	Total Suspended Solids	DPR2	52	mg/l	DPR2-Duplicate	49	mg/l	5.94	30	Pass
0L21055	4	Weck Laboratories, Inc	General Chemistry	SM5310C	Total Organic Carbon (TOC)	DPR2	5.5	mg/l	DPR2-Duplicate	5.6	mg/l	-1.80	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Potassium, Total	DPR2	3.2	mg/l	DPR2-Duplicate	3.1	mg/l	3.17	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Magnesium, Total	DPR2	4.7	mg/l	DPR2-Duplicate	4.7	mg/l	0.00	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.7	Sodium, Total	DPR2	22	mg/l	DPR2-Duplicate	23	mg/l	-4.44	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Copper, Total	DPR2	15	ug/l	DPR2-Duplicate	14	ug/l	6.90	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Copper, Dissolved	DPR2	6.9	ug/l	DPR2-Duplicate	7.1	ug/l	-2.86	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Lead, Total	DPR2	8.4	ug/l	DPR2-Duplicate	7.9	ug/l	6.13	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Lead, Dissolved	DPR2	0.48	ug/l	DPR2-Duplicate	0.50	ug/l	-4.08	30	Pass
0L21055	4	Weck Laboratories, Inc	Trace Metals	EPA 200.8	Zinc, Total	DPR2	67	ug/l	DPR2-Duplicate	63	ug/l	6.15	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	alpha-Chlordane	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1016	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1248	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1254	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1260	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	delta-BHC	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Dieldrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endosulfan I	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endrin aldehyde	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	gamma-BHC (Lindane)	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	gamma-Chlordane	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Mirex	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Toxaphene	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	2,4´-DDD	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	4,4´-DDE	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	4,4´-DDT	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aldrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1221	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1232	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Aroclor 1242	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	beta-BHC	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endosulfan II	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endosulfan sulfate	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Endrin	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Heptachlor	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Heptachlor epoxide	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	Methoxychlor	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass
0K01019	3	Weck Laboratories, Inc	Chlorinated Pesticides	EPA 608	trans-Nonachlor	CC-SD8 (1)	ND	ng/l	CC-SD8 (1)-DUP	ND	ng/l	NC	30	Pass

Appendix Table E-2-7. Definitive WER Laboratory Duplicate Analytical Results - Trace Metals

Batch	Event	Laboratory	Group	Method	Parameter	Fraction	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Lab Dup Results	Lab Dup Result Units	RPD	Precision Limit	Precision Accept
10C0053	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E1-I-T-113.4	0.105	mg/l	DPR2-Cu-E1-I-T-113.4 DUP	0.105	mg/l	0.00	30	Pass
10C0053	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E1-I-D-113.4	0.075	mg/l	DPR2-Cu-E1-I-D-113.4 DUP	0.070	mg/l	6.90	30	Pass
10C0052	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	SD8(1)-Zn-E1-I-T-560	1.19	mg/l	SD8(1)-Zn-E1-I-T-560 DUP	1.14	mg/l	4.29	30	Pass
10C0052	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	SD8(1)-Zn-E1-I-D-560	0.667	mg/l	SD8(1)-Zn-E1-I-D-560 DUP	0.668	mg/l	-0.15	30	Pass
10C0119	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E1-F- T -113.4	75	ug/l	DPR2-Cu-E1-F- T -113.4 DUP	82	ug/l	-8.92	30	Pass
10C0119	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E1-F- D -113.4	64	ug/l	DPR2-Cu-E1-F- D -113.4 DUP	62	ug/l	3.17	30	Pass
10C0120	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	SD8(1)-Zn-E1-F- T -560	1270	ug/l	SD8(1)-Zn-E1-F- T -560-DUP	1210	ug/l	4.84	30	Pass
10C0120	1	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	SD8(1)-Zn-E1-F- D -560	1100	ug/l	SD8(1)-Zn-E1-F- D -560-DUP	1060	ug/l	3.70	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	MB-E2-I-T-1	4	ug/l	MB-E2-I-T-2	1	ug/l	120.00	30	Fail
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Total	Total	MB-E2-I-T-1	0.2	ug/l	MB-E2-I-T-2	ND	ug/l	NC	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	MB-E2-I-T-1	15	ug/l	MB-E2-I-T-2	15	ug/l	0.00	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	MB-E2-I-D-1	ND	ug/l	MB-E2-I-D-2	ND	ug/l	NC	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	MB-E2-I-D-1	ND	ug/l	MB-E2-I-D-2	ND	ug/l	NC	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	MB-E2-I-D-1	ND	ug/l	MB-E2-I-D-2	0.8	ug/l	NC	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	MB-E2-F-T-1	2	ug/l	MB-E2-F-T-2	1	ug/l	66.67	30	Fail
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Total	Total	MB-E2-F-T-1	0.2	ug/l	MB-E2-F-T-2	0.2	ug/l	0.00	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	MB-E2-F-T-1	13	ug/l	MB-E2-F-T-2	32	ug/l	-84.44	30	Fail
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	MB-E2-F-D-1	ND	ug/l	MB-E2-F-D-2	ND	ug/l	NC	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	MB-E2-F-D-1	ND	ug/l	MB-E2-F-D-2	ND	ug/l	NC	30	Pass
10D0126	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	MB-E2-F-D-1	ND	ug/l	MB-E2-F-D-2	ND	ug/l	NC	30	Pass
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	DMW-Zn-E2-F-T-180	196	ug/l	DMW-Zn-E2-F-T-180-Dup	194	ug/l	1.03	30	Pass
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	DMW-Zn-E2-F-D-180	141	ug/l	DMW-Zn-E2-F-D-180-Dup	145	ug/l	-2.80	30	Pass
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	SD8(1)-Zn-E2-F-D-100	130	ug/l	SD8(1)-Zn-E2-F-D-100-DUP	129	ug/l	0.77	30	Pass
10D0128	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	SD8(1)-Zn-E2-F-T-100	247	ug/l	SD8(1)-Zn-E2-F-T-100-DUP	271	ug/l	-9.27	30	Pass
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	DMW-Zn-E2-I-T-180	192	ug/l	DMW-Zn-E2-I-T-180-DUP	188	ug/l	2.11	30	Pass
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	DMW-Zn-E2-I-D-180	137	ug/l	DMW-Zn-E2-I-D-180-DUP	139	ug/l	-1.45	30	Pass
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	SD8(1)-Zn-E2-I-T-100	323	ug/l	SD8(1)-Zn-E2-I-T-100 DUP	295	ug/l	9.06	30	Pass
10D0129	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	SD8(1)-Zn-E2-I-D-100	138	ug/l	SD8(1)-Zn-E2-I-D-100 DUP	132	ug/l	4.44	30	Pass
10D0130	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DMW-Cu-E2-I-T-24	24	ug/l	DMW-Cu-E2-I-T-24-DUP	22	ug/l	8.70	30	Pass
10D0130	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DMW-Cu-E2-I-D-24	12	ug/l	DMW-Cu-E2-I-D-24-DUP	11	ug/l	8.70	30	Pass
10D0130	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E2-I-T-113.4	132	ug/l	DPR2-Cu-E2-I-T-113.4 DUP	142	ug/l	-7.30	30	Pass
10D0130	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E2-I-D-113.4	110	ug/l	DPR2-Cu-E2-I-D-113.4 DUP	112	ug/l	-1.80	30	Pass
10D0131	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DMW-Cu-E2-F-T-24	21	ug/l	DMW-Cu-E2-F-T-24-DUP	22	ug/l	-4.65	30	Pass
10D0131	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DMW-Cu-E2-F-D-24	10	ug/l	DMW-Cu-E2-F-D-24-DUP	10	ug/l	0.00	30	Pass
10D0131	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E2-F-T-113.4	114	ug/l	DPR2-Cu-E2-F-T-113.4 DUP	126	ug/l	-10.00	30	Pass
10D0131	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E2-F-D-113.4 DUP	97	ug/l	DPR2-Cu-E2-F-D-113.4 DUP	97	ug/l	0.00	30	Pass
10D0249rev2	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E2-I-T-367.3	348	ug/l	DPR2-Cu-E2-I-T-367.3-DUP	361	ug/l	-3.67	30	Pass
10D0249rev2	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E2-I-D-367.3	299	ug/l	DPR2-Cu-E2-I-D-367.3-DUP	302	ug/l	-1.00	30	Pass
10D0249rev2	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E2-F-T-367.3	322	ug/l	DPR2-Cu-E2-F-T-367.3-DUP	338	ug/l	-4.85	30	Pass
10D0249rev2	2	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E2-F-D-367.3	291	ug/l	DPR2-Cu-E2-F-D-367.3-DUP	307	ug/l	-5.35	30	Pass
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	MB-E3-F-T-1	0.001	mg/l	MB-E3-F-T-2	0.001	mg/l	0.00	30	Pass
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Total	Total	MB-E3-F-T-1	0.0002	mg/l	MB-E3-F-T-2	0.0001	mg/l	66.67	30	Fail
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	MB-E3-F-T-1	0.012	mg/l	MB-E3-F-T-2	0.007	mg/l	52.63	30	Fail
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	MB-E3-F-D-1	ND	mg/l	MB-E3-F-D-2	ND	mg/l	NC	30	Pass
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	MB-E3-F-D-1	ND	mg/l	MB-E3-F-D-2	ND	mg/l	NC	30	Pass
10K0163	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	MB-E3-F-D-1	ND	mg/l	MB-E3-F-D-2	0.001	mg/l	NC	30	Pass
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-CU-E3-F-T-113.4	0.096	mg/l	DPR2-CU-E3-F-T-113.4-DUP	0.094	mg/l	2.11	30	Pass
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-CU-E3-F-D-113.4	0.091	mg/l	DPR2-CU-E3-F-D-113.4-DUP	0.094	mg/l	-3.24	30	Pass
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DMW-CU-E3-F-T-24	0.019	mg/l	DMW-CU-E3-F-T-24-DUP	0.019	mg/l	0.00	30	Pass
10K0164	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DMW-CU-E3-F-D-24	0.006	mg/l	DMW-CU-E3-F-D-24-DUP	0.008	mg/l	-28.57	30	Pass
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	DMW-Zn-E3-F-T-180	0.165	mg/l	DMW-Zn-E3-F-T-180-DUP	0.170	mg/l	-2.99	30	Pass
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	DMW-Zn-E3-F-D-180	0.133	mg/l	DMW-Zn-E3-F-D-180-DUP	0.131	mg/l	1.52	30	Pass
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	SD8(1)-Zn-E3-F-T-100	0.208	mg/l	SD8(1)-Zn-E3-F-T-100-DUP	0.184	mg/l	12.24	30	Pass
10K0165	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	SD8(1)-Zn-E3-F-D-100	0.086	mg/l	SD8(1)-Zn-E3-F-D-100-DUP	0.085	mg/l	1.17	30	Pass
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DMW-Cu-E3-I-T-24	0.037	mg/l	DMW-Cu-E3-I-T-24-DUP	0.020	mg/l	59.65	30	Fail
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DMW-Cu-E3-I-D-24	0.010	mg/l	DMW-Cu-E3-I-D-24-DUP	0.009	mg/l	10.53	30	Pass
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E3-I-T-113.4	0.111	mg/l	DPR2-Cu-E3-I-T-113.4-DUP	0.113	mg/l	-1.79	30	Pass
10K0166rev1	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E3-I-D-113.4	0.103	mg/l	DPR2-Cu-E3-I-D-113.4-DUP	0.104	mg/l	-0.97	30	Pass
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	MB-E3-I-T-1	0.002	mg/l	MB-E3-I-T-2	0.003	mg/l	-40.00	30	Fail
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Total	Total	MB-E3-I-T-1	ND	mg/l	MB-E3-I-T-2	0.0001	mg/l	NC	30	Pass
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	MB-E3-I-T-1	0.006	mg/l	MB-E3-I-T-2	0.007	mg/l	-15.38	30	Pass
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	MB-E3-I-D-1	ND	mg/l	MB-E3-I-D-2	ND	mg/l	NC	30	Pass
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	MB-E3-I-D-1	ND	mg/l	MB-E3-I-D-2	ND	mg/l	NC	30	Pass
10K0167rev2	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	MB-E3-I-D-1	0.001	mg/l	MB-E3-I-D-2	0.001	mg/l	0.00	30	Pass
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	SD8(1)-Zn-E3-I-T-100	0.218	mg/l	SD8(1)-Zn-E3-I-T-100-DUP	0.226	mg/l	-3.60	30	Pass
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	SD8(1)-Zn-E3-I-D-100	0.114	mg/l	SD8(1)-Zn-E3-I-D-100-DUP	0.110	mg/l	3.57	30	Pass
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	DMW-Zn-E3-I-T-180	0.180	mg/l	DMW-Zn-E3-I-T-180-DUP	0.177	mg/l	1.68	30	Pass
10K0168	3	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	DMW-Zn-E3-I-D-180	0.148	mg/l	DMW-Zn-E3-I-D-180-DUP	0.149	mg/l	-0.67	30	Pass
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	DMW-Zn-E4-F-T-180	0.179	mg/l	DMW-Zn-E4-F-T-180-Dup	0.167	mg/l	6.94	30	Pass
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	DMW-Zn-E4-F-D-180	0.163	mg/l	DMW-Zn-E4-F-D-180-Dup	0.155	mg/l	5.03	30	Pass
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	SD8(1)-Zn-E4-F-T-100	0.204	mg/l	SD8(1)-Zn-E4-F-T-100-Dup	0.232	mg/l	-12.84	30	Pass
10L0653	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	SD8(1)-Zn-E4-F-D-100	0.063	mg/l	SD8(1)-Zn-E4-F-D-100-Dup	0.061	mg/l	3.23	30	Pass
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	MB-E4-F-T-1	0.002	mg/l	MB-E4-F-T-2	ND	mg/l	NC	30	Pass
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Total	Total	MB-E4-F-T-1	ND	mg/l	MB-E4-F-T-2	ND	mg/l	NC	30	Pass
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	MB-E4-F-T-1	0.004	mg/l	MB-E4-F-T-2	0.003	mg/l	28.57	30	Pass

Appendix Table E-2-7. Definitive WER Laboratory Duplicate Analytical Results - Trace Metals

Batch	Event	Laboratory	Group	Method	Parameter	Fraction	Original Sample Id	Original Result	Original Sample Result Units	Field Dup Sample Id	Lab Dup Results	Lab Dup Result Units	RPD	Precision Limit	Precision Accept
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	MB-E4-F-D-1	ND	mg/l	MB-E4-F-D-2	ND	mg/l	NC	30	Pass
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	MB-E4-F-D-1	ND	mg/l	MB-E4-F-D-2	ND	mg/l	NC	30	Pass
10L0654	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	MB-E4-F-D-1	0.001	mg/l	MB-E4-F-D-2	0.001	mg/l	0.00	30	Pass
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DMW-Cu-E4-F-T-24	0.020	mg/l	DMW-Cu-E4-F-T-24-Dup	0.023	mg/l	-13.95	30	Pass
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DMW-Cu-E4-F-D-24	0.012	mg/l	DMW-Cu-E4-F-D-24-Dup	0.011	mg/l	8.70	30	Pass
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E4-F-T-113.4	0.123	mg/l	DPR2-Cu-E4-F-T-113.4 Dup	0.124	mg/l	-0.81	30	Pass
10L0655	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E4-F-D-113.4	0.067	mg/l	DPR2-Cu-E4-F-D-113.4 Dup	0.066	mg/l	1.50	30	Pass
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Dissolved	Dissolved	MB-E4-I-D-1	ND	mg/l	MB-E4-I-D-2	ND	mg/l	NC	30	Pass
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	MB-E4-I-D-1	0.001	mg/l	MB-E4-I-D-2	0.0006	mg/l	50.00	30	Pass
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	MB-E4-I-T-1	0.106	mg/l	MB-E4-I-T-2	0.095	mg/l	10.95	30	Pass
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Lead, Total	Total	MB-E4-I-T-1	0.012	mg/l	MB-E4-I-T-2	0.014	mg/l	-15.38	30	Pass
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	MB-E4-I-T-1	0.089	mg/l	MB-E4-I-T-2	0.251	mg/l	-95.29	30	Fail
10L0656	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	MB-E4-I-D-1	ND	mg/l	MB-E4-I-D-2	ND	mg/l	NC	30	Pass
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DMW-Cu-E4-I-T-24	0.029	mg/l	DMW-Cu-E4-I-T-24-Dup	0.031	mg/l	-6.67	30	Pass
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DMW-Cu-E4-I-D-24	0.009	mg/l	DMW-Cu-E4-I-D-24-Dup	0.009	mg/l	0.00	30	Pass
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Total	Total	DPR2-Cu-E4-I-T-113.4	0.119	mg/l	DPR2-Cu-E4-I-T-113.4-Dup	0.123	mg/l	-3.31	30	Pass
10L0657	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Copper, Dissolved	Dissolved	DPR2-Cu-E4-I-D-113.4	0.082	mg/l	DPR2-Cu-E4-I-D-113.4-Dup	0.084	mg/l	-2.41	30	Pass
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	DMW-Zn-E4-I-T-180	0.181	mg/l	DMW-Zn-E4-I-T-180-Dup	0.171	mg/l	5.68	30	Pass
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	DMW-Zn-E4-I-D-180	0.135	mg/l	DMW-Zn-E4-I-D-180-Dup	0.146	mg/l	-7.83	30	Pass
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Total	Total	SD8(1)-Zn-E4-I-T-100	0.186	mg/l	SD8(1)-Zn-E4-I-T-100-Dup	0.320	mg/l	-52.96	30	Fail
10L0658	4	EnviroMatrix Analytical, Inc.	Trace Metals	EPA 200.8	Zinc, Dissolved	Dissolved	SD8(1)-Zn-E4-I-D-100	0.083	mg/l	SD8(1)-Zn-E4-I-D-100-Dup	0.083	mg/l	0.00	30	Pass

Appendix Table E-2-8. Field Duplicate and Analytical Blank Results - Chollas Definitive WER Events 1 and 2

Parameter	Units	Event 1		Event 2	
		SD8(1)-DUP	FIELD BLANK	SD8(1)-DUP	FIELD BLANK
		2/27/2010	2/27/2010	4/1/2010	4/1/2010
General Chemistry					
Ammonia-N	mg/L	0.14	<0.03	0.46	<0.03
Chloride by IC	mg/L	19.22	<0.02	27.82	<0.02
Dissolved Organic Carbon	mg/L	8.2	0.4	25.1	<0.1
Sulfate by IC	mg/L	15.01B	0.08B	19.84B	0.04J
Total Alkalinity	mg/L	33	4J	30	3J
Total Dissolved Solids	mg/L	150	<0.1	144	<0.1
Total Hardness as CaCO3	mg/L	37	<1	49.6	<1
Total Organic Carbon	mg/L	8	0.4	27.9	<0.1
Total Sulfides	mg/L	NA	NA	NA	NA
Total Suspended Solids	mg/L	300	<0.5	75.5	<0.5
Chlorinated Pesticides					
2,4'-DDD	ng/L	<1	<1	<1	<1
2,4'-DDE	ng/L	<1	<1	<1	<1
2,4'-DDT	ng/L	<1	<1	<1	<1
4,4'-DDD	ng/L	<1	<1	<1	<1
4,4'-DDE	ng/L	5.2	<1	<1	<1
4,4'-DDT	ng/L	<1	<1	<1	<1
Aldrin	ng/L	<1	<1	<1	<1
BHC-alpha	ng/L	<1	<1	<1	<1
BHC-beta	ng/L	<1	<1	<1	<1
BHC-delta	ng/L	<1	<1	<1	<1
BHC-gamma	ng/L	<1	<1	<1	<1
Chlordane-alpha	ng/L	12.8	<1	10.8	<1
Chlordane-gamma	ng/L	11.3	<1	12.1	<1
DCPA (Dacthal)	ng/L	<5	<5	<5	<5
Dicofol	ng/L	<50	<50	<50	<50
Dieldrin	ng/L	<1	<1	<1	<1
Endosulfan Sulfate	ng/L	<1	<1	<1	<1
Endosulfan-I	ng/L	<1	<1	<1	<1
Endosulfan-II	ng/L	<1	<1	<1	<1
Endrin	ng/L	<1	<1	<1	<1
Endrin Aldehyde	ng/L	<1	<1	<1	<1
Endrin Ketone	ng/L	<1	<1	<1	<1
Heptachlor	ng/L	<1	<1	<1	<1
Heptachlor Epoxide	ng/L	<1	<1	<1	<1
Methoxychlor	ng/L	<1	<1	<1	<1
Mirex	ng/L	<1	<1	<1	<1
Oxychlordane	ng/L	<1	<1	<1	<1
Perthane	ng/L	<5	<5	<5	<5
Toxaphene	ng/L	<10	<10	<10	<10
cis-Nonachlor	ng/L	5.4	<1	<1	<1
trans-Nonachlor	ng/L	11.2	<1	7.1	<1
Dissolved Metals					
Calcium (Ca)	mg/L	9.15	<0.05	13.14	<0.05
Copper (Cu)	µg/L	7.2	<0.4	17.1	<0.4
Lead (Pb)	µg/L	1.35	0.06J	2.02	<0.05
Magnesium (Mg)	mg/L	3.44	<0.05	4.09	<0.05
Potassium (K)	mg/L	<5	<5	<5	<5
Sodium (Na)	mg/L	17	<5	20.3	<5
Zinc (Zn)	µg/L	22.1	<0.1	75.7	<0.1
Total Metals					
Calcium (Ca)	mg/L	11.27	<0.05	14.34	<0.05
Copper (Cu)	µg/L	23.1	<0.4	29.8	<0.4

Appendix Table E-2-8. Field Duplicate and Analytical Blank Results - Chollas Definitive WER Events 1 and 2

Parameter	Units	Event 1		Event 2	
		SD8(1)-DUP	FIELD BLANK	SD8(1)-DUP	FIELD BLANK
		2/27/2010	2/27/2010	4/1/2010	4/1/2010
Lead (Pb)	µg/L	25.17	<0.05	11.32	<0.05
Magnesium (Mg)	mg/L	4.15	<0.05	4.44	<0.05
Potassium (K)	mg/L	<5	<5	<5	<5
Sodium (Na)	mg/L	17.5	<5	20.7	<5
Zinc (Zn)	µg/L	149.8	<0.1	160.3	0.1J
Organophosphorus Pesticides					
Azinphos Methyl	ng/L	<10	<10	<10	<10
Bolstar (Sulprofos)	ng/L	<2	<2	<2	<2
Chlorpyrifos	ng/L	<1	<1	<1	<1
Demeton	ng/L	<1	<1	<1	<1
Diazinon	ng/L	<2	<2	<2	<2
Dichlorvos	ng/L	<3	<3	<3	<3
Dimethoate	ng/L	<3	<3	<3	<3
Disulfoton	ng/L	<1	<1	<1	<1
Ethoprop (Ethoprofos)	ng/L	<1	<1	<1	<1
Ethyl Parathion	ng/L	<10	<10	<10	<10
Fenchlorphos (Ronnel)	ng/L	<2	<2	<2	<2
Fenitrothion	ng/L	<10	<10	<10	<10
Fensulfothion	ng/L	<1	<1	<1	<1
Fenthion	ng/L	<2	<2	<2	<2
Malathion	ng/L	61.4	<3	506.7	<3
Merphos	ng/L	<1	<1	<1	<1
Methamidophos (Monitor)	ng/L	<50	<50	<50	<50
Methidathion	ng/L	<10	<10	<10	<10
Methyl Parathion	ng/L	<1	<1	<1	<1
Mevinphos (Phosdrin)	ng/L	<8	<8	<8	<8
Phorate	ng/L	<6	<6	<6	<6
Phosmet	ng/L	<50	<50	<50	<50
Tetrachlorvinphos (Stirofos)	ng/L	<2	<2	<2	<2
Tokuthion	ng/L	<3	<3	<3	<3
Trichloronate	ng/L	<1	<1	<1	<1
PCB Congeners					
PCB003	ng/L	<1	<1	<1	<1
PCB008	ng/L	<1	<1	<1	<1
PCB018	ng/L	<1	<1	<1	<1
PCB028	ng/L	<1	<1	<1	<1
PCB031	ng/L	<1	<1	<1	<1
PCB033	ng/L	<1	<1	<1	<1
PCB037	ng/L	<1	<1	<1	<1
PCB044	ng/L	<1	<1	<1	<1
PCB049	ng/L	<1	<1	<1	<1
PCB052	ng/L	<1	<1	<1	<1
PCB056/060	ng/L	<1	<1	<1	<1
PCB066	ng/L	<1	<1	<1	<1
PCB070	ng/L	<1	<1	<1	<1
PCB074	ng/L	<1	<1	<1	<1
PCB077	ng/L	<1	<1	<1	<1
PCB081	ng/L	<1	<1	<1	<1
PCB087	ng/L	<1	<1	<1	<1
PCB095	ng/L	<1	<1	<1	<1
PCB097	ng/L	3.1J	<1	<1	<1
PCB099	ng/L	<1	<1	<1	<1
PCB101	ng/L	1.8J	<1	<1	<1
PCB105	ng/L	<1	<1	<1	<1

Appendix Table E-2-8. Field Duplicate and Analytical Blank Results - Chollas Definitive WER Events 1 and 2

Parameter	Units	Event 1		Event 2	
		SD8(1)-DUP	FIELD BLANK	SD8(1)-DUP	FIELD BLANK
		2/27/2010	2/27/2010	4/1/2010	4/1/2010
PCB110	ng/L	4.9J	<1	<1	<1
PCB114	ng/L	<1	<1	<1	<1
PCB118	ng/L	<1	<1	<1	<1
PCB119	ng/L	<1	<1	<1	<1
PCB123	ng/L	<1	<1	<1	<1
PCB126	ng/L	<1	<1	<1	<1
PCB128	ng/L	<1	<1	<1	<1
PCB138	ng/L	<1	<1	<1	<1
PCB141	ng/L	<1	<1	<1	<1
PCB149	ng/L	<1	<1	<1	<1
PCB151	ng/L	<1	<1	<1	<1
PCB153	ng/L	<1	<1	<1	<1
PCB156	ng/L	<1	<1	<1	<1
PCB157	ng/L	<1	<1	<1	<1
PCB158	ng/L	<1	<1	<1	<1
PCB167	ng/L	<1	<1	<1	<1
PCB168+132	ng/L	<1	<1	<1	<1
PCB169	ng/L	<1	<1	<1	<1
PCB170	ng/L	<1	<1	<1	<1
PCB174	ng/L	<1	<1	<1	<1
PCB177	ng/L	<1	<1	<1	<1
PCB180	ng/L	<1	<1	<1	<1
PCB183	ng/L	<1	<1	<1	<1
PCB187	ng/L	<1	<1	<1	<1
PCB189	ng/L	<1	<1	<1	<1
PCB194	ng/L	<1	<1	<1	<1
PCB195	ng/L	<1	<1	<1	<1
PCB200	ng/L	<1	<1	<1	<1
PCB201	ng/L	<1	<1	<1	<1
PCB203	ng/L	<1	<1	<1	<1
PCB206	ng/L	<1	<1	<1	<1
PCB209	ng/L	<1	<1	<1	<1
Polynuclear Aromatic Hydrocarbons					
1-Methylnaphthalene	ng/L	4.8J	<1	11	<1
1-Methylphenanthrene	ng/L	14.6	<1	11.5	<1
2,3,5-Trimethylnaphthalene	ng/L	3.4J	<1	3.5J	<1
2,6-Dimethylnaphthalene	ng/L	3.7J	<1	<1	<1
2-Methylnaphthalene	ng/L	8	<1	16.1	<1
Acenaphthene	ng/L	2.3J	<1	<1	<1
Acenaphthylene	ng/L	3.8J	<1	<1	<1
Anthracene	ng/L	16.6	<1	10.2	<1
Benz[a]anthracene	ng/L	48.4	<1	22.3	<1
Benzo[a]pyrene	ng/L	64.4	<1	40.5	<1
Benzo[b]fluoranthene	ng/L	112.8	<1	77.9	<1
Benzo[e]pyrene	ng/L	84.6	<1	65.3	<1
Benzo[g,h,i]perylene	ng/L	88.8	<1	70	<1
Benzo[k]fluoranthene	ng/L	53.9	<1	28.8	<1
Biphenyl	ng/L	4.8J	<1	<1	<1
Chrysene	ng/L	130.1	<1	71.1	<1
Dibenz[a,h]anthracene	ng/L	19.3	<1	<1	<1
Dibenzothiophene	ng/L	24.6	<1	47.6	<1
Fluoranthene	ng/L	212.5	<1	103.6	<1
Fluorene	ng/L	5.2	<1	4J	<1
Indeno[1,2,3-c,d]pyrene	ng/L	48.2	<1	45.8	<1

Appendix Table E-2-8. Field Duplicate and Analytical Blank Results - Chollas Definitive WER Events 1 and 2

Parameter	Units	Event 1		Event 2	
		SD8(1)-DUP	FIELD BLANK	SD8(1)-DUP	FIELD BLANK
		2/27/2010	2/27/2010	4/1/2010	4/1/2010
Naphthalene	ng/L	8.7	3.7J	15.3	6
Perylene	ng/L	47.4	<1	44.8	<1
Phenanthrene	ng/L	86.5	<1	51.8	<1
Pyrene	ng/L	193.8	<1	102	<1
Pyrethroids by NCI					
Allethrin by NCI	ng/L	<0.5	<0.5	<0.5	<0.5
Bifenthrin by NCI	ng/L	105.1	<0.5	101.3	<0.5
Cyfluthrin by NCI	ng/L	76.8	<0.5	48	<0.5
Cypermethrin by NCI	ng/L	97.4	<0.5	55.6	<0.5
Danitol by NCI	ng/L	<0.5	<0.5	<0.5	<0.5
Deltamethrin by NCI	ng/L	<0.5	<0.5	<0.5	<0.5
Esfenvalerate by NCI	ng/L	25.2	22.9*	1.2J	<0.5
Fenvalerate by NCI	ng/L	25.6	22.6*	<0.5	<0.5
Fluvalinate by NCI	ng/L	<0.5	<0.5	<0.5	<0.5
L-Cyhalothrin by NCI	ng/L	27.5	21.6*	10.9	<0.5
Permethrin by NCI	ng/L	<5	<5	274.9	<5
Prallethrin by NCI	ng/L	<0.5	<0.5	<0.5	<0.5
Resmethrin by NCI	ng/L	NA	NA	NA	NA

< = less than the method detection limit
B = Analyte was detected in the associated method blank
J = Detected but below the Reporting Limit; therefore,result is an estimated concentration.
NA = Not Available
* Field blank detections noted

Appendix Table E-2-9. Field Duplicate and Analytical Blank Results - Chollas Definitive WER Events 3 and 4

Parameter	Units	Event 3		Event 4	
		SD8(1)-DUP	FIELD BLANK	DPR2-DUP	FIELD BLANK
		10/30/2010	10/30/2010	12/20/2010	12/20/2010
General Chemistry					
Ammonia-N	mg/l	0.64	0.068J	0.12	<0.048
Chloride	mg/l	23	0.12J	34	<0.1
Dissolved Organic Carbon	mg/l	8.2	0.18J	4.6	0.074J
Sulfate	mg/l	17	<0.1	15	<0.1
Total Alkalinity	mg/l	36	<1.2	40	1.6J
Total Dissolved Solids	mg/l	130	4.0J	130	5.0J
Total Hardness as CaCO3	mg/l	56	<0.089	53	<0.089
Total Organic Carbon	mg/l	11	0.16J	5.6	0.058J
Total Suspended Solids	mg/l	54	<1	49	<1
Chlorinated Pesticides					
2,4'-DDD	ng/l	<5	<5	<5	<5
2,4'-DDE	ng/l	<5	<5	<5	<5
2,4'-DDT	ng/l	<5	<5	<5	<5
4,4'-DDD	ng/l	<3	<3	<3	<3
4,4'-DDE	ng/l	<2.5	<2.5	<2.5	<2.5
4,4'-DDT	ng/l	<3.1	<3.1	<3.1	<3.1
Aldrin	ng/l	<1.5	<1.5	<1.5	<1.5
BHC-alpha	ng/l	<1.8	<1.8	<1.8	<1.8
BHC-beta	ng/l	<3.1	<3.1	<3.1	<3.1
BHC-delta	ng/l	<2.5	<2.5	<2.5	<2.5
BHC-gamma	ng/l	<2.1	<2.1	<2.1	<2.1
Chlordane-alpha	ng/l	<5	<5	<5	<5
Chlordane-gamma	ng/l	<5	<5	<5	<5
Dieldrin	ng/l	<2.1	<2.1	<2.1	<2.1
Endosulfan Sulfate	ng/l	<5	<5	<5	<5
Endosulfan-I	ng/l	<1.7	<1.7	<1.7	<1.7
Endosulfan-II	ng/l	<1.9	<1.9	<1.9	<1.9
Endrin	ng/l	<2.8	<2.8	<2.8	<2.8
Endrin Aldehyde	ng/l	<3	<3	<3	<3
Heptachlor	ng/l	<1.7	<1.7	<1.7	<1.7
Heptachlor Epoxide	ng/l	<1.9	<1.9	<1.9	<1.9
Methoxychlor	ng/l	<5	<5	<5	<5
Mirex	ng/l	<5	<5	<5	<5
Toxaphene	ng/l	<120	<120	<120	<120
trans-Nonachlor	ng/l	<5	<5	<5	<5
Dissolved Metals					
Copper (Cu)	ug/l	16	0.10J	7.1	0.11J
Lead (Pb)	ug/l	0.62	<0.017	0.5	<0.017
Zinc(Zn)	ug/l	72	2.1J	21	1.2J
Total Metals					
Calcium (Ca)	mg/l	14	0.030J	13	0.033J
Copper (Cu)	ug/l	81	0.073J	14	0.12J
Lead (Pb)	ug/l	65	<0.017	7.9	<0.017
Magnesium (Mg)	mg/l	5.1	<0.012	4.7	<0.012
Potassium (K)	mg/l	4.6	<0.081	3.1	<0.081
Sodium (Na)	mg/l	18	0.22J	23	0.14J
Zinc (Zn)	ug/l	440	0.42J	63	0.48J
Organophosphorus Pesticides					
Azinphos Methyl	ug/l	<0.0055	<0.0055	<0.0055 BS-L	<0.0055 BS-L
Bolstar (Sulprofos)	ug/l	<0.0046	<0.0046	<0.0046	<0.0046
Chlorpyrifos	ug/l	<0.0069	<0.0069	<0.0069	<0.0069
Coumaphos	ug/l	<0.0051	<0.0051	<0.0051	<0.0051

Appendix Table E-2-9. Field Duplicate and Analytical Blank Results - Chollas Definitive WER Events 3 and 4

Parameter	Units	Event 3		Event 4	
		SD8(1)-DUP	FIELD BLANK	DPR2-DUP	FIELD BLANK
		10/30/2010	10/30/2010	12/20/2010	12/20/2010
Demeton-o	ug/l	<0.01	<0.01	<0.01	<0.01
Demeton-s	ug/l	<0.01	<0.01	<0.01	<0.01
Diazinon	ug/l	<0.0052	<0.0052	0.0054J	<0.0052
Dichlorvos	ug/l	<0.0029	<0.0029	0.0031J	<0.0029
Dimethoate	ug/l	<0.0062	<0.0062	<0.0062	<0.0062
Disulfoton	ug/l	<0.01	<0.01	<0.01	<0.01
Ethoprop (Ethoprofos)	ug/l	<0.0067	<0.0067	<0.0067	<0.0067
Ethyl Parathion	ug/l	<0.0054	<0.0054	<0.0054	<0.0054
Fenchlorphos (Ronnel)	ug/l	<0.0041	<0.0041	<0.0041	<0.0041
Fensulfothion	ug/l	<0.0029	<0.0029	<0.0029	<0.0029
Fenthion	ug/l	<0.0038	<0.0038	<0.0038	<0.0038
Malathion	ug/l	0.2	<0.0076	0.096	<0.0076
Merphos	ug/l	<0.0058	<0.0058	<0.0058	<0.0058
Methyl Parathion	ug/l	<0.0063	<0.0063	<0.0063	<0.0063
Mevinphos (Phosdrin)	ug/l	<0.0042	<0.0042	<0.0042	<0.0042
Naled	ug/l	<0.0076	<0.0076	<0.0076	<0.0076
Phorate	ug/l	<0.003	<0.003	<0.003	<0.003
Tetrachlorvinphos (Stirofos)	ug/l	<0.0031	<0.0031	<0.0031	<0.0031
Tokuthion	ug/l	<0.0078	<0.0078	<0.0078	<0.0078
Trichloronate	ug/l	<0.0067	<0.0067	<0.0067	<0.0067
PCB Congeners					
PCB003	ng/l	<5	<5	<5	<5
PCB008	ng/l	<5	<5	<5	<5
PCB018	ng/l	<5	<5	<5	<5
PCB028	ng/l	<5	<5	<5	<5
PCB031	ng/l	<5	<5	<5	<5
PCB033	ng/l	<5	<5	<5	<5
PCB037	ng/l	<5	<5	<5	<5
PCB044	ng/l	<5	<5	<5	<5
PCB049	ng/l	<5	<5	<5	<5
PCB052	ng/l	<5	<5	<5	<5
PCB056	ng/l	<5	<5	<5	<5
PCB060	ng/l	<5	<5	<5	<5
PCB066	ng/l	<5	<5	<5	<5
PCB070	ng/l	<5	<5	<5	<5
PCB074	ng/l	<5	<5	<5	<5
PCB077	ng/l	<5	<5	<5	<5
PCB081	ng/l	<5	<5	<5	<5
PCB087	ng/l	<5	<5	<5	<5
PCB095	ng/l	<5	<5	<5	<5
PCB097	ng/l	<5	<5	<5	<5
PCB099	ng/l	<5	<5	<5	<5
PCB101	ng/l	<5	<5	<5	<5
PCB105	ng/l	<5	<5	<5	<5
PCB110	ng/l	<5	<5	<5	<5
PCB114	ng/l	<5	<5	<5	<5
PCB118	ng/l	<5	<5	<5	<5
PCB119	ng/l	<5	<5	<5	<5
PCB123	ng/l	<5	<5	<5	<5
PCB126	ng/l	<5	<5	<5	<5
PCB128	ng/l	<5	<5	<5	<5
PCB132	ng/l	<5	<5	<5	<5
PCB138	ng/l	<5	<5	<5	<5

Appendix Table E-2-9. Field Duplicate and Analytical Blank Results - Chollas Definitive WER Events 3 and 4

Parameter	Units	Event 3		Event 4	
		SD8(1)-DUP	FIELD BLANK	DPR2-DUP	FIELD BLANK
		10/30/2010	10/30/2010	12/20/2010	12/20/2010
PCB141	ng/l	<5	<5	<5	<5
PCB149	ng/l	<5	<5	<5	<5
PCB151	ng/l	<5	<5	<5	<5
PCB153	ng/l	<5	<5	<5	<5
PCB156	ng/l	<5	<5	<5	<5
PCB157	ng/l	<5	<5	<5	<5
PCB158	ng/l	<5	<5	<5	<5
PCB167	ng/l	<5	<5	<5	<5
PCB168	ng/l	<5	<5	<5	<5
PCB169	ng/l	<5	<5	<5	<5
PCB170	ng/l	<5	<5	<5	<5
PCB174	ng/l	<5	<5	<5	<5
PCB177	ng/l	<5	<5	<5	<5
PCB180	ng/l	<5	<5	<5	<5
PCB183	ng/l	<5	<5	<5	<5
PCB187	ng/l	<5	<5	<5	<5
PCB189	ng/l	<5	<5	<5	<5
PCB194	ng/l	<5	<5	<5	<5
PCB195	ng/l	<5	<5	<5	<5
PCB200	ng/l	<5	<5	<5	<5
PCB201	ng/l	<5	<5	<5	<5
PCB203	ng/l	<5	<5	<5	<5
PCB206	ng/l	<5	<5	<5	<5
PCB209	ng/l	<5	<5	<5	<5
Aroclor PCBs					
Aroclor 1016	ng/l	<50	<50	<50	<50
Aroclor 1221	ng/l	<60	<60	<60	<60
Aroclor 1232	ng/l	<100	<100	<100	<100
Aroclor 1242	ng/l	<70	<70	<70	<70
Aroclor 1248	ng/l	<60	<60	<60	<60
Aroclor 1254	ng/l	<40	<40	<40	<40
Aroclor 1260	ng/l	<40	<40	<40	<40
Polynuclear Aromatic Hydrocarbons					
1-Methylnaphthalene	ug/l	<0.02	<0.02	<0.02	<0.02
1-Methylphenanthrene	ug/l	<0.02	<0.02	<0.02	<0.02
2,6-Dimethylnaphthalene	ug/l	<0.02	<0.02	<0.02	<0.02
2-Methylnaphthalene	ug/l	<0.02	<0.02	<0.02	<0.02
Acenaphthene	ug/l	<0.02	<0.02	<0.02	<0.02
Acenaphthylene	ug/l	<0.02	<0.02	<0.02	<0.02
Anthracene	ug/l	<0.02	<0.02	<0.02	<0.02
Benz[a]anthracene	ug/l	0.051J	<0.02	<0.02	<0.02
Benzo[a]pyrene	ug/l	<0.02	<0.02	<0.02	<0.02
Benzo[b]fluoranthene	ug/l	<0.02	<0.02	<0.02	<0.02
Benzo[e]pyrene	ug/l	<0.02	<0.02	<0.02	<0.02
Benzo[g,h,i]perylene	ug/l	<0.02	<0.02	<0.02	<0.02
Benzo[k]fluoranthene	ug/l	<0.02	<0.02	<0.02	<0.02
Biphenyl	ug/l	<0.02	<0.02	<0.02	<0.02
Chrysene	ug/l	<0.02	<0.02	<0.02	<0.02
Dibenz[a,h]anthracene	ug/l	<0.02	<0.02	<0.02	<0.02
Fluoranthene	ug/l	<0.02	<0.02	<0.02	<0.02
Fluorene	ug/l	<0.02	<0.02	<0.02	<0.02
Indeno[1,2,3-c,d]pyrene	ug/l	<0.02	<0.02	<0.02	<0.02
Naphthalene	ug/l	<0.02	<0.02	<0.02	<0.02

Appendix Table E-2-9. Field Duplicate and Analytical Blank Results - Chollas Definitive WER Events 3 and 4

Parameter	Units	Event 3		Event 4	
		SD8(1)-DUP	FIELD BLANK	DPR2-DUP	FIELD BLANK
		10/30/2010	10/30/2010	12/20/2010	12/20/2010
Perylene	ug/l	<0.02	<0.02	<0.02	<0.02
Phenanthrene	ug/l	<0.02	<0.02	<0.02	<0.02
Pyrene	ug/l	<0.02	<0.02	<0.02	<0.02
Pyrethroids by NCI					
Allethrin	ng/l	<0.85	<0.85	<0.85	<0.85
Bifenthrin	ng/l	<0.79	<0.79	<0.79	<0.79
Cyfluthrin	ng/l	<0.83	<0.83	<0.83	<0.83
Cypermethrin	ng/l	<0.66	<0.66	<0.66	<0.66
Deltamethrin	ng/l	<1.9	<1.9	<1.9	<1.9
Dichloran	ng/l	<0.8	<0.8	<0.8	<0.8
Esfenvalerate	ng/l	<0.98	<0.98	<0.98	<0.98
Fenvalerate	ng/l	<0.98	<0.98	<0.98	<0.98
L-Cyhalothrin	ng/l	<1.2	<1.2	<1.2	<1.2
Pendimethalin	ng/l	<0.5	<0.5	<0.5	<0.5
Permethrin	ng/l	<5	<5	15 BS-H	25 BS-H
Prallethrin	ng/l	<0.92	<0.92	<0.92	<0.92
Sumithrin	ng/l	<2.4	<2.4	<2.4	<2.4
Tefluthrin	ng/l	<0.93	<0.93	<0.93	<0.93

< = result are less than the method detection limit

J = Detected but below the Reporting Limit; therefore,result is an estimated concentration.

BS-H = The recovery of this anlayte in the BS/LCS was above the control limit. Sample result is suspect.

BS-L = The recovery of this anlayte in the BS/LCS was below the control limit. Sample result is suspect.

Item 10
Supporting Document No. 2
December 14, 2016

2014

Confirmation WERs

QUALITY CONTROL SECTION

Metals by EPA 200 Series Methods - Quality Control

Batch W4D0464 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0464-BLK1)					Analyzed: 04/10/14 11:25						
Copper, Dissolved	ND	0.036	0.50	ug/l							
LCS (W4D0464-BS1)					Analyzed: 04/10/14 11:28						
Copper, Dissolved	47.2	0.036	0.50	ug/l	50.0		94	85-115			
Matrix Spike (W4D0464-MS1)		**Source: 4D08038-12**			Analyzed: 04/10/14 11:37						
Copper, Dissolved	80.0	0.036	0.50	ug/l	50.0	30.5	99	70-130			
Matrix Spike (W4D0464-MS2)		**Source: 4D08038-20**			Analyzed: 04/10/14 12:10						
Copper, Dissolved	1240	0.036	0.50	ug/l	50.0	1150	177	70-130			MS-02
Matrix Spike Dup (W4D0464-MSD1)		**Source: 4D08038-12**			Analyzed: 04/10/14 11:39						
Copper, Dissolved	81.7	0.036	0.50	ug/l	50.0	30.5	102	70-130	2	30	
Matrix Spike Dup (W4D0464-MSD2)		**Source: 4D08038-20**			Analyzed: 04/10/14 12:12						
Copper, Dissolved	1260	0.036	0.50	ug/l	50.0	1150	208	70-130	1	30	MS-02

Batch W4D0467 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0467-BLK1)					Analyzed: 04/10/14 12:20						
Zinc, Dissolved	2.44	0.50	5.0	ug/l							J
LCS (W4D0467-BS1)					Analyzed: 04/10/14 12:21						
Zinc, Dissolved	47.3	0.50	5.0	ug/l	50.0		95	85-115			
Matrix Spike (W4D0467-MS1)		**Source: 4D08038-41**			Analyzed: 04/10/14 12:23						
Zinc, Dissolved	65.5	0.50	5.0	ug/l	50.0	22.3	87	70-130			
Matrix Spike (W4D0467-MS2)		**Source: 4D08038-50**			Analyzed: 04/10/14 14:38						
Zinc, Dissolved	2580	50	500	ug/l	50.0	2310	539	70-130			MS-02
Matrix Spike Dup (W4D0467-MSD1)		**Source: 4D08038-41**			Analyzed: 04/10/14 12:24						
Zinc, Dissolved	64.8	0.50	5.0	ug/l	50.0	22.3	85	70-130	1	30	
Matrix Spike Dup (W4D0467-MSD2)		**Source: 4D08038-50**			Analyzed: 04/10/14 14:39						
Zinc, Dissolved	2550	50	500	ug/l	50.0	2310	469	70-130	1	30	MS-02

Batch W4D0468 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0468-BLK1)					Analyzed: 04/10/14 15:09						
Copper, Dissolved	0.0563	0.036	0.50	ug/l							J
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0468-BS1)					Analyzed: 04/10/14 15:10						
Copper, Dissolved	45.5	0.036	0.50	ug/l	50.0		91	85-115			
Zinc, Dissolved	46.3	0.50	5.0	ug/l	50.0		93	85-115			
Matrix Spike (W4D0468-MS1)		**Source: 4D08038-61**			Analyzed: 04/10/14 15:11						
Copper, Dissolved	52.4	0.036	0.50	ug/l	50.0	8.06	89	70-130			
Zinc, Dissolved	64.7	0.50	5.0	ug/l	50.0	20.0	89	70-130			
Matrix Spike (W4D0468-MS2)		**Source: 4D08038-62**			Analyzed: 04/10/14 15:14						
Copper, Dissolved	89.0	0.036	0.50	ug/l	50.0	48.0	82	70-130			

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

Metals by EPA 200 Series Methods - Quality Control

Batch W4D0468 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike (W4D0468-MS2)		**Source: 4D08038-62**			Analyzed: 04/10/14 15:14						
Zinc, Dissolved	177	0.50	5.0	ug/l	50.0	135	84	70-130			
Matrix Spike Dup (W4D0468-MSD1)		**Source: 4D08038-61**			Analyzed: 04/10/14 15:12						
Copper, Dissolved	53.1	0.036	0.50	ug/l	50.0	8.06	90	70-130	1	30	
Zinc, Dissolved	64.7	0.50	5.0	ug/l	50.0	20.0	90	70-130	0.09	30	
Matrix Spike Dup (W4D0468-MSD2)		**Source: 4D08038-62**			Analyzed: 04/10/14 15:15						
Copper, Dissolved	92.9	0.036	0.50	ug/l	50.0	48.0	90	70-130	4	30	
Zinc, Dissolved	183	0.50	5.0	ug/l	50.0	135	97	70-130	4	30	

Batch W4D0483 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0483-BLK1)					Analyzed: 04/10/14 15:42						
Copper, Dissolved	0.0369	0.036	0.50	ug/l							J
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0483-BS1)					Analyzed: 04/10/14 15:44						
Copper, Dissolved	46.6	0.036	0.50	ug/l	50.0		93	85-115			
Zinc, Dissolved	47.1	0.50	5.0	ug/l	50.0		94	85-115			
Matrix Spike (W4D0483-MS1)		**Source: 4D08038-81**			Analyzed: 04/10/14 15:51						
Copper, Dissolved	160	0.036	0.50	ug/l	50.0	107	107	70-130			
Zinc, Dissolved	295	0.50	5.0	ug/l	50.0	236	117	70-130			
Matrix Spike (W4D0483-MS2)		**Source: 4D08038-90**			Analyzed: 04/10/14 16:27						
Copper, Dissolved	104	0.036	0.50	ug/l	50.0	57.9	93	70-130			
Zinc, Dissolved	49.9	0.50	5.0	ug/l	50.0	2.79	94	70-130			
Matrix Spike Dup (W4D0483-MSD1)		**Source: 4D08038-81**			Analyzed: 04/10/14 15:54						
Copper, Dissolved	162	0.036	0.50	ug/l	50.0	107	110	70-130	1	30	
Zinc, Dissolved	297	0.50	5.0	ug/l	50.0	236	121	70-130	0.7	30	
Matrix Spike Dup (W4D0483-MSD2)		**Source: 4D08038-90**			Analyzed: 04/10/14 16:29						
Copper, Dissolved	109	0.036	0.50	ug/l	50.0	57.9	102	70-130	4	30	
Zinc, Dissolved	52.7	0.50	5.0	ug/l	50.0	2.79	100	70-130	5	30	

Batch W4D0486 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0486-BLK1)					Analyzed: 04/10/14 16:05						
Copper, Dissolved	0.0604	0.036	0.50	ug/l							J
Zinc, Dissolved	0.819	0.50	5.0	ug/l							J
LCS (W4D0486-BS1)					Analyzed: 04/10/14 16:07						
Copper, Dissolved	45.5	0.036	0.50	ug/l	50.0		91	85-115			
Zinc, Dissolved	46.5	0.50	5.0	ug/l	50.0		93	85-115			
Matrix Spike (W4D0486-MS1)		**Source: 4D08038-AB**			Analyzed: 04/10/14 16:08						
Copper, Dissolved	48.6	0.036	0.50	ug/l	50.0	7.25	83	70-130			
Zinc, Dissolved	47.3	0.50	5.0	ug/l	50.0	5.46	84	70-130			

Metals by EPA 200 Series Methods - Quality Control

Batch W4D0486 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike (W4D0486-MS1)		**Source: 4D08038-AB**			Analyzed: 04/10/14 16:08						
Matrix Spike (W4D0486-MS2)		**Source: 4D08038-AL**			Analyzed: 04/10/14 16:10						
Copper, Dissolved	45.7	0.036	0.50	ug/l	50.0	0.427	91	70-130			
Zinc, Dissolved	70.3	0.50	5.0	ug/l	50.0	25.9	89	70-130			
Matrix Spike Dup (W4D0486-MSD1)		**Source: 4D08038-AB**			Analyzed: 04/10/14 16:09						
Copper, Dissolved	50.6	0.036	0.50	ug/l	50.0	7.25	87	70-130	4	30	
Zinc, Dissolved	49.3	0.50	5.0	ug/l	50.0	5.46	88	70-130	4	30	
Matrix Spike Dup (W4D0486-MSD2)		**Source: 4D08038-AL**			Analyzed: 04/10/14 16:12						
Copper, Dissolved	48.7	0.036	0.50	ug/l	50.0	0.427	97	70-130	6	30	
Zinc, Dissolved	75.6	0.50	5.0	ug/l	50.0	25.9	99	70-130	7	30	

Batch W4D0502 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0502-BLK1)					Analyzed: 04/10/14 11:33						
Copper, Dissolved	ND	0.036	0.50	ug/l							
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0502-BS1)					Analyzed: 04/10/14 11:35						
Copper, Dissolved	46.8	0.036	0.50	ug/l	50.0		94	85-115			
Zinc, Dissolved	45.6	0.50	5.0	ug/l	50.0		91	85-115			
Matrix Spike (W4D0502-MS1)		**Source: 4D08038-36**			Analyzed: 04/10/14 11:36						
Copper, Dissolved	46.6	0.036	0.50	ug/l	50.0	0.272	93	70-130			
Zinc, Dissolved	113	0.50	5.0	ug/l	50.0	68.3	90	70-130			
Matrix Spike (W4D0502-MS2)		**Source: 4D08038-04**			Analyzed: 04/10/14 11:38						
Copper, Dissolved	57.3	0.036	0.50	ug/l	50.0	12.9	89	70-130			
Zinc, Dissolved	46.4	0.50	5.0	ug/l	50.0	1.82	89	70-130			
Matrix Spike Dup (W4D0502-MSD1)		**Source: 4D08038-36**			Analyzed: 04/10/14 11:37						
Copper, Dissolved	46.2	0.036	0.50	ug/l	50.0	0.272	92	70-130	0.8	30	
Zinc, Dissolved	113	0.50	5.0	ug/l	50.0	68.3	89	70-130	0.4	30	
Matrix Spike Dup (W4D0502-MSD2)		**Source: 4D08038-04**			Analyzed: 04/10/14 11:40						
Copper, Dissolved	59.1	0.036	0.50	ug/l	50.0	12.9	92	70-130	3	30	
Zinc, Dissolved	45.7	0.50	5.0	ug/l	50.0	1.82	88	70-130	2	30	

Batch W4D0506 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0506-BLK1)					Analyzed: 04/11/14 14:46						
Copper, Dissolved	ND	0.036	0.50	ug/l							
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0506-BS1)					Analyzed: 04/11/14 14:47						
Copper, Dissolved	49.0	0.036	0.50	ug/l	50.0		98	85-115			
Zinc, Dissolved	49.6	0.50	5.0	ug/l	50.0		99	85-115			
Matrix Spike (W4D0506-MS1)		**Source: 4D08038-DU**			Analyzed: 04/11/14 14:49						

Metals by EPA 200 Series Methods - Quality Control

Batch W4D0506 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Copper, Dissolved	152	0.036	0.50	ug/l	50.0	102	100	70-130			
Zinc, Dissolved	268	0.50	5.0	ug/l	50.0	220	96	70-130			
Matrix Spike (W4D0506-MS2)		**Source: 4D08038-DO**			Analyzed: 04/11/14 14:51						
Copper, Dissolved	114	0.036	0.50	ug/l	50.0	61.4	105	70-130			
Zinc, Dissolved	230	0.50	5.0	ug/l	50.0	171	117	70-130			
Matrix Spike Dup (W4D0506-MSD1)		**Source: 4D08038-DU**			Analyzed: 04/11/14 14:50						
Copper, Dissolved	149	0.036	0.50	ug/l	50.0	102	94	70-130	2	30	
Zinc, Dissolved	261	0.50	5.0	ug/l	50.0	220	83	70-130	3	30	
Matrix Spike Dup (W4D0506-MSD2)		**Source: 4D08038-DO**			Analyzed: 04/11/14 14:52						
Copper, Dissolved	113	0.036	0.50	ug/l	50.0	61.4	103	70-130	0.8	30	
Zinc, Dissolved	225	0.50	5.0	ug/l	50.0	171	107	70-130	2	30	

Batch W4D0509 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0509-BLK1)					Analyzed: 04/10/14 16:47						
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0509-BS1)					Analyzed: 04/10/14 16:48						
Zinc, Dissolved	46.1	0.50	5.0	ug/l	50.0		92	85-115			
Matrix Spike (W4D0509-MS1)		**Source: 4D08038-BL**			Analyzed: 04/10/14 16:49						
Zinc, Dissolved	549	0.50	5.0	ug/l	50.0	486	125	70-130			
Matrix Spike (W4D0509-MS2)		**Source: 4D08038-AX**			Analyzed: 04/10/14 16:52						
Zinc, Dissolved	112	0.50	5.0	ug/l	50.0	66.7	92	70-130			
Matrix Spike Dup (W4D0509-MSD1)		**Source: 4D08038-BL**			Analyzed: 04/10/14 16:51						
Zinc, Dissolved	514	0.50	5.0	ug/l	50.0	486	55	70-130	7	30	MS-02
Matrix Spike Dup (W4D0509-MSD2)		**Source: 4D08038-AX**			Analyzed: 04/10/14 16:53						
Zinc, Dissolved	112	0.50	5.0	ug/l	50.0	66.7	91	70-130	0.01	30	

Batch W4D0515 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0515-BLK1)					Analyzed: 04/11/14 15:51						
Copper, Dissolved	0.122	0.036	0.50	ug/l							J
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0515-BS1)					Analyzed: 04/11/14 15:52						
Copper, Dissolved	47.4	0.036	0.50	ug/l	50.0		95	85-115			
Zinc, Dissolved	48.3	0.50	5.0	ug/l	50.0		97	85-115			
Matrix Spike (W4D0515-MS1)		**Source: 4D08038-DD**			Analyzed: 04/11/14 15:54						
Copper, Dissolved	108	0.036	0.50	ug/l	50.0	59.7	96	70-130			
Zinc, Dissolved	192	0.50	5.0	ug/l	50.0	143	99	70-130			
Matrix Spike (W4D0515-MS2)		**Source: 4D08038-CP**			Analyzed: 04/11/14 15:56						
Copper, Dissolved	77.8	0.036	0.50	ug/l	50.0	34.6	86	70-130			
Zinc, Dissolved	48.9	0.50	5.0	ug/l	50.0	3.02	92	70-130			

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San Diego CA, 92123

Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

Metals by EPA 200 Series Methods - Quality Control

Batch W4D0515 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike (W4D0515-MS2)		**Source: 4D08038-CP**			Analyzed: 04/11/14 15:56						
Matrix Spike Dup (W4D0515-MSD1)		**Source: 4D08038-DD**			Analyzed: 04/11/14 15:55						
Copper, Dissolved	106	0.036	0.50	ug/l	50.0	59.7	92	70-130	2	30	
Zinc, Dissolved	189	0.50	5.0	ug/l	50.0	143	93	70-130	2	30	
Matrix Spike Dup (W4D0515-MSD2)		**Source: 4D08038-CP**			Analyzed: 04/11/14 15:57						
Copper, Dissolved	83.6	0.036	0.50	ug/l	50.0	34.6	98	70-130	7	30	
Zinc, Dissolved	51.6	0.50	5.0	ug/l	50.0	3.02	97	70-130	5	30	

Batch W4D0516 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0516-BLK1)					Analyzed: 04/10/14 17:49						
Copper, Dissolved	ND	0.036	0.50	ug/l							
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0516-BS1)					Analyzed: 04/10/14 17:50						
Copper, Dissolved	45.9	0.036	0.50	ug/l	50.0		92	85-115			
Zinc, Dissolved	45.7	0.50	5.0	ug/l	50.0		91	85-115			
Matrix Spike (W4D0516-MS1)		**Source: 4D08038-CF**			Analyzed: 04/10/14 17:51						
Copper, Dissolved	101	0.036	0.50	ug/l	50.0	57.9	85	70-130			
Zinc, Dissolved	67.4	0.50	5.0	ug/l	50.0	21.7	91	70-130			
Matrix Spike (W4D0516-MS2)		**Source: 4D08038-BS**			Analyzed: 04/10/14 17:54						
Copper, Dissolved	55.9	0.036	0.50	ug/l	50.0	7.60	97	70-130			
Zinc, Dissolved	158	0.50	5.0	ug/l	50.0	101	113	70-130			
Matrix Spike Dup (W4D0516-MSD1)		**Source: 4D08038-CF**			Analyzed: 04/10/14 17:52						
Copper, Dissolved	101	0.036	0.50	ug/l	50.0	57.9	86	70-130	0.2	30	
Zinc, Dissolved	66.4	0.50	5.0	ug/l	50.0	21.7	89	70-130	2	30	
Matrix Spike Dup (W4D0516-MSD2)		**Source: 4D08038-BS**			Analyzed: 04/10/14 17:55						
Copper, Dissolved	54.1	0.036	0.50	ug/l	50.0	7.60	93	70-130	3	30	
Zinc, Dissolved	154	0.50	5.0	ug/l	50.0	101	107	70-130	2	30	

Batch W4D0517 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0517-BLK1)					Analyzed: 04/10/14 18:30						
Copper, Dissolved	ND	0.036	0.50	ug/l							
LCS (W4D0517-BS1)					Analyzed: 04/10/14 18:31						
Copper, Dissolved	47.3	0.036	0.50	ug/l	50.0		95	85-115			
Matrix Spike (W4D0517-MS1)		**Source: 4D08038-CJ**			Analyzed: 04/10/14 18:33						
Copper, Dissolved	410	0.036	0.50	ug/l	50.0	374	71	70-130			
Matrix Spike Dup (W4D0517-MSD1)		**Source: 4D08038-CJ**			Analyzed: 04/10/14 18:34						
Copper, Dissolved	405	0.036	0.50	ug/l	50.0	374	61	70-130	1	30	MS-02

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San Diego CA, 92123

Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

Notes and Definitions

MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

PHYSIS
TERRA FAUNA FLORA AQUA AURA
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

July 03, 2014

Chris Stransky
AMEC
9210 Sky Park Court
Suite 200
San Diego, CA 92123-

Project Name: Chollas Creek WER Confirmation
Physis Project ID: 1404002-001

Dear Chris,

Enclosed are the analytical results for samples submitted to PHYSIS Environmental Laboratories, Inc. (PHYSIS) on 4/4/2014. A total of 2 samples were received for analysis in accordance with the attached chain of custody (COC). Per the COC, the samples were analyzed for:

Organics
Synthetic Pyrethroid Pesticides by EPA 625-NCI

Analytical results in this report apply only to samples submitted to PHYSIS in accordance with the COC and are intended to be considered in their entirety.

Please feel free to contact me at any time with any questions. PHYSIS appreciates the opportunity to provide you with our analytical and support services.

Regards,

Misty Mercier
Extension 202
714-335-5918 cell
mistymercier@physislabs.com

ABBREVIATIONS and ACRONYMS

QM	Quality Manual
QA	Quality Assurance
QC	Quality Control
MDL	method detection limit
RL	reporting limit
R1	project sample
R2	project sample replicate
MS1	matrix spike
MS2	matrix spike replicate
B1	procedural blank
B2	procedural blank replicate
BS1	blank spike
BS2	blank spike replicate
LCS1	laboratory control spike
LCS2	laboratory control spike replicate
LCM1	laboratory control material
LCM2	laboratory control material replicate
CRM1	certified reference material
CRM2	certified reference material replicate
RPD	relative percent difference
LMW	low molecular weight
HMW	high molecular weight

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QUALITY ASSURANCE SUMMARY

LABORATORY BATCH: Physis' QM defines a laboratory batch as a group of 20 or fewer project samples of similar matrix, processed together under the same conditions and with the same reagents. QC samples are associated with each batch and were used to assess the validity of the sample analyses.

PROCEDURAL BLANK: Laboratory contamination introduced during method use is assessed through the preparation and analysis of procedural blanks is provided at a minimum frequency of one per batch.

ACCURACY: Accuracy of analytical measurements is the degree of closeness based on percent recovery calculations between measured values and the actual or true value and includes a combination of reproducibility error and systematic bias due to sampling and analytical operations. Accuracy of the project data was indicated by analysis of MS, BS, LCS, LCM, CRM, and/or surrogate spikes on a minimum frequency of one per batch. Physis' QM requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits.

PRECISION: Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value and is based on RPD calculations between repeated values. Precision of the project data was determined by analysis of replicate MS1/MS2, BS1/BS2, LCS1/LCS2, LCM1/LCM2, CRM1/CRM2, surrogate spikes and/or replicate project sample analysis (R1/R2) on a minimum frequency of one per batch. Physis' QM requires that for 95% of the compounds greater than 10 times the MDL, the percent RPD should be within the specified acceptance range.

BLANK SPIKES: BS is the introduction of a known concentration of analyte into the procedural blank. BS demonstrates performance of the preparation and analytical methods on a clean matrix void of potential matrix related interferences. The BS is performed in laboratory deionized water, making these recoveries a better indicator of the efficiency of the laboratory method per se.

MATRIX SPIKES: MS is the introduction of a known concentration of analyte into a sample. MS samples demonstrate the effect a particular project sample matrix has on the accuracy of a measurement. Individually, MS samples also indicate the bias of analytical measurements due to chemical interferences inherent in the in the specific project sample spiked. Intrinsic target analyte concentration in the specific project sample can also significantly impact MS recovery.

CERTIFIED REFERENCE MATERIALS: CRMs are materials of various matrices for which analytical information has been determined and certified by a recognized authority. These are used to provide a quantitative assessment of the accuracy of an analytical method. CRMs provide evidence that the laboratory preparation and analysis produces results that are comparable to those obtained by an independent organization.

LABORATORY CONTROL MATERIAL: LCM is provided because a suitable natural seawater CRM is not available and can be used to indicate accuracy of the method. Physis' internal LCM is seawater collected at ~800 meters in the Southern California San Pedro Basin and can be used as a reference for background concentrations in clean, natural seawater for comparison to project samples.

LABORATORY CONTROL SPIKES: LCS is the introduction of a known concentration of analyte into Physis' LCM. LCS samples were employed to assess the effect the seawater matrix has on the accuracy of a measurement. LCS also indicate the bias of this method due to chemical interferences inherent in the in the seawater matrix. Intrinsic LCM concentration can also significantly impact LCS recovery.

SURROGATES: A surrogate is a pure analyte unlikely to be found in any project sample, behaves similarly to the target analyte and most often used with organic analytical procedures. Surrogates are added in known concentration to all samples and are measured to indicate overall efficiency of the method including processing and analyses.

HOLDING TIME: Method recommended holding times are the length of time a project sample can be stored under specific conditions after collection and prior to analysis without significantly affecting the analyte's concentration. Holding times can be extended if preservation techniques are employed to reduce biodegradation, volatilization, oxidation, sorption, precipitation, and other physical and chemical processes.

SAMPLE STORAGE/RETENTION: In order to maintain chemical integrity prior to analysis, all samples submitted to Physis are refrigerated (liquids) or frozen (solids) upon receipt unless otherwise recommended by applicable methods. Solid samples are retained for 1 year from collection while liquid samples are retained until method recommended holding times elapse.

TOTAL/DISSOLVED FRACTION: In some instances, the results for the dissolved fraction may be higher than the total fraction for a particular analyte (e.g. trace metals). This is typically caused by the analytical variation for each result and indicates that the target analyte is primarily in the dissolved phase, within the sample.

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PHYSIS QUALIFIER CODES

CODE	DEFINITION
*	see Case Narrative
ND	analyte not detected at or above the MDL
B	analyte was detected in the procedural blank greater than 10 times the MDL
E	analyte concentration exceeds the upper limit of the linear calibration range, reported value is estimated
H	sample received and/or analyzed past the recommended holding time
J	analyte was detected at a concentration below the RL and above the MDL, reported value is estimated
N	insufficient sample, analysis could not be performed
M	analyte was outside the specified recovery and/or RPD acceptance limits due to matrix interference. The associated B/BS were within limits, therefore the sample data was reported without further clarification
SH	analyte concentration in the project sample exceeded the spike concentration, therefore MS recovery and/or RPD acceptance limits do not apply
SL	analyte results for R1 and/or R2 were lower than 10 times the MDL, therefore RPD acceptance limits do not apply
NH	project sample was heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices, therefore MS recovery and/or RPD were outside the specified acceptance limits
R	Physis' QM allows for 5% of the target compounds greater than 10 times the MDL to be outside the specified acceptance limits for precision and/or accuracy. This is often due to random error and does not indicate any significant problems with the analysis of these project samples

QUALITY CONTROL REPORT

PHYSIS
ENVIRONMENTAL LABORATORIES, INC.
Innovative Solutions for Nature

1904 E. Wright Circle, Anaheim CA 92806 main: (714) 602-5320 fax: (714) 602-5321 www.physislabs.com info@physislabs.com CA ELAP #2769

Pyrethroids QUALITY CONTROL REPORT

Sample ID: 26860-B1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625-NCI Batch ID: O-5140 Prepared: 11-Mar-14 Analyzed: 20-Apr-14

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(PCB112)	Total	114			% Recovery	100		114	50 - 150%	PASS			
(PCB198)	Total	94			% Recovery	100		94	50 - 150%	PASS			
Allethrin	Total	ND	0.5	2	ng/L								
Bifenthrin	Total	ND	0.5	2	ng/L								
Cyfluthrin	Total	ND	0.5	2	ng/L								
Cyhalothrin, Total Lambda	Total	ND	0.5	2	ng/L								
Cypermethrin	Total	ND	0.5	2	ng/L								
Danitol (Fenpropathrin)	Total	ND	0.5	2	ng/L								
Deltamethrin/Tralomethrin	Total	ND	0.5	2	ng/L								
Esfenvalerate	Total	ND	0.5	2	ng/L								
Fenvalerate	Total	ND	0.5	2	ng/L								
Fluvalinate	Total	ND	0.5	2	ng/L								
Permethrin, cis-	Total	ND	5	10	ng/L								
Permethrin, trans-	Total	ND	5	10	ng/L								
Prallethrin	Total	ND	0.5	2	ng/L								

Sample ID: 26860-BS1 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625-NCI Batch ID: O-5140 Prepared: 11-Mar-14 Analyzed: 20-Apr-14

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY %	ACCURACY LIMITS		PRECISION %	PRECISION LIMITS	QA CODE
(PCB112)	Total	107			% Recovery	100	0	107	50 - 150%	PASS			
(PCB198)	Total	106			% Recovery	100	0	106	50 - 150%	PASS			
Allethrin	Total	972.2	0.5	2	ng/L	1000	0	97	50 - 150%	PASS			
Bifenthrin	Total	949.5	0.5	2	ng/L	1000	0	95	50 - 150%	PASS			
Cyfluthrin	Total	824.3	0.5	2	ng/L	1000	0	82	50 - 150%	PASS			
Cyhalothrin, Total Lambda	Total	1026.5	0.5	2	ng/L	1000	0	103	50 - 150%	PASS			
Cypermethrin	Total	789.7	0.5	2	ng/L	1000	0	79	50 - 150%	PASS			
Danitol (Fenpropathrin)	Total	968.3	0.5	2	ng/L	1000	0	97	50 - 150%	PASS			
Deltamethrin/Tralomethrin	Total	1789.6	0.5	2	ng/L	2000	0	89	50 - 150%	PASS			
Esfenvalerate	Total	906.5	0.5	2	ng/L	1000	0	91	50 - 150%	PASS			
Fenvalerate	Total	816.1	0.5	2	ng/L	1000	0	82	50 - 150%	PASS			

Pyrethroids QUALITY CONTROL REPORT

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY			PRECISION			QA CODE
								%	LIMITS		%	LIMITS		
Fluvalinate	Total	897.2	0.5	2	ng/L	1000	0	90	50 - 150%	PASS				
Permethrin, cis-	Total	218.4	5	10	ng/L	267	0	82	50 - 150%	PASS				
Permethrin, trans-	Total	612.8	5	10	ng/L	716	0	86	50 - 150%	PASS				
Prallethrin	Total	906.3	0.5	2	ng/L	1000	0	91	50 - 150%	PASS				

Sample ID: 26860-BS2 **QAQC Procedural Blank** **Matrix: DI Water** **Sampled:** **Received:**
Method: EPA 625-NCI Batch ID: O-5140 Prepared: 11-Mar-14 Analyzed: 20-Apr-14

ANALYTE	FRACTION	RESULT	MDL	RL	UNITS	SPIKE LEVEL	SOURCE RESULT	ACCURACY			PRECISION			QA CODE
								%	LIMITS		%	LIMITS		
(PCB112)	Total	105			% Recovery	100	0	105	50 - 150%	PASS	2	30	PASS	
(PCB198)	Total	109			% Recovery	100	0	109	50 - 150%	PASS	3	30	PASS	
Allethrin	Total	988.5	0.5	2	ng/L	1000	0	99	50 - 150%	PASS	2	30	PASS	
Bifenthrin	Total	984.4	0.5	2	ng/L	1000	0	98	50 - 150%	PASS	3	30	PASS	
Cyfluthrin	Total	903.9	0.5	2	ng/L	1000	0	90	50 - 150%	PASS	9	30	PASS	
Cyhalothrin, Total Lambda	Total	1095.8	0.5	2	ng/L	1000	0	110	50 - 150%	PASS	7	30	PASS	
Cypermethrin	Total	907.4	0.5	2	ng/L	1000	0	91	50 - 150%	PASS	14	30	PASS	
Danitol (Fenpropathrin)	Total	982	0.5	2	ng/L	1000	0	98	50 - 150%	PASS	1	30	PASS	
Deltamethrin/Tralomethrin	Total	2335	0.5	2	ng/L	2000	0	117	50 - 150%	PASS	27	30	PASS	
Esfenvalerate	Total	1006.8	0.5	2	ng/L	1000	0	101	50 - 150%	PASS	10	30	PASS	
Fenvalerate	Total	902.3	0.5	2	ng/L	1000	0	90	50 - 150%	PASS	9	30	PASS	
Fluvalinate	Total	1033.5	0.5	2	ng/L	1000	0	103	50 - 150%	PASS	13	30	PASS	
Permethrin, cis-	Total	243	5	10	ng/L	267	0	91	50 - 150%	PASS	10	30	PASS	
Permethrin, trans-	Total	688.1	5	10	ng/L	716	0	96	50 - 150%	PASS	11	30	PASS	
Prallethrin	Total	924.8	0.5	2	ng/L	1000	0	92	50 - 150%	PASS	1	30	PASS	

Item 10
Supporting Document No. 2
December 14, 2016

APPENDIX F

Proposed Lead Criteria Tables

Appendix F Proposed Lead Criteria Tables

AMBIENT AQUATIC LIFE WATER QUALITY CRITERIA LEAD, 1998, Great Lakes Environmental Center, Traverse City, Michigan 49686
Prepared for U. S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Health and Ecological Criteria Division, Washington, D.C., EPA Contract No. 68-C-04-006

Table 1. Acute Toxicity of Lead to Aquatic Animals

Species	**Method**[a]	**Chemical**	**Hardness (mg/L as $CaCO_3$)**	**LC50 or EC50 (Total µg/L)**[b]	**LC50 or EC50 (Dissolved µg/L)**	**LC50 or EC50 Adjusted to TH=50 (Total µg/L)**	**Species Mean Acute Value at TH=50 (Total µg/L)**[c]	**Reference**
				FRESHWATER SPECIES				
Rotifer, *Lecane hamata*	S, U	Lead nitrate	135	680	-	**162.3**	162.3	Perez-Legaspi and Rico-Martinez 2001
Rotifer, *Lecane luna*	S, U	Lead nitrate	135	140	-	***33.42***	33.42	Perez-Legaspi and Rico-Martinez 2001
Rotifer, *Lecane quadridentata*	S, U	Lead nitrate	135	3,700	-	**883.3**	883.3	Perez-Legaspi and Rico-Martinez 2001
Worm, *Lumbriculus variegatus*	S, U	-	30	1,800	-	3,760	-	Bailey and Liu 1980
Worm (adult), *Lumbriculus variegatus*	S, M, T	Lead chloride	290	>8,000	-	>634.1	-	Schubauer-Berigan et al. 1993
Worm, *Lumbriculus variegatus*	F, M, T	-	44	740	-	**889.8**	889.8	Phipps et al. 1995
Worm, *Tubifex tubifex*	S, U	Lead nitrate	237	454,700 (15EC)	-	**48,215**	-	Rathore and Khangarot 2002
Worm, *Tubifex tubifex*	S, U	Lead nitrate	237	514,190 (20EC)	-	**54,523**	-	Rathore and Khangarot 2002
Worm, *Tubifex tubifex*	S, U	Lead nitrate	237	334,140 (25EC)	-	**35,431**	-	Rathore and Khangarot 2002

Worm, *Tubifex tubifex*	S, U	Lead nitrate	237	165,220 (30EC)	-	**17,520**	35,741	Rathore and Khangarot 2002
Snail, *Aplexa hypnorum*	F, M, T	Lead nitrate	61	1,340	-	**1,006**	1,006	Call et al. 1981
Cladoceran (<24 hr), *Ceriodaphnia dubia*	R, M, T	Lead nitrate	100	248	-	**91.27**	-	Spehar and Fiandt 1986
Cladoceran (<24 hr), *Ceriodaphnia dubia*	S, U	Lead chloride	80-100	120	-	**52.25**	-	Bitton et al. 1996
Cladoceran (<24 hr), *Ceriodaphnia dubia*	R, M, D	Lead nitrate	20-30	30.3	29.1	**84.76**	-	Diamond et al. 1997
Cladoceran (<24 hr), *Ceriodaphnia dubia*	R, M, D	Lead nitrate	20-30	195	187	**545.5**	-	Diamond et al. 1997
Cladoceran (<24 hr), *Ceriodaphnia dubia*	R, M, D	Lead nitrate	20-30	47.9	46.1	**134.0**	-	Diamond et al. 1997
Cladoceran (<24 hr), *Ceriodaphnia dubia*	R, M, D	Lead nitrate	20-30	27.5	26.4	**76.93**	114.7	Diamond et al. 1997
Cladoceran (<24 hr), *Ceriodaphnia reticulata*	S, U	Lead nitrate	240	1,878	-	**195.6**	195.6	Elnabarawy et al. 1986
Cladoceran, *Daphnia galeata*	F, U	Lead nitrate	135	714	-	**170.5**	170.5	Wilson 1980
Cladoceran, *Daphnia magna*	S, U	Lead chloride	-	931	-	-	-	Anderson 1948
Cladoceran, *Daphnia magna*	S, U	Lead nitrate	120	5,000[d]	-	1,415[d]	-	Bringman and Kuhn 1959a,b
Cladoceran, *Daphnia magna*	F, U	Lead nitrate	135	510 (10EC)	-	**121.8**	-	Wilson 1980
Cladoceran, *Daphnia magna*	F, U	Lead nitrate	135	950 (15EC)	-	**226.8**	-	Wilson 1980

Cladoceran, *Daphnia magna*	F, U	Lead nitrate	135	870 (20EC)	-	**207.7**	-	Wilson 1980
Cladoceran, *Daphnia magna*	F, U	Lead nitrate	135	160 (25EC)	-	**38.20**	-	Wilson 1980
Cladoceran, *Daphnia magna*	S, U	Lead nitrate	175	150	-	**24.63**	-	LeBlanc 1982
Cladoceran (<24 hr), *Daphnia magna*	S, U	Lead nitrate	240	1,815	-	**189.0**	-	Elnabarawy et al. 1986
Cladoceran (<24 hr), *Daphnia magna*	S, U	Lead nitrate	259	3,700	-	**345.2**	-	Ziegenfuss et al. 1986
Cladoceran, *Daphnia magna*	S, M, T	Lead nitrate	170	967	-	**165.6**	-	McWilliam and Baird 2002
Cladoceran, *Daphnia magna*	S, M, T	Lead sulfide	-	3,655	-	-	-	Erten-Unal et al. 1998
Cladoceran, *Daphnia magna*	S, U	Lead carbonate	-	>5,000	-	-	-	Erten-Unal et al. 1998
Cladoceran, *Daphnia magna*	S, M, T	Lead chloride	-	3,414	-	-	-	Erten-Unal et al. 1998
Cladoceran, *Daphnia magna*	S, M, T	Lead sulfate	-	3,221	-	-	-	Erten-Unal et al. 1998
Cladoceran, *Daphnia magna*	R, M, T	Lead nitrate	54	612	-	**547.7**	-	Chapman et al. Manuscript
Cladoceran, *Daphnia magna*	R, M, T	Lead nitrate	110	952	-	**305.4**	-	Chapman et al. Manuscript
Cladoceran, *Daphnia magna*	R, M, T	Lead nitrate	152	1,910	-	**384.3**	171.4	Chapman et al. Manuscript
Cladoceran, *Daphnia pulex*	S, U	Lead nitrate	45	5,100[e]	-	5,937[e]	-	Mount and Norberg 1984
Cladoceran (<24 hr), *Daphnia pulex*	S, U	Lead nitrate	240	2,003	-	**208.6**	208.6	Elnabarawy et al. 1986
Cladoceran (<24 hr), *Moina macrocopa*	S, U	Lead nitrate	-	755	-	-	-	Pokethitiyook et al. 1987
Cladoceran, *Simocephalus vetulus*	S, U	Lead nitrate	45	4,500[e]	-	5,238[e]	-	Mount and Norberg 1984
Amphipod,	R, U	Lead	50	27,600	-	**27,600**	27,600	Martin and

Crangonyx pseudogracilis		nitrate						Holdich 1986
Amphipod, *Gammarus pseudolimnaeus*	F, M, T	Lead nitrate	46	124	-	**139.8**	-	Spehar et al. 1978
Amphipod, *Gammarus pseudolimnaeus*	F, M, T	Lead nitrate	48	140	-	**148.5**	144.1	Call et al. 1983
Amphipod (1.2 - 1.3 mm) *Hyalella azteca*	F, M, T	-	71	.<380[b]	<151	**<229.2**	<229.2	Besser et al. 2005
Copepod (female), *Cyclops bicuspidatus*	F, U	Lead nitrate	135	770 (10EC)	-	**183.8**	-	Wilson 1980
Copepod (female), *Cyclops bicuspidatus*	F, U	Lead nitrate	135	900 (15EC)	-	**214.9**	-	Wilson 1980

Copepod (female), *Cyclops bicuspidatus*	F, U	Lead nitrate	135	1,135 (20EC)	-	**271.0**	220.4	Wilson 1980
Copepod (male), *Diaptomus sicilis*	F, U	Lead nitrate	135	275 (5EC)	-	**65.65**	-	Wilson 1980
Copepod (female), *Diaptomus sicilis*	F, U	Lead nitrate	135	460 (5EC)	-	**109.8**	-	Wilson 1980
Copepod (female), *Diaptomus sicilis*	F, U	Lead nitrate	135	380 (10EC)	-	**90.72**	-	Wilson 1980
Copepod (female), *Diaptomus sicilis*	F, U	Lead nitrate	135	190 (15EC)	-	**45.36**	73.80	Wilson 1980
Crayfish, *Orconectes limsous*	S, M, T	Lead chloride	-	3,300	-	-	-	Boutet and Chaisemartin 1973
Crayfish (adult), *Procambarus clarkii*	S, U	Lead nitrate	-	>400,000	-	-	-	Torreblanca et al. 1987
Crayfish (juvenile), *Procambarus clarkii*	S, M, T	Lead nitrate	30	751,570	-	**1,569,992**	1,569,992	Naqvi and Howell 1993b
Midge (first instar larvae), *Benacus* sp.	S, U	Lead nitrate	5	1,360	-	**37,639**	37,639	Oladimeji and Offem 1989
Midge (first instar larvae), *Chironomus tentans*	S, U	Lead nitrate	5	1,770	-	**48,986**	48,986	Oladimeji and Offem 1989
Midge, *Tanytarsus dissimilis*	F, M, T	Lead nitrate	48	224,000	-	**237,583**	237,583	Call et al. 1983

Coho salmon (alevin), *Oncorhynchus kisutch*	S, U	Lead nitrate	41	7,000	-	**9,319**	-	Buhl and Hamilton 1990
Coho salmon (alevin), *Oncorhynchus kisutch*	S, U	Lead nitrate	41	21,700	-	**28,890**	-	Buhl and Hamilton 1990
Coho salmon (0.41 g), *Oncorhynchus kisutch*	S, U	Lead nitrate	41	4,180	-	**5,565**	-	Buhl and Hamilton 1990
Coho salmon (0.94 g), *Oncorhynchus kisutch*	S, U	Lead nitrate	41	>18,000	-	**>23,964**	13,765	Buhl and Hamilton 1990
Rainbow trout (2 mos), *Oncorhynchus mykiss*	F, M, T, D	Lead nitrate	-	8,000	-	-	-	Hale 1977
Rainbow trout, *Oncorhynchus mykiss*	S, M, T, D	Lead nitrate	385	542,000	1,320	28,549	-	Goettl et al. 1972; Davies and Everhart 1973; Davies et al. 1976
Rainbow trout, *Oncorhynchus mykiss*	S, M, T	Lead nitrate	290	471,000	1,470	37,332	-	Goettl et al. 1972; Davies and Everhart 1973; Davies et al. 1976
Rainbow trout (alevin), *Oncorhynchus mykiss*	S, U	Lead nitrate	41	30,000	-	39,940	-	Buhl and Hamilton 1990
Rainbow trout (0.6 g), *Oncorhynchus mykiss*	S, U	Lead nitrate	41	<1,700	-	<2,263	-	Buhl and Hamilton 1990
Rainbow trout, *Oncorhynchus mykiss*	F, M, T	Lead nitrate	32	.1,460[b]	1,170	**2,779**	-	Goettl et al. 1972; Davies and Everhart 1973; Davies et al. 1976
Rainbow trout, *Oncorhynchus mykiss*	F, M, T	Lead nitrate	140	1,040	1,000	**235.6**	809.2	Rogers et al. 2003

Brook trout (18 mos), *Salvelinus fontinalis*	F, M, T	Lead nitrate	44	4,100	-	**4,930**	4,930	Holcombe et al. 1976
Arctic grayling (alevin), *Thymallus arcticus*	S, U	Lead nitrate	41	>36,000	-	>47,928[f]	-	Buhl and Hamilton 1990
Arctic grayling (fry), *Thymal*lus arcticus	S, U	Lead nitrate	41	12,000	-	15,976[f]	-	Buhl and Hamilton 1990
Arctic grayling (0.34 g), *Thymallus arcticus*	S, U	Lead nitrate	41	<320	-	**<426.0**	-	Buhl and Hamilton 1990
Arctic grayling (0.85 g), *Thymallus arcticus*	S, U	Lead nitrate	41	<1,700	-	**<2,263**	-	Buhl and Hamilton 1990
Arctic grayling (0.97 g), *Thymallus arcticus*	S, U	Lead nitrate	41	<1,000	-	**<1,331**	<1,087	Buhl and Hamilton 1990
Goldfish, *Carassius auratus*	S, U	Lead chloride	20	31,500	-	**118,081**	118,081	Pickering and Henderson 1966
Common carp (eggs), *Cyprinus carpio*	F, M, T	Lead nitrate	-	>199	-	-	-	Stouthart et al. 1994
Common carp (fry), *Cyprinus carpio*	S, M, T, D	Lead nitrate	58	8,200	1,350	**6,620**	-	Datta and Das 2003
Common carp (fry), *Cyprinus carpio*	S, M, T, D	Lead nitrate	90	341,000	1,780	**146,092**	-	Datta and Das 2003
Common carp (fry), *Cyprinus carpio*	S, M, T, D	Lead nitrate	170	414,000	1,580	**70,885**	-	Datta and Das 2003
Common carp (fry), *Cyprinus carpio*	S, M, T, D	Lead nitrate	280	554,000	1,400	**46,190**	-	Datta and Das 2003
Common carp (fry), *Cyprinus carpio*	S, M, T, D	Lead nitrate	720	1,129,000	1,470	**24,111**	37,719	Datta and Das 2003
Fathead	S, U	Lead	20	5,580	-	20,917	-	Pickering and

minnow, *Pimephales promelas*		chloride						Henderson 1966
Fathead minnow, *Pimephales promelas*	S, U	Lead chloride	20	7,330	-	27,477	-	Pickering and Henderson 1966
Fathead minnow, Pimephales promelas	S, U	Lead chloride	360	482,000	-	27,970	-	Pickering and Henderson 1966
Fathead minnow (<24 hr), *Pimephales promelas*	S, M, T	Lead chloride	290	>5,400	-	>428.0	-	Schubauer-Berigan et al. 1993
Fathead minnow, *Pimephales promelas*	S, U	Lead sulfide	-	9,958	-	-	-	Erten-Unal et al. 1998
Fathead minnow, *Pimephales promelas*	S, U	Lead carbonate	-	>10,000	-	-	-	Erten-Unal et al. 1998
Fathead minnow, *Pimephales promelas*	S, U	Lead chloride	-	167	-	-	-	Erten-Unal et al. 1998
Fathead minnow, *Pimephales promelas*	S, U	Lead sulfate	-	3,166	-	-	-	Erten-Unal et al. 1998

Fathead minnow (30 d), *Pimephales promelas*	F, M, T	Lead nitrate	44	2,100	-	**2,525**	2,525	Spehar and Fiandt 1986
Colorado squawfish (larva and juvenile), *Ptychocheilus lucius*	S, U	Lead nitrate	199	>170,000	-	**>23,193**	>23,193	Buhl 1997
Bonytail (larva and juvenile), *Gila elegans*	S, U	Lead nitrate	199	>170,000	-	**>23,193**	>23,193	Buhl 1997
Razorback sucker (larva and juvenile), *Xyrauchen texanus*	S, U	Lead nitrate	199	>170,000	-	**>23,193**	>23,193	Buhl 1997
Mosquitofish (adult), *Gambusia affinis*	S, U	Lead nitrate	-	240,000[g]	-	-	-	Wallen et al 1957
Mosquitofish, *Gambusia affinis*	S, U	Lead nitrate	-	56,500	-	-	-	Mowbray 1988
Guppy (6 mos), *Poecilla reticulata*	S, U	Lead chloride	20	20,600	-	**77,221**	77,221	Pickering and Henderson 1966
Bluegill, *Lepomis macrochirus*	S, U	Lead chloride	20	23,800	-	**89,217**	-	Pickering and Henderson 1966
Bluegill, *Lepomis macrochirus*	S, U	Lead chloride	360	442,000	-	**25,649**	47,836	Pickering and Henderson 1966
Smallmouth bass (egg and sac fry), *Micropterus dolomieui*	S, M, T	-	152	>15,900	-	>3,199[f]	-	Coughlan et al. 1986

Smallmouth bass (fingerling), *Micropterus dolomieui*	S, M, T	-	152	29,000	-	5,835[f]	-	Coughlan et al. 1986
Smallmouth bass (fry), *Micropterus dolomieui*	S, M, T	-	152	2,800	-	**563.4**	563.4	Coughlan et al. 1986
Tilapia, *Oreochromis hornorum*	S, U	Lead nitrate	120	202,000	-	**57,154**	57,154	Arias et al. 1991
Tilapia, *Oreochromis mossambicus*	R, U	Lead nitrate	-	104,910	-	-	-	James et al. 1996

a S = static; R = renewal; F = flow-through; M = measured; U = unmeasured; T = total metal concentration measured; D=dissolved metal concentration measured.
b Concentration of lead, not the chemical. Where indicated, total lead value was calculated from reported dissolved value and appropriate conversion factor.
c Freshwater Species Mean Acute Values are calculated at a hardness of 50 mg/L using the pooled slope. SMAVs calculated using Lotus spreadsheet, values presented may be different than those calculated with a hand held calculator due to rounding. **Note:** Each SMAV was calculated from the associated underlined number(s) in the preceding column (freshwater) or preceding third column for saltwater.
d In river water, not used in calculations.
e Not used in calculations because the values in Mount and Norberg (1984) are much higher than values for other species in the same genus and family.
f Not used in calculation because data are available for a more sensitive life stage.
g High turbidity.
h Value not used to calculate the SMAV because the "less than" value is greater than the other value for the species.

Results of Covariance Analysis of Freshwater Acute Toxicity versus Hardness

Species	n	Slope	95% Confidence Limits	Degrees of Freedom
Daphnia magna	8	0.7245	-1.8411, 3.2901	6

Rainbow trout	5	1.8306	0.3392, 3.3220	3
Fathead minnow	4	1.5492	0.1314, 2.9670	2
Bluegill	2	1.0108	(Cannot be calculated)	0
Carp	5	1.5619	-0.1397, 3.2635	3
All of the above	24	1.4421[a]	0.7777, 2.1056	18

[a] P = 0. 8988 For equality of slopes

Table 2. Chronic Toxicity of Lead to Aquatic Animals

Species	Test[a]	Chemical	Hardness (mg/L as $CaCO_3$)	Chronic Limits Total (Φg/L)[b]	Chronic Limits Dissolved (µg/L)	Chronic Value Total (Φg/L)	Chronic Value Dissolved (µg/L)	Reference
				FRESHWATER SPECIES				
Snail, *Lymnaea palustris*	LC, T	Lead nitrate	139	12-54	-	25.46	-	Borgmann et al. 1978
Snail, *Lymnaea stagnalis*	LC, D	Lead nitrate	-	13.4-17.9[c]	12-16[c]	15.52	13.86	Grosell et al. 2006
Cladoceran, *Ceriodaphnia dubia*	LC, T	Lead nitrate	100	-	-	52	-	Spehar and Fiandt 1986
Cladoceran, *Ceriodaphnia dubia*	LC, T	-	20	51-99	-	71	-	Jop et al. 1995
Cladoceran, *Daphnia magna*	LC, T	Lead nitrate	52	9-16.7	-	12.26	-	Chapman et al. Manuscript
Cladoceran, *Daphnia magna*	LC, T	Lead nitrate	102	78-181	-	118.8	-	Chapman et al. Manuscript
Cladoceran, *Daphnia magna*	LC, T	Lead nitrate	151	85-193	-	128.1	-	Chapman et al. Manuscript
Amphipod, *Hyalella azteca*	LC, T	-	136	7.9-18	-	11.92	-	Besser et al. 2005
Midge, *Chironomus tentans*	LC, D	Lead nitrate	-	122-557[c]	109-497[c]	260.7	232.8	Grosell et al. 2006
Rainbow trout, *Oncorhynchus mykiss*	ELS, T	Lead nitrate	28	13.2-27	-	18.88	-	Goettl et al. 1972; Davies and Everhart 1973; Davies et al. 1976
Rainbow trout, *Oncorhynchus mykiss*	ELS, T	Lead nitrate	35	71-146	-	101.8	-	Sauter et al. 1976
Brook trout, *Salvelinus fontinalis*	LC, T	Lead nitrate	44	58-119	-	83.08	-	Holcombe et al. 1976
Fathead minnow, *Pimephales promelas*	ELS, T	Lead nitrate	44	-	-	329	-	Spehar and Fiandt 1986

Species	**Test[a]**	**Chemical**	**Hardness (mg/L as $CaCO_3$)**	**Chronic Limits Total (Φg/L)[b]**	**Chronic Limits Dissolved (µg/L)**	**Chronic Value Total (Φg/L)**	**Chronic Value Dissolved (µg/L)**	**Reference**
Smallmouth bass, *Micropterus dolomieui*	LC, T	Lead	152	>405	-	>405	-	Coughlan et al. 1986

Species	**Test[a]**	**Chemical**	**Hardness (mg/L as $CaCO_3$)**	**Chronic Limits Total (Φg/L)[b]**	**Chronic Limits Dissolved (µg/L)**	**Chronic Value Total (Φg/L)**	**Chronic Value Dissolved (µg/L)**	**Reference**
				SALTWATER SPECIES				
Mysid, *Americamysis bahia*	LC, T	Lead nitrate	30[d]	17-37	-	25.08	-	Lussier et al. 1985

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a LC = life cycle or partial life cycle, ELS = early life stage, T = total metal concentration, D = dissolved metal concentration.

b Results are expressed as lead, not as the chemical.

c Where indicated, total lead value was calculated from reported dissolved value and appropriate conversion factor.

d Salinity (g/kg).

Results of Regression Analysis of Freshwater Chronic Toxicity versus Hardness

Species	**n**	**Slope**	**95% Confidence Limits**	**Degrees of Freedom**
Daphnia magna	3	2.328	-8.274, 12.931	1

Acute-Chronic Ratio

Species	Hardness (mg/L as $CaCO_3$)	Acute Value (µg/L)	Chronic Value (µg/L)	Ratio	Reference
Cladoceran, *Ceriodaphnia dubia*	100	248	52	4.77	Spehar and Fiandt 1986
Cladoceran, *Daphnia magna*	52-54	612	12.26	49.92	Chapman et al. Manuscript
Cladoceran, *Daphnia magna*	102-110	952	118.8	8.013	Chapman et al. Manuscript
Cladoceran, *Daphnia magna*	151-152	1,910	128.1	14.91	Chapman et al. Manuscript
Rainbow trout, *Oncorhynchus mykiss*	28-32	1,460	18.88	77.33	Goettl et al. 1972; Davies and Everhart 1973; Davies et al. 1976
Brook trout, *Salvelinus fontinalis*	44	4,100	83.08	49.35	Holcombe et al. 1976
Fathead minnow, *Pimephales promelas*	44	2,100	329	6.38	Spehar and Fiandt 1986
Smallmouth bass, *Micropterus dolomieui*	152	2,800	>405	<6.91	Coughlan et al. 1986
Mysid, *Americamysis bahia*	-	3,130	25.08	124.8[a]	Lussier et al. 1985

a ACR not acceptable because of solubility issues encountered in the acute test.

Table 3. Ranked Genus Mean Acute Values with Species Mean Acute-Chronic Ratios

Rank[a]	Genus Mean Acute Value (Total µg/L)[b]	Species	Species Mean Acute Value (Total µg/L)[b]	Species Mean Acute-Chronic Ratio
		FRESHWATER SPECIES		
28	1,569,992	Crayfish,	1,569,992	-

Rank[a]	Genus Mean Acute Value (Total µg/L)[b]	Species	Species Mean Acute Value (Total µg/L)[b]	Species Mean Acute-Chronic Ratio
		Procambarus clarkii		
27	237,583	Midge, *Tanytarsus dissimilis*	237,583	-
26	118,081	Goldfish, *Carassius auratus*	118,081	-
25	77,221	Guppy, *Poecilia reticulata*	77,221	-
24	57,154	Tilapia, *Oreochromis hornorum*	57,154	-
23	48,986	Midge, *Chironomus tentans*	48,986	-
22	47,836	Bluegill, *Lepomis macrochirus*	47,836	-
21	37,719	Common carp, *Cyprinus carpio*	37,719	-
20	37,639	Midge, *Benacus* sp.	37,639	-
19	35,741	Worm, *Tubifex tubifex*	35,741	-
18	27,600	Amphipod, *Crangonyx pseudogracilis*	27,600	-
17	>23,193	Colorado squawfish, *Ptychocheilus lucius*	>23,193	-
16	>23,193	Bonytail, *Gila elegans*	>23,193	-
15	>23,193	Razorback sucker, *Xyrauchen texanus*	>23,193	-
14	4,930	Brook trout, *Salvelinus fontinalis*	4,930	49.35
13	3,337	Coho salmon, *Oncorhynchus kisutch*	13,765	-
		Rainbow trout, *Oncorhynchus* mykiss	809.2	77.33

Rank[a]	Genus Mean Acute Value (Total µg/L)[b]	Species	Species Mean Acute Value (Total µg/L)[b]	Species Mean Acute-Chronic Ratio
12	2,525	Fathead minnow, *Pimephales promelas*	2,525	6.38
11	<1,087	Arctic grayling, *Thymallus arcticus*	<1,087	-
10	1,006	Snail, *Aplexa hypnorum*	1,006	-
9	889.8	Worm, *Lumbriculus variegatus*	889.8	-
8	563.4	Smallmouth bass, *Micropterus dolomieui*	563.4	<6.91
7	<229.2	Amphipod, *Hyalella azteca*	<229.2	-
6	220.4	Copepod, *Cyclops bicuspidatus*	220.4	-
5	182.7	Cladoceran, *Daphnia galeata*	170.5	-
		Cladoceran, *Daphnia magna*	171.4	18.13[c]
		Cladoceran, *Daphnia pulex*	208.6	-
4	168.6	Rotifer, *Lecane hamata*	162.3	-
		Rotifer, *Lecane luna*	33.42	-
		Rotifer, *Lecane quadridentata*	883.3	-
3	149.8	Cladoceran, *Ceriodaphnia dubia*	114.7	4.77
		Cladoceran, *Ceriodaphnia reticulata*	195.6	-
2	144.1	Amphipod, *Gammarus pseudolimnaeus*	144.1	-
1	73.80	Copepod, *Diaptomus sicilis*	73.80	-

Item 10
Supporting Document No. 2
December 14, 2016

Item 10
Supporting Document No. 2
December 14, 2016

APPENDIX G

Bioassay Laboratory Reports

Weston - 2010

Range-finder and Definitive WERs

Item 10
Supporting Document No. 2
December 14, 2016

Range-finding WER Event

1/26/2010

Acute Daphnid-48 Hr Survival

Start Date:	1/26/2010 14:30	Test ID:	Copper	Sample ID:	DMW
End Date:	1/28/2010 16:05	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	Copper Spiking
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia

Comments: WER Rangefinder

Conc-ppb	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
1.5	1.0000	1.0000	1.0000	1.0000
3	1.0000	1.0000	1.0000	1.0000
6	1.0000	1.0000	1.0000	1.0000
12	1.0000	0.4000	0.2000	0.6000
24	0.0000	0.0000	0.0000	0.0000
48	0.0000	0.0000	0.0000	0.0000

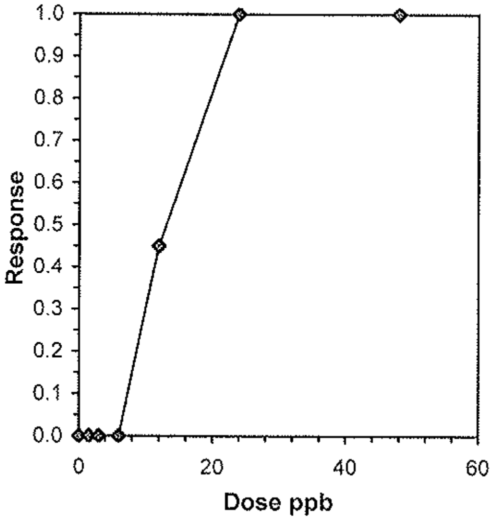
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	1.0000
1.5	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
3	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
6	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
12	0.5500	0.5500	0.5500	0.2000	1.0000	62.103	4	12.00	10.00	0.5500	0.5500
24	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000
48	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.56056	0.868	1.05255	8.49412
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	12	24	16.9706	

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	6.667	0.685	6.286	8.800	6.6170
IC10	7.333	0.913	6.571	11.600	4.0003
IC15	8.000	1.091	6.857	14.400	2.8399
IC20	8.667	1.234	7.143	15.129	2.1590
IC25	9.333	1.359	7.429	15.859	1.7145
IC40	11.333	1.661	8.286	18.047	0.9803
IC50	13.091	1.919	8.603	19.251	0.4635



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: DMW
Start Date: 1/26/2010 14:30 End Date: 1/28/2010 16:05
Test ID: Copper
Protocol: EPAA 02-EPA Acute
Sample Type: Copper Spiking
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5		5			
	2	2	Control	5		5			
	3	3	Control	5		5			
	4	4	Control	5		5			
	5	1	1.500	5		5			
	6	2	1.500	5		5			
	7	3	1.500	5		5			
	8	4	1.500	5		5			
	9	1	3.000	5		5			
	10	2	3.000	5		5			
	11	3	3.000	5		5			
	12	4	3.000	5		5			
	13	1	6.000	5		5			
	14	2	6.000	5		5			
	15	3	6.000	5		5			
	16	4	6.000	5		5			
	17	1	12.000	5		5			
	18	2	12.000	5		2			
	19	3	12.000	5		1			
	20	4	12.000	5		3			
	21	1	24.000	5		0			
	22	2	24.000	5		0			
	23	3	24.000	5		0			
	24	4	24.000	5		0			
	25	1	48.000	5		0			
	26	2	48.000	5		0			
	27	3	48.000	5		0			
	28	4	48.000	5		0			

Comments: WER Rangefinder

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	WER rangefinder
Client Sample ID:	Copper in DMW
Weston Test ID:	~~N/A~~ ①am Copper in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	N/A
Date Test Started:	1/26/10
Date Test Ended:	1/28/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	7	8.4	7	20.9	5	0.21	2	8.6			
Date: 1/26/10	1.5		8.4		20.9		0.21		8.5			
Sample ID:	3		8.4		20.8		0.20		8.5			
Dilutions (Tech): AM	6		8.4		20.4		0.21		8.5			
WQ Time: 1500	12		8.5		20.7		0.20		8.5			
Technician: VH	24		8.6		20.7		0.21		8.5			
① **~~24~~ 48 hours**	Control	7	8.9	7	19.5	5	0.24	2	8.6			
	1.5		8.9		19.7		0.21		8.6			
Date: 1/28/10	3		8.9		19.3		0.21		8.6			
WQ Time: 1430	6		9.0		19.5		0.21		8.6			
Technician: VH	12		8.8		19.7		0.21		8.6			
	24		8.9		19.6		0.21		8.6			
48 hours	Control											
Date:												
WQ Time:												
Technician:												

Start Time:	1430 VH		
End Time:	1605 DA		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2244	Age:	<24 hr.

Dilution Water Batch:	DMW 404
Hobo Temp. No.:	N/A
Test Location:	Rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

① JE 1/28/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	WER Rangefinder
Client Sample ID:	Copper in DMW
Weston Test ID:	~~N/A~~ am Copper in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	N/A
Date Test Started:	1/26/10
Date Test Ended:	1/28/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	7	—	7	—	5	—	2	—			
Date: 1/26/10	48		8.5		20.6		0.20		8.5			
Sample ID:												
Dilutions (Tech): AM												
WQ Time: 1500												
Technician: VH												
48 **~~24~~ hours** ① am	~~Control~~	7	—	7	—	5	—	2	—			
	48		9.0		19.6		0.21		8.6			
Date: 1/28/10												
WQ Time: 1430												
Technician: VH												
48 hours	Control											
Date:												
WQ Time:												
Technician:												

Start Time:	1430 VH	
End Time:	1605 JA	
Supplier:	Aquatic Biosystems	
Organism Batch:	ABS 2244	Age: < 24 hR.

①JE 1/28/10 am

Dilution Water Batch:	DMW 404
Hobo Temp. No.:	N/A
Test Location:	Rm 3
Test Acceptability:	✓ ≥ 90% Survival in Control

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
~~N/A~~ ②am Copper in DMW	City of San Diego	Copper in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 1/27/10		Date: 1/28/10	
		Time: 1320		Time: 1605	
		Technician: am		Technician: EA	
		# Alive	# Dead	# Alive	# Dead
Control	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
1.5	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
3	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
6	1	6 ①am	0	5	1
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
12	1	5	0	5	0
	2	2	3	2	0
	3	2	3	1	1
	4	4	1	3	1
24	1	0	5	—	—
	2	0	5	—	—
	3	0	5	—	—
	4	0	5	—	—

① extra found 1/27/10 am
② EE 1/28/10 am

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
~~N/A~~ Oan Copper in DMW	City of San Diego	Copper in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 1/27/10 Time: 1320 Technician: Oan		48 Hours Date: 1/28/10 Time: 1605 Technician: DA	
		# Alive	# Dead	# Alive	# Dead
48 ~~Control~~	1	0	5	—	—
	2	0	5	—	—
	3	0	5	—	—
	4	0	5	—	—
~~48~~ ① DA	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

① IE 1/28/10 DA
② IE 1/28/10

Acute Daphnid-48 Hr Survival

Start Date:	1/26/2010 15:50	Test ID:	Copper	Sample ID:	Chollas
End Date:	1/28/2010 16:30	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	Copper Spiking
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:	WER Rangefinder				

Conc-ppb	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
6	1.0000	1.0000	1.0000	0.8000
12	1.0000	0.8000	1.0000	1.0000
24	1.0000	1.0000	1.0000	1.0000
48	0.8000	1.0000	1.0000	1.0000
96	1.0000	1.0000	0.8000	1.0000
192	0.0000	0.0000	0.0000	0.0000
384	0.0000	0.0000	0.0000	0.0000

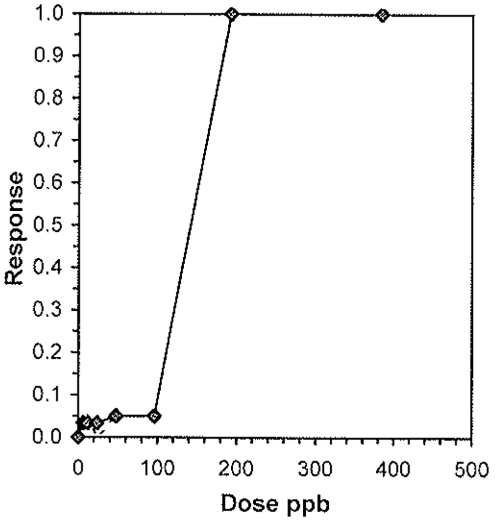
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	1.0000
6	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9667	0.9667
12	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9667	0.9667
24	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	0.9667	0.9667
48	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.9500
96	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.9500
192	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000
384	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.66392	0.884	-1.5103	0.921
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	96	192	135.765	

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	96.00	33.04	0.00	102.21	-0.8660
IC10	101.05	17.77	5.64	106.93	-2.3258
IC15	106.11	5.92	89.94	111.66	-6.2912
IC20	111.16	3.39	95.94	116.38	-1.0903
IC25	116.21	3.18	101.94	121.11	-1.0903
IC40	131.37	2.55	119.96	135.29	-1.0903
IC50	141.47	2.12	131.96	144.74	-1.0903



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Chollas
Start Date: 1/26/2010 15:50 End Date: 1/28/2010 16:30

Test ID: Copper
Protocol: EPAA 02-EPA Acute
Sample Type: Copper Spiking
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5		5			
	2	2	Control	5		5			
	3	3	Control	5		5			
	4	4	Control	5		5			
	5	1	6.000	5		5			
	6	2	6.000	5		5			
	7	3	6.000	5		5			
	8	4	6.000	5		4			
	9	1	12.000	5		5			
	10	2	12.000	5		4			
	11	3	12.000	5		5			
	12	4	12.000	5		5			
	13	1	24.000	5		5			
	14	2	24.000	5		5			
	15	3	24.000	5		5			
	16	4	24.000	5		5			
	17	1	48.000	5		4			
	18	2	48.000	5		5			
	19	3	48.000	5		5			
	20	4	48.000	5		5			
	21	1	96.000	6		6			
	22	2	96.000	5		5			
	23	3	96.000	5		4			
	24	4	96.000	5		5			
	25	1	192.000	5		0			
	26	2	192.000	5		0			
	27	3	192.000	5		0			
	28	4	192.000	5		0			
	29	1	384.000	5		0			
	30	2	384.000	5		0			
	31	3	384.000	5		0			
	32	4	384.000	5		0			

Comments: WER Rangefinder

Reviewed by: _______

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	WER Rangefinder
Client Sample ID:	Copper in Chollas
Weston Test ID:	② ~~Copper in Chollas~~ C100119.09
Species:	*Ceriodaphnia dubia*

Date Received:	1/19/10
Date Test Started:	1/26/10
Date Test Ended:	1/28/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C) ①VH	Meter #	Cond. (mS/cm) ①VH	Meter #	pH ①VH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	7	①VH ~~7.9~~ 8.4	7	~~20.6~~ 20.9	5	~~0.14~~ 0.21	2	~~7.9~~ 8.6			
Date: 1/26/10	6		7.9		20.6		0.14		7.9			
Sample ID: C100119.09	12		7.8		20.7		0.13		7.3			
Dilutions (Tech): AM	24		7.6		20.7		0.13		7.2			
WQ Time: 1620	48		7.8		20.5		0.13		7.2			
Technician: VH	96		7.7		20.5		0.13		7.1			
② ~~**24 hours**~~ 48	Control	7	8.9	7	19.5	5	0.24	2	8.6			
	6		8.5		19.2		0.14		7.6			
Date: 1/28/10	12		8.4		19.2		0.14		7.6			
WQ Time: 1430	24		8.2		19.3		0.14		7.5			
Technician: VH	48		8.5		19.3		0.14		7.6			
	96		8.3		19.4		0.13		7.5			
48 hours	Control											
Date:												
WQ Time:												
Technician:												

Start Time:	1550 VH		
End Time:	1630 am		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2244	Age:	<24 hrs

Dilution Water Batch:	~~DMW 404~~ ②am CCSD8(i)
Hobo Temp. No.:	N/A
Test Location:	Rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

①WP 1/26/10 VH
②IE 1/26/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	WER Rangefinders
Client Sample ID:	Copper in Chollas
Weston Test ID:	C100119.09
Species:	*Ceriodaphnia dubia*

Date Received:	1/19/10
Date Test Started:	1/26/10
Date Test Ended:	1/28/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	7	—	7	—	5	—	2	—			
Date: 1/26/10	192		7.8		20.8		0.13		7.1			
Sample ID C100119.09	384		7.8		20.6		0.13		7.1			
Dilutions (Tech): AM												
WQ Time: 1620												
Technician: VH												
24 hours	~~Control~~	7	—	7	—	5	—	2	—			
	192		8.4		19.5		0.14		7.5			
Date: 1/28/10	384		8.1		19.6		0.13		7.5			
WQ Time: 1430												
Technician: VH												
48 hours	Control											
Date:												
WQ Time:												
Technician:												

Start Time:	1550 VH		
End Time:	1630 am		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2244	Age:	<24 hr.

Dilution Water Batch:	am ~~DMW 404~~ CCSD8(1)
Hobo Temp. No.:	N/A
Test Location:	Rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

OIE 1/28/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100119.09	City of SD	Copper in Chollas

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 1/27/10 Time: 1340 Technician: am		48 Hours Date: 1/28/10 Time: 1630 Technician: am	
		# Alive	# Dead	# Alive	# Dead
Control	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
6	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	4	0 (NB)	4	0
12	1	5	0	5	0
	2	4	0 (NB)	② am ~~3~~ 4	0 ~~(NB)~~ ② am
	3	5	0	5	0
	4	5	0	5	0
24	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
48	1	4	0 (NB)	4	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
96	1	6 ① am	0	6	0
	2	5	0	5	0
	3	4	0 (NB)	4	0
	4	5	0	5	0

① extra found 1/27/10 am ② IE 1/28/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100119.09	City of SD	Copper in Chollas

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 1/27/10		Date: 1/28/10	
		Time: 1340		Time: 1630	
		Technician: am		Technician: am	
		# Alive	# Dead	# Alive	# Dead
~~Control~~	1				
	2				
	3				
	4				
192	1	0	2 (3NB)		
	2	0	2 (3NB)		
	3	0	2 (3NB)		
	4	0	0 (5NB)		
384	1	0	0 (5NB)		
	2	0	0 (5NB)		
	3	0	1 (4NB)		
	4	0	0 (5NB)		
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

Acute Daphnid-48 Hr Survival

Start Date:	1/26/2010 15:00	Test ID:	Zinc	Sample ID:	DMW
End Date:	1/28/2010 15:45	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	Zinc Spiking
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia

Comments: WER Rangefinder

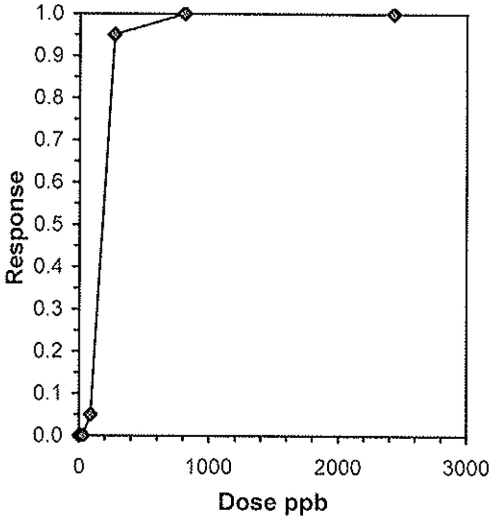
Conc-ppb	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000
30	1.0000	1.0000	1.0000	1.0000
90	1.0000	0.8000	1.0000	1.0000
270	0.2000	0.0000	0.0000	0.0000
810	0.0000	0.0000	0.0000	0.0000
2430	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
30	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
90	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.9500
*270	0.0500	0.0500	0.0500	0.0000	0.2000	200.000	4	10.00	10.00	0.0500	0.0500
810	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000
2430	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.81129	0.868	2.3E-15	4.06699
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	90	270	155.885	

			Linear Interpolation (200 Resamples)		
Point	ppb	SD	95% CL(Exp)		Skew
IC05	90.00	16.47	26.00	106.00	-1.0030
IC10	100.00	9.70	52.00	116.00	-1.3302
IC15	110.00	8.00	78.00	126.00	-0.7243
IC20	120.00	7.55	90.00	136.00	-0.6978
IC25	130.00	7.15	102.00	146.00	-0.6612
IC40	160.00	6.29	138.00	176.00	-0.4613
IC50	180.00	6.07	162.00	198.00	-0.2395



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: DMW
Start Date: 1/26/2010 15:00 End Date: 1/28/2010 15:45

Test ID: Zinc
Protocol: EPAA 02-EPA Acute
Sample Type: Zinc Spiking
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5		5			
	2	2	Control	5		5			
	3	3	Control	5		5			
	4	4	Control	5		5			
	5	1	10.000	5		5			
	6	2	10.000	5		5			
	7	3	10.000	5		5			
	8	4	10.000	5		5			
	9	1	30.000	5		5			
	10	2	30.000	5		5			
	11	3	30.000	5		5			
	12	4	30.000	5		5			
	13	1	90.000	5		5			
	14	2	90.000	5		4			
	15	3	90.000	5		5			
	16	4	90.000	5		5			
	17	1	270.000	5		1			
	18	2	270.000	5		0			
	19	3	270.000	5		0			
	20	4	270.000	5		0			
	21	1	810.000	5		0			
	22	2	810.000	5		0			
	23	3	810.000	5		0			
	24	4	810.000	5		0			
	25	1	2430.000	5		0			
	26	2	2430.000	5		0			
	27	3	2430.000	5		0			
	28	4	2430.000	5		0			

Comments: WER Rangefinder

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	WER Rangefinder
Client Sample ID:	Zinc in DMW
Weston Test ID:	Zinc in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	N/A
Date Test Started:	1/26/10
Date Test Ended:	1/28/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	7	8.5	7	20.4	5	0.20	2	8.5			
Date: 1/26/10	10		8.4		20.8		0.21		8.5			
Sample ID:	30		8.5		20.7		0.20		8.5			
Dilutions (Tech): AM	90		8.6		20.7		0.20		8.5			
WQ Time: 1510	270		8.4		21.0		0.20		8.4			
Technician: VH	810		8.4		20.9		0.21		8.2			
① **24 hours** 48	Control	7	9.1	7	19.2	5	0.21	2	8.5			
	10		8.9		19.4		0.21		8.6			
Date: 1/28/10	30		8.9		19.6		0.21		8.6			
WQ Time: 1440	90		8.9		19.3		0.21		8.5			
Technician: VH	270		8.9		19.5		0.20		8.5			
	810		8.9		19.3		0.22		8.3			
48 hours	Control											
Date:												
WQ Time:												
Technician:												

Start Time:	1500 DS
End Time:	1545 DA
Supplier:	Aquatic Biosystems
Organism Batch:	ABS 2244 Age: <24 hrs.

Dilution Water Batch:	DMW 404
Hobo Temp. No.:	N/A
Test Location:	Rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

① JE 1/28/10 am

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	WER rangefinder
Client Sample ID:	Zinc in DMW
Weston Test ID:	Zinc in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	N/A
Date Test Started:	1/26/10
Date Test Ended:	1/28/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	7	—	7	—	5	—	2	—			
Date: 1/26/10	2,430		8.4		20.9		0.22		7.9			
Sample ID:												
Dilutions (Tech): AM												
WQ Time: 1510												
Technician: VH												
48 ~~24~~ hours ①	~~Control~~	7	—	7	—	5	—	2	—			
	2,430		9.0		19.5		0.21		8.4			
Date: 1/28/10												
WQ Time: 1440												
Technician: VH												
48 hours	Control											
Date:												
WQ Time:												
Technician:												

Start Time:	1500 DS	
End Time:	1545 DS	
Supplier:	Aquatic Biosystems	
Organism Batch:	ABS 2244	Age: <24 hrs.

Dilution Water Batch:	DMW 404
Hobo Temp. No.:	N/A
Test Location:	Rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

① IE 1/28/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
Zinc in DMW	City of SD	Zinc in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 1/27/10		Date: 1/28/10	
		Time: 1420		Time: 1545	
		Technician: am		Technician: SA	
		# Alive	# Dead	# Alive	# Dead
Control	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
10	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
30	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
90	1	5	0	5	0
	2	5	0	4	1
	3	5	0	5	0
	4	5	0	5	0
270	1	2	3	1	1
	2	~~4~~ 2	①am ~~1~~ 3	0	2
	3	4	1	0	4
	4	3	2	0	3
810	1	0	5	—	—
	2	0	5	—	—
	3	0	5	—	—
	4	0	5	—	—

① WC 1/27/10 am

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
Zinc in DMW	City of SD	Zinc in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 1/27/10 Time: 1420 Technician:		48 Hours Date: 1/28/10 Time: 1545 Technician:	
		# Alive	# Dead	# Alive	# Dead
~~Control~~	1				
	2				
	3				
	4				
2,430	1	0	5	—	—
	2	0	5	—	—
	3	0	5	—	—
	4	0	5	—	—
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

Acute Daphnid-48 Hr Survival

Start Date:	1/26/2010 16:00	Test ID:	Zinc	Sample ID:	Chollas
End Date:	1/28/2010 16:25	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	Zinc Spiking
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:	WER Rangefinder				

Conc-ppb	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000
40	1.0000	1.0000	1.0000	1.0000
160	1.0000	1.0000	0.6000	1.0000
640	0.0000	0.0000	0.0000	0.0000
2560	0.0000	0.0000	0.0000	0.0000
10240	0.0000	0.0000	0.0000	0.0000

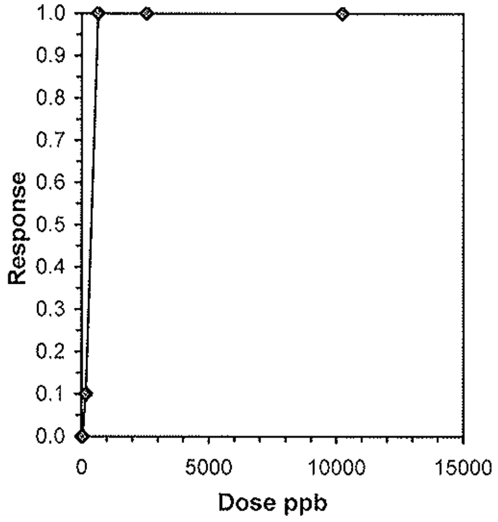
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
40	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
160	0.9000	0.9000	0.9000	0.6000	1.0000	22.222	4	16.00	10.00	0.9000	0.9000
640	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000
2560	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000
10240	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.56485	0.844	-2.5555	9.36813
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	160	640	320	

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	100.00	47.99	51.60	234.40	0.3759
IC10	160.00	42.81	63.20	236.80	-0.4085
IC15	186.67	41.08	94.80	259.20	-0.4664
IC20	213.33	39.44	126.40	281.60	-0.5550
IC25	240.00	37.90	158.00	304.00	-0.6837
IC40	320.00	32.20	253.94	371.20	-1.1473
IC50	373.33	26.83	318.29	416.00	-1.1473



ToxCalc v5.0.23

Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Chollas
Start Date: 1/26/2010 16:00 End Date: 1/28/2010 16:25

Test ID: Zinc
Protocol: EPAA 02-EPA Acute
Sample Type: Zinc Spiking
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5		5			
	2	2	Control	5		5			
	3	3	Control	5		5			
	4	4	Control	5		5			
	5	1	10.000	5		5			
	6	2	10.000	5		5			
	7	3	10.000	5		5			
	8	4	10.000	5		5			
	9	1	40.000	5		5			
	10	2	40.000	5		5			
	11	3	40.000	5		5			
	12	4	40.000	5		5			
	13	1	160.000	5		5			
	14	2	160.000	5		5			
	15	3	160.000	5		3			
	16	4	160.000	5		5			
	17	1	640.000	5		0			
	18	2	640.000	5		0			
	19	3	640.000	5		0			
	20	4	640.000	5		0			
	21	1	2560.000	5		0			
	22	2	2560.000	5		0			
	23	3	2560.000	5		0			
	24	4	2560.000	5		0			
	25	1	10240.000	5		0			
	26	2	10240.000	5		0			
	27	3	10240.000	5		0			
	28	4	10240.000	5		0			

Comments: WER Rangefinder

Reviewed by:

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	WER Rangefinder
Client Sample ID:	Zinc in Chollas
Weston Test ID:	C100119.09
Species:	*Ceriodaphnia dubia*

Date Received:	1/19/10
Date Test Started:	1/26/10
Date Test Ended:	1/28/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	7	8.5	7	20.4	5	0.20	2	8.5			
Date: 1/26/10	10		7.6		20.2		0.13		7.2			
Sample ID: C100119.09	40		7.6		20.4		0.13		7.1			
Dilutions (Tech): AM	160		7.9		20.5		0.13		7.0			
WQ Time: 1630	640		7.6		21.0		0.14		6.9			
Technician: VH	2,560		7.8		21.1		0.15		6.7			
② am **~~24~~ hours** 48	Control	7	9.1	7	19.2	5	0.21	2	8.5			
	10		8.6		19.2		0.14		8.3			
Date: 1/28/10	40		8.5		19.4		0.14		8.1			
WQ Time: 1440	160		8.3		19.5		0.16		8.0			
Technician: VH	640		8.1		19.1		0.14		7.7			
	2,560		8.5		19.1		0.15		7.4			
48 hours	Control											
Date:												
WQ Time:												
Technician:												

Start Time:	①VH 1600 ~~VH~~ DS		
End Time:	1625 DA		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2244	Age:	≥24 hrs.

Dilution Water Batch:	CCSD8 (1)
Hobo Temp. No.:	N/A
Test Location:	Rm 3
Test Acceptability:	✓ ≥ 90% Survival in Control

① IE 1/26/10 VH
② IE 1/28/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	WER Rangefinder
Client Sample ID:	Zinc in Chollas
Weston Test ID:	C100119.09
Species:	*Ceriodaphnia dubia*

Date Received:	1/19/10
Date Test Started:	1/26/10
Date Test Ended:	1/28/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours) Date: 1/26/10 Sample ID: C100119.09 Dilutions (Tech): AM WQ Time: 1630 Technician: VH	~~Control~~	7	—	7	—	5	—	2	—			
	10,240		7.9		21.1		0.20		6.5			
①② **~~24~~ 48 hours** Date: 1/28/10 WQ Time: 1440 Technician: VH	~~Control~~	7	—	7	—	5	—	2	—			
	10,240		8.4		19.3		0.20		7.1			
48 hours Date: WQ Time: Technician:	Control											

① VH

Start Time:	1600 ~~VH~~ DS
End Time:	1625 DA
Supplier:	Aquatic Biosystems
Organism Batch:	ABS2244 Age: <24 hrs.

①IE 1/26/10 VH
②JE 1/28/10 cam

Dilution Water Batch:	CCSD8(i)
Hobo Temp. No.:	N/A
Test Location:	Rm3
Test Acceptability:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100119.09	City of SD	Zinc in Chollas

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 1/27/10		Date: 1/28/10	
		Time: 1435		Time: 1625	
		Technician: am		Technician: DA	
		# Alive	# Dead	# Alive	# Dead
Control	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
10	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
40	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
160	1	5	0	5	0
	2	4	0 (NB)	5 ① DA	0
	3	4	0 (NB)	3	0 (1NB)
	4	5	0	5	0
646	1	1	2 (2NB)	0	1
	2	3	0 (2NB)	0	1 (2NB)
	3	0	4 (NB)	—	—
	4	2	1 (2NB)	0	0 (2NB)
2,560	1	0	1 (4NB)	—	—
	2	0	1 (4NB)	—	—
	3	0	1 (4NB)	—	—
	4	0	0 (5NB)	—	—

① Found body. 1/28/10 DA

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100119.09	City of SD	Zinc in Chollas

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 1/28/10 Time: 1435 Technician: am		48 Hours Date: 1/28/10 Time: 1625 Technician: [illegible]	
		# Alive	# Dead	# Alive	# Dead
~~Control~~	1				
	2				
	3				
	4				
10,240	1	0	1 (4NB)	—	—
	2	0	1 (4NB)	—	—
	3	0	1 (4NB)	—	—
	4	0	2 (3NB)	—	—
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

WESTON SOLUTIONS

☒ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

30500

DATE 1/19/10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: Chollas Creek WER / 06754.090.008.0005
PROJECT MANAGER / CONTACT: Dave Renfrew
COMPANY / CLIENT:
ADDRESS:
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED								PRESERVED HOW	FOR WESTON USE ONLY	
							C. dubia 48 hr.	acute Rangefinder Test								SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
CC-SD 8(1) Comp	CC-SD 8(1) Comp.	1/18/10	2100	SW	10L/G	4	X	~~X~~							ICE		

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ______

Container Code: [✓ G=glass] P=plastic B=bags ☐ O=other ______

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☒ Client drop off ☐ Other ______

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day [✓ ☐ Standard] ☐ Other ______

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other ______

SAMPLED BY: PRINT B. Isham, P. Renfrew SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS
Rangefinder Test for Chollas WER.

	RELINQUISHED BY				RECEIVED BY			
	Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1.	Garth Engelhorn		Weston	1-19-10 1110	V. Hayes		Weston	1/19/10 1100
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of SD		**Project:** Chollas Creek WER	
Weston Sample ID:	C100119.09a	C100119.09b	C100119.09c
Client Sample ID:	CC-SD8(1)Comp	—	→
Renewal Sample (Y/N):	N	N	N
Date/Time Received:	1/19/10 1100	—	→
Airbill #:	N/A	—	→
Sample Tracking Information Kept for Records: (Y/N)	Y	—	→
Collection Date/Time:	1/18/10 2100	—	→
Condition of Shipping Container:	N/A	—	→
Type and Capacity of Sample Container:	10L glass	—	→
Total Sample Volume (L):	10L	10L	10L
Condition of Sampling Container:	good	good	good
Sample Container Appropriate: (Y/N)	Y	Y	Y
Custody Seals Intact: (Y/N)	N/A	—	→
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	Y
Sampler's Name Present on COC Form: (Y/N)	Y	Y	Y

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	[✓ Conductivity] ~~(mS/cm)~~ or Salinity (ppt)	Hardness (mg CaCO$_3$/L)	Alkalinity (mg CaCO$_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH$_3$/L)	Tech
C100119.09a	13.5	11.6	8.2	0.13	40	26	0.04		am
↓ .09b	12.2	11.6	8.2	0.12	40	24	0.01		am
↓ .09c	12.1	11.3	8.1	0.13	40	24	0.00		am

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

Definitive WER Event 1

2/28/2010

Acute Daphnid-48 Hr Survival

Start Date:	2/28/2010	Test ID:	DMW	Sample ID:	Cu in DMW
End Date:	3/2/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
3	0.8000	1.0000	1.0000	1.0000
1	1.0000	1.0000	1.0000	1.0000
2	1.0000	1.0000	1.0000	1.0000
4	0.2000	0.0000	0.2000	0.0000
9	0.0000	0.0000	0.0000	0.0000
23	0.0000	0.0000	0.0000	0.0000

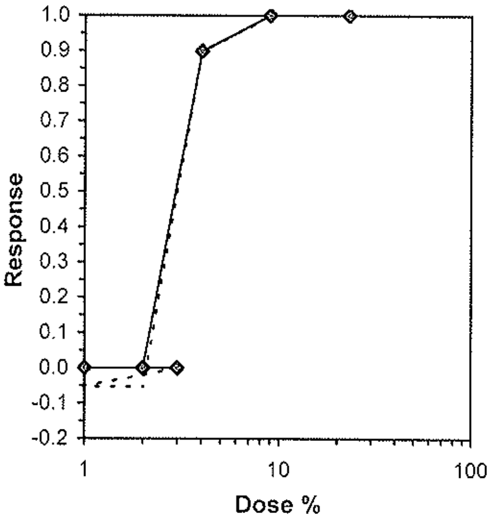
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
3	0.9500	1.0000	0.9500	0.8000	1.0000	10.526	4			0.9500	0.0000
1	1.0000	1.0526	1.0000	1.0000	1.0000	0.000	4	20.00	10.00	1.0000	-0.0526
2	1.0000	1.0526	1.0000	1.0000	1.0000	0.000	4	20.00	10.00	1.0000	-0.0526
*4	0.1000	0.1053	0.1000	0.0000	0.2000	115.470	4	10.00	10.00	0.1000	0.8947
9	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
23	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.87117	0.844	-0.717	0.5231
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	2	4	2.82843	50

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	3.0532	2.4324	3.8324
5.0%	2.9732	2.3861	3.7049
10.0%	2.9416	2.5634	3.3757
20.0%	2.9416	2.5835	3.3493
Auto-0.0%	3.0532	2.4324	3.8324



ToxCalc v5.0.23

Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in DMW
Start Date: 2/28/2010   End Date: 3/2/2010

Test ID: DMW
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	3.000	5		4			
	2	2	3.000	5		5			
	3	3	3.000	5		5			
	4	4	3.000	5		5			
	5	1	1.000	5		5			
	6	2	1.000	5		5			
	7	3	1.000	5		5			
	8	4	1.000	5		5			
	9	1	2.000	5		5			
	10	2	2.000	5		5			
	11	3	2.000	5		5			
	12	4	2.000	5		5			
	13	1	4.000	5		1			
	14	2	4.000	5		0			
	15	3	4.000	5		1			
	16	4	4.000	5		0			
	17	1	9.000	5		0			
	18	2	9.000	5		0			
	19	3	9.000	5		0			
	20	4	9.000	5		0			
	21	1	23.000	5		0			
	22	2	23.000	5		0			
	23	3	23.000	5		0			
	24	4	23.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	Cu in DMW
Weston Test ID:	Cu in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	N/A
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	1	7.5	1	20.6	6	0.20	3	7.8			
Date: 2/28/10	1.5		8.1		20.7		0.20		7.8			
Sample ID:	3		8.1		20.7		0.20		7.8			
Dilutions (Tech): AM	6		8.1		20.7		0.20		7.8			
WQ Time: 1705	12		8.1		20.7		0.20		7.8			
Technician: YS	24 / 48		8.2 / 8.2		20.7 / 20.7		0.20 / 0.20		7.9 / 7.9			
24 hours	Control	7	8.3	7	20.0	6	0.20	2	8.0			
	1.5		8.5		19.8		0.20		8.2			
Date: 3/1/10	3		8.5		20.1		0.20		8.2			
WQ Time: 1100	6		8.6		19.9		0.20		8.3			
Technician: YS	12		8.6		19.9		0.20		8.3			
	24 / 48		8.4 / 8.3		19.8 / 20.0		0.20 / 0.20		8.3 / 8.3			
48 hours	Control	1	9.1	1	18.6	5	0.20	2	8.3			
	1.5		9.4		18.5		0.20		8.4			
Date: 3/2/10	3		9.2		18.9		0.20		8.5			
WQ Time: 1300	6		9.4		18.5		0.20		8.5			
Technician: VH	12		9.3		18.5		0.20		8.5			
	24/48		9.4 / 9.3		18.6 / 18.6		0.20 / 0.20		8.5 / 8.5			

Start Time:	1610 am		
End Time:	1500 VH		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2244	Age:	<24 hours

Dilution Water Batch:	DMW 407
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
Cu in DMW	City of San Diego	Cu in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours		
		Date: 3/1/10		Date: 3/2/10		
		Time: 1222		Time: 1500		
		Technician: KS		Technician: VH		
		# Alive	# Dead	# Alive	# Dead	
Control	1	4	1	4	0	
	2	5	0	5	0	
	3	5	0	5	0	
	4	5	0	5	0	
1.5	1	5	0	5	0	100
	2	5	0	5	0	
	3	5	0	5	0	
	4	5	0	5	0	
3	1	5	0	5	0	100
	2	5	0	5	0	
	3	5	0	5	0	
	4	5	0	5	0	
6	1	5	0	5	0	100
	2	5	0	5	0	
	3	5	0	5	0	
	4	5	0	5	0	
12	1	5	0	1	4	10
	2	4	1	0	①VH ~~5~~ 4	
	3	3	2	1	2	
	4	0	5	—	—	
24 / 48	1	0 0	5 5			0/0
	2	0 0	5 5			
	3	0 0	5 5			
	4	0 0	5 5			

① IE 3/2/10 VH

Acute Daphnid-48 Hr Survival

Start Date:	2/28/2010	Test ID:	CCSD8(1)	Sample ID:	Cu in CCSD8(1)
End Date:	3/2/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
7	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000
26	0.8000	1.0000	1.0000	1.0000
42	0.8000	1.0000	0.8000	1.0000
61	0.8000	1.0000	0.8000	0.8000
95	0.0000	0.0000	0.0000	0.0000
160	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
7	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
12	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
26	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
42	0.9000	0.9000	0.9000	0.8000	1.0000	12.830	4	14.00	10.00	0.9000	0.1000
61	0.8500	0.8500	0.8500	0.8000	1.0000	11.765	4	12.00	10.00	0.8500	0.1500
95	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
160	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

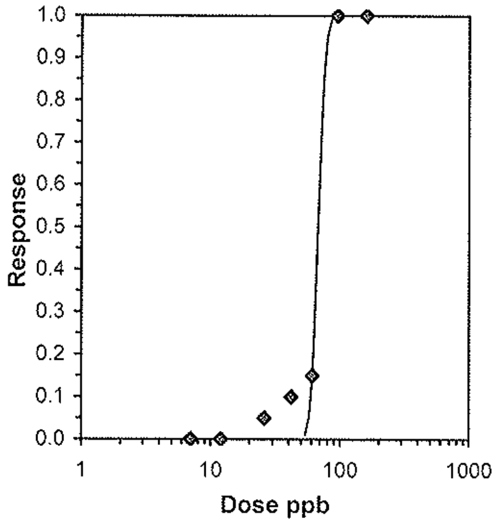
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95228	0.868	0	0.24216
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	61	95	76.1249	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	23.217	205.519	-379.6	426.034	0	6.43784	11.0705	0.27	1.82997	0.04307	13
Intercept	-37.486	366.92	-756.65	681.678							
TSCR											

Point	Probits	ppb	95% Fiducial Limits
EC01	2.674	53.6748	
EC05	3.355	57.428	
EC10	3.718	59.5349	
EC15	3.964	60.9999	
EC20	4.158	62.1899	
EC25	4.326	63.2294	
EC40	4.747	65.9262	
EC50	5.000	67.6037	
EC60	5.253	69.3238	
EC75	5.674	72.2807	
EC80	5.842	73.4887	
EC85	6.036	74.9224	
EC90	6.282	76.7661	
EC95	6.645	79.5825	
EC99	7.326	85.1473	



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in CCSD8(1)
Start Date: 2/28/2010 End Date: 3/2/2010

Test ID: CCSD8(1)
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	7.000	5		5			
	2	2	7.000	5		5			
	3	3	7.000	5		5			
	4	4	7.000	5		5			
	5	1	12.000	5		5			
	6	2	12.000	5		5			
	7	3	12.000	5		5			
	8	4	12.000	5		5			
	9	1	26.000	5		4			
	10	2	26.000	5		5			
	11	3	26.000	5		5			
	12	4	26.000	5		5			
	13	1	42.000	5		4			
	14	2	42.000	5		5			
	15	3	42.000	5		4			
	16	4	42.000	5		5			
	17	1	61.000	5		4			
	18	2	61.000	5		5			
	19	3	61.000	5		4			
	20	4	61.000	5		4			
	21	1	95.000	5		0			
	22	2	95.000	5		0			
	23	3	95.000	5		0			
	24	4	95.000	5		0			
	25	1	160.000	5		0			
	26	2	160.000	5		0			
	27	3	160.000	5		0			
	28	4	160.000	5		0			

Comments:

Reviewed by: BA

Item 10
Supporting Document No. 2
December 14, 2016

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Cholla WER Study
Client Sample ID:	~~CCSD8(1)~~ am Cu in CCSD8(1)
Weston Test ID:	C100228.0723
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A.margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	1	7.5	1	20.6	6	0.20	3	7.8			
Date: 2/28/10	6		9.6		19.2		0.18		7.1			
Sample ID C100228.07	10.8		9.7		19.2		0.18		7.1			
Dilutions (Tech) AM	19.4		9.7		19.2		0.18		7.1			
WQ Time: 1720	35		9.7		19.2		0.18		7.1			
Technician: KS	63		9.4		19.1		0.18		7.0			
24 hours	Control	7	8.3	7	20.0	6	0.20	2	8.0			
	6		7.8		20.1		0.18		7.5			
Date: 3/1/10	10.8		7.6		20.6		0.18		7.4			
WQ Time: 1114	19.4		7.6		20.6		0.18		7.4			
Technician: KS	35		7.6		20.6		0.18		7.4			
	63		7.7		20.1		0.18		7.4			
48 hours	Control	1	9.1	1	18.6	5	0.20	2	8.3			
	6		9.1		18.5		0.18		7.9			
Date: 3/2/10	10.8		8.5		18.7		0.18		7.8			
WQ Time: 1330	19.4		8.5		18.7		0.18		7.8			
Technician: VH	35		8.3		18.9		0.18		7.8			
	63		8.3		18.6		0.18		7.8			

Start Time:	1640 am		
End Time:	1550 VH		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS2244	Age:	<24 hours

Dilution Water Batch:	~~A~~ am CCSD8(1)
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

DJE 2/28/10 am

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	SD8(1) Cu
Weston Test ID:	C1002280723
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	1	—	1	—	6	—	3	—			
Date: 2/28/10	113.4		9.8		19.2		0.18		7.0			
Sample ID: C100228.07	204.1		9.7		19.2		0.18		7.0			
Dilutions (Tech): AM	367.3		9.9		19.2		0.18		7.0			
WQ Time: 1720												
Technician: KS												
24 hours	~~Control~~	7	—	7	—	6	—	2	—			
	113.4		7.6		20.1		0.18		7.4			
Date: 3/1/10	204.1		7.8		19.9		0.18		7.4			
WQ Time: 1114	367.3		7.8		20.5		0.18		7.3			
Technician: KS												
48 hours	~~Control~~	1	—	1	—	5	—	2	—			
	113.4		8.3		18.5		0.18		7.7			
Date: 3/2/10	204.1		8.5		18.6		0.18		7.7			
WQ Time: 1330	367.3		8.3		18.9		0.18		7.7			
Technician: VH												

Start Time:	1640 AM		
End Time:	1550 VH		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS2244	Age:	<24 hours

Dilution Water Batch:	CCSD8(1)
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptability:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100228.0723	City of San Diego	~~SDB(1)~~①cm Cu in CCSD8(1))

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 3/1/10 Time: 1333 Technician: KS		48 Hours Date: 3/2/10 Time: 1550 Technician: VH		
		# Alive	# Dead	# Alive	# Dead	
Control	1	4	1	4	0	95
	2	5	0	5	0	
	3	5	0	5	0	
	4	5	0	5	0	
6	1	5	0	5	0	100
	2	5	0	5	0	
	3	5	0	5	0	
	4	5	0	5	0	
10.8	1	5	0	5	0	85
	2	5	0	3	1(INB)	
	3	5	0	4	1	
	4	5	0	5	0	
19.4	1	4	1NB	4	0	80
	2	4	1NB	4	0	
	3	4	1NB	4	0	
	4	5	0	4	1NB	
35	1	4	1NB	4	0	95
	2	5	0	5	0	
	3	5	0	5	0	
	4	4	1NB	5	1FB	
63	1	4	1NB	4	0	90
	2	4	1NB	5	1FB	
	3	4	1NB	4	0	
	4	4	1NB	5	1FB	

① JE 2/28/10 cm

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100228.0723	City of San Diego	~~SD8(1)~~ ① am Cu in (CSD8(1))

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours		
		Date: 3/1/10		Date: 3/2/10		
		Time: 1333		Time: 3/2/10		
		Technician: VS		Technician: VH		
		# Alive	# Dead	# Alive	# Dead	
Control	1					
	2					
	3					
	4					
113.4	1	3	2NB	4	1FB	
	2	4	1NB	5	1FB	85
	3	3	2NB	4	1FB	
	4	3	2NB	4	1FB	
204.1	1	0	2 (3NB)	—	—	
	2	0	5NB	—	—	
	3	0	1 (4NB)	—	—	0
	4	0	2 (3NB)	—	—	
367.3	1	0	2(3NB)	—	—	
	2	0	2(3NB)	—	—	0
	3	0	5NB	—	—	
	4	0	5NB	—	—	
	1					
	2					
	3					
	4					
	1					
	2					
	3					
	4					

① IF 2/28/10 am

Acute Daphnid-48 Hr Survival

Start Date:	2/28/2010	Test ID:	DPR2	Sample ID:	Cu in DPR2
End Date:	3/2/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
3	1.0000	1.0000	1.0000	1.0000
11	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	0.6000	1.0000
43	1.0000	1.0000	1.0000	1.0000
70	1.0000	1.0000	1.0000	1.0000
108	0.0000	0.0000	0.0000	0.0000
168	0.0000	0.0000	0.0000	0.0000

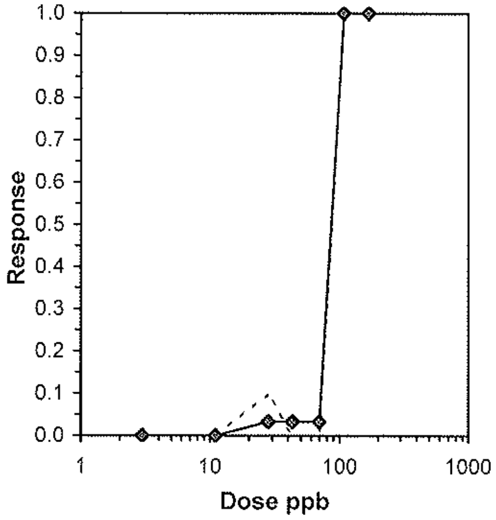
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
3	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
11	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
28	0.9000	0.9000	0.9000	0.6000	1.0000	22.222	4	16.00	10.00	0.9000	0.1000
43	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
70	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
108	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
168	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.5089	0.868	-2.7962	11.6732
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	70	108	86.9483	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	82.432	69.613	97.611
5.0%	86.301	82.780	89.971
10.0%	86.301	82.780	89.971
20.0%	86.301	82.780	89.971
Auto-0.0%	82.432	69.613	97.611



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in DPR2
Start Date: 2/28/2010 End Date: 3/2/2010

Test ID: DPR2
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	3.000	5		5			
	2	2	3.000	5		5			
	3	3	3.000	5		5			
	4	4	3.000	5		5			
	5	1	11.000	5		5			
	6	2	11.000	5		5			
	7	3	11.000	5		5			
	8	4	11.000	5		5			
	9	1	28.000	5		5			
	10	2	28.000	5		5			
	11	3	28.000	5		3			
	12	4	28.000	5		5			
	13	1	43.000	5		5			
	14	2	43.000	5		5			
	15	3	43.000	5		5			
	16	4	43.000	5		5			
	17	1	70.000	5		5			
	18	2	70.000	5		5			
	19	3	70.000	5		5			
	20	4	70.000	5		5			
	21	1	108.000	5		0			
	22	2	108.000	5		0			
	23	3	108.000	5		0			
	24	4	108.000	5		0			
	25	1	168.000	5		0			
	26	2	168.000	5		0			
	27	3	168.000	5		0			
	28	4	168.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	~~DPR20~~ Cu in DPR2
Weston Test ID:	C100228.0823
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	1	7.5	1	20.6	6	0.20	3	7.8			
Date: 2/28/10	6		8.7		20.0		0.38		7.3			
Sample ID C100228.08	10.8		9.1		19.7		0.38		7.2			
Dilutions (Tech): AM	19.4		9.3		20.0		0.38		7.2			
WQ Time: 1710	35		9.4		20.2		0.38		7.2			
Technician: YS	63		9.3		20.3		0.38		7.2			
24 hours	Control	7	8.3	7	20.0	6	0.20	2	8.0			
	6		7.8		20.0		0.39		7.7			
Date: 3/1/10	10.8		7.5		20.2		0.39		7.6			
WQ Time: 1106	19.4		7.6		19.9		0.38		7.6			
Technician: YS	35		7.6		19.8		0.39		7.6			
	63		7.5		19.8		0.39		7.6			
48 hours	Control	1	9.1	1	18.6	5	0.20	2	8.3			
	6		8.6		18.8		0.39		8.2			
Date: 3/2/10	10.8		8.6		18.6		0.39		8.1			
WQ Time: 1315	19.4		8.0		18.6		0.39		8.0			
Technician: VH	35		8.5		18.7		0.39		8.0			
	63		8.5		18.6		0.39		7.9			

Start Time:	1630 am		
End Time:	1515 VH		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS2244	Age:	<24 hours

Dilution Water Batch:	DPR2
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptability:	✓ ≥ 90% Survival in Control

① IE 2/28/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	~~DPR 2~~ ② Cu in DPR2
Weston Test ID:	① ks C10228.0823
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	1	—	1	—	6	—	3	—			
Date: 2/28/10	113.4		9.1		20.1		0.38		7.3			
Sample ID: C10022808	204.1		9.6		20.1		0.38		7.3			
Dilutions (Tech): AM	367.3		9.7		20.1		0.38		7.2			
WQ Time: ~~1710~~ ① ks 1710												
Technician: ks												
24 hours	~~Control~~	7	—	7	—	6	—	2	—			
	113.4		7.8		20.6		0.39		7.6			
Date: 3/1/10	204.1		7.6		20.5		0.39		7.6			
WQ Time: 1106	367.3		8.0		20.2		0.39		7.6			
Technician: ks												
48 hours	~~Control~~	1	—	1	—	5	—	2	—			
	113.4		8.5		18.8		0.39		7.9			
Date: 3/2/10	204.1		8.5		18.7		0.39		7.9			
WQ Time: 1315	367.3		8.5		18.6		0.39		7.9			
Technician: VH												

Start Time:	1030 AM		
End Time:	1515 VH		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS2244	Age:	<24 hours

Dilution Water Batch:	DPR2
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptability:	✓ ≥ 90% Survival in Control

① IE 2/28/10 ks

② IE 2/28/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100228.0823	City of San Diego	~~DPR2~~ ①cm Cu in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours		
		Date: 3/1/10		Date: 3/2/10		
		Time: 1243		Time: 1515		
		Technician: YS		Technician: VH		
		# Alive	# Dead	# Alive	# Dead	
Control	1	4	1	4	0	
	2	5	0	5	0	
	3	5	0	5	0	
	4	5	0	5	0	
6	1	5	0	5	0	
	2	5	0	5	0	100
	3	5	0	5	0	
	4	5	0	5	0	
10.8	1	5	0	5	0	
	2	5	0	5	0	100
	3	5	0	5	0	
	4	5	0	5	0	
19.4	1	5	0	5	0	
	2	5	0	5	0	100
	3	5	0	5	0	
	4	5	0	5	0	
35	1	5	0	5	0	
	2	5	0	5	0	97
	3	3	2 NB	3	0	
	4	5	0	5	0	
63	1	5	0	5	0	
	2	5	0	5	0	100
	3	5	0	5	0	
	4	5	0	5	0	

① IE 2/28/10 cm

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100228.0823	City of San Diego	~~DPR 2~~ ②am Cu in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 3/1/10		Date: 3/2/10	
		Time: 1243		Time: 1515	
		Technician: KS		Technician: VH	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
113.4	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	4	1NB ~~AMB~~ ①KS	5	1FB
204.1	1	0	5NB	—	—
	2	0	5NB	—	—
	3	0	1 (4NB)	—	—
	4	0	5NB	—	—
367.3	1	0	5NB	—	—
	2	0	5NB	—	—
	3	0	5NB	—	—
	4	0	5NB	—	—
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

100

0

0

① IE 3/1/10 KS
② IE 2/28/10 am

Acute Daphnid-48 Hr Survival

Start Date:	2/28/2010	Test ID:	DMW	Sample ID:	Zn in DMW
End Date:	3/2/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
11	0.8000	0.6000	1.0000	0.6000
27	1.0000	1.0000	1.0000	1.0000
62	1.0000	1.0000	0.8000	1.0000
98	1.0000	1.0000	0.8000	0.6000
193	0.4000	0.2000	0.0000	0.2000
342	0.4000	0.4000	0.2000	0.0000
584	0.0000	0.0000	0.0000	0.0000

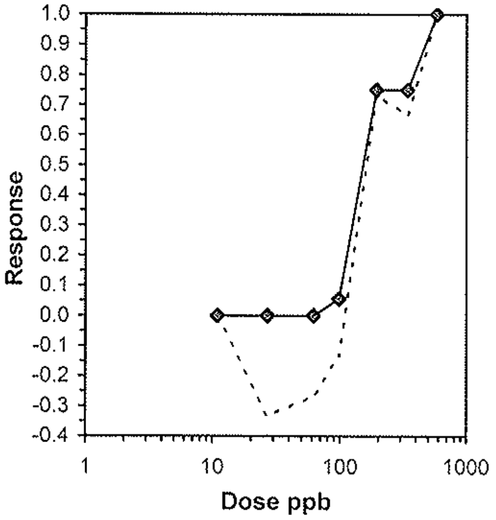
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
11	0.7500	1.0000	0.7500	0.6000	1.0000	25.531	4			0.7500	0.0000
27	1.0000	1.3333	1.0000	1.0000	1.0000	0.000	4	24.00	10.00	1.0000	-0.3333
62	0.9500	1.2667	0.9500	0.8000	1.0000	10.526	4	23.00	10.00	0.9500	-0.2667
98	0.8500	1.1333	0.8500	0.6000	1.0000	22.528	4	20.50	10.00	0.8500	-0.1333
*193	0.2000	0.2667	0.2000	0.0000	0.4000	81.650	4	10.00	10.00	0.2000	0.7333
*342	0.2500	0.3333	0.2500	0.0000	0.4000	76.594	4	10.00	10.00	0.2500	0.6667
584	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94934	0.884	-0.2151	-0.5807
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	98	193	137.528	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	178.92	121.84	262.73
5.0%	176.20	116.93	265.50
10.0%	171.12	109.71	266.89
20.0%	158.99	93.95	269.03
Auto-0.0%	178.92	121.84	262.73



Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Zn in DMW
Start Date: 2/28/2010 End Date: 3/2/2010

Test ID: DMW
Protocol: EPAA 02-EPA Acute
Sample Type: ZNSO-Zinc sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	11.000	5		4			
	2	2	11.000	5		3			
	3	3	11.000	5		5			
	4	4	11.000	5		3			
	5	1	27.000	5		5			
	6	2	27.000	5		5			
	7	3	27.000	5		5			
	8	4	27.000	5		5			
	9	1	62.000	5		5			
	10	2	62.000	5		5			
	11	3	62.000	5		4			
	12	4	62.000	5		5			
	13	1	98.000	5		5			
	14	2	98.000	5		5			
	15	3	98.000	5		4			
	16	4	98.000	5		3			
	17	1	193.000	5		2			
	18	2	193.000	5		1			
	19	3	193.000	5		0			
	20	4	193.000	5		1			
	21	1	342.000	5		2			
	22	2	342.000	5		2			
	23	3	342.000	5		1			
	24	4	342.000	5		0			
	25	1	584.000	5		0			
	26	2	584.000	5		0			
	27	3	584.000	5		0			
	28	4	584.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	Zn in DMW
Weston Test ID:	Zn in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	1	7.1	1	19.5	6	0.20	3	7.8			
Date: 2/28/10	18		7.5		19.6		0.20		7.8			
①VH Sample ID: ~~C100228~~	32		7.5		19.6		0.20		7.8			
Dilutions (Tech): AM	56		7.5		19.6		0.20		7.8			
WQ Time: 1734	100		7.6		19.6		0.20		7.7			
Technician: YS	180		7.6		19.6		0.20		7.4			
24 hours	Control	7	8.0	7	20.7	6	0.20	2	8.2			
	18		8.4		20.4		0.20		8.3			
Date: 3/1/10	32		8.4		20.5		0.20		8.3			
WQ Time: 1126	56		8.2		20.5		0.20		8.3			
Technician: YS	100		8.1		20.6		0.20		8.2			
	180		8.2		20.5		0.20		8.1			
48 hours	Control	1	9.0	1	19.5	5	0.20	2	8.5			
	18		9.0		19.4		0.20		8.4			
Date: 3/2/10	32		8.8		19.3		0.20		8.4			
WQ Time: 1145	56		9.2		19.0		0.20		8.4			
Technician: VH	100		9.3		19.3		0.20		8.3			
	180		9.1		19.2		0.20		8.3			

Start Time:	1650	am	
End Time:	1550	DS	
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS2244	Age:	<24 hours

Dilution Water Batch:	DMW407
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptablility:	②EB ___ ≥ 90% Survival in Control

① WP 2/28/10 VH
② ≥90% survival in 0 criterion not met - survival in 0 was 75% 5/18/11 EB

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	Zn in DMW
Weston Test ID:	Zn in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	1	—	1	—	6	—	3	—			
Date: 2/28/10	320		7.5		19.7		0.20		7.6			
Sample ID:	560		7.5		19.7		0.21		7.2			
Dilutions (Tech): AM	1000		7.6		19.7		0.20		7.4			
WQ Time: 1734												
Technician: KS												
24 hours	~~Control~~	7	—	7	—	6	—	2	—			
	320		8.1		20.5		0.20		8.1			
Date: 3/1/10	560		8.2		20.4		0.21		7.9			
WQ Time: 1126	1000		8.5		20.3		0.21		7.8			
Technician: KS												
			①VH		①VH		①VH		①VH			
48 hours	Control	1	~~9.1~~	1	~~18.9~~	5	~~0~~	2	~~8.2~~			
	320		9.1		18.9		0.20		8.2			
Date: 3/2/10	560		9.1		19.1		0.21		7.9			
WQ Time: 1145	1000		9.1		19.2		0.20		7.9			
Technician: VH												

Start Time:	1650 AM		
End Time:	1550 DS		
Supplier:	Aquatic BioSystems		
Organism Batch:	ABS 2244	Age:	<24 hours

Dilution Water Batch:	DMW 407
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptablility:	② ___ ≥ 90% Survival in Control

① WC 3/2/10 VH

② ≥ 90% survival in Ø criterion not met - survival in Ø was 75% 5/19/11 GB

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: Zn in DMW

Client: City of San Diego

Client Sample ID: Zn in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 3/1/10 Time: 1430 Technician: KS		48 Hours Date: 3/2/10 Time: 1550 Technician: DA		
		# Alive	# Dead	# Alive	# Dead	
Control	1	4	1	4	0	
	2	3	2	3	0	
	3	5	0	5	0	
	4	3	2NB	3	0	
18	1	5	0	5	0	100
	2	5	0	5	0	
	3	5	0	5	0	
	4	5	0	5	0	
32	1	5	0	5	0	95
	2	5	0	5	0	
	3	5	0	4	1NB	
	4	5	0	5	0	
56	1	5	0	5	0	85
	2	5	0	5	0	
	3	4	1	4	0	
	4	5	0	3	2	
100	1	3	2	2	1	20
	2	3	2	1	2	
	3	4	1	0	4	
	4	4	1	1	3	
180	1	4	1	2	2	25
	2	2	3	2	0	
	3	2	3	1	1	
	4	1	4	0	1	

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
Zn in DMW	City of San Diego	Zn in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours		
		Date: 3/1/10		Date: 3/2/10		
		Time: 1430		Time: 1550		
		Technician: KS		Technician: BA		
		# Alive	# Dead	# Alive	# Dead	
Control	1					
	2					
	3					
	4					
320	1	1	4	0	1	
	2	0	5	—	—	0
	3	1	4	0	1	
	4	2	3	0	2	
560	1	0	5	—	—	
	2	0	5	—	—	0
	3	0	5	—	—	
	4	0	5	—	—	
1000	1	0	5	—	—	
	2	0	5	—	—	0
	3	0	5	—	—	
	4	0	5	—	—	
	1					
	2					
	3					
	4					
	1					
	2					
	3					
	4					

Acute Daphnid-48 Hr Survival

Start Date:	2/28/2010	Test ID:	CCSD8(1)	Sample ID:	Zn in CCSD8(1)
End Date:	3/2/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
19	1.0000	1.0000	1.0000	0.8000
121	0.8000	0.4000	0.4000	1.0000
200	0.0000	0.4000	0.4000	0.4000
461	0.0000	0.0000	0.0000	0.0000
884	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed					1-Tailed				
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
19	0.9500	1.0000	0.9500	0.8000	1.0000	10.526	4				0.9500	0.0000
121	0.6500	0.6842	0.6500	0.4000	1.0000	46.154	4	1.964	2.180	0.3330	0.6500	0.3158
*200	0.3000	0.3158	0.3000	0.0000	0.4000	66.667	4	4.255	2.180	0.3330	0.3000	0.6842
461	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000
884	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000

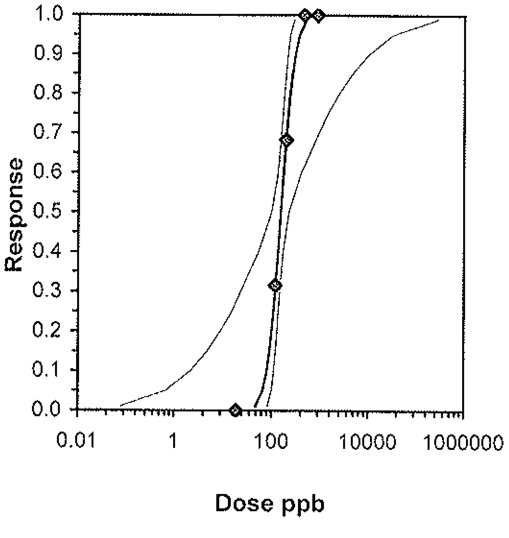
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.90136	0.805	-0.1755	-0.5475
Bartlett's Test indicates equal variances (p = 0.26)	2.71171	9.21034		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	121	200	155.563		0.333	0.35053	0.42333	0.04667	0.00696	2, 9

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	4.50383	1.93559	0.71007	8.29759	0	0.02513	7.81473	1	2.19129	0.22203	3
Intercept	-4.8692	4.25422	-13.207	3.46907							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	47.2892	0.07678	83.815
EC05	3.355	67.0002	0.69287	102.287
EC10	3.718	80.6755	2.22918	114.223
EC15	3.964	91.4462	4.88647	123.495
EC20	4.158	101.023	9.08292	131.903
EC25	4.326	110.035	15.3852	140.246
EC40	4.747	136.47	54.7708	173.501
EC50	5.000	155.342	100.401	230.909
EC60	5.253	176.823	137.948	410.003
EC75	5.674	219.304	172.726	1442.11
EC80	5.842	238.867	183.874	2439.8
EC85	6.036	263.883	196.547	4531.5
EC90	6.282	299.113	212.619	9927.77
EC95	6.645	360.164	237.531	31927.1
EC99	7.326	510.287	289.977	288010



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Zn in CCSD8(1)
Start Date: 2/28/2010 End Date: 3/2/2010

Test ID: CCSD8(1)
Protocol: EPAA 02-EPA Acute
Sample Type: ZNSO-Zinc sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	19.000	5		5			
	2	2	19.000	5		5			
	3	3	19.000	5		5			
	4	4	19.000	5		4			
	5	1	121.000	5		4			
	6	2	121.000	5		2			
	7	3	121.000	5		2			
	8	4	121.000	5		5			
	9	1	200.000	5		0			
	10	2	200.000	5		2			
	11	3	200.000	5		2			
	12	4	200.000	5		2			
	13	1	461.000	5		0			
	14	2	461.000	5		0			
	15	3	461.000	5		0			
	16	4	461.000	5		0			
	17	1	884.000	5		0			
	18	2	884.000	5		0			
	19	3	884.000	5		0			
	20	4	884.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	~~SD8(1)~~ ② zinc in CCSD8(1)
Weston Test ID:	C100228.07 23
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	1	7.1	1	19.5	6	0.20	3	7.8			
Date: 2/28/10	32		9.8		19.4		0.18		7.2			
Sample ID: C100228.07	56		10.0		19.3		0.18		7.2			
Dilutions (Tech): AM	100		10.0		19.3		0.18		7.2			
WQ Time: 1751	180		10.1		19.4		0.18		7.2			
Technician: YS	320		10.0		19.4		0.18		7.1			
24 hours	Control	7	8.0	7	20.7	6	0.20	2	8.2			
	32		7.1		①YS 22.0		0.18		7.7			
Date: 3/1/10	56		7.5		22.0		0.18		7.6			
WQ Time: 1131	100		7.4		↓ 21.6		0.18		7.6			
Technician: YS	180		7.5		21.1		0.18		7.6			
	320		7.7		①YS 21.8		0.18		7.5			
48 hours	Control	1	9.0	1	19.5	5	0.20	2	8.5			
	32		7.8		19.6		0.18		8.3			
Date: 3/2/10	56		8.3		19.2		0.18		8.1			
WQ Time: 1300	100		8.4		19.1		0.18		8.0			
Technician: VH	180		7.8		19.5		0.18		7.9			
	320		8.3		19.3		0.18		7.8			

Start Time:	1235 VH	
End Time:	1630 VH	
Supplier:	Aquatic Biosystems	
Organism Batch:	ABS 2244	Age: <24 hours

Dilution Water Batch:	CCSD8(1)
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

① temp. out of range. Turned off shelf lights below containers 3/1/10 YS
② IE 3/2/10 am

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	~~S08(1)~~ 0 Zn in CCSD8(1)
Weston Test ID:	C100228.0723
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	1	—	1	—	6	—	3	—			
Date: 2/28/10	560		10.0		19.2		0.18		7.1			
Sample ID: C100228.07	1000		10.4		19.3		0.18		6.9			
Dilutions (Tech): AM	1800		10.5		19.3		0.19		6.8			
WQ Time: 1751												
Technician: KS												
24 hours	~~Control~~	7	—	7	—	6	—	2	—			
	560		8.0		21.3		0.18		7.4			
Date: 3/1/10	1000		7.9		①KS 21.5		0.18		7.3			
WQ Time: 1131	1800		8.4		21.4		0.20		7.2			
Technician: KS												
48 hours	~~Control~~	1	—	1	—	5	—	2	—			
	560		8.2		19.3		0.18		7.8			
Date: 3/2/10	1000		8.5		19.1		0.18		7.5			
WQ Time: 1300	1800		8.6		19.1		0.20		7.4			
Technician: VH												

Start Time:	1735 VH
End Time:	1630 VH
Supplier:	Aquatic Biosystems
Organism Batch:	ABS2244 Age: <24 hours

Dilution Water Batch:	CCSD8(1)
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

① temp. out of range. Turned off shelf lights below containers 3/1/10 KS
OIE 3/2/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100228.0723	City of San Diego	~~808(1)~~ ① Zn in CCSD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours		
		Date: 3/1/10		Date: 3/2/10		
		Time: 1556		Time: 1630		
		Technician: VS		Technician: VH		
		# Alive	# Dead	# Alive	# Dead	
Control	1	4	1	4	0	
	2	3	2	3	0	75
	3	5	0	5	0	
	4	3	2NB	3	0	
32	1	4	1NB	5	1FB	
	2	4	1NB	5	1FB	95.
	3	3	2NB	5	2FB	
	4	2	3NB	4	2FB	
56	1	2	3NB	0	2NB	
	2	2	3NB	2	0	30.
	3	2	3NB	3	1FB	
	4	2	3NB	1	1NB	
100	1	2	3NB	4	2FB	
	2	3	2NB	2	1NB	
	3	3	2NB	2	1NB	65
	4	4	1NB	5	1FB	
180	1	2	3NB	0	2NB	
	2	2	3NB	2	0	30
	3	2	3NB	2	0	
	4	2	3NB	2	0	
320	1	0	5NB	0	—	
	2	0	5NB	—	—	0
	3	0	5NB	—	—	
	4	0	5NB	—	—	

①IE 3/2/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100228.0723	Client: City of San Diego	Client Sample ID: ~~SD8(1)~~ ①cm Zn in CCSD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 3/1/10		Date: 3/2/10	
		Time: 1556		Time: 1630	
		Technician: VS		Technician: VH	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
560	1	0	5 NB		
	2	0	5 NB		
	3	0	5 NB		
	4	0	5 NB		
1000	1	0	5 NB		
	2	0	5 NB		
	3	0	5 NB		
	4	0	5 NB		
1800	1	0	5 NB		
	2	0	5 NB		
	3	0	5 NB		
	4	0	5 NB		
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

① IE 3/2/10 cm

Acute Daphnid-48 Hr Survival

Start Date:	2/28/2010	Test ID:	DPR2	Sample ID:	Zn in DPR2
End Date:	3/2/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
8	0.6000	0.8000	1.0000	1.0000
93	0.8000	0.6000	0.6000	0.8000
143	0.6000	1.0000	1.0000	0.8000
277	0.4000	0.0000	0.8000	0.4000
535	0.0000	0.0000	0.0000	0.0000
948	0.0000	0.0000	0.0000	0.0000

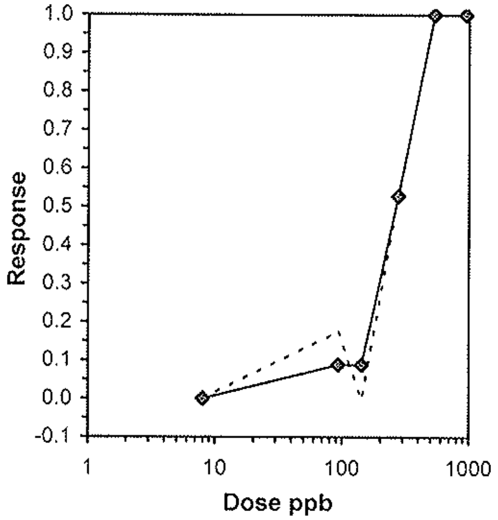
			Transform: Untransformed						1-Tailed			
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
8	0.8500	1.0000	0.8500	0.6000	1.0000	22.528	4				0.8500	0.0000
93	0.7000	0.8235	0.7000	0.6000	0.8000	16.496	4	0.965	2.290	0.3560	0.7000	0.1765
143	0.8500	1.0000	0.8500	0.6000	1.0000	22.528	4	0.000	2.290	0.3560	0.8500	0.0000
*277	0.4000	0.4706	0.4000	0.0000	0.8000	81.650	4	2.895	2.290	0.3560	0.4000	0.5294
535	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000
948	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95833	0.844	-0.1804	0.38622
Bartlett's Test indicates equal variances (p = 0.43)	2.76262	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	143	277	199.025		0.35599	0.41882	0.18	0.04833	0.04211	3, 12

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	262.79	173.10	398.97
20.0%	263.45	155.95	445.03
Auto-8.8%	262.72	174.53	395.47



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Zn in DPR2
Start Date: 2/28/2010 End Date: 3/2/2010

Test ID: DPR2
Protocol: EPAA 02-EPA Acute
Sample Type: ZNSO-Zinc sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	8.000	5		3			
	2	2	8.000	5		4			
	3	3	8.000	5		5			
	4	4	8.000	5		5			
	5	1	93.000	5		4			
	6	2	93.000	5		3			
	7	3	93.000	5		3			
	8	4	93.000	5		4			
	9	1	143.000	5		3			
	10	2	143.000	5		5			
	11	3	143.000	5		5			
	12	4	143.000	5		4			
	13	1	277.000	5		2			
	14	2	277.000	5		0			
	15	3	277.000	5		4			
	16	4	277.000	5		2			
	17	1	535.000	5		0			
	18	2	535.000	5		0			
	19	3	535.000	5		0			
	20	4	535.000	5		0			
	21	1	948.000	5		0			
	22	2	948.000	5		0			
	23	3	948.000	5		0			
	24	4	948.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	ks ~~C100228.08 DPR2~~ Zn in DPR2
Weston Test ID:	C100228.0823
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	1	7.1	1	19.5	6	0.20	3	7.8			
Date: 2/28/10	32		9.7		19.6		0.38		7.4			
Sample ID: C100228.08	56		9.8		19.6		0.38		7.4			
Dilutions (Tech): AM	100		9.8		19.5		0.38		7.4			
WQ Time: 1745	180		9.7		19.5		0.38		7.4			
Technician: ks	320		10.0		19.6		0.38		7.3			
24 hours	Control	7	8.0	7	ks② ~~8~~ 20.7	6	0.20	2	8.2			
Date: 3/1/10	32		7.4		③ks 22.4		0.38		7.4			
	56		7.5		22.8		0.38		7.6			
WQ Time: 1141	100		7.6		21.7		0.38		7.6			
Technician: ks	180		7.7		21.7		0.38		7.5			
	320		7.9		21.0		0.38		7.5			
48 hours	Control	1	9.0	1	19.5	5	0.20	2	8.5			
	32		8.2		19.1		0.39		7.6			
Date: 3/2/10	56		8.4		19.2		0.39		7.8			
WQ Time: 1310	100		8.5		19.2		0.39		7.8			
Technician: VH	180		8.3		19.2		0.39		7.8			
	320		8.5		19.0		0.39		7.7			

Start Time:	1655 VH		
End Time:	1610 VH		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2244	Age:	<24 hours

Dilution Water Batch:	DPR2
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptability:	___ ≥ 90% Survival in Control

① WC 2/28/10 VH

② WC 3/1/10 ks

③ temp out of range. turned off lights below shelf

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas WER Study
Client Sample ID:	~~DPR~~ 20ug Zn in DPR2
Weston Test ID:	C100228.0823
Species:	*Ceriodaphnia dubia*

Date Received:	2/28/10
Date Test Started:	2/28/10
Date Test Ended:	3/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	1	—	1	—	6	—	3	—			
Date: 2/28/10	560		10.2		19.7		0.39		7.2			
Sample ID: C100228.08	1000		10.0		19.6		0.39		7.1			
Dilutions (Tech): AM	1800		10.1		19.6		0.39		7.0			
WQ Time: 1745												
Technician: VS												
24 hours	~~Control~~	7	—	7	—	6	—	2	—			
	560		8.1		21.1		0.39		7.5			
Date: 3/1/10	1000		8.0		21.0		0.39		7.4			
WQ Time: 1141	1800		8.1		21.2		0.39		7.3			
Technician: VS												
48 hours	~~Control~~	1	—	1	—	5	—	2	—			
	560		8.4		19.1		0.39		7.6			
Date: 3/2/10	1000		8.4		19.2		0.39		7.5			
WQ Time: 1310	1800		8.3		19.1		0.39		7.4			
Technician: VH												

Start Time:	1655 VH		
End Time:	1610 VH		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2244	Age:	<24 hours

Dilution Water Batch:	DPR2
Hobo Temp. No.:	N/A
Test Location:	rm3
Test Acceptablility:	___ ≥ 90% Survival in Control

OIE 3/2/10 CM

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100228.0823	Client: City of San Diego	Client Sample ID: ~~DPR2~~ ②a Zn in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 3/1/10 Time: 1518 Technician: KS		48 Hours Date: 3/2/10 Time: 1610 Technician: VH		
		# Alive	# Dead	# Alive	# Dead	
Control	1	4	1	~~3~~	~~1NB~~	①VH
	2	3	2	~~4~~	~~1FB~~	
	3	5	0	5	0	
	4	3	2NB	~~5~~	~~2FB~~	
32	1	5	0	3	0(2NB)	
	2	5	0	4	0(1NB)	85
	3	5	0	5	0	
	4	4	1NB	5	1FB	
56	1	4	1NB	4	0	
	2	4	1NB	3	0(1NB)	70
	3	4	1NB	3	0(1NB)	
	4	3	2NB	4	1FB	
100	1	3	2NB	3	1 (1FB)	
	2	5	0	5	0	85
	3	2	3NB	5	0(2FB)	
	4	3	2NB	4	1FB	
180	1	2	3NB	2	0	
	2	2	3NB	0	2NB	40
	3	4	1NB	4	0	
	4	2	3NB	2	0	
320	1	0	5NB	—	—	
	2	0	5NB	—	—	0
	3	0	5NB	—	—	
	4	0	5NB	—	—	

①WC 3/2/10 VH
②IE 3/2/10 am

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100228.0823	City of San Diego	~~DPR 2~~ Om Zn in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours # Alive	24 Hours # Dead	48 Hours # Alive	48 Hours # Dead	
		Date: 3/1/10		Date: 3/2/10		
		Time: 1518		Time: 1610		
		Technician: KS		Technician: VH		
Control	1					
	2					
	3					
	4					
560	1	0	5 NB	—	—	
	2	0	5 NB	—	—	0
	3	0	5 NB	—	—	
	4	0	5 NB	—	—	
1000	1	0	5 NB	—	—	
	2	0	5 NB	—	—	0
	3	0	5 NB	—	—	
	4	0	5 NB	—	—	
18000	1	0	5 NB	—	—	
	2	0	5 NB	—	—	0
	3	0	5 NB	—	—	
	4	0	5 NB	—	—	
	1					
	2					
	3					
	4					
	1					
	2					
	3					
	4					

①IE 3/2/10 Om

1447

WESTON SOLUTIONS

☒ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

DATE 2/27/10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: Chollas Water Effects Ratio Study/06754.090.008.0006.01

PROJECT MANAGER / CONTACT: Dave Renfrew

COMPANY / CLIENT: Weston Solutions

ADDRESS: See above

PHONE / FAX / EMAIL: See above

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED								PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
							Cu Zn WER w/ C. dubia 48 hr. Acute tests									FOR WESTON USE ONLY	
SD8 (1)	SD8 (1)	2/27/10	1715	SW	1L-G	2	X								ICE		
DPR2	DPR2	↓	1740	↓	1gL-G	2	X								↓		

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ______

Container Code: [✓ G=glass] P=plastic B=bags ☐ O=other ______

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☒ Other pickup

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☒ Standard ☐ Other ______

Reporting Requirements: ☒ PDF ☒ EDD ☐ Hard Copy ☒ Email ☐ Other ______

SAMPLED BY: PRINT B. Isham SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS

	RELINQUISHED BY				RECEIVED BY			
	Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1.	Dave Renfrew		Weston	2/27/10@2021	Vanessa Hayes		Weston	2/28/10 0830
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of San Diego

Project: Chollas WER Study

Weston Sample ID:	C100228.07a	C100228.07b	C100228.08a
Client Sample ID:	SD8(1)	SD8(1)	DPR2
Renewal Sample (Y/N):	N	N	N
Date/Time Received:	2/28/10 0830	2/28/10 0830	2/28/10 0830
Airbill #:	N/A	N/A	N/A
Sample Tracking Information Kept for Records: (Y/N)	Y	Y	Y
Collection Date/Time:	2/27/10 1715	2/27/10 1715	2/27/10 1740
Condition of Shipping Container:	good	good	good
Type and Capacity of Sample Container:	①VH ~~2x~~ 19L jar	①VH ~~2x~~ 19L jar	1x 19L jar
Total Sample Volume (L):	19L	19L	19L
Condition of Sampling Container:	good	good	good
Sample Container Appropriate: (Y/N)	Y	Y	Y
Custody Seals Intact: (Y/N)	N/A	N/A	N/A
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	Y
Sampler's Name Present on COC Form: (Y/N)	Y	Y	Y

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg CaCO$_3$/L)	Alkalinity (mg CaCO$_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH$_3$/L)	Tech
C100228.07a	7.3	10.7	8.3	0.21	80	32	0.04		VH
C100228.07b	8.3	10.3	7.8	0.18	72	32	0.02		↓
C100228.08a	9.1	10.8	7.3	0.40	88	44	0.03		
①VH ~~C100228.08b~~									

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

① IE 2/28/10 VH

O:\BLANK FORMS\Bioassay\Forms with Weston Logo\SAMPLE RECEIPT Form- Weston temp.doc
Last printed 1/25/2006 10:55:00 AM

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of San Diego	**Project:** Chollas WER Study		
Weston Sample ID:	C100928.086		
Client Sample ID:	OPR2		
Renewal Sample (Y/N):	N		
Date/Time Received:	9/28/10 0830		
Airbill #:	N/A		
Sample Tracking Information Kept for Records: (Y/N)	Y		
Collection Date/Time:	9/27/10 1740		
Condition of Shipping Container:	good		
Type and Capacity of Sample Container:	VH 19 ~~20L~~ jar		
Total Sample Volume (L):	OK ~~38L~~ 19L		
Condition of Sampling Container:	good		
Sample Container Appropriate: (Y/N)	Y		
Custody Seals Intact: (Y/N)	N/A		
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y		
Sampler's Name Present on COC Form: (Y/N)	Y		

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) **(0-6°C)** *	Dissolved Oxygen (mg/L)	pH	Conductivity ~~(mS/cm)~~ or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C100928.86	8.8	10.8	7.5	0.40	88	44	0.03		VH

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

OK 9/28/10 VH

O:\BLANK FORMS\Bioassay\Forms with Weston Logo\SAMPLE RECEIPT Form- Weston temp.doc
Last printed 1/25/2006 10:55:00 AM

Item 10
Supporting Document No. 2
December 14, 2016

Definitive WER Event 2

4/02/2010

Acute Daphnid-48 Hr Survival

Start Date:	4/2/2010	Test ID:	DMW	Sample ID:	Cu in DMW
End Date:	4/4/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
0	1.0000	1.0000	1.0000	1.0000				
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.0000	1.0000	1.0000	1.0000				
7	0.0000	0.4000	0.2000	0.2000				
11	0.0000	0.0000	0.0000	0.0000				
24	0.0000	0.0000	0.0000	0.0000				

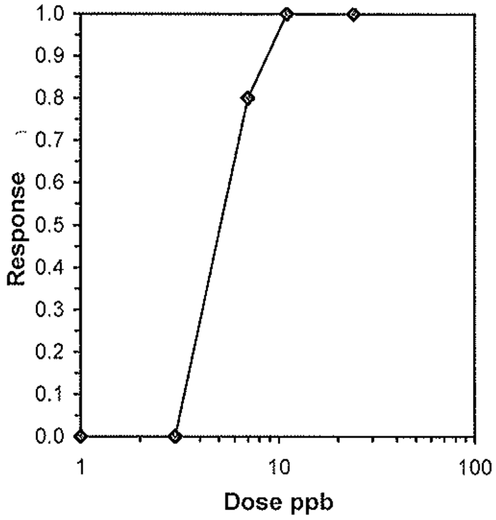
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
0	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
1	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	8	52.00	39.00	1.0000	0.0000
3	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
*7	0.2000	0.2000	0.2000	0.0000	0.4000	81.650	4	10.00	10.00	0.2000	0.8000
11	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
24	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.44822	0.868	0	9.5
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	3	7	4.58258	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	5.2184	4.0242	6.7669
5.0%	5.1716	3.8962	6.8646
10.0%	5.1329	3.8030	6.9279
20.0%	5.0946	3.9094	6.6390
Auto-0.0%	5.2184	4.0242	6.7669



Reviewed by:

Test: AD-Acute Daphnid	Test ID: DMW
Species: CD-Ceriodaphnia dubia	Protocol: EPAA 02-EPA Acute
Sample ID: Cu in DMW	Sample Type: CUSO-Copper sulfate
Start Date: 4/2/2010 End Date: 4/4/2010	Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	0.000	5		5			
	2	2	0.000	5		5			
	3	3	0.000	5		5			
	4	4	0.000	5		5			
	5	1	1.000	5		5			
	6	2	1.000	5		5			
	7	3	1.000	5		5			
	8	4	1.000	5		5			
	9	1	1.000	5		5			
	10	2	1.000	5		5			
	11	3	1.000	5		5			
	12	4	1.000	5		5			
	13	1	3.000	5		5			
	14	2	3.000	5		5			
	15	3	3.000	5		5			
	16	4	3.000	5		5			
	17	1	7.000	5		0			
	18	2	7.000	5		2			
	19	3	7.000	5		1			
	20	4	7.000	5		1			
	21	1	11.000	5		0			
	22	2	11.000	5		0			
	23	3	11.000	5		0			
	24	4	11.000	5		0			
	25	1	24.000	5		0			
	26	2	24.000	5		0			
	27	3	24.000	5		0			
	28	4	24.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	DMW409
Weston Test ID:	Cu in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	7	8.6	7	19.5	5	0.19	2	8.4			
Date: 4/2/10	~~18~~ 1.5		8.7		19.3		0.19		8.3			
Sample ID:	~~32~~ 3		8.6		19.2		0.19		8.3			
Dilutions (Tech): AM	~~56~~ 6		8.7		19.4		0.19		8.2			
WQ Time: 1650	~~100~~ 12		8.7		19.3		0.20		8.2			
Technician: KC	~~180~~ 24		8.9		19.0		0.20		8.1			
24 hours KC ①	Control	7	8.8	7	19.2	6	0.20	2	8.4			
	1.5		9.0		19.0		0.20		8.4			
Date: 4/3/10	3		8.8		19.3		0.20		8.4			
WQ Time: 1335	6		8.8		19.4		0.20		8.4			
Technician: EA	12		8.9		19.2		0.20		8.4			
	24		8.9		18.8		0.20		8.4			
48 hours	Control	7	8.9	7	19.0	6	0.20	2	8.1			
	1.5		9.0		18.9		0.20		8.2			
Date: 4/4/10	3		8.9		19.3		0.20		8.3			
WQ Time: 1227	6		9.0		18.8		0.20		8.3			
Technician: EA	12		9.0		18.9		0.20		8.3			
	24		9.0		18.7		0.21		8.3			

① IE KC 4/2/10

Start Time:	1430 EA		
End Time:	1432 EA		
Supplier:	Aquatic Biosystems		
Organism Batch:	~~in house~~ EA ABS2462C	Age:	<24 hours

Dilution Water Batch:	DMW409
Hobo Temp. No.:	778889
Test Location:	rm 3
Test Acceptability:	✓ ≥ 90% Survival in Control

② IE 4/2/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	DMW409
Weston Test ID:	Cu in DMW
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	7	—	7	—	5	—	2	—	—	—	—
Date: 4/2/10	~~320~~ 48		8.7		19.2		0.19		8.2			
Sample ID:	~~560~~											
Dilutions (Tech): AM	~~1000~~											
WQ Time: 1650	KC ①											
Technician: KC												
24 hours	Control	7		7		6		2				
Date: 4/3/10	48		9.0		18.7		0.20		8.4			
WQ Time: 1335												
Technician: DA												
48 hours	Control	7		7		6		2				
Date: 4/4/10	48		9.0		18.8		0.20		8.3			
WQ Time: 1227												
Technician: DA												

① IE KC 4/2/10

Start Time:	1430 DA		
End Time:	1432 DA		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2462C	Age:	<24 hours

Dilution Water Batch:	DMW409
Hobo Temp. No.:	778889
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: DMW 409 Cu in DMW	Client: City of SD	Client Sample ID: Cu in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 4/4/10	
		Time:		Time: 1432	
		Technician:		Technician: BA	
		# Alive	# Dead	# Alive	# Dead
Control	1			5	0
	2			5	0
	3			5	0
	4			5	0
1.5	1			5	0
	2			5	0
	3			5	0
	4			5	0
3	1			5	0
	2			5	0
	3			5	0
	4			5	0
6	1			5	0
	2			5	0
	3			5	0
	4			5	0
12	1			0	5
	2			2	3
	3			1	4
	4			1	4
24	1			0	5
	2			0	5
	3			0	5
	4			0	5

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: DMW 409 Cu in DMW	Client: City of SD	Client Sample ID: Cu in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 4/4/10	
		Time:		Time: 1432	
		Technician:		Technician: DA	
		# Alive	# Dead	# Alive	# Dead
~~Control~~	1				
	2				
	3				
	4				
48	1			0	5
	2			0	5
	3			0	5
	4			0	5
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

Acute Daphnid-48 Hr Survival

Start Date:	4/2/2010	Test ID:	CCSD8	Sample ID:	Cu in CCSD8
End Date:	4/4/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
17	1.0000	1.0000	1.0000	1.0000
43	1.0000	1.0000	1.0000	1.0000
68	1.0000	1.0000	1.0000	1.0000
107	1.0000	1.0000	1.0000	1.0000
170	0.6000	0.8000	1.0000	0.8000
269	0.0000	0.0000	0.0000	0.0000

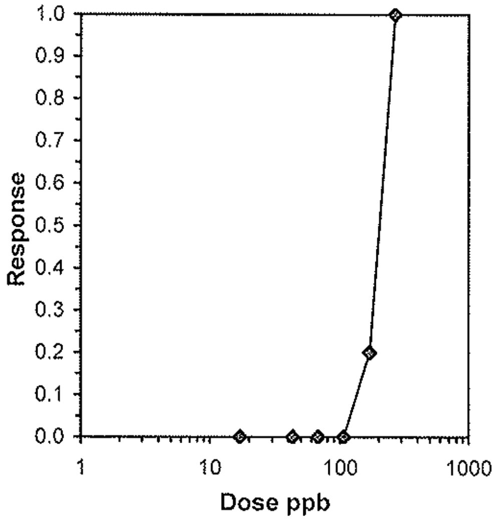
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
17	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
43	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
68	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
107	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
170	0.8000	0.8000	0.8000	0.6000	1.0000	20.412	4	12.00	10.00	0.8000	0.2000
269	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.44822	0.868	-3E-15	9.5
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	170	269	213.846	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	195.01	162.18	234.50
5.0%	197.58	160.01	243.96
10.0%	199.74	154.38	258.43
20.0%	201.92	174.95	233.06
Auto-0.0%	195.01	162.18	234.50



Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in CCSD8
Start Date: 4/2/2010 End Date: 4/4/2010

Test ID: CCSD8
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	17.000	5		5			
	2	2	17.000	5		5			
	3	3	17.000	5		5			
	4	4	17.000	5		5			
	5	1	43.000	5		5			
	6	2	43.000	5		5			
	7	3	43.000	5		5			
	8	4	43.000	5		5			
	9	1	68.000	5		5			
	10	2	68.000	5		5			
	11	3	68.000	5		5			
	[illegible]	4	68.000	5		5			
	13	[illegible]	107.000	5		5			
	14	2	107.000	5		5			
	15	3	107.000	5		5			
	16	4	107.000	5		5			
	17	1	170.000	5		3			
	18	2	170.000	5		4			
	19	3	170.000	5		5			
	20	4	170.000	5		4			
	21	1	269.000	5		0			
	22	2	269.000	5		0			
	23	3	269.000	5		0			
	24	4	269.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	C100401.06 23
Weston Test ID:	Cu in SD8(1)
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours) Kc ①	~~Control~~ SD8(1)	7	8.3	7	19.2	5	0.23	2	7.6			
Date: 4/2/10	6		8.6		19.3		0.23		7.3			
Sample ID C100401.06	10.8		8.5		19.4		0.23		7.2			
Dilutions (Tech): AM	19.4		8.5		19.4		0.23		7.1			
WQ Time: 1705	35.0		8.6		19.4		0.23		7.1			
Technician: Kc	63.0		8.7		19.4		0.23		7.1			
24 hours	~~Control~~ SD8(1)	7	5.2	7	19.3	6	0.23	2	7.2			
	6		DA ② ~~5.4~~ 4.7		DA ② ~~19.6~~ 19.5		0.23		7.2			
Date: 4/3/10	10.8		5.4		19.6		0.23		7.1			
WQ Time: 1408	19.4		4.2		19.6		0.23		7.1			
Technician: DA	35.0		4.7		19.6		0.23		6.9			
	63.0		4.3		19.6		0.23		6.8			
48 hours	~~Control~~ SD8(1)	7	6.6	7	19.1	6	0.24	2	7.2			
	6		6.6		19.2		0.23		7.2			
Date: 4/4/10	10.8		6.7		19.3		0.23		7.2			
WQ Time: 1258	19.4		6.4		19.2		0.23		7.1			
Technician: DA	35.0		5.8		19.4		0.23		7.1			
	63.0		5.3		19.5		0.23		7.0			

① IE Kc 4/2/10 ③ IE 4/4/10 cm
② W.C. 4/3/10 DA

Start Time:	1555 DA		
End Time:	1503 DA		
Supplier:	Aquatic Biosystems		
Organism Batch:	~~in house~~ ③ cm ABS2462C	Age:	<24 hours

Dilution Water Batch:	C100401.06
Hobo Temp. No.:	778889
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	C100401.0623
Weston Test ID:	Cu in SD8(1)
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	7	—	7	—	5	—	2	—	—	—	—
Date: 4/2/10	113.4		8.8		19.3		0.23		7.1			
Sample ID C100401.06	204.1		8.9		19.3		0.23		7.1			
Dilutions (Tech): AM	367.3		9.0		19.2		0.23		7.1			
WQ Time: 1705												
Technician: KC												
24 hours	Control	7		7		6		2				
	113.4		5.4		19.4		0.23		6.9			
Date: 4/3/10	204.1		5.0		19.3		0.23		6.9			
WQ Time: 1408	367.3		5.0		19.2		0.23		6.9			
Technician: BA												
48 hours	Control	7		7		6		2				
	113.4		5.9		19.5		0.23		7.0			
Date: 4/4/10	204.1		5.4		19.5		0.23		7.0			
WQ Time: 1258	367.3		6.2		19.2		0.24		7.0			
Technician: BA												

Start Time:	1555 BA	
End Time:	1503 BA	
Supplier:	Aquatic Biosystems	
Organism Batch:	ABS2462C	Age: <24 hours

Dilution Water Batch:	C100401.06
Hobo Temp. No.:	778889
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100401.0623
~~Cu in SD8(1)~~ ② ar

Client: City of SD

Client Sample ID: Cu in (CSD8(1))

SURVIVAL DATA

Conc.	Rep	24 Hours Date: Time: Technician:		48 Hours Date: 4/4/10 Time: 1503 Technician: DA	
		# Alive	# Dead	# Alive	# Dead
~~Control~~ SD8(1)	1			5 ~~0~~ ① DA	0 ~~5~~ ① DA
	2			5 ~~0~~	0 ~~5~~
	3			5	0
	4			5	0
6	1			5	0
	2			5	0
	3			5	0
	4			5	0
10.8	1			5	0
	2			5	0
	3			5	0
	4			5	0
19.4	1			5	0
	2			5	0
	3			5	0
	4			5	0
35.0	1			5	0
	2			5	0
	3			5	0
	4			5	0
63.0	1			5	0
	2			5	0
	3			5	0
	4			5	0

① WC. 4/4/10 DA
② IE 4/4/10 Ca

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100401.0623 ~~Cu in SD8(1)~~ ① dan	Client: City of SD	Client Sample ID: Cu in CCSD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours # Alive	24 Hours # Dead	48 Hours # Alive	48 Hours # Dead
		Date:		Date: 4/4/10	
		Time:		Time: 1503	
		Technician:		Technician: EA	
Control	1				
	2				
	3				
	4				
113.4	1			5	0
	2			5	0
	3			5	0
	4			5	0
204.1	1			3	2
	2			4	1NB
	3			5	0
	4			4	1NB
367.3	1			0	5
	2			0	5
	3			0	2 (3NB)
	4			0	5
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

① JE 4/4/10 dan

Acute Daphnid-48 Hr Survival

Start Date:	4/6/2010	Test ID:	DPR2	Sample ID:	Cu in DPR2
End Date:	4/8/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
15	1.0000	1.0000	1.0000	1.0000
68	1.0000	1.0000	1.0000	1.0000
107	1.0000	1.0000	1.0000	1.0000
175	1.0000	1.0000	1.0000	1.0000
295	0.0000	0.0000	0.0000	0.0000
480	0.0000	0.0000	0.0000	0.0000
767	0.0000	0.0000	0.0000	0.0000

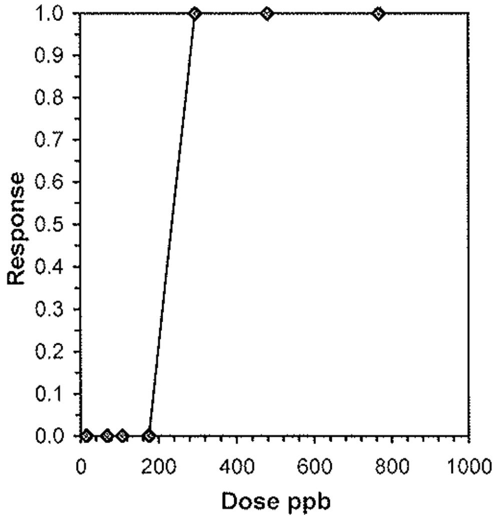
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
15	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	1.0000
68	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
107	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
175	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	1.0000
295	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000
480	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000
767	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	1	0.844		
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	175	295	227.211	

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	181.00	0.00	181.00	181.00	#DIV/0!
IC10	187.00	0.00	187.00	187.00	#DIV/0!
IC15	193.00	0.00	193.00	193.00	#DIV/0!
IC20	199.00	0.00	199.00	199.00	#DIV/0!
IC25	205.00	0.00	205.00	205.00	#DIV/0!
IC40	223.00	0.00	223.00	223.00	#DIV/0!
IC50	235.00	0.00	235.00	235.00	#DIV/0!



Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in DPR2
Start Date: 4/6/2010 End Date: 4/8/2010

Test ID: DPR2
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	15.000	5		5			
	2	2	15.000	5		5			
	3	3	15.000	5		5			
	4	4	15.000	5		5			
	5	1	68.000	5		5			
	6	2	68.000	5		5			
	7	3	68.000	5		5			
	8	4	68.000	5		5			
	9	1	107.000	5		5			
	10	2	107.000	5		5			
	11	3	107.000	5		5			
	12	4	107.000	5		5			
	13	1	175.000	5		5			
	14	2	175.000	5		5			
	15	3	175.000	5		5			
	16	4	175.000	5		5			
	17	1	295.000	5		0			
	18	2	295.000	5		0			
	19	3	295.000	5		0			
	20	4	295.000	5		0			
	21	1	480.000	5		0			
	22	2	480.000	5		0			
	23	3	480.000	5		0			
	24	4	480.000	5		0			
	25	1	767.000	5		0			
	26	2	767.000	5		0			
	27	3	767.000	5		0			
	28	4	767.000	5		0			

Comments:

ToxCalc 5.0

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	Cu M DPR2
Weston Test ID:	C100401.0723
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/6/10
Date Test Ended:	4/8/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm) KC①	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	7	8.6	7	20.1	~~6~~ 5	0.18	~~3~~ 2	8.5			
Date: 4/6/10	63		5.4		19.7		0.43		7.0			
Sample ID: C100401.07	113.4		5.2		19.7		0.43		6.8			
Dilutions (Tech): AM	201.1		5.8		19.7		0.43		6.8			
WQ Time: 1440	367.3		6.4		19.7		0.43		6.9			
Technician: KC	661.1		6.2		19.7		0.43		6.8			
24 hours	Control	7	8.8	7	19.3	5	0.18	2	8.3			
	63		6.0		19.0		0.44		7.4			
Date: 4/7/10	113.4		6.2		18.6		0.44		7.2			
WQ Time: 1135	201.1		5.8		18.9		0.44		7.1			
Technician: KC	367.3		8.8		18.5		0.47		7.5			
	661.1		6.9		18.8		0.44		7.2			
48 hours	Control	7	9.0	7	19.3	5	0.18	2	7.7			
	63		7.3		18.9		0.44		7.0			
Date: 4/8/10	113.4		7.3		18.6		0.45		6.8			
WQ Time: 0930	201.1		7.5		18.5		0.45		7.0			
Technician: KC	367.3		8.7		18.5		0.50		7.3			
	661.1		6.4		19.0		0.44		6.9			

① IE KC 4/6/10

Start Time:	1535 VH
End Time:	1520 VH
Supplier:	Aquatic Biosystems
Organism Batch:	ABS 7462C Age: <24 hours

Dilution Water Batch:	DPR2
Hobo Temp. No.:	N/A
Test Location:	rm 3
Test Acceptability:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	Cu in DPR2
Weston Test ID:	C100407.0723
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/6/10
Date Test Ended:	4/8/10
Study Director:	A. margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours) KC	~~Control~~	7	—	7	—	5	—	2	—			
Date: 4/6/10	1190.1		6.4		19.7		0.43		6.8			
Sample ID: C100401.07												
Dilutions (Tech): AM												
WQ Time: 1440												
Technician: KC												
24 hours	~~Control~~	7	—	7	—	5	—	2	—			
	1190.1		7.4		19.7		0.44		7.2			
Date: 4/7/10												
WQ Time: 1135												
Technician: KC												
48 hours	~~Control~~	7	—	7	—	5	—	2	—			
	1190.1		7.4		19.0		0.44		7.0			
Date: 4/7/10												
WQ Time: 0930												
Technician: KC												

Start Time:	1535 VH		
End Time:	1520 VH		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2462C	Age:	<24hours

Dilution Water Batch:	DPR2
Hobo Temp. No.:	N/A
Test Location:	rm3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100401.0723	Client: City of SD	Client Sample ID: Cu in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 4/8/10	
		Time:		Time: 1520	
		Technician:		Technician: VH	
		# Alive	# Dead	# Alive	# Dead
Control	1			5	0
	2			5	0
	3			5	0
	4			5	0
63	1			5	0
	2			5	0
	3			5	0
	4			5	0
113.4	1			5	0
	2			5	0
	3			5	0
	4			5	0
204.1	1			5	0
	2			5	0
	3			5	0
	4			5	0
367.3	1			0	4 (1NB)
	2			0	3 (2NB)
	3			0	3 (2NB)
	4			0	3 (2NB)
661.1	1			0	3 (2NB)
	2			0	5
	3			0	3 (2NB)
	4			0	4 (1NB)

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C100401.07-23	City of SD	Cu in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 4/8/10	
		Time:		Time: 1520	
		Technician:		Technician: VH	
		# Alive	# Dead	# Alive	# Dead
1190.1 ~~Control~~	1			0	4 (1NB)
	2			0	2 (3NB)
	3			0	3 (2NB)
	4			0	4 (1NB)
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

Acute Daphnid-48 Hr Survival

Start Date:	4/2/2010	Test ID:	DMW	Sample ID:	Zn in DMW
End Date:	4/4/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
0	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000
21	1.0000	1.0000	1.0000	1.0000
55	1.0000	1.0000	1.0000	1.0000
74	1.0000	1.0000	1.0000	1.0000
139	1.0000	0.8000	0.4000	0.4000
266	0.0000	0.0000	0.0000	0.0000
462	0.0000	0.0000	0.0000	0.0000

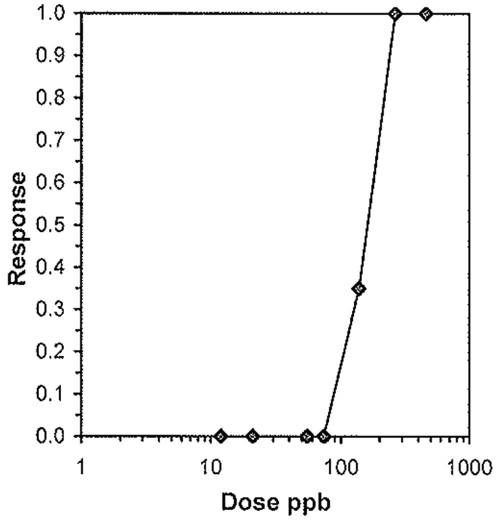
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
0	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
12	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
21	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
55	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
74	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
139	0.6500	0.6500	0.6500	0.4000	1.0000	46.154	4	12.00	10.00	0.6500	0.3500
266	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
462	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.57349	0.884	0.55937	6.12215
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	139	266	192.286	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	153.71	113.29	208.56
5.0%	155.11	110.24	218.23
10.0%	156.47	105.71	231.61
20.0%	159.05	90.31	280.10
Auto-0.0%	153.71	113.29	208.56



Reviewed by:

Test: AD-Acute Daphnid		Test ID: DMW
Species: CD-Ceriodaphnia dubia		Protocol: EPAA 02-EPA Acute
Sample ID: Zn in DMW		Sample Type: ZNSO-Zinc sulfate
Start Date: 4/2/2010	End Date: 4/4/2010	Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	0.000	5		5			
	2	2	0.000	5		5			
	3	3	0.000	5		5			
	4	4	0.000	5		5			
	5	1	12.000	5		5			
	6	2	12.000	5		5			
	7	3	12.000	5		5			
	8	4	12.000	5		5			
	9	1	21.000	5		5			
	10	2	21.000	5		5			
	11	3	21.000	5		5			
	12	4	21.000	5		5			
	13	1	55.000	5		5			
	14	2	55.000	5		5			
	15	3	55.000	5		5			
	16	4	55.000	5		5			
	17	1	74.000	5		5			
	18	2	74.000	5		5			
	19	3	74.000	5		5			
	20	4	74.000	5		5			
	21	1	139.000	5		5			
	22	2	139.000	5		4			
	23	3	139.000	5		2			
	24	4	139.000	5		2			
	25	1	266.000	5		0			
	26	2	266.000	5		0			
	27	3	266.000	5		0			
	28	4	266.000	5		0			
	29	1	462.000	5		0			
	30	2	462.000	5		0			
	31	3	462.000	5		0			
	32	4	462.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	~~C1004~~ DMW409
Weston Test ID:	Zn M DMW
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	1	8.4	1	20.3	6	0.19	3	7.8			
Date: 4/2/10	18		8.3		18.7		0.20		8.5			
Sample ID:	32		8.3		18.7		0.20		8.4			
Dilutions (Tech): AM	56		8.3		18.7		0.20		8.4			
WQ Time: 1726	100		8.3		18.7		0.20		8.4			
Technician: Vs	180		8.4		17.6 ① vs		0.20		8.3			
24 hours	Control	7	8.6	7	19.2	6	0.20	2	8.3			
	18		8.8		19.0		0.20		8.3			
Date: 4/3/10	32		8.9		19.0		0.20		8.3			
WQ Time: 1345	56		8.9		18.9		0.20		8.3			
Technician: DA	100		8.9		19.1		0.20		8.3			
	180		9.0		18.3		0.20		8.3			
48 hours	Control	7	8.7	7	19.1	6	0.20	2	8.2			
	18		8.9		19.0		0.20		8.3			
Date: 4/4/10	32		8.9		19.1		0.20		8.3			
WQ Time: 1235	56		8.9		19.1		0.20		8.4			
Technician: DA.	100		9.0		18.6		0.20		8.4			
	180		8.8		18.3		0.21		8.4			

Start Time:	1715 DA		
End Time:	1700 DA		
Supplier: ABS 2424	Aquatic Biosystems		
Organism Batch:	~~in house~~ ②	Age:	<24 hours

Dilution Water Batch:	DMW409
Hobo Temp. No.:	778889
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

① temp below protocol range. Surrogate has very little water in container compared to other concentrations therefore could be due to evaporative cooling 4/2/10 vs

② IE 4/12/10 am

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	DMW 409
Weston Test ID:	Zn M DMW
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	1	—	1	—	6	—	3	—	—	—	—
Date: 4/2/10	320		8.5		18.6		0.20		8.3			
Sample ID:	560		8.7		18.7		0.20		8.3			
Dilutions (Tech): AM	1000		8.5		18.6		0.20		8.2			
WQ Time: 1726												
Technician: YS												
24 hours	Control	7		7		6		2				
	320		8.9		18.8		0.20		8.3			
Date: 4/3/10	560		9.0		18.6		0.20		8.3			
WQ Time: 1345	1000		8.8		18.8		0.20		8.2			
Technician: BA												
48 hours	Control	7		7		6		2				
	320		9.0		18.7		0.20		8.3			
Date: 4/4/10	560		9.0		18.8		0.20		8.3			
WQ Time: 1235	1000		8.9		18.8		0.20		8.2			
Technician: BA												

Start Time:	1715 BA		
End Time:	1700 BA		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2462C	Age:	<24 hours

Dilution Water Batch:	DMW 409
Hobo Temp. No.:	778889
Test Location:	rm3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: DMW 409 Zn in DMW	Client: City of SD	Client Sample ID: Zn in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: Time: Technician:		Date: 4/4/10 Time: 1700 Technician: DA	
		# Alive	# Dead	# Alive	# Dead
Control	1			5	0
	2			5	0
	3			5	0
	4			5	0
18	1			5	0
	2			5	0
	3			5	0
	4			5	0
32	1			5	0
	2			5	0
	3			5	0
	4			5	0
56	1			5	0
	2			5	0
	3			5	0
	4			5	0
100	1			5	0
	2			5	0
	3			5	0
	4			5	0
180	1			5	0
	2			4	1
	3			2	3
	4			2	3

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: DMW409 Zn in DMW	Client: City of SD	Client Sample ID: Zn in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 4/4/10	
		Time:		Time: 1700	
		Technician:		Technician: SA	
		# Alive	# Dead	# Alive	# Dead
~~Control~~	1				
	2				
	3				
	4				
320	1			0	5
	2			0	5
	3			0	5
	4			0	4, INB
560	1			0	5
	2			0	5
	3			0	5
	4			0	5
1000	1			0	5
	2			0	5
	3			0	5
	4			0	5
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

Acute Daphnid-96 Hr Survival

Start Date:	4/2/2010	Test ID:	CCSD8	Sample ID:	Zn in CCSD8
End Date:	4/4/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
61	1.0000	1.0000	1.0000	1.0000
87	1.0000	1.0000	1.0000	1.0000
102	1.0000	1.0000	1.0000	1.0000
134	0.8000	1.0000	1.0000	0.6000
177	1.0000	1.0000	0.8000	1.0000
301	0.8000	0.8000	1.0000	0.8000
438	0.4000	0.2000	0.6000	0.2000

			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
61	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
87	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
102	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
134	0.8500	0.8500	0.8500	0.6000	1.0000	22.528	4	14.00	10.00	0.8500	0.1500
177	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
301	0.8500	0.8500	0.8500	0.8000	1.0000	11.765	4	12.00	10.00	0.8500	0.1500
*438	0.3500	0.3500	0.3500	0.2000	0.6000	54.710	4	10.00	10.00	0.3500	0.6500

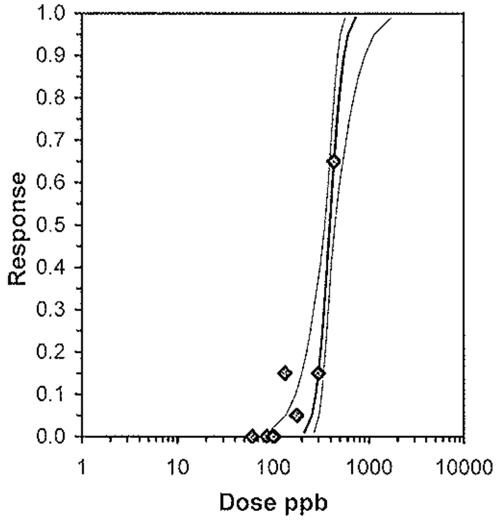
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.91409	0.896	-4E-16	1.32478
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	301	438	363.095	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.65343	2.5606	3.63465	13.6722	0	3.61012	11.0705	0.61	2.59721	0.11556	8
Intercept	-17.475	6.64642	-30.502	-4.4478							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	213	90.14	270.373
EC05	3.355	255.348	138.056	304.908
EC10	3.718	281.266	172.903	325.8
EC15	3.964	300.222	200.898	341.306
EC20	4.158	316.196	225.939	354.794
EC25	4.326	330.575	249.376	367.553
EC40	4.747	369.775	314.01	409.169
EC50	5.000	395.562	351.516	447.851
EC60	5.253	423.147	382.981	503.657
EC75	5.674	473.325	424.758	636.563
EC80	5.842	494.85	439.761	703.03
EC85	6.036	521.178	456.932	791.018
EC90	6.282	556.304	478.515	919.412
EC95	6.645	612.767	511.157	1151.8
EC99	7.326	734.598	576.312	1764.49



Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Zn in CCSD8
Start Date: 4/2/2010 End Date: 4/4/2010
Test ID: CCSD8
Protocol: EPAA 02-EPA Acute
Sample Type: ZNSO-Zinc sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	61.000	5				5	
	2	2	61.000	5				5	
	3	3	61.000	5				5	
	4	4	61.000	5				5	
	5	1	87.000	5				5	
	6	2	87.000	5				5	
	7	3	87.000	5				5	
	8	4	87.000	5				5	
	9	1	102.000	5				5	
	10	2	102.000	5				5	
	11	3	102.000	5				5	
	12	4	102.000	5				5	
	13	1	134.000	5				4	
	14	2	134.000	5				5	
	15	3	134.000	5				5	
	16	4	134.000	5				3	
	17	1	177.000	5				5	
	18	2	177.000	5				5	
	19	3	177.000	5				4	
	20	4	177.000	5				5	
	21	1	301.000	5				4	
	22	2	301.000	5				4	
	23	3	301.000	5				5	
	24	4	301.000	5				4	
	25	1	438.000	5				2	
	26	2	438.000	5				1	
	27	3	438.000	5				3	
	28	4	438.000	5				1	

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	C100401.06
Weston Test ID:	Zn in SD8(1)
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~ SD8(1)	7	8.3	7	19.2	5	0.23	2	7.6			
Date: 4/2/10	32		8.2		19.2		0.23		7.2			
Sample ID: C100401.06	56		8.9		19.3		0.23		7.2			
Dilutions (Tech): AM	100		8.8		18.8		0.24		7.2			
WQ Time: 1735	180		9.3		19.3		0.23		7.2			
Technician: Kc	320		9.5		19.4		0.23		7.1			
24 hours	~~Control~~ SD8(1)	7	5.2	7	19.3	6	0.23	2	7.2			
	32		5.0		19.5		0.23		7.2			
Date: 4/3/10	56		4.7		19.4		0.23		6.9			
WQ Time: 1445	100		8.5		19.0		0.25		7.2			
Technician: DA	180		5.2		19.4		0.23		7.0			
	320		4.5		19.5		0.23		6.9			
48 hours	~~Control~~ SD8(1)	7	6.6	7	19.1	6	0.24	2	7.2			
	32		6.5		19.3		0.23		7.3			
Date: 4/4/10	56		6.0		19.5		0.23		7.2			
WQ Time: 1319	100		8.6		19.3		0.26		7.4			
Technician: DA	180		6.7		19.1		0.24		7.2			
	320		6.4		19.3		0.23		7.1			

Start Time:	1740 VH		
End Time:	1730 DA		
Supplier:	Aquatic BioSystems		
Organism Batch:	~~in house~~ ABS 2462C	Age:	<24 hours

Dilution Water Batch:	C100401.06 (CSD8(1))
Hobo Temp. No.:	778889
Test Location:	Rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	C100401.06
Weston Test ID:	Zn m SD8(1)
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	7	—	7	—	5	—	2	—	—	—	—
Date: 4/2/10	560		9.5		19.2		0.23		7.1			
Sample ID: C100401.06	1000		9.9		19.3		0.23		7.1			
Dilutions (Tech): AM	1800		10.0		19.3		0.23		7.1			
WQ Time: 1735												
Technician:												
24 hours	Control	7	—	7	—	6	—	2	—			
	560		4.3		19.7		0.23		6.8			
Date: 4/3/10	1000		4.8		19.5		0.23		6.8			
WQ Time: 1445	1800		5.2		19.5		0.23		6.8			
Technician: BA												
48 hours	Control	7	—	7	—	6	—	2	—			
	560		5.6		19.8		0.23		7.0			
Date: 4/4/10	1000		6.0		19.6		0.23		7.0			
WQ Time: 1319	1800		6.7		19.4		0.24		7.0			
Technician: BA												

Start Time:	1740 VH		
End Time:	1730 BA		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2462C	Age:	<24 hours

Dilution Water Batch:	C10040106 CCSD8(1)
Hobo Temp. No.:	778889
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100407.06 ~~Zn in SD8(1)~~ ①Or	Client: City of SD	Client Sample ID: Zn in (CSD8(1))

SURVIVAL DATA

Conc.	Rep	24 Hours Date: Time: Technician:		48 Hours Date: 4/4/10 Time: 1730 Technician: DA	
		# Alive	# Dead	# Alive	# Dead
~~Control~~ SD8(1)	1			5	0
	2			5	0
	3			5	0
	4			5	0
32	1			5	0
	2			5	0
	3			5	0
	4			5	0
56	1			5	0
	2			5	0
	3			5	0
	4			5	0
100	1			4	1NB
	2			5	0
	3			5	0
	4			3	2NB
180	1			5	0
	2			5	0
	3			4	1NB
	4			5	0
320	1			4	1NB
	2			4	1NB
	3			5	0
	4			4	1NB

①JE 4/4/10 Or

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100401.06 ~~Zn in SD8(1)~~ ① IE	Client: City of SD	Client Sample ID: Zn in CCSD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours Date: Time: Technician:		48 Hours Date: 4/4/10 Time: 1730 Technician: DA	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
560	1			2	1, 2NB
	2			1	3, 1NB
	3			3	1, 1NB
	4			1	1, 3NB
1000	1			0	2, 3NB
	2			0	1, 4NB
	3			0	2, 3NB
	4			0	1, 4NB
1800	1			0	5NB
	2			0	5NB
	3			0	1, 4NB
	4			0	2, 3NB
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

① IE 4/4/10 am

Acute Daphnid-48 Hr Survival

Start Date:	4/2/2010	Test ID:	DPR2	Sample ID:	Zn in DPR2
End Date:	4/4/2010	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
51	1.0000	1.0000	1.0000	1.0000
74	1.0000	1.0000	1.0000	0.8000
95	1.0000	1.0000	1.0000	1.0000
118	1.0000	1.0000	1.0000	1.0000
185	1.0000	1.0000	1.0000	1.0000
310	1.0000	1.0000	1.0000	0.4000
509	0.6000	0.4000	0.6000	0.4000

			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
51	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
74	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
95	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
118	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
185	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
310	0.8500	0.8500	0.8500	0.4000	1.0000	35.294	4	16.00	10.00	0.8500	0.1500
*509	0.5000	0.5000	0.5000	0.4000	0.6000	23.094	4	10.00	10.00	0.5000	0.5000

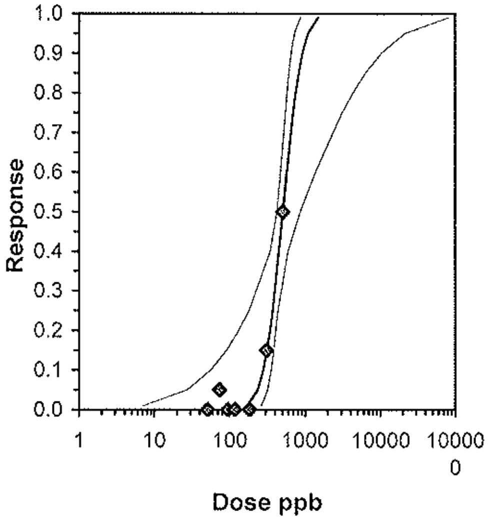
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.71908	0.896	-2.371	9.31302
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	310	509	397.228	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	4.93437	1.93159	1.14845	8.7203	0	0.36356	11.0705	1	2.70596	0.20266	5
Intercept	-8.3522	5.12437	-18.396	1.69157							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	171.592	7.11735	265.546
EC05	3.355	235.836	27.6353	321.031
EC10	3.718	279.406	56.6639	357.033
EC15	3.964	313.265	91.516	385.532
EC20	4.158	343.078	133.108	412.406
EC25	4.326	370.906	181.853	441.064
EC40	4.747	451.453	348.645	598.188
EC50	5.000	508.108	425.592	870.722
EC60	5.253	571.872	477.751	1378.24
EC75	5.674	696.062	550.569	3109.66
EC80	5.842	752.521	578.994	4320.61
EC85	6.036	824.137	612.812	6351.29
EC90	6.282	924.006	656.977	10331.9
EC95	6.645	1094.72	726.73	21299.1
EC99	7.326	1504.57	874.923	83046.2



ToxCalc v5.0.23

Reviewed by:

Test: AD-Acute Daphnid
Test ID: DPR2
Species: CD-Ceriodaphnia dubia
Protocol: EPAA 02-EPA Acute
Sample ID: Zn in DPR2
Sample Type: ZNSO-Zinc sulfate
Start Date: 4/2/2010
End Date: 4/4/2010
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	51.000	5		5			
	2	2	51.000	5		5			
	3	3	51.000	5		5			
	4	4	51.000	5		5			
	5	1	74.000	5		5			
	6	2	74.000	5		5			
	7	3	74.000	5		5			
	8	4	74.000	5		4			
	9	1	95.000	5		5			
	10	2	95.000	5		5			
	11	3	95.000	5		5			
	12	4	95.000	5		5			
	13	1	118.000	5		5			
	14	2	118.000	5		5			
	15	3	118.000	5		5			
	16	4	118.000	5		5			
	17	1	185.000	5		5			
	18	2	185.000	5		5			
	19	3	185.000	5		5			
	20	4	185.000	5		5			
	21	1	310.000	5		5			
	22	2	310.000	5		5			
	23	3	310.000	5		5			
	24	4	310.000	5		2			
	25	1	509.000	5		3			
	26	2	509.000	5		2			
	27	3	509.000	5		3			
	28	4	509.000	5		2			

Comments:

ToxCalc 5.0

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	C100401.07
Weston Test ID:	Zn in DPR2
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~ DPR-2	1	8.7	1	19.0	6	0.49	3	7.1			
Date: 4/2/10	32		8.4		19.4		0.48		7.3			
Sample ID: C100401.07	56		8.5		19.3		0.48		7.2			
Dilutions (Tech): AM	100		8.4		19.3		0.49		7.2			
WQ Time: 1750	180		8.5		19.3		0.49		7.2			
Technician: YS	320		9.3		19.2		0.49		7.2			
24 hours	~~Control~~ DPR2	7	4.6	7	DA ① ~~19.3~~ 19.1	6	0.49	2	7.7			
	32		4.6		19.3		0.49		6.9			
Date: 4/3/10	56		5.7		18.9		0.49		7.0			
WQ Time: 1432	100		5.1		19.0		0.49		7.0			
Technician: DA	180		6.1		18.6		0.50		7.1			
	320		4.6		19.1		0.49		7.0			
48 hours	~~Control~~ DPR2	7	5.4	7	19.1	6	0.49	2	7.7			
	32		5.9		19.2		0.49		7.1			
Date: 4/4/10	56		6.6		19.0		0.50		7.2			
WQ Time: 1308	100		6.1		19.2		0.49		7.2			
Technician: DA	180		6.9		18.7		0.51		7.2			
	320		4.5		19.2		0.49		7.1			

① IE 4/3/10 DA
② IE 4/4/10 am

Start Time:	1750 AM/VH		
End Time:	1625 DA		
Supplier:	Aquatic Biosystems		
Organism Batch:	~~in house~~ ABS2402C	Age:	<24 hours

Dilution Water Batch:	C100401.07 DPR2
Hobo Temp. No.:	778889
Test Location:	rm 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of SD
Project:	Chollas Creek WER
Client Sample ID:	C100401.07
Weston Test ID:	Zn in DPR2
Species:	*Ceriodaphnia dubia*

Date Received:	4/1/10
Date Test Started:	4/2/10
Date Test Ended:	4/4/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	1	—	1	—	6	—	3	—			
Date: 4/2/10	560		9.6		19.2		0.49		7.2			
Sample ID: C100401.07	1000		9.9		19.2		0.49		7.2			
Dilutions (Tech): AM	1800		10.0		19.2		0.49		7.1			
WQ Time: 1750												
Technician: YS												
24 hours	Control	7	—	7	—	6	—	2	—			
	560		5.7		18.8		0.49		7.0			
Date: 4/3/10	1000		4.2		19.2		0.49		6.9			
WQ Time: 1432	1800		5.0		18.8		0.49		6.9			
Technician: BA												
48 hours	Control	7	—	7	—	6	—	2	—			
	560		6.5		18.8		0.50		7.2			
Date: 4/4/10	1000		4.3		19.2		0.49		7.0			
WQ Time: 1308	1800		6.7		18.6		0.50		7.1			
Technician: BA												

Start Time:	1750 AM/VH		
End Time:	1625 BA		
Supplier:	Aquatic Biosystems		
Organism Batch:	ABS 2462C	Age:	<24 hours

Dilution Water Batch:	C100401.07 DPR2
Hobo Temp. No.:	778889
Test Location:	rm3
Test Acceptablility:	✓ ≥ 90% Survival in Control

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100401.07 ~~Zn in DPR2~~ om	Client: City of SD	Client Sample ID: Zn in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 4/4/10	
		Time:		Time: 1625	
		Technician:		Technician: DS	
		# Alive	# Dead	# Alive	# Dead
~~Control~~ DPR2	1			5	0
	2			5	0
	3			5	0
	4			5	0
32	1			5	0
	2			5	0
	3			5	0
	4			4	1NB
56	1			5	0
	2			5	0
	3			5	0
	4			5	0
100	1			5	0
	2			5	0
	3			5	0
	4			5	0
180	1			5	0
	2			5	0
	3			5	0
	4			5	0
320	1			5	0
	2			5	0
	3			5	0
	4			2	3NB

① IE 4/4/10 om

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C100401.07 ~~Zn in DPR2~~ ① an	Client: City of SD	Client Sample ID: Zn in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 4/4/10	
		Time:		Time: 1625	
		Technician:		Technician: BA	
		# Alive	# Dead	# Alive	# Dead
~~Control~~	1				
	2				
	3				
	4				
560	1			3	1, 1NB
	2			2	2, 1NB
	3			3	2NB
	4			2	2, 1NB
1000	1			0	4, 1NB
	2			0	4, 1NB
	3			0	3, 2NB
	4			0	2, 3NB
1800	1			0	3, 2NB
	2			0	2, 3NB
	3			0	2, 3NB
	4			0	2, 3NB
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

① IE 4/4/10 an

Item 10
Supporting Document No. 2
December 14, 2016

WESTON SOLUTIONS

☒ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

30458

DATE 4/1/10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: Chollas Creek WER 06754.090.008.0006.02
PROJECT MANAGER / CONTACT: Dave Renfrew
COMPANY / CLIENT: Weston
ADDRESS:
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: Ceriodaphnia dubia WER Cu and Zn	chronic Cerio Screen						PRESERVED HOW	FOR WESTON USE ONLY: SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
SD 8(1)	SD 8(1)	4/1/10	1100	SW	19-L Gl	2	X	X						ICE		C100401.06
~~SD 8(1)~~	~~SD 8(1) Dup~~	↓		↓	↓	1		X								
DPR2	DPR2	↓	1140	↓	↓	2	X	X						↓		C100401.07

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ________

Container Code: G=glass P=plastic B=bags ☐ O=other ________

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other ________

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other ________

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other ________

SAMPLED BY: PRINT: B. Isham G/Roberts M. Wertian SIGNATURE:

COMMENTS / SPECIAL INSTRUCTIONS

	RELINQUISHED BY				RECEIVED BY			
	Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1.	David S. Renfrew		Weston	4/1/10 @ 1340	Kasey Skrivseth	Kasey Skrivseth	Weston	4/1/10 1340
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

BIOASSAY SAMPLE RECEIPT

Client: City of San Diego	**Project:** Chollas Creek WER		
Weston Sample ID:	C100401.06a,b,c	C100401.07a,b	
Client Sample ID:	SD8(1)	DPR2	
Renewal Sample (Y/N):	N	N	
Date/Time Received:	4/1/10 1340	4/1/10 1340	
Airbill #:	N/A	N/A	
Sample Tracking Information Kept for Records: (Y/N)	N	N	
Collection Date/Time:	4/1/10 1100	4/1/10 1140	
Condition of Shipping Container:	good	good	
Type and Capacity of Sample Container:	glass 19L x3	glass 19L x2	
Total Sample Volume (L):	57 L	38 L	
Condition of Sampling Container:	good	good	
Sample Container Appropriate: (Y/N)	Y	Y	
Custody Seals Intact: (Y/N)	N/A	N/A	
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	
Sampler's Name Present on COC Form: (Y/N)	Y	Y	

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) **(0-6°C) ***	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C100401.06a	11.6	10.4	7.6	0.23	56	28	0.02	<0.5	YS/NH/DS
C100401.~~07~~06b	11.2	10.3	7.5	0.23	56	26	0.00	0.505	
C100401.06c	11.1	10.3	7.5	0.23	56	28	0.03	0.508	
C100401.07a	9.8	10.2	7.3	0.49	108	40	0.02	<0.5	
C100401.07b	9.9	10.4	7.4	0.48	112	42	0.03	0.520	↓

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of SD	**Project:** Chollas Creek WER		
Weston Sample ID:	C100119.09d		
Client Sample ID:	CESD8(1)Comp		
Renewal Sample (Y/N):	N		
Date/Time Received:	1/19/10 1100		
Airbill #:	N/A		
Sample Tracking Information Kept for Records: (Y/N)	Y		
Collection Date/Time:	1/18/10 2100		
Condition of Shipping Container:	N/A		
Type and Capacity of Sample Container:	10L glass		
Total Sample Volume (L):	10L		
Condition of Sampling Container:	good		
Sample Container Appropriate: (Y/N)	Y		
Custody Seals Intact: (Y/N)	N/A		
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y		
Sampler's Name Present on COC Form: (Y/N)	Y		

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	[✓ Conductivity] ~~(mS/cm) or~~ Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C100119.09d	12.0	11.0	8.1	0.13	40	24	0.04		am

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

O:\Bioassay WQ&Reports\BLANK FORMS\Forms with Weston Logo\SAMPLE RECEIPT Form- Weston 2006.doc
Last printed 1/9/2008 10:59:00 AM

Item 10
Supporting Document No. 2
December 14, 2016

Definitive WER Event 3

10/31/2010

Acute Daphnid-48 Hr Survival

Start Date:	10/31/2010 19:20	Test ID:	DMW 423	Sample ID:	Cu in DMW
End Date:	11/2/2010 16:22	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	0.8000	1.0000	1.0000	1.0000				
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	1.0000	0.0000	1.0000	1.0000				
8	0.0000	0.0000	0.0000	0.0000				
19	0.0000	0.0000	0.2000	0.0000				

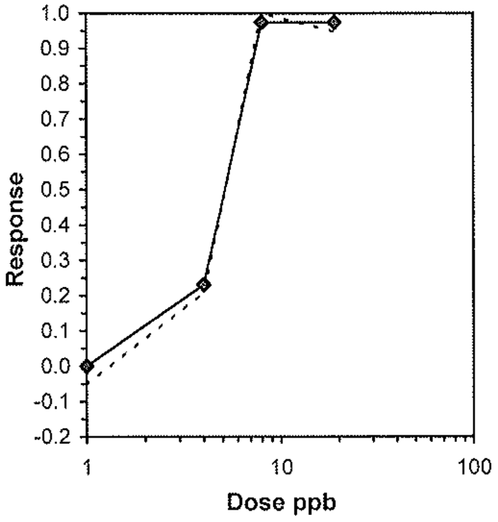
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.9500	1.0000	0.9500	0.8000	1.0000	10.526	4			0.9500	0.0000
1	1.0000	1.0526	1.0000	1.0000	1.0000	0.000	8	56.00	39.00	1.0000	-0.0526
4	0.7500	0.7895	0.7500	0.0000	1.0000	66.667	4	17.50	10.00	0.7500	0.2105
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
*19	0.0500	0.0526	0.0500	0.0000	0.2000	200.000	4	10.00	10.00	0.0500	0.9474

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.69275	0.868	-2.4914	9.54472
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	4	19	8.7178	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%	4.6886	2.8295	7.7690
10.0%	4.8696	2.6280	9.0234
20.0%	5.1205	1.7326	15.1332
Auto-2.6%	4.5938	2.8737	7.3436



Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in DMW
Start Date: 10/31/2010 19:20 End Date: 11/2/2010 16:22

Test ID: DMW 423
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5		4			
	2	2	Control	5		5			
	3	3	Control	5		5			
	4	4	Control	5		5			
	5	1	1.000	5		5			
	6	2	1.000	5		5			
	7	3	1.000	5		5			
	8	4	1.000	5		5			
	9	1	1.000	5		5			
	10	2	1.000	5		5			
	11	3	1.000	5		5			
	12	4	1.000	5		5			
	13	1	4.000	5		5			
	14	2	4.000	5		0			
	15	3	4.000	5		5			
	16	4	4.000	5		5			
	17	1	8.000	5		0			
	18	2	8.000	5		0			
	19	3	8.000	5		0			
	20	4	8.000	5		0			
	21	1	19.000	5		0			
	22	2	19.000	5		0			
	23	3	19.000	5		1			
	24	4	19.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER study
Client Sample ID:	Cu in DMW
Weston Test ID:	DMW423
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10 bow
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	8.4	2	20.5	6	0.19	2	8.2	92	92	0.00
Date: 10/31/10	1.5		8.2		20.6		0.20		8.3			
Sample ID:	3		8.3		20.6		0.20		8.3			
Dilutions (Tech): DS	6		8.4		20.7		0.19		8.3			
WQ Time: 1930	12		8.5		20.7		0.19		8.3			
Technician: KS	24/48		8.5/8.6		20.7/20.6		0.20/0.20		8.4/8.4			
24 hours	Control	2	8.6	2	19.3	6	0.20	4	8.22			
	1.5		8.6		19.6		0.20		8.3			
Date: 11-1-10	3		8.5		19.9		0.20		8.3			
WQ Time: 1355	6		8.6		20.0		0.20		8.3			
Technician: SH	12		8.6		20.2		0.20		8.3			
	24/48		8.6/8.5		19.7/19.8		0.20/0.20		8.3/8.3			
48 hours	Control	2	8.9	2	19.1	6	0.20	2	8.1			
	1.5		8.8		19.4		0.20		8.2			
Date: 11/2/10	3		8.8		19.8		0.20		8.2			
WQ Time: 1155	6		8.8		20.1		0.20		8.3			
Technician: X.P.	12		8.7		19.9		0.20		8.3			
	24/48		8.8/8.9		20.0/20.0		0.20/0.20		8.3/8.3			

Start Time:	1920 DS		
End Time:	①SH ~~1340~~ SH 1622		
Supplier:	Aquatic BioSystems		
Organism Batch:	ABS 0554	Age:	<24 hrs

① WP 11-2-10 SH

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: DMW 423 Cu in DMW	Client: City of San Diego	Client Sample ID: Cu in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 11/1/10 Time: 1635 Technician: JH		48 Hours Date: ①WC SH ~~1340~~ 11/2/10 Time: ②SH ~~1340~~ 1622 Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1	4	1	4	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
1.5 = <1	1	4	1	4	0
	2	4	1	4	0
	3	5	0	5	0
	4	5	0	5	0
3 = 1	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
6 = 1	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
12 = 4	1	5	0	5	0
	2	3	2	0	3
	3	5	0	5	0
	4	5	0	5	0
24 / 48 = 8 / = 19	1	0 0	5 5	— —	— —
	2	0 0	5 5	— —	— —
	3	1 0	4 5	0 —	1 —
	4	0 0	5 5	— —	— —

①WC 11/2/10 SH
②WP 11/2/10 SH

Acute Daphnid-48 Hr Survival

Start Date:	10/31/2010 14:40	Test ID:	CCSD8(1)	Sample ID:	Cu in CCSD8(1)
End Date:	11/2/2010 13:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Blank	1.0000	1.0000	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000
22	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000
40	1.0000	1.0000	1.0000	1.0000
58	1.0000	1.0000	1.0000	1.0000
95	1.0000	0.6000	0.6000	0.6000
147	0.0000	0.0000	0.0000	0.0000
261	0.0000	0.0000	0.0000	0.0000
331	0.0000	0.0000	0.0000	0.0000

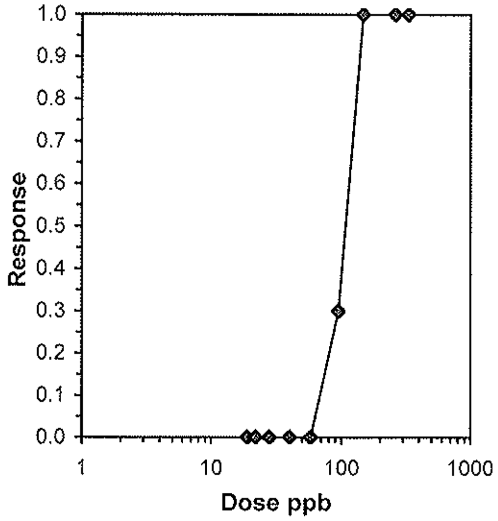
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Blank	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
19	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
22	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
40	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
58	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
95	0.7000	0.7000	0.7000	0.6000	1.0000	28.571	4	12.00	10.00	0.7000	0.3000
147	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
261	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
331	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.43373	0.896	3.23077	16.3108
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	95	147	118.174	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	102.79	83.06	127.20
5.0%	103.87	81.73	132.00
10.0%	104.91	79.33	138.74
20.0%	106.71	69.74	163.27
Auto-0.0%	102.79	83.06	127.20



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in CCSD8(1)
Start Date: 10/31/2010 14:40 End Date: 11/2/2010 13:40

Test ID: CCSD8(1)
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Blank	5		5			
	2	2	Blank	5		5			
	3	3	Blank	5		5			
	4	4	Blank	5		5			
	5	1	19.000	5		5			
	6	2	19.000	5		5			
	7	3	19.000	5		5			
	8	4	19.000	5		5			
	9	1	22.000	5		5			
	10	2	22.000	5		5			
	11	3	22.000	5		5			
	12	4	22.000	5		5			
	13	1	28.000	5		5			
	14	2	28.000	5		5			
	15	3	28.000	5		5			
	16	4	28.000	5		5			
	17	1	40.000	5		5			
	18	2	40.000	5		5			
	19	3	40.000	5		5			
	20	4	40.000	5		5			
	21	1	58.000	5		5			
	22	2	58.000	5		5			
	23	3	58.000	5		5			
	24	4	58.000	5		5			
	25	1	95.000	5		5			
	26	2	95.000	5		3			
	27	3	95.000	5		3			
	28	4	95.000	5		3			
	29	1	147.000	5		0			
	30	2	147.000	5		0			
	31	3	147.000	5		0			
	32	4	147.000	5		0			
	33	1	261.000	5		0			
	34	2	261.000	5		0			
	35	3	261.000	5		0			
	36	4	261.000	5		0			
	37	1	331.000	5		0			
	38	2	331.000	5		0			
	39	3	331.000	5		0			
	40	4	331.000	5		0			

Comments:

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER study
Client Sample ID:	Cu in CCSD8(1)
Weston Test ID:	C101031.0123
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	8.4	2	20.5	6	0.19	2	8.2	92	92	0.00
Date: 10/31/10	6		7.2		19.3		0.18		7.6			
Sample ID:	10.8		7.3		19.2		0.18		7.6			
Dilutions (Tech): DS	19.4		6.9		19.7		0.18		7.6			
WQ Time: 1712	35		7.1		19.9		0.18		7.5			
Technician: YS	63		7.2		19.5		0.18		7.5			
24 hours	Control	2	8.6	2	19.3	6	0.20	4	8.2			
	6		7.6		19.2		0.19		7.7			
Date: 11-1-10	10.8		7.7		19.5		0.19		7.6			
WQ Time: 1403	19.4		7.5		20.0		0.18		7.4			
Technician: SH	35		7.2		19.9		0.18		7.3			
	63		7.4		19.7		0.19		7.3			
48 hours	Control	2	8.9	2	19.1	6	0.20	2	8.1			
	6		8.4		19.4		0.19		7.6			
Date: 11/2/10	10.8		8.3		19.7		0.19		7.6			
WQ Time: 1220	19.4		8.1		20.1		0.19		7.6			
Technician: X.D.	35		7.9		20.1		0.19		7.6			
	63		7.7		19.9		0.19		7.6			

Start Time:	1440 DS		
End Time:	1340 SH		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24 hrs.

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	☒ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER Study
Client Sample ID:	Cu in CCSD8(1)
Weston Test ID:	C101031.0123
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	2	—	2	—	6	—	2	—			
Date: 10/31/10	113.4		7.0		19.7		0.18		7.5			
Sample ID:	204.1		7.2		19.7		0.18		7.4			
Dilutions (Tech): DS	367.3		7.3		19.5		0.18		7.4			
WQ Time: 1712	500		7.6		19.7		0.18		7.4			
Technician: ks	100% Blank		6.8		20.0		0.18		7.3			
24 hours	Control	2	—	2	—	6	—	4	—			
	113.4		7.5		20.0		0.19		7.3			
Date: 11-1-10	204.1		7.7		19.8		0.19		7.3			
WQ Time: 1903	367.3		8.0		19.8		0.19		7.3			
Technician: SH	500		8.0		19.9		0.19		7.4			
	100% Blank		7.0		20.3		0.19		7.3			
48 hours	Control	2	—	2	—	6	—	2	—			
	113.4		7.8		20.6		0.19		7.9			
Date: 11/2/10	204.1		7.9		20.1		0.19		7.8			
WQ Time: 1107	367.3		7.9		20.1		0.19		7.8			
Technician: X.P.	500		8.1		20.3		0.19		7.7			
	100% Blank		7.5		20.3		0.19		7.6			

Start Time:	1440 DS	
End Time:	1340 SH	
Supplier:	Aquatic Bio Systems	
Organism Batch:	ABS 0554	Age: <24 hrs.

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C10031.0123	City of San Diego	Cu in CCSD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours Date: 11/1/10 Time: 1650 Technician: JH		48 Hours Date: 11-2-10 Time: 1340 Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1	4	1	4	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
6 =19	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
10.8 =22	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
19.4 =28	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
35 =40	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
63 =58	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101031.0123	City of San Diego	Cu in CCSD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 11/1/10		Date: 11-2-10	
		Time: 1650		Time: 1340	
		Technician: JH		Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
113.4 =95	1	5	0	5	0
	2	4	1	3	1
	3	3	2	3	0
	4	4	1	3	1
204.1 =147	1	0	5		
	2	0	5		
	3	0	5		
	4	0	5		
367.3 =261	1	0	5		
	2	0	5		
	3	0	5		
	4	0	5		
500 =331	1	0	5		
	2	0	5		
	3	0	5		
	4	0	5		
100% Blank	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0

Acute Daphnid-48 Hr Survival

Start Date:	10/31/2010 15:55	Test ID:	DPR2	Sample ID:	Cu in DPR2
End Date:	11/2/2010 14:10	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Blank	1.0000	1.0000	1.0000	1.0000
15	1.0000	1.0000	1.0000	1.0000
18	1.0000	1.0000	1.0000	0.8000
25	1.0000	1.0000	1.0000	1.0000
38	0.8000	1.0000	1.0000	1.0000
60	1.0000	1.0000	1.0000	1.0000
97	1.0000	1.0000	1.0000	1.0000
167	0.2000	0.2000	0.2000	0.2000
288	0.0000	0.0000	0.0000	0.0000
382	0.0000	0.0000	0.0000	0.0000

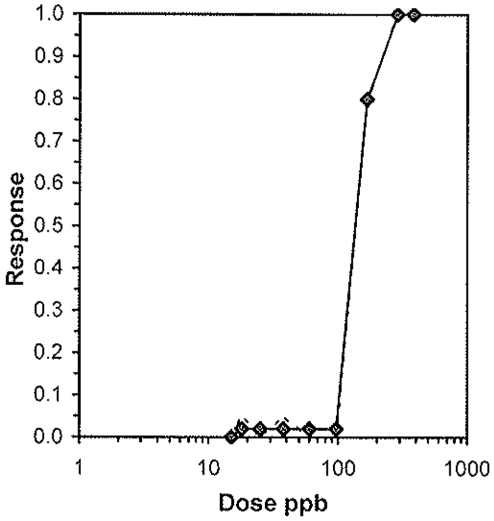
			Transform: Untransformed						1-Tailed			
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Blank	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4				1.0000	0.0000
15	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	0.000	2.480	0.0877	1.0000	0.0000
18	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	1.414	2.480	0.0877	0.9500	0.0500
25	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	0.000	2.480	0.0877	1.0000	0.0000
38	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	1.414	2.480	0.0877	0.9500	0.0500
60	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	0.000	2.480	0.0877	1.0000	0.0000
97	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	0.000	2.480	0.0877	1.0000	0.0000
*167	0.2000	0.2000	0.2000	0.2000	0.2000	0.000	4	22.627	2.480	0.0877	0.2000	0.8000
288	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000
382	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.55437	0.904	-2.4246	7.66092
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	97	167	127.275		0.08768	0.08768	0.31071	0.0025	2.8E-17	7, 24

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	136.21	105.65	175.63
5.0%	138.99	109.59	176.28
10.0%	137.24	107.69	174.90
20.0%	135.51	113.70	161.51
Auto-0.0%	136.21	105.65	175.63



Reviewed by:

Test: AD-Acute Daphnid	Test ID: DPR2
Species: CD-Ceriodaphnia dubia	Protocol: EPAA 02-EPA Acute
Sample ID: Cu in DPR2	Sample Type: CUSO-Copper sulfate
Start Date: 10/31/2010 15:55 End Date: 11/2/2010 14:10	Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Blank	5		5			
	2	2	Blank	5		5			
	3	3	Blank	5		5			
	4	4	Blank	5		5			
	5	1	15.000	5		5			
	6	2	15.000	5		5			
	7	3	15.000	5		5			
	8	4	15.000	5		5			
	9	1	18.000	5		5			
	10	2	18.000	5		5			
	11	3	18.000	5		5			
	12	4	18.000	5		4			
	13	1	25.000	5		5			
	14	2	25.000	5		5			
	15	3	25.000	5		5			
	16	4	25.000	5		5			
	17	1	38.000	5		4			
	18	2	38.000	5		5			
	19	3	38.000	5		5			
	20	4	38.000	5		5			
	21	1	60.000	5		5			
	22	2	60.000	5		5			
	23	3	60.000	5		5			
	24	4	60.000	5		5			
	25	1	97.000	5		5			
	26	2	97.000	5		5			
	27	3	97.000	5		5			
	28	4	97.000	5		5			
	29	1	167.000	5		1			
	30	2	167.000	5		1			
	31	3	167.000	5		1			
	32	4	167.000	5		1			
	33	1	288.000	5		0			
	34	2	288.000	5		0			
	35	3	288.000	5		0			
	36	4	288.000	5		0			
	37	1	382.000	5		0			
	38	2	382.000	5		0			
	39	3	382.000	5		0			
	40	4	382.000	5		0			

Comments:

Reviewed by:

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER Study
Client Sample ID:	Cu in DPR 2
Weston Test ID:	C101031.0223
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	8.4	2	20.5	6	0.19	2	8.2	92	92	0.00
Date: 10/31/10	6		7.9		18.7		0.43		7.5			
Sample ID:	10.8		8.2		18.8		0.44		7.5			
Dilutions (Tech): DS	19.4		8.1		18.7		0.43		7.5			
WQ Time: 1722	35		8.3		18.7		0.44		7.5			
Technician: KB	63		8.6		18.6		0.43		7.5			
24 hours	Control	2	8.6	2	19.3	6	0.20	4	8.2			
	6		7.9		19.9		0.43		7.5			
Date: 11-1-10	10.8		8.0		19.9		0.44		7.7			
WQ Time: 1412	19.4		7.9		19.9		0.44		7.7			
Technician: SH	35		8.1		19.7		0.44		7.7			
	63		7.9		19.9		0.44		7.7			
48 hours	Control	2	8.9	2	19.1	6	0.20	2	8.1			
	6		8.0		19.9		0.43		7.5			
Date: 11/2/10	10.8		8.2		19.8		0.45		7.6			
WQ Time: 1225	19.4		8.3		19.6		0.45		7.7			
Technician: X.P.	35		8.0		19.5		0.45		7.7			
	63		7.9		19.9		0.44		7.7			

Start Time:	1555 DS	
End Time:	1410 SH	
Supplier:	Aquatic Bio Systems	
Organism Batch:	ABS 0554	Age: <24hrs

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER Study
Client Sample ID:	Cu in DPR7
Weston Test ID:	C101031. 0223
Species:	Ceriodaphnia dubia

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	—	2	—	6	—	2	—	~~92~~	~~92~~	~~0.00~~ ① ab
Date: 10/31/10	113.4		8.6		19.8		0.45		7.5			
Sample ID:	204.1		8.7		20.9		0.44		7.5			
Dilutions (Tech): DS	367.3		8.8		20.8		0.43		7.5			
WQ Time: 1722	500		8.9		20.7		0.43		7.5			
Technician: VS	100% blank		8.6		20.9		0.43		7.5			
24 hours	~~Control~~	2	—	2	—	6	—	4	—			
	113.4		8.1		20.0		0.49		7.7			
Date: 11-1-10	204.1		8.3		19.6		0.49		7.7			
WQ Time: 1412	367.3		8.2		20.0		0.43		7.7			
Technician: SH	500		8.4		20.0		0.44		7.8			
	100% BLANK		8.1		19.8		0.44		7.7			
48 hours	Control	2	—	2	—	6	—	2	—			
	113.4		8.3		19.8		0.45		7.7			
Date: 11/2/10	204.1		8.3		19.6		0.45		7.8			
WQ Time: 1235	367.3		8.4		20.0		0.45		7.8			
Technician: X.R.	500		8.4		19.8		0.44		7.8			
	100% Blank		8.2		19.9		0.44		7.8			

① WP 5/19/11 ab

Start Time:	1555 DS		
End Time:	1410 SH		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	< 24hrs

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	___ ≥ 90% Survival in Control

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101031.0223	City of San Diego	Cu in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 11-1-10		Date: 11-2-10	
		Time: 1645		Time: 1410	
		Technician: SH		Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1	4	1	4	SH① ~~1~~ 0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
6 =15	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
10.8 =18	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	4	1	4	0
19.4 =25	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
35 =38	1	4	1	4	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
63 =60	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0

① IE 11-2-10 SH

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101031.0223	City of San Diego	Cu in DPR2

SURVIVAL DATA

24 Hours — Date: 11/1/10 — Time: 1650 — Technician: KS

48 Hours — Date: 11-2-10 — Time: 1410 — Technician: SH

Conc.	Rep	24 Hours # Alive	24 Hours # Dead	48 Hours # Alive	48 Hours # Dead
Control	1				
	2				
	3				
	4				
113.4 =97	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
204.1 =167	1	4	1	1	3
	2	2	3	1	1
	3	2	3	1	1NB
	4	3	2	1	2
367.3 =288	1	0	5		
	2	0	5		
	3	0	5		
	4	0	5		
500 =382	1	0	5		
	2	0	5		
	3	0	5		
	4	0	5		
100% Blank	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0

Acute Daphnid-48 Hr Survival

Start Date:	10/31/2010 18:50	Test ID:	DMW 423	Sample ID:	Zn in DMW
End Date:	11/2/2010 16:54	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Control	1.0000	1.0000	1.0000	1.0000
14	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000
44	1.0000	1.0000	1.0000	1.0000
73	1.0000	1.0000	1.0000	0.8000
141	1.0000	1.0000	1.0000	1.0000
248	0.8000	0.8000	0.4000	0.4000
481	0.0000	0.0000	0.0000	0.0000
825	0.0000	0.0000	0.0000	0.0000

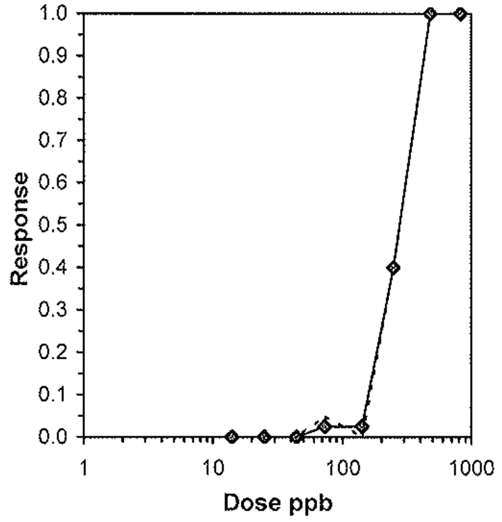
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
14	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
25	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
44	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
73	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
141	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
*248	0.6000	0.6000	0.6000	0.4000	0.8000	38.490	4	10.00	10.00	0.6000	0.4000
481	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
825	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.69367	0.896	-0.2027	3.1056
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	141	248	186.997	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	262.27	188.89	364.16
5.0%	269.48	192.55	377.14
10.0%	270.76	185.41	395.40
20.0%	273.27	162.21	460.35
Auto-0.0%	262.27	188.89	364.16



Reviewed by:

Test: AD-Acute Daphnid
Test ID: DMW423
Species: CD-Ceriodaphnia dubia
Protocol: EPAA 02-EPA Acute
Sample ID: Zn in DMW
Sample Type: ZNSO-Zinc sulfate
Start Date: 10/31/2010 18:50
End Date: 11/2/2010 16:54
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5		5			
	2	2	Control	5		5			
	3	3	Control	5		5			
	4	4	Control	5		5			
	5	1	14.000	5		5			
	6	2	14.000	5		5			
	7	3	14.000	5		5			
	8	4	14.000	5		5			
	9	1	25.000	5		5			
	10	2	25.000	5		5			
	11	3	25.000	5		5			
	12	4	25.000	5		5			
	13	1	44.000	5		5			
	14	2	44.000	5		5			
	15	3	44.000	5		5			
	16	4	44.000	5		5			
	17	1	73.000	5		5			
	18	2	73.000	5		5			
	19	3	73.000	5		5			
	20	4	73.000	5		4			
	21	1	141.000	5		5			
	22	2	141.000	5		5			
	23	3	141.000	5		5			
	24	4	141.000	5		5			
	25	1	248.000	5		4			
	26	2	248.000	5		4			
	27	3	248.000	5		2			
	28	4	248.000	5		2			
	29	1	481.000	5		0			
	30	2	481.000	5		0			
	31	3	481.000	5		0			
	32	4	481.000	5		0			
	33	1	825.000	5		0			
	34	2	825.000	5		0			
	35	3	825.000	5		0			
	36	4	825.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER Study
Client Sample ID:	Zn in DMW
Weston Test ID:	DMW 423
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	8.2	2	19.8	6	0.19	2	8.2	92	92	0.00
Date: 10/31/10	18		8.1		20.2		0.19		8.2			
Sample ID:	32		8.2		20.2		0.19		8.2			
Dilutions (Tech): DS	56		8.1		20.2		0.19		8.2			
WQ Time: 1907	100		8.3		20.2		0.19		8.2			
Technician: KS	180		8.4		20.2		0.20		8.2			
24 hours	Control	2	8.8	2	19.2	6	0.20	4	8.1			
	18		9.0		19.5		0.20		7.9			
Date: 11-1-10	32		8.7		19.5		0.20		8.1			
WQ Time: 1140	56		9.0		19.2		0.19		8.2			
Technician: SH	100		9.1		19.0		0.20		8.3			
	180		9.0		19.3		0.20		8.3			
48 hours	Control	2	8.9	2	18.9	6	0.20	2	8.1			
	18		8.8		20.0		0.20		8.1			
Date: 11/2/10	32		8.8		19.8		0.19		8.2			
WQ Time: 1050	56		8.8		19.8		0.19		8.3			
Technician: X.P.	100		8.8		19.4		0.20		8.3			
	180		8.9		19.6		0.20		8.3			

Start Time:	1850 DS		
End Time:	1654 SH		
Supplier:	① ~~ABS 0~~ Aquatic Bio Systems gb		
Organism Batch:	ABS 0554	Age:	<24hrs

① WC 5/19/11 gb

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas creek WER Study
Client Sample ID:	Zn in DMW
Weston Test ID:	DMW 423
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	2	—	2	—	6	—	2	—			
Date: 10/31/10	320		8.2		20.3		0.20		8.2			
Sample ID:	560		8.4		20.1		0.20		8.2			
Dilutions (Tech): DS	1000		8.4		20.1		0.20		8.2			
WQ Time: 1907												
Technician: KS												
24 hours	Control	2	—	2	—	6	—	4	—			
	320		9.1		19.1		0.20		8.2			
Date: 11-1-10	560		9.1		18.9		0.20		8.2			
WQ Time: 1140	1000		9.0		18.8		0.20		8.1			
Technician: SH												
48 hours	Control	2	8.9	2	18.9	6	0.20	2	8.1			
	320		9.0		19.5		0.20		8.2			
Date: 11/2/10	560		8.9		19.5		0.20		8.2			
WQ Time: 1110	1000		9.0		19.4		0.20		8.2			
Technician: K.P.												

Start Time:	1850 DS	
End Time:	1654 SH	
Supplier:	Aquatic BioSystems	
Organism Batch:	ABS 0554	Age: <24hrs

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
DMW 423	City of San Diego	Zn in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 11/1/10		Date: 11-2-10	
		Time: 1515		Time: 1654	
		Technician: SH		Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
18 ≈14	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
32 =25	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
56 =44	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
100 =73	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	4	1	4	0
180 =141	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
DMW 423	City of San Diego	Zn in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 11/1/10		Date: 11-2-10	
		Time: 1515		Time: 1654	
		Technician: SH		Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
320 =248	1	5	0	4	1
	2	5	0	4	1
	3	4	1	2	2
	4	5	0	2	3
560 =491	1	5	0	0	5
	2	5	0	0	5
	3	3	2	0	3
	4	0	5		
1000 =825	1	0	5		
	2	0	5		
	3	0	5		
	4	0	5		
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

Acute Daphnid-48 Hr Survival

Start Date:	10/31/2010 18:30	Test ID:	CCSD8(1)	Sample ID:	Zn in CCSD8(1)
End Date:	11/2/2010 16:33	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Blank	1.0000	1.0000	1.0000	1.0000
62	1.0000	1.0000	1.0000	1.0000
78	0.8000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000
158	1.0000	0.8000	1.0000	1.0000
233	0.8000	0.8000	1.0000	1.0000
415	0.2000	0.2000	0.2000	0.6000
727	0.0000	0.0000	0.0000	0.0000
1091	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Blank	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
62	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
78	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
100	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
158	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
233	0.9000	0.9000	0.9000	0.8000	1.0000	12.830	4	14.00	10.00	0.9000	0.1000
*415	0.3000	0.3000	0.3000	0.2000	0.6000	66.667	4	10.00	10.00	0.3000	0.7000
727	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
1091	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

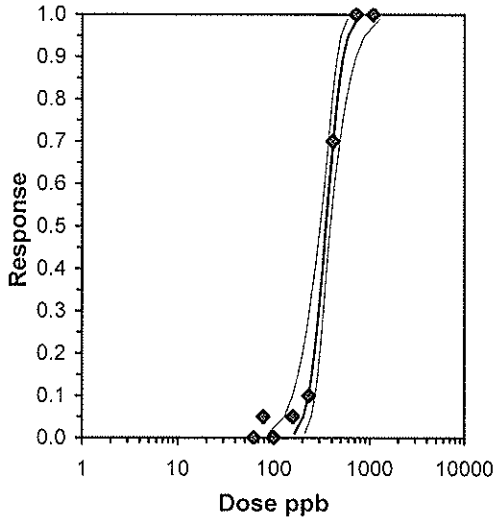
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.86055	0.896	0.97612	3.4997
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	233	415	310.958	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	7.08033	1.55389	4.0347	10.126	0	1.04354	12.5916	0.98	2.54377	0.14124	7
Intercept	-13.011	3.98864	-20.828	-5.193							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	164.135	88	212.447
EC05	3.355	204.858	129.093	249.484
EC10	3.718	230.55	158.038	272.336
EC15	3.964	249.681	180.888	289.344
EC20	4.158	266.011	201.115	304.021
EC25	4.326	280.869	219.955	317.646
EC40	4.747	322.096	272.844	358.372
EC50	5.000	349.757	306.726	390.22
EC60	5.253	379.795	339.802	431.167
EC75	5.674	435.541	390.364	525.258
EC80	5.842	459.869	409.42	572.272
EC85	6.036	489.947	431.494	634.336
EC90	6.282	530.602	459.572	724.269
EC95	6.645	597.145	502.732	884.789
EC99	7.326	745.301	591.469	1295.55



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Zn in CCSD8(I)
Start Date: 10/31/2010 18:30 End Date: 11/2/2010 16:33

Test ID: CCSD8(I)
Protocol: EPAA 02-EPA Acute
Sample Type: ZNSO-Zinc sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Blank	5		5			
	2	2	Blank	5		5			
	3	3	Blank	5		5			
	4	4	Blank	5		5			
	5	1	62.000	5		5			
	6	2	62.000	5		5			
	7	3	62.000	5		5			
	8	4	62.000	5		5			
	9	1	78.000	5		4			
	10	2	78.000	5		5			
	11	3	78.000	5		5			
	12	4	78.000	5		5			
	13	1	100.000	5		5			
	14	2	100.000	5		5			
	15	3	100.000	5		5			
	16	4	100.000	5		5			
	17	1	158.000	5		5			
	18	2	158.000	5		4			
	19	3	158.000	5		5			
	20	4	158.000	5		5			
	21	1	233.000	5		4			
	22	2	233.000	5		4			
	23	3	233.000	5		5			
	24	4	233.000	5		5			
	25	1	415.000	5		1			
	26	2	415.000	5		1			
	27	3	415.000	5		1			
	28	4	415.000	5		3			
	29	1	727.000	5		0			
	30	2	727.000	5		0			
	31	3	727.000	5		0			
	32	4	727.000	5		0			
	33	1	1091.000	5		0			
	34	2	1091.000	5		0			
	35	3	1091.000	5		0			
	36	4	1091.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER Study
Client Sample ID:	Zn in CCSD8(1)
Weston Test ID:	C101031.0123
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	8.2	2	19.8	6	0.19	2	8.2	92	92	0.00
Date: 10/31/10	32		6.8		20.3		0.18		7.5			
Sample ID:	56		7.0		20.3		0.18		7.4			
Dilutions (Tech): DS	100		7.1		20.4		0.18		7.4			
WQ Time: 1736	180		7.1		20.5		0.18		7.3			
Technician: KS	320		7.2		20.3		0.18		7.3			
24 hours	Control	2	8.8	2	19.2	6	0.20	4	8.1			
	32		7.8		19.0		0.19		7.6			
Date: 11-1-10	56		7.6		18.9		0.18		7.5			
WQ Time: 1330	100		7.5		18.8		0.18		7.4			
Technician: SH	180		7.5		18.7		0.19		7.3			
	320		7.4		19.1		0.18		7.2			
48 hours	Control	2	8.9	2	18.9	6	0.20	2	8.1			
	32		7.7		19.2		0.19		7.7			
Date: 11/2/10	56		7.9		19.1		0.19		7.7			
WQ Time: 1115	100		8.0		19.0		0.19		7.6			
Technician: X.P.	180		7.9		19.2		0.19		7.6			
	320		7.5		19.6		0.19		7.5			

Start Time:	1830 KS	
End Time:	1633 SH	
Supplier:	Aquatic Bio Systems	
Organism Batch:	ABS 0554	Age: < 24 hrs

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER Study
Client Sample ID:	Zn in CCSD8 (1)
Weston Test ID:	C101031.0123
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	2	—	2	—	6	—	2	—			
Date: 10/31/10	560		7.2		20.1		0.18		7.3			
Sample ID:	1000		7.3		20.1		0.18		7.2			
Dilutions (Tech): DS	1800		7.1		20.1		0.19		7.1			
WQ Time: 1736	100% Blank		6.8		20.0		0.18		7.3			
Technician: KS												
24 hours	~~Control~~	2	—	2	—	6	—	4	—			
	560		7.9		19.0		0.19		7.2			
Date: 11-1-10	1000		7.8		18.7		0.19		7.4			
WQ Time: 1330	1800		7.3		18.5		0.19		7.1			
Technician: SH	100% Blank		①SH ~~8.1~~ 7.0		20.3		0.19		7.3			
48 hours	~~Control~~	2	—	2	—	6	—	2	—			
	560		7.6		19.3		0.19		7.5			
Date: 11/2/10	1000		7.5		19.0		0.19		7.4			
WQ Time: 1125	1800		7.6		19.1		0.19		7.3			
Technician: KP												

①WN 11-1-10 SH

Start Time:	1830 KS		
End Time:	1633 SH		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 8554	Age:	<24 hrs

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptability:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: 0101031.0123	Client: City of San Diego	Client Sample ID: Zn in ~~DPT~~ CCSD8(1) ①KS

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 11-1-10		Date: 11-2-10	
		Time: ~~1515~~ ②(WT)SH 1540		Time: 1633	
		Technician: SH		Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
32 =62	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
56 =78	1	5	0	4	1NB
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
100 =100	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
180 =158	1	5	0	5	0
	2	5	0	4	1NB
	3	5	0	5	0
	4	5	0	5	0
320 =233	1	5	0	4	1NB
	2	5	0	4	1NB
	3	5	0	5	0
	4	5	0	5	0

① WP 10/31/10 KS
② WT 11-1-10 SH

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101031-0123	City of San Diego	Zn in CCSD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 11-1-10		Date: 11-2-10	
		Time: 1540		Time: 1633	
		Technician: SH		Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
560 =415	1	2	2 (2NB)	1	1
	2	2	1(2NB)	1	1
	3	4	1	1	2 (1NB)
	4	4	1	3	1
1000 =727	1	2	2 (1NB)	0	1 (1NB)
	2	1	4NB	0	1NB
	3	0	1 (4NB)	0	——
	4	0	1 (4NB)	0	——
1800 =1091	1	①SH	①SH	0	1 (4NB)
	2			0	2 (3NB)
	3			0	1 (4NB)
	4			0	3 (2NB)
100% Blank	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
	1				
	2				
	3				
	4				

①DC 11-1-10 SH

Acute Daphnid-48 Hr Survival

Start Date:	10/31/2010 18:10	Test ID:	DPR2	Sample ID:	Zn in DPR2
End Date:	11/2/2010 16:10	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Blank	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000
69	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000
161	1.0000	1.0000	1.0000	1.0000
274	0.8000	0.4000	1.0000	0.8000
456	0.0000	0.0000	0.0000	0.0000
789	0.0000	0.0000	0.0000	0.0000
1445	0.0000	0.2000	0.0000	0.0000

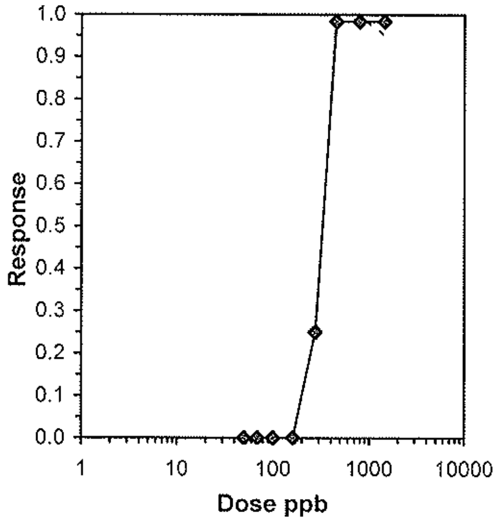
			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Blank	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
50	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
69	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
100	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
161	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
274	0.7500	0.7500	0.7500	0.4000	1.0000	33.555	4	12.00	10.00	0.7500	0.2500
456	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
789	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
*1445	0.0500	0.0500	0.0500	0.0000	0.2000	200.000	4	10.00	10.00	0.0500	0.9500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.60932	0.896	-1.3015	10.1898
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	274	1445	629.23	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%	315.75	244.08	408.45
10.0%	319.46	235.56	433.25
20.0%	324.99	199.51	529.39
Auto-1.7%	313.07	247.23	396.46



Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Zn in DPR2
Start Date: 10/31/2010 18:10 End Date: 11/2/2010 16:10

Test ID: DPR2
Protocol: EPAA 02-EPA Acute
Sample Type: ZNSO-Zinc sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Blank	5		5			
	2	2	Blank	5		5			
	3	3	Blank	5		5			
	4	4	Blank	5		5			
	5	1	50.000	5		5			
	6	2	50.000	5		5			
	7	3	50.000	5		5			
	8	4	50.000	5		5			
	9	1	69.000	5		5			
	10	2	69.000	5		5			
	11	3	69.000	5		5			
	12	4	69.000	5		5			
	13	1	100.000	5		5			
	14	2	100.000	5		5			
	15	3	100.000	5		5			
	16	4	100.000	5		5			
	17	1	161.000	5		5			
	18	2	161.000	5		5			
	19	3	161.000	5		5			
	20	4	161.000	5		5			
	21	1	274.000	5		4			
	22	2	274.000	5		2			
	23	3	274.000	5		5			
	24	4	274.000	5		4			
	25	1	456.000	5		0			
	26	2	456.000	5		0			
	27	3	456.000	5		0			
	28	4	456.000	5		0			
	29	1	789.000	5		0			
	30	2	789.000	5		0			
	31	3	789.000	5		0			
	32	4	789.000	5		0			
	33	1	1445.000	5		0			
	34	2	1445.000	5		1			
	35	3	1445.000	5		0			
	36	4	1445.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER study
Client Sample ID:	Zn in DPR2
Weston Test ID:	C101031.0223
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	8.2	2	19.8	6	0.19	2	8.2	92	92	0.00
Date: 10/31/10	32		8.3		20.3		0.43		7.7			
Sample ID:	56		8.6		20.4		0.43		7.6			
Dilutions (Tech): DS	100		8.7		20.4		0.43		7.6			
WQ Time: 1549	180		8.8		20.4		0.43		7.6			
Technician: VS	320		8.8		20.1		0.43		7.5			
24 hours	Control	2	8.8	2	19.2	6	0.20	4	8.1			
	32		8.2		19.5		0.43		7.7			
Date: 11/1/10	56		8.0		19.6		0.43		7.7			
WQ Time: 1220	100		8.1		19.6		0.44		7.7			
Technician: SH	180		8.3		19.2		0.43		7.7			
	320		8.3		19.2		0.44		7.6			
48 hours	Control	2	8.9	2	18.9	6	0.20	2	8.1			
	32		8.5		19.1		0.44		7.6			
Date: 11/2/10	56		8.3		19.1		0.44		7.6			
WQ Time: 1135	100		8.1		19.5		0.44		7.7			
Technician: X.P.	180		8.0		19.3		0.44		7.7			
	320		8.0		19.2		0.44		7.7			

Start Time:	1810 DS		
End Time:	1610 SH		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24 hrs

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptability:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER Study
Client Sample ID:	Zn in PPR2
Weston Test ID:	C101031.0223
Species:	*Ceriodaphnia dubia*

Date Received:	10/31/10
Date Test Started:	10/31/10
Date Test Ended:	11/2/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	2	—	2	—	6	—	2	—			
Date: 10/31/10	560		8.9		20.0		0.43		7.5			
Sample ID:	1000		8.9		20.0		0.43		7.4			
Dilutions (Tech): DS	1800		8.9		20.0		0.44		7.3			
WQ Time: 1549	100% Blank		8.6		20.9		① KS ~~0.44~~ 0.43		7.5			
Technician: KS												
24 hours	~~Control~~	2	—	2	—	6	—	4	—			
	560		8.3		19.3		0.44		7.6			
Date: 11/1/10	1000		8.2		19.4		0.44		7.5			
WQ Time: 1220	1800		8.3		19.4		0.44		7.4			
Technician: SH	100% Blank		8.1		19.8		0.44		7.7			
48 hours	Control	2	—	2	—	6	—	2	—			
	560		8.7		19.0		0.44		7.7			
Date: 11/2/10	1000		8.5		19.1		0.44		7.7			
WQ Time: 1145	1800		8.1		19.0		0.44		7.6			
Technician: X.P.	100% Blank		8.2		19.8		0.44		7.6			

① WP 10/31/10 KS

Start Time:	1810 DS		
End Time:	1610 SH		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24 hrs

Dilution Water Batch:	DMW 423
Hobo Temp. No.:	269090
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C101031-0223	Client: City of San Diego	Client Sample ID: Zn in DPR 2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 11/1/10		Date: 11-2-10	
		Time: 1615		Time: 1610	
		Technician: SH		Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
32 =50	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
56 =69	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
100 =100	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
180 =161	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
320 =274	1	5	0	4	1
	2	2	3	2	0
	3	5	0	5	0
	4	5	0	4	1

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C101031.0223	Client: City of San Diego	Client Sample ID: Zn in DPR2

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date: 11/1/10		Date: 11-2-10	
		Time: 1615		Time: 1610	
		Technician: SH		Technician: SH	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
560 =456	1	1	4	0	1
	2	2	2 (1NB)	0	2
	3	1	4	0	1NB
	4	1	2 (2NB)	0	1
1000 =789	1	2	2 (1NB)	0	1 (1NB)
	2	1	2(2NB)	0	1
	3	2	3NB	0	2
	4	0	3(2NB) ①SH	—	—
1800 =1446	1	0	5	—	—
	2	1	3 (1NB)	1	0
	3	0	5	—	—
	4	0	5	—	—
100% Blank	1	5	0	5	0
	2	5	0	5	0
	3	5	0	5	0
	4	5	0	5	0
	1				
	2				
	3				
	4				

①WN 11-1-10 SH

Item 10
Supporting Document No. 2
December 14, 2016

Weston Tox Lab.

WESTON SOLUTIONS

☒ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

31582

DATE 10-30-10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: City of San Diego / Chollas Creek WER Study / 06754.100.002.0005.01

PROJECT MANAGER / CONTACT: Dave Renfrew

COMPANY / CLIENT: Weston Solutions

ADDRESS: see above

PHONE / FAX / EMAIL: see above

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: C.dubia 48 hr. acute WER for Cu and Zn.	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
CC-SO8(1)	CC-SO8(1)	10/30/10	1548	SW	G/19L	2	X	ICE	11.9	C101031.01 a,b
DPR2	DPR2	↓	2005	SW	G/19L	2	X	ICE	9.5-9.9	C101031.02 a,b

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ______

Container Code: [✓ G=glass] P=plastic B=bags ☐ O=other ______

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS [✓ ☐ Client drop off] ☐ Other ______

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day [✓ ☐ Standard] ☐ Other ______

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other ______

SAMPLED BY: PRINT
B. Isham
L. Campagna

SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS

	RELINQUISHED BY				RECEIVED BY			
	Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1.	Garth Engelhorn		Weston	10-31-10 0810	Kasey Skrivseth	Kasey Skrivseth	Weston	10/31/10 0810
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: City of San Diego

Project: Chollas Creek WER Study

Weston Sample ID:	C101031.01 a,b	C101031.02 a,b	
Client Sample ID:	CC-SD8(1)	DPR 2	
Renewal Sample (Y/N):	N	N	
Date/Time Received:	10/31/10 0810	10/31/10 0810	
Airbill #:	N/A	N/A	
Sample Tracking Information Kept for Records: (Y/N)	N/A	N/A	
Collection Date/Time:	10/30/10 1548	10/30/10 2005	
Condition of Shipping Container:	good	good	
Type and Capacity of Sample Container:	glass 20L	glass 20L	
Total Sample Volume (L):	19L x2	19L x2	
Condition of Sampling Container:	good	good	
Sample Container Appropriate: (Y/N)	Y	Y	
Custody Seals Intact: (Y/N)	N/A	N/A	
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	
Sampler's Name Present on COC Form: (Y/N)	Y	Y	

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	[✓ Conductivity] (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C101031.01a	11.9	6.6	7.0	0.18	48	28	0.03	<0.5	KS/JH
C101031.01 b	11.9	7.1	7.1	0.18	48	28	0.05	<0.5	↓
C101031.02 a	9.9	9.0	7.3	0.43	100	52	0.01	<0.5	
C101031.02 b	9.5	9.2	7.3	0.43	100	56	0.04	<0.5	

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

Item 10
Supporting Document No. 2
December 14, 2016

Definitive WER Event 4

12/21/2010

Acute Daphnid-48 Hr Survival

Start Date:	12/21/2010 17:15	Test ID:	DMW 425	Sample ID:	Cu in DMW 425
End Date:	12/23/2010 15:20	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Control	0.8000	1.0000	1.0000	1.0000
1	0.8000	0.4000	1.0000	0.6000
2	0.6000	1.0000	1.0000	0.6000
4	0.0000	0.4000	0.4000	0.6000
11	0.2000	0.2000	0.0000	0.4000
25	0.0000	0.2000	0.4000	0.0000

			Transform: Untransformed					1-Tailed				
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9500	1.0000	0.9500	0.8000	1.0000	10.526	4				0.9500	0.0000
1	0.7000	0.7368	0.7000	0.4000	1.0000	36.886	4	1.709	2.410	0.3525	0.7000	0.2632
2	0.8000	0.8421	0.8000	0.6000	1.0000	28.868	4	1.026	2.410	0.3525	0.8000	0.1579
*4	0.3500	0.3684	0.3500	0.0000	0.6000	71.903	4	4.103	2.410	0.3525	0.3500	0.6316
*11	0.2000	0.2105	0.2000	0.0000	0.4000	81.650	4	5.128	2.410	0.3525	0.2000	0.7895
*25	0.1500	0.1579	0.1500	0.0000	0.4000	127.657	4	5.470	2.410	0.3525	0.1500	0.8421

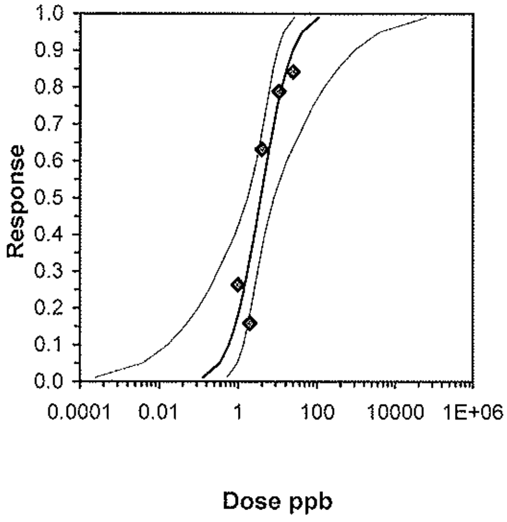
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94981	0.884	-0.1626	-0.8972
Bartlett's Test indicates equal variances (p = 0.74)	2.71832	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	2	4	2.82843		0.35246	0.37101	0.451	0.04278	7.5E-05	5, 18

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	1.58779	0.52566	0.5575	2.61808	0	2.71444	7.81473	0.44	0.57581	0.62981	4
Intercept	4.08574	0.3606	3.37896	4.79251							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	0.12902	0.00024	0.52056
EC05	3.355	0.34663	0.00396	0.97777
EC10	3.718	0.58706	0.01725	1.38572
EC15	3.964	0.83764	0.04606	1.77166
EC20	4.158	1.11109	0.09947	2.1769
EC25	4.326	1.41583	0.19013	2.63073
EC40	4.747	2.60764	0.86435	4.77213
EC50	5.000	3.76537	1.78624	8.21596
EC60	5.253	5.4371	2.9986	17.4132
EC75	5.674	10.0139	5.34032	80.6299
EC80	5.842	12.7604	6.43565	154.559
EC85	6.036	16.9262	7.89192	334.464
EC90	6.282	24.151	10.0749	894.514
EC95	6.645	40.902	14.2612	3900.28
EC99	7.326	109.889	26.7603	63163.5



Reviewed by:

Test: AD-Acute Daphnid
Test ID: DMW 425
Species: CD-Ceriodaphnia dubia
Protocol: EPAA 02-EPA Acute
Sample ID: Cu in DMW425
Sample Type: CUSO-Copper sulfate
Start Date: 12/21/2010 17:15
End Date: 12/23/2010 15:20
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5		4			
	2	2	Control	5		5			
	3	3	Control	5		5			
	4	4	Control	5		5			
	5	1	1.000	5		4			
	6	2	1.000	5		2			
	7	3	1.000	5		5			
	8	4	1.000	5		3			
	9	1	2.000	5		3			
	10	2	2.000	5		5			
	11	3	2.000	5		5			
	12	4	2.000	5		3			
	13	1	4.000	5		0			
	14	2	4.000	5		2			
	15	3	4.000	5		2			
	16	4	4.000	5		3			
	17	1	11.000	5		1			
	18	2	11.000	5		1			
	19	3	11.000	5		0			
	20	4	11.000	5		2			
	21	1	25.000	5		0			
	22	2	25.000	5		1			
	23	3	25.000	5		2			
	24	4	25.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Cu in DMW
Weston Test ID:	DMW 425
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control 1	2	9.0	2	20.1	6	0.20	4	8.6	96	70	0.01
Date: 12/21/10	1.5		8.9		19.9		0.19		8.6			
Sample ID:	3		8.9		20.0		0.19		8.5			
Dilutions (Tech): am	6		8.8		19.6		0.19		8.5			
WQ Time: 1505	12		8.7		19.7		0.19		8.5			
Technician: am	24/48		8.7/8.8		19.7/20.1		0.19/0.19		8.4/8.4			
24 hours	Control	1	9.1	1	19.6	5	0.20	4	8.6			
	1.5		9.2		19.5		0.19		8.6			
Date: 12/22/10	3		9.3		19.4		0.19		8.6			
WQ Time: 1425	6		9.3		19.6		0.19		8.6			
Technician: am	12		9.3		19.5		0.19		8.6			
	24/48		9.2/9.2		19.4/19.8		0.20/0.19		8.6/8.6			
48 hours	Control	2	8.9	2	20.0	6	0.21	2	8.3			
	1.5		8.8		19.9		0.20		8.2			
Date: 12/23/10	3		8.8		19.7		0.20		8.4			
WQ Time: 1106	6		8.7		19.7		0.20		8.4			
Technician: SH	12		9.0		20.0		0.20		8.4			
	24/48		8.7/8.8		19.5/19.5		0.20/0.20		8.3/8.3			

Start Time:	1715 KS	
End Time:	1520 KC	
Supplier:	Aquatic Bio Systems	
Organism Batch:	ABS 0554	Age: < 24hrs

Dilution Water Batch:	DMW 425
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptability:	☒ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
DMW 425	City of San Diego	Cu in DMW

SURVIVAL DATA

<table>
<tr><th rowspan="4">Conc.</th><th rowspan="4">Rep</th><th colspan="4">24 Hours</th><th colspan="4">48 Hours</th></tr>
<tr><td colspan="4">Date:</td><td colspan="4">Date: 12/23/10</td></tr>
<tr><td colspan="4">Time:</td><td colspan="4">Time: 1520</td></tr>
<tr><td colspan="4">Technician:</td><td colspan="4">Technician: KC</td></tr>
<tr><th></th><th></th><th colspan="2"># Alive</th><th colspan="2"># Dead</th><th colspan="2"># Alive</th><th colspan="2"># Dead</th></tr>
<tr><td rowspan="4">Control 1</td><td>1</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">4</td><td colspan="2">1</td></tr>
<tr><td>2</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">5</td><td colspan="2">0</td></tr>
<tr><td>3</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">5</td><td colspan="2">0</td></tr>
<tr><td>4</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">5</td><td colspan="2">0</td></tr>
<tr><td rowspan="4">1.5</td><td>1</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">5</td><td colspan="2">0</td></tr>
<tr><td>2</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">5</td><td colspan="2">0</td></tr>
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<tr><td>2</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">2</td><td colspan="2">3</td></tr>
<tr><td>3</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">5</td><td colspan="2">0</td></tr>
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<tr><td>3</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">5</td><td colspan="2">0</td></tr>
<tr><td>4</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">3</td><td colspan="2">2</td></tr>
<tr><td rowspan="4">12
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<tr><td>2</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">2</td><td colspan="2">3</td></tr>
<tr><td>3</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">2</td><td colspan="2">3</td></tr>
<tr><td>4</td><td colspan="2"></td><td colspan="2"></td><td colspan="2">3</td><td colspan="2">2</td></tr>
<tr><td rowspan="4">24 / 48
=11 / =28</td><td>1</td><td></td><td></td><td></td><td></td><td>1</td><td>4</td><td>0</td><td>5</td></tr>
<tr><td>2</td><td></td><td></td><td></td><td></td><td>1</td><td>4</td><td>1</td><td>4</td></tr>
<tr><td>3</td><td></td><td></td><td></td><td></td><td>0</td><td>5</td><td>2</td><td>3</td></tr>
<tr><td>4</td><td></td><td></td><td></td><td></td><td>2</td><td>3</td><td>0</td><td>5</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>alive</td><td>dead</td><td>alive</td><td>dead</td></tr>
</table>

Acute Daphnid-48 Hr Survival

Start Date:	12/21/2010 15:15	Test ID:	CCSD8(1)	Sample ID:	Cu in CCSD8(1)
End Date:	12/23/2010 14:03	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Blank	1.0000	1.0000	1.0000	1.0000
9	1.0000	1.0000	1.0000	1.0000
12	0.8000	1.0000	1.0000	1.0000
16	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000
44	1.0000	1.0000	0.8000	1.0000
67	0.4000	0.4000	0.2000	0.0000
110	0.0000	0.0000	0.0000	0.0000
183	0.0000	0.0000	0.0000	0.0000
225	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Blank	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
9	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
12	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
16	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
44	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
*67	0.2500	0.2500	0.2500	0.0000	0.4000	76.594	4	10.00	10.00	0.2500	0.7500
110	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
183	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
225	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

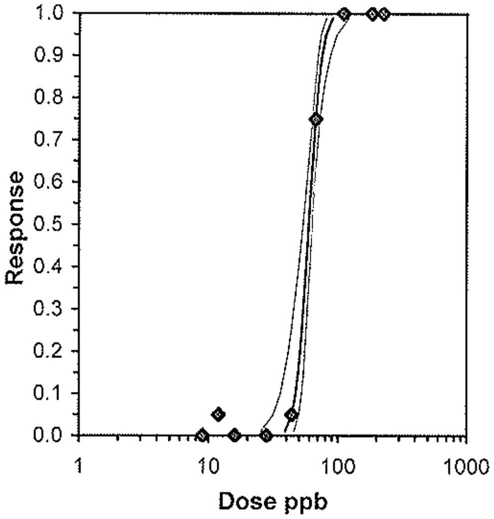
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.78175	0.896	-1.1975	3.60882
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	44	67	54.2955	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	12.7005	2.94844	6.92158	18.4795	0	0.89595	14.0671	1	1.77297	0.07874	7
Intercept	-17.518	5.33511	-27.974	-7.0608							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	38.8864	25.357	45.8353
EC05	3.355	44.0003	31.7417	50.004
EC10	3.718	46.9961	35.756	52.4125
EC15	3.964	49.1316	38.7302	54.1267
EC20	4.158	50.8979	41.2535	55.5506
EC25	4.326	52.4638	43.5317	56.8243
EC40	4.747	56.6264	49.7057	60.3349
EC50	5.000	59.288	53.6324	62.7855
EC60	5.253	62.0747	57.5365	65.7136
EC75	5.674	66.9999	63.3072	72.407
EC80	5.842	69.0611	65.265	75.813
EC85	6.036	71.5439	67.3829	80.2716
EC90	6.282	74.795	69.9072	86.5501
EC95	6.645	79.8873	73.5479	97.1332
EC99	7.326	90.3934	80.4815	121.222



Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in CCSD8 (I)
Start Date: 12/21/2010 15:15 End Date: 12/23/2010 14:03

Test ID: CCSD8 (I)
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Blank	5		5			
	2	2	Blank	5		5			
	3	3	Blank	5		5			
	4	4	Blank	5		5			
	5	1	9.000	5		5			
	6	2	9.000	5		5			
	7	3	9.000	5		5			
	8	4	9.000	5		5			
	9	1	12.000	5		4			
	10	2	12.000	5		5			
	11	3	12.000	5		5			
	12	4	12.000	5		5			
	13	1	16.000	5		5			
	14	2	16.000	5		5			
	15	3	16.000	5		5			
	16	4	16.000	5		5			
	17	1	28.000	5		5			
	18	2	28.000	5		5			
	19	3	28.000	5		5			
	20	4	28.000	5		5			
	21	1	44.000	5		5			
	22	2	44.000	5		5			
	23	3	44.000	5		4			
	24	4	44.000	5		5			
	25	1	67.000	5		2			
	26	2	67.000	5		2			
	27	3	67.000	5		1			
	28	4	67.000	5		0			
	29	1	110.000	5		0			
	30	2	110.000	5		0			
	31	3	110.000	5		0			
	32	4	110.000	5		0			
	33	1	183.000	5		0			
	34	2	183.000	5		0			
	35	3	183.000	5		0			
	36	4	183.000	5		0			
	37	1	225.000	5		0			
	38	2	225.000	5		0			
	39	3	225.000	5		0			
	40	4	225.000	5		0			

Comments:

Reviewed by: EB

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Cu in SD8(1)
Weston Test ID:	C101221.0123
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	9.0	2	20.1	6	~~0.14~~ 0.20 am	4	8.6	96	70	0.01
Date: 12/21/10	6		9.1		19.7		0.14		7.7			
Sample ID:	10.8		9.2		19.8		0.14		7.7			
Dilutions (Tech): am	19.4		9.2		19.9		0.14		7.6			
WQ Time: 1512	35		9.1		19.6		0.14		7.6			
Technician: am	63		9.3		19.7		0.14		7.6			
24 hours	Control	1	9.1	1	19.6	5	0.20	4	8.6			
	6		8.9		19.8		0.14		7.9			
Date: 12/22/10	10.8		8.8		19.7		0.14		7.9			
WQ Time: 1433	19.4		8.9		19.8		0.14		7.8			
Technician: am	35		9.0		19.4		0.14		7.8			
	63		8.9		19.5		0.14		7.8			
48 hours	Control	2	8.9	2	20.0	6	0.21	2	8.3			
	6		8.3		19.8		0.14		7.7			
Date: 12-23-16	10.8		8.6		19.8		0.14		7.7			
WQ Time: 1658	19.4		8.5		20.0		0.14		7.7			
Technician: SH	35		8.7		19.6		0.14		7.7			
	63		8.5		19.6		0.14		7.7			

Start Time:	1515 KS		
End Time:	1403 RSM		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS0554	Age:	< 24 hrs

Dilution Water Batch:	DMW 425
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

①WC 12/21/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Cu in SD8(1)
Weston Test ID:	C101221.0123
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	2	—	2	—	6	—	4	—	~~96~~	~~70~~	~~0.01~~ ①ab
Date: 12/21/10	113.4		9.2		20.1		0.14		7.6			
Sample ID:	204.1		9.2		20.0		0.14		7.6			
Dilutions (Tech): am	367.3		9.4		19.8		0.14		7.6			
WQ Time: 1512	500		9.4		19.9		0.14		7.5			
Technician: am	Blank 100%		9.2		19.7		0.14		7.9			
24 hours	~~Control~~	1	—	1	—	5	—	4	—			
	113.4		8.9		19.6		0.14		7.8			
Date: 12/22/10	204.1		8.9		19.8		0.14		7.8			
WQ Time: 1433	367.3		9.0		19.4		0.14		7.8			
Technician: am	500		9.2		19.5		0.14		7.8			
	blank 100%		8.8		19.7		0.14		8.1			
48 hours	~~Control~~		—		—		—		—			
	113.21		8.5		19.8		0.14		7.7			
Date: 12/23/10	204.1		8.6		19.8		0.14		7.6			
WQ Time: 1058	367.3		8.7		19.5		0.14		7.7			
Technician: SH	500		8.7		19.8		0.14		7.7			
	blank 100		8.4		19.8		0.14		7.7			

① WP 5/19/11 QB

Start Time:	1515 KS		
End Time:	1403 BM		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24 hrs

Dilution Water Batch:	DMW 425
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101221.0123	City of San Diego	Cu in SD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 12-23-10	
		Time:		Time: 1403 h	
		Technician:		Technician: B Mastin	
		# Alive	# Dead	# Alive	# Dead
Control 1	1			~~5~~ 4 BM	1
	2			5	0
	3			5	0
	4			5	0
6 = 9	1			5	0
	2			5	0
	3			5	0
	4			5	0
10.8 = 12	1			4	0 (INB)
	2			5	0
	3			5	0
	4			5	0
19.4 = 16	1			5	0
	2			5	0
	3			5	0
	4			5	0
35 = 28	1			5	0
	2			5	0
	3			5	0
	4			5	0
43 = 44	1			5	0
	2			5	0
	3			4	0 (INB)
	4			5	0

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101221.0123	City of San Diego	Cu in SD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 12-23-10	
		Time:		Time: 1403h	
		Technician:		Technician: B Mastin	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
113.4 =67	1			2	0(3NB)
	2			2	0(3NB)
	3			1	0(4NB)
	4			0	0 (5NB)
204.1 =110	1			0	0 (5NB)
	2			0	0 (5NB)
	3			0	0 (5NB)
	4			0	0 (5NB)
367.3 =183	1			0	0 (5NB)
	2			0	0 (5NB)
	3			0	0 (5NB)
	4			0	0 (5NB)
500 =225	1			0	0 (5NB)
	2			0	0 (5NB)
	3			0	0 (5NB)
	4			0	0 (5NB)
Blank 100%	1			5	0
	2			5	0
	3			5	0
	4			5	0

Acute Daphnid-48 Hr Survival

Start Date: 12/21/2010 15:55 Test ID: DPR2 Sample ID: Cu in DPR2
End Date: 12/23/2010 15:30 Lab ID: CCA-Weston, Carlsbad Sample Type: CUSO-Copper sulfate
Sample Date: Protocol: EPAA 02-EPA Acute Test Species: CD-Ceriodaphnia dubia
Comments:

Conc-ppb	1	2	3	4
Blank	0.8000	1.0000	0.8000	1.0000
10	1.0000	1.0000	1.0000	1.0000
13	0.8000	1.0000	1.0000	1.0000
19	1.0000	1.0000	1.0000	1.0000
32	0.8000	1.0000	1.0000	1.0000
48	0.8000	0.8000	1.0000	0.8000
75	0.6000	1.0000	0.6000	1.0000
125	0.0000	0.2000	0.0000	0.0000
202	0.0000	0.0000	0.0000	0.0000
259	0.0000	0.0000	0.0000	0.0000

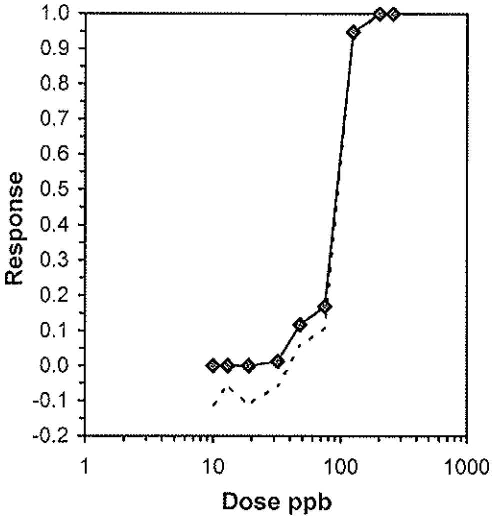
			Transform: Untransformed						1-Tailed			
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Blank	0.9000	1.0000	0.9000	0.8000	1.0000	12.830	4				0.9000	0.0000
10	1.0000	1.1111	1.0000	1.0000	1.0000	0.000	4	-1.225	2.480	0.2025	1.0000	-0.1111
13	0.9500	1.0556	0.9500	0.8000	1.0000	10.526	4	-0.612	2.480	0.2025	0.9500	-0.0556
19	1.0000	1.1111	1.0000	1.0000	1.0000	0.000	4	-1.225	2.480	0.2025	1.0000	-0.1111
32	0.9500	1.0556	0.9500	0.8000	1.0000	10.526	4	-0.612	2.480	0.2025	0.9500	-0.0556
48	0.8500	0.9444	0.8500	0.8000	1.0000	11.765	4	0.612	2.480	0.2025	0.8500	0.0556
75	0.8000	0.8889	0.8000	0.6000	1.0000	28.868	4	1.225	2.480	0.2025	0.8000	0.1111
*125	0.0500	0.0556	0.0500	0.0000	0.2000	200.000	4	10.410	2.480	0.2025	0.0500	0.9444
202	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000
259	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95755	0.904	-6E-16	-0.0434
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	75	125	96.8246		0.20249	0.22499	0.39929	0.01333	2.3E-10	7, 24

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	86.665	67.070	111.984
5.0%	88.589	68.689	114.253
10.0%	91.097	70.338	117.983
20.0%	93.185	79.873	108.716
Auto-0.0%	86.665	67.070	111.984



Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Cu in DPR2
Start Date: 12/21/2010 15:55 End Date: 12/23/2010 15:30

Test ID: DPR2
Protocol: EPAA 02-EPA Acute
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Blank	5		4			
	2	2	Blank	5		5			
	3	3	Blank	5		4			
	4	4	Blank	5		5			
	5	1	10.000	5		5			
	6	2	10.000	5		5			
	7	3	10.000	5		5			
	8	4	10.000	5		5			
	9	1	13.000	5		4			
	10	2	13.000	5		5			
	11	3	13.000	5		5			
	12	4	13.000	5		5			
	13	1	19.000	5		5			
	14	2	19.000	5		5			
	15	3	19.000	5		5			
	16	4	19.000	5		5			
	17	1	32.000	5		4			
	18	2	32.000	5		5			
	19	3	32.000	5		5			
	20	4	32.000	5		5			
	21	1	48.000	5		4			
	22	2	48.000	5		4			
	23	3	48.000	5		5			
	24	4	48.000	5		4			
	25	1	75.000	5		3			
	26	2	75.000	5		5			
	27	3	75.000	5		3			
	28	4	75.000	5		5			
	29	1	125.000	5		0			
	30	2	125.000	5		1			
	31	3	125.000	5		0			
	32	4	125.000	5		0			
	33	1	202.000	5		0			
	34	2	202.000	5		0			
	35	3	202.000	5		0			
	36	4	202.000	5		0			
	37	1	259.000	5		0			
	38	2	259.000	5		0			
	39	3	259.000	5		0			
	40	4	259.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Cu in DPR(2)
Weston Test ID:	C101221.0223
Species:	Ceriodaphnia dubia

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	9.0	2	20.1	6	0.20	4	8.4	96	70	0.01
Date: 12/21/10	6		9.2		19.5		0.23		7.6			
Sample ID:	10.8		9.0		19.7		0.23		7.6			
Dilutions (Tech): am	19.4		9.1		19.7		0.22		7.6			
WQ Time: 1522	35		9.2		19.6		0.22		7.6			
Technician: am	63		9.3		19.8		0.22		7.6			
24 hours	Control	2	9.1	2	19.6	6	0.20	2	8.6			
	6		8.6		19.1		0.23		7.7			
Date: 12-22-10	10.8		8.5		19.2		0.23		7.7			
WQ Time: 1620	19.4		8.5		19.0		0.23		7.7			
Technician: SH	35		8.5		19.5		0.23		7.7			
	63		8.6		19.1		0.23		7.7			
48 hours	Control	2	8.9	2	20.0	6	0.21	2	8.3			
	6		8.8		18.8		0.24		7.7			
Date: 12-23-10	10.8		8.7		19.3		0.23		7.8			
WQ Time: 1050	19.4		8.7		19.2		0.23		7.8			
Technician: SH	35		8.6		19.7		0.23		7.8			
	63		8.6		19.5		0.23		7.8			

Start Time:	am ~~1715 KS~~ 1555 KS		
End Time:	1530 am		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24 hrs

Dilution Water Batch:	DMW 425
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptablility:	☒ ≥ 90% Survival in Control

OWP 12/21/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Cu in DPR(2)
Weston Test ID:	C101221.0223
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	2	—	2	—	6	—	4	—			
Date: 12/21/10	113.4		9.1		19.4		0.22		7.6			
Sample ID:	204.1		9.2		19.7		0.23		7.6			
Dilutions (Tech) am	367.3		9.4		19.7		0.23		7.6			
WQ Time: 1522	500		9.4		19.7		0.23		7.6			
Technician: am	Blank 100%		9.2		19.1		0.23		7.6			
24 hours	~~Control~~	2	—	2	—	6	—	2	—			
	113.4		8.6		18.6		0.24		7.8			
Date: 12/22/10	204.1		8.7		18.7		0.23		7.7			
WQ Time: 1620	367.3		8.8		18.5		0.23		7.8			
Technician: SH	500		8.7		18.5		0.23		7.8			
	Blank 100%		8.7		18.5		0.24		7.8			
48 hours	~~Control~~	2	—	2	—	6	—	2	—			
	113.4		8.7		19.2		0.24		7.8			
Date: 12-23-10	204.1		8.8		19.0		0.23		7.8			
WQ Time: 1050	367.3		8.9		18.8		0.23		7.8			
Technician: SH	500		8.9		18.7		0.23		7.8			
	Blank 100%		8.8		18.8		0.24		7.8			

Start Time:	1555 KS		
End Time:	1530 AM		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24hrs

Dilution Water Batch:	DMW 425
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101221.0223	City of San Diego	Cu in DPR (2)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: ~~12/3~~ 12/23/10 ke ①	
		Time:		Time: ~~1520~~ 1530	
		Technician:		Technician: ~~ke~~ am	
		# Alive	# Dead	# Alive	# Dead
Control 1	1			4	1
	2			5	0
	3			5	0
	4			5	0
6 =10	1			5	0
	2			5	0
	3			5	0
	4			5	0
10.8 =13	1			4	0
	2			5	0
	3			5	0
	4			5	0
19.4 =19	1			5	0
	2			5	0
	3			5	0
	4			5	0
35 =32	1			②a ~~3~~ 4	0
	2			5	0
	3			5	0
	4			5	0
43 =48	1			4	0
	2			4	0
	3			5	0
	4			4	0

① IE 12/23/10 ke

② IE 12/23/10 am

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID: C101221.0223	Client: City of San Diego	Client Sample ID: Cu in DPR(2)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date:	
		Time:		Time:	
		Technician:		Technician:	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
113.4 =75	1			3	1
	2			5	0
	3			3	1
	4			5	0
204.1 =125	1			0	1
	2			1	0
	3			0	1
	4			0	0
367.3 =202	1			0	2
	2			0	1
	3			0	4
	4			0	1
500 =259	1			0	2
	2			0	2
	3			0	2
	4			0	1
Blank 100%	1			4	0
	2	~~5~~	~~0~~	5	0
	3	① an		4	0
	4	~~5~~		5	0

① IE 12/23/10 am

Acute Daphnid-48 Hr Survival

Start Date:	12/21/2010 17:20	Test ID:	DMW420	Sample ID:	Zn in DMW
End Date:	12/23/2010 17:10	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Control	0.8000	0.8000	1.0000	1.0000
16	1.0000	1.0000	1.0000	0.8000
27	0.8000	0.8000	1.0000	0.8000
47	0.8000	1.0000	1.0000	1.0000
84	0.8000	1.0000	1.0000	1.0000
149	0.6000	0.4000	0.8000	0.6000
285	0.0000	0.2000	0.0000	0.2000
420	0.0000	0.0000	0.0000	0.0000
894	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed						1-Tailed			
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9000	1.0000	0.9000	0.8000	1.0000	12.830	4				0.9000	0.0000
16	0.9500	1.0556	0.9500	0.8000	1.0000	10.526	4	-0.612	2.451	0.2002	0.9500	-0.0556
27	0.8500	0.9444	0.8500	0.8000	1.0000	11.765	4	0.612	2.451	0.2002	0.8500	0.0556
47	0.9500	1.0556	0.9500	0.8000	1.0000	10.526	4	-0.612	2.451	0.2002	0.9500	-0.0556
84	0.9500	1.0556	0.9500	0.8000	1.0000	10.526	4	-0.612	2.451	0.2002	0.9500	-0.0556
*149	0.6000	0.6667	0.6000	0.4000	0.8000	27.217	4	3.674	2.451	0.2002	0.6000	0.3333
*285	0.1000	0.1111	0.1000	0.0000	0.2000	115.470	4	9.798	2.451	0.2002	0.1000	0.8889
420	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000
894	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000

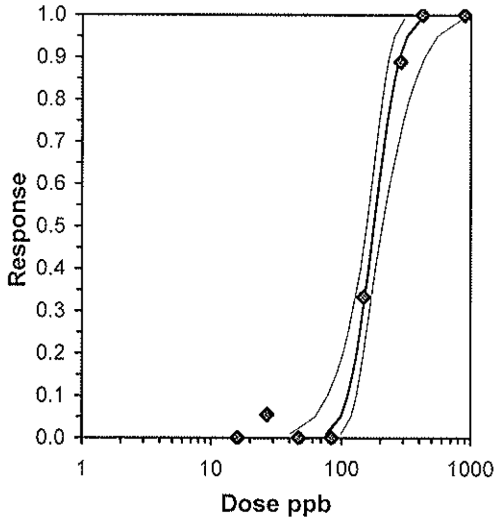
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94125	0.896	-0.2266	-0.7403
Bartlett's Test indicates equal variances (p = 0.98)	1.21807	16.8119		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	84	149	111.875		0.20016	0.2224	0.3981	0.01333	3.1E-09	6, 21

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.44512	1.46515	3.57344	9.31681	0	3.59642	12.5916	0.73	2.2479	0.15516	7
Intercept	-9.488	3.25671	-15.871	-3.1048							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	77.082	40.8267	99.5484
EC05	3.355	98.3312	62.8076	118.802
EC10	3.718	111.959	78.7395	131.01
EC15	3.964	122.206	91.4476	140.356
EC20	4.158	131.014	102.699	148.683
EC25	4.326	139.075	113.088	156.718
EC40	4.747	161.656	140.876	183.129
EC50	5.000	176.97	157.081	205.855
EC60	5.253	193.735	172.193	235.373
EC75	5.674	225.191	196.08	300.881
EC80	5.842	239.047	205.582	333.084
EC85	6.036	256.277	216.877	375.624
EC90	6.282	279.731	231.575	437.702
EC95	6.645	318.5	254.648	550.289
EC99	7.326	406.301	303.157	848.636



Reviewed by:

Test: AD-Acute Daphnid
Species: CD-Ceriodaphnia dubia
Sample ID: Zn in DMW 426
Start Date: 12/21/2010 17:20 End Date: 12/23/2010 17:10

Test ID: DMW 426
Protocol: EPAA 02-EPA Acute
Sample Type: ZNSO-Zinc sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5		4			
	2	2	Control	5		4			
	3	3	Control	5		5			
	4	4	Control	5		5			
	5	1	16.000	5		5			
	6	2	16.000	5		5			
	7	3	16.000	5		5			
	8	4	16.000	5		4			
	9	1	27.000	5		4			
	10	2	27.000	5		4			
	11	3	27.000	5		5			
	12	4	27.000	5		4			
	13	1	47.000	5		4			
	14	2	47.000	5		5			
	15	3	47.000	5		5			
	16	4	47.000	5		5			
	17	1	84.000	5		4			
	18	2	84.000	5		5			
	19	3	84.000	5		5			
	20	4	84.000	5		5			
	21	1	149.000	5		3			
	22	2	149.000	5		2			
	23	3	149.000	5		4			
	24	4	149.000	5		3			
	25	1	285.000	5		0			
	26	2	285.000	5		1			
	27	3	285.000	5		0			
	28	4	285.000	5		1			
	29	1	420.000	5		0			
	30	2	420.000	5		0			
	31	3	420.000	5		0			
	32	4	420.000	5		0			
	33	1	894.000	5		0			
	34	2	894.000	5		0			
	35	3	894.000	5		0			
	36	4	894.000	5		0			

Comments:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Zn in DMW
Weston Test ID:	DMW 426
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control 2	2	9.0	2	19.3	6	0.19	4	8.7	104	92	0.00
Date: 12/21/10	18		8.9		19.6		0.19		8.7			
Sample ID:	32		8.9		19.7		0.19		8.6			
Dilutions (Tech): am	56		8.9		19.6		0.19		8.6			
WQ Time: 1610	100		8.8		19.5		0.19		8.5			
Technician: am	180		8.9		19.2		0.19		8.5			
24 hours	Control	2	8.9	2	18.8	6	0.21	2	8.4			
	18		8.8		18.9		0.20		8.4			
Date: 12/22/10	32		8.9		18.9		0.20		8.4			
WQ Time: 1640	56		8.8		19.1		0.19		8.4			
Technician: SH	100		8.6		19.0		0.19		8.4			
	180		8.7		19.0		0.20		8.4			
48 hours	Control	2	9.0	2	19.4	6	0.21	3	8.4			
	18		8.9		19.2		0.21		9.0			
Date: 12/23/10	32		8.9		19.4		0.20		9.2			
WQ Time: 1000	56		8.8		19.3		0.20		9.2			
Technician: SH	100		9.3		18.7		0.20		9.2			
	180		9.0		18.7		0.20		9.2			

Start Time:	1720 am		
End Time:	1710 AM		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24hrs.

Dilution Water Batch:	DMW 426
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Zn in DMW
Weston Test ID:	DMW 426
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	2	—	2	—	6	—	4	—			
Date: 12/21/10	320		8.9		19.4		0.19		8.5			
Sample ID:	560		8.9		19.5		0.19		8.4			
Dilutions (Tech): AMM	1000		8.9		19.4		0.19		8.3			
WQ Time: 1610												
Technician: AM												
24 hours	~~Control~~	2	—	2	—	6	—	2	—			
	320		8.7		18.8		0.20		8.3			
Date: 12/22/10	560		8.8		19.1		0.19		8.3			
WQ Time: 1640	1000		8.7		18.7		0.20		8.2			
Technician: SH												
48 hours	Control	2	—	2	—	6	—	3	—			
	320		9.0		19.1		0.20		9.1			
Date: 12-23-10	560		9.0		18.9		0.20		9.1			
WQ Time: 1600	1000		9.1		19.0		0.20		8.9			
Technician: SH												

Start Time:	1720 am		
End Time:	1710 AM		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24 hrs

Dilution Water Batch:	DMW 426
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptablility:	✓ ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
DMW 426	City of San Diego	Zn in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 12/23/10	
		Time:		Time: 1710	
		Technician:		Technician: am	
		# Alive	# Dead	# Alive	# Dead
Control 2	1			4	1
	2			4	0
	3			5	0
	4			5	0
18 =16	1			5	0
	2			5	0
	3			5	0
	4			4	1
32 =27	1			4	1
	2			4	1
	3			5	0
	4			4	0
56 =47	1			4	1
	2			5	0
	3			5	0
	4			5	0
100 =84	1			4	1
	2			5	0
	3			5	0
	4			5	0
180 =149	1			3	2
	2			2	2
	3			4	1
	4			3	2

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
DMW 426	City of San Diego	Zn in DMW

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date:	
		Time:		Time:	
		Technician:		Technician:	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
320 =285	1			0	5
	2			1	3
	3			0	5
	4			1	4
560 =420	1			0	5
	2			0	5
	3			0	5
	4			0	4
1000 =894	1			0	5
	2			0	4
	3			0	5
	4			0	5
	1				
	2				
	3				
	4				
	1				
	2				
	3				
	4				

Acute Daphnid-48 Hr Survival

Start Date: 12/21/2010 15:55
End Date: 12/23/2010 16:00
Sample Date:
Comments:
Test ID: CCSD8(1)
Lab ID: CCA-Weston, Carlsbad
Protocol: EPAA 02-EPA Acute
Sample ID: Zn in CCSD8(1)
Sample Type: ZNSO-Zinc sulfate
Test Species: CD-Ceriodaphnia dubia

Conc-ppb	1	2	3	4
Blank	1.0000	1.0000	1.0000	1.0000
36	1.0000	1.0000	1.0000	1.0000
50	1.0000	0.8000	1.0000	1.0000
73	0.8000	0.6000	1.0000	0.6000
132	0.6000	1.0000	0.6000	0.8000
218	0.4000	0.0000	0.4000	0.0000
372	0.0000	0.0000	0.0000	0.0000
671	0.0000	0.0000	0.0000	0.0000
1205	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed					Rank	1-Tailed		
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Blank	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4			1.0000	0.0000
36	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	4	18.00	10.00	1.0000	0.0000
50	0.9500	0.9500	0.9500	0.8000	1.0000	10.526	4	16.00	10.00	0.9500	0.0500
73	0.7500	0.7500	0.7500	0.6000	1.0000	25.531	4	12.00	10.00	0.7500	0.2500
132	0.7500	0.7500	0.7500	0.6000	1.0000	25.531	4	12.00	10.00	0.7500	0.2500
*218	0.2000	0.2000	0.2000	0.0000	0.4000	115.470	4	10.00	10.00	0.2000	0.8000
372	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
671	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000
1205	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4			0.0000	1.0000

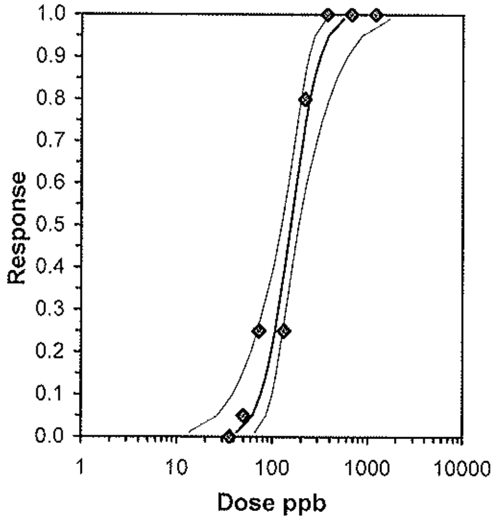
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.89613	0.884	0.29893	-0.4543
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	132	218	169.635	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	4.17764	0.99443	2.22857	6.12672	0	6.584	12.5916	0.36	2.18693	0.23937	11
Intercept	-4.1362	2.18628	-8.4213	0.14889							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	42.6654	13.3981	66.1219
EC05	3.355	62.1162	26.8169	86.3
EC10	3.718	75.8872	38.6712	99.8506
EC15	3.964	86.8645	49.3565	110.507
EC20	4.158	96.7106	59.7448	120.129
EC25	4.326	106.043	70.1608	129.458
EC40	4.747	133.749	102.62	160.215
EC50	5.000	153.792	125.033	187.907
EC60	5.253	176.838	147.44	227.712
EC75	5.674	223.041	183.406	331.36
EC80	5.842	244.563	197.843	388.747
EC85	6.036	272.285	215.232	470.212
EC90	6.282	311.671	238.346	599.777
EC95	6.645	380.768	275.91	864.467
EC99	7.326	554.357	360.266	1729.52



Test: AD-Acute Daphnid
Test ID: CCSD8(1)
Species: CD-Ceriodaphnia dubia
Protocol: EPAA 02-EPA Acute
Sample ID: Zn in CCSD8(1)
Sample Type: ZNSO-Zinc sulfate
Start Date: 12/21/2010 15:55
End Date: 12/23/2010 16:00
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Blank	5		5			
	2	2	Blank	5		5			
	3	3	Blank	5		5			
	4	4	Blank	5		5			
	5	1	36.000	5		5			
	6	2	36.000	5		5			
	7	3	36.000	5		5			
	8	4	36.000	5		5			
	9	1	50.000	5		5			
	10	2	50.000	5		4			
	11	3	50.000	5		5			
	12	4	50.000	5		5			
	13	1	73.000	5		4			
	14	2	73.000	5		3			
	15	3	73.000	5		5			
	16	4	73.000	5		3			
	17	1	132.000	5		3			
	18	2	132.000	5		5			
	19	3	132.000	5		3			
	20	4	132.000	5		4			
	21	1	218.000	5		2			
	22	2	218.000	5		0			
	23	3	218.000	5		2			
	24	4	218.000	5		0			
	25	1	372.000	5		0			
	26	2	372.000	5		0			
	27	3	372.000	5		0			
	28	4	372.000	5		0			
	29	1	671.000	5		0			
	30	2	671.000	5		0			
	31	3	671.000	5		0			
	32	4	671.000	5		0			
	33	1	1205.000	5		0			
	34	2	1205.000	5		0			
	35	3	1205.000	5		0			
	36	4	1205.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Zn in SD8(1)
Weston Test ID:	C101221.0123
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control2	2	9.0	2	19.3	6	0.19	4	8.7	104	92	0.00
Date: 12/21/10	32		9.4		19.7		0.14		8.2			
Sample ID:	56		9.2		19.7		0.14		8.1			
Dilutions (Tech): AM	100		9.0		19.3		0.14		8.0			
WQ Time: 1618	180		9.2		19.8		0.14		7.9			
Technician: AM	320		9.2		19.7		0.14		7.8			
24 hours	Control	2	8.9	2	18.8	6	0.21	4	8.4			
	32		8.3		19.6		0.14		8.1			
Date: 12-22-10	56		8.6		19.3		0.14		8.0			
WQ Time: ①54 ~~1458~~ 1658	100		8.7		19.4		0.14		8.0			
Technician: SH	180		8.5		19.4		0.14		8.0			
	320		8.5		19.4		0.14		7.8			
48 hours	Control	2	9.0	2	19.4	6	0.21	4	8.4			
	32		8.8		19.0		0.15		7.7			
Date: 12-23-10	56		8.8		18.6		0.15		7.7			
WQ Time: 1035	100		8.8		19.0		0.15		7.7			
Technician: SH	180		8.8		SH② ~~0.14~~ 18.8		0.14		7.7			
	320		8.6		19.4		0.14		7.7			

Start Time:	1555 KS
End Time:	1600 BM
Supplier:	Aquatic Bio Systems
Organism Batch:	ABS 0534 Age: < 24hrs

①WT 12-22-1054
②WC 12-23-10 SH

Dilution Water Batch:	DMW 426
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Zn in SD8(1)
Weston Test ID:	C101221.0123
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	~~Control~~	2	—	2	—	6	—	4	—			
Date: 12/21/10	560		9.3		19.6		0.14		7.7			
Sample ID:	1000		9.2		19.8		0.14		7.6			
Dilutions (Tech): am	1800		9.3		19.8		0.14		7.5			
WQ Time: 1618	Blank 100%		9.2		19.7		0.14		7.9			
Technician: am												
24 hours	~~Control~~	2	—	2	—	6	—	4	—			
	560		8.6		19.1		0.14		7.7			
Date: 12-22-10	1000		8.6		19.3		0.14		7.6			
WQ Time: ~~1145~~ SH① 1658	1800		8.6		19.4		0.15		7.5			
Technician: SH	Blank 100%		8.8		19.7		0.14		8.1			
48 hours	~~Control~~	2	—	2	—	6	—	2	—			
	560		8.8		19.0		0.14		7.6			
Date: 12-23-10	1000		8.8		19.1		0.15		7.6			
WQ Time: 1035	1800		8.7		19.1		0.15		7.5			
Technician: SH	Blank 100		8.4		19.8		0.14		7.7			

Start Time:	1555 ys		
End Time:	1600 BM		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24hrs

① WT 12-22-10 SH

Dilution Water Batch:	DMW 426
Hobo Temp. No.:	778891
Test Location:	Room 3
Test Acceptablility:	X ≥ 90% Survival in Control

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101221.0123	City of San Diego	Zn. in SD8(1)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 12-23-10	
		Time:		Time: 1400 h	
		Technician:		Technician: B Mastin	
		# Alive	# Dead	# Alive	# Dead
Control 2	1				
	2				
	3				
	4				
32 =36	1			5	0
	2			5	0
	3			5	0
	4			5	0
56 =50	1			5	0
	2			4	1
	3			5	0
	4			5	0
160 =73	1			4	0
	2			3	1 (1NB)
	3			5	0
	4			3	0 (2NB)
180 =132	1			3	0 (2NB)
	2			5	0
	3			3	0 (2NB)
	4			4	0 (1NB)
320 =218	1			2	0 (3NB)
	2			0	0 (5NB)
	3			2	0 (3NB)
	4			0	0 (5NB

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101221.0123	City of San Diego	Zn in SD8(1)

SURVIVAL DATA

24 Hours
Date:
Time:
Technician:

48 Hours
Date: 12-23-10
Time: 1600 h
Technician: B Martin

Conc.	Rep	24 Hours # Alive	24 Hours # Dead	48 Hours # Alive	48 Hours # Dead
Control	1				
	2				
	3				
	4				
560 =372	1			0	0 (5 NB)
	2			0	0 (5 NB)
	3			0	0 (5 NB)
	4			0	0 (5 NB)
1000 =671	1			0	0 (5 NB)
	2			0	0 (5 NB)
	3			0	0 (5 NB)
	4			0	0 (5 NB)
1800 =1205	1			0	0 (5 NB)
	2			0	0 (5 NB)
	3			0	0 (5 NB)
	4			0	0 (5 NB)
Blank 100%	1			5	0 ~~(5 NB)~~ ①
	2			5	0 ~~(5 NB)~~
	3			5	0 (
	4			5	0
	1				
	2				
	3				
	4				

① WC 5/19/11

Acute Daphnid-48 Hr Survival

Start Date:	12/21/2010 16:50	Test ID:	DPR2	Sample ID:	Zn in DPR2
End Date:	12/23/2010 16:35	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-ppb	1	2	3	4
Blank	0.8000	1.0000	0.8000	1.0000
35	0.8000	1.0000	1.0000	1.0000
54	0.8000	1.0000	1.0000	1.0000
77	1.0000	0.8000	1.0000	0.8000
127	1.0000	1.0000	0.8000	1.0000
221	0.0000	0.4000	0.2000	0.6000
379	0.0000	0.0000	0.0000	0.0000
704	0.0000	0.0000	0.0000	0.0000
1280	0.0000	0.0000	0.0000	0.0000

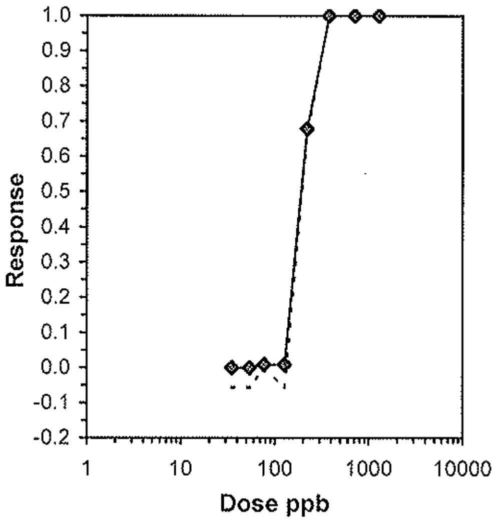
			Transform: Untransformed						1-Tailed			
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Blank	0.9000	1.0000	0.9000	0.8000	1.0000	12.830	4				0.9000	0.0000
35	0.9500	1.0556	0.9500	0.8000	1.0000	10.526	4	-0.493	2.410	0.2443	0.9500	-0.0556
54	0.9500	1.0556	0.9500	0.8000	1.0000	10.526	4	-0.493	2.410	0.2443	0.9500	-0.0556
77	0.9000	1.0000	0.9000	0.8000	1.0000	12.830	4	0.000	2.410	0.2443	0.9000	0.0000
127	0.9500	1.0556	0.9500	0.8000	1.0000	10.526	4	-0.493	2.410	0.2443	0.9500	-0.0556
*221	0.3000	0.3333	0.3000	0.0000	0.6000	86.066	4	5.918	2.410	0.2443	0.3000	0.6667
379	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000
704	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000
1280	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4				0.0000	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.89661	0.884	-0.2092	0.66144
Bartlett's Test indicates equal variances (p = 0.43)	4.91522	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	127	221	167.532		0.24432	0.27147	0.267	0.02056	1.9E-05	5, 18

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	198.02	152.20	257.63
5.0%	197.41	148.90	261.71
10.0%	195.69	143.83	266.23
20.0%	192.65	134.08	276.82
Auto-0.0%	198.02	152.20	257.63



Test: AD-Acute Daphnid
Test ID: DPR2
Species: CD-Ceriodaphnia dubia
Protocol: EPAA 02-EPA Acute
Sample ID: Zn in DPR2
Sample Type: ZNSO-Zinc sulfate
Start Date: 12/21/2010 16:50
End Date: 12/23/2010 16:35
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Blank	5		4			
	2	2	Blank	5		5			
	3	3	Blank	5		4			
	4	4	Blank	5		5			
	5	1	35.000	5		4			
	6	2	35.000	5		5			
	7	3	35.000	5		5			
	8	4	35.000	5		5			
	9	1	54.000	5		4			
	10	2	54.000	5		5			
	11	3	54.000	5		5			
	12	4	54.000	5		5			
	13	1	77.000	5		5			
	14	2	77.000	5		4			
	15	3	77.000	5		5			
	16	4	77.000	5		4			
	17	1	127.000	5		5			
	18	2	127.000	5		5			
	19	3	127.000	5		4			
	20	4	127.000	5		5			
	21	1	221.000	5		0			
	22	2	221.000	5		2			
	23	3	221.000	5		1			
	24	4	221.000	5		3			
	25	1	379.000	5		0			
	26	2	379.000	5		0			
	27	3	379.000	5		0			
	28	4	379.000	5		0			
	29	1	704.000	5		0			
	30	2	704.000	5		0			
	31	3	704.000	5		0			
	32	4	704.000	5		0			
	33	1	1280.000	5		0			
	34	2	1280.000	5		0			
	35	3	1280.000	5		0			
	36	4	1280.000	5		0			

Comments:

Reviewed by:

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Zn in DPR(2)
Weston Test ID:	C101221.0223
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/21/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control 2	2	9.0	2	19.3	6	~~0.23~~0.19	4	8.7	104	92	0.00
Date: 12/21/10	32		9.4		20.2		①0.~~22~~23		7.8			
Sample ID:	56		9.3		20.3		0.22		7.8			
Dilutions (Tech): am	100		9.4		20.3		0.22		7.7			
WQ Time 1630	180		9.3		20.3		0.23		7.7			
Technician: am	320		9.5		20.1		0.22		7.7			
24 hours	Control	2	8.9	2	18.8	6	0.21	2	8.4			
	32		8.3		20.4		0.23		7.7			
Date: 12-22-10	56		8.4		20.3		0.23		7.8			
WQ Time: 1720	100		8.5		20.2		0.23		7.8			
Technician: SH	180		8.5		20.0		0.22		7.8			
	320		8.5		20.5		0.23		7.7			
48 hours	Control	2	9.0	2	19.4	6	0.21 2	②SH 3	8.4			
	32		8.7		19.0		0.24	②SH	~~8.9~~7.7			
Date: 12-23-10	56		8.6		19.1		0.23		~~8.9~~7.7			
WQ Time: 1020	100		8.7		19.0		0.24		7.7			
Technician: SH	180		8.7		19.0		0.24		7.7			
	320		8.7		18.9		0.24		7.7			

Start Time:	1650 AM		
End Time:	1635 AM		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24 hrs

Dilution Water Batch:	DMW 426
Hobo Temp. No.:	778891
Test Location:	Rm 3
Test Acceptability:	✓ ≥ 90% Survival in Control

① WC 12/21/10 am

② Δ meters due to pH 12-23-10 SH

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Client	City of San Diego
Project:	Chollas Creek WER
Client Sample ID:	Zn in DPR(2)
Weston Test ID:	C101221.0223
Species:	*Ceriodaphnia dubia*

Date Received:	12/21/10
Date Test Started:	12/21/10
Date Test Ended:	12/23/10
Study Director:	A. Margolis
# Organisms/Chamber:	5

	Conc.	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Cond. (mS/cm)	Meter #	pH	Hard. (mg/L CaCO3)	Alk. (mg/L CaCO3)	Total Chlorine (mg/L)
Day 0 (0 hours)	Control	2	—	2	—	6	—	4	—	~~104~~	~~92~~	~~0.00~~ ②
Date: 12/21/10	560		9.5		20.0		0.23		7.6			
Sample ID:	1000		9.5		20.0		0.23		7.6			
Dilutions (Tech): AM	1800		9.4		20.1		0.23		7.5			
WQ Time: 1630	Blank 100		9.2		19.1		0.23		7.6			
Technician: AM												
24 hours	~~Control~~	2	—	2	—	6	—	2	—			
	560		8.5		19.8		0.24		7.7			
Date: 12-22-10	1000		8.6		20.0		0.23		7.7			
WQ Time: 1720	1800		8.6		20.0		0.23		7.6			
Technician: SH	Blank 100		8.7		18.5		0.24		7.8			
48 hours	Control	2	—	2	—	6	—	3 ①	—			
	560		8.7		19.0		0.25		7.6			
Date: 12-23-10	1000		8.8		18.8		0.24		7.6			
WQ Time: 1020	1800		9.0		18.9		0.25		7.5			
Technician: SH	Blank 100		8.8		18.8		0.24		7.8			

Start Time:	1650 AM		
End Time:	1635 AM		
Supplier:	Aquatic Bio Systems		
Organism Batch:	ABS 0554	Age:	<24hrs

Dilution Water Batch:	DMW 426
Hobo Temp. No.:	778891
Test Location:	Rm 3
Test Acceptablility:	☒ ≥ 90% Survival in Control

① Δ meters due to pH 12-23-10 SH
② WP 5/19/11 QB

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101221.0223	City of San Diego	Zn in DPR(2)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date: 12/23/10	
		Time:		Time: 1635	
		Technician:		Technician: am	
		# Alive	# Dead	# Alive	# Dead
Control 2	1				
	2				
	3				
	4				
32 =35	1			4	0
	2			5	0
	3			5	0
	4			5	0
56 =54	1			4	0
	2			5	0
	3			5	0
	4			5	0
100 =77	1			5	0
	2			4	0
	3			5	0
	4			4	0
180 =127	1			5	0
	2			5	0
	3			4	0
	4			5	0
320 =221	1			0	0
	2			2	0
	3			1	0
	4			3	0

WESTON SOLUTIONS

Ceriodaphnia dubia 48-Hour Acute Toxicity Test

BIO023

Weston Test ID:	Client:	Client Sample ID:
C101221.0223	City of San Diego	Zn in DPR (2)

SURVIVAL DATA

Conc.	Rep	24 Hours		48 Hours	
		Date:		Date:	
		Time:		Time:	
		Technician:		Technician:	
		# Alive	# Dead	# Alive	# Dead
Control	1				
	2				
	3				
	4				
560 =379	1			0	0
	2			0	1
	3			0	1
	4			0	0
1000 =704	1			0	0
	2			0	0
	3			0	0
	4			0	1
1800 =1280	1			0	2
	2			0	0
	3			0	0
	4			0	0
Blank 100%	1			4	0 (1NB)
	2			5	0
	3			4	0 (1 NB)
	4			5	0
	1				
	2				
	3				
	4				

WESTON SOLUTIONS

☒ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

31790

DATE 12/20/10 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: City of S.D. / Chollas Creek WER / 06754.100.002.0004.02
PROJECT MANAGER / CONTACT: DAVE RENFREW
COMPANY / CLIENT: Weston
ADDRESS:
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: C. dubia 48-hr. acute WER	ANALYSIS/TEST REQUESTED: Cu + Zn	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
CC-SD 8(1)	CC-SD 8(1)	12/20/10	1520	SW	G-1gL	3	X	X	ICE		C101221.01
PPR	PPRZ	↓	1605	SW	↓	2	X	X	ICE		C101221.02

FOR WESTON USE ONLY

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water [✓ SW=storm water] WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) ____________

Container Code: [✓ G=glass] P=plastic B=bags ☐ O=other ____________

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS [✓ ☐ Client drop-off] ☐ Other ____________

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day [✓ ☐ Standard] ☐ Other ____________

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other ____________

SAMPLED BY: PRINT
G. Engelhorn
L. Campagna

SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS
Samples placed in locked Walkin Cooler

	RELINQUISHED BY: Print Name	Signature	Firm	Date/Time	RECEIVED BY: Print Name	Signature	Firm	Date/Time
1.	L. Campagna		Weston	12-21-10 0840	Sean Hasan		weston	0850
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

BIOASSAY SAMPLE RECEIPT

Client: city of San Diego		**Project:** chollas creek WER	
Weston Sample ID:	C101221.01	C101221.02	
Client Sample ID:	CC-SD8(1)	DPR 2	
Renewal Sample (Y/N):	N	N	
Date/Time Received:	12/21/10 0850	12/21/10 0850	
Airbill #:	N/A	N/A	
Sample Tracking Information Kept for Records: (Y/N)	N/A	N/A	
Collection Date/Time:	12/20/10 1520	12/20/10 1605	
Condition of Shipping Container:	good	good	
Type and Capacity of Sample Container:	glass 19L x3	glass 19 L x2	
Total Sample Volume (L):	57 L	38 L	
Condition of Sampling Container:	good	good	
Sample Container Appropriate: (Y/N)	Y	Y	
Custody Seals Intact: (Y/N)	N/A	N/A	
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	
Sampler's Name Present on COC Form: (Y/N)	Y	Y	

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) **(0-6°C) ***	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C101221.01 a	10.4	9.5	7.4	0.14	44	28	0.17	<0.5	ks
〃 b	10.5	9.4	7.5	0.14	44	28	0.00	<0.5	
〃 c	10.5	9.2	7.5	0.14	44	28	0.06	<0.5	
C101221.02 a	11.5	9.1	7.4	0.22	48	40	0.00	<0.5	
〃 b	12.1	9.3	7.5	0.22	56	44	0.23	<0.5	

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:

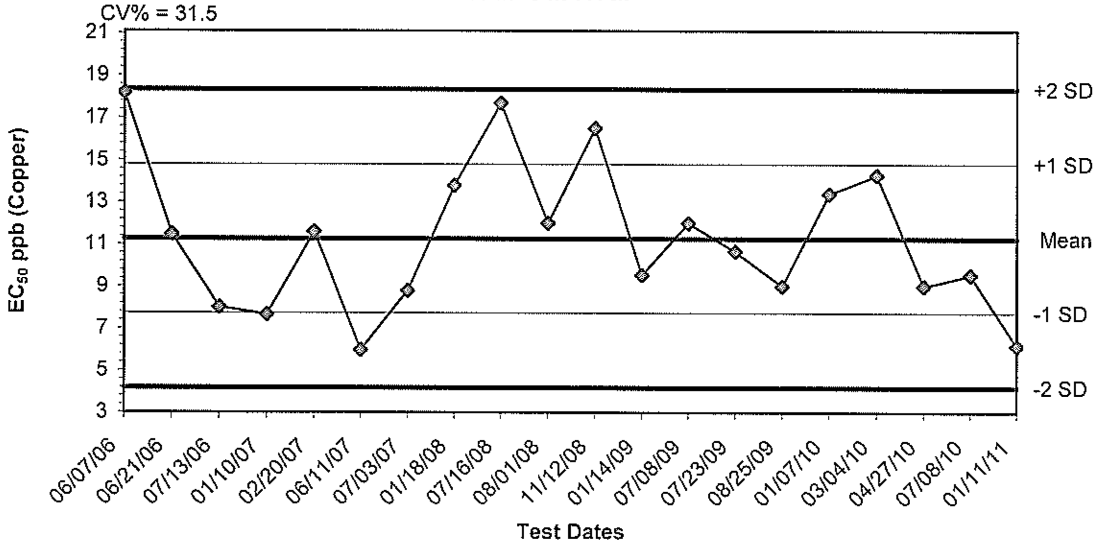
Contacted by:

Client Response and/or Action to be Taken:

Date Action Taken:

O:\BLANK FORMS\Bioassay\Forms with Weston Logo\SAMPLE RECEIPT Form- Weston temp.doc
Last printed 1/25/2006 10:55:00 AM

Ceriodaphnia dubia Reference Toxicant Control Chart: 48-Hour Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
06/07/06	18.1890	11.2573	7.7148	4.1724	14.7997	18.3421
06/21/06	11.4710	11.2573	7.7148	4.1724	14.7997	18.3421
07/13/06	8.0000	11.2573	7.7148	4.1724	14.7997	18.3421
01/10/07	7.6474	11.2573	7.7148	4.1724	14.7997	18.3421
02/20/07	11.5910	11.2573	7.7148	4.1724	14.7997	18.3421
06/11/07	5.9616	11.2573	7.7148	4.1724	14.7997	18.3421
07/03/07	8.7845	11.2573	7.7148	4.1724	14.7997	18.3421
01/18/08	13.7840	11.2573	7.7148	4.1724	14.7997	18.3421
07/16/08	17.6840	11.2573	7.7148	4.1724	14.7997	18.3421
08/01/08	12.0000	11.2573	7.7148	4.1724	14.7997	18.3421
11/12/08	16.5000	11.2573	7.7148	4.1724	14.7997	18.3421
01/14/09	9.5294	11.2573	7.7148	4.1724	14.7997	18.3421
07/08/09	12.0000	11.2573	7.7148	4.1724	14.7997	18.3421
07/23/09	10.6599	11.2573	7.7148	4.1724	14.7997	18.3421
08/25/09	9.0000	11.2573	7.7148	4.1724	14.7997	18.3421
01/07/10	13.3850	11.2573	7.7148	4.1724	14.7997	18.3421
03/04/10	14.2700	11.2573	7.7148	4.1724	14.7997	18.3421
04/27/10	9.0000	11.2573	7.7148	4.1724	14.7997	18.3421
07/08/10	9.5333	11.2573	7.7148	4.1724	14.7997	18.3421
01/11/11	6.1550	11.2573	7.7148	4.1724	14.7997	18.3421

Updated 1/31/11 KS

Item 10
Supporting Document No. 2
December 14, 2016

Nautilus - 2014

Confirmation WERs

Nautilus Environmental

Water-Effect Ratio Toxicity Test Results for Chollas Creek

❖ Storm Event: April 2-3, 2014

Prepared for:
AMEC Environment & Infrastructure, Inc.
9210 Sky Park Court, Ste. 200
Carlsbad, CA 92123
PO# C013101247

Prepared by:
Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Report Submitted: June 9, 2014

Data Quality Assurance:

- Nautilus Environmental is a certified laboratory under the State of California Department of Health Services, Environmental Laboratory Accreditation Program (ELAP), Certificate No. 1802.
- All data have been reviewed and verified.
- All test results have met minimum test acceptability criteria under their respective EPA protocols, unless otherwise noted in this report.
- Any test data discrepancies or protocol deviations have been noted in the report.

Results verified by: Adrienne Cibor

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INTRODUCTION

Acute 48-hour toxicity bioassays were conducted in support of a Water Effect Ratio (WER) study as part of Total Maximum Daily Load (TMDL) monitoring in the City of San Diego's Chollas Creek watershed. A previous WER study was performed for these sites by Weston Solutions (Weston) in 2010-2011 testing a single species (*Ceriodaphnia dubia*) with copper and zinc spiked separately into each sample. This current study expands on the Weston study at the request of the San Diego Regional Water Quality Control Board (Regional Board) by also testing the effects of the mixture of copper and zinc together in solution to *C. dubia*. Confirmation testing with a second species, the fathead minnow *Pimephales promelas*, was also conducted.

Storm water samples from two sites within the watershed were spiked with copper and zinc to evaluate toxicity of these metals in the site water in relation to toxicity of the same metals in laboratory control water. Testing with both metals was conducted using the water flea *C. dubia* and fathead minnow *P. promelas*. Water flea tests were also conducted with copper and zinc mixtures. The samples were collected between April 2 and 3, 2014. Testing was conducted at Nautilus Environmental (Nautilus) in San Diego from April 4 through 6, 2014.

MATERIALS AND METHODS

Methods for holding and processing samples, and toxicity test procedures for development of WERs are provided in the following guidance documents:

- *Interim Guidance on the Determination and Use of Water-Effect Ratios for Metals.* United States Environmental Protection Agency (USEPA) 1994. EPA-823-B-94-001.
- *Streamlined Water-Effect Ratio Procedure for Discharges of Copper*. USEPA/822/R-01/005.
- *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*. Fifth Edition. USEPA 2002. EPA-821-R-02-012.

Test Material

Test material consisted of two samples collected from mass loading stations in the Chollas Creek watershed. Each initial sample was collected as a composite for the duration of the storm event; samples were collected by an auto-sampler into multiple 20-liter glass containers. It was discovered following collection and prior to testing, however that the composite for Site SD8(1) was compromised by two water main leaks that occurred upstream within the Chollas Creek watershed during the storm resulting in elevated chlorine levels in the sample. As a contingency to account for limited rainfall and runoff, a bulk grab sample was collected at Site SD8(1) at the beginning of the storm. All other water quality characteristics (pH, conductivity etc.) were similar between the storm composite and bulk grab sample, and consistent with that recorded during prior storm events. It was therefore determined that the grab sample from SD8(1) was sufficiently representative of the site during a storm and was used for this study.

Samples were collected under the direction of Mr. Tommy Wells of AMEC Environment and Infrastructure (AMEC E&I) by AMEC personnel and hand delivered to Nautilus.

Upon arrival at Nautilus, an aliquot of each the sample was drawn and water quality parameters of pH, dissolved oxygen (DO), conductivity, temperature, alkalinity, hardness, and total chlorine were measured and recorded. The samples were stored at 4°C prior to use. A summary of the sample collection and receipt times is provided in Table 1.

Table 1. Sample Collection and Receipt Times

Site	Sample ID	Sample Collection Date/Time	Sample Receipt Date/Time
SD8(1)	SD8(1) Grab[a]	04/02/2014; 13:20	04/03/2014; 13:00
DPR(3)	DPR(3) Comp	04/03/2014; 06:31	04/03/2014; 13:00

[a] The SD8(1) sample used for the WER study was a contingency grab sample collected toward the beginning of the storm rather than a composite (see explanation above).

Sample Preparation

Metal stocks were prepared in Nanopure-filtered water using J.T. Baker Brand ACS reagent grade copper chloride and zinc sulfate salts purchased from Sigma-Aldrich®. All primary working stock solutions were sub-sampled and analytically verified by Calscience Laboratories in Garden Grove, California prior to use. Test solutions were prepared by adding appropriate volumes of stock metal solutions into glass volumetric flasks. All stock solutions were measured using volumetric pipettes. The lab or site water was then added to the fill line on the volumetric flask, mixed thoroughly, and each solution then poured back out into a separate clean, labeled low density polyethylene (LDPE) plastic cubitainer. Nominal target test concentrations are provided in Table 2.

The test solutions were manually mixed immediately upon preparation, allowed to sit for a minimum of 3 hours to allow metal partitioning to reach equilibrium with test water constituents, and manually mixed again before distributing to test chambers. Initial water quality parameters including pH, DO, temperature, and conductivity were recorded for each test concentration prior to test initiation. Solutions were created as a single shared batch for water flea and fathead minnow tests when appropriate. After mixing, all dilutions were acclimated to the appropriate temperatures prior to using for test initiations and renewals.

Table 2. Nominal Spiked Test Concentrations

Sample	Trace Metal	Species	Nominal Total Concentration (µg/L)
Lab Water	Copper	Water flea	0, 5.0, 8.4, 14.0, 23.3, 38.9, 64.8, 108
Lab Water	Copper	Fathead minnow	0, 14.0, 23.3, 38.9, 64.8, 108, 180, 300
Site Water: SD8(1), DPR(3)	Copper	Water flea	0, 23.3, 38.9, 64.8, 108, 180, 300, 500
Site Water: SD8(1), DPR(3)	Copper	Fathead minnow	0, 64.8, 108, 180, 300, 500, 833, 1389
Lab Water	Zinc	Water flea	0, 10.1, 16.8, 28.0, 46.7, 77.8, 130, 216
Lab Water	Zinc	Fathead minnow	0, 28.0, 46.7, 77.8, 130, 216, 360, 600
Site Water: SD8(1), DPR(3)	Zinc	Water flea	0, 46.7, 77.8, 130, 216, 360, 600, 1000
Site Water: SD8(1), DPR(3)	Zinc	Fathead minnow	0, 130, 216, 360, 600, 1000, 1667, 2778
Site Water: SD8(1)	Copper+ [Zinc]	Water flea	0, 48.7+[150], 60.8+[150], 85.2+[150],113+[150], 48.7+[182], 60.8+[182], 85.2+[182], 113+[182], 48.7+[236], 60.8+[236], 85.2+[236], 113+[236]
Site Water: DPR(3)	Copper+ [Zinc]	Water flea	0, 63.8+[191], 79.8+[191], 112+[191], 148+[191], 63.8+[232], 79.8+[232], 112+[232], 148+[232], 63.8+[301], 79.8+[301], 112+[301], 148+[301]

Subsample Collection

Using “clean” sampling techniques (EPA 1995), subsamples of each test concentration were collected immediately prior to test initiation and again at test termination for determination of dissolved and total metal fractions. If complete mortality was observed in any test concentration, subsamples for dissolved fractions were collected on the same day.

Sterile disposable 250 milliliter (mL) VWR® Bottle Top Filtration Units were used to filter samples for dissolved metals analysis. Filter material consisted of a 0.45-µm hydrophilic polyethersulfone (PES) membrane. A single filter unit was used for each site/metal combination to avoid contamination between concentrations. Solutions were thoroughly mixed immediately prior to sub-sampling. Each filter unit was rinsed thoroughly with deionized water, and the first 10 to 20 mL sample water to go through the filters was disposed of. Dissolved metals fractions were then immediately poured into a clean, pre-labeled 250 mL HDPE bottle prepared by the analytical lab with high purity nitric acid to preserve the samples. The remaining sample was poured into the pre-labeled 250 mL trace clean VWR bottle and capped. Sub-samples were immediately recorded on a chain of custody form and stored at 4°C until transfer to the analytical laboratory.

Subsamples selected for analysis were placed within an insulated cooler on ice for shipment to Weck Laboratories in the City of Industry, California via same day courier.

Toxicity Test Methods

Testing was conducted in accordance with methods published in USEPA 2002. Test specifications are summarized in Tables 2 and 3.

Table 3. Summary of Test Conditions for the 48-hour Water Flea Acute Survival Test

Test Type	48-hour Acute Static (no water renewal)
Test period	4/4/2014 – 4/6/2014
Test organism	Water flea (*Ceriodaphnia dubia*)
Test organism source	In-house culture
Test organism age at initiation	< 24 hours
Test solution renewal	None
Feeding	*Selenastrum* and yeast/cerophyll/trout chow (YCT) two hours prior to test initiation. No feeding during test.
Test chamber	30 mL plastic cup
Test solution volume	20 mL
Test temperature	20 ± 1°C
Dilution water	Diluted Mineral Water (Moderately Hard Lab Water 80-100 mg/L $CaCO_3$) or Site Water
Number of organisms/chamber	5
Number of replicates	4
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test Protocol	EPA-821-R-02-012 (USEPA, 2002)
Test acceptability criterion for controls	≥ 90% mean survival
Statistical Analysis	Median lethal concentration (LC_{50}) values calculated using Trimmed Spearman Kärber (TSK) analysis with CETIS™ statistical software, version 1.8.4.23.
Reference toxicant	Copper chloride (48-hour exposure)

Table 4. Summary of Test Conditions for the 48-hour Fathead Minnow Acute Survival Test

Test Type	48-hour Acute Static (no water renewal)
Test period	4/4/2014 – 4/6/2014
Test organism	*Pimephales promelas* (fathead minnow)
Test organism source, age	Aquatic Biosystems (Fort Collins, CO), 4 days old at initiation
Test solution renewal	None
Feeding	*Artemia* prior to test initiation. No feeding during test.
Test chamber	500 mL plastic cup
Test solution volume	250 mL
Test temperature	20 ± 1°C
Dilution water	Diluted Mineral Water (Moderately Hard Lab Water 80-100 mg/L $CaCO_3$) or Site Water
Number of organisms/chamber	5
Number of replicates	4
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test Protocol	EPA-821-R-02-012 (USEPA, 2002)
Test acceptability criterion for controls	≥ 90% mean survival
Statistical Analysis	Median lethal concentration (LC_{50}) values calculated using TSK analysis with CETIS™ statistical software, version 1.8.4.23.
Reference toxicant	Copper chloride (96-hour exposure)

RESULTS

Statistical results including no observed effect (and low observed effect) concentrations (NOEC/LOEC), and median lethal concentrations (LC_{50}) are provided in Tables 5 and 6 for the copper tests and Tables 7 and 8 for the zinc tests. Statistical results for the copper/zinc mixture are summarized in Table 9. Detailed test results summaries are provided in Appendix A. Statistical analysis summaries and raw datasheets are provided Appendix B. A summary of sample water quality characteristics measured at Nautilus upon receipt and water quality characteristics of the laboratory water upon test initiation are provided in Appendix C. A copy of the Chain of Custody form is presented in Appendix D. A copy of the analytical chemistry report with all the measured metals concentrations is provided in Appendix E.

The copper tests with both species showed typical dose responses in lab water. As expected, copper was notably more toxic in lab water than in site water. No effects were observed in the water flea lab water test conducted with zinc, preventing a comparison between lab and site water. For the fathead minnow zinc test in lab water, the percent effect in the highest concentration tested was slightly below 50 (48.7), preventing calculation of an LC_{50} using TSK. An LC_{50} value was estimated using linear regression; these results indicate that the lab water tests showed a higher degree of toxicity than the site water tests. Results of the copper and zinc mixture tests indicate that the amount of zinc present in the sample does not have an impact on toxicity of copper in the samples tested.

Table 5. Statistical Results for Water Flea Copper Tests

			48-hr LC_{50}		
Site	**NOEC**	**LOEC**	**LC_{50}**	**95% LCL**	**95% UCL**
SD8(1)	59	97	102	91.8	112
DPR(3)	160	265	196	179	215
Lab Water	5.9	7.2	7.36	6.78	7.99

All values in µg/L dissolved copper

LC_{50}: Median lethal concentration; concentration expected to cause mortality to 50 percent of test organisms. Calculated using Trimmed Spearman Kärber analysis.

NOEC: No Observed Effect Concentration; the highest concentration at which no effect is observed.

LOEC: Lowest Observed Effect Concentration; one concentration above the NOEC

Table 6. Statistical Results for Fathead Minnow Copper Tests

			48-hr LC_{50}		
Site	**NOEC**	**LOEC**	**LC_{50}**	**95% LCL**	**95% UCL**
SD8(1)	155	255	332	298	370
DPR(3)	275	440	930	870	994
Lab Water	13	22	57.3	46.1	71.1

All values in µg/L dissolved copper

LC_{50}: Median lethal concentration; concentration expected to cause mortality to 50 percent of test organisms. Calculated using Trimmed Spearman Kärber analysis.

NOEC: No Observed Effect Concentration; the highest concentration at which no effect is observed.

LOEC: Lowest Observed Effect Concentration; one concentration above the NOEC.

Table 7. Statistical Results for Water Flea Zinc Tests

			48-hr LC_{50}		
Site	**NOEC**	**LOEC**	**LC_{50}**	**95% LCL**	**95% UCL**
SD8(1)	290	475	334	300	372
DPR(3)	320	510	395	365	427
Lab Water	185[a]	>185[a]	>185[b]	N/A	N/A

All values in µg/L dissolved zinc

LC_{50}: Median lethal concentration; concentration expected to cause mortality to 50 percent of test organisms. Calculated using Trimmed Spearman Kärber (TSK) analysis unless otherwise noted.

NOEC: No Observed Effect Concentration; the highest concentration at which no effect is observed.

LOEC: Lowest Observed Effect Concentration; one concentration above the NOEC

[a] Highest concentration tested.

[b] A 50% effect was not observed in the test; LC_{50} is expressed as greater than the highest concentration tested. Calculated using linear interpolation instead of TSK.

N/A: Not applicable - data do not meet required assumptions to obtain a valid result.

Table 8. Statistical Results for Fathead Minnow Zinc Tests

			48-hr LC_{50}		
Site	**NOEC**	**LOEC**	**LC_{50}**	**95% LCL**	**95% UCL**
SD8(1)	295	480	789	692	900
DPR(3)	520	850	1453	1243	1697
Lab Water	310	505	528[a]	N/A	N/A

All values in µg/L dissolved zinc

LC_{50}: Median lethal concentration; concentration expected to cause mortality to 50 percent of test organisms. Calculated using Trimmed Spearman Kärber (TSK) analysis unless otherwise noted.

NOEC: No Observed Effect Concentration; the highest concentration at which no effect is observed.

LOEC: Lowest Observed Effect Concentration; one concentration above the NOEC

[a] Effect in the highest concentration tested was less than 50% (48.7%) resulting an LC_{50} of > 505 µg/L using TSK. An LC_{50} of 528 µg/L (452 – 801) was extrapolated using Linear Regression.

N/A: Not applicable - data do not meet required assumptions to obtain a valid result.

Table 9. Statistical Results for Water Flea Copper and Zinc Mixture Tests

Site	Dissolved Zinc (µg/L, nominal)	NOEC	LOEC	48-hr LC_{50}		
				LC_{50}	95% LCL	95% UCL
SD8(1)	150	80	98	87.0	83.0	91.1
	182	79	100	87.3	81.7	93.2
	236	79	98	84.4	80.9	88.1
DPR(3)	191	130	>130[a]	>130[b]	N/A	N/A
	232	105	135	>135[b]	N/A	N/A
	301	140	>140[a]	>140[b]	N/A	N/A

All NOEC, LOEC and LC_{50} values in µg/L dissolved copper

LC_{50}: Median lethal concentration; concentration expected to cause mortality to 50 percent of test organisms. Calculated using Trimmed Spearman Kärber (TSK) analysis unless otherwise noted.

NOEC: No Observed Effect Concentration; the highest concentration at which no effect is observed.

LOEC: Lowest Observed Effect Concentration; one concentration above the NOEC

[a] Highest concentration tested.

[b] A 50% effect was not observed in the test; LC_{50} is expressed as greater than the highest concentration tested. Calculated using linear interpolation instead of TSK.

N/A: Not applicable - data do not meet required assumptions to obtain a valid result.

QUALITY ASSURANCE

The samples were received under appropriate conditions and within the recommended temperature range of 0-6° C. The tests with the sample from DPR(3) were initiated within 36 hours of sample receipt. The tests with the sample from SD8(1) were initiated past a standard 36 hour holding time (51 and 54 hours past collection at test initiation), but were within the maximum holding time of 96-hours post collection allowed for WER testing purposes (EPA 1994 and 2001). Mean control responses met minimum test acceptability criteria. Dose-response relationships were reviewed to evaluate reliability of the results. Based on the dose responses observed during testing, the statistical results are deemed reliable. All test results were deemed valid.

Sufficient sample volume was not available to allow for water quality surrogates for the water flea tests. Initial and final water quality readings for the water flea tests were obtained from the fathead minnow test chambers when available. Water quality surrogates were used for initial and final water quality measurements for those dilutions that were not shared with the fathead minnow tests. Temperature readings were measured at 24 hours for the water flea tests from a temperature surrogate on each test board.

The surrogate used for initial readings for the 48.7 µg/L (nominal) concentration in the SD8(1) copper/zinc mixture test had an abnormally high conductivity reading at initiation. This was most likely due to contamination of the surrogate chamber. The temperature in this test was also below recommended test range of 20 ± 1°C (18.6) at 24 hours. These deviations did not appear to affect the final test results.

Reference Toxicant Testing

Concurrent reference toxicant tests were conducted during this round of testing. All test organisms were obtained from Nautilus' internal culture. Both tests met applicable test acceptability criteria and the calculated effect concentrations were within two standard deviations the historical mean, indicating that the organism sensitivity to copper was typical. Reference toxicant test results are summarized in Table 10 and provided in full in Appendix F. A glossary of qualifier codes is provided in Appendix G.

Table 10. Reference Toxicant Test Results

Species	Endpoint	LC_{50} (µg/L copper)	Historical mean ± 2 SD (µg/L copper)	CV (%)
Water flea	48 hr survival	14.5[a]	17.7 ± 9.61	27.2
Fathead minnow	96 hr survival	16.6[a]	54.1 ± 48.1	44.5

[a] Calculated based on nominal rather than measured copper concentrations.

REFERENCES

USEPA. 1994. Interim Guidance on Determination and Use of Water-Effect Ratios for Metals. United States Environmental Protection Agency. EPA-823-B-94-001.

USEPA 1995. Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels. United States Environmental Protection Agency. EPA 821-R-95-034.

USEPA. 2001. Streamlined Water-Effect Ratio Procedure for Discharges of Copper. United States Environmental Protection Agency. EPA-822-R-01-005.

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. United States Environmental Protection Agency. EPA-821-R-02-012.

USEPA 2007, Aquatic Life Ambient Freshwater Criteria – Copper. 2007 Revision. United States Environmental Protection Agency Office of Water. EPA-822-R-07-001. February 2007.

Weston Solutions 2011. Chollas Creek Copper, Lead, and Zinc Water Effect Ratio Study. May 27, 2011. Prepared for: City of San Diego Transportation and Storm Water Department.

APPENDIX A

LC_{50} and Survival Data Summaries

Copper and Zinc WER Mixture Study for Chollas Creek
Summary of Single Metal Spike Results
Test Date: 4/04/2014

C. dubia 48-hr Survival

COPPER

Lab Control Water

Test Conc.	Mean % Surv.
0.5	95
5.9	**100**
7.2	30
13	0
22	0
35	0
58	0
104	0
LC_{50}	**7.36**

Site SD8(1)

Test Conc.	Mean % Surv.
9.1	95
27	95
41	95
59	**95**
97	60
150	0
265	0
425	0
LC_{50}	**102**

Site DPR3

Test Conc.	Mean % Surv.
11	100
29	95
43	100
65	100
104	100
160	**85**
265	5.0
435	0
LC_{50}	**196**

ZINC

Lab Control Water

Test Conc.	Mean % Surv.
1.9	90
9.2	95
15	95
26	95
41	100
68	95
110	100
185	**90**
LC_{50}	**>185**

Site SD8(1)

Test Conc.	Mean % Surv.
20	100
51	100
69	95
115	100
185	95
290	**75**
475	5
810	5
LC_{50}	**334**

Site DPR3

Test Conc.	Mean % Surv.
31	100
61	100
80	100
130	100
200	100
320	**90**
510	5
835	0
LC_{50}	**395**

P. promelas 48-hr Survival

COPPER

Lab Control Water

Test Conc.	Mean % Surv.
0.30	100
13	**85**
22	80
35	60
59	65
98	25
170	15
280	13
LC_{50}	**57.3**

Site SD8(1)

Test Conc.	Mean % Surv.
8.9	98
60	98
95	100
155	**93**
255	73
405	40
645	5
1015	0
LC_{50}	**332**

Site DPR3

Test Conc.	Mean % Surv.
11	100
67	98
110	98
165	98
275	**100**
440	90
720	83
1200	18
LC_{50}	**930**

ZINC

Lab Control Water

Test Conc.	Mean % Surv.
1.7	98
26	98
42	100
67	93
110	93
185	90
310	**88**
505	50
LC_{50}	**528**[a]

Site SD8(1)

Test Conc.	Mean % Surv.
22	95
120	100
190	100
295	**95**
480	73
835	53
1500	13
2450	0
LC_{50}	**789**

Site DPR3

Test Conc.	Mean % Surv.
34	98
135	95
205	98
330	98
520	**95**
850	75
1400	55
2400	18
LC_{50}	**1453**

No Obsered Effect Conc. (NOEC)

Note: All LC_{50} values based on measured metal concentrations; not adjusted for water hardness.

[a] Effect in the highest concentration tested was less than 50% (48.7%) resulting an LC50 of > 505 µg/L using TSK. The reported LC_{50} was extrapolated using Linear Regression: 528 µg/L (452 – 801).

Copper and Zinc WER Mixture Study for Chollas Creek
Summary of Combined Metal Results
Test Date 4/04/2014

Metal Mixture Test Matrix - SD8(1)-Grab

Measured Copper and Zinc Concentrations

Trace Metals	Measured Spike Conc. (µg/L)			
Copper	49	60	**80**	98
Zinc	135	140	**145**	140
Copper	49	58	**79**	100
Zinc	160	165	**175**	175
Copper	48	58	**79**	98
Zinc	200	215	**210**	210

C. dubia 48-hr Survival

Mean % Survival in Mixture Combinations				LC50 (µg/L Cu)
100	100	**85**	5	87
95	85	**80**	10	87
95	95	**80**	0	84

Metal Mixture Test Matrix - DPR3-Comp

Measured Copper and Zinc Concentrations

Trace Metals	Measured Spike Conc. (µg/L)			
Copper	63	80	105	**130**
Zinc	180	190	190	**185**
Copper	65	78	**105**	135
Zinc	220	215	**230**	220
Copper	70	82	110	**140**
Zinc	295	290	280	**280**

C. dubia 48-hr Survival

Mean % Survival in Mixture Combinations				LC50 (µg/L Cu)
100	95	100	**80**	>130
95	90	**95**	80	>135
100	95	100	**80**	>140

No Obsered Effect Conc. (NOEC)

Note: LC_{50} values based on measured metal concentrations; not adjusted for water hardness.

Item 10
Supporting Document No. 2
December 14, 2016

Lab Water

AMEC/ City of San Diego Chollas Creek WER
Lab Water Copper Spike - Summary of Results
Water Flea (*Ceriodaphnia dubia*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Cu (µg/L)**	**T0 Actual Cu (µg/L)**	**48h Actual Cu (µg/L)**	**Mean Cu (µg/L)**	**Rep**	**# Alive (Initial = 5)**	**%Survival**	**Mean % Survival**	**SD**
LW-CdCu-0	0 (Lab Control)	0.32	0.58	**0.45**	A	5	100	95	10
					B	5	100		
					C	5	100		
					D	4	80		
LW-CdCu-1	5.0	4.6	7.2	**5.9**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
LW-CdCu-2	8.4	7.6	6.7	**7.2**	A	1	20	30	20
					B	3	60		
					C	1	20		
					D	1	20		
LW-CdCu-3	14.0	13	13	**13**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
LW-CdCu-4	23.3	22	21	**22**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
LW-CdCu-5	38.9	35	34	**35**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
LW-CdCu-6	64.8	58	58	**58**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
LW-CdCu-7	108	97	110	**104**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
			LC_{50} Copper	7.36					

AMEC/ City of San Diego Chollas Creek WER
Lab Water Zinc Spike - Summary of Results
Water Flea (*Ceriodaphnia dubia*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	Nominal Zn (µg/L)	T0 Actual Zn (µg/L)	48h Actual Zn (µg/L)	Mean Zn (µg/L)	Rep	# Alive (Initial = 5)	%Survival	Mean % Survival	SD
LW-CdZn-0	0 (Lab Control)	0.93	2.8	**1.9**	A	5	100	90	20
					B	5	100		
					C	3	60		
					D	5	100		
LW-CdZn-1	10.1	8.8	9.6	**9.2**	A	5	100	95	10
					B	4	80		
					C	5	100		
					D	5	100		
LW-CdZn-2	16.8	14	15	**15**	A	4	80	95	10
					B	5	100		
					C	5	100		
					D	5	100		
LW-CdZn-3	28.0	25	26	**26**	A	5	100	95	10
					B	4	80		
					C	5	100		
					D	5	100		
LW-CdZn-4	46.7	41	41	**41**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
LW-CdZn-5	77.8	68	67	**68**	A	5	100	95	10
					B	5	100		
					C	4	80		
					D	5	100		
LW-CdZn-6	130	110	110	**110**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
LW-CdZn-7	216	190	180	**185**	A	4	80	90	12
					B	5	100		
					C	5	100		
					D	4	80		
			LC_{50} Zinc	**>185**					

AMEC/ City of San Diego Chollas Creek WER
Lab Water Copper Spike - Summary of Results
Fathead Minnow (*Pimephales promelas*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Cu (µg/L)**	**T0 Actual Cu (µg/L)**	**48h Actual Cu (µg/L)**	**Mean Cu (µg/L)**	**Rep**	**# Alive (Initial = 10)**	**%Survival**	**Mean % Survival**	**SD**
LW-PpCu-0	0	0.32	0.28	**0.30**	A	10	100	100	0.0
					B	10	100		
					C	10	100		
					D	10	100		
LW-PpCu-1	14.0	13	12	**13**	A	9	90	85	17
					B	9	90		
					C	6	60		
					D	10	100		
LW-PpCu-2	23.3	22	21	**22**	A	8	80	80	8.2
					B	8	80		
					C	7	70		
					D	9	90		
LW-PpCu-3	38.9	35	35	**35**	A	6	60	60	16
					B	6	60		
					C	4	40		
					D	8	80		
LW-PpCu-4	64.8	58	59	**59**	A	8	80	65	13
					B	6	60		
					C	7	70		
					D	5	50		
LW-PpCu-5	108	97	99	**98**	A	4	40	25	13
					B	2	20		
					C	3	30		
					D	1	10		
LW-PpCu-6	180	170	170	**170**	A	1	10	15	5.8
					B	2	20		
					C	1	10		
					D	2	20		
LW-PpCu-7	300	290	270	**280**	A	2	20	12.5	5.0
					B	1	10		
					C	1	10		
					D	1	10		
			LC$_{50}$	**57.25**					

AMEC/ City of San Diego Chollas Creek WER
Lab Water Zinc Spike - Summary of Results
Fathead Minnow (*Pimephales promelas*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Zn (µg/L)**	**T0 Actual Zn (µg/L)**	**48h Actual Zn (µg/L)**	**Mean Zn (µg/L)**	**Rep**	**# Alive (Initial = 10)**	**%Survival**	**Mean % Survival**	**SD**
LW-PpZn-0	0	0.93	2.5	**1.7**	A	10	100	97.5	5.0
					B	9	90		
					C	10	100		
					D	10	100		
LW-PpZn-1	28.0	25.0	26.0	**26**	A	10	100	97.5	5.0
					B	9	90		
					C	10	100		
					D	10	100		
LW-PpZn-2	46.7	41	42	**42**	A	10	100	100	0.0
					B[a]	5	100		
					C	10	100		
					D	10	100		
LW-PpZn-3	77.8	68	65	**67**	A	10	100	93.3	9.4
					B[b]	14	93		
					C	10	100		
					D	8	80		
LW-PpZn-4	130	110	110	**110**	A	9	90	92.5	5.0
					B	10	100		
					C	9	90		
					D	9	90		
LW-PpZn-5	216	190	180	**185**	A	10	100	90	11.5
					B	8	80		
					C	10	100		
					D	8	80		
LW-PpZn-6	360	300	320	**310**	A	9	90	87.5	5.0
					B	9	90		
					C	8	80		
					D	9	90		
LW-PpZn-7	600	510	500	**505**	A	5	50	50	16.3
					B	5	50		
					C	3	30		
					D	7	70		
			LC_{50} Zinc	**528**					

[a] Initial number of organisms = 5

[b] Initial number of organisms = 15

Item 10
Supporting Document No. 2
December 14, 2016

Site: SD8(1)

AMEC/ City of San Diego Chollas Creek WER
SD8(1) Copper Spike - Summary of Results
Water Flea (*Ceriodaphnia dubia*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	Nominal Cu (µg/L)	T0 Actual Cu (µg/L)	48h Actual Cu (µg/L)	Mean Cu (µg/L)	Rep	# Alive (Initial = 5)	%Survival	Mean % Survival	SD
SD8(1)-CdCu-0	0	9.1	9.0	**9.1**	A	5	100	95	10
					B	4	80		
					C	5	100		
					D	5	100		
SD8(1)-CdCu-1	23.3	27	26	**27**	A	5	100	95	10
					B	5	100		
					C	5	100		
					D	4	80		
SD8(1)-CdCu-2	38.9	43	39	**41**	A	5	100	95	10
					B	5	100		
					C	4	80		
					D	5	100		
SD8(1)-CdCu-3	64.8	61	57	**59**	A	5	100	95	10
					B[a]	6	100		
					C	5	100		
					D	4	80		
SD8(1)-CdCu-4	108	99	95	**97**	A	2	40	60	16
					B	4	80		
					C	3	60		
					D	3	60		
SD8(1)-CdCu-5	180	160	140	**150**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
SD8(1)-CdCu-6	300	270	260	**265**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
SD8(1)-CdCu-7	500	440	410	**425**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
			LC_{50} Copper	101.6					

[a] Initial number of organisms = 6

AMEC/ City of San Diego Chollas Creek WER
SD8(1) Zinc Spike - Summary of Results
Water Flea (*Ceriodaphnia dubia*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Zn (µg/L)**	**T0 Actual Zn (µg/L)**	**48h Actual Zn (µg/L)**	**Mean Zn (µg/L)**	**Rep**	**# Alive (Initial = 5)**	**%Survival**	**Mean % Survival**	**SD**
SD8(1)-CdZn-0	0	22	18	**20**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D[a]	6	100		
SD8(1)-CdZn-1	46.7	55	46	**51**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
SD8(1)-CdZn-2	77.8	72	65	**69**	A	5	100	95	10
					B	5	100		
					C	5	100		
					D	4	80		
SD8(1)-CdZn-3	130	130	100	**115**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
SD8(1)-CdZn-4	216	200	170	**185**	A	5	100	95	10
					B	5	100		
					C	4	80		
					D	5	100		
SD8(1)-CdZn-5	360	310	270	**290**	A	4	80	75	19
					B	3	60		
					C	3	60		
					D	5	100		
SD8(1)-CdZn-6	600	500	450	**475**	A	1	20	5	10
					B	0	0		
					C	0	0		
					D	0	0		
SD8(1)-CdZn-7	1000	850	770	**810**	A	0	0	5	10
					B	0	0		
					C	0	0		
					D	1	20		
			LC$_{50}$ Zinc	**334.2**					

[a] Initial number of organisms = 6

AMEC/ City of San Diego Chollas Creek WER
SD8(1) Copper and Zinc Spike - Summary of Results
Water Flea (*Ceriodaphnia dubia*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	Nominal Cu (µg/L)	Nominal Zn (µg/L)	Actual T0 Cu (µg/L)	Actual 48h Cu (µg/L)	Actual T0 Zn (µg/L)	Actual 48h Zn (µg/L)	Mean Cu (µg/L)	Mean Zn (µg/L)	Rep	# Alive (Initial = 5)	%Survival	Mean % Survival	SD
SD8(1)-CdCuZn-0	0	0	8.1	9.0	20	18	**8.6**	**19**	A	5	100	95	10
									B	4	80		
									C	5	100		
									D	5	100		
SD8(1)-CdCuZn-1	48.7	150	48	49	130	140	**49**	**135**	A	5	100	100	0.0
									B	5	100		
									C	5	100		
									D	5	100		
SD8(1)-CdCuZn-2	60.8	150	60	60	140	140	**60**	**140**	A	5	100	100	0.0
									B	5	100		
									C	5	100		
									D	5	100		
SD8(1)-CdCuZn-3	85.2	150	78	82	140	150	**80**	**145**	A	5	100	85	19
									B	5	100		
									C	3	60		
									D	4	80		
SD8(1)-CdCuZn-4	113	150	97	99	140	140	**98**	**140**	A	1	20	5	10
									B	0	0		
									C	0	0		
									D	0	0		
SD8(1)-CdCuZn-5	48.7	182	49	49	160	160	**49**	**160**	A	5	100	95	10
									B	4	80		
									C	5	100		
									D	5	100		
SD8(1)-CdCuZn-6	60.8	182	55	61	160	170	**58**	**165**	A	4	80	85	10
									B	4	80		
									C	4	80		
									D	5	100		
SD8(1)-CdCuZn-7	85.2	182	78	79	170	180	**79**	**175**	A	5	100	80	16
									B	4	80		
									C	4	80		
									D	3	60		
SD8(1)-CdCuZn-8	113	182	100	100	170	180	**100**	**175**	A	0	0	10	12
									B	1	20		
									C	1	20		
									D	0	0		
SD8(1)-CdCuZn-9	48.7	236	47	48	200	200	**48**	**200**	A	5	100	95	10
									B	4	80		
									C	5	100		
									D	5	100		
SD8(1)-CdCuZn-10	60.8	236	57	59	210	220	**58**	**215**	A	4	80	95	10
									B	5	100		
									C	5	100		
									D	5	100		
SD8(1)-CdCuZn-11	85.2	236	76	81	200	220	**79**	**210**	A	4	80	80	16
									B	5	100		
									C	4	80		
									D	3	60		
SD8(1)-CdCuZn-12	113	236	96	100	200	220	**98**	**210**	A	0	0	0	0.0
									B	0	0		
									C	0	0		
									D	0	0		

AMEC/ City of San Diego Chollas Creek WER
SD8(1) Copper Spike - Summary of Results
Fathead Minnow (*Pimephales promelas*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Cu (µg/L)**	**T0 Actual Cu (µg/L)**	**48h Actual Cu (µg/L)**	**Mean Cu (µg/L)**	**Rep**	**# Alive (Initial = 10)**	**%Survival**	**Mean % Survival**	**SD**
SD8(1)-PpCu-0	0	9.1	8.7	**8.9**	A	10	100	97.5	5.0
					B	9	90		
					C	10	100		
					D	10	100		
SD8(1)-PpCu-1	64.8	61	58	**60**	A	10	100	97.5	5.0
					B	10	100		
					C	10	100		
					D	9	90		
SD8(1)-PpCu-2	108	99	91	**95**	A	10	100	100	0.0
					B	10	100		
					C	10	100		
					D	10	100		
SD8(1)-PpCu-3	180	160	150	**155**	A	8	80	92.5	9.6
					B	10	100		
					C	10	100		
					D	9	90		
SD8(1)-PpCu-4	300	270	240	**255**	A	8	80	72.5	9.6
					B	7	70		
					C	8	80		
					D	6	60		
SD8(1)-PpCu-5	500	440	370	**405**	A	3	30	40	8.2
					B	4	40		
					C	4	40		
					D	5	50		
SD8(1)-PpCu-6	833	690	600	**645**	A	0	0	5	5.8
					B	0	0		
					C	1	10		
					D	1	10		
SD8(1)-PpCu-7	1389	1100	930	**1015**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
			LC_{50} Copper	**332.2**					

AMEC/ City of San Diego Chollas Creek WER
SD8(1) Zinc Spike - Summary of Results
Fathead Minnow (*Pimephales promelas*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Zn (µg/L)**	**T0 Actual Zn (µg/L)**	**48h Actual Zn (µg/L)**	**Mean Zn (µg/L)**	**Rep**	**# Alive (Initial = 10)**	**%Survival**	**Mean % Survival**	**SD**
SD8(1)-PpZn-0	0	22	21	**22**	A	9	90	95	5.8
					B	9	90		
					C	10	100		
					D	10	100		
SD8(1)-PpZn-1	130	130	110	**120**	A	10	100	100	0.0
					B	10	100		
					C	10	100		
					D	10	100		
SD8(1)-PpZn-2	216	200	180	**190**	A	10	100	100	0.0
					B	10	100		
					C	10	100		
					D	10	100		
SD8(1)-PpZn-3	360	310	280	**295**	A	10	100	95	5.8
					B	9	90		
					C	9	90		
					D	10	100		
SD8(1)-PpZn-4	600	500	460	**480**	A	8	80	72.5	9.6
					B	7	70		
					C	6	60		
					D	8	80		
SD8(1)-PpZn-5	1000	850	820	**835**	A	5	50	52.5	9.6
					B	6	60		
					C	6	60		
					D	4	40		
SD8(1)-PpZn-6	1667	1400	1600	**1500**	A	2	20	12.5	9.6
					B	1	10		
					C	0	0		
					D	2	20		
SD8(1)-PpZn-7	2778	2300	2600	**2450**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
			LC_{50} Zinc	**789**					

Site: DPR3

AMEC/ City of San Diego Chollas Creek WER
DPR3 Copper Spike - Summary of Results
Water Flea (*Ceriodaphnia dubia*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Cu (µg/L)**	**T0 Actual Cu (µg/L)**	**48h Actual Cu (µg/L)**	**Mean Cu (µg/L)**	**Rep**	**# Alive (Initial = 5)**	**%Survival**	**Mean % Survival**	**SD**
DPR-CdCu-0	0	10	11	**11**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
DPR-CdCu-1	23.3	30	28	**29**	A	5	100	95	10
					B	5	100		
					C	4	80		
					D	5	100		
DPR-CdCu-2	38.9	47	39	**43**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
DPR-CdCu-3	64.8	69	60	**65**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
DPR-CdCu-4	108	110	97	**104**	A	5	100	100	0.0
					B	5	100		
					C[a]	6	100		
					D	5	100		
DPR-CdCu-5	180	170	150	**160**	A	4	80	85	10
					B	5	100		
					C	4	80		
					D	4	80		
DPR-CdCu-6	300	290	240	**265**	A	0	0	5	10
					B	0	0		
					C	0	0		
					D	1	20		
DPR-CdCu-7	500	470	400	**435**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
			LC_{50} Copper	196					

[a] Initial number of organisms = 6

AMEC/ City of San Diego Chollas Creek WER
DPR3 Zinc Spike - Summary of Results
Water Flea (*Ceriodaphnia dubia*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Zn (µg/L)**	**T0 Actual Zn (µg/L)**	**48h Actual Zn (µg/L)**	**Mean Zn (µg/L)**	**Rep**	**# Alive (Initial = 5)**	**%Survival**	**Mean % Survival**	**SD**
DPR-CdZn-0	0	33	29	**31**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
DPR-CdZn-1	46.7	65	57	**61**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
DPR-CdZn-2	77.8	87	73	**80**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
DPR-CdZn-3	130	140	120	**130**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
DPR-CdZn-4	216	210	190	**200**	A	5	100	100	0.0
					B	5	100		
					C	5	100		
					D	5	100		
DPR-CdZn-5	360	340	300	**320**	A	5	100	90	12
					B	5	100		
					C	4	80		
					D	4	80		
DPR-CdZn-6	600	550	470	**510**	A	0	0	5	10
					B	0	0		
					C	0	0		
					D	1	20		
DPR-CdZn-7	1000	890	780	**835**	A	0	0	0	0.0
					B	0	0		
					C	0	0		
					D	0	0		
			LC_{50} Zinc	**395**					

AMEC/ City of San Diego Chollas Creek WER
DPR3 Copper and Zinc Spike - Summary of Results
Water Flea (*Ceriodaphnia dubia*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	Nominal Cu (µg/L)	Nominal Zn (µg/L)	Actual T0 Cu (µg/L)	Actual 48h Cu (µg/L)	Actual T0 Zn (µg/L)	Actual 48h Zn (µg/L)	Mean Cu (µg/L)	Mean Zn (µg/L)	Rep	# Alive (Initial = 5)	%Survival	Mean % Survival	SD
DPR-CdCuZn-0	0	0	9.7	11	32	29	**10**	**31**	A	5	100	100	0.0
									B	5	100		
									C	5	100		
									D	5	100		
DPR-CdCuZn-1	63.8	191	64	61	190	170	**63**	**180**	A	5	100	100	0.0
									B	5	100		
									C	5	100		
									D	5	100		
DPR-CdCuZn-2	79.8	191	79	81	190	190	**80**	**190**	A	5	100	95	10
									B	4	80		
									C	5	100		
									D	5	100		
DPR-CdCuZn-3	112	191	110	100	200	180	**105**	**190**	A	5	100	100	0.0
									B	5	100		
									C	5	100		
									D	5	100		
DPR-CdCuZn-4	148	191	130	130	190	180	**130**	**185**	A	4	80	80	16
									B	3	60		
									C	4	80		
									D	5	100		
DPR-CdCuZn-5	63.8	232	63	67	220	220	**65**	**220**	A	5	100	95	10
									B	5	100		
									C	5	100		
									D	4	80		
DPR-CdCuZn-6	79.8	232	78	78	220	210	**78**	**215**	A	4	80	90	12
									B	5	100		
									C	4	80		
									D	5	100		
DPR-CdCuZn-7	112	232	110	100	240	220	**105**	**230**	A	5	100	95	10
									B	5	100		
									C	5	100		
									D	4	80		
DPR-CdCuZn-8	148	232	140	130	230	210	**135**	**220**	A	4	80	80	16
									B	3	60		
									C	5	100		
									D	4	80		
DPR-CdCuZn-9	63.8	301	71	68	310	280	**70**	**295**	A	5	100	100	0.0
									B	5	100		
									C	5	100		
									D	5	100		
DPR-CdCuZn-10	79.8	301	83	81	300	280	**82**	**290**	A	4	80	95	10
									B	5	100		
									C	5	100		
									D	5	100		
DPR-CdCuZn-11	112	301	110	110	280	280	**110**	**280**	A	5	100	100	0.0
									B[a]	6	100		
									C	5	100		
									D	5	100		
DPR-CdCuZn-12	148	301	140	140	290	270	**140**	**280**	A	3	60	80	16
									B	4	80		
									C	5	100		
									D	4	80		

[a] Initial number of organisms = 6

AMEC/ City of San Diego Chollas Creek WER
DPR3 Copper Spike - Summary of Results
Fathead Minnow (*Pimephales promelas*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	**Nominal Cu (µg/L)**	**T0 Actual Cu (µg/L)**	**48h Actual Cu (µg/L)**	**Mean Cu (µg/L)**	**Rep**	**# Alive (Initial = 10)**	**%Survival**	**Mean % Survival**	**SD**
DPR-PpCu-0	0	10	11	**11**	A	10	100	100	0.0
					B	10	100		
					C	10	100		
					D	10	100		
DPR-PpCu-1	64.8	69	64	**67**	A	10	100	97.5	5.0
					B	10	100		
					C	10	100		
					D	9	90		
DPR-PpCu-2	108	110	110	**110**	A	9	90	97.5	5.0
					B	10	100		
					C	10	100		
					D	10	100		
DPR-PpCu-3	180	170	160	**165**	A	10	100	97.5	5.0
					B	9	90		
					C	10	100		
					D	10	100		
DPR-PpCu-4	300	290	260	**275**	A	10	100	100	0.0
					B	10	100		
					C	10	100		
					D	10	100		
DPR-PpCu-5	500	470	410	**440**	A	9	90	90	0.0
					B	9	90		
					C	9	90		
					D	9	90		
DPR-PpCu-6	833	740	700	**720**	A	8	80	82.5	5.0
					B	8	80		
					C	9	90		
					D	8	80		
DPR-PpCu-7	1389	1200	1200	**1200**	A	2	20	17.5	5.0
					B	2	20		
					C	1	10		
					D	2	20		
			LC_{50} Copper	**929.5**					

Nautilus Environmental - San Diego Bioassay Laboratory

AMEC/ City of San Diego Chollas Creek WER
DPR3 Zinc Spike - Summary of Results
Fathead Minnow (*Pimephales promelas*) 48-hour Survival
Test Initiation Date: 4/4/14

Sample ID	Nominal Zn (µg/L)	T0 Actual Zn (µg/L)	48h Actual Zn (µg/L)	Mean Zn (µg/L)	Rep	# Alive (Initial = 10)	%Survival	Mean % Survival	SD
DPR-PpZn-0	0	33	34	**34**	A	10	100	97.5	5.0
					B	10	100		
					C	9	90		
					D	10	100		
DPR-PpZn-1	130	140	130	**135**	A	8	80	95	10
					B	10	100		
					C	10	100		
					D	10	100		
DPR-PpZn-2	216	210	200	**205**	A	10	100	97.5	5.0
					B	10	100		
					C	9	90		
					D	10	100		
DPR-PpZn-3	360	340	320	**330**	A	10	100	97.5	5.0
					B	10	100		
					C	9	90		
					D	10	100		
DPR-PpZn-4	600	550	490	**520**	A	10	100	95	5.8
					B	9	90		
					C	9	90		
					D	10	100		
DPR-PpZn-5	1000	890	810	**850**	A	7	70	75	10
					B	9	90		
					C	7	70		
					D	7	70		
DPR-PpZn-6	1667	1500	1300	**1400**	A	6	60	55	5.8
					B	5	50		
					C	6	60		
					D	5	50		
DPR-PpZn-7	2778	2500	2300	**2400**	A	0	0	17.5	12.6
					B	2	20		
					C	3	30		
					D	2	20		
			LC_{50} Zinc	**1453**					

APPENDIX B

Statistical Analysis and Raw Datasheets

Item 10
Supporting Document No. 2
December 14, 2016

Lab Water

CETIS Summary Report

Report Date: 01 May-14 08:35 (p 1 of 1)
Test Code: 1404-S115 | 14-3558-3474

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	18-9163-9585	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 17:20	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 15:20	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	46h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	15-8310-8775	**Code:**	LabWater	**Client:**	AMEC
Sample Date:	04 Apr-14	**Material:**	Copper chloride	**Project:**	City of SD Chollas Creek WER
Receive Date:	04 Apr-14	**Source:**	Lab Water		
Sample Age:	17h	**Station:**			

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-7294-2968	48h Survival Rate	5.9	7.2	6.518	19.0%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
19-4770-6219	48h Survival Rate	EC50	7.36	6.784	7.985		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
15-7294-2968	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria
19-4770-6219	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0.45	Lab Control	4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
5.9		4	1	1	1	1	1	0	0	0.0%	-5.26%
7.2		4	0.3	0.2253	0.3747	0.2	0.6	0.1	0.2	66.67%	68.42%
13		4	0	0	0	0	0	0	0		100.0%
22		4	0	0	0	0	0	0	0		100.0%
35		4	0	0	0	0	0	0	0		100.0%
58		4	0	0	0	0	0	0	0		100.0%
104		4	0	0	0	0	0	0	0		100.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.45	Lab Control	1	1	1	0.8
5.9		1	1	1	1
7.2		0.2	0.6	0.2	0.2
13		0	0	0	0
22		0	0	0	0
35		0	0	0	0
58		0	0	0	0
104		0	0	0	0

Analyst: SD QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 08:35 (p 1 of 2)
Test Code: 1404-S115 | 14-3558-3474

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 15-7294-2968 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 8:34 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	5.9	7.2	6.518		19.0%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
0.45		5.9	-0.6014	2.18	0.216	6	0.8559	CDF	Non-Significant Effect
0.45		7.2*	7.238	2.18	0.216	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.49217	0.7460852	2	38.07	<0.0001	Significant Effect
Error	0.1763659	0.01959622	9			
Total	1.668536		11			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.5722	8.022	0.5835	Equal Variances
Variances	Levene Equality of Variance	5.15	8.022	0.0323	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8673	0.8025	0.0604	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.45	Lab Control	4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
5.9		4	1	1	1	1	1	1	0	0.0%	-5.26%
7.2		4	0.3	0	0.6182	0.2	0.2	0.6	0.1	66.67%	68.42%
13		4	0	0	0	0	0	0	0		100.0%
22		4	0	0	0	0	0	0	0		100.0%
35		4	0	0	0	0	0	0	0		100.0%
58		4	0	0	0	0	0	0	0		100.0%
104		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.45	Lab Control	4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
5.9		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-4.63%
7.2		4	0.5693	0.2332	0.9053	0.4636	0.4636	0.8861	0.1056	37.1%	55.73%
13		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%
22		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%
35		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%
58		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%
104		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%

Analyst: SD QA: AC 5/1/14

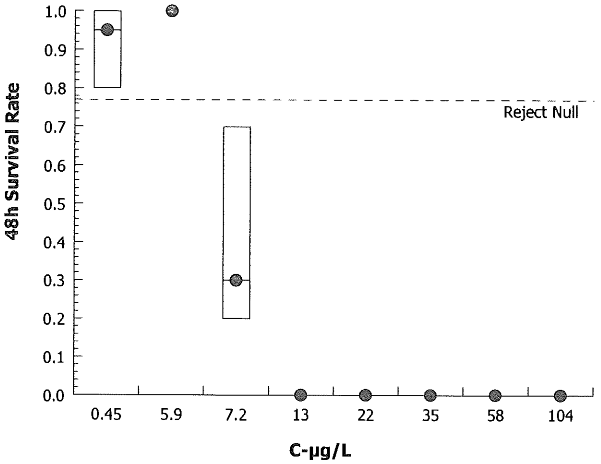
CETIS Analytical Report

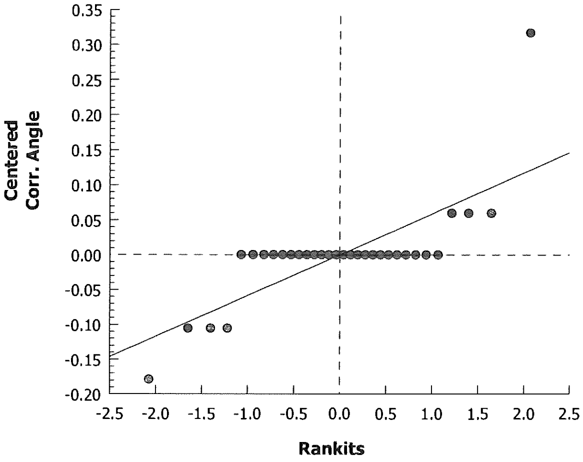
Report Date:	01 May-14 08:35 (p 2 of 2)
Test Code:	1404-S115 | 14-3558-3474

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	15-7294-2968	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 8:34	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: SD QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 08:35 (p 1 of 1)
Test Code: 1404-S115 | 14-3558-3474

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 19-4770-6219 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 8:34 **Analysis:** Untrimmed Spearman-Kärber **Official Results:** Yes

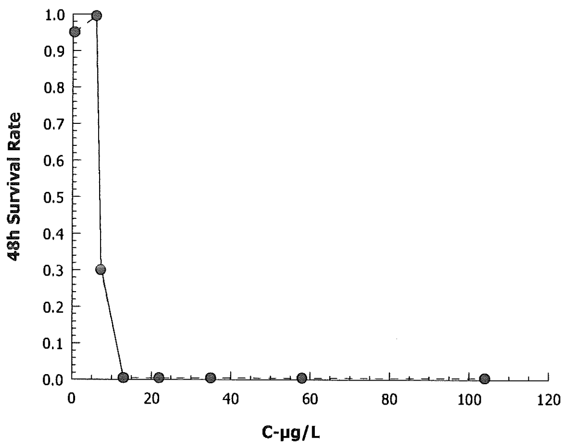
Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.05	0.00%	0.8669	0.0177	7.36	6.784	7.985

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0.45	Lab Control	4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
5.9		4	1	1	1	0	0	0.0%	-5.26%	20	20
7.2		4	0.3	0.2	0.6	0.1	0.2	66.67%	68.42%	6	20
13		4	0	0	0	0	0		100.0%	0	20
22		4	0	0	0	0	0		100.0%	0	20
35		4	0	0	0	0	0		100.0%	0	20
58		4	0	0	0	0	0		100.0%	0	20
104		4	0	0	0	0	0		100.0%	0	20

Graphics



Analyst: SD QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: Lab Water - Copper Spikes
Test No.: 1404-S115
Test Species: *C. dubia*
Start Date/Time: 4/4/2014 1720
End Date/Time: 4/6/2014 1520

	Tech Initials		
	0	24	48
Counts:	AD	KFP	BK
Readings:	SD/AG	KFP	AB
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	A	5	5	5	201	–	203	20.9	20.0	19.8	8.0	–	8.1	7.95	–	7.77
LW-CdCu-0	B	5	5	5												
	C	5	5	5												
	D	5	5	4												
LW-CdCu-1	A	5	5	5	197	–	204	20.6	20.0	20.1	7.7	–	8.7	7.45	–	8.02
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
LW-CdCu-2	A	5	2	1	196	–	204	20.5	20.0	20.2	7.8	–	8.8	7.90	–	8.08
	B	5	4	3												
	C	5	2	1												
	D	5	2	1	AC											
LW-CdCu-3	A	5	0	–	~~196~~	–	198	20.6	20.0	20.2	8.2	–	8.1	7.96	–	7.88
	B	5	0	–	195											
	C	5	0	–												
	D	5	0	–												
LW-CdCu-4	A	5	0	–	196	–	201	20.5	20.0	20.3	8.0	–	8.2	7.95	–	7.88
	B	5	0	–												
	C	5	0	–												
	D	5	0	–												
LW-CdCu-5	A	5	0	–	196	–	199	20.6	20.0	20.4	8.1	–	8.1	7.97	–	7.90
	B	5	0	–												
	C	5	0	–												
	D	5	0	–												
LW-CdCu-6	A	5	0	–	196	–	199	20.8	20.0	20.4	8.1	–	8.1	7.99	–	7.86
	B	5	0	–												
	C	5	0	–												
	D	5	0	–												
LW-CdCu-7	A	5	0	–	196	–	210	20.8	20.0	204	7.9	–	8.3	7.90	–	7.93
	B	5	0	–												
	C	5	0	–												
	D	5	0	–												

Initial Counts QC'd by: Cl

Animal Source/Date Received: Internal/N/A

Age at Initiation: <24 hrs

Comments: Organisms fed prior to initiation, circle one (y / n)

only temp recorded at 24 hours

QC Check: AC 5/1/14

Final Review: 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Analytical Report

Report Date: 09 Jun-14 18:33 (p 1 of 2)
Test Code: 1404-S118 | 07-9956-2549

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID: 06-2757-4556
Analyzed: 09 Jun-14 18:31
Endpoint: 48h Survival Rate
Analysis: Nonparametric-Two Sample
CETIS Version: CETISv1.8.4
Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	185	>185	NA		15.8%

Mann-Whitney U Two-Sample Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
1.9		9	7.5	NA	1	6	0.7857	Exact	Non-Significant Effect
1.9		15	7.5	NA	1	6	0.7857	Exact	Non-Significant Effect
1.9		26	7.5	NA	1	6	0.7857	Exact	Non-Significant Effect
1.9		41	6	NA	1	6	1.0000	Exact	Non-Significant Effect
1.9		68	7.5	NA	1	6	0.7857	Exact	Non-Significant Effect
1.9		110	6	NA	1	6	1.0000	Exact	Non-Significant Effect
1.9		185	9	NA	1	6	0.5000	Exact	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.05473999	0.007819998	7	0.4875	0.8342	Non-Significant Effect
Error	0.3849841	0.016041	24			
Total	0.4397241		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.5717	3.496	0.7716	Equal Variances
Variances	Levene Equality of Variance	3.871	3.496	0.0059	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8142	0.9081	<0.0001	Non-normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
1.9	Lab Control	4	0.9	0.5818	1	1	0.6	1	0.1	22.22%	0.0%
9		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	-5.56%
15		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	-5.56%
26		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	-5.56%
41		4	1	1	1	1	1	1	0	0.0%	-11.11%
68		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	-5.56%
110		4	1	1	1	1	1	1	0	0.0%	-11.11%
185		4	0.9	0.7163	1	0.9	0.8	1	0.05774	12.83%	0.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
1.9	Lab Control	4	1.23	0.8651	1.596	1.345	0.8861	1.345	0.1148	18.66%	0.0%
9		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	-4.49%
15		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	-4.49%
26		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	-4.49%
41		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-9.33%
68		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	-4.49%
110		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-9.33%
185		4	1.226	1.007	1.445	1.226	1.107	1.345	0.06874	11.21%	0.35%

Analyst: SD/AC QA: AC 6/9/14

CETIS Analytical Report

Report Date: 09 Jun-14 18:33 (p 2 of 2)
Test Code: 1404-S118 | 07-9956-2549

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 06-2757-4556 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 09 Jun-14 18:31 **Analysis:** Nonparametric-Two Sample **Official Results:** Yes

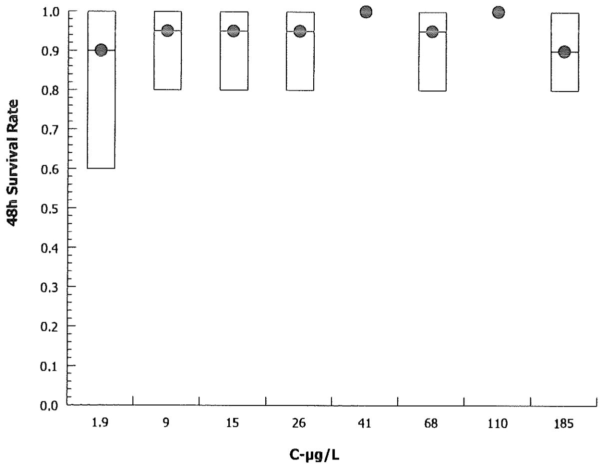
48h Survival Rate Detail

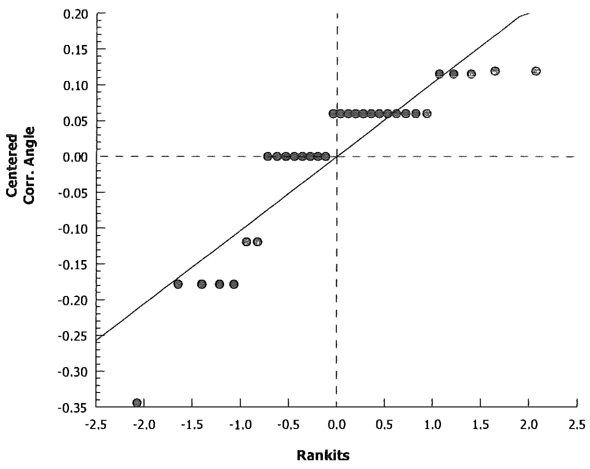
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
1.9	Lab Control	1	1	0.6	1
9		1	0.8	1	1
15		0.8	1	1	1
26		1	0.8	1	1
41		1	1	1	1
68		1	1	0.8	1
110		1	1	1	1
185		0.8	1	1	0.8

Angular (Corrected) Transformed Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
1.9	Lab Control	1.345	1.345	0.8861	1.345
9		1.345	1.107	1.345	1.345
15		1.107	1.345	1.345	1.345
26		1.345	1.107	1.345	1.345
41		1.345	1.345	1.345	1.345
68		1.345	1.345	1.107	1.345
110		1.345	1.345	1.345	1.345
185		1.107	1.345	1.345	1.107

Graphics





Analyst: SD/AL QA: AC 6/9/14

CETIS Summary Report

Report Date: 01 May-14 08:39 (p 1 of 1)
Test Code: 1404-S118 | 07-9956-2549

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	06-4481-7594	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 15:50	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 14:05	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	46h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	13-6348-7839	**Code:**	LabWater	**Client:**	AMEC
Sample Date:	04 Apr-14	**Material:**	Zinc ~~chloride~~	**Project:**	City of SD Chollas Creek WER
Receive Date:	04 Apr-14	**Source:**	Lab Water		
Sample Age:	16h	**Station:**			

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
00-5646-2430	48h Survival Rate	EC50	>185	N/A	N/A		Linear Interpolation (ICPIN)

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-5646-2430	48h Survival Rate	Control Resp	0.9	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
1.9	Lab Control	4	0.9	0.8253	0.9747	0.6	1	0.1	0.2	22.22%	0.0%
9.2		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	-5.56%
15		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	-5.56%
26		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	-5.56%
41		4	1	1	1	1	1	0	0	0.0%	-11.11%
68		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	-5.56%
110		4	1	1	1	1	1	0	0	0.0%	-11.11%
185		4	0.9	0.8569	0.9431	0.8	1	0.05774	0.1155	12.83%	0.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
1.9	Lab Control	1	1	0.6	1
9.2		1	0.8	1	1
15		0.8	1	1	1
26		1	0.8	1	1
41		1	1	1	1
68		1	1	0.8	1
110		1	1	1	1
185		0.8	1	1	0.8

Analyst: SD QA: 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 08:39 (p 1 of 1)
Test Code: 1404-S118 | 07-9956-2549

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	00-5646-2430	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 8:38	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1473729	1000	Yes	Two-Point Interpolation

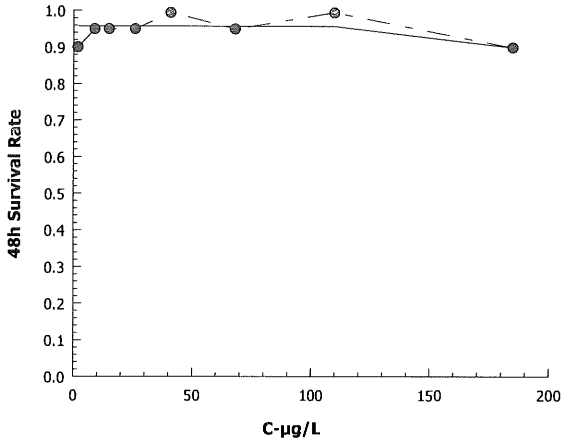
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC50	>185	N/A	N/A

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
1.9	Lab Control	4	0.9	0.6	1	0.1	0.2	22.22%	0.0%	18	20
9		4	0.95	0.8	1	0.05	0.1	10.53%	-5.56%	19	20
15		4	0.95	0.8	1	0.05	0.1	10.53%	-5.56%	19	20
26		4	0.95	0.8	1	0.05	0.1	10.53%	-5.56%	19	20
41		4	1	1	1	0	0	0.0%	-11.11%	20	20
68		4	0.95	0.8	1	0.05	0.1	10.53%	-5.56%	19	20
110		4	1	1	1	0	0	0.0%	-11.11%	20	20
185		4	0.9	0.8	1	0.05774	0.1155	12.83%	0.0%	18	20

Graphics



Analyst:________ QA: 5/1/14

CETIS Analytical Report C. dubia Zinc Lab Water

Report Date: 06 May-14 16:21 (p 1 of 1)
Test Code: 1404-S118 | 07-9956-2549

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 19-5642-7126 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 06 May-14 16:19 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	920556	1000	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	172.8	72.31	N/A
EC10	>185	N/A	N/A
EC15	>185	N/A	N/A
EC20	>185	N/A	N/A
EC25	>185	N/A	N/A
EC40	>185	N/A	N/A
EC50	>185	N/A	N/A

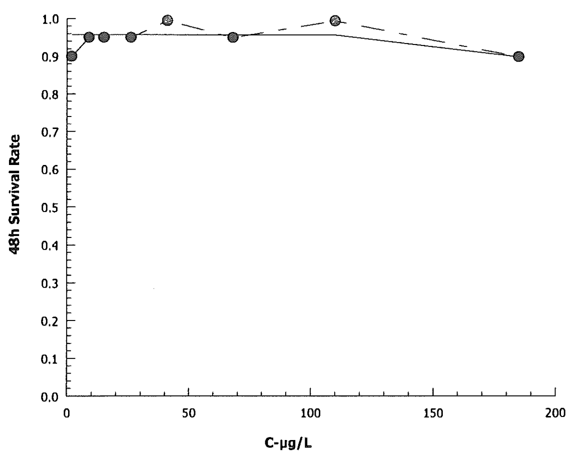
48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
1.9	Lab Control	4	0.9	0.6	1	0.1	0.2	22.22%	0.0%	18	20
9		4	0.95	0.8	1	0.05	0.1	10.53%	-5.56%	19	20
15		4	0.95	0.8	1	0.05	0.1	10.53%	-5.56%	19	20
26		4	0.95	0.8	1	0.05	0.1	10.53%	-5.56%	19	20
41		4	1	1	1	0	0	0.0%	-11.11%	20	20
68		4	0.95	0.8	1	0.05	0.1	10.53%	-5.56%	19	20
110		4	1	1	1	0	0	0.0%	-11.11%	20	20
185		4	0.9	0.8	1	0.05774	0.1155	12.83%	0.0%	18	20

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
1.9	Lab Control	1	1	0.6	1
9.2		1	0.8	1	1
15		0.8	1	1	1
26		1	0.8	1	1
41		1	1	1	1
68		1	1	0.8	1
110		1	1	1	1
185		0.8	1	1	0.8

Graphics



Analyst: AC QA:

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: Lab Water - Zinc Spikes
Test No.: 1404-S118

Test Species: *C. dubia*
Start Date/Time: 4/4/2014 1550
End Date/Time: 4/6/2014 1405

	Tech Initials		
	0	24	48
Counts:	AD	KFP	BK
Readings:	SO/AG	BL	AB
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	Ⓐ 24	48	0	24	48	0	24	48
Lab Control	A	5	5	5	195	-	200	20.9	20.2	20.1	7.7	-	8.1	8.05	-	7.85
LW-CdZn-0	B	5	5	5												
	C	5	3	3												
	D	5	5	5												
LW-CdZn-1	A	5	5	5	195	-	205	20.9	20.2	20.1	7.8	-	8.9	7.89	7.8	7.95
	B	5	4	4												
	C	5	5	5												
	D	5	5	5												
LW-CdZn-2	A	5	4	4	196	-	205	21.0	20.2	20.0	7.8	-	8.8	7.93	-	8.02
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
LW-CdZn-3	A	5	5	5	196	-	201	20.9	20.2	20.8	8.0	-	9.0	8.03	-	7.85
	B	5	4	4												
	C	5	5	5												
	D	5	5	5												
LW-CdZn-4	A	5	5	5	195	-	202	21.0	20.2	20.7	8.1	-	8.0	8.02	-	7.87
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
LW-CdZn-5	A	5	5	5	195	-	204	20.9	20.2	20.6	8.1	-	8.0	8.01	-	7.85
	B	5	5	5												
	C	5	5	4												
	D	5	5	5												
LW-CdZn-6	A	5	5	5	195	-	201	20.9	20.2	20.5	8.0	-	8.1	8.00	-	7.85
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
LW-CdZn-7	A	5	5	4	195	-	204	20.9	20.2	20.5	8.0	-	8.0	7.99	-	7.83
	B	5	5	5												
	C	5	5	5												
	D	5	4	4												

Initial Counts QC'd by: CL

Animal Source/Date Received: Internal / NA

Age at Initiation: <24h

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)

Ⓐ Temperature taken from surrogate cup, no other water quality @ 24 hrs

QC Check: Yg 5/1/14

Final Review: AC 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 01 May-14 08:45 (p 1 of 1)
Test Code: 1404-S125 | 14-8152-3781

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	18-8204-1510	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 15:40	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 ~~12:45~~ 1345	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Duration:	45h	**Source:**	Aquatic Biosystems, CO	**Age:**	4d

Sample ID:	15-8310-8775	**Code:**	LabWater	**Client:**	AMEC
Sample Date:	04 Apr-14	**Material:**	Copper chloride	**Project:**	City of SD Chollas Creek WER
Receive Date:	04 Apr-14	**Source:**	Lab Water		
Sample Age:	16h	**Station:**			

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
06-1947-1578	48h Survival Rate	13	22	16.91	14.8%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
05-7766-1877	48h Survival Rate	EC50	57.25	46.11	71.08		Trimmed Spearman-Kärber

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0.3	Lab Control	4	1	1	1	1	1	0	0	0.0%	0.0%
13		4	0.85	0.7853	0.9147	0.6	1	0.0866	0.1732	20.38%	15.0%
22		4	0.8	0.7695	0.8305	0.7	0.9	0.04082	0.08165	10.21%	20.0%
35		4	0.6	0.539	0.661	0.4	0.8	0.08165	0.1633	27.22%	40.0%
59		4	0.65	0.6018	0.6982	0.5	0.8	0.06455	0.1291	19.86%	35.0%
98		4	0.25	0.2018	0.2982	0.1	0.4	0.06455	0.1291	51.64%	75.0%
170		4	0.15	0.1284	0.1716	0.1	0.2	0.02887	0.05774	38.49%	85.0%
280		4	0.125	0.1063	0.1437	0.1	0.2	0.025	0.05	40.0%	87.5%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.3	Lab Control	1	1	1	1
13		0.9	0.9	0.6	1
22		0.8	0.8	0.7	0.9
35		0.6	0.6	0.4	0.8
59		0.8	0.6	0.7	0.5
98		0.4	0.2	0.3	0.1
170		0.1	0.2	0.1	0.2
280		0.2	0.1	0.1	0.1

Analyst: SD QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 08:44 (p 1 of 2)
Test Code: 1404-S125 | 14-8152-3781

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	06-1947-1578	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 8:43	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	13	22	16.91		14.8%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
0.3		13	2.233	2.482	0.237	6	0.0810	CDF	Non-Significant Effect
0.3		22*	3.129	2.482	0.237	6	0.0125	CDF	Significant Effect
0.3		35*	5.463	2.482	0.237	6	<0.0001	CDF	Significant Effect
0.3		59*	4.924	2.482	0.237	6	0.0002	CDF	Significant Effect
0.3		98*	9.433	2.482	0.237	6	<0.0001	CDF	Significant Effect
0.3		170*	10.69	2.482	0.237	6	<0.0001	CDF	Significant Effect
0.3		280*	11.06	2.482	0.237	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.333069	0.6190099	7	34.03	<0.0001	Significant Effect
Error	0.4365636	0.01819015	24			
Total	4.769632		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.012	3.496	0.4477	Equal Variances
Variances	Levene Equality of Variance	1.581	3.496	0.1889	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9654	0.9081	0.3830	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.3	Lab Control	4	1	1	1	1	1	1	0	0.0%	0.0%
13		4	0.85	0.5744	1	0.9	0.6	1	0.0866	20.38%	15.0%
22		4	0.8	0.6701	0.9299	0.8	0.7	0.9	0.04082	10.21%	20.0%
35		4	0.6	0.3402	0.8598	0.6	0.4	0.8	0.08165	27.22%	40.0%
59		4	0.65	0.4446	0.8554	0.65	0.5	0.8	0.06455	19.86%	35.0%
98		4	0.25	0.04457	0.4554	0.25	0.1	0.4	0.06455	51.64%	75.0%
170		4	0.15	0.05813	0.2419	0.15	0.1	0.2	0.02887	38.49%	85.0%
280		4	0.125	0.04544	0.2046	0.1	0.1	0.2	0.025	40.0%	87.5%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.3	Lab Control	4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
13		4	1.199	0.8453	1.553	1.249	0.8861	1.412	0.1112	18.54%	15.08%
22		4	1.114	0.9457	1.282	1.107	0.9912	1.249	0.05277	9.48%	21.13%
35		4	0.891	0.6164	1.166	0.8861	0.6847	1.107	0.08627	19.37%	36.9%
59		4	0.9424	0.7225	1.162	0.9386	0.7854	1.107	0.06913	14.67%	33.26%
98		4	0.5124	0.2643	0.7606	0.5216	0.3218	0.6847	0.07796	30.43%	63.71%
170		4	0.3927	0.2623	0.5231	0.3927	0.3218	0.4636	0.04096	20.86%	72.19%
280		4	0.3572	0.2443	0.4701	0.3218	0.3218	0.4636	0.03547	19.86%	74.7%

Analyst: QA: AC 5/1/14

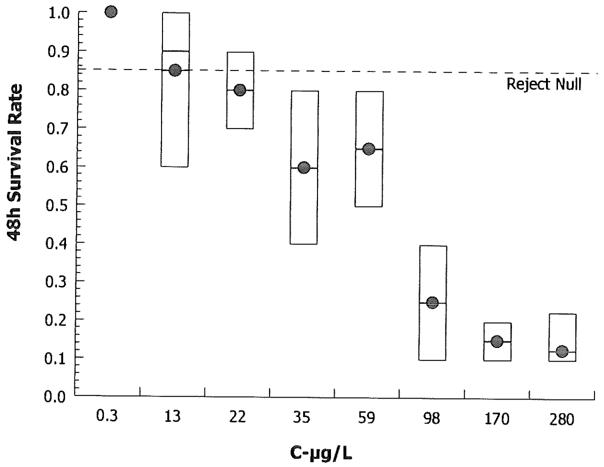
CETIS Analytical Report

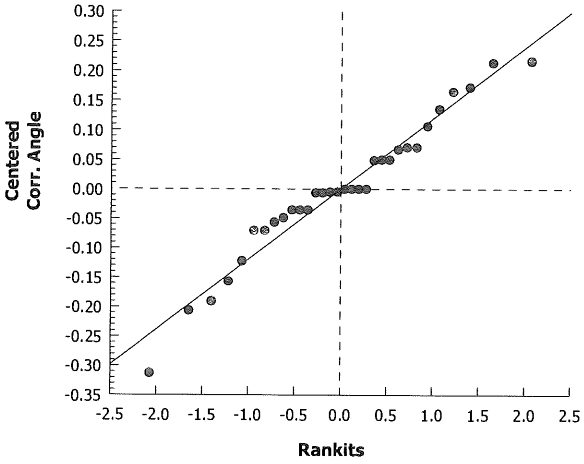
Report Date: 01 May-14 08:44 (p 2 of 2)
Test Code: 1404-S125 | 14-8152-3781

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	06-1947-1578	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 8:43	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 08:44 (p 1 of 1)
Test Code: 1404-S125 | 14-8152-3781

Fathead Minnow 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 05-7766-1877 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 8:44 **Analysis:** Trimmed Spearman-Kärber **Official Results:** Yes

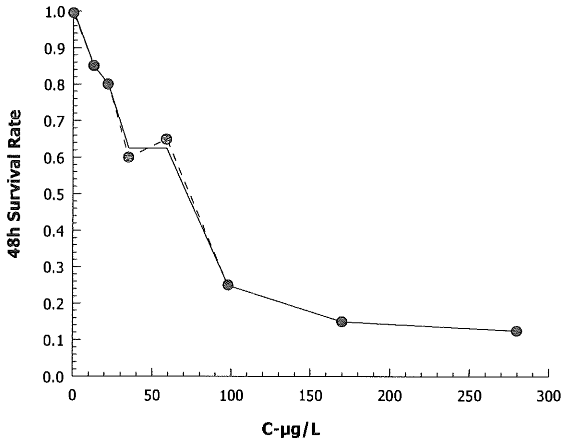
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	15.00%	1.758	0.04698	57.25	46.11	71.08

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0.3	Lab Control	4	1	1	1	0	0	0.0%	0.0%	40	40
13		4	0.85	0.6	1	0.0866	0.1732	20.38%	15.0%	34	40
22		4	0.8	0.7	0.9	0.04082	0.08165	10.21%	20.0%	32	40
35		4	0.6	0.4	0.8	0.08165	0.1633	27.22%	40.0%	24	40
59		4	0.65	0.5	0.8	0.06455	0.1291	19.86%	35.0%	26	40
98		4	0.25	0.1	0.4	0.06455	0.1291	51.64%	75.0%	10	40
170		4	0.15	0.1	0.2	0.02887	0.05774	38.49%	85.0%	6	40
280		4	0.125	0.1	0.2	0.025	0.05	40.0%	87.5%	5	40

Graphics



Analyst: QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: Lab Water - Copper Spikes
Test No.: 1404-S125
Test Species: *P. promelas*
Start Date/Time: 4/4/2014 1540
End Date/Time: 4/6/2014 1245

	Tech Initials		
	0	24	48
Counts:	AG	ML	S
Readings:	AC	BG	AB
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	A	10	10	10	201	203	203	20.9	20.3	20.2	8.0	8.0	8.1	7.95	7.90	7.77
LW-PpCu-0	B	10	10	10												
	C	10	10	10												
	D	10	10	10												
LW-PpCu-1	A	10	10	9	195	198	198	20.6	20.3	20.2	8.2	8.1	8.1	7.96	7.90	7.88
	B	10	10	9												
	C	10	9	6												
	D	10	10	10												
LW-PpCu-2	A	10	8	9	196	200	201	20.5	20.2	20.3	8.0	8.1	8.2	7.95	7.92	7.88
	B	10	10	8												
	C	10	8	7												
	D	10	10	9												
LW-PpCu-3	A	10	8	6	196	199	199	20.6	20.4	20.4	8.1	8.1	8.2	7.97	7.94	7.90
	B	10	8	6												
	C	10	5	4												
	D	10	9	8												
LW-PpCu-4	A	10	9	8	196	198	199	20.8	20.5	20.4	8.1	8.1	8.1	7.99	7.97	7.86
	B	10	9	6												
	C	10	8	7												
	D	10	8	5												
LW-PpCu-5	A	10	7	4	196	206	210	20.8	20.4	20.4	7.9	8.5	8.3	7.90	7.96	7.93
	B	10	6	2												
	C	10	6	3												
	D	10	4	1												
LW-PpCu-6	A	10	3	1	196	199	200	20.8	20.7	20.6	8.1	8.2	8.2	7.92	7.96	7.92
	B	10	4	2												
	C	10	2	1												
	D	10	4	2												
LW-PpCu-7	A	10	2	2	195	200	201	20.8	20.9	20.6	8.1	8.2	8.2	7.94	7.95	7.92
	B	10	2	1												
	C	10	2	1												
	D	10	1	1												

Initial Counts QC'd by: SD

Animal Source/Date Received: ABS / 4/3/14

Age at Initiation: 4 d

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: AC 5/1/14

Final Review: 5/1/14

CETIS Summary Report

Report Date: 01 May-14 08:53 (p 1 of 1)
Test Code: 1404-S128 | 07-2086-2292

Fathead Minnow 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID:	10-7857-9284	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 15:50	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 13:55	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Duration:	46h	**Source:**	Aquatic Biosystems, CO	**Age:**	4d

Sample ID:	13-6348-7839	**Code:**	LabWater	**Client:**	AMEC
Sample Date:	04 Apr-14	**Material:**	Zinc ~~chloride~~	**Project:**	City of SD Chollas Creek WER
Receive Date:	04 Apr-14	**Source:**	Lab Water		
Sample Age:	16h	**Station:**			

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
10-3199-0829	48h Survival Rate	310	505	395.7	13.1%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
09-2709-7784	48h Survival Rate	EC25	381.5	336.4	442.6		Linear Interpolation (ICPIN)
		EC50	>505	N/A	N/A		

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
21.7	Lab Control	4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	0.0%
26		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	0.0%
42		4	1	1	1	1	1	0	0	0.0%	-2.56%
67		4	0.9333	0.8981	0.9685	0.8	1	0.04714	0.09428	10.1%	4.27%
110		4	0.925	0.9063	0.9437	0.9	1	0.025	0.05	5.41%	5.13%
185		4	0.9	0.8569	0.9431	0.8	1	0.05774	0.1155	12.83%	7.69%
310		4	0.875	0.8563	0.8937	0.8	0.9	0.025	0.05	5.71%	10.26%
505		4	0.5	0.439	0.561	0.3	0.7	0.08165	0.1633	32.66%	48.72%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
21.7	Lab Control	1	0.9	1	1
26		1	0.9	1	1
42		1	1	1	1
67		1	0.9333	1	0.8
110		0.9	1	0.9	0.9
185		1	0.8	1	0.8
310		0.9	0.9	0.8	0.9
505		0.5	0.5	0.3	0.7

Analyst: SD QA: 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 08:53 (p 1 of 2)
Test Code: 1404-S128 | 07-2086-2292

Fathead Minnow 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 10-3199-0829 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 8:52 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	310	505	395.7		13.1%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
2		26	0	2.482	0.202	6	0.8750	CDF	Non-Significant Effect
2		42	-0.2957	2.482	0.202	6	0.9341	CDF	Non-Significant Effect
2		67	0.7505	2.482	0.202	6	0.5972	CDF	Non-Significant Effect
2		110	1.001	2.482	0.202	6	0.4802	CDF	Non-Significant Effect
2		185	1.373	2.482	0.202	6	0.3169	CDF	Non-Significant Effect
2		310	1.938	2.482	0.202	6	0.1370	CDF	Non-Significant Effect
2		505*	7.2	2.482	0.202	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.092064	0.1560092	7	11.78	<0.0001	Significant Effect
Error	0.3177799	0.01324083	24			
Total	1.409844		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	9.232	18.48	0.2364	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9541	0.9081	0.1877	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
2	Lab Control	4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	0.0%
26		4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	0.0%
42		4	1	1	1	1	1	1	0	0.0%	-2.56%
67		4	0.9333	0.7833	1	0.9667	0.8	1	0.04714	10.1%	4.27%
110		4	0.925	0.8454	1	0.9	0.9	1	0.025	5.41%	5.13%
185		4	0.9	0.7163	1	0.9	0.8	1	0.05774	12.83%	7.69%
310		4	0.875	0.7954	0.9546	0.9	0.8	0.9	0.025	5.71%	10.26%
505		4	0.5	0.2402	0.7598	0.5	0.3	0.7	0.08165	32.66%	48.72%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
2	Lab Control	4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	0.0%
26		4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	0.0%
42		4	1.395	1.342	1.448	1.412	1.345	1.412	0.01668	2.39%	-1.76%
67		4	1.31	1.082	1.539	1.361	1.107	1.412	0.07186	10.97%	4.45%
110		4	1.29	1.16	1.419	1.249	1.249	1.412	0.04074	6.32%	5.94%
185		4	1.26	0.9795	1.54	1.26	1.107	1.412	0.08801	13.97%	8.15%
310		4	1.214	1.101	1.326	1.249	1.107	1.249	0.03547	5.85%	11.5%
505		4	0.7854	0.5181	1.053	0.7854	0.5796	0.9912	0.084	21.39%	42.72%

Analyst: QA: 5/1/14

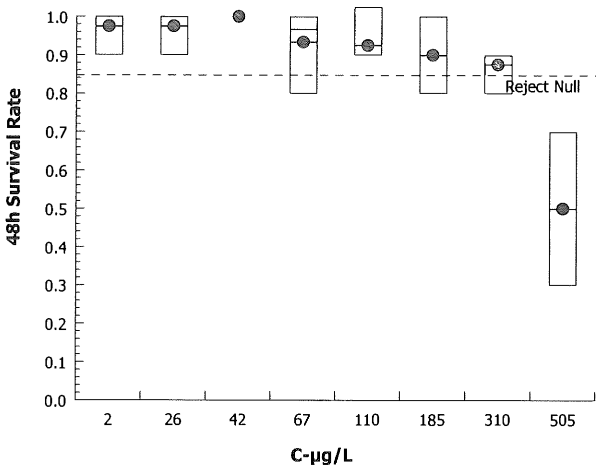
CETIS Analytical Report

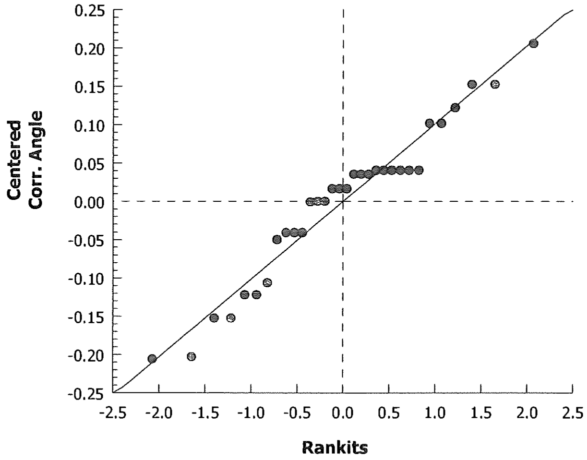
Report Date: 01 May-14 08:53 (p 2 of 2)
Test Code: 1404-S128 | 07-2086-2292

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	10-3199-0829	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 8:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst:________ QA: 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 08:53 (p 1 of 1)
Test Code: 1404-S128 | 07-2086-2292

Fathead Minnow 48-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID:	09-2709-7784	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 8:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	172556	1000	Yes	Two-Point Interpolation

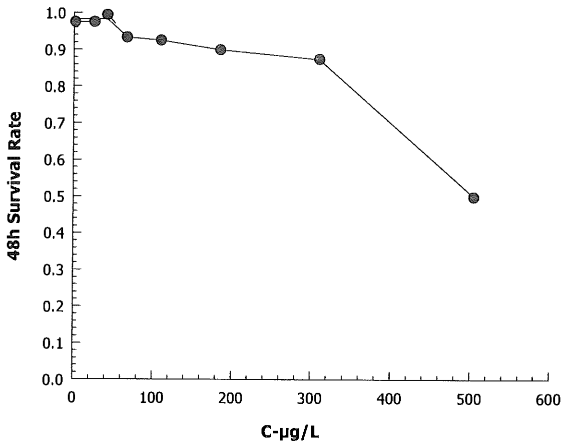
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	381.5	336.4	442.6
EC50	>505	N/A	N/A

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
			Calculated Variate(A/B)								
2	Lab Control	4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
26		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
42		4	1	1	1	0	0	0.0%	-2.56%	35	35
67		4	0.9333	0.8	1	0.04714	0.09428	10.1%	4.27%	42	45
110		4	0.925	0.9	1	0.025	0.05	5.41%	5.13%	37	40
185		4	0.9	0.8	1	0.05774	0.1155	12.83%	7.69%	36	40
310		4	0.875	0.8	0.9	0.025	0.05	5.71%	10.26%	35	40
505		4	0.5	0.3	0.7	0.08165	0.1633	32.66%	48.72%	20	40

Graphics



Analyst: QA: 5/1/14

CETIS Analytical Report

Fathead Zinc Lab Water

Report Date: 06 May-14 16:23 (p 1 of 2)
Test Code: 1404-S128 | 07-2086-2292

Fathead Minnow 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	20-2658-1564	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 May-14 16:22	**Analysis:**	Linear Regression (MLE)	**Official Results:**	Yes

Linear Regression Options

Model Function	Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted
Log-Normal [NED=A+B*log(X)]	Control Threshold	0.025	Yes	No	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
58	-90.29	187.4	191	2.723	0.1932	0.6559	2.043	2.621	0.1085	Non-Significant Lack of Fit

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	391.2	289.3	457.8
EC50	528	451.8	800.9

(note greater than highest concentration tested, data extrapolated)

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.04598	0.01424	0.01808	0.07388	3.23	0.0031	Significant Parameter
Slope	5.177	1.677	1.89	8.464	3.087	0.0044	Significant Parameter
Intercept	-14.1	4.418	-22.75	-5.437	-3.191	0.0034	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	59.6026	59.6026	1	61.08	<0.0001	Significant
Lack of Fit	8.449057	1.689811	5	2.043	0.1085	Non-Significant
Pure Error	19.8508	0.827117	24			
Residual	28.29986	0.975857	29			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	28.3	42.56	0.5019	Non-Significant Heterogenity
	Likelihood Ratio GOF	29.02	42.56	0.4639	Non-Significant Heterogenity
Variances	Mod Levene Equality of Variance	1.872	2.423	0.1192	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8109	0.9338	<0.0001	Non-normal Distribution
	Anderson-Darling A2 Normality	2.835	2.492	<0.0001	Non-normal Distribution

48h Survival Rate Summary

										Calculated Variate(A/B)	
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
~~2~~ 17	Lab Control	4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
26		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
42		4	1	1	1	0	0	0.0%	-2.56%	35	35
67		4	0.9333	0.8	1	0.04714	0.09428	10.1%	4.27%	42	45
110		4	0.925	0.9	1	0.025	0.05	5.41%	5.13%	37	40
185		4	0.9	0.8	1	0.05774	0.1155	12.83%	7.69%	36	40
310		4	0.875	0.8	0.9	0.025	0.05	5.71%	10.26%	35	40
505		4	0.5	0.3	0.7	0.08165	0.1633	32.66%	48.72%	20	40

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
~~2~~ 1.7	Lab Control	1	0.9	1	1
26		1	0.9	1	1
42		1	1	1	1
67		1	0.9333	1	0.8
110		0.9	1	0.9	0.9
185		1	0.8	1	0.8
310		0.9	0.9	0.8	0.9
505		0.5	0.5	0.3	0.7

Analyst: AC QA: 5/10/14

CETIS Analytical Report Fathead Zinc lab water

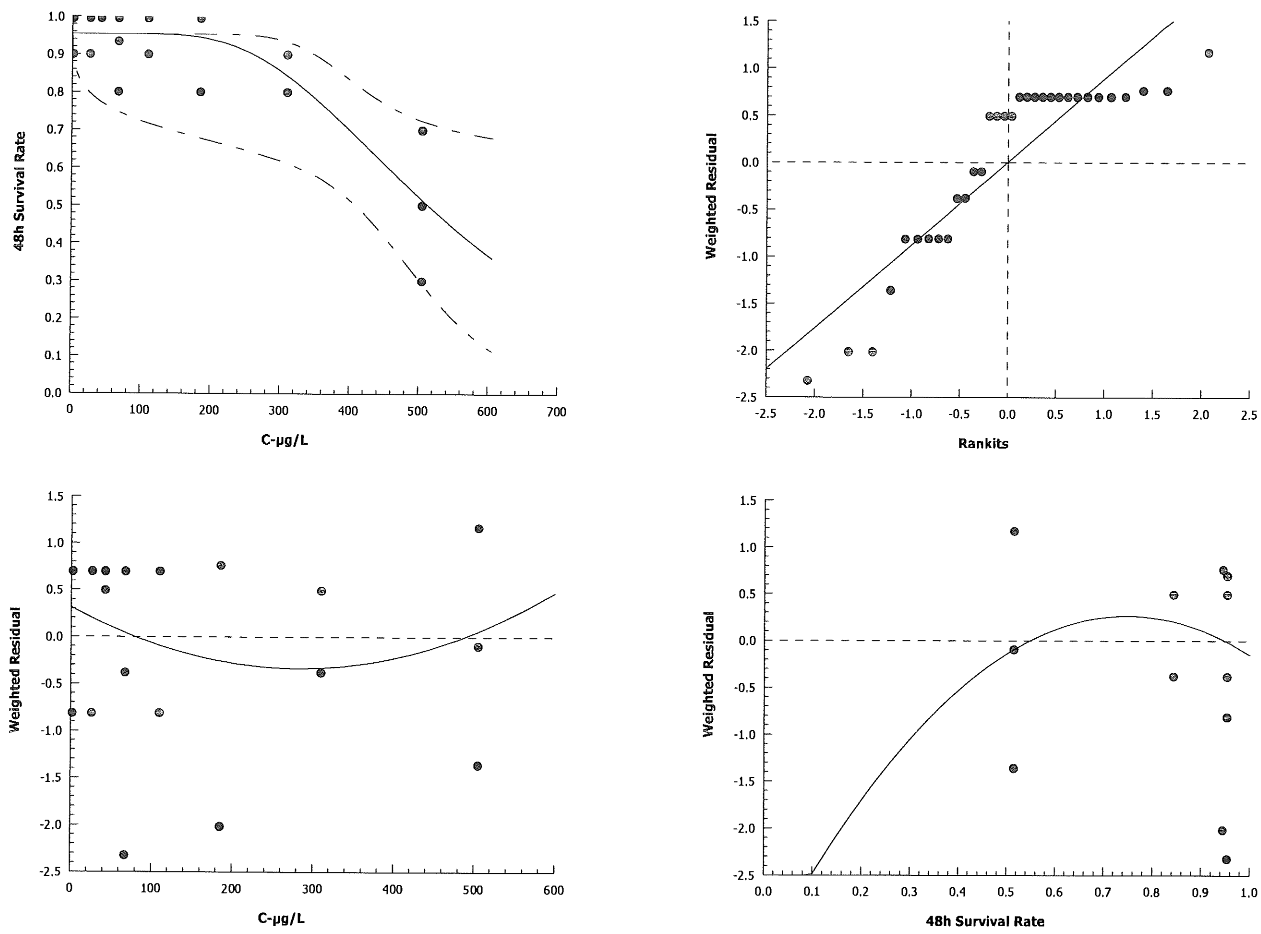
Report Date: 06 May-14 16:23 (p 2 of 2)
Test Code: 1404-S128 | 07-2086-2292

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	20-2658-1564	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 May-14 16:22	**Analysis:**	Linear Regression (MLE)	**Official Results:**	Yes

Graphics

Log-Normal [NED=A+B*log(X)]



Analyst: AC QA: 5/10/14

CETIS Analytical Report

Fathead Zinc LabWater

Report Date:	06 May-14 16:23 (p 1 of 1)
Test Code:	1404-S128 | 07-2086-2292

Fathead Minnow 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	15-9142-5988	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 May-14 16:22	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	316177	1000	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	66.58	43.25	322.7
EC10	260	N/A	360.1
EC15	330.4	95.21	364.5
EC20	355.9	312.8	400.3
EC25	381.5	336.4	444.4
EC40	458.2	394.4	N/A
EC50	>505	N/A	N/A

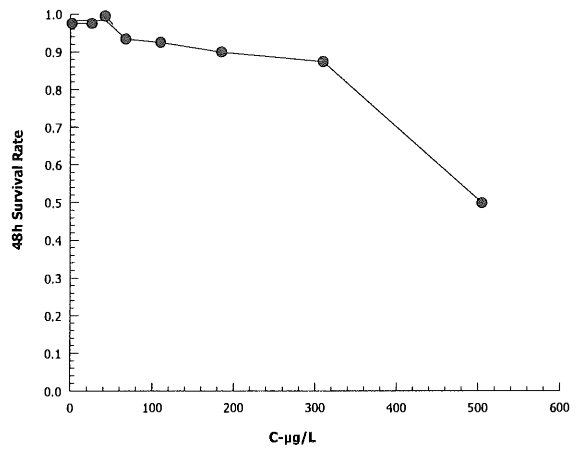
48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
2	Lab Control	4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
26		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
42		4	1	1	1	0	0	0.0%	-2.56%	35	35
67		4	0.9333	0.8	1	0.04714	0.09428	10.1%	4.27%	42	45
110		4	0.925	0.9	1	0.025	0.05	5.41%	5.13%	37	40
185		4	0.9	0.8	1	0.05774	0.1155	12.83%	7.69%	36	40
310		4	0.875	0.8	0.9	0.025	0.05	5.71%	10.26%	35	40
505		4	0.5	0.3	0.7	0.08165	0.1633	32.66%	48.72%	20	40

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
2	Lab Control	1	0.9	1	1
26		1	0.9	1	1
42		1	1	1	1
67		1	0.9333	1	0.8
110		0.9	1	0.9	0.9
185		1	0.8	1	0.8
310		0.9	0.9	0.8	0.9
505		0.5	0.5	0.3	0.7

Graphics



Analyst: AC QA: 5/16/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: Lab Water - Zinc Spikes
Test No.: 1404-5128

Test Species: *P. promelas*
Start Date/Time: 4/4/2014 1550
End Date/Time: 4/6/2014 1355

Tech Initials	0	24	48
Counts:	AG	BG	SD
Readings:	AG	BG	AB
Dilutions made by:	AG/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	A	10	10	10	195	199	200	20.9	21.0	20.7	7.7	8.1	8.1	8.05	7.95	7.85
LW-PpZn-0	B	10	9	9												
	C	10	10	10												
	D	10	10	10												
LW-PpZn-1	A	10	10	10	196	201	201	20.9	21.0	20.8	8.0	7.9	8.0	8.03	7.94	7.85
	B	10	BG ~~10~~ 9	9												
	C	10	10	10												
	D	10	BG ~~9~~ 10	10												
LW-PpZn-2	A	10	10	10	195	200	202	21.0	20.8	20.7	8.1	7.9	8.0	8.02	7.95	7.87
SD	B	5 ~~10~~	5	5												
	C	10	10	10												
	D	10	10	10												
LW-PpZn-3	A	10	10	10	195	203	204	20.9	20.8	20.6	8.1	7.9	8.0	801	7.92	7.85
	B	15 ~~10~~ SD	14	14												
	C	10	10	10												
	D	10	9	8												
LW-PpZn-4	A	10	9	9	195	200	201	20.9	20.7	20.5	8.0	7.9	8.1	8.00	7.93	7.85
	B	10	10	10												
	C	10	9	9												
	D	10	9	9												
LW-PpZn-5	A	10	10	10	195	203	204	20.9	20.5	20.5	8.0	7.9	8.6	7.99	7.90	7.83
	B	10	9	8												
	C	10	10	10												
	D	10	8	8												
LW-PpZn-6	A	10	9	9	196	199	200	21.0	204	20.5	8.0	8.1	8.2	7.90	7.92	7.84
	B	10	9	9												
	C	10	8	8												
	D	10	9	9												
LW-PpZn-7	A	10	5	5	196	200	201	20.9	20.4	20.5	8.0	8.1	8.3	7.87	7.88	7.84
	B	10	5	5												
	C	10	3	3												
	D	10	7	7												

Initial Counts QC'd by: SD

Animal Source/Date Received: ABS / 4/3/14

Age at Initiation: 4 d

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: SD 5/1/14

Final Review: AC 5/1/14

Site: SD8(1)

CETIS Summary Report

Report Date: 01 May-14 15:25 (p 1 of 1)
Test Code: 1404-S114 | 04-3253-5365

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID: 18-8798-0698
Start Date: 04 Apr-14 16:45
Ending Date: 06 Apr-14 15:05
Duration: 46h

Test Type: Survival (48h)
Protocol: EPA/821/R-02-012 (2002)
Species: Ceriodaphnia dubia
Source: In-House Culture

Analyst:
Diluent: Not Applicable
Brine: Not Applicable
Age:

Sample ID: 10-5222-3971
Sample Date: 02 Apr-14 13:20
Receive Date: 03 Apr-14 13:00
Sample Age: 51h (5.5 °C)

Code: 14-0310
Material: Stormwater + Copper chloride
Source: City of San Diego
Station: SD8(1)

Client: AMEC
Project: City of SD Chollas Creek WER

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
09-1710-8205	48h Survival Rate	59	97	75.65	19.4%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
03-1136-6891	48h Survival Rate	EC50	101.6	91.83	112.3		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
03-1136-6891	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria
09-1710-8205	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
9.1	Baseline	4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
27		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
41		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
59		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
97		4	0.6	0.539	0.661	0.4	0.8	0.08165	0.1633	27.22%	36.84%
150		4	0	0	0	0	0	0	0		100.0%
265		4	0	0	0	0	0	0	0		100.0%
425		4	0	0	0	0	0	0	0		100.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
9.1	Baseline	1	0.8	1	1
27		1	1	1	0.8
41		1	1	0.8	1
59		1	1	1	0.8
97		0.4	0.8	0.6	0.6
150		0	0	0	0
265		0	0	0	0
425		0	0	0	0

Analyst: SD|AC QA: AC 5|1|14

CETIS Analytical Report

Report Date: 01 May-14 15:24 (p 1 of 2)
Test Code: 1404-S114 | 04-3253-5365

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 09-1710-8205 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 15:23 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	59	97	75.65		19.4%

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
9.1		27	18	10	2	6	0.8000	Asymp	Non-Significant Effect
9.1		41	18	10	2	6	0.8000	Asymp	Non-Significant Effect
9.1		59	18	10	2	6	0.8000	Asymp	Non-Significant Effect
9.1		97*	10.5	10	1	6	0.0495	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.5018613	0.1254653	4	7.18	0.0019	Significant Effect
Error	0.2621173	0.01747448	15			
Total	0.7639786		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.6423	13.28	0.9582	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7704	0.866	0.0003	Non-normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
9.1	Baseline	4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
27		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
41		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
59		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
97		4	0.6	0.3402	0.8598	0.6	0.4	0.8	0.08165	27.22%	36.84%
150		4	0	0	0	0	0	0	0		100.0%
265		4	0	0	0	0	0	0	0		100.0%
425		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
9.1	Baseline	4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
27		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
41		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
59		4	1.291	1.095	1.486	1.345	1.107	1.365	0.06138	9.51%	-0.39%
97		4	0.891	0.6164	1.166	0.8861	0.6847	1.107	0.08627	19.37%	30.7%
150		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%
265		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%
425		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%

Analyst: SD/AC QA: AC 5/1/14

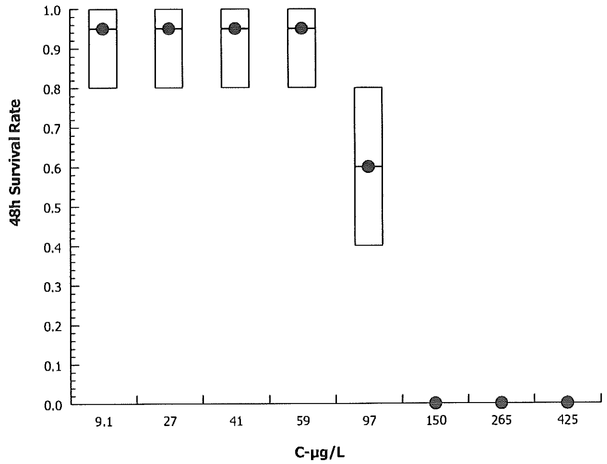
CETIS Analytical Report

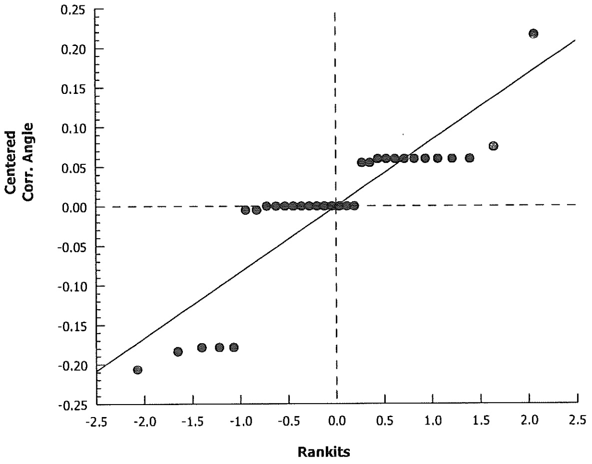
Report Date: 01 May-14 15:24 (p 2 of 2)
Test Code: 1404-S114 | 04-3253-5365

Ceriodaphnia 48-h Acute Survival Test | **Nautilus Environmental (CA)**

Analysis ID:	09-1710-8205	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 15:23	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: SD|AC QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 15:25 (p 1 of 1)
Test Code: 1404-S114 | 04-3253-5365

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	03-1136-6891	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 15:23	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes

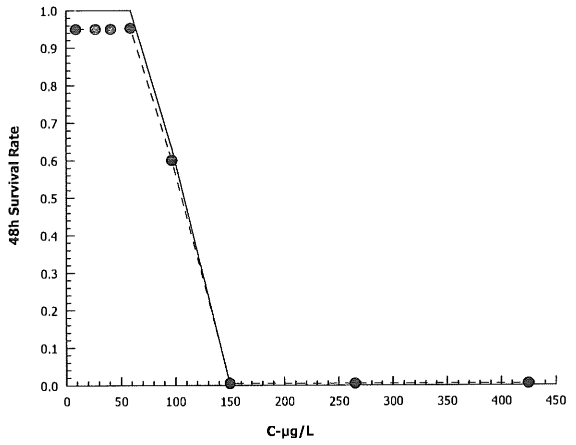
Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.05	0.00%	2.007	0.02186	101.6	91.83	112.3

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
9.1	Baseline	4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
27		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
41		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
59		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	20	21
97		4	0.6	0.4	0.8	0.08165	0.1633	27.22%	36.84%	12	20
150		4	0	0	0	0	0		100.0%	0	20
265		4	0	0	0	0	0		100.0%	0	20
425		4	0	0	0	0	0		100.0%	0	20

Graphics



CETIS™ v1.8.4.23

Analyst: SD|AC QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: SD8(1) - Copper Spikes
Test No.: 1404-5114

Test Species: *C. dubia*
Start Date/Time: 4/4/2014 1645
End Date/Time: 4/6/2014 1505

	Tech Initials		
	0	24	48
Counts:	AD	KFP	BK
Readings:	AG	KFP	AB
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	ⓒ 24	48	0	24	48	0	24	48
SD8(1)-CdCu-0	A	5	5	5	258	—	262	20.5	20.2	19.9	8.7	—	7.5	7.26	—	7.33
	B	5	5	4												
	C	5	5	5												
	D	5	5	5												
SD8(1)-CdCu-1	A	5	5	5	246	—	296	20.6	20.2	21.0	7.0	—	8.5	7.59	—	7.87
ⓐ	B	5	5	5												
	C	5	5	5												
	D	5	4	4												
SD8(1)-CdCu-2	A	5	5	5	201	—	ⓑ	20.9	20.2	19.9	7.9	—	ⓑ	7.55	—	ⓑ
ⓐ	B	5	5	5												
	C	5	5	4												
	D	5	5	5												
SD8(1)-CdCu-3	A	5	5	5	258	—	262	20.6	20.2	19.9	8.8	—	7.6	7.28	—	7.33
	B	KFP ~~5~~ 6	6	6												
	C	5	5	5												
	D	5	4	4												
SD8(1)-CdCu-4	A	5	3	2	257	—	263	20.9	20.2	19.9	8.5	—	7.7	7.26	—	7.34
	B	5	5	4												
	C	5	3	3												
	D	5	5	3												
SD8(1)-CdCu-5	A	5	0	-	259	—	263	20.8	20.2	20.0	8.6	—	7.5	7.12	—	7.30
	B	5	0	-												
	C	5	0	-												
	D	5	0	-												
SD8(1)-CdCu-6	A	5	0	-	254	—	261	20.5	20.2	20.0	8.5	—	7.7	7.11	—	7.32
	B	5	0	-												
	C	5	0	-												
	D	5	0	-												
SD8(1)-CdCu-7	A	5	0	-	255	—	262	20.7	20.2	20.0	8.5	—	8.1	6.83	—	7.36
	B	5	0	-												
	C	5	0	-												
	D	5	0	-												

Initial Counts QC'd by: CL

Animal Source/Date Received: Internal / NA

Age at Initiation: <24h

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)
ⓐ readings taken in low volume. ⓒ only temp recorded at 24hr.
ⓑ surrogate cup spilled, no final readings

QC Check: AC 5/1/14

Final Review: CS 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 09 Jun-14 14:23 (p 1 of 1)
Test Code: 1404-S117 | 18-0104-2654

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID:	14-5385-1211	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 19:20	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 17:20	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	46h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	15-0033-6535	**Code:**	14-0310	**Client:**	AMEC
Sample Date:	02 Apr-14 13:20	**Material:**	Stormwater + Zinc ~~chloride~~ AC	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	54h (5.5 °C)	**Station:**	SD8(1)		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
00-0361-3558	48h Survival Rate	290	475	371.1	13.6%		Mann-Whitney U Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
03-6808-5195	48h Survival Rate	EC50	334.2	300.1	372.2		Trimmed Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-0361-3558	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
03-6808-5195	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
20	Baseline	4	1	1	1	1	1	0	0	0.0%	0.0%
51		4	1	1	1	1	1	0	0	0.0%	0.0%
69		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
115		4	1	1	1	1	1	0	0	0.0%	0.0%
185		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
290		4	0.75	0.6785	0.8215	0.6	1	0.09574	0.1915	25.53%	25.0%
475		4	0.05	0.01266	0.08734	0	0.2	0.05	0.1	200.0%	95.0%
810		4	0.05	0.01266	0.08734	0	0.2	0.05	0.1	200.0%	95.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
20	Baseline	1	1	1	1
51		1	1	1	1
69		1	1	1	0.8
115		1	1	1	1
185		1	1	0.8	1
290		0.8	0.6	0.6	1
475		0.2	0	0	0
810		0	0	0	0.2

Analyst: SD/AC QA: AC 6/9/14

CETIS Analytical Report

Report Date: 09 Jun-14 14:22 (p 1 of 2)
Test Code: 1404-S117 | 18-0104-2654

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID: 00-0361-3558
Analyzed: 09 Jun-14 14:19
Endpoint: 48h Survival Rate
Analysis: Nonparametric-Two Sample
CETIS Version: CETISv1.8.4
Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	290	475	371.1		13.6%

Mann-Whitney U Two-Sample Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
20		51	8	NA	1	6	1.0000	Exact	Non-Significant Effect
20		69	10	NA	1	6	0.5000	Exact	Non-Significant Effect
20		115	8	NA	1	6	1.0000	Exact	Non-Significant Effect
20		185	10	NA	1	6	0.5000	Exact	Non-Significant Effect
20		290	14	NA	1	6	0.0714	Exact	Non-Significant Effect
20		475*	16	NA	0	6	0.0143	Exact	Significant Effect
20		810*	16	NA	0	6	0.0143	Exact	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.171151	0.881593	7	67.28	<0.0001	Significant Effect
Error	0.3144703	0.01310293	24			
Total	6.485621		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.403	3.496	0.2497	Equal Variances
Variances	Levene Equality of Variance	4.857	3.496	0.0016	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9064	0.9081	0.0090	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1835	0.1798	0.0077	Non-normal Distribution
Distribution	D'Agostino Skewness	1.212	2.576	0.2254	Normal Distribution
Distribution	D'Agostino Kurtosis	1.698	2.576	0.0895	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	4.354	9.21	0.1134	Normal Distribution
Distribution	Anderson-Darling A2 Normality	1.356	3.878	0.0011	Non-normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
20	Baseline	4	1	1	1	1	1	1	0	0.0%	0.0%
51		4	1	1	1	1	1	1	0	0.0%	0.0%
69		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
115		4	1	1	1	1	1	1	0	0.0%	0.0%
185		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
290		4	0.75	0.4453	1	0.7	0.6	1	0.09574	25.53%	25.0%
475		4	0.05	0	0.2091	0	0	0.2	0.05	200.0%	95.0%
810		4	0.05	0	0.2091	0	0	0.2	0.05	200.0%	95.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
20	Baseline	4	1.35	1.334	1.366	1.345	1.345	1.365	0.004985	0.74%	0.0%
51		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.37%
69		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.78%
115		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.37%
185		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.78%
290		4	1.056	0.7075	1.405	0.9966	0.8861	1.345	0.1096	20.75%	21.78%
475		4	0.285	0.09558	0.4745	0.2255	0.2255	0.4636	0.05953	41.77%	78.89%
810		4	0.285	0.09558	0.4745	0.2255	0.2255	0.4636	0.05953	41.77%	78.89%

Analyst: SD/AL QA: AC 6/9/14

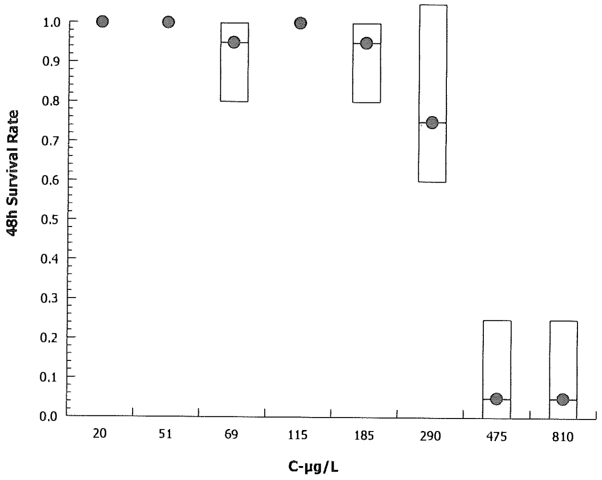
CETIS Analytical Report

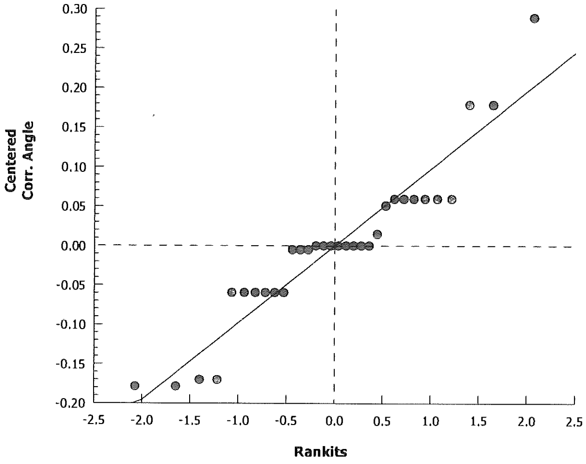
Report Date: 09 Jun-14 14:22 (p 2 of 2)
Test Code: 1404-S117 | 18-0104-2654

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	00-0361-3558	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	09 Jun-14 14:19	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Analyst: 6D / AC QA: AC 6/9/14

CETIS Analytical Report

Report Date: 01 May-14 11:14 (p 1 of 1)
Test Code: 1404-S117 | 18-0104-2654

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	03-6808-5195	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 11:13	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

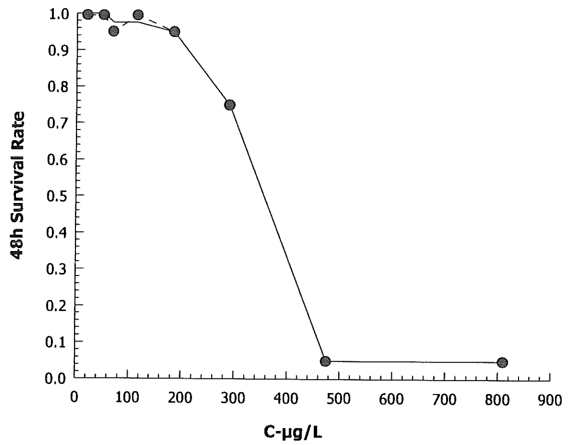
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	5.00%	2.524	0.02339	334.2	300.1	372.2

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
20	Baseline	4	1	1	1	0	0	0.0%	0.0%	21	21
51		4	1	1	1	0	0	0.0%	0.0%	20	20
69		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
115		4	1	1	1	0	0	0.0%	0.0%	20	20
185		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
290		4	0.75	0.6	1	0.09574	0.1915	25.53%	25.0%	15	20
475		4	0.05	0	0.2	0.05	0.1	200.0%	95.0%	1	20
810		4	0.05	0	0.2	0.05	0.1	200.0%	95.0%	1	20

Graphics



Analyst: QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: SD8(1) - Zinc Spikes
Test No.: 1404-S117

Test Species: *C. dubia*
Start Date/Time: 4/4/2014 1920
End Date/Time: 4/6/2014 1720

	Tech Initials		
	0	24	48
Counts:	AD	KFP	AC
Readings:	SD/AG	KFP	AB
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	Ⓐ24	48	0	24	48	0	24	48
SD8(1)-CdZn-0	A	5	5	5	254	–	260	20.3	19.4	20.1	8.7	–	7.4	7.30	–	7.20
	B	5	5	5												
	C	5	5	5												
	D	~~5~~ 6	6	6												
SD8(1)-CdZn-1	A	5	5	5	261	–	266	20.3	19.4	20.0	7.7	–	8.4	7.45	–	7.85
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
SD8(1)-CdZn-2	A	5	5	5	255	–	271	20.8	19.4	20.1	7.6	–	8.3	7.43	–	7.75
	B	5	5	5												
	C	5	5	5												
	D	5	5	4												
SD8(1)-CdZn-3	A	5	5	5	256	–	262	20.3	19.4	20.1	8.4	–	7.5	7.23	–	7.20
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
SD8(1)-CdZn-4	A	5	5	5	254	–	264	20.8	19.4	20.1	8.4	–	7.5	7.12	–	7.17
	B	5	5	5												
	C	5	4	4												
	D	5	5	5												
SD8(1)-CdZn-5	A	5	4	4	253	–	264	20.5	19.4	20.1	8.6	–	7.4	7.16	–	7.15
	B	5	3	3												
	C	5	3	3												
	D	5	5	5												
SD8(1)-CdZn-6	A	5	1	1	255	–	263	20.5	19.4	20.1	8.5	–	7.3	7.11	–	7.09
	B	5	1	0												
	C	5	1	0												
	D	5	1	0												
SD8(1)-CdZn-7	A	5	0	0	255	–	263	20.4	19.4	20.1	8.5	–	7.4	7.04	–	7.09
	B	5	0	0												
	C	5	0	0												
	D	5	1	1												

Initial Counts QC'd by: CL

Animal Source/Date Received: Internal /NA

Age at Initiation: <24h

Comments: Organisms fed prior to initiation, circle one [✓ y] / n

Ⓐ Only temp recorded at 24 hrs

QC Check: AC 5/1/14

Final Review: LO 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 01 May-14 15:31 (p 1 of 1)
Test Code: 1404-S124 | 00-7191-3756

Fathead Minnow 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID:	05-5753-7904	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 17:20	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 15:45	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Duration:	46h	**Source:**	Aquatic Biosystems, CO	**Age:**	4d

Sample ID:	10-5222-3971	**Code:**	14-0310	**Client:**	AMEC
Sample Date:	02 Apr-14 13:20	**Material:**	Stormwater + Copper chloride	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	52h (5.5 °C)	**Station:**	SD8(1)		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
19-2517-8606	48h Survival Rate	155	255	198.8	10.0%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
16-7178-5611	48h Survival Rate	EC50	332.2	298	370.2		Spearman-Kärber

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
8.9	Baseline	4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	0.0%
60		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	0.0%
95		4	1	1	1	1	1	0	0	0.0%	-2.56%
155		4	0.925	0.8892	0.9608	0.8	1	0.04787	0.09574	10.35%	5.13%
255		4	0.725	0.6892	0.7608	0.6	0.8	0.04787	0.09574	13.21%	25.64%
405		4	0.35	0.3284	0.3716	0.3	0.4	0.02887	0.05774	16.5%	64.1%
645		4	0.05	0.02844	0.07156	0	0.1	0.02887	0.05774	115.5%	94.87%
1015		4	0	0	0	0	0	0	0		100.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
8.9	Baseline	1	0.9	1	1
60		1	1	1	0.9
95		1	1	1	1
155		0.8	1	1	0.9
255		0.8	0.7	0.8	0.6
405		0.3	0.4	0.4	0.3
645		0	0	0.1	0.1
1015		0	0	0	0

Analyst: SD/AC QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 15:30 (p 1 of 2)
Test Code: 1404-S124 | 00-7191-3756

Fathead Minnow 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	19-2517-8606	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 15:29	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	155	255	198.8		10.0%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
8.9		60	0	2.448	0.159	6	0.8571	CDF	Non-Significant Effect
8.9		95	-0.6291	2.448	0.159	6	0.9650	CDF	Non-Significant Effect
8.9		155	1.177	2.448	0.159	6	0.3753	CDF	Non-Significant Effect
8.9		255*	5.38	2.448	0.159	6	<0.0001	CDF	Significant Effect
8.9		405*	11.41	2.448	0.159	6	<0.0001	CDF	Significant Effect
8.9		645*	17.46	2.448	0.159	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.914071	0.8190117	6	97.64	<0.0001	Significant Effect
Error	0.1761493	0.008388061	21			
Total	5.09022		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.924	3.812	0.1238	Equal Variances
Variances	Levene Equality of Variance	4.248	3.812	0.0059	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9408	0.8975	0.1159	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.9	Baseline	4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	0.0%
60		4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	0.0%
95		4	1	1	1	1	1	1	0	0.0%	-2.56%
155		4	0.925	0.7727	1	0.95	0.8	1	0.04787	10.35%	5.13%
255		4	0.725	0.5727	0.8773	0.75	0.6	0.8	0.04787	13.21%	25.64%
405		4	0.35	0.2581	0.4419	0.35	0.3	0.4	0.02887	16.5%	64.1%
645		4	0.05	0	0.1419	0.05	0	0.1	0.02887	115.5%	94.87%
1015		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.9	Baseline	4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	0.0%
60		4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	0.0%
95		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	-2.97%
155		4	1.295	1.061	1.529	1.331	1.107	1.412	0.07348	11.35%	5.56%
255		4	1.023	0.8537	1.192	1.049	0.8861	1.107	0.05317	10.4%	25.41%
405		4	0.6322	0.5356	0.7287	0.6322	0.5796	0.6847	0.03033	9.6%	53.9%
645		4	0.2403	0.09055	0.39	0.2403	0.1588	0.3218	0.04705	39.16%	82.48%
1015		4	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.42%

Analyst: SD/AC QA: AC 5/1/14

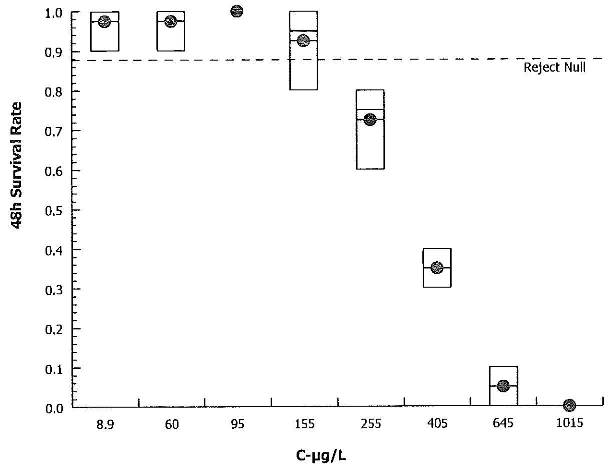
CETIS Analytical Report

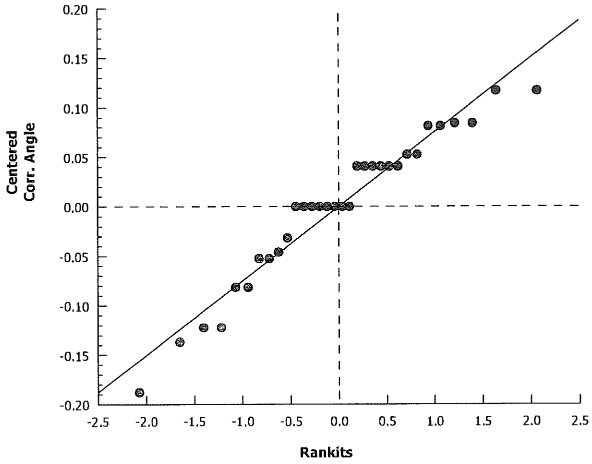
Report Date: 01 May-14 15:30 (p 2 of 2)
Test Code: 1404-S124 | 00-7191-3756

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 19-2517-8606 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 15:29 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst: SD|AC QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 15:31 (p 1 of 1)
Test Code: 1404-S124 | 00-7191-3756

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 16-7178-5611 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 15:30 **Analysis:** Untrimmed Spearman-Kärber **Official Results:** Yes

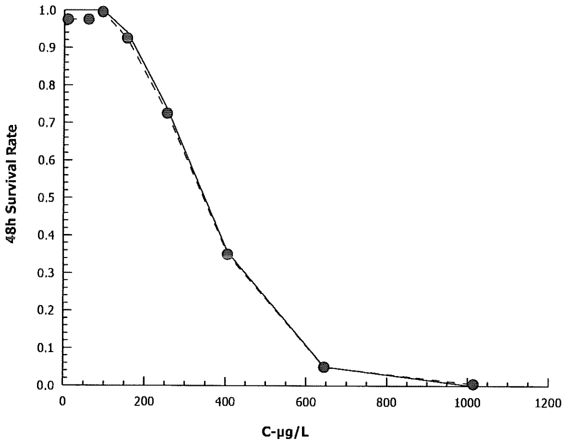
Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.025	0.00%	2.521	0.02357	332.2	298	370.2

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
8.9	Baseline	4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
60		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
95		4	1	1	1	0	0	0.0%	-2.56%	40	40
155		4	0.925	0.8	1	0.04787	0.09574	10.35%	5.13%	37	40
255		4	0.725	0.6	0.8	0.04787	0.09574	13.21%	25.64%	29	40
405		4	0.35	0.3	0.4	0.02887	0.05774	16.5%	64.1%	14	40
645		4	0.05	0	0.1	0.02887	0.05774	115.5%	94.87%	2	40
1015		4	0	0	0	0	0		100.0%	0	40

Graphics



Analyst: SD/NL QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: SD8(1) - Copper Spikes
Test No.: M04-5124

Test Species: *P. promelas*
Start Date/Time: 4/4/2014 AG ~~1520~~ 1720
End Date/Time: 4/6/2014 1545

	Tech Initials		
	0	24	48
Counts:	SD	BG	BK
Readings:	AG	BG	AB
Dilutions made by:	PA/KEP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
SD8(1)-PpCu-0	A	10	10	10	258	260	262	20.5	19.9	19.9	8.7	7.5	~~7.5~~ AB	7.26	7.29	7.33
	B	10	10	9									7.5			
	C	10	10	10												
	D	10	10	10												
SD8(1)-PpCu-1	A	10	10	10	258	261	262	20.6	20.0	19.9	8.8	7.5	7.6	7.28	7.34	7.33
	B	10	10	10												
	C	10	10	10												
	D	10	10	9												
SD8(1)-PpCu-2	A	10	10	10	257	261	263	20.9	20.0	19.9	8.5	7.5	7.7	7.26	7.40	7.34
	B	10	10	10												
	C	10	10	10												
	D	10	10	10												
SD8(1)-PpCu-3	A	10	10	8	259	260	263	20.9	19.8	19.9	8.6	7.5	7.5	7.12 ~~7.02~~ AG	7.41	7.30
	B	10	10	10												
	C	10	10	10												
	D	10	9	9												
SD8(1)-PpCu-4	A	10	10	8	254	260	261	20.8	20.0	20.6	8.5	7.7	7.7	7.11	7.42	7.32
	B	10	9	7												
	C	10	9	8												
	D	10	10	6												
SD8(1)-PpCu-5	A	10	8	3	255	261	262	20.5	20.0	20.0	8.5	7.9	8.1	6.83	7.42	7.36
	B	10	7	4												
	C	10	7	4												
	D	10	6	3												
SD8(1)-PpCu-6	A	10	0	-	257	258	260	20.7	20.2	20.6	8.7	7.6	8.3	6.77	7.42	7.38
	B	10	2	0												
	C	10	3	1												
	D	10	2	1												
SD8(1)-PpCu-7	A	10	0	-	258	259	261	20.8	20.3	19.9	8.9	8.1	8.3	6.74	7.31	7.34
	B	10	6	-												
	C	10	1	0												
	D	10	0	-												

Initial Counts QC'd by: AG

Animal Source/Date Received: ABS / 4/3/14

Age at Initiation: 4d

Comments: Organisms fed prior to initiation, circle one ([✓ y] n)

QC Check: AC 5/1/14

Final Review: [illegible] 5/1/14

CETIS Summary Report

Report Date: 01 May-14 11:23 (p 1 of 1)
Test Code: 1404-S127 | 01-5813-9747

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	05-2082-5639	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 17:35	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 16:00	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Duration:	46h	**Source:**	Aquatic Biosystems, CO	**Age:**	4d

Sample ID:	15-0033-6535	**Code:**	14-0310	**Client:**	AMEC
Sample Date:	02 Apr-14 13:20	**Material:**	Stormwater + Zinc ~~chloride~~ AC	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	52h (5.5 °C)	**Station:**	SD8(1)		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
03-1219-6406	48h Survival Rate	295	480	376.3	10.7%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
10-6063-0557	48h Survival Rate	EC50	789	692	899.7		Spearman-Kärber

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
22	Baseline	4	0.95	0.9284	0.9716	0.9	1	0.02887	0.05774	6.08%	0.0%
120		4	1	1	1	1	1	0	0	0.0%	-5.26%
190		4	1	1	1	1	1	0	0	0.0%	-5.26%
295		4	0.95	0.9284	0.9716	0.9	1	0.02887	0.05774	6.08%	0.0%
480		4	0.725	0.6892	0.7608	0.6	0.8	0.04787	0.09574	13.21%	23.68%
835		4	0.525	0.4892	0.5608	0.4	0.6	0.04787	0.09574	18.24%	44.74%
1500		4	0.125	0.08925	0.1608	0	0.2	0.04787	0.09574	76.59%	86.84%
2450		4	0	0	0	0	0	0	0		100.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
22	Baseline	0.9	0.9	1	1
120		1	1	1	1
190		1	1	1	1
295		1	0.9	0.9	1
480		0.8	0.7	0.6	0.8
835		0.5	0.6	0.6	0.4
1500		0.2	0.1	0	0.2
2450		0	0	0	0

Analyst: SD QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 11:23 (p 1 of 2)
Test Code: 1404-S127 | 01-5813-9747

Fathead Minnow 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	03-1219-6406	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 11:22	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	295	480	376.3		10.7%

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
22		120	22	10	2	6	0.9934	Asymp	Non-Significant Effect
22		190	22	10	2	6	0.9934	Asymp	Non-Significant Effect
22		295	18	10	3	6	0.8571	Asymp	Non-Significant Effect
22		480*	10	10	0	6	0.0480	Asymp	Significant Effect
22		835*	10	10	0	6	0.0480	Asymp	Significant Effect
22		1500*	10	10	0	6	0.0480	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.80064	0.63344	6	74.69	<0.0001	Significant Effect
Error	0.1780965	0.008480784	21			
Total	3.978736		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	4.534	3.812	0.0043	Unequal Variances
Variances	Levene Equality of Variance	6.801	3.812	0.0004	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.921	0.8975	0.0368	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
22	Baseline	4	0.95	0.8581	1	0.95	0.9	1	0.02887	6.08%	0.0%
120		4	1	1	1	1	1	1	0	0.0%	-5.26%
190		4	1	1	1	1	1	1	0	0.0%	-5.26%
295		4	0.95	0.8581	1	0.95	0.9	1	0.02887	6.08%	0.0%
480		4	0.725	0.5727	0.8773	0.75	0.6	0.8	0.04787	13.21%	23.68%
835		4	0.525	0.3727	0.6773	0.55	0.4	0.6	0.04787	18.24%	44.74%
1500		4	0.125	0	0.2773	0.15	0	0.2	0.04787	76.59%	86.84%
2450		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
22	Baseline	4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	0.0%
120		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	-6.12%
190		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	-6.12%
295		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	0.0%
480		4	1.023	0.8537	1.192	1.049	0.8861	1.107	0.05317	10.4%	23.12%
835		4	0.8106	0.6572	0.964	0.8357	0.6847	0.8861	0.0482	11.89%	39.08%
1500		4	0.352	0.121	0.5829	0.3927	0.1588	0.4636	0.07256	41.23%	73.55%
2450		4	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.07%

Analyst:________ QA: AC 5/1/14

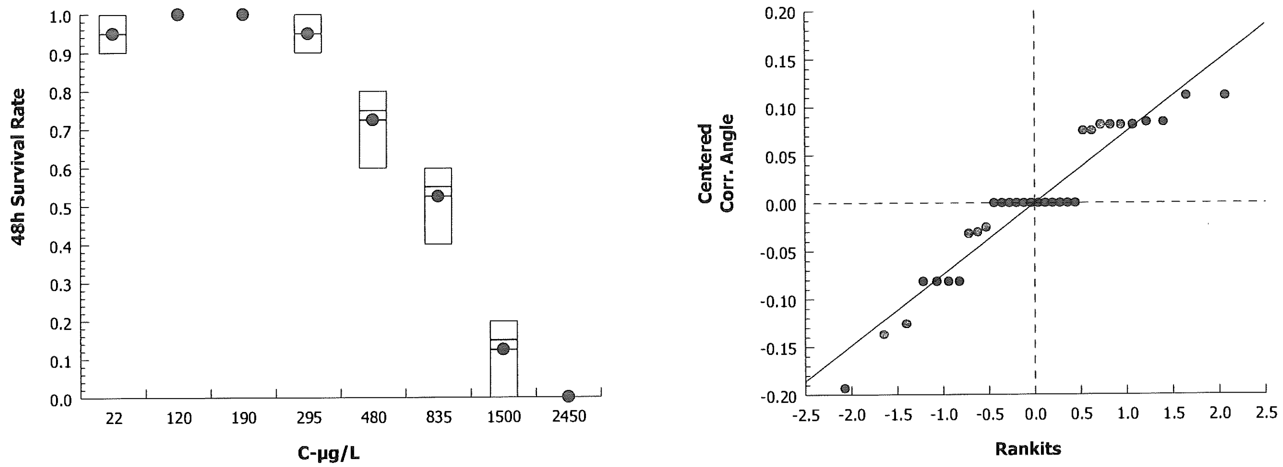
CETIS Analytical Report

Report Date: 01 May-14 11:23 (p 2 of 2)
Test Code: 1404-S127 | 01-5813-9747

Fathead Minnow 48-h Acute Survival Test | **Nautilus Environmental (CA)**

Analysis ID: 03-1219-6406
Analyzed: 01 May-14 11:22
Endpoint: 48h Survival Rate
Analysis: Nonparametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Graphics



Analyst:________ QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 11:23 (p 1 of 1)
Test Code: 1404-S127 | 01-5813-9747

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 10-6063-0557 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 11:22 **Analysis:** Untrimmed Spearman-Kärber **Official Results:** Yes

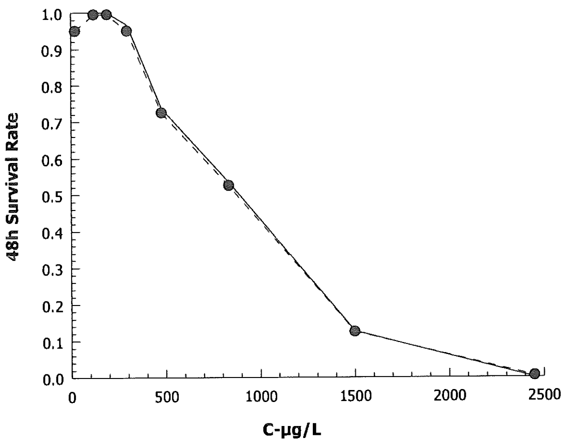
Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.05	0.00%	2.897	0.02851	789	692	899.7

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
22	Baseline	4	0.95	0.9	1	0.02887	0.05773	6.08%	0.0%	38	40
120		4	1	1	1	0	0	0.0%	-5.26%	40	40
190		4	1	1	1	0	0	0.0%	-5.26%	40	40
295		4	0.95	0.9	1	0.02887	0.05773	6.08%	0.0%	38	40
480		4	0.725	0.6	0.8	0.04787	0.09574	13.21%	23.68%	29	40
835		4	0.525	0.4	0.6	0.04787	0.09574	18.24%	44.74%	21	40
1500		4	0.125	0	0.2	0.04787	0.09574	76.59%	86.84%	5	40
2450		4	0	0	0	0	0		100.0%	0	40

Graphics



Analyst: SD QA: AC 5/1/14

CETIS Analytical Report

Fathead Zinc SD8(1)

Report Date: 06 May-14 16:32 (p 1 of 1)
Test Code: 1404-S127 | 01-5813-9747

Fathead Minnow 48-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID:	10-9142-6346	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 May-14 16:31	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1564913	1000	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	308	218.3	356.3
EC10	348.4	287.2	407.2
EC15	388.9	333.6	466.6
EC20	429.3	362.4	542.9
EC25	469.7	389.4	628.2
EC40	719.6	518	927.9
EC50	890.4	686	1050

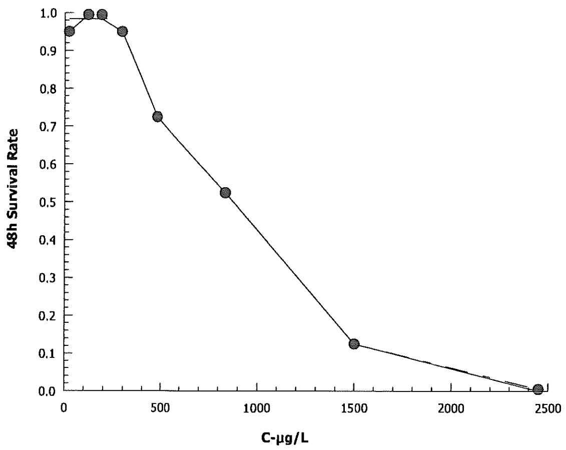
48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
22	Baseline	4	0.95	0.9	1	0.02887	0.05773	6.08%	0.0%	38	40
120		4	1	1	1	0	0	0.0%	-5.26%	40	40
190		4	1	1	1	0	0	0.0%	-5.26%	40	40
295		4	0.95	0.9	1	0.02887	0.05773	6.08%	0.0%	38	40
480		4	0.725	0.6	0.8	0.04787	0.09574	13.21%	23.68%	29	40
835		4	0.525	0.4	0.6	0.04787	0.09574	18.24%	44.74%	21	40
1500		4	0.125	0	0.2	0.04787	0.09574	76.59%	86.84%	5	40
2450		4	0	0	0	0	0		100.0%	0	40

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
22	Baseline	0.9	0.9	1	1
120		1	1	1	1
190		1	1	1	1
295		1	0.9	0.9	1
480		0.8	0.7	0.6	0.8
835		0.5	0.6	0.6	0.4
1500		0.2	0.1	0	0.2
2450		0	0	0	0

Graphics



Analyst: AC QA: 5/11/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements & Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: SD8(1) - Zinc Spikes
Test No.: 1404-S127

Test Species: *P. promelas*
Start Date/Time: 4/4/2014 ~~1535~~ AD 1735
End Date/Time: 4/6/2014 1600

	Tech Initials		
	0	24	48
Counts:	SD	BG	BK
Readings:	AG	BG	AB
Dilutions made by:	BA/KGP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
SD8(1)-PpZn-0	A	10	9	9	254	258	260	20.3	20.1	20.1	8.7	7.6	7.4	[illegible] 7.30	7.30	7.20
	B	10	9	9												
	C	10	10	10												
	D	10	10	10												
SD8(1)-PpZn-1	A	10	10	10	256	259	262	20.3	20.1	20.1	8.4	7.5	7.5	7.23	7.31	7.20
	B	10	10	10												
	C	10	10	10												
	D	10	10	10												
SD8(1)-PpZn-2	A	10	10	10	254	260	264	20.8	20.1	20.1	8.4	7.5	7.5	7.17	7.32	7.17
	B	10	10	10												
	C	10	10	10												
	D	10	10	10												
SD8(1)-PpZn-3	A	10	10	10	253	261	264	20.5	20.2	20.1	8.6	7.5	7.4	7.16	7.31	7.15
	B	10	10	9												
	C	10	10	9												
	D	10	10	10												
SD8(1)-PpZn-4	A	10	10	8	255	259	263	20.5	20.0	20.1	8.5	7.2	7.3	7.11	7.21	7.09
	B	10	10	7												
	C	10	10	6												
	D	10	10	8												
SD8(1)-PpZn-5	A	10	9	5	255	259	263	20.4	19.9	20.1	8.5	7.4	7.4	7.04	7.19	7.09
	B	10	9	6												
	C	10	8	6												
	D	10	8	4												
SD8(1)-PpZn-6	A	10	2	2	256	262	264	20.6	19.9	20.1	8.6	7.5	7.6	6.96	7.09	7.06
	B	10	3	1												
	C	10	0	-												
	D	10	3	2												
SD8(1)-PpZn-7	A	10	1	0	257	262	265	20.8	20.0	20.3	8.6	7.5	7.5	6.92	6.99	7.01
	B	10	0	-												
	C	10	0	-												
	D	10	0	-												

Initial Counts QC'd by: AG

Animal Source/Date Received: ABS 4/3/14

Age at Initiation: 4 days

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: AC 5/1/14

Final Review: 5/1/14

CETIS Summary Report

Report Date: 02 May-14 08:26 (p 1 of 1)
Test Code: 1404-S120A | 06-5812-7472

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	14-8593-7987	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 17:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	47h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	20-2984-1121	**Code:**	SD8(1) A · 14-0310	**Client:**	AMEC
Sample Date:	02 Apr-14 13:20	**Material:**	Stormwater + Copper & Zinc Mixture	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	52h (5.5 °C)	**Station:**	SD8(1)		

Sample Note: Nominal Zinc 150 µg/L

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
11-7482-2655	48h Survival Rate	80	98	88.54	18.2%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
00-7383-6343	48h Survival Rate	EC50	86.96	83	91.11		Trimmed Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-7383-6343	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria
11-7482-2655	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
8.6	Baseline	4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
49		4	1	1	1	1	1	0	0	0.0%	-5.26%
60		4	1	1	1	1	1	0	0	0.0%	-5.26%
80		4	0.85	0.7785	0.9215	0.6	1	0.09574	0.1915	22.53%	10.53%
98		4	0.05	0.01266	0.08734	0	0.2	0.05	0.1	200.0%	94.74%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
8.6	Baseline	1	0.8	1	1
49		1	1	1	1
60		1	1	1	1
80		1	1	0.6	0.8
98		0.2	0	0	0

Analyst: AC QA: 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:26 (p 1 of 2)
Test Code: 1404-S120A | 06-5812-7472

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 11-7482-2655 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 May-14 8:24 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Sample Note: Nominal Zinc 150

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	80	98	88.54		18.2%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
8.6		49	-0.6783	2.356	0.207	6	0.9466	CDF	Non-Significant Effect
8.6		60	-0.6783	2.356	0.207	6	0.9466	CDF	Non-Significant Effect
8.6		80	1.308	2.356	0.207	6	0.2647	CDF	Non-Significant Effect
8.6		98*	11.4	2.356	0.207	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.292384	0.8230959	4	53.43	<0.0001	Significant Effect
Error	0.2310689	0.0154046	15			
Total	3.523453		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	2.497	4.893	0.0870	Equal Variances
Variances	Levene Equality of Variance	7.033	4.893	0.0021	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8944	0.866	0.0325	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.6	Baseline	4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
49		4	1	1	1	1	1	1	0	0.0%	-5.26%
60		4	1	1	1	1	1	1	0	0.0%	-5.26%
80		4	0.85	0.5453	1	0.9	0.6	1	0.09574	22.53%	10.53%
98		4	0.05	0	0.2091	0	0	0.2	0.05	200.0%	94.74%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.6	Baseline	4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
49		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-4.63%
60		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-4.63%
80		4	1.171	0.8199	1.522	1.226	0.8861	1.345	0.1103	18.84%	8.93%
98		4	0.285	0.09558	0.4745	0.2255	0.2255	0.4636	0.05953	41.77%	77.83%

Analyst: AC QA: 5/2/14

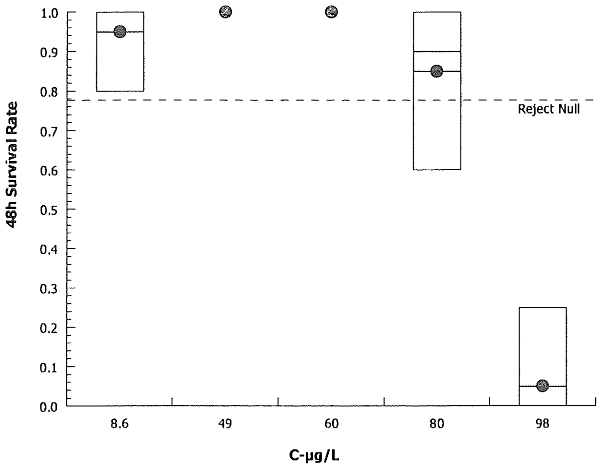
CETIS Analytical Report

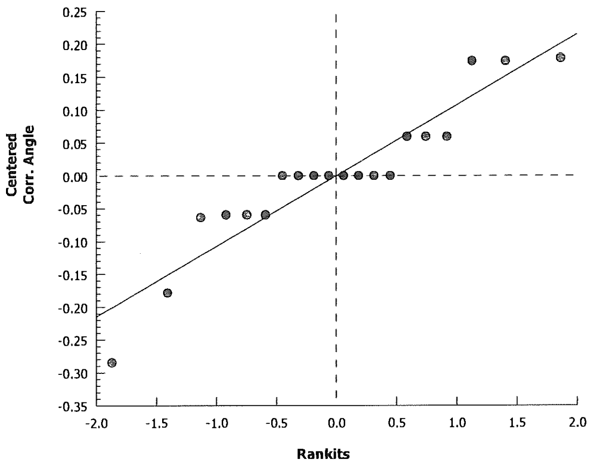
Report Date: 02 May-14 08:26 (p 2 of 2)
Test Code: 1404-S120A | 06-5812-7472

Ceriodaphnia 48-h Acute Survival Test | **Nautilus Environmental (CA)**

Analysis ID:	11-7482-2655	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 8:24	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:26 (p 1 of 1)
Test Code: 1404-S120A | 06-5812-7472

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	00-7383-6343	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 8:25	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

Sample Note: Nominal Zinc 150

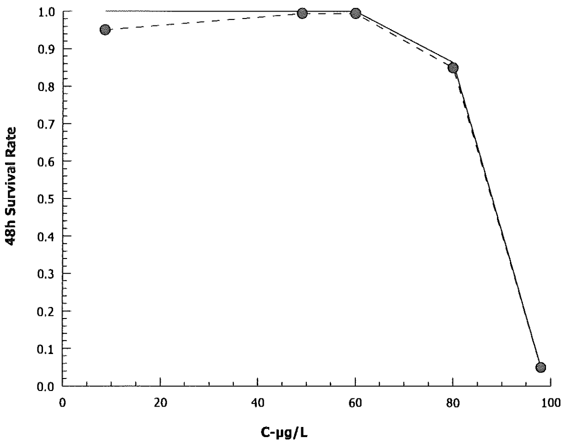
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.05	5.08%	1.939	0.01012	86.96	83	91.11

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
8.6	Baseline	4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
49		4	1	1	1	0	0	0.0%	-5.26%	20	20
60		4	1	1	1	0	0	0.0%	-5.26%	20	20
80		4	0.85	0.6	1	0.09574	0.1915	22.53%	10.53%	17	20
98		4	0.05	0	0.2	0.05	0.1	200.0%	94.74%	1	20

Graphics



Analyst: AC QA: 5/2/14

CETIS Summary Report

Report Date: 02 May-14 08:31 (p 1 of 1)
Test Code: 1404-S120B | 03-0817-2862

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	13-2550-1255	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 17:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	47h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	05-8360-5941	**Code:**	SD8(1) B -14-0310	**Client:**	AMEC
Sample Date:	02 Apr-14 13:20	**Material:**	Stormwater + Copper & Zinc chloride	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	52h (5.5 °C)	**Station:**	SD8(1)		

Batch Note: Nominal Zinc 182 µg/L

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
13-9943-4350	48h Survival Rate	79	100	88.88	20.4%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
02-9703-5391	48h Survival Rate	EC50	87.28	81.74	93.2		Trimmed Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-9703-5391	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria
13-9943-4350	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
8.6	Baseline	4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
49		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
58		4	0.85	0.8127	0.8873	0.8	1	0.05	0.1	11.76%	10.53%
79		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	15.79%
100		4	0.1	0.05688	0.1431	0	0.2	0.05774	0.1155	115.5%	89.47%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
8.6	Baseline	1	0.8	1	1
49		1	0.8	1	1
58		0.8	0.8	0.8	1
79		1	0.8	0.8	0.6
100		0	0.2	0.2	0

Analyst: AC QA: 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:31 (p 1 of 2)
Test Code: 1404-S120B | 03-0817-2862

Ceriodaphnia 48-h Acute Survival Test | **Nautilus Environmental (CA)**

Analysis ID:	13-9943-4350	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 8:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: Nominal Zinc 182

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	79	100	88.88		20.4%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
8.6		49	0	2.356	0.232	6	0.8000	CDF	Non-Significant Effect
8.6		58	1.211	2.356	0.232	6	0.2994	CDF	Non-Significant Effect
8.6		79	1.774	2.356	0.232	6	0.1350	CDF	Non-Significant Effect
8.6		100*	9.576	2.356	0.232	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.502142	0.6255354	4	32.38	<0.0001	Significant Effect
Error	0.2898084	0.01932056	15			
Total	2.79195		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.9305	13.28	0.9201	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9627	0.866	0.5986	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.6	Baseline	4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
49		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
58		4	0.85	0.6909	1	0.8	0.8	1	0.05	11.76%	10.53%
79		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	15.79%
100		4	0.1	0	0.2837	0.1	0	0.2	0.05774	115.5%	89.47%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.6	Baseline	4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
49		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
58		4	1.167	0.9772	1.356	1.107	1.107	1.345	0.05953	10.21%	9.26%
79		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	13.56%
100		4	0.3446	0.1258	0.5634	0.3446	0.2255	0.4636	0.06874	39.9%	73.2%

Analyst: AC

QA: 5/2/14

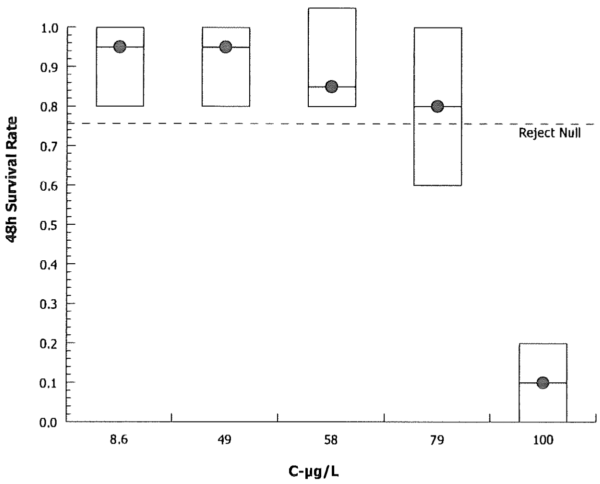
CETIS Analytical Report

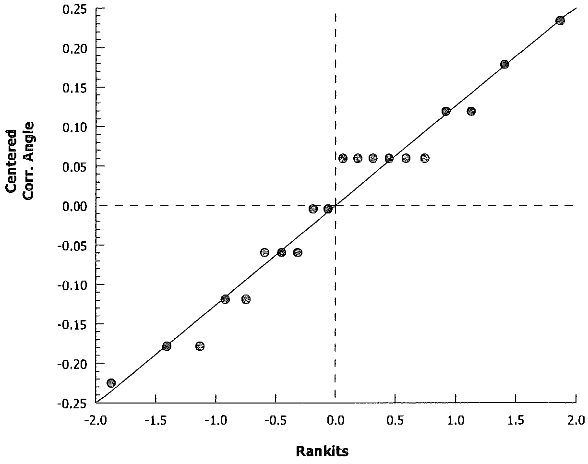
Report Date: 02 May-14 08:31 (p 2 of 2)
Test Code: 1404-S120B | 03-0817-2862

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	13-9943-4350	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 8:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:31 (p 1 of 1)
Test Code: 1404-S120B | 03-0817-2862

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	02-9703-5391	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 8:30	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

Batch Note: Nominal Zinc 182

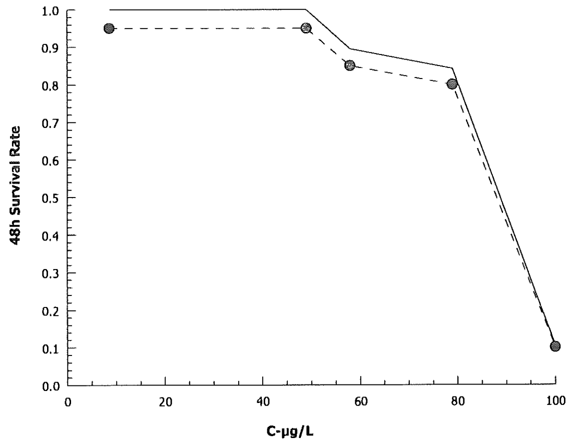
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.05	10.53%	1.941	0.01425	87.28	81.74	93.2

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
8.6	Baseline	4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
49		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
58		4	0.85	0.8	1	0.05	0.1	11.76%	10.53%	17	20
79		4	0.8	0.6	1	0.08165	0.1633	20.41%	15.79%	16	20
100		4	0.1	0	0.2	0.05774	0.1155	115.5%	89.47%	2	20

Graphics



Analyst: AC QA: SP 5/2/14

CETIS Summary Report

Report Date: 02 May-14 08:36 (p 1 of 1)
Test Code: 1404-S120C | 13-1502-2217

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	14-0121-4889	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 17:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	47h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	16-6321-6659	**Code:**	SD8(1) C 14-0310	**Client:**	AMEC
Sample Date:	02 Apr-14 13:20	**Material:**	Stormwater + Copper & Zinc chloride	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	52h (5.5 °C)	**Station:**	SD8(1)		

Sample Note: Nominal Zinc 236 µg/L

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
02-3858-5404	48h Survival Rate	79	98	87.99	19.9%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
04-8669-2037	48h Survival Rate	EC50	84.42	80.89	88.11		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-3858-5404	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria
04-8669-2037	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
8.6	Baseline	4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
48		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
58		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
79		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	15.79%
98		4	0	0	0	0	0	0	0		100.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
8.6	Baseline	1	0.8	1	1
48		1	0.8	1	1
58		0.8	1	1	1
79		0.8	1	0.8	0.6
98		0	0	0	0

Analyst: AC QA: SD 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:35 (p 1 of 1)
Test Code: 1404-S120C | 13-1502-2217

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 02-3858-5404 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 May-14 8:34 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Sample Note: Nominal Zinc 236

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	79	98	87.99		19.9%

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
8.6		48	18	10	2	6	0.7500	Asymp	Non-Significant Effect
8.6		58	18	10	2	6	0.7500	Asymp	Non-Significant Effect
8.6		79	13.5	10	2	6	0.2126	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09117807	0.03039269	3	1.565	0.2491	Non-Significant Effect
Error	0.2331005	0.01942505	12			
Total	0.3242786		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	0.9252	11.34	0.8193	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8018	0.8408	0.0029	Non-normal Distribution

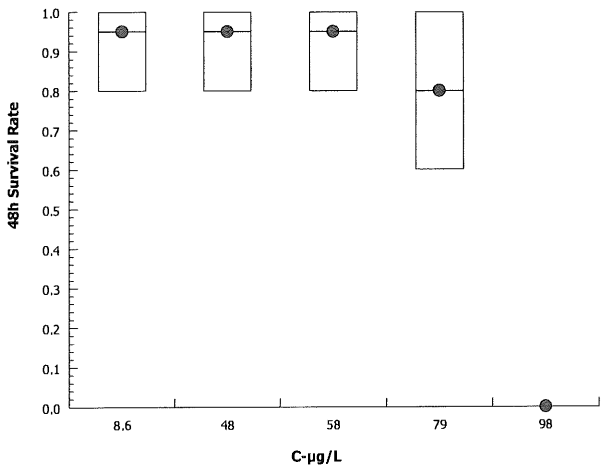
48h Survival Rate Summary

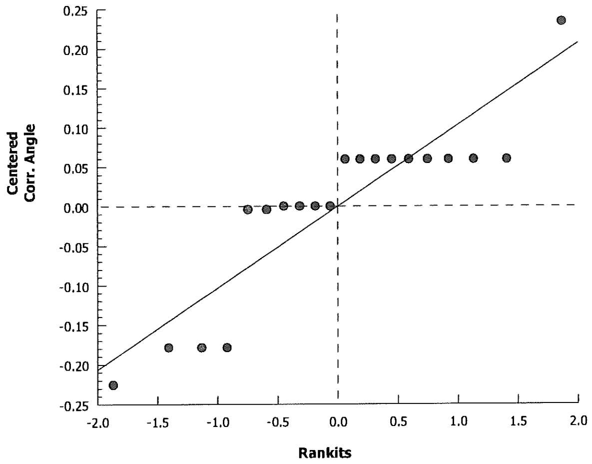
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.6	Baseline	4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
48		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
58		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
79		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	15.79%
98		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.6	Baseline	4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
48		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
58		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
79		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	13.56%
98		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%

Graphics





Analyst: AC QA: 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:36 (p 1 of 1)
Test Code: 1404-S120C | 13-1502-2217

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 04-8669-2037 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 May-14 8:34 **Analysis:** Untrimmed Spearman-Kärber **Official Results:** Yes

Sample Note: Nominal Zinc 236

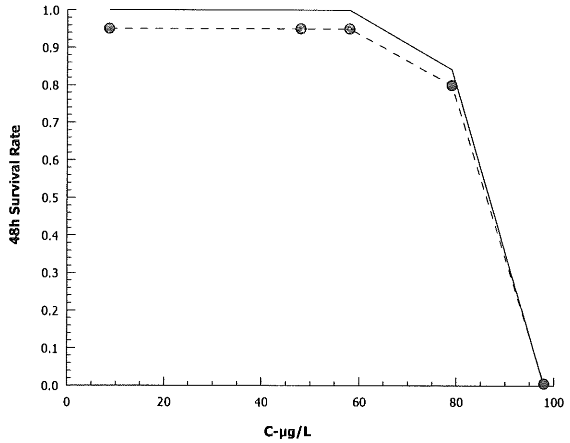
Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.05	0.00%	1.926	0.009287	84.42	80.89	88.11

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
8.6	Baseline	4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
48		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
58		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
79		4	0.8	0.6	1	0.08165	0.1633	20.41%	15.79%	16	20
98		4	0	0	0	0	0		100.0%	0	20

Graphics



Analyst: AC QA: 5/2/14

CETIS Summary Report

Report Date: 01 May-14 14:19 (p 1 of 1)
Test Code: 1404-S120 | 20-0516-7276

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	06-9253-6317	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 17:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	47h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	19-9760-0734	**Code:**	14-0310	**Client:**	AMEC
Sample Date:	02 Apr-14 13:20	**Material:**	Stormwater + Copper & Zinc ~~chloride~~ -AC	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	52h (5.5 °C)	**Station:**	SD8(1)		

Batch Note: Concentrations listed are dissolved copper – All conc's blended

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-7097-6306	48h Survival Rate	80	98	88.54	21.8%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
14-4044-1085	48h Survival Rate	EC50	86.21	83.29	89.22		Trimmed Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
14-4044-1085	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria
20-7097-6306	48h Survival Rate	Control Resp	0.95	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
8.6	Baseline	4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
48		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
49		4	1	1	1	1	1	0	0	0.0%	-5.26%
49.01		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
58		4	0.85	0.8127	0.8873	0.8	1	0.05	0.1	11.76%	10.53%
58.01		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	0.0%
60		4	1	1	1	1	1	0	0	0.0%	-5.26%
79		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	15.79%
79.01		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	15.79%
80		4	0.85	0.7785	0.9215	0.6	1	0.09574	0.1915	22.53%	10.53%
98		4	0.05	0.01266	0.08734	0	0.2	0.05	0.1	200.0%	94.74%
98.01		4	0	0	0	0	0	0	0		100.0%
100		4	0.1	0.05688	0.1431	0	0.2	0.05774	0.1155	115.5%	89.47%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
8.6	Baseline	1	0.8	1	1
48		1	0.8	1	1
49		1	1	1	1
49.01		1	0.8	1	1
58		0.8	0.8	0.8	1
58.01		0.8	1	1	1
60		1	1	1	1
79		1	0.8	0.8	0.6
79.01		0.8	1	0.8	0.6
80		1	1	0.6	0.8
98		0.2	0	0	0
98.01		0	0	0	0
100		0	0.2	0.2	0

Analyst: SD/AC QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 14:18 (p 1 of 2)
Test Code: 1404-S120 | 20-0516-7276

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	20-7097-6306	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 14:15	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: Concentrations listed are dissolved copper

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	80	98	88.54		21.8%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
8.6		48	0	2.56	0.247	6	0.9091	CDF	Non-Significant Effect
8.6		49	-0.6181	2.56	0.247	6	0.9819	CDF	Non-Significant Effect
8.6		49.01	0	2.56	0.247	6	0.9091	CDF	Non-Significant Effect
8.6		58	1.236	2.56	0.247	6	0.4306	CDF	Non-Significant Effect
8.6		58.01	0	2.56	0.247	6	0.9091	CDF	Non-Significant Effect
8.6		60	-0.6181	2.56	0.247	6	0.9819	CDF	Non-Significant Effect
8.6		79	1.81	2.56	0.247	6	0.2011	CDF	Non-Significant Effect
8.6		79.01	1.81	2.56	0.247	6	0.2011	CDF	Non-Significant Effect
8.6		80	1.192	2.56	0.247	6	0.4513	CDF	Non-Significant Effect
8.6		98*	10.39	2.56	0.247	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.606977	0.3606977	10	19.44	<0.0001	Significant Effect
Error	0.6122082	0.01855176	33			
Total	4.219185		43			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.8417	2.913	0.5933	Equal Variances
Variances	Levene Equality of Variance	1.709	2.913	0.1204	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9369	0.9295	0.0184	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.6	Baseline	4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
48		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
49		4	1	1	1	1	1	1	0	0.0%	-5.26%
49.01		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
58		4	0.85	0.6909	1	0.8	0.8	1	0.05	11.76%	10.53%
58.01		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	0.0%
60		4	1	1	1	1	1	1	0	0.0%	-5.26%
79		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	15.79%
79.01		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	15.79%
80		4	0.85	0.5453	1	0.9	0.6	1	0.09574	22.53%	10.53%
98		4	0.05	0	0.2091	0	0	0.2	0.05	200.0%	94.74%
98.01		4	0	0	0	0	0	0	0		100.0%
100		4	0.1	0	0.2837	0.1	0	0.2	0.05774	115.5%	89.47%

Analyst: SD/AC QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 14:18 (p 2 of 2)
Test Code: 1404-S120 | 20-0516-7276

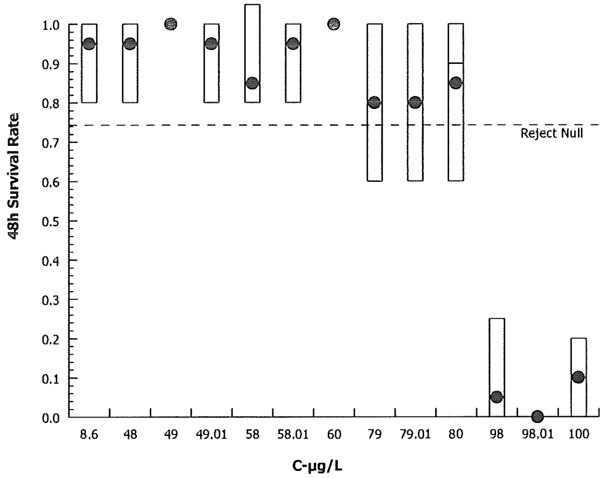
Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

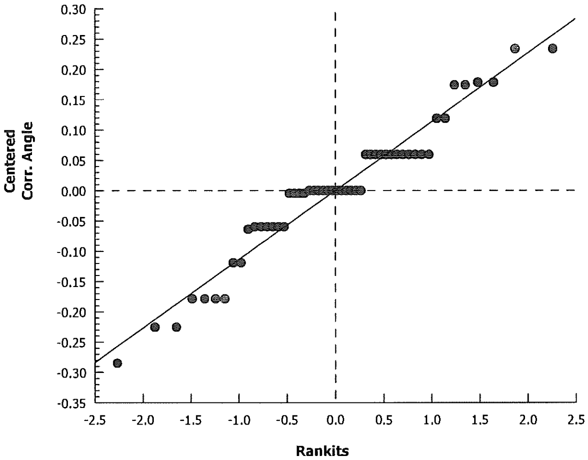
Analysis ID: 20-7097-6306 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 14:15 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
8.6	Baseline	4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
48		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
49		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-4.63%
49.01		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
58		4	1.167	0.9772	1.356	1.107	1.107	1.345	0.05953	10.21%	9.26%
58.01		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	0.0%
60		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-4.63%
79		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	13.56%
79.01		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	13.56%
80		4	1.171	0.8199	1.522	1.226	0.8861	1.345	0.1103	18.84%	8.93%
98		4	0.285	0.09558	0.4745	0.2255	0.2255	0.4636	0.05953	41.77%	77.83%
98.01		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.46%
100		4	0.3446	0.1258	0.5634	0.3446	0.2255	0.4636	0.06874	39.9%	73.2%

Graphics





Analyst: SD|AC QA: AC 5|1|14

CETIS Analytical Report

Report Date: 01 May-14 14:19 (p 1 of 1)
Test Code: 1404-S120 | 20-0516-7276

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	14-4044-1085	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 14:15	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

Batch Note: Concentrations listed are dissolved copper

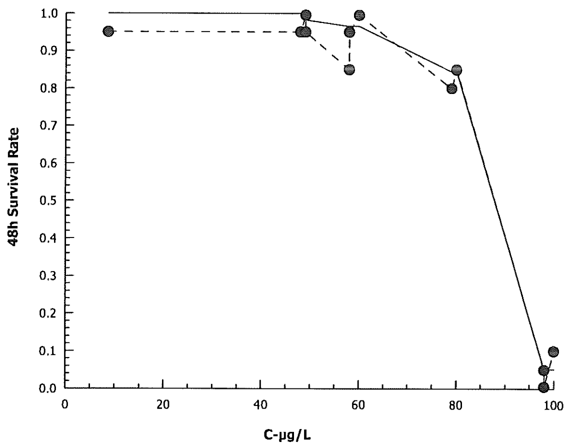
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.05	5.17%	1.936	0.007468	86.21	83.29	89.22

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
8.6	Baseline	4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
48		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
49		4	1	1	1	0	0	0.0%	-5.26%	20	20
49.01		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
58		4	0.85	0.8	1	0.05	0.1	11.76%	10.53%	17	20
58.01		4	0.95	0.8	1	0.05	0.1	10.53%	0.0%	19	20
60		4	1	1	1	0	0	0.0%	-5.26%	20	20
79		4	0.8	0.6	1	0.08165	0.1633	20.41%	15.79%	16	20
79.01		4	0.8	0.6	1	0.08165	0.1633	20.41%	15.79%	16	20
80		4	0.85	0.6	1	0.09574	0.1915	22.53%	10.53%	17	20
98		4	0.05	0	0.2	0.05	0.1	200.0%	94.74%	1	20
98.01		4	0	0	0	0	0		100.0%	0	20
100		4	0.1	0	0.2	0.05774	0.1155	115.5%	89.47%	2	20

Graphics



Analyst: SD|AC QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: SD8(1) - Copper and Zinc Spikes
Test No.: 1404 S120

Test Species: *C. dubia*
Start Date/Time: 4/4/2014 1700
End Date/Time: 4/6/2014 1615

	Tech Initials		
	0	24	48
Counts:	AC	KFP	BK
Readings:	SD/AC	KFP	AC
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24 @	48 KFP	0	24	48	0	24	48
SD8(1) -Cd	A	5	5	5	258	-	260	20.5	~~19.4~~ 18.6	19.5	8.7	-	7.4	7.26	-	7.20
CuZn-0	B	5	5	4												
	C	5	5	5												
	D	5 ~~56~~ KFP	KFP ~~2~~ 5	5												
SD8(1) -Cd	A	5	5	5	534@	-	533	~~534~~ 205	-	21.0	7.5	-	8.5	7.39	-	7.30
CuZn-1	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
SD8(1) -Cd	A	5	5	5	262	-	277	205	-	21.0	7.5	-	7.5	7.41	-	7.37
CuZn-2	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
SD8(1) -Cd	A	5	5	5	254	-	267	20.5	-	20.9	7.4	-	7.9	7.40	-	7.38
CuZn-3	B	5	5	5												
	C	5	KFP ~~5~~ 3	3												
	D	5	KFP ~~5~~ 4	4												
SD8(1) -Cd	A	5	KFP ~~5~~ 1	1	254	-	258	205	-	21.0	7.6	-	8.1	7.40	-	7.42
CuZn-4	B	5	KFP ~~5~~ 1	0												
	C	5	KFP ~~4~~ 0	-												
	D	5	KFP ~~5~~ 1	0												
SD8(1) -Cd	A	5	KFP ~~4~~ 5	5	259	-	260	205	-	21.0	7.6	-	8.2	7.41	-	7.45
CuZn-5	B	5	KFP ~~5~~ 5	4												
	C	5	KFP ~~5~~ 5	5												
	D	5	~~5~~ 5 KFP	5												

Initial Counts QC'd by: CL

Animal Source/Date Received: Internal / N/A

Age at Initiation: <24hrs

Comments: Organisms fed prior to initiation, circle one (y / n)

@ Surrogate cup contaminated. Only temp recorded at 24 hours.

QC Check: AC 5/1/14

Final Review: 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: SD8(1) - Copper and Zinc Spikes
Test No.: 1404-S120

Test Species: *C. dubia*
Start Date/Time: 4/4/2014 ~~1840~~ 1700
End Date/Time: 4/6/2014 ~~1625~~ 1615

Tech Initials	0	24	48
Counts:	BG	KFP	BK
Readings:	SD/AC	KFP	AC
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
SD8(1) -Cd	A	5	4	4	257	-	261	20.5	18.6	21.0	7.3	-	8.3	7.40	-	7.48
CuZn-6	B	5	4	4												
	C	5	4	4												
	D	5	KFP ~~4~~ 5	5												
SD8(1) -Cd	A	5	KFP ~~0~~ 5	5	257	-	258	20.5	-	21.0	7.5	-	8.2	7.39	-	7.49
CuZn-7	B	5	KFP ~~0~~ 4	4												
	C	5	KFP ~~0~~ 5	4												
	D	5	KFP ~~4~~ 3	3												
SD8(1) -Cd	A	5	0	-	256	-	257	20.5	-	21.0	7.4	-	8.0	7.37	-	7.48
CuZn-8	B	5	3	1												
	C	5	2	1												
	D	5	0	-												
SD8(1) -Cd	A	5	5	5	257	-	259	20.5	-	21.0	7.4	-	8.1	7.38	-	7.52
CuZn-9	B	5	5	4												
	C	5	5	5												
	D	5	5	5												
SD8(1) -Cd	A	5	4	4	249	-	260	20.5	-	21.0	7.3	-	8.0	7.51	-	7.53
CuZn-10	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
SD8(1)-Cd	A	5	4	4	254	-	258	20.5	-	21.0	7.3	-	8.1	7.49	-	7.53
CuZn-11	B	5	5	5												
	C	5	5	4												
	D	5	4	3												
SD8(1)-Cd	A	5	0	-	251	-	262	20.5	-	21.0	7.2	-	7.8	7.45	-	7.51
CuZn-12	B	5	0	-												
	C	5	1	0												
	D	5	0	-												

Initial Counts QC'd by: ML

Animal Source/Date Received: Internal / N/A

Age at Initiation: <24h

Comments: Organisms fed prior to initiation, circle one (y / n)

only temp recorded at 24 hours

QC Check: AC 5/1/14

Final Review: 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Item 10
Supporting Document No. 2
December 14, 2016

Site: DPR3

CETIS Summary Report

Report Date: 01 May-14 09:07 (p 1 of 1)
Test Code: 1404-S113 | 07-7706-3456

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID:	04-8624-7265	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 18:50	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 17:20	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	46h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	07-3153-1135	**Code:**	14-0309	**Client:**	
Sample Date:	03 Apr-14 06:31	**Material:**	Stormwater + Copper chloride	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	36h (5 °C)	**Station:**	DPR3		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
02-1032-1032	48h Survival Rate	160	265	205.9	12.4%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
06-4757-4793	48h Survival Rate	EC50	196	178.9	214.8		Trimmed Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-1032-1032	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
06-4757-4793	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
11	Baseline	4	1	1	1	1	1	0	0	0.0%	0.0%
29		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
43		4	1	1	1	1	1	0	0	0.0%	0.0%
65		4	1	1	1	1	1	0	0	0.0%	0.0%
104		4	1	1	1	1	1	0	0	0.0%	0.0%
160		4	0.85	0.8127	0.8873	0.8	1	0.05	0.1	11.76%	15.0%
265		4	0.05	0.01266	0.08734	0	0.2	0.05	0.1	200.0%	95.0%
435		4	0	0	0	0	0	0	0		100.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
11	Baseline	1	1	1	1
29		1	1	0.8	1
43		1	1	1	1
65		1	1	1	1
104		1	1	1	1
160		0.8	1	0.8	0.8
265		0	0	0	0.2
435		0	0	0	0

Analyst: SD QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 09:07 (p 1 of 2)
Test Code: 1404-S113 | 07-7706-3456

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 02-1032-1032 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 9:06 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	160	265	205.9		12.4%

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
11		29	16	10	1	6	0.6451	Asymp	Non-Significant Effect
11		43	18	10	1	6	0.8571	Asymp	Non-Significant Effect
11		65	18	10	1	6	0.8571	Asymp	Non-Significant Effect
11		104	18	10	1	6	0.8571	Asymp	Non-Significant Effect
11		160	12	10	1	6	0.1598	Asymp	Non-Significant Effect
11		265*	10	10	0	6	0.0480	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.68236	0.6137267	6	100.8	<0.0001	Significant Effect
Error	0.1278911	0.006090053	21			
Total	3.810251		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.6396	3.812	0.6975	Equal Variances
Variances	Levene Equality of Variance	5.756	3.812	0.0011	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8229	0.8975	0.0003	Non-normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
11	Baseline	4	1	1	1	1	1	1	0	0.0%	0.0%
29		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
43		4	1	1	1	1	1	1	0	0.0%	0.0%
65		4	1	1	1	1	1	1	0	0.0%	0.0%
104		4	1	1	1	1	1	1	0	0.0%	0.0%
160		4	0.85	0.6909	1	0.8	0.8	1	0.05	11.76%	15.0%
265		4	0.05	0	0.2091	0	0	0.2	0.05	200.0%	95.0%
435		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
11	Baseline	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
29		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
43		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
65		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
104		4	1.35	1.334	1.366	1.345	1.345	1.365	0.004985	0.74%	-0.37%
160		4	1.167	0.9772	1.356	1.107	1.107	1.345	0.05953	10.21%	13.28%
265		4	0.285	0.09558	0.4745	0.2255	0.2255	0.4636	0.05953	41.77%	78.81%
435		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%

Analyst: SD QA: AC 5/1/14

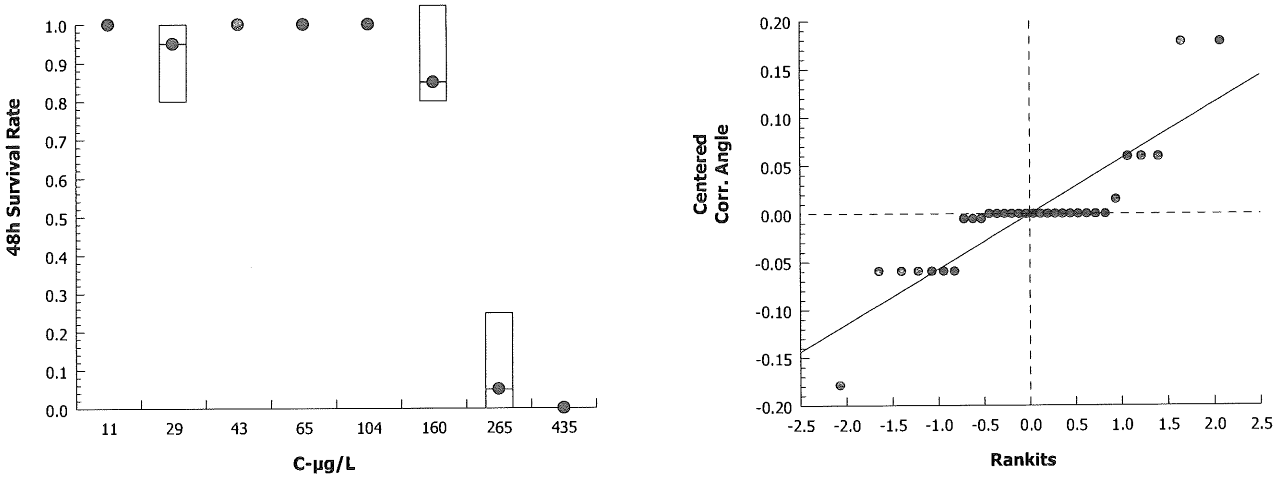
CETIS Analytical Report

Report Date: 01 May-14 09:07 (p 2 of 2)
Test Code: 1404-S113 | 07-7706-3456

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 02-1032-1032 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 9:06 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Graphics



Analyst: SD QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 09:07 (p 1 of 1)
Test Code: 1404-S113 | 07-7706-3456

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID:	06-4757-4793	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 9:06	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

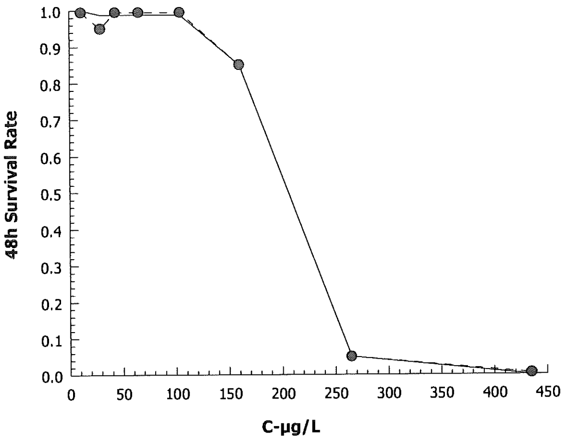
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	1.25%	2.292	0.01982	196	178.9	214.8

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
11	Baseline	4	1	1	1	0	0	0.0%	0.0%	20	20
29		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
43		4	1	1	1	0	0	0.0%	0.0%	20	20
65		4	1	1	1	0	0	0.0%	0.0%	20	20
104		4	1	1	1	0	0	0.0%	0.0%	21	21
160		4	0.85	0.8	1	0.05	0.1	11.76%	15.0%	17	20
265		4	0.05	0	0.2	0.05	0.1	200.0%	95.0%	1	20
435		4	0	0	0	0	0		100.0%	0	20

Graphics



Analyst: SD QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: DPR3 - Copper Spikes
Test No.: 1404 - S113

Test Species: C. dubia
Start Date/Time: 4/4/2014 ~~1800~~ 1850 AD
End Date/Time: 4/6/2014 1720

	Tech Initials		
	0	24	48
Counts:	AD	KFP	BK
Readings:	SD/AG	RFP	AB
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L) Q14			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
DPR-CdCu-0	A	5	5	5	476	–	482	19.6	19.5	19.8	9.3	–	7.4	7.63	–	7.51
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-CdCu-1	A	5	5	5	497	–	536ⓐ	19.7	19.5	20.2	8.0	–	8.1	7.54	–	7.64
	B	5	5	5												
	C	5	5	4												
	D	5	5	5												
DPR-CdCu-2	A	5	5	5	484	–	565ⓐ	19.7	19.5	20.0	8.1	–	8.1	7.54	–	7.67
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-CdCu-3	A	5	5	5	482	–	488	19.7	19.5	20.2	9.3	–	7.1	7.61	–	7.44
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-CdCu-4	A	5	5	5	482	–	488	19.7	19.5	20.2	9.2	–	6.9	7.58	–	7.40
	B	5	5	5												
	C	~~5~~ 6 KFP	6	6												
	D	5	5	5												
DPR-CdCu-5	A	5	5	4	485	–	489	19.4	19.5	20.2	9.4	–	6.9	7.58	–	7.37
	B	5	5	5												
	C	5	5	4												
	D	5	5	4												
DPR-CdCu-6	A	5	0	-	485	–	498	19.7	19.5	20.2	9.4	–	7.4	7.57	–	7.44
	B	5	0	-												
	C	5	0	-												
	D	5	1	1												
DPR-CdCu-7	A	5	0	-	482	–	485	19.3	19.5	20.3	9.4	–	7.7	7.55	–	7.49
	B	5	0	-												
	C	5	0	-												
	D	5	0	-												

Initial Counts QC'd by: SD/AG

Animal Source/Date Received: Internal/NA

Age at Initiation: <24h

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)
ⓐ readings from surrogate cup. only temp recorded at 24hr

QC Check: AC 5/1/14

Final Review: BS 5/1/14

CETIS Summary Report

Report Date: 01 May-14 11:37 (p 1 of 1)
Test Code: 1404-S116 | 19-5558-2326

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Batch ID:	13-0240-4733	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 16:40	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 14:50	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	46h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	16-2150-1995	**Code:**	14-0309	**Client:**	AMEC
Sample Date:	03 Apr-14 06:31	**Material:**	Stormwater + Zinc ~~chloride~~	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	34h (5 °C)	**Station:**	DPR3		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
17-0649-8048	48h Survival Rate	320	510	404	11.4%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
03-6183-7039	48h Survival Rate	EC50	394.9	365.1	427		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
03-6183-7039	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
17-0649-8048	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
31	Baseline	4	1	1	1	1	1	0	0	0.0%	0.0%
61		4	1	1	1	1	1	0	0	0.0%	0.0%
80		4	1	1	1	1	1	0	0	0.0%	0.0%
130		4	1	1	1	1	1	0	0	0.0%	0.0%
200		4	1	1	1	1	1	0	0	0.0%	0.0%
320		4	0.9	0.8569	0.9431	0.8	1	0.05774	0.1155	12.83%	10.0%
510		4	0.05	0.01266	0.08734	0	0.2	0.05	0.1	200.0%	95.0%
835		4	0	0	0	0	0	0	0		100.0%

48h Survival Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
31	Baseline	1	1	1	1
61		1	1	1	1
80		1	1	1	1
130		1	1	1	1
200		1	1	1	1
320		1	1	0.8	0.8
510		0	0	0	0.2
835		0	0	0	0

Analyst:________ QA: 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 11:37 (p 1 of 2)
Test Code: 1404-S116 | 19-5558-2326

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 17-0649-8048 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 11:35 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	320	510	404		11.4%

Steel Many-One Rank Sum Test

Control	vs	C-ug/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
31		61	18	10	1	6	0.8571	Asymp	Non-Significant Effect
31		80	18	10	1	6	0.8571	Asymp	Non-Significant Effect
31		130	18	10	1	6	0.8571	Asymp	Non-Significant Effect
31		200	18	10	1	6	0.8571	Asymp	Non-Significant Effect
31		320	14	10	1	6	0.3760	Asymp	Non-Significant Effect
31		510*	10	10	0	6	0.0480	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.758392	0.6263986	6	132.6	<0.0001	Significant Effect
Error	0.09923882	0.004725658	21			
Total	3.85763		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	4.333	3.812	0.0054	Unequal Variances
Variances	Levene Equality of Variance	21	3.812	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.7259	0.8975	<0.0001	Non-normal Distribution

48h Survival Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
31	Baseline	4	1	1	1	1	1	1	0	0.0%	0.0%
61		4	1	1	1	1	1	1	0	0.0%	0.0%
80		4	1	1	1	1	1	1	0	0.0%	0.0%
130		4	1	1	1	1	1	1	0	0.0%	0.0%
200		4	1	1	1	1	1	1	0	0.0%	0.0%
320		4	0.9	0.7163	1	0.9	0.8	1	0.05774	12.83%	10.0%
510		4	0.05	0	0.2091	0	0	0.2	0.05	200.0%	95.0%
835		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
31	Baseline	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
61		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
80		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
130		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
200		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
320		4	1.226	1.007	1.445	1.226	1.107	1.345	0.06874	11.21%	8.85%
510		4	0.285	0.09558	0.4745	0.2255	0.2255	0.4636	0.05953	41.77%	78.81%
835		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%

Analyst:_______ QA: 5/1/14

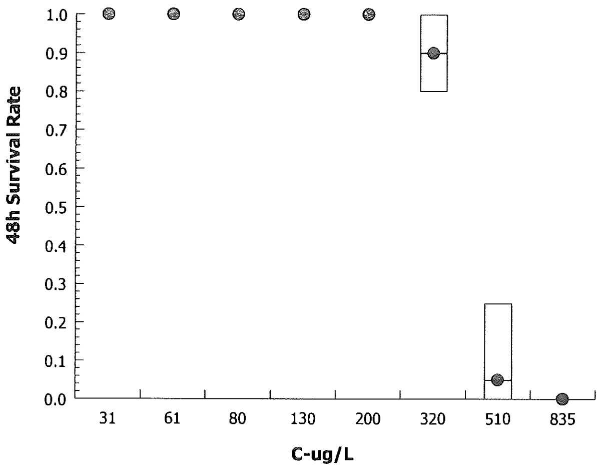
CETIS Analytical Report

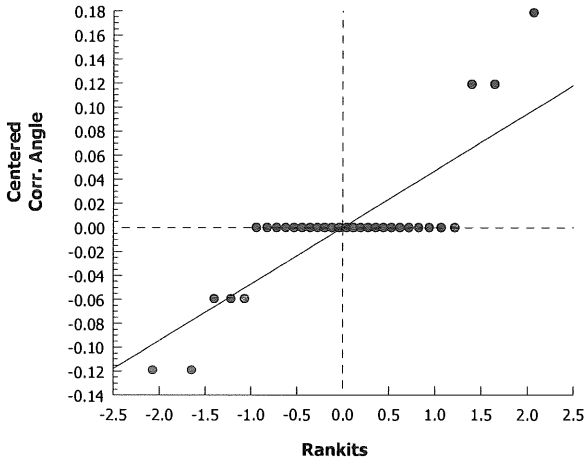
Report Date: 01 May-14 11:37 (p 2 of 2)
Test Code: 1404-S116 | 19-5558-2326

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	17-0649-8048	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 11:35	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 01 May-14 11:37 (p 1 of 1)
Test Code: 1404-S116 | 19-5558-2326

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 03-6183-7039 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 01 May-14 11:35 **Analysis:** Untrimmed Spearman-Kärber **Official Results:** Yes

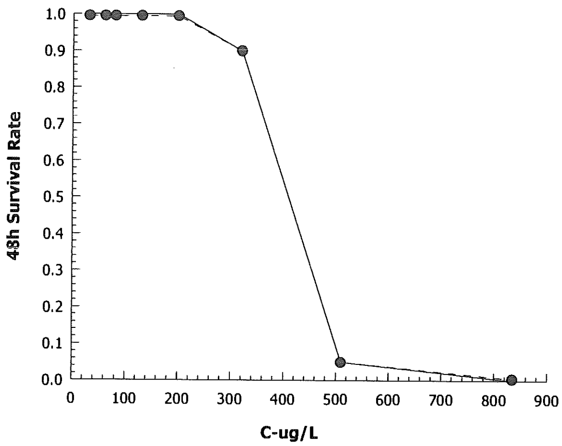
Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	0.00%	2.596	0.017	394.9	365.1	427

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
31	Baseline	4	1	1	1	0	0	0.0%	0.0%	20	20
61		4	1	1	1	0	0	0.0%	0.0%	20	20
80		4	1	1	1	0	0	0.0%	0.0%	20	20
130		4	1	1	1	0	0	0.0%	0.0%	20	20
200		4	1	1	1	0	0	0.0%	0.0%	20	20
320		4	0.9	0.8	1	0.05774	0.1155	12.83%	10.0%	18	20
510		4	0.05	0	0.2	0.05	0.1	200.0%	95.0%	1	20
835		4	0	0	0	0	0		100.0%	0	20

Graphics



Analyst: QA: 05/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: DPR3- Zinc Spikes
Test No.: 1404-S116

Test Species: *C. dubia*
Start Date/Time: 4/4/2014 1640
End Date/Time: 4/6/2014 1450

	Tech Initials		
	0	24	48
Counts:	AC	KFP	BK
Readings:	SO/AG	KFP	AC
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L) 214			pH (units)		
		0	24	48	0	24	48	0	Ⓑ 24	48	0	24	48	0	24	48
DPR-CdZn-0	A	5	5	5	485	-	488	20.0	19.5	19.7	9.1	-	7.4	7.40	-	7.39
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-CdZn-1	A	5	5	5	485	-	529 ⓐ	20.4	19.5	19.9	7.7	-	8.4	7.56	-	7.70 ~~8.35~~ AC
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-CdZn-2	A	5	5	5	486	-	563 ⓐ	20.3	19.5	20.1	7.7	-	8.2	7.58	-	7.68
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-CdZn-3	A	5	5	5	484	-	488	20.4	19.5	20.6	9.1	-	7.0	7.33	-	7.34
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-CdZn-4	A	5	5	5	486	-	493	20.3	19.5	20.6	9.3	-	6.9	7.32	-	7.32
	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-CdZn-5	A	5	5	5	486	-	493	20.2	19.5	20.5	9.3	-	7.1	7.30	-	7.33
	B	5	5	5												
	C	5	4	4												
	D	5	4	4												
DPR-CdZn-6	A	5	0	-	485	-	498	20.2	19.5	20.5	9.4	-	7.0	7.24	-	7.27
	B	5	1	0												
	C	5	0	-												
	D	5	2	1												
DPR-CdZn-7	A	5	2	0	485	-	489	20.4	19.5	20.4	9.3	-	7.2	7.21	-	7.26
	B	5	1	0												
	C	5	0	-												
	D	5	1	0												

Initial Counts QC'd by: CL

Animal Source/Date Received: Internal/N/A

Age at Initiation: <24 hrs

Comments: Organisms fed prior to initiation, circle one (y / n)

ⓐ readings from surrogate cup; ~~evaporated~~ AC ~200 ml

Ⓑ Temperature taken from surrogate cup; no other water quality readings @ 24 hrs

QC Check: 5/1/14

Final Review: AC 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 09 Jun-14 14:28 (p 1 of 1)
Test Code: 1404-S123 | 06-9555-3568

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	05-0319-8084	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 16:25	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 14:30	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Duration:	46h	**Source:**	Aquatic Biosystems, CO	**Age:**	4d

Sample ID:	07-3153-1135	**Code:**	14-0309	**Client:**	
Sample Date:	03 Apr-14 06:31	**Material:**	Stormwater + Copper chloride	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	34h (5 °C)	**Station:**	DPR3		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-0463-9317	48h Survival Rate	275	440	347.9	5.79%		Mann-Whitney U Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
14-1528-0375	48h Survival Rate	EC50	929.5	869.5	993.7		Trimmed Spearman-Kärber

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
11	Baseline	4	1	1	1	1	1	0	0	0.0%	0.0%
67		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	2.5%
110		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	2.5%
165		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	2.5%
275		4	1	1	1	1	1	0	0	0.0%	0.0%
440		4	0.9	0.9	0.9	0.9	0.9	0	0	0.0%	10.0%
720		4	0.825	0.8063	0.8437	0.8	0.9	0.025	0.05	6.06%	17.5%
1200		4	0.175	0.1563	0.1937	0.1	0.2	0.025	0.05	28.57%	82.5%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
11	Baseline	1	1	1	1
67		1	1	1	0.9
110		0.9	1	1	1
165		1	0.9	1	1
275		1	1	1	1
440		0.9	0.9	0.9	0.9
720		0.8	0.8	0.9	0.8
1200		0.2	0.2	0.1	0.2

Analyst: SD/AC QA: AC 6/9/14

CETIS Analytical Report

Report Date: 09 Jun-14 14:28 (p 1 of 2)
Test Code: 1404-S123 | 06-9555-3568

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	15-0463-9317	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	09 Jun-14 14:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	275	440	347.9		5.79%

Mann-Whitney U Two-Sample Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
11		67	10	NA	1	6	0.5000	Exact	Non-Significant Effect
11		110	10	NA	1	6	0.5000	Exact	Non-Significant Effect
11		165	10	NA	1	6	0.5000	Exact	Non-Significant Effect
11		275	8	NA	1	6	1.0000	Exact	Non-Significant Effect
11		440*	16	NA	0	6	0.0143	Exact	Significant Effect
11		720*	16	NA	0	6	0.0143	Exact	Significant Effect
11		1200*	16	NA	0	6	0.0143	Exact	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.104844	0.4435492	7	118.3	<0.0001	Significant Effect
Error	0.08996066	0.003748361	24			
Total	3.194805		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.4317	3.496	0.8726	Equal Variances
Variances	Levene Equality of Variance	3.886	3.496	0.0058	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8262	0.9081	0.0001	Non-normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
11	Baseline	4	1	1	1	1	1	1	0	0.0%	0.0%
67		4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	2.5%
110		4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	2.5%
165		4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	2.5%
275		4	1	1	1	1	1	1	0	0.0%	0.0%
440		4	0.9	0.8998	0.9002	0.9	0.9	0.9	0	0.0%	10.0%
720		4	0.825	0.7454	0.9046	0.8	0.8	0.9	0.025	6.06%	17.5%
1200		4	0.175	0.09544	0.2546	0.2	0.1	0.2	0.025	28.57%	82.5%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
11	Baseline	4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
67		4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	2.89%
110		4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	2.89%
165		4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	2.89%
275		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
440		4	1.249	1.249	1.249	1.249	1.249	1.249	0	0.0%	11.54%
720		4	1.143	1.03	1.256	1.107	1.107	1.249	0.03547	6.21%	19.08%
1200		4	0.4282	0.3153	0.5411	0.4636	0.3218	0.4636	0.03547	16.57%	69.68%

Analyst: SD/AC QA: AC 6/9/14

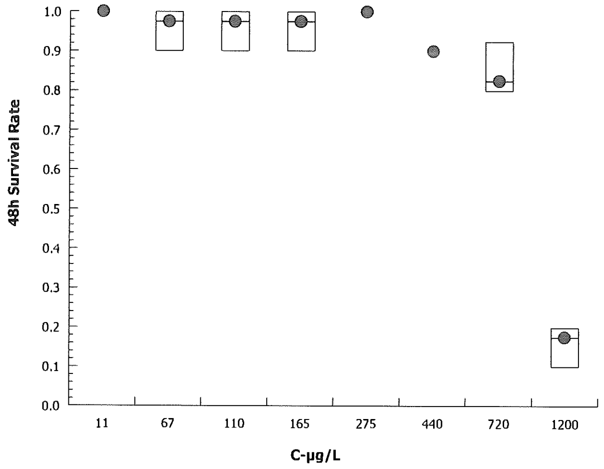
CETIS Analytical Report

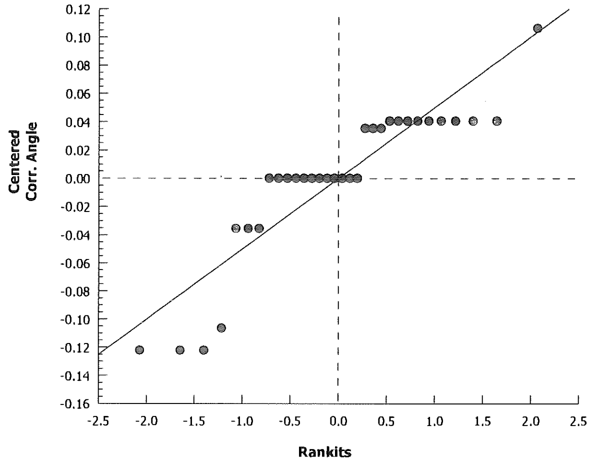
Report Date:	09 Jun-14 14:28 (p 2 of 2)
Test Code:	1404-S123 | 06-9555-3568

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	15-0463-9317	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	09 Jun-14 14:27	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Analyst: SD/AC QA: AC 6/9/14

CETIS Analytical Report

Report Date: 01 May-14 09:13 (p 1 of 1)
Test Code: 1404-S123 | 06-9555-3568

Fathead Minnow 48-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID:	14-1528-0375	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 9:13	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

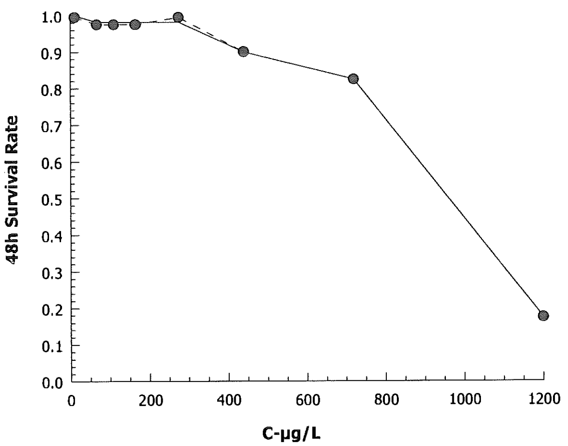
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	17.50%	2.968	0.0145	929.5	869.5	993.7

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
11	Baseline	4	1	1	1	0	0	0.0%	0.0%	40	40
67		4	0.975	0.9	1	0.025	0.05	5.13%	2.5%	39	40
110		4	0.975	0.9	1	0.025	0.05	5.13%	2.5%	39	40
165		4	0.975	0.9	1	0.025	0.05	5.13%	2.5%	39	40
275		4	1	1	1	0	0	0.0%	0.0%	40	40
440		4	0.9	0.9	0.9	0	0	0.0%	10.0%	36	40
720		4	0.825	0.8	0.9	0.025	0.05	6.06%	17.5%	33	40
1200		4	0.175	0.1	0.2	0.025	0.05	28.57%	82.5%	7	40

Graphics



Analyst:______ QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: DPR3 - Copper Spikes
Test No.: 1404-S123

Test Species: *P. promelas*
Start Date/Time: 4/4/2014 1625
End Date/Time: 4/6/2014 1430

	Tech Initials		
	0	24	48
Counts:	SD	BG	BK
Readings:	AG	BG	MB
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen Q14 (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
DPR-PpCu-0	A	10	10	10	476	482	482	19.6	20.1	20.2	9.3	7.7	7.4	7.63	7.56	7.51
	B	10	10	10												
	C	10	10	10												
	D	10	10	10												
DPR-PpCu-1	A	10	10	10	482	487	488	19.7	20.1	20.2	9.3	7.5	7.1	7.61	7.54	7.44
	B	10	10	10												
	C	10	10	10												
	D	10	9	9												
DPR-PpCu-2	A	10	9	9	482	488	488	19.7	20.1	20.2	9.2	7.6	6.9	7.58	7.54	740
	B	10	10	10												
	C	10	10	10												
	D	10	10	10												
DPR-PpCu-3	A	10	10	10	485	488	489	19.4	20.1	20.2	9.4	7.7	6.9	7.58	7.54	7.37
	B	10	9	9												
	C	10	10	10												
	D	10	10	10												
DPR-PpCu-4	A	10	~~9~~ 10	10	485	488	490	19.7	20.2	20.2	9.4	7.7	7.4	7.57	7.54	7.44
	B	10	10	10												
	C	10	10	10												
	D	10	10	10												
DPR-PpCu-5	A	10	10	9	482	482	485	19.3	20.3	20.3	9.4	7.8	7.7	7.55	7.55	7.49
	B	10	~~10~~ 9	9												
	C	10	~~9~~ 10	9												
	D	10	10	9												
DPR-PpCu-6	A	10	10	8	482	487	491	19.3	20.2	20.2	9.5	7.7	7.9	7.60	7.55	7.51
	B	10	10	8												
	C	10	9	9												
	D	10	10	8												
DPR-PpCu-7	A	10	2	2	482	484	491	19.5	20.4	20.1	9.5	8.0	8.1	7.42	7.57	7.55
	B	10	5	2												
	C	10	4	1												
	D	10	3	2												

Initial Counts QC'd by: AG

Animal Source/Date Received: ABS / 4/3/14

Age at Initiation: 4 d

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: AC 5/1/14

Final Review: 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 09 Jun-14 14:32 (p 1 of 1)
Test Code: 1404-S126 | 06-4987-4630

Fathead Minnow 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID: 11-7684-5974
Start Date: 04 Apr-14 16:35
Ending Date: 06 Apr-14 15:30
Duration: 47h
Test Type: Survival (48h)
Protocol: EPA/821/R-02-012 (2002)
Species: Pimephales promelas
Source: Aquatic Biosystems, CO
Analyst:
Diluent: Not Applicable
Brine: Not Applicable
Age: 4d

Sample ID: 16-2150-1995
Sample Date: 03 Apr-14 06:31
Receive Date: 03 Apr-14 13:00
Sample Age: 34h (5 °C)
Code: 14-0309
Material: Stormwater + Zinc ~~chloride~~ AC
Source: City of San Diego
Station: DPR3
Client: AMEC
Project: City of SD Chollas Creek WER

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-4022-2543	48h Survival Rate	520	850	664.8	9.93%		Mann-Whitney U Two-Sample Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
09-4995-5388	48h Survival Rate	EC50	1453	1243	1697		Trimmed Spearman-Kärber

48h Survival Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
34	Baseline	4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	0.0%
135		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	2.56%
205		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	0.0%
330		4	0.975	0.9563	0.9937	0.9	1	0.025	0.05	5.13%	0.0%
520		4	0.95	0.9284	0.9716	0.9	1	0.02887	0.05774	6.08%	2.56%
850		4	0.75	0.7127	0.7873	0.7	0.9	0.05	0.1	13.33%	23.08%
1400		4	0.55	0.5284	0.5716	0.5	0.6	0.02887	0.05774	10.5%	43.59%
2400		4	0.175	0.128	0.222	0	0.3	0.06292	0.1258	71.9%	82.05%

48h Survival Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
34	Baseline	1	1	0.9	1
135		0.8	1	1	1
205		1	1	0.9	1
330		1	1	0.9	1
520		1	0.9	0.9	1
850		0.7	0.9	0.7	0.7
1400		0.6	0.5	0.6	0.5
2400		0	0.2	0.3	0.2

Analyst: SD/AC QA: AC 6/9/14

CETIS Analytical Report

Report Date: 09 Jun-14 14:31 (p 1 of 2)
Test Code: 1404-S126 | 06-4987-4630

Fathead Minnow 48-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID:	14-4022-2543	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	09 Jun-14 14:30	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	520	850	664.8		9.93%

Mann-Whitney U Two-Sample Test

Control	vs	C-ug/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
34		135	8.5	NA	1	6	0.5000	Exact	Non-Significant Effect
34		205	8	NA	2	6	0.7857	Exact	Non-Significant Effect
34		330	8	NA	2	6	0.7857	Exact	Non-Significant Effect
34		520	10	NA	2	6	0.5000	Exact	Non-Significant Effect
34		850*	15.5	NA	1	6	0.0286	Exact	Significant Effect
34		1400*	16	NA	0	6	0.0143	Exact	Significant Effect
34		2400*	16	NA	0	6	0.0143	Exact	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.432891	0.490413	7	37.54	<0.0001	Significant Effect
Error	0.3135221	0.01306342	24			
Total	3.746413		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.449	18.48	0.6054	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9072	0.9081	0.0095	Non-normal Distribution

48h Survival Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
34	Baseline	4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	0.0%
135		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	2.56%
205		4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	0.0%
330		4	0.975	0.8954	1	1	0.9	1	0.025	5.13%	0.0%
520		4	0.95	0.8581	1	0.95	0.9	1	0.02887	6.08%	2.56%
850		4	0.75	0.5909	0.9091	0.7	0.7	0.9	0.05	13.33%	23.08%
1400		4	0.55	0.4581	0.6419	0.55	0.5	0.6	0.02887	10.5%	43.59%
2400		4	0.175	0	0.3752	0.2	0	0.3	0.06292	71.9%	82.05%

Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
34	Baseline	4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	0.0%
135		4	1.336	1.093	1.578	1.412	1.107	1.412	0.07622	11.41%	2.59%
205		4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	0.0%
330		4	1.371	1.242	1.501	1.412	1.249	1.412	0.04074	5.94%	0.0%
520		4	1.331	1.181	1.48	1.331	1.249	1.412	0.04705	7.07%	2.97%
850		4	1.056	0.8504	1.261	0.9912	0.9912	1.249	0.06447	12.21%	23.02%
1400		4	0.8357	0.7432	0.9282	0.8357	0.7854	0.8861	0.02906	6.96%	39.05%
2400		4	0.4164	0.1296	0.7033	0.4636	0.1588	0.5796	0.09013	43.29%	69.63%

Analyst: SD|AC QA: AC 6/9/14

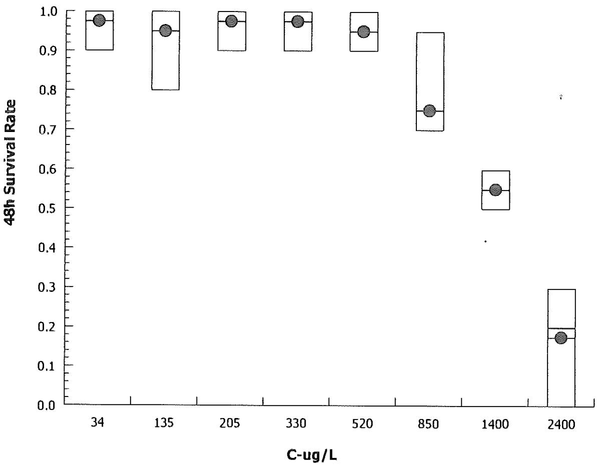
CETIS Analytical Report

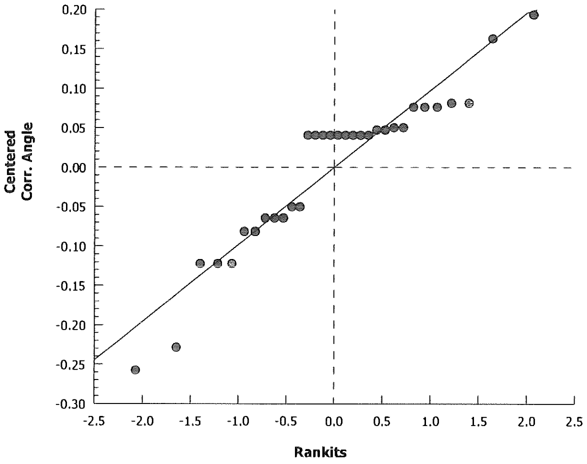
Report Date:	09 Jun-14 14:31 (p 2 of 2)
Test Code:	1404-S126 | 06-4987-4630

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	14-4022-2543	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	09 Jun-14 14:30	**Analysis:**	Nonparametric-Two Sample	**Official Results:**	Yes

Graphics





Analyst: SD/AC QA: AC 6/9/14

CETIS Analytical Report

Report Date: 01 May-14 11:54 (p 1 of 1)
Test Code: 1404-S126 | 06-4987-4630

Fathead Minnow 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	09-4995-5388	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 11:51	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

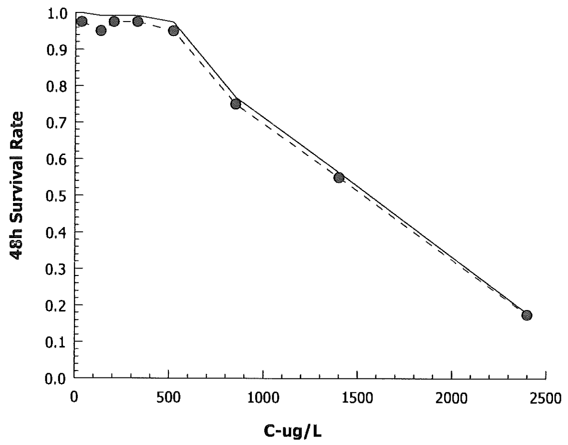
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.025	17.95%	3.162	0.0338	1453	1243	1697

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
34	Baseline	4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
135		4	0.95	0.8	1	0.05	0.1	10.53%	2.56%	38	40
205		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
330		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
520		4	0.95	0.9	1	0.02887	0.05773	6.08%	2.56%	38	40
850		4	0.75	0.7	0.9	0.05	0.1	13.33%	23.08%	30	40
1400		4	0.55	0.5	0.6	0.02887	0.05773	10.5%	43.59%	22	40
2400		4	0.175	0	0.3	0.06292	0.1258	71.9%	82.05%	7	40

Graphics



Analyst: SO QA: g 5/1/14

CETIS Analytical Report

Fathead Zinc DP23

Report Date: 06 May-14 16:34 (p 1 of 1)
Test Code: 1404-S126 | 06-4987-4630

Fathead Minnow 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	05-5208-7714	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	06 May-14 16:33	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	688552	1000	Yes	Two-Point Interpolation

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	559.2	N/A	647.1
EC10	639.6	487.8	793.8
EC15	720.1	576	990.3
EC20	800.5	645	1085
EC25	901.6	701.7	1167
EC40	1304	1081	1511
EC50	1567	1314	1757

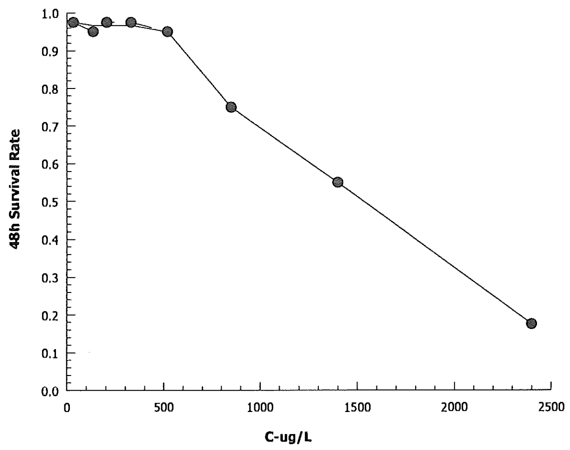
48h Survival Rate Summary

			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
34	Baseline	4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
135		4	0.95	0.8	1	0.05	0.1	10.53%	2.56%	38	40
205		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
330		4	0.975	0.9	1	0.025	0.05	5.13%	0.0%	39	40
520		4	0.95	0.9	1	0.02887	0.05773	6.08%	2.56%	38	40
850		4	0.75	0.7	0.9	0.05	0.1	13.33%	23.08%	30	40
1400		4	0.55	0.5	0.6	0.02887	0.05773	10.5%	43.59%	22	40
2400		4	0.175	0	0.3	0.06292	0.1258	71.9%	82.05%	7	40

48h Survival Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
34	Baseline	1	1	0.9	1
135		0.8	1	1	1
205		1	1	0.9	1
330		1	1	0.9	1
520		1	0.9	0.9	1
850		0.7	0.9	0.7	0.7
1400		0.6	0.5	0.6	0.5
2400		0	0.2	0.3	0.2

Graphics



Analyst: AC QA: 5/10/14

Item 10
Supporting Document No. 2
December 14, 2016

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: DPR3- Zinc Spikes
Test No.: 1404-S126

Test Species: *P. promelas*
Start Date/Time: 4/4/2014 1635
End Date/Time: 4/6/2014 1530

	Tech Initials		
	0	24	48
Counts:	SD	BG	BK
Readings:	Ab	BG	AB
Dilutions made by:	PH/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen Q14 (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
DPR-PpZn-0	A	10	10	10	485	485	488	20.6	20.4	20.4	9.1	7.4	7.4	7.40	7.41	7.39
	B	10	10	10												
	C	10	9	9												
	D	10	10	10												
DPR-PpZn-1	A	10	8	8	484	487	488	20.4	20.3	20.6	9.1	7.4	7.0	7.33	7.43	7.34
	B	10	10	10												
	C	10	10	10												
	D	10	10	10												
DPR-PpZn-2	A	10	10	10	486	490	493	20.3	20.3	20.6	9.3	7.3	6.9	7.32	7.44	7.32
	B	10	10	10												
	C	10	9	9												
	D	10	10	10												
DPR-PpZn-3	A	10	10	10	486	490	493	20.2	20.2	20.5	9.3	7.4	7.1	7.30	7.43	7.33
	B	10	10	10												
	C	10	10	9												
	D	10	10	10												
DPR-PpZn-4	A	10	10	10	485	488	498	20.2	20.3	20.5	9.4	7.4	7.0	7.24	7.41	7.27
	B	10	10	9												
	C	10	10	9												
	D	10	10	10												
DPR-PpZn-5	A	10	9	7	485	486	489	20.4	20.4	20.4	9.3	7.6	7.2	7.21	7.35	7.26
	B	10	10	9												
	C	10	10	7												
	D	10	10	7												
DPR-PpZn-6	A	10	10	6	485	488	494	20.7	20.3	20.4	9.1	7.4	7.4	7.20	7.26	7.25
	B	10	7	5												
	C	10	9	6												
	D	10	8	5												
DPR-PpZn-7	A	10	1	0	483	483	488	20.7	20.3	20.4	9.2	7.5	7.6	7.12	7.17	7.25
	B	10	4	2												
	C	10	4	3												
	D	10	3	2												

Initial Counts QC'd by: AO

Animal Source/Date Received: ABS/4/3/14

Age at Initiation: 4 d

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: AC 5/1/14

Final Review: 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 02 May-14 08:53 (p 1 of 1)
Test Code: 1404-S119A | 09-0290-1512

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID:	04-2437-2747	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 18:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 16:45	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	47h	**Source:**	In-House Culture	**Age:**	2-24h

Sample ID:	14-8982-8021	**Code:**	DPR3 A 14-0309	**Client:**	AMEC
Sample Date:	03 Apr-14 06:31	**Material:**	Stormwater + Copper & Zinc ~~chloride~~	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	35h	**Station:**	DPR3		

Sample Note: Nominal zinc 191 µg/L, measured copper concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
00-2844-9637	48h Survival Rate	130	>130	NA	14.5%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
08-3451-8931	48h Survival Rate	EC25	>130	N/A	N/A		Linear Interpolation (ICPIN)
		EC50	>130	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-2844-9637	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
08-3451-8931	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
10	Baseline	4	1	1	1	1	1	0	0	0.0%	0.0%
63		4	1	1	1	1	1	0	0	0.0%	0.0%
80		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
105		4	1	1	1	1	1	0	0	0.0%	0.0%
130		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	20.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
10	Baseline	1	1	1	1
63		1	1	1	1
80		1	0.8	1	1
105		1	1	1	1
130		0.8	0.6	0.8	1

Analyst: AC QA: 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:52 (p 1 of 2)
Test Code: 1404-S119A | 09-0290-1512

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 00-2844-9637 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 May-14 8:51 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Sample Note: Nominal zinc 191, measured copper concentrations

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	130	>130	NA		14.5%

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
10		63	18	10	1	6	0.8000	Asymp	Non-Significant Effect
10		80	16	10	1	6	0.5661	Asymp	Non-Significant Effect
10		105	18	10	1	6	0.8000	Asymp	Non-Significant Effect
10		130	12	10	1	6	0.1228	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1640871	0.04102178	4	4.157	0.0184	Significant Effect
Error	0.1480387	0.009869246	15			
Total	0.3121258		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.674	4.893	0.2081	Equal Variances
Variances	Levene Equality of Variance	3.208	4.893	0.0432	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7073	0.866	<0.0001	Non-normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
10	Baseline	4	1	1	1	1	1	1	0	0.0%	0.0%
63		4	1	1	1	1	1	1	0	0.0%	0.0%
80		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
105		4	1	1	1	1	1	1	0	0.0%	0.0%
130		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	20.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
10	Baseline	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
63		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
80		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
105		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
130		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	17.38%

Analyst: AC QA: 5/2/14

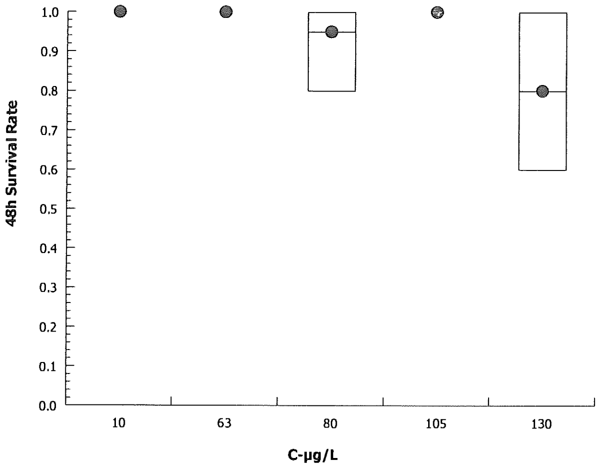
CETIS Analytical Report

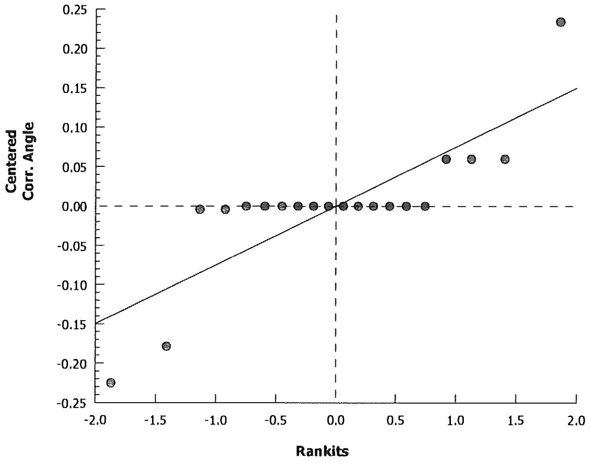
Report Date: 02 May-14 08:52 (p 2 of 2)
Test Code: 1404-S119A | 09-0290-1512

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	00-2844-9637	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 8:51	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: 8D 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:53 (p 1 of 1)
Test Code: 1404-S119A | 09-0290-1512

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 08-3451-8931 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 May-14 8:50 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Sample Note: Nominal zinc 191, measured copper concentrations

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	888610	1000	Yes	Two-Point Interpolation

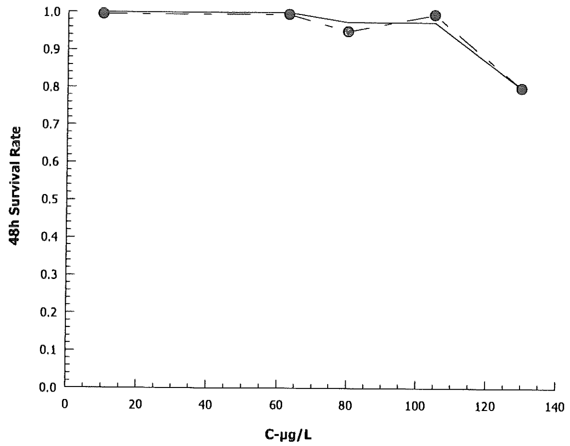
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	>130	N/A	N/A
EC50	>130	N/A	N/A

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
10	Baseline	4	1	1	1	0	0	0.0%	0.0%	20	20
63		4	1	1	1	0	0	0.0%	0.0%	20	20
80		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
105		4	1	1	1	0	0	0.0%	0.0%	20	20
130		4	0.8	0.6	1	0.08165	0.1633	20.41%	20.0%	16	20

Graphics



Analyst: AC QA: 5/2/14

CETIS Summary Report

Report Date: 02 May-14 08:57 (p 1 of 1)
Test Code: 1404-S119B | 03-6537-0924

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID: 14-5331-7312
Start Date: 04 Apr-14 18:00
Ending Date: 06 Apr-14 16:45
Duration: 47h

Test Type: Survival (48h)
Protocol: EPA/821/R-02-012 (2002)
Species: Ceriodaphnia dubia
Source: In-House Culture

Analyst:
Diluent: Not Applicable
Brine: Not Applicable
Age: <24h

Sample ID: 15-4587-6814
Sample Date: 03 Apr-14 06:31
Receive Date: 03 Apr-14 13:00
Sample Age: 35h (5 °C)

Code: DPR3 B 14-0309
Material: Stormwater + Copper & Zinc ~~chloride~~ SD
Source: City of San Diego
Station: DPR3

Client: AMEC
Project: City of SD Chollas Creek WER

Sample Note: Nominal zinc 232 ug/L; measured copper concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
05-1691-3163	48h Survival Rate	105	135	119.1	18.1%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
02-1634-2412	48h Survival Rate	EC25	>135	N/A	N/A		Linear Interpolation (ICPIN)
		EC50	>135	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
02-1634-2412	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
05-1691-3163	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
10	Baseline	4	1	1	1	1	1	0	0	0.0%	0.0%
65		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
78		4	0.9	0.8569	0.9431	0.8	1	0.05774	0.1155	12.83%	10.0%
105		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
135		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	20.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
10	Baseline	1	1	1	1
65		1	1	1	0.8
78		0.8	1	0.8	1
105		1	1	1	0.8
135		0.8	0.6	1	0.8

Analyst: AC QA: SD 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:56 (p 1 of 2)
Test Code: 1404-S119B | 03-6537-0924

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 05-1691-3163 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 May-14 8:55 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Sample Note: Nominal zinc 232; measured copper concentrations

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	105	135	119.1		18.1%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
10		65	0.6557	2.356	0.214	6	0.5348	CDF	Non-Significant Effect
10		78	1.311	2.356	0.214	6	0.2635	CDF	Non-Significant Effect
10		105	0.6557	2.356	0.214	6	0.5348	CDF	Non-Significant Effect
10		135*	2.576	2.356	0.214	6	0.0333	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1256106	0.03140264	4	1.905	0.1620	Non-Significant Effect
Error	0.2472775	0.01648517	15			
Total	0.3728881		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.037	4.893	0.4207	Equal Variances
Variances	Levene Equality of Variance	1.961	4.893	0.1526	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9253	0.866	0.1252	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
10	Baseline	4	1	1	1	1	1	1	0	0.0%	0.0%
65		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
78		4	0.9	0.7163	1	0.9	0.8	1	0.05774	12.83%	10.0%
105		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
135		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	20.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
10	Baseline	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
65		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
78		4	1.226	1.007	1.445	1.226	1.107	1.345	0.06874	11.21%	8.85%
105		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
135		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	17.38%

Analyst: AC QA: 5/2/14

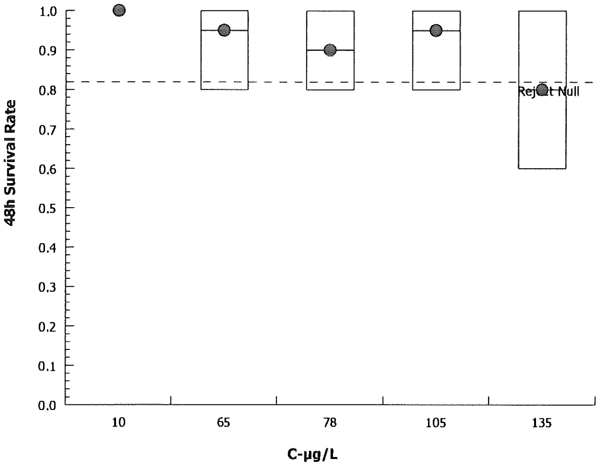
CETIS Analytical Report

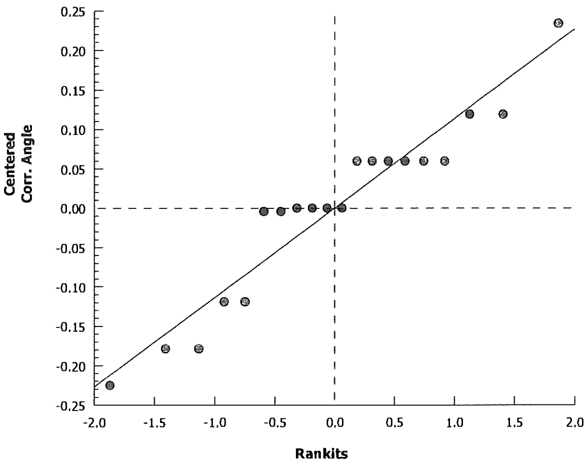
Report Date: 02 May-14 08:56 (p 2 of 2)
Test Code: 1404-S119B | 03-6537-0924

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	05-1691-3163	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 8:55	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: SP 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 08:56 (p 1 of 1)
Test Code: 1404-S119B | 03-6537-0924

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 02-1634-2412 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 May-14 8:55 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Sample Note: Nominal zinc 232; measured copper concentrations

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1031252	1000	Yes	Two-Point Interpolation

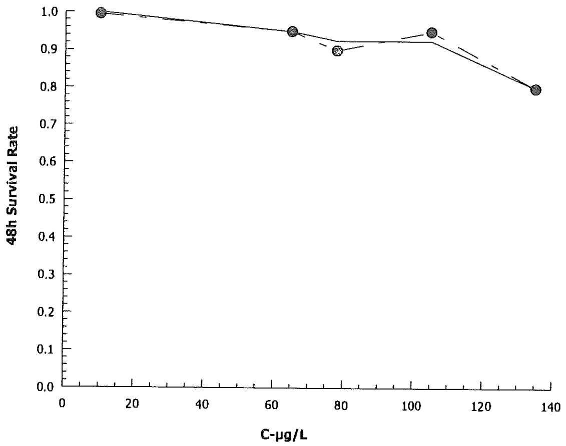
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	>135	N/A	N/A
EC50	>135	N/A	N/A

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
10	Baseline	4	1	1	1	0	0	0.0%	0.0%	20	20
65		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
78		4	0.9	0.8	1	0.05774	0.1155	12.83%	10.0%	18	20
105		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
135		4	0.8	0.6	1	0.08165	0.1633	20.41%	20.0%	16	20

Graphics



CETIS™ v1.8.4.23 Analyst: AC QA: SD 5/2/14

CETIS Summary Report

Report Date: 02 May-14 09:03 (p 1 of 1)
Test Code: 1404-S119C | 17-6348-2604

Ceriodaphnia 48-h Acute Survival Test | **Nautilus Environmental (CA)**

Batch ID:	11-1246-8799	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 18:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 16:45	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	47h	**Source:**	In-House Culture	**Age:**	<24 h

Sample ID:	18-7360-5078	**Code:**	DPR3 C 14-0309	**Client:**	AMEC
Sample Date:	03 Apr-14 06:31	**Material:**	Stormwater + Copper & Zinc ~~chloride~~ SD	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	35h (5 °C)	**Station:**	DPR3		

Sample Note: Nominal zinc 30[illegible]; measured copper concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-2080-7859	48h Survival Rate	140	>140	NA	14.5%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
20-0736-7287	48h Survival Rate	EC25	>140	N/A	N/A		Linear Interpolation (ICPIN)
		EC50	>140	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
14-2080-7859	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
20-0736-7287	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
10	Baseline	4	1	1	1	1	1	0	0	0.0%	0.0%
70		4	1	1	1	1	1	0	0	0.0%	0.0%
82		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
110		4	1	1	1	1	1	0	0	0.0%	0.0%
140		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	20.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
10	Baseline	1	1	1	1
70		1	1	1	1
82		0.8	1	1	1
110		1	1	1	1
140		0.6	0.8	1	0.8

Analyst: AC QA: SD 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 09:02 (p 1 of 2)
Test Code: 1404-S119C | 17-6348-2604

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	14-2080-7859	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 9:01	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Sample Note: Nominal zinc; measured copper concentrations

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	140	>140	NA		14.5%

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
10		70	18	10	1	6	0.8000	Asymp	Non-Significant Effect
10		82	16	10	1	6	0.5661	Asymp	Non-Significant Effect
10		110	18	10	1	6	0.8000	Asymp	Non-Significant Effect
10		140	12	10	1	6	0.1228	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1665074	0.04162685	4	4.209	0.0176	Significant Effect
Error	0.148337	0.009889135	15			
Total	0.3148444		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.617	4.893	0.2215	Equal Variances
Variances	Levene Equality of Variance	3.065	4.893	0.0496	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.7266	0.866	<0.0001	Non-normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
10	Baseline	4	1	1	1	1	1	1	0	0.0%	0.0%
70		4	1	1	1	1	1	1	0	0.0%	0.0%
82		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
110		4	1	1	1	1	1	1	0	0.0%	0.0%
140		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	20.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
10	Baseline	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
70		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
82		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
110		4	1.35	1.334	1.366	1.345	1.345	1.365	0.004985	0.74%	-0.37%
140		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	17.38%

Analyst: AC QA: 5/2/14

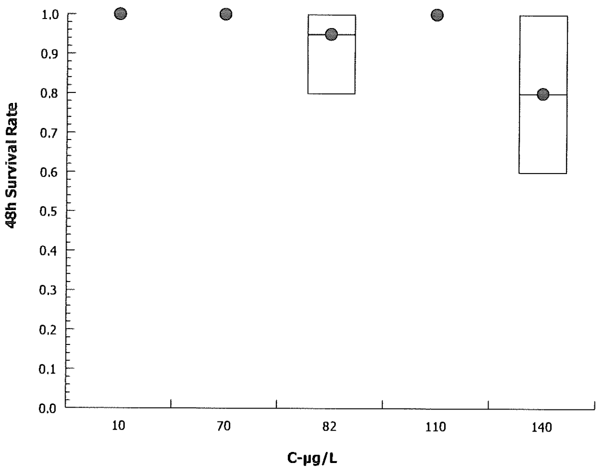
CETIS Analytical Report

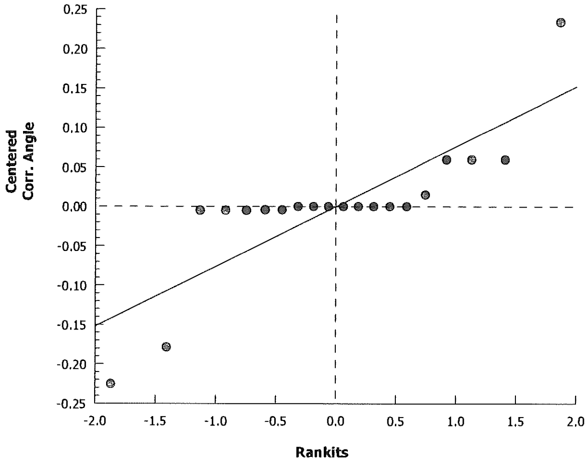
Report Date: 02 May-14 09:02 (p 2 of 2)
Test Code: 1404-S119C | 17-6348-2604

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	14-2080-7859	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	02 May-14 9:01	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AC QA: SO 5/2/14

CETIS Analytical Report

Report Date: 02 May-14 09:02 (p 1 of 1)
Test Code: 1404-S119C | 17-6348-2604

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 20-0736-7287 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 02 May-14 9:01 **Analysis:** Linear Interpolation (ICPIN) **Official Results:** Yes

Sample Note: Nominal zinc; measured copper concentrations

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1227103	1000	Yes	Two-Point Interpolation

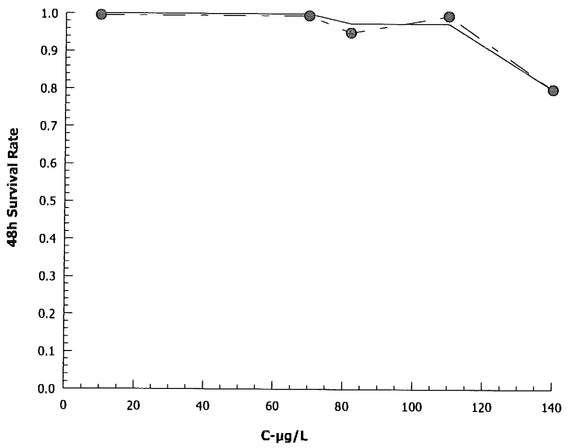
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	>140	N/A	N/A
EC50	>140	N/A	N/A

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
10	Baseline	4	1	1	1	0	0	0.0%	0.0%	20	20
70		4	1	1	1	0	0	0.0%	0.0%	20	20
82		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
110		4	1	1	1	0	0	0.0%	0.0%	21	21
140		4	0.8	0.6	1	0.08165	0.1633	20.41%	20.0%	16	20

Graphics



Analyst: AC QA: SP 5/2/14

CETIS Summary Report

Report Date: 01 May-14 14:38 (p 1 of 1)
Test Code: 1404-S119 | 11-0155-1664

Ceriodaphnia 48-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID:	13-9161-5569	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	04 Apr-14 18:00	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Not Applicable
Ending Date:	06 Apr-14 16:45	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	47h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	00-3819-1119	**Code:**	14-0309	**Client:**	AMEC
Sample Date:	03 Apr-14 06:31	**Material:**	Stormwater + Copper & Zinc ~~chloride~~ AC	**Project:**	City of SD Chollas Creek WER
Receive Date:	03 Apr-14 13:00	**Source:**	City of San Diego		
Sample Age:	35h (5 °C)	**Station:**	DPR3		

Batch Note: Concentrations listed are dissolved copper

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
11-8263-0966	48h Survival Rate	110	130	119.6	18.3%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
19-9013-0658	48h Survival Rate	EC25	>140	N/A	N/A		Linear Interpolation (ICPIN)
		EC50	>140	N/A	N/A		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
11-8263-0966	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
19-9013-0658	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
10	Baseline	4	1	1	1	1	1	0	0	0.0%	0.0%
63		4	1	1	1	1	1	0	0	0.0%	0.0%
65		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
70		4	1	1	1	1	1	0	0	0.0%	0.0%
78		4	0.9	0.8569	0.9431	0.8	1	0.05774	0.1155	12.83%	10.0%
80		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
82		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
105		4	1	1	1	1	1	0	0	0.0%	0.0%
105.01		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
110		4	1	1	1	1	1	0	0	0.0%	0.0%
130		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	20.0%
135		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	20.0%
140		4	0.8	0.739	0.861	0.6	1	0.08165	0.1633	20.41%	20.0%

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
10	Baseline	1	1	1	1
63		1	1	1	1
65		1	1	1	0.8
70		1	1	1	1
78		0.8	1	0.8	1
80		1	0.8	1	1
82		0.8	1	1	1
105		1	1	1	1
105.01		1	1	1	0.8
110		1	1	1	1
130		0.8	0.6	0.8	1
135		0.8	0.6	1	0.8
140		0.6	0.8	1	0.8

Analyst: SJ|AC QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 14:37 (p 1 of 2)
Test Code: 1404-S119 | 11-0155-1664

Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	11-8263-0966	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 14:36	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch Note: Concentrations listed are dissolved copper

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	110	130	119.6		18.3%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
10		63	0	2.6	0.217	6	0.9231	CDF	Non-Significant Effect
10		65	0.7131	2.6	0.217	6	0.7046	CDF	Non-Significant Effect
10		70	0	2.6	0.217	6	0.9231	CDF	Non-Significant Effect
10		78	1.426	2.6	0.217	6	0.3717	CDF	Non-Significant Effect
10		80	0.7131	2.6	0.217	6	0.7046	CDF	Non-Significant Effect
10		82	0.7131	2.6	0.217	6	0.7046	CDF	Non-Significant Effect
10		105	0	2.6	0.217	6	0.9231	CDF	Non-Significant Effect
10		105.01	0.7131	2.6	0.217	6	0.7046	CDF	Non-Significant Effect
10		110	-0.05972	2.6	0.217	6	0.9333	CDF	Non-Significant Effect
10		130*	2.801	2.6	0.217	6	0.0319	CDF	Significant Effect
10		135*	2.801	2.6	0.217	6	0.0319	CDF	Significant Effect
10		140*	2.801	2.6	0.217	6	0.0319	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4281451	0.03567876	12	2.559	0.0133	Significant Effect
Error	0.5436532	0.01393983	39			
Total	0.9717984		51			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.166	2.678	0.3399	Equal Variances
Variances	Levene Equality of Variance	2.238	2.678	0.0289	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8539	0.9388	<0.0001	Non-normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
10	Baseline	4	1	1	1	1	1	1	0	0.0%	0.0%
63		4	1	1	1	1	1	1	0	0.0%	0.0%
65		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
70		4	1	1	1	1	1	1	0	0.0%	0.0%
78		4	0.9	0.7163	1	0.9	0.8	1	0.05774	12.83%	10.0%
80		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
82		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
105		4	1	1	1	1	1	1	0	0.0%	0.0%
105.01		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
110		4	1	1	1	1	1	1	0	0.0%	0.0%
130		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	20.0%
135		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	20.0%
140		4	0.8	0.5402	1	0.8	0.6	1	0.08165	20.41%	20.0%

Analyst: SD|AC QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 14:37 (p 2 of 2)
Test Code: 1404-S119 | 11-0155-1664

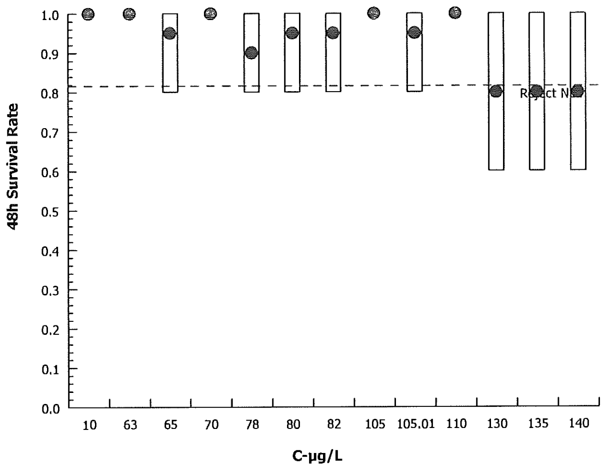
Ceriodaphnia 48-h Acute Survival Test **Nautilus Environmental (CA)**

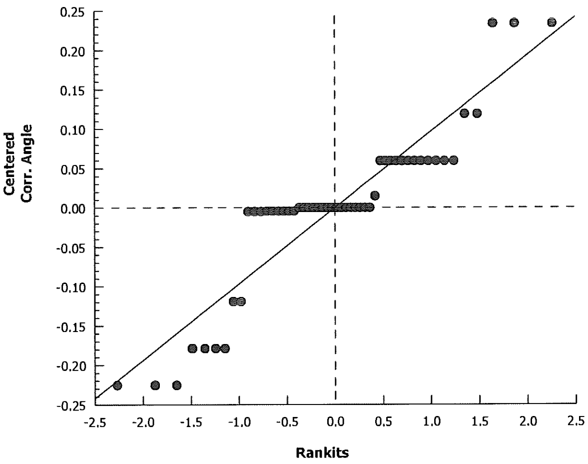
Analysis ID:	11-8263-0966	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 14:36	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
10	Baseline	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
63		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
65		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
70		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
78		4	1.226	1.007	1.445	1.226	1.107	1.345	0.06874	11.21%	8.85%
80		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
82		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
105		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
105.01		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
110		4	1.35	1.334	1.366	1.345	1.345	1.365	0.004985	0.74%	-0.37%
130		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	17.38%
135		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	17.38%
140		4	1.111	0.813	1.41	1.107	0.8861	1.345	0.09377	16.87%	17.38%

Graphics





Analyst: SD|AC QA: AC 5/1/14

CETIS Analytical Report

Report Date: 01 May-14 14:38 (p 1 of 1)
Test Code: 1404-S119 | 11-0155-1664

Ceriodaphnia 48-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	19-9013-0658	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	01 May-14 14:36	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch Note: Concentrations listed are dissolved copper

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	553260	1000	Yes	Two-Point Interpolation

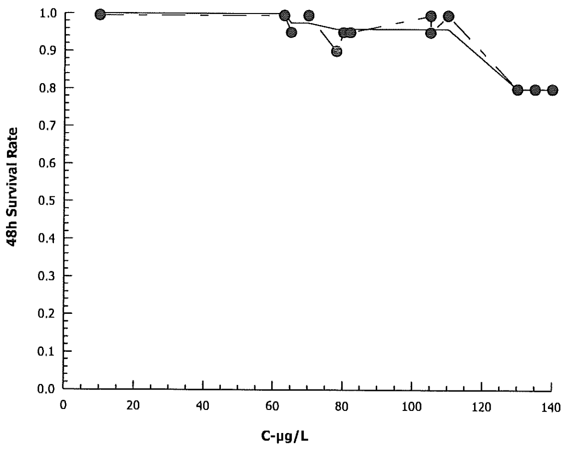
Point Estimates

Level	µg/L	95% LCL	95% UCL
EC25	>140	N/A	N/A
EC50	>140	N/A	N/A

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
10	Baseline	4	1	1	1	0	0	0.0%	0.0%	20	20
63		4	1	1	1	0	0	0.0%	0.0%	20	20
65		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
70		4	1	1	1	0	0	0.0%	0.0%	20	20
78		4	0.9	0.8	1	0.05774	0.1155	12.83%	10.0%	18	20
80		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
82		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
105		4	1	1	1	0	0	0.0%	0.0%	20	20
105.01		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
110		4	1	1	1	0	0	0.0%	0.0%	21	21
130		4	0.8	0.6	1	0.08165	0.1633	20.41%	20.0%	16	20
135		4	0.8	0.6	1	0.08165	0.1633	20.41%	20.0%	16	20
140		4	0.8	0.6	1	0.08165	0.1633	20.41%	20.0%	16	20

Graphics



Analyst: SD|AC QA: AC 5/1/14

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements & Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: DPR3 - Copper and Zinc Spikes
Test No.: ~~1404~~ 1404-SM9

Test Species: *C. dubia*
Start Date/Time: 4/4/2014 1800
End Date/Time: 4/6/2014 1645

	Tech Initials		
	0	24	48
Counts:	AO	KFP	AC
Readings:	SD/PGS	KFP	AC
Dilutions made by:	RA/KPF	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
DPR-Cd	A	5	5	5	485	–	488	20.6	19.5	20.4	9.1	–	7.4	7.40	–	7.39
CuZn-0	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-Cd	A	5	5	5	484	–	497	20.6	19.5	19.6	7.9	–	8.1	7.51	–	7.63
CuZn-1	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-Cd	A	5	5	5	489	–	498	20.6	19.5	19.6	7.8	–	8.1	7.51	–	7.65
CuZn-2	B	5	4	4												
	C	5	5	5												
	D	5	5	5												
DPR-Cd	A	5	5	5	491	–	495	20.6	19.5	19.6	75	–	8.3	7.49	–	7.66
CuZn-3	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-Cd	A	5	4	4	488	–	499	20.6	19.5	19.6	7.6	–	8.2	7.51	–	7.68
CuZn-4	B	5	3	3												
	C	5	KFP ~~4~~ 5	4												
	D	5	5	5												
DPR-Cd	A	5	5	5	493	–	496	20.6	19.5	19.6	8.0	–	8.2	7.51	–	7.73
CuZn-5	B	5	5	5												
	C	5	5	5												
	D	5	5	4												

Initial Counts QC'd by: CL

Animal Source/Date Received: Internal/NA

Age at Initiation: <24h

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)
Only temp recorded at 24 hrs.

QC Check: AC 5/1/14

Final Review: 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

48-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: AMEC/City of San Diego Chollas WER
Sample ID: DPR3 - Copper and Zinc Spikes
Test No.: 1404-S119

Test Species: *C. dubia*
Start Date/Time: 4/4/2014 1800
End Date/Time: 4/6/2014 ~~1700~~ 1645

	Tech Initials		
	0	24	48
Counts:	AO	KFP	BK
Readings:	SOl	KFP	AC
Dilutions made by:	PA/KFP	--	--

Concentration µg/L	Rep	Number of Live Organisms			Conductivity (µmhos/cm)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (units)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
DPR-Cd	A	5	4	4	485	–	490	20.6	19.5	19.6	7.7	–	8.1	7.52	–	7.72
CuZn-6	B	5	5	5												
	C	5	4	4												
	D	5	5	5												
DPR-Cd	A	5	5	5	487	–	491	20.6	19.5	19.6	7.7	–	8.2	7.50	–	7.71
CuZn-7	B	5	5	5												
	C	5	5	5												
	D	5	5	4												
DPR-Cd	A	5	5	4	490	–	493	20.6	19.5	19.6	7.6	–	8.2	7.50	–	7.69
CuZn-8	B	5	5	3												
	C	5	5	5												
	D	5	5	4												
DPR-Cd	A	5	5	5	484	–	497	20.6	19.5	19.6	7.3	–	8.2	7.50	–	7.71
CuZn-9	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-Cd	A	5	4	4	482	–	488	20.6	19.5	19.6	7.5	–	8.1	7.44	–	7.72
CuZn-10	B	5	5	5												
	C	5	5	5												
	D	5	5	5												
DPR-Cd	A	5	5	5	485	–	497	20.6	19.5	19.6	7.6	–	8.1	7.50	–	7.72
CuZn-11	B	6 ~~5~~ KFP	6	6												
	C	5	5	5												
	D	5	5	5												
DPR-Cd	A	5	4	3	488	–	497	20.6	19.5	19.6	7.7	–	7.9	7.53	–	7.72
CuZn-12	B	5	5	4												
	C	5	5	5												
	D	5	5	4												

Initial Counts QC'd by: cl

Animal Source/Date Received: Internal / NA

Age at Initiation: <24h

Comments: Organisms fed prior to initiation, circle one ([✓ y] / n)
only temp recorded at 24 hrs

QC Check: AC 5/1/14

Final Review: 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

APPENDIX C

Sample Receipt Information

Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Sample Check-In Information

Client: AMEC/City of San Diego **Tests Performed:** P. promelas and C. dubia 48-hr Acute

Project: Chollas Creek WER **Test ID No.(s) :** 1404-S113 to S128

Sample ID:	1) SD8(D) Comp	2) DPR(3) Comp	3 SD8(D) ~~Comp~~ Grab ⓐ NH	4)
Log-in No. (14-xxxx):	0308	0309	0310	
Sample Collection Date & Time:	4/2/14 1925	4/3/14 0631	4/2/14 1320	
Sample Receipt Date & Time:	4/3/14 1300	4/3/14 1300	4/3/14 1300	
Number of Containers & Container Type:	~~2~~ 3 NH 19L	~~2~~ 3 19L	2, 19L	
Approx. Total Volume Received (L):	NH ~~38L~~ 38L or ~~57L~~	~~~36L~~ 57L	~38L	
Check-in Temp (°C)	4.4	3.0	3.5	
Temperature OK? [1]	[✓ Y] N	[✓ Y] N	[✓ Y] N	Y N
DO (mg/L)	10.1	9.9	9.4	
pH (units)	7.64	7.56	7.44	
Conductivity (µS/cm)	546	461	252	
Salinity (ppt)	0.2	0.2	0.1	
Alkalinity (mg/L) [2]	65	59	29	
Hardness (mg/L) [2, 3]	173	121	91	
Total Chlorine (mg/L)	NH ~~1.3~~ 0.13	0.02	0.02	
Technician Initials	NH	NH	NH	

Sample Descriptions:

1) SD8(D) COMP: Yellow, slight opaque, No odr, no debris
2) DPR3 Comp: " " " "
3) SD8(D) Grab " " " "
4)

COC Complete? [✓ Y] N

Filtration? Y [✓ N]

Pore Size:

Organisms or **Debris**

pH Adjustment? Y [✓ N]

	1	2	3	4	5	6
Initial pH:						
Amount of HCl added:						
Final pH:						

Freshwater Tests:

Control/Dilution Water Source: [✓ 8:2] pH 8.09 Culligan Other: ______ Alkalinity: ~~85~~ 87 Hardness: AC ~~87~~ 90

Additional Control? Y [✓ N] = ______ Alkalinity: ______ Hardness: ______

Marine Tests:

Control/Dilution Water Source: LAB SW ART SW Other: ______ Alkalinity: ______ Salinity: ______

Additional Control? Y N = ______ Alkalinity: ______ Salinity: ______

Sample Salted w/ artificial salt? Y N If yes, target ppt? ______

Sample salted w/brine? Y N If yes, target ppt? ______

Cl_2 Adjustment? Y [✓ N]

	1	2	3	4	5	6
Initial Free Cl_2:	0.09					
STS added:	No					
Final Free Cl_2:						

Sample Aeration? Y [✓ N]

	1	2	3	4	5	6
Initial D.O.						
Duration & Rate						
Final D.O.						

Notes [1] Temperature for sample must be 0-6°C if received >24 hours past collection time.

[2] mg/L as CaCO3, [3] Measured for freshwater samples only, NA = Not Applicable

Additional Comments ⓐ Grab sample only used for testing; chlorine was detected in the composite sample and it was not used for testing. Water main break suspected.

QC Check: AC 4/30/14

Subsamples For Additional Chemistry Required? Y

NH3 **Other** metals

Tech Initials AC/KFP

Final Review: eg 6/1/14

APPENDIX D

Chain-of-Custody Form

Nautilus Environmental

4340 Vandever Ave.
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

Date 4/3/14 Page 1 of 1

Sample Collection By:

Report to:		**Invoice To:**	
Company	AMEC	**Company**	Same
Address	9210 Sky Park Court, Suite 200	**Address**	
City/State/Zip	San Diego, CA 92123	**City/State/Zip**	
Contact	Chris Stransky	**Contact**	
Phone	858-300-4350	**Phone**	
Email	chris.stransky@amec.com	**Email**	

ANALYSES REQUIRED

	SAMPLE ID	**DATE**	**TIME**	**MATRIX**	**CONTAINER TYPE**	**NO. OF CONTAINERS**	**COMMENTS**	C. dubia 48-hr acute pre-WER screen	C. dubia 48-hr WER Confirmation Tests (See SOW)	P. promelas 48-hr WER Confirmation Tests (See SOW)								**Receipt Temperature (°C)**
1	**SD8(1) Comp**	4/2/14	1925	AQ	20-L Glass	2	Not used due to elevated chlorine level	X	X	X								4.4
2	**DPR(3) Comp**	4/3/14	0631	AQ	20-L Glass	3		X	X	X								5.0
3	**SD8(1) Grab**	4/2/14	1320	AQ	20-L Glass	2	Hold for testing if needed - WER	X										5.5
4																		
5																		
6																		
7																		
8																		
9																		
10																		

PROJECT INFORMATION		**SAMPLE RECEIPT**	
Client:	**AMEC**	**Total No. of Containers**	7
PO No.:	**To forward via email**	**Received Good Condition?**	Y
Shipped Via:	**AMEC _Tommy Wells**	**Matches Test Schedule?**	Y

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)

(Signature) (Time) 1300
(Printed Name) Tommy Wells (Date) 4-3-14
(Company) AMEC

RELINQUISHED BY (COURIER)

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (COURIER)

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time) 1300
(Printed Name) Nick Henricks (Date) 4/3/14
(Company) Nautilus Environmental 14-0308 to 0310

Additional costs may be required for sample disposal or storage. Payment net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

APPENDIX E

Weck Laboratories
Analytical Chemistry Report

CERTIFICATE OF ANALYSIS

Client: AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Report Date: 04/15/14 14:15

Received Date: 04/07/14 18:10

Turn Around: 4 workdays

Attention: Chris Stransky

Phone: (858) 300-4350

Fax: (858) 300-4301

Work Order(s): 4D08038

NELAP #04229CA ELAP#1132 NEVADA #CA211 HAWAII LACSD #10143

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. Weck Laboratories, Inc. certifies that the test results meet all NELAC requirements unless noted in the case narrative. This analytical report is confidential and is only intended for the use of Weck Laboratories, Inc. and its client. This report contains the Chain of Custody document, which is an integral part of it, and can only be reproduced in full with the authorization of Weck Laboratories, Inc.

Dear Chris Stransky :

Enclosed are the results of analyses for samples received 04/07/14 18:10 with the Chain of Custody document. The samples were received in good condition, at 2.1 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Case Narrative:

Reviewed by:

hainguyen

Hai Van Nguyen
Project Manager

AMEC Environment & Infrastructure - San Diego
9210 Sky Park Court, Suite 200
San Diego CA, 92123

Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
LW-TOCu-0	Client		4D08038-01	Water	04/04/14 14:49
LW-TOCu-1	Client		4D08038-02	Water	04/04/14 14:51
LW-TOCu-2	Client		4D08038-03	Water	04/04/14 14:52
LW-TOCu-3	Client		4D08038-04	Water	04/04/14 14:53
LW-TOCu-4	Client		4D08038-05	Water	04/04/14 14:55
LW-TOCu-5	Client		4D08038-06	Water	04/04/14 14:56
LW-TOCu-6	Client		4D08038-07	Water	04/04/14 14:59
LW-TOCu-7	Client		4D08038-08	Water	04/04/14 15:00
LW-TOCu-8pp	Client		4D08038-09	Water	04/04/14 15:05
LW-TOCu-9pp	Client		4D08038-10	Water	04/04/14 15:06
DPR-TOCu-0	Client		4D08038-11	Water	04/04/14 15:10
DPR-TOCu-1	Client		4D08038-12	Water	04/04/14 15:15
DPR-TOCu-2	Client		4D08038-13	Water	04/04/14 15:18
DPR-TOCu-3	Client		4D08038-14	Water	04/04/14 15:23
DPR-TOCu-4	Client		4D08038-15	Water	04/04/14 15:25
DPR-TOCu-5	Client		4D08038-16	Water	04/04/14 15:29
DPR-TOCu-6	Client		4D08038-17	Water	04/04/14 15:31
DPR-TOCu-7	Client		4D08038-18	Water	04/04/14 15:35
DPR-TOCu-8pp	Client		4D08038-19	Water	04/04/14 15:37
DPR-TOCu-9pp	Client		4D08038-20	Water	04/04/14 15:40
SD8(1)-TOCu-0	Client		4D08038-21	Water	04/04/14 18:03
SD8(1)-TOCu-1	Client		4D08038-22	Water	04/04/14 18:06
SD8(1)-TOCu-2	Client		4D08038-23	Water	04/04/14 18:12
SD8(1)-TOCu-3	Client		4D08038-24	Water	04/04/14 18:14
SD8(1)-TOCu-4	Client		4D08038-25	Water	04/04/14 18:16
SD8(1)-TOCu-5	Client		4D08038-26	Water	04/04/14 18:20
SD8(1)-TOCu-6	Client		4D08038-27	Water	04/04/14 18:22
SD8(1)-TOCu-7	Client		4D08038-28	Water	04/04/14 18:25
SD8(1)-TOCu-8pp	Client		4D08038-29	Water	04/04/14 18:29
SD8(1)-TOCu-9pp	Client		4D08038-30	Water	04/04/14 18:31
LW-TOZn-0	Client		4D08038-31	Water	04/04/14 14:10
LW-TOZn-1	Client		4D08038-32	Water	04/04/14 14:13

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
LW-TOZn-2	Client		4D08038-33	Water	04/04/14 14:23
LW-TOZn-3	Client		4D08038-34	Water	04/04/14 14:25
LW-TOZn-4	Client		4D08038-35	Water	04/04/14 14:28
LW-TOZn-5	Client		4D08038-36	Water	04/04/14 14:30
LW-TOZn-6	Client		4D08038-37	Water	04/04/14 14:33
LW-TOZn-7	Client		4D08038-38	Water	04/04/14 14:35
LW-TOZn-8pp	Client		4D08038-39	Water	04/04/14 14:42
LW-TOZn-9pp	Client		4D08038-40	Water	04/04/14 14:45
SD8(1)-TOZn-0	Client		4D08038-41	Water	04/04/14 15:45
SD8(1)-TOZn-1	Client		4D08038-42	Water	04/04/14 15:50
SD8(1)-TOZn-2	Client		4D08038-43	Water	04/04/14 15:54
SD8(1)-TOZn-3	Client		4D08038-44	Water	04/04/14 15:52
SD8(1)-TOZn-4	Client		4D08038-45	Water	04/04/14 15:58
SD8(1)-TOZn-5	Client		4D08038-46	Water	04/04/14 16:00
SD8(1)-TOZn-6	Client		4D08038-47	Water	04/04/14 16:04
SD8(1)-TOZn-7	Client		4D08038-48	Water	04/04/14 16:06
SD8(1)-TOZn-8pp	Client		4D08038-49	Water	04/04/14 16:11
SD8(1)-TOZn-9pp	Client		4D08038-50	Water	04/04/14 16:14
DPR-TOZn-0	Client		4D08038-51	Water	04/04/14 16:25
DPR-TOZn-1	Client		4D08038-52	Water	04/04/14 16:27
DPR-TOZn-2	Client		4D08038-53	Water	04/04/14 16:32
DPR-TOZn-3	Client		4D08038-54	Water	04/04/14 16:35
DPR-TOZn-4	Client		4D08038-55	Water	04/04/14 16:37
DPR-TOZn-5	Client		4D08038-56	Water	04/04/14 16:40
DPR-TOZn-6	Client		4D08038-57	Water	04/04/14 16:45
DPR-TOZn-7	Client		4D08038-58	Water	04/04/14 16:49
DPR-TOZn-8pp	Client		4D08038-59	Water	04/04/14 16:50
DPR-TOZn-9pp	Client		4D08038-60	Water	04/04/14 16:52
SD8(1)-TOCuZn-0	Client		4D08038-61	Water	04/04/14 15:45
SD8(1)-TOCuZn-1	Client		4D08038-62	Water	04/04/14 15:52
SD8(1)-TOCuZn-2	Client		4D08038-63	Water	04/04/14 15:56
SD8(1)-TOCuZn-3	Client		4D08038-64	Water	04/04/14 16:00

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
SD8(1)-TOCuZn-4	Client		4D08038-65	Water	04/04/14 16:05
SD8(1)-TOCuZn-5	Client		4D08038-66	Water	04/04/14 16:10
SD8(1)-TOCuZn-6	Client		4D08038-67	Water	04/04/14 16:15
SD8(1)-TOCuZn-7	Client		4D08038-68	Water	04/04/14 16:22
SD8(1)-TOCuZn-8	Client		4D08038-69	Water	04/04/14 16:26
SD8(1)-TOCuZn-9	Client		4D08038-70	Water	04/04/14 16:30
SD8(1)-TOCuZn-10	Client		4D08038-71	Water	04/04/14 16:35
SD8(1)-TOCuZn-11	Client		4D08038-72	Water	04/04/14 16:42
SD8(1)-TOCuZn-12	Client		4D08038-73	Water	04/04/14 16:45
DPR-TOCuZn-0	Client		4D08038-74	Water	04/04/14 17:10
DPR-TOCuZn-1	Client		4D08038-75	Water	04/04/14 17:20
DPR-TOCuZn-2	Client		4D08038-76	Water	04/04/14 17:29
DPR-TOCuZn-3	Client		4D08038-77	Water	04/04/14 17:30
DPR-TOCuZn-4	Client		4D08038-78	Water	04/04/14 17:35
DPR-TOCuZn-5	Client		4D08038-79	Water	04/04/14 17:38
DPR-TOCuZn-6	Client		4D08038-80	Water	04/04/14 17:40
DPR-TOCuZn-7	Client		4D08038-81	Water	04/04/14 17:44
DPR-TOCuZn-8	Client		4D08038-82	Water	04/04/14 17:46
DPR-TOCuZn-9	Client		4D08038-83	Water	04/04/14 17:50
DPR-TOCuZn-10	Client		4D08038-84	Water	04/04/14 17:51
DPR-TOCuZn-11	Client		4D08038-85	Water	04/04/14 17:55
DPR-TOCuZn-12	Client		4D08038-86	Water	04/04/14 17:58
LW-Cd48Cu-3	Client		4D08038-87	Water	04/05/14 15:40
LW-Cd48Cu-4	Client		4D08038-88	Water	04/05/14 15:41
LW-Cd48Cu-5	Client		4D08038-89	Water	04/05/14 15:42
LW-Cd48Cu-6	Client		4D08038-90	Water	04/05/14 15:43
LW-Cd48Cu-7	Client		4D08038-91	Water	04/05/14 15:44
SD8(1)-Cd48Cu-5	Client		4D08038-92	Water	04/05/14 15:46
SD8(1)-Cd48Cu-6	Client		4D08038-93	Water	04/05/14 15:47
SD8(1)-Cd48Cu-7	Client		4D08038-94	Water	04/05/14 15:48
SD8(1)-Cd48Cu-0	Client		4D08038-95	Water	04/06/14 15:18
SD8(1)-Cd48Cu-1	Client		4D08038-96	Water	04/06/14 15:20

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
SD8(1)-Cd48Cu-2	Client		4D08038-97	Water	04/06/14 15:22
SD8(1)-Cd48Cu-3	Client		4D08038-98	Water	04/06/14 15:24
SD8(1)-Cd48Cu-4	Client		4D08038-99	Water	04/06/14 15:26
LW-Cd48Cu-0	Client		4D08038-AA	Water	04/06/14 15:33
LW-Cd48Cu-1	Client		4D08038-AB	Water	04/06/14 15:35
LW-Cd48Cu-2	Client		4D08038-AC	Water	04/06/14 15:37
DPR-Cd48Cu-0	Client		4D08038-AD	Water	04/06/14 17:30
DPR-Cd48Cu-1	Client		4D08038-AE	Water	04/06/14 17:31
DPR-Cd48Cu-2	Client		4D08038-AF	Water	04/06/14 17:32
DPR-Cd48Cu-3	Client		4D08038-AG	Water	04/06/14 17:34
DPR-Cd48Cu-4	Client		4D08038-AH	Water	04/06/14 17:35
DPR-Cd48Cu-5	Client		4D08038-AI	Water	04/06/14 17:36
DPR-Cd48Cu-6	Client		4D08038-AJ	Water	04/06/14 17:37
DPR-Cd48Cu-7	Client		4D08038-AK	Water	04/05/14 15:45
LW-Pp48Zn-1	Client		4D08038-AL	Water	04/06/14 14:53
LW-Pp48Zn-2	Client		4D08038-AM	Water	04/06/14 14:55
LW-Pp48Zn-3	Client		4D08038-AN	Water	04/06/14 14:57
LW-Pp48Zn-4	Client		4D08038-AO	Water	04/06/14 14:59
LW-Pp48Zn-5	Client		4D08038-AP	Water	04/06/14 15:01
LW-Pp48Zn-6	Client		4D08038-AQ	Water	04/06/14 15:03
LW-Pp48Zn-7	Client		4D08038-AR	Water	04/06/14 15:05
LW-Cd48Zn-0	Client		4D08038-AS	Water	04/06/14 14:30
LW-Cd48Zn-1	Client		4D08038-AT	Water	04/06/14 14:31
LW-Cd48Zn-2	Client		4D08038-AU	Water	04/06/14 14:32
LW-Cd48Zn-3	Client		4D08038-AV	Water	04/06/14 14:34
LW-Cd48Zn-4	Client		4D08038-AW	Water	04/06/14 14:35
LW-Cd48Zn-5	Client		4D08038-AX	Water	04/06/14 14:36
LW-Cd48Zn-6	Client		4D08038-AY	Water	04/06/14 14:37
LW-Cd48Zn-7	Client		4D08038-AZ	Water	04/06/14 14:39
DPR-Cd48Zn-0	Client		4D08038-BA	Water	04/06/14 15:20
DPR-Cd48Zn-1	Client		4D08038-BB	Water	04/06/14 15:22
DPR-Cd48Zn-2	Client		4D08038-BC	Water	04/06/14 15:23

AMEC Environment & Infrastructure - San Diego
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San Diego CA, 92123

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
DPR-Cd48Zn-3	Client		4D08038-BD	Water	04/06/14 15:26
DPR-Cd48Zn-4	Client		4D08038-BE	Water	04/06/14 15:27
DPR-Cd48Zn-5	Client		4D08038-BF	Water	04/06/14 15:29
DPR-Cd48Zn-6	Client		4D08038-BG	Water	04/06/14 15:30
DPR-Cd48Zn-7	Client		4D08038-BH	Water	04/06/14 15:31
DPR-Pp48Zn-1	Client		4D08038-BI	Water	04/06/14 15:50
DPR-Pp48Zn-2	Client		4D08038-BJ	Water	04/06/14 15:52
DPR-Pp48Zn-3	Client		4D08038-BK	Water	04/06/14 15:56
DPR-Pp48Zn-4	Client		4D08038-BL	Water	04/06/14 16:00
DPR-Pp48Zn-5	Client		4D08038-BM	Water	04/06/14 16:02
DPR-Pp48Zn-6	Client		4D08038-BN	Water	04/06/14 16:26
DPR-Pp48Zn-7	Client		4D08038-BO	Water	04/06/14 16:36
SD8(1)Cd48Zn-0	Client		4D08038-BP	Water	04/06/14 17:36
SD8(1)Cd48Zn-1	Client		4D08038-BQ	Water	04/06/14 17:38
SD8(1)Cd48Zn-2	Client		4D08038-BR	Water	04/06/14 17:39
SD8(1)Cd48Zn-3	Client		4D08038-BS	Water	04/06/14 17:40
SD8(1)Cd48Zn-4	Client		4D08038-BT	Water	04/06/14 17:41
SD8(1)Cd48Zn-5	Client		4D08038-BU	Water	04/06/14 17:42
SD8(1)Cd48Zn-6	Client		4D08038-BV	Water	04/06/14 17:43
SD8(1)Cd48Zn-7	Client		4D08038-BW	Water	04/06/14 17:44
SD8(1)Pp48Zn-1	Client		4D08038-BX	Water	04/06/14 16:17
SD8(1)Pp48Zn-2	Client		4D08038-BY	Water	04/06/14 16:23
SD8(1)Pp48Zn-3	Client		4D08038-BZ	Water	04/06/14 16:26
SD8(1)Pp48Zn-4	Client		4D08038-CA	Water	04/06/14 16:28
SD8(1)Pp48Zn-5	Client		4D08038-CB	Water	04/06/14 16:36
SD8(1)Pp48Zn-6	Client		4D08038-CC	Water	04/06/14 16:40
SD8(1)Pp48Zn-7	Client		4D08038-CD	Water	04/06/14 16:43
SD8(1)Pp48Cu-0	Client		4D08038-CE	Water	04/06/14 16:43
SD8(1)Pp48Cu-1	Client		4D08038-CF	Water	04/06/14 15:55
SD8(1)Pp48Cu-2	Client		4D08038-CG	Water	04/06/14 15:59
SD8(1)Pp48Cu-3	Client		4D08038-CH	Water	04/06/14 16:02
SD8(1)Pp48Cu-4	Client		4D08038-CI	Water	04/06/14 16:05

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
SD8(1)Pp48Cu-5	Client		4D08038-CJ	Water	04/06/14 16:09
SD8(1)Pp48Cu-6	Client		4D08038-CK	Water	04/06/14 16:15
SD8(1)Pp48Cu-7	Client		4D08038-CL	Water	04/06/14 16:17
LWPp48Cu-0	Client		4D08038-CM	Water	04/06/14 14:26
LWPp48Cu-1	Client		4D08038-CN	Water	04/06/14 14:28
LWPp48Cu-2	Client		4D08038-CO	Water	04/06/14 14:30
LWPp48Cu-3	Client		4D08038-CP	Water	04/06/14 14:32
LWPp48Cu-4	Client		4D08038-CQ	Water	04/06/14 14:34
LWPp48Cu-5	Client		4D08038-CR	Water	04/06/14 14:36
LWPp48Cu-6	Client		4D08038-CS	Water	04/06/14 14:38
LWPp48Cu-7	Client		4D08038-CT	Water	04/06/14 14:40
DPRPp48Cu-0	Client		4D08038-CU	Water	04/06/14 14:52
DPRPp48Cu-1	Client		4D08038-CV	Water	04/06/14 14:55
DPRPp48Cu-2	Client		4D08038-CW	Water	04/06/14 15:00
DPRPp48Cu-3	Client		4D08038-CX	Water	04/06/14 15:04
DPRPp48Cu-4	Client		4D08038-CY	Water	04/06/14 15:06
DPRPp48Cu-5	Client		4D08038-CZ	Water	04/06/14 15:09
DPRPp48Cu-6	Client		4D08038-DA	Water	04/06/14 15:15
DPRPp48Cu-7	Client		4D08038-DB	Water	04/06/14 15:17
SD(1)-48CuZn-1	Client		4D08038-DC	Water	04/06/14 16:45
SD(1)-48CuZn-2	Client		4D08038-DD	Water	04/06/14 16:50
SD(1)-48CuZn-3	Client		4D08038-DE	Water	04/06/14 16:51
SD(1)-48CuZn-4	Client		4D08038-DF	Water	04/06/14 16:55
SD(1)-48CuZn-5	Client		4D08038-DG	Water	04/06/14 16:57
SD(1)-48CuZn-6	Client		4D08038-DH	Water	04/06/14 17:00
SD(1)-48CuZn-7	Client		4D08038-DI	Water	04/06/14 17:02
SD(1)-48CuZn-8	Client		4D08038-DJ	Water	04/06/14 17:05
SD(1)-48CuZn-9	Client		4D08038-DK	Water	04/06/14 17:06
SD(1)-48CuZn-10	Client		4D08038-DL	Water	04/06/14 17:08
SD(1)-48CuZn-11	Client		4D08038-DM	Water	04/06/14 17:10
SD(1)-48CuZn-12	Client		4D08038-DN	Water	04/06/14 17:12
DPR-48CuZn-1	Client		4D08038-DO	Water	04/06/14 17:00

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Sampled by:	Sample Comments	Lab ID	Matrix	Date Sampled
DPR-48CuZn-2	Client		4D08038-DP	Water	04/06/14 17:03
DPR-48CuZn-3	Client		4D08038-DQ	Water	04/06/14 17:05
DPR-48CuZn-4	Client		4D08038-DR	Water	04/06/14 17:07
DPR-48CuZn-5	Client		4D08038-DS	Water	04/06/14 17:09
DPR-48CuZn-6	Client		4D08038-DT	Water	04/06/14 17:15
DPR-48CuZn-7	Client		4D08038-DU	Water	04/06/14 17:17
DPR-48CuZn-8	Client		4D08038-DV	Water	04/06/14 17:19
DPR-48CuZn-9	Client		4D08038-DW	Water	04/06/14 17:21
DPR-48CuZn-10	Client		4D08038-DX	Water	04/06/14 17:24
DPR-48CuZn-11	Client		4D08038-DY	Water	04/06/14 17:26
DPR-48CuZn-12	Client		4D08038-DZ	Water	04/06/14 17:27

ANALYSES

Metals by EPA 200 Series Methods

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-01 **LW-TOCu-0**

Sampled: 04/04/14 14:49 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**0.32**	0.036	0.50	ug/l	1	04/10/14 11:41	J

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4D08038-02 **LW-TOCu-1**

Sampled: 04/04/14 14:51 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**4.6**	0.036	0.50	ug/l	1	04/10/14 11:42	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-03 **LW-TOCu-2**

Sampled: 04/04/14 14:52 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**7.6**	0.036	0.50	ug/l	1	04/10/14 11:43	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-04 **LW-TOCu-3**

Sampled: 04/04/14 14:53 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**13**	0.036	0.50	ug/l	1	04/10/14 11:45	

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Date Reported: 04/15/14 14:15

4D08038-05 **LW-TOCu-4**

Sampled: 04/04/14 14:55 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**22**	0.036	0.50	ug/l	1	04/10/14 11:48	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-06 **LW-TOCu-5**

Sampled: 04/04/14 14:56 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**35**	0.036	0.50	ug/l	1	04/10/14 11:50	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-07 **LW-TOCu-6**

Sampled: 04/04/14 14:59 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**58**	0.036	0.50	ug/l	1	04/10/14 11:51	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-08 **LW-TOCu-7**

Sampled: 04/04/14 15:00 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**97**	0.036	0.50	ug/l	1	04/10/14 11:52	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-09 **LW-TOCu-8pp**

Sampled: 04/04/14 15:05 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**170**	0.036	0.50	ug/l	1	04/10/14 11:53	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-10 **LW-TOCu-9pp**

Sampled: 04/04/14 15:06 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**290**	0.036	0.50	ug/l	1	04/10/14 11:55	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-11 **DPR-TOCu-0**

Sampled: 04/04/14 15:10 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**10**	0.036	0.50	ug/l	1	04/10/14 11:32	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-12 **DPR-TOCu-1**

Sampled: 04/04/14 15:15 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**30**	0.036	0.50	ug/l	1	04/10/14 11:35	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-13 **DPR-TOCu-2**

Sampled: 04/04/14 15:18 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**47**	0.036	0.50	ug/l	1	04/10/14 11:51	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-14 **DPR-TOCu-3**

Sampled: 04/04/14 15:23 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**69**	0.036	0.50	ug/l	1	04/10/14 11:54	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-15 **DPR-TOCu-4**

Sampled: 04/04/14 15:25 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**110**	0.036	0.50	ug/l	1	04/10/14 11:56	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-16 **DPR-TOCu-5**

Sampled: 04/04/14 15:29 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**170**	0.036	0.50	ug/l	1	04/10/14 11:58	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-17 **DPR-TOCu-6**

Sampled: 04/04/14 15:31 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**290**	0.036	0.50	ug/l	1	04/10/14 12:01	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-18 **DPR-TOCu-7**

Sampled: 04/04/14 15:35 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**470**	0.036	0.50	ug/l	1	04/10/14 12:03	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-19 **DPR-TOCu-8pp**

Sampled: 04/04/14 15:37 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**740**	0.036	0.50	ug/l	1	04/10/14 12:05	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-20 **DPR-TOCu-9pp**

Sampled: 04/04/14 15:40 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**1200**	0.036	0.50	ug/l	1	04/10/14 12:08	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-21 **SD8(1)-TOCu-0**

Sampled: 04/04/14 18:03 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**9.1**	0.036	0.50	ug/l	1	04/10/14 12:24	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-22 **SD8(1)-TOCu-1**

Sampled: 04/04/14 18:06 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**27**	0.036	0.50	ug/l	1	04/10/14 12:26	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-23 **SD8(1)-TOCu-2**

Sampled: 04/04/14 18:12 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**43**	0.036	0.50	ug/l	1	04/10/14 12:29	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-24 **SD8(1)-TOCu-3**

Sampled: 04/04/14 18:14 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**61**	0.036	0.50	ug/l	1	04/10/14 12:31	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-25 **SD8(1)-TOCu-4**

Sampled: 04/04/14 18:16 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**99**	0.036	0.50	ug/l	1	04/10/14 12:34	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-26 **SD8(1)-TOCu-5**

Sampled: 04/04/14 18:20 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**160**	0.036	0.50	ug/l	1	04/10/14 12:36	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-27 **SD8(1)-TOCu-6**

Sampled: 04/04/14 18:22 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**270**	0.036	0.50	ug/l	1	04/10/14 12:38	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-28 **SD8(1)-TOCu-7**

Sampled: 04/04/14 18:25 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**440**	0.036	0.50	ug/l	1	04/10/14 12:41	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-29 **SD8(1)-TOCu-8pp**

Sampled: 04/04/14 18:29 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**690**	0.036	0.50	ug/l	1	04/10/14 12:43	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-30 **SD8(1)-TOCu-9pp**

Sampled: 04/04/14 18:31 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0464 Prepared: 04/09/14 11:45 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**1100**	0.036	0.50	ug/l	1	04/10/14 12:52	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-31 **LW-TOZn-0**

Sampled: 04/04/14 14:10 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**0.93**	0.50	5.0	ug/l	1	04/10/14 11:56	J

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-32 **LW-TOZn-1**

Sampled: 04/04/14 14:13 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**8.8**	0.50	5.0	ug/l	1	04/10/14 11:57	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-33 **LW-TOZn-2**

Sampled: 04/04/14 14:23 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**14**	0.50	5.0	ug/l	1	04/10/14 11:58	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-34 **LW-TOZn-3**

Sampled: 04/04/14 14:25 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**25**	0.50	5.0	ug/l	1	04/10/14 12:02	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-35 **LW-TOZn-4**

Sampled: 04/04/14 14:28 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**41**	0.50	5.0	ug/l	1	04/10/14 12:03	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-36 **LW-TOZn-5**

Sampled: 04/04/14 14:30 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**68**	0.50	5.0	ug/l	1	04/10/14 12:05	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-37 **LW-TOZn-6**

Sampled: 04/04/14 14:33 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**110**	0.50	5.0	ug/l	1	04/10/14 12:06	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-38 **LW-TOZn-7**

Sampled: 04/04/14 14:35 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**190**	0.50	5.0	ug/l	1	04/10/14 12:07	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-39 **LW-TOZn-8pp**

Sampled: 04/04/14 14:42 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**300**	0.50	5.0	ug/l	1	04/10/14 12:08	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-40 **LW-TOZn-9pp**

Sampled: 04/04/14 14:45 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0502 Prepared: 04/10/14 08:34 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**510**	0.50	5.0	ug/l	1	04/10/14 12:10	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-41 **SD8(1)-TOZn-0**

Sampled: 04/04/14 15:45 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**22**	0.50	5.0	ug/l	1	04/10/14 12:30	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-42 **SD8(1)-TOZn-1**

Sampled: 04/04/14 15:50 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**55**	0.50	5.0	ug/l	1	04/10/14 12:32	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-43 **SD8(1)-TOZn-2**

Sampled: 04/04/14 15:54 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**72**	0.50	5.0	ug/l	1	04/10/14 12:33	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-44 **SD8(1)-TOZn-3**

Sampled: 04/04/14 15:52 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**130**	0.50	5.0	ug/l	1	04/10/14 12:37	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-45 **SD8(1)-TOZn-4**

Sampled: 04/04/14 15:58 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**200**	0.50	5.0	ug/l	1	04/10/14 12:38	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-46 **SD8(1)-TOZn-5**

Sampled: 04/04/14 16:00 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**310**	0.50	5.0	ug/l	1	04/10/14 12:39	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-47 **SD8(1)-TOZn-6**

Sampled: 04/04/14 16:04 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**500**	0.50	5.0	ug/l	1	04/10/14 12:40	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-48 **SD8(1)-TOZn-7**

Sampled: 04/04/14 16:06 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**850**	0.50	5.0	ug/l	1	04/10/14 12:42	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-49 **SD8(1)-TOZn-8pp**

Sampled: 04/04/14 16:11 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**1400**	50	500	ug/l	100	04/10/14 14:41	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-50 **SD8(1)-TOZn-9pp**

Sampled: 04/04/14 16:14 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**2300**	50	500	ug/l	100	04/10/14 14:42	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-51 **DPR-TOZn-0**

Sampled: 04/04/14 16:25 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**33**	0.50	5.0	ug/l	1	04/10/14 12:52	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-52 **DPR-TOZn-1**

Sampled: 04/04/14 16:27 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**65**	0.50	5.0	ug/l	1	04/10/14 12:55	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-53 **DPR-TOZn-2**

Sampled: 04/04/14 16:32 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**87**	0.50	5.0	ug/l	1	04/10/14 12:58	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-54 **DPR-TOZn-3**

Sampled: 04/04/14 16:35 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**140**	0.50	5.0	ug/l	1	04/10/14 13:04	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-55 **DPR-TOZn-4**

Sampled: 04/04/14 16:37 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**210**	0.50	5.0	ug/l	1	04/10/14 13:07	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-56 **DPR-TOZn-5**

Sampled: 04/04/14 16:40 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**340**	0.50	5.0	ug/l	1	04/10/14 13:10	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-57 **DPR-TOZn-6**

Sampled: 04/04/14 16:45 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**550**	0.50	5.0	ug/l	1	04/10/14 13:13	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-58 **DPR-TOZn-7**

Sampled: 04/04/14 16:49 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**890**	0.50	5.0	ug/l	1	04/10/14 13:16	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-59 **DPR-TOZn-8pp**

Sampled: 04/04/14 16:50 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**1500**	50	500	ug/l	100	04/10/14 14:45	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-60 **DPR-TOZn-9pp**

Sampled: 04/04/14 16:52 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0467 Prepared: 04/09/14 12:16 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**2500**	50	500	ug/l	100	04/10/14 14:48	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-61 **SD8(1)-TOCuZn-0**

Sampled: 04/04/14 15:45 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**8.1**	0.036	0.50	ug/l	1	04/10/14 15:16	
Zinc, Dissolved	**20**	0.50	5.0	ug/l	1	04/10/14 15:16	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-62 **SD8(1)-TOCuZn-1**

Sampled: 04/04/14 15:52 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**48**	0.036	0.50	ug/l	1	04/10/14 15:17	
Zinc, Dissolved	**130**	0.50	5.0	ug/l	1	04/10/14 15:17	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-63 **SD8(1)-TOCuZn-2**

Sampled: 04/04/14 15:56 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**60**	0.036	0.50	ug/l	1	04/10/14 15:19	
Zinc, Dissolved	**140**	0.50	5.0	ug/l	1	04/10/14 15:19	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-64 **SD8(1)-TOCuZn-3**

Sampled: 04/04/14 16:00 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**78**	0.036	0.50	ug/l	1	04/10/14 15:20	
Zinc, Dissolved	**140**	0.50	5.0	ug/l	1	04/10/14 15:20	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-65 **SD8(1)-TOCuZn-4**

Sampled: 04/04/14 16:05 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**97**	0.036	0.50	ug/l	1	04/10/14 15:24	
Zinc, Dissolved	**140**	0.50	5.0	ug/l	1	04/10/14 15:24	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-66 **SD8(1)-TOCuZn-5**

Sampled: 04/04/14 16:10 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**49**	0.036	0.50	ug/l	1	04/10/14 15:25	
Zinc, Dissolved	**160**	0.50	5.0	ug/l	1	04/10/14 15:25	

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Date Reported: 04/15/14 14:15

4D08038-67 **SD8(1)-TOCuZn-6**

Sampled: 04/04/14 16:15 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**55**	0.036	0.50	ug/l	1	04/10/14 15:26	
Zinc, Dissolved	**160**	0.50	5.0	ug/l	1	04/10/14 15:26	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-68 **SD8(1)-TOCuZn-7**

Sampled: 04/04/14 16:22 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**78**	0.036	0.50	ug/l	1	04/10/14 15:27	
Zinc, Dissolved	**170**	0.50	5.0	ug/l	1	04/10/14 15:27	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-69 **SD8(1)-TOCuZn-8**

Sampled: 04/04/14 16:26 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**100**	0.036	0.50	ug/l	1	04/10/14 15:29	
Zinc, Dissolved	**170**	0.50	5.0	ug/l	1	04/10/14 15:29	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-70 **SD8(1)-TOCuZn-9**

Sampled: 04/04/14 16:30 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**47**	0.036	0.50	ug/l	1	04/10/14 15:30	
Zinc, Dissolved	**200**	0.50	5.0	ug/l	1	04/10/14 15:30	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-71 **SD8(1)-TOCuZn-10**

Sampled: 04/04/14 16:35 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**57**	0.036	0.50	ug/l	1	04/10/14 15:31	
Zinc, Dissolved	**210**	0.50	5.0	ug/l	1	04/10/14 15:31	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-72 **SD8(1)-TOCuZn-11**

Sampled: 04/04/14 16:42 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**76**	0.036	0.50	ug/l	1	04/10/14 15:32	
Zinc, Dissolved	**200**	0.50	5.0	ug/l	1	04/10/14 15:32	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-73 **SD8(1)-TOCuZn-12**

Sampled: 04/04/14 16:45 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**96**	0.036	0.50	ug/l	1	04/10/14 15:34	
Zinc, Dissolved	**200**	0.50	5.0	ug/l	1	04/10/14 15:34	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-74 **DPR-TOCuZn-0**

Sampled: 04/04/14 17:10 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**9.7**	0.036	0.50	ug/l	1	04/10/14 15:35	
Zinc, Dissolved	**32**	0.50	5.0	ug/l	1	04/10/14 15:35	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-75 **DPR-TOCuZn-1**

Sampled: 04/04/14 17:20 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**64**	0.036	0.50	ug/l	1	04/10/14 15:39	
Zinc, Dissolved	**190**	0.50	5.0	ug/l	1	04/10/14 15:39	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-76 **DPR-TOCuZn-2**

Sampled: 04/04/14 17:29 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**79**	0.036	0.50	ug/l	1	04/10/14 15:40	
Zinc, Dissolved	**190**	0.50	5.0	ug/l	1	04/10/14 15:40	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-77 **DPR-TOCuZn-3**

Sampled: 04/04/14 17:30 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**110**	0.036	0.50	ug/l	1	04/10/14 15:41	
Zinc, Dissolved	**200**	0.50	5.0	ug/l	1	04/10/14 15:41	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-78 **DPR-TOCuZn-4**

Sampled: 04/04/14 17:35 **Sampled By:** Client **Matrix:** Water

Metadata by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**130**	0.036	0.50	ug/l	1	04/10/14 15:42	
Zinc, Dissolved	**190**	0.50	5.0	ug/l	1	04/10/14 15:42	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-79 **DPR-TOCuZn-5**

Sampled: 04/04/14 17:38 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**63**	0.036	0.50	ug/l	1	04/10/14 15:44	
Zinc, Dissolved	**220**	0.50	5.0	ug/l	1	04/10/14 15:44	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-80 **DPR-TOCuZn-6**

Sampled: 04/04/14 17:40 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0468 Prepared: 04/09/14 12:31 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**78**	0.036	0.50	ug/l	1	04/10/14 15:45	
Zinc, Dissolved	**220**	0.50	5.0	ug/l	1	04/10/14 15:45	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-81 **DPR-TOCuZn-7**

Sampled: 04/04/14 17:44 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**110**	0.036	0.50	ug/l	1	04/10/14 15:49	
Zinc, Dissolved	**240**	0.50	5.0	ug/l	1	04/10/14 15:49	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-82 **DPR-TOCuZn-8**

Sampled: 04/04/14 17:46 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**140**	0.036	0.50	ug/l	1	04/10/14 17:23	
Zinc, Dissolved	**230**	0.50	5.0	ug/l	1	04/10/14 17:23	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-83 **DPR-TOCuZn-9**

Sampled: 04/04/14 17:50 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**71**	0.036	0.50	ug/l	1	04/10/14 16:01	
Zinc, Dissolved	**310**	0.50	5.0	ug/l	1	04/10/14 16:01	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-84 **DPR-TOCuZn-10**

Sampled: 04/04/14 17:51 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**83**	0.036	0.50	ug/l	1	04/10/14 16:10	
Zinc, Dissolved	**300**	0.50	5.0	ug/l	1	04/10/14 16:10	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-85 **DPR-TOCuZn-11**

Sampled: 04/04/14 17:55 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**110**	0.036	0.50	ug/l	1	04/10/14 16:12	
Zinc, Dissolved	**280**	0.50	5.0	ug/l	1	04/10/14 16:12	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-86 **DPR-TOCuZn-12**

Sampled: 04/04/14 17:58 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**140**	0.036	0.50	ug/l	1	04/10/14 16:15	
Zinc, Dissolved	**290**	0.50	5.0	ug/l	1	04/10/14 16:15	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-87 **LW-Cd48Cu-3**

Sampled: 04/05/14 15:40 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**13**	0.036	0.50	ug/l	1	04/10/14 16:17	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-88 **LW-Cd48Cu-4**

Sampled: 04/05/14 15:41 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**21**	0.036	0.50	ug/l	1	04/10/14 16:20	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-89 **LW-Cd48Cu-5**

Sampled: 04/05/14 15:42 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**34**	0.036	0.50	ug/l	1	04/10/14 16:22	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-90 **LW-Cd48Cu-6**

Sampled: 04/05/14 15:43 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**58**	0.036	0.50	ug/l	1	04/10/14 16:24	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-91 **LW-Cd48Cu-7**

Sampled: 04/05/14 15:44 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**110**	0.036	0.50	ug/l	1	04/10/14 16:41	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-92 **SD8(1)-Cd48Cu-5**

Sampled: 04/05/14 15:46 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**140**	0.036	0.50	ug/l	1	04/10/14 16:43	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-93 **SD8(1)-Cd48Cu-6**

Sampled: 04/05/14 15:47 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**260**	0.036	0.50	ug/l	1	04/10/14 16:46	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-94 **SD8(1)-Cd48Cu-7**

Sampled: 04/05/14 15:48 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**410**	0.036	0.50	ug/l	1	04/10/14 16:48	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-95 **SD8(1)-Cd48Cu-0**

Sampled: 04/06/14 15:18 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**9.0**	0.036	0.50	ug/l	1	04/10/14 16:50	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-96 **SD8(1)-Cd48Cu-1**

Sampled: 04/06/14 15:20 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**26**	0.036	0.50	ug/l	1	04/10/14 16:53	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-97 **SD8(1)-Cd48Cu-2**

Sampled: 04/06/14 15:22 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**39**	0.036	0.50	ug/l	1	04/10/14 17:26	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-98 **SD8(1)-Cd48Cu-3**

Sampled: 04/06/14 15:24 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**57**	0.036	0.50	ug/l	1	04/10/14 16:57	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-99 **SD8(1)-Cd48Cu-4**

Sampled: 04/06/14 15:26 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**95**	0.036	0.50	ug/l	1	04/10/14 17:00	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AA **LW-Cd48Cu-0**

Sampled: 04/06/14 15:33 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0483 Prepared: 04/09/14 16:58 Analyst: Royuan Rosario Lopez

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**0.58**	0.036	0.50	ug/l	1	04/10/14 17:02	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AB **LW-Cd48Cu-1**

Sampled: 04/06/14 15:35 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**7.2**	0.036	0.50	ug/l	1	04/10/14 16:13	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AC **LW-Cd48Cu-2**

Sampled: 04/06/14 15:37 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**6.7**	0.036	0.50	ug/l	1	04/10/14 16:14	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AD **DPR-Cd48Cu-0**

Sampled: 04/06/14 17:30 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**11**	0.036	0.50	ug/l	1	04/10/14 16:15	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AE **DPR-Cd48Cu-1**

Sampled: 04/06/14 17:31 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**28**	0.036	0.50	ug/l	1	04/10/14 16:17	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AF **DPR-Cd48Cu-2**

Sampled: 04/06/14 17:32 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**39**	0.036	0.50	ug/l	1	04/10/14 16:20	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AG **DPR-Cd48Cu-3**

Sampled: 04/06/14 17:34 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**60**	0.036	0.50	ug/l	1	04/10/14 16:22	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AH **DPR-Cd48Cu-4**

Sampled: 04/06/14 17:35 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**97**	0.036	0.50	ug/l	1	04/10/14 16:23	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AI **DPR-Cd48Cu-5**

Sampled: 04/06/14 17:36 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**150**	0.036	0.50	ug/l	1	04/10/14 16:24	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AJ **DPR-Cd48Cu-6**

Sampled: 04/06/14 17:37 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**240**	0.036	0.50	ug/l	1	04/10/14 16:25	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AK **DPR-Cd48Cu-7**

Sampled: 04/05/14 15:45 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**400**	0.036	0.50	ug/l	1	04/10/14 16:27	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AL **LW-Pp48Zn-1**

Sampled: 04/06/14 14:53 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**26**	0.50	5.0	ug/l	1	04/10/14 16:28	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AM **LW-Pp48Zn-2**

Sampled: 04/06/14 14:55 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**42**	0.50	5.0	ug/l	1	04/10/14 16:29	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AN **LW-Pp48Zn-3**

Sampled: 04/06/14 14:57 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**65**	0.50	5.0	ug/l	1	04/10/14 16:30	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AO **LW-Pp48Zn-4**

Sampled: 04/06/14 14:59 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**110**	0.50	5.0	ug/l	1	04/10/14 16:34	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AP **LW-Pp48Zn-5**

Sampled: 04/06/14 15:01 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**180**	0.50	5.0	ug/l	1	04/10/14 16:35	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AQ **LW-Pp48Zn-6**

Sampled: 04/06/14 15:03 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**320**	0.50	5.0	ug/l	1	04/10/14 16:37	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AR **LW-Pp48Zn-7**

Sampled: 04/06/14 15:05 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**500**	0.50	5.0	ug/l	1	04/10/14 16:38	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AS **LW-Cd48Zn-0**

Sampled: 04/06/14 14:30 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**2.8**	0.50	5.0	ug/l	1	04/10/14 16:39	J

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AT **LW-Cd48Zn-1**

Sampled: 04/06/14 14:31 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**9.6**	0.50	5.0	ug/l	1	04/10/14 16:40	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AU **LW-Cd48Zn-2**

Sampled: 04/06/14 14:32 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0486 Prepared: 04/09/14 17:29 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**15**	0.50	5.0	ug/l	1	04/10/14 16:42	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AV **LW-Cd48Zn-3**

Sampled: 04/06/14 14:34 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**26**	0.50	5.0	ug/l	1	04/10/14 16:54	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AW **LW-Cd48Zn-4**

Sampled: 04/06/14 14:35 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**41**	0.50	5.0	ug/l	1	04/10/14 16:56	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AX **LW-Cd48Zn-5**

Sampled: 04/06/14 14:36 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**67**	0.50	5.0	ug/l	1	04/10/14 16:57	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AY **LW-Cd48Zn-6**

Sampled: 04/06/14 14:37 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**110**	0.50	5.0	ug/l	1	04/10/14 16:58	

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San Diego CA, 92123

Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-AZ **LW-Cd48Zn-7**

Sampled: 04/06/14 14:39 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**180**	0.50	5.0	ug/l	1	04/10/14 17:02	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BA **DPR-Cd48Zn-0**

Sampled: 04/06/14 15:20 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**29**	0.50	5.0	ug/l	1	04/10/14 17:03	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BB **DPR-Cd48Zn-1**

Sampled: 04/06/14 15:22 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**57**	0.50	5.0	ug/l	1	04/10/14 17:04	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BC **DPR-Cd48Zn-2**

Sampled: 04/06/14 15:23 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**73**	0.50	5.0	ug/l	1	04/10/14 17:06	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BD **DPR-Cd48Zn-3**

Sampled: 04/06/14 15:26 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**120**	0.50	5.0	ug/l	1	04/10/14 17:07	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BE **DPR-Cd48Zn-4**

Sampled: 04/06/14 15:27 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**190**	0.50	5.0	ug/l	1	04/10/14 17:08	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BF **DPR-Cd48Zn-5**

Sampled: 04/06/14 15:29 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**300**	0.50	5.0	ug/l	1	04/10/14 17:09	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BG **DPR-Cd48Zn-6**

Sampled: 04/06/14 15:30 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**470**	0.50	5.0	ug/l	1	04/10/14 17:11	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BH **DPR-Cd48Zn-7**

Sampled: 04/06/14 15:31
Sampled By: Client
Matrix: Water

Metals by EPA 200 Series Methods

Method: EPA 200.8
Batch: W4D0509
Prepared: 04/10/14 08:41
Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**780**	0.50	5.0	ug/l	1	04/10/14 17:12	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BI **DPR-Pp48Zn-1**

Sampled: 04/06/14 15:50 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**130**	0.50	5.0	ug/l	1	04/10/14 17:13	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BJ **DPR-Pp48Zn-2**

Sampled: 04/06/14 15:52 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**200**	0.50	5.0	ug/l	1	04/10/14 17:17	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BK **DPR-Pp48Zn-3**

Sampled: 04/06/14 15:56 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**320**	0.50	5.0	ug/l	1	04/10/14 17:18	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BL **DPR-Pp48Zn-4**

Sampled: 04/06/14 16:00 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**490**	0.50	5.0	ug/l	1	04/10/14 17:19	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BM **DPR-Pp48Zn-5**

Sampled: 04/06/14 16:02 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**810**	0.50	5.0	ug/l	1	04/10/14 17:21	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BN **DPR-Pp48Zn-6**

Sampled: 04/06/14 16:26 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**1300**	50	500	ug/l	100	04/10/14 17:42	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BO **DPR-Pp48Zn-7**

Sampled: 04/06/14 16:36 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0509 Prepared: 04/10/14 08:41 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**2300**	50	500	ug/l	100	04/10/14 17:44	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BP **SD8(1)Cd48Zn-0**

Sampled: 04/06/14 17:36 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**18**	0.50	5.0	ug/l	1	04/10/14 17:56	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BQ **SD8(1)Cd48Zn-1**

Sampled: 04/06/14 17:38 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**46**	0.50	5.0	ug/l	1	04/10/14 17:57	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BR **SD8(1)Cd48Zn-2**

Sampled: 04/06/14 17:39 **Sampled By:** Client **Matrix:** Water

Metadata by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**65**	0.50	5.0	ug/l	1	04/10/14 17:59	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BS **SD8(1)Cd48Zn-3**

Sampled: 04/06/14 17:40 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**100**	0.50	5.0	ug/l	1	04/10/14 18:00	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BT **SD8(1)Cd48Zn-4**

Sampled: 04/06/14 17:41 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**170**	0.50	5.0	ug/l	1	04/10/14 18:04	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BU **SD8(1)Cd48Zn-5**

Sampled: 04/06/14 17:42 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**270**	0.50	5.0	ug/l	1	04/10/14 18:05	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BV **SD8(1)Cd48Zn-6**

Sampled: 04/06/14 17:43 **Sampled By:** Client **Matrix:** Water

Metadata by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**450**	0.50	5.0	ug/l	1	04/10/14 18:06	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BW **SD8(1)Cd48Zn-7**

Sampled: 04/06/14 17:44 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**770**	0.50	5.0	ug/l	1	04/10/14 18:07	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BX **SD8(1)Pp48Zn-1**

Sampled: 04/06/14 16:17 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**110**	0.50	5.0	ug/l	1	04/10/14 18:09	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BY **SD8(1)Pp48Zn-2**

Sampled: 04/06/14 16:23 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**180**	0.50	5.0	ug/l	1	04/10/14 18:10	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-BZ **SD8(1)Pp48Zn-3**

Sampled: 04/06/14 16:26 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**280**	0.50	5.0	ug/l	1	04/10/14 18:11	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CA **SD8(1)Pp48Zn-4**

Sampled: 04/06/14 16:28 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**460**	0.50	5.0	ug/l	1	04/10/14 18:12	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CB **SD8(1)Pp48Zn-5**

Sampled: 04/06/14 16:36 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**820**	0.50	5.0	ug/l	1	04/10/14 18:14	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CC **SD8(1)Pp48Zn-6**

Sampled: 04/06/14 16:40 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**1600**	50	500	ug/l	100	04/11/14 09:08	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CD **SD8(1)Pp48Zn-7**

Sampled: 04/06/14 16:43 **Sampled By:** Client **Matrix:** Water

Metadata by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Zinc, Dissolved	**2600**	50	500	ug/l	100	04/11/14 09:09	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CE **SD8(1)Pp48Cu-0**

Sampled: 04/06/14 16:43 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**8.7**	0.036	0.50	ug/l	1	04/10/14 18:20	
Zinc, Dissolved	**21**	0.50	5.0	ug/l	1	04/10/14 18:20	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CF **SD8(1)Pp48Cu-1**

Sampled: 04/06/14 15:55 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**58**	0.036	0.50	ug/l	1	04/10/14 18:21	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CG **SD8(1)Pp48Cu-2**

Sampled: 04/06/14 15:59 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**91**	0.036	0.50	ug/l	1	04/10/14 18:23	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CH **SD8(1)Pp48Cu-3**

Sampled: 04/06/14 16:02 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**150**	0.036	0.50	ug/l	1	04/10/14 18:24	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CI **SD8(1)Pp48Cu-4**

Sampled: 04/06/14 16:05 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0516 Prepared: 04/10/14 09:21 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**240**	0.036	0.50	ug/l	1	04/10/14 18:25	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CJ **SD8(1)Pp48Cu-5**

Sampled: 04/06/14 16:09 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0517 Prepared: 04/10/14 09:23 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**370**	0.036	0.50	ug/l	1	04/10/14 18:35	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CK **SD8(1)Pp48Cu-6**

Sampled: 04/06/14 16:15 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0517 Prepared: 04/10/14 09:23 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**600**	0.036	0.50	ug/l	1	04/10/14 18:36	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CL **SD8(1)Pp48Cu-7**

Sampled: 04/06/14 16:17
Sampled By: Client
Matrix: Water

Metadata by EPA 200 Series Methods

Method: EPA 200.8
Batch: W4D0517
Prepared: 04/10/14 09:23
Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**930**	0.036	0.50	ug/l	1	04/10/14 18:38	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CM **LWPp48Cu-0**

Sampled: 04/06/14 14:26 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**0.28**	0.036	0.50	ug/l	1	04/11/14 15:59	J
Zinc, Dissolved	**2.5**	0.50	5.0	ug/l	1	04/11/14 15:59	J

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CN **LWPp48Cu-1**

Sampled: 04/06/14 14:28 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**12**	0.036	0.50	ug/l	1	04/11/14 16:00	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CO **LWPp48Cu-2**

Sampled: 04/06/14 14:30 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**21**	0.036	0.50	ug/l	1	04/11/14 16:01	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CP **LWPp48Cu-3**

Sampled: 04/06/14 14:32 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**35**	0.036	0.50	ug/l	1	04/11/14 16:06	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CQ **LWPp48Cu-4**

Sampled: 04/06/14 14:34 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**59**	0.036	0.50	ug/l	1	04/11/14 16:07	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CR **LWPp48Cu-5**

Sampled: 04/06/14 14:36 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**99**	0.036	0.50	ug/l	1	04/11/14 16:09	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CS **LWPp48Cu-6**

Sampled: 04/06/14 14:38 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**170**	0.036	0.50	ug/l	1	04/11/14 16:10	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CT **LWPp48Cu-7**

Sampled: 04/06/14 14:40 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**270**	0.036	0.50	ug/l	1	04/11/14 16:11	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CU **DPRPp48Cu-0**

Sampled: 04/06/14 14:52 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**11**	0.036	0.50	ug/l	1	04/11/14 16:12	
Zinc, Dissolved	**34**	0.50	5.0	ug/l	1	04/11/14 16:12	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CV **DPRPp48Cu-1**

Sampled: 04/06/14 14:55 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**64**	0.036	0.50	ug/l	1	04/11/14 16:14	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CW **DPRPp48Cu-2**

Sampled: 04/06/14 15:00 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**110**	0.036	0.50	ug/l	1	04/11/14 16:15	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CX **DPRPp48Cu-3**

Sampled: 04/06/14 15:04 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**160**	0.036	0.50	ug/l	1	04/11/14 16:16	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CY **DPRPp48Cu-4**

Sampled: 04/06/14 15:06 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**260**	0.036	0.50	ug/l	1	04/11/14 16:20	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-CZ **DPRPp48Cu-5**

Sampled: 04/06/14 15:09 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**410**	0.036	0.50	ug/l	1	04/11/14 16:21	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DA **DPRPp48Cu-6**

Sampled: 04/06/14 15:15 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**700**	0.036	0.50	ug/l	1	04/11/14 16:22	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DB **DPRPp48Cu-7**

Sampled: 04/06/14 15:17 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**1200**	3.6	50	ug/l	100	04/11/14 16:30	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DC **SD(1)-48CuZn-1**

Sampled: 04/06/14 16:45 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**49**	0.036	0.50	ug/l	1	04/11/14 16:32	
Zinc, Dissolved	**140**	0.50	5.0	ug/l	1	04/11/14 16:32	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DD **SD(1)-48CuZn-2**

Sampled: 04/06/14 16:50 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**60**	0.036	0.50	ug/l	1	04/11/14 16:33	
Zinc, Dissolved	**140**	0.50	5.0	ug/l	1	04/11/14 16:33	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DE **SD(1)-48CuZn-3**

Sampled: 04/06/14 16:51 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**82**	0.036	0.50	ug/l	1	04/11/14 16:34	
Zinc, Dissolved	**150**	0.50	5.0	ug/l	1	04/11/14 16:34	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DF **SD(1)-48CuZn-4**

Sampled: 04/06/14 16:55 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0515 Prepared: 04/10/14 09:18 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**99**	0.036	0.50	ug/l	1	04/11/14 16:35	
Zinc, Dissolved	**140**	0.50	5.0	ug/l	1	04/11/14 16:35	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DG **SD(1)-48CuZn-5**

Sampled: 04/06/14 16:57 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**49**	0.036	0.50	ug/l	1	04/11/14 14:54	
Zinc, Dissolved	**160**	0.50	5.0	ug/l	1	04/11/14 14:54	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DH **SD(1)-48CuZn-6**

Sampled: 04/06/14 17:00 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**61**	0.036	0.50	ug/l	1	04/11/14 14:55	
Zinc, Dissolved	**170**	0.50	5.0	ug/l	1	04/11/14 14:55	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DI **SD(1)-48CuZn-7**

Sampled: 04/06/14 17:02 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**79**	0.036	0.50	ug/l	1	04/11/14 14:56	
Zinc, Dissolved	**180**	0.50	5.0	ug/l	1	04/11/14 14:56	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DJ **SD(1)-48CuZn-8**

Sampled: 04/06/14 17:05 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**100**	0.036	0.50	ug/l	1	04/11/14 15:00	
Zinc, Dissolved	**180**	0.50	5.0	ug/l	1	04/11/14 15:00	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DK **SD(1)-48CuZn-9**

Sampled: 04/06/14 17:06 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**48**	0.036	0.50	ug/l	1	04/11/14 15:01	
Zinc, Dissolved	**200**	0.50	5.0	ug/l	1	04/11/14 15:01	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DL **SD(1)-48CuZn-10**

Sampled: 04/06/14 17:08 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**59**	0.036	0.50	ug/l	1	04/11/14 15:02	
Zinc, Dissolved	**220**	0.50	5.0	ug/l	1	04/11/14 15:02	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DM **SD(1)-48CuZn-11**

Sampled: 04/06/14 17:10 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**81**	0.036	0.50	ug/l	1	04/11/14 15:04	
Zinc, Dissolved	**220**	0.50	5.0	ug/l	1	04/11/14 15:04	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DN **SD(1)-48CuZn-12**

Sampled: 04/06/14 17:12 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**100**	0.036	0.50	ug/l	1	04/11/14 15:05	
Zinc, Dissolved	**220**	0.50	5.0	ug/l	1	04/11/14 15:05	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DO **DPR-48CuZn-1**

Sampled: 04/06/14 17:00 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**61**	0.036	0.50	ug/l	1	04/11/14 15:06	
Zinc, Dissolved	**170**	0.50	5.0	ug/l	1	04/11/14 15:06	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DP **DPR-48CuZn-2**

Sampled: 04/06/14 17:03 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**81**	0.036	0.50	ug/l	1	04/11/14 15:07	
Zinc, Dissolved	**190**	0.50	5.0	ug/l	1	04/11/14 15:07	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DQ **DPR-48CuZn-3**

Sampled: 04/06/14 17:05 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**100**	0.036	0.50	ug/l	1	04/11/14 15:09	
Zinc, Dissolved	**180**	0.50	5.0	ug/l	1	04/11/14 15:09	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DR **DPR-48CuZn-4**

Sampled: 04/06/14 17:07 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**130**	0.036	0.50	ug/l	1	04/11/14 15:10	
Zinc, Dissolved	**180**	0.50	5.0	ug/l	1	04/11/14 15:10	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DS **DPR-48CuZn-5**

Sampled: 04/06/14 17:09 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**67**	0.036	0.50	ug/l	1	04/11/14 15:14	
Zinc, Dissolved	**220**	0.50	5.0	ug/l	1	04/11/14 15:14	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DT **DPR-48CuZn-6**

Sampled: 04/06/14 17:15 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**78**	0.036	0.50	ug/l	1	04/11/14 15:15	
Zinc, Dissolved	**210**	0.50	5.0	ug/l	1	04/11/14 15:15	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DU **DPR-48CuZn-7**

Sampled: 04/06/14 17:17 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**100**	0.036	0.50	ug/l	1	04/11/14 15:16	
Zinc, Dissolved	**220**	0.50	5.0	ug/l	1	04/11/14 15:16	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DV **DPR-48CuZn-8**

Sampled: 04/06/14 17:19 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**130**	0.036	0.50	ug/l	1	04/11/14 15:17	
Zinc, Dissolved	**210**	0.50	5.0	ug/l	1	04/11/14 15:17	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DW **DPR-48CuZn-9**

Sampled: 04/06/14 17:21 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**68**	0.036	0.50	ug/l	1	04/11/14 15:19	
Zinc, Dissolved	**280**	0.50	5.0	ug/l	1	04/11/14 15:19	

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Date Received: 04/07/14 18:10
Date Reported: 04/15/14 14:15

4D08038-DX **DPR-48CuZn-10**

Sampled: 04/06/14 17:24 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**81**	0.036	0.50	ug/l	1	04/11/14 15:20	
Zinc, Dissolved	**280**	0.50	5.0	ug/l	1	04/11/14 15:20	

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4D08038-DY **DPR-48CuZn-11**

Sampled: 04/06/14 17:26 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**110**	0.036	0.50	ug/l	1	04/11/14 15:21	
Zinc, Dissolved	**280**	0.50	5.0	ug/l	1	04/11/14 15:21	

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4D08038-DZ **DPR-48CuZn-12**

Sampled: 04/06/14 17:27 **Sampled By:** Client **Matrix:** Water

Metals by EPA 200 Series Methods

Method: EPA 200.8 Batch: W4D0506 Prepared: 04/10/14 08:37 Analyst: Gary Zhou

Analyte	Result	MDL	MRL	Units	Dil	Analyzed	Qualifier
Copper, Dissolved	**140**	0.036	0.50	ug/l	1	04/11/14 15:22	
Zinc, Dissolved	**270**	0.50	5.0	ug/l	1	04/11/14 15:22	

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QUALITY CONTROL SECTION

Metals by EPA 200 Series Methods - Quality Control

Batch W4D0464 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0464-BLK1)					Analyzed: 04/10/14 11:25						
Copper, Dissolved	ND	0.036	0.50	ug/l							
LCS (W4D0464-BS1)					Analyzed: 04/10/14 11:28						
Copper, Dissolved	47.2	0.036	0.50	ug/l	50.0		94	85-115			
Matrix Spike (W4D0464-MS1)			**Source: 4D08038-12**		Analyzed: 04/10/14 11:37						
Copper, Dissolved	80.0	0.036	0.50	ug/l	50.0	30.5	99	70-130			
Matrix Spike (W4D0464-MS2)			**Source: 4D08038-20**		Analyzed: 04/10/14 12:10						
Copper, Dissolved	1240	0.036	0.50	ug/l	50.0	1150	177	70-130			MS-02
Matrix Spike Dup (W4D0464-MSD1)			**Source: 4D08038-12**		Analyzed: 04/10/14 11:39						
Copper, Dissolved	81.7	0.036	0.50	ug/l	50.0	30.5	102	70-130	2	30	
Matrix Spike Dup (W4D0464-MSD2)			**Source: 4D08038-20**		Analyzed: 04/10/14 12:12						
Copper, Dissolved	1260	0.036	0.50	ug/l	50.0	1150	208	70-130	1	30	MS-02

Batch W4D0467 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0467-BLK1)					Analyzed: 04/10/14 12:20						
Zinc, Dissolved	2.44	0.50	5.0	ug/l							J
LCS (W4D0467-BS1)					Analyzed: 04/10/14 12:21						
Zinc, Dissolved	47.3	0.50	5.0	ug/l	50.0		95	85-115			
Matrix Spike (W4D0467-MS1)			**Source: 4D08038-41**		Analyzed: 04/10/14 12:23						
Zinc, Dissolved	65.5	0.50	5.0	ug/l	50.0	22.3	87	70-130			
Matrix Spike (W4D0467-MS2)			**Source: 4D08038-50**		Analyzed: 04/10/14 14:38						
Zinc, Dissolved	2580	50	500	ug/l	50.0	2310	539	70-130			MS-02
Matrix Spike Dup (W4D0467-MSD1)			**Source: 4D08038-41**		Analyzed: 04/10/14 12:24						
Zinc, Dissolved	64.8	0.50	5.0	ug/l	50.0	22.3	85	70-130	1	30	
Matrix Spike Dup (W4D0467-MSD2)			**Source: 4D08038-50**		Analyzed: 04/10/14 14:39						
Zinc, Dissolved	2550	50	500	ug/l	50.0	2310	469	70-130	1	30	MS-02

Batch W4D0468 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0468-BLK1)					Analyzed: 04/10/14 15:09						
Copper, Dissolved	0.0563	0.036	0.50	ug/l							J
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0468-BS1)					Analyzed: 04/10/14 15:10						
Copper, Dissolved	45.5	0.036	0.50	ug/l	50.0		91	85-115			
Zinc, Dissolved	46.3	0.50	5.0	ug/l	50.0		93	85-115			
Matrix Spike (W4D0468-MS1)			**Source: 4D08038-61**		Analyzed: 04/10/14 15:11						
Copper, Dissolved	52.4	0.036	0.50	ug/l	50.0	8.06	89	70-130			
Zinc, Dissolved	64.7	0.50	5.0	ug/l	50.0	20.0	89	70-130			
Matrix Spike (W4D0468-MS2)			**Source: 4D08038-62**		Analyzed: 04/10/14 15:14						
Copper, Dissolved	89.0	0.036	0.50	ug/l	50.0	48.0	82	70-130			

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Metals by EPA 200 Series Methods - Quality Control

Batch W4D0468 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike (W4D0468-MS2)		**Source: 4D08038-62**			Analyzed: 04/10/14 15:14						
Zinc, Dissolved	177	0.50	5.0	ug/l	50.0	135	84	70-130			
Matrix Spike Dup (W4D0468-MSD1)		**Source: 4D08038-61**			Analyzed: 04/10/14 15:12						
Copper, Dissolved	53.1	0.036	0.50	ug/l	50.0	8.06	90	70-130	1	30	
Zinc, Dissolved	64.7	0.50	5.0	ug/l	50.0	20.0	90	70-130	0.09	30	
Matrix Spike Dup (W4D0468-MSD2)		**Source: 4D08038-62**			Analyzed: 04/10/14 15:15						
Copper, Dissolved	92.9	0.036	0.50	ug/l	50.0	48.0	90	70-130	4	30	
Zinc, Dissolved	183	0.50	5.0	ug/l	50.0	135	97	70-130	4	30	

Batch W4D0483 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0483-BLK1)					Analyzed: 04/10/14 15:42						
Copper, Dissolved	0.0369	0.036	0.50	ug/l							J
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0483-BS1)					Analyzed: 04/10/14 15:44						
Copper, Dissolved	46.6	0.036	0.50	ug/l	50.0		93	85-115			
Zinc, Dissolved	47.1	0.50	5.0	ug/l	50.0		94	85-115			
Matrix Spike (W4D0483-MS1)		**Source: 4D08038-81**			Analyzed: 04/10/14 15:51						
Copper, Dissolved	160	0.036	0.50	ug/l	50.0	107	107	70-130			
Zinc, Dissolved	295	0.50	5.0	ug/l	50.0	236	117	70-130			
Matrix Spike (W4D0483-MS2)		**Source: 4D08038-90**			Analyzed: 04/10/14 16:27						
Copper, Dissolved	104	0.036	0.50	ug/l	50.0	57.9	93	70-130			
Zinc, Dissolved	49.9	0.50	5.0	ug/l	50.0	2.79	94	70-130			
Matrix Spike Dup (W4D0483-MSD1)		**Source: 4D08038-81**			Analyzed: 04/10/14 15:54						
Copper, Dissolved	162	0.036	0.50	ug/l	50.0	107	110	70-130	1	30	
Zinc, Dissolved	297	0.50	5.0	ug/l	50.0	236	121	70-130	0.7	30	
Matrix Spike Dup (W4D0483-MSD2)		**Source: 4D08038-90**			Analyzed: 04/10/14 16:29						
Copper, Dissolved	109	0.036	0.50	ug/l	50.0	57.9	102	70-130	4	30	
Zinc, Dissolved	52.7	0.50	5.0	ug/l	50.0	2.79	100	70-130	5	30	

Batch W4D0486 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0486-BLK1)					Analyzed: 04/10/14 16:05						
Copper, Dissolved	0.0604	0.036	0.50	ug/l							J
Zinc, Dissolved	0.819	0.50	5.0	ug/l							J
LCS (W4D0486-BS1)					Analyzed: 04/10/14 16:07						
Copper, Dissolved	45.5	0.036	0.50	ug/l	50.0		91	85-115			
Zinc, Dissolved	46.5	0.50	5.0	ug/l	50.0		93	85-115			
Matrix Spike (W4D0486-MS1)		**Source: 4D08038-AB**			Analyzed: 04/10/14 16:08						
Copper, Dissolved	48.6	0.036	0.50	ug/l	50.0	7.25	83	70-130			
Zinc, Dissolved	47.3	0.50	5.0	ug/l	50.0	5.46	84	70-130			

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Metals by EPA 200 Series Methods - Quality Control

Batch W4D0486 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike (W4D0486-MS1)		**Source: 4D08038-AB**			Analyzed: 04/10/14 16:08						
Matrix Spike (W4D0486-MS2)		**Source: 4D08038-AL**			Analyzed: 04/10/14 16:10						
Copper, Dissolved	45.7	0.036	0.50	ug/l	50.0	0.427	91	70-130			
Zinc, Dissolved	70.3	0.50	5.0	ug/l	50.0	25.9	89	70-130			
Matrix Spike Dup (W4D0486-MSD1)		**Source: 4D08038-AB**			Analyzed: 04/10/14 16:09						
Copper, Dissolved	50.6	0.036	0.50	ug/l	50.0	7.25	87	70-130	4	30	
Zinc, Dissolved	49.3	0.50	5.0	ug/l	50.0	5.46	88	70-130	4	30	
Matrix Spike Dup (W4D0486-MSD2)		**Source: 4D08038-AL**			Analyzed: 04/10/14 16:12						
Copper, Dissolved	48.7	0.036	0.50	ug/l	50.0	0.427	97	70-130	6	30	
Zinc, Dissolved	75.6	0.50	5.0	ug/l	50.0	25.9	99	70-130	7	30	

Batch W4D0502 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0502-BLK1)					Analyzed: 04/10/14 11:33						
Copper, Dissolved	ND	0.036	0.50	ug/l							
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0502-BS1)					Analyzed: 04/10/14 11:35						
Copper, Dissolved	46.8	0.036	0.50	ug/l	50.0		94	85-115			
Zinc, Dissolved	45.6	0.50	5.0	ug/l	50.0		91	85-115			
Matrix Spike (W4D0502-MS1)		**Source: 4D08038-36**			Analyzed: 04/10/14 11:36						
Copper, Dissolved	46.6	0.036	0.50	ug/l	50.0	0.272	93	70-130			
Zinc, Dissolved	113	0.50	5.0	ug/l	50.0	68.3	90	70-130			
Matrix Spike (W4D0502-MS2)		**Source: 4D08038-04**			Analyzed: 04/10/14 11:38						
Copper, Dissolved	57.3	0.036	0.50	ug/l	50.0	12.9	89	70-130			
Zinc, Dissolved	46.4	0.50	5.0	ug/l	50.0	1.82	89	70-130			
Matrix Spike Dup (W4D0502-MSD1)		**Source: 4D08038-36**			Analyzed: 04/10/14 11:37						
Copper, Dissolved	46.2	0.036	0.50	ug/l	50.0	0.272	92	70-130	0.8	30	
Zinc, Dissolved	113	0.50	5.0	ug/l	50.0	68.3	89	70-130	0.4	30	
Matrix Spike Dup (W4D0502-MSD2)		**Source: 4D08038-04**			Analyzed: 04/10/14 11:40						
Copper, Dissolved	59.1	0.036	0.50	ug/l	50.0	12.9	92	70-130	3	30	
Zinc, Dissolved	45.7	0.50	5.0	ug/l	50.0	1.82	88	70-130	2	30	

Batch W4D0506 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0506-BLK1)					Analyzed: 04/11/14 14:46						
Copper, Dissolved	ND	0.036	0.50	ug/l							
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0506-BS1)					Analyzed: 04/11/14 14:47						
Copper, Dissolved	49.0	0.036	0.50	ug/l	50.0		98	85-115			
Zinc, Dissolved	49.6	0.50	5.0	ug/l	50.0		99	85-115			
Matrix Spike (W4D0506-MS1)		**Source: 4D08038-DU**			Analyzed: 04/11/14 14:49						

Metals by EPA 200 Series Methods - Quality Control

Batch W4D0506 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Copper, Dissolved	152	0.036	0.50	ug/l	50.0	102	100	70-130			
Zinc, Dissolved	268	0.50	5.0	ug/l	50.0	220	96	70-130			
Matrix Spike (W4D0506-MS2)		**Source: 4D08038-DO**			Analyzed: 04/11/14 14:51						
Copper, Dissolved	114	0.036	0.50	ug/l	50.0	61.4	105	70-130			
Zinc, Dissolved	230	0.50	5.0	ug/l	50.0	171	117	70-130			
Matrix Spike Dup (W4D0506-MSD1)		**Source: 4D08038-DU**			Analyzed: 04/11/14 14:50						
Copper, Dissolved	149	0.036	0.50	ug/l	50.0	102	94	70-130	2	30	
Zinc, Dissolved	261	0.50	5.0	ug/l	50.0	220	83	70-130	3	30	
Matrix Spike Dup (W4D0506-MSD2)		**Source: 4D08038-DO**			Analyzed: 04/11/14 14:52						
Copper, Dissolved	113	0.036	0.50	ug/l	50.0	61.4	103	70-130	0.8	30	
Zinc, Dissolved	225	0.50	5.0	ug/l	50.0	171	107	70-130	2	30	

Batch W4D0509 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0509-BLK1)					Analyzed: 04/10/14 16:47						
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0509-BS1)					Analyzed: 04/10/14 16:48						
Zinc, Dissolved	46.1	0.50	5.0	ug/l	50.0		92	85-115			
Matrix Spike (W4D0509-MS1)		**Source: 4D08038-BL**			Analyzed: 04/10/14 16:49						
Zinc, Dissolved	549	0.50	5.0	ug/l	50.0	486	125	70-130			
Matrix Spike (W4D0509-MS2)		**Source: 4D08038-AX**			Analyzed: 04/10/14 16:52						
Zinc, Dissolved	112	0.50	5.0	ug/l	50.0	66.7	92	70-130			
Matrix Spike Dup (W4D0509-MSD1)		**Source: 4D08038-BL**			Analyzed: 04/10/14 16:51						
Zinc, Dissolved	514	0.50	5.0	ug/l	50.0	486	55	70-130	7	30	MS-02
Matrix Spike Dup (W4D0509-MSD2)		**Source: 4D08038-AX**			Analyzed: 04/10/14 16:53						
Zinc, Dissolved	112	0.50	5.0	ug/l	50.0	66.7	91	70-130	0.01	30	

Batch W4D0515 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0515-BLK1)					Analyzed: 04/11/14 15:51						
Copper, Dissolved	0.122	0.036	0.50	ug/l							J
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0515-BS1)					Analyzed: 04/11/14 15:52						
Copper, Dissolved	47.4	0.036	0.50	ug/l	50.0		95	85-115			
Zinc, Dissolved	48.3	0.50	5.0	ug/l	50.0		97	85-115			
Matrix Spike (W4D0515-MS1)		**Source: 4D08038-DD**			Analyzed: 04/11/14 15:54						
Copper, Dissolved	108	0.036	0.50	ug/l	50.0	59.7	96	70-130			
Zinc, Dissolved	192	0.50	5.0	ug/l	50.0	143	99	70-130			
Matrix Spike (W4D0515-MS2)		**Source: 4D08038-CP**			Analyzed: 04/11/14 15:56						
Copper, Dissolved	77.8	0.036	0.50	ug/l	50.0	34.6	86	70-130			
Zinc, Dissolved	48.9	0.50	5.0	ug/l	50.0	3.02	92	70-130			

Metals by EPA 200 Series Methods - Quality Control

Batch W4D0515 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Matrix Spike (W4D0515-MS2)			**Source: 4D08038-CP**		Analyzed: 04/11/14 15:56						
Matrix Spike Dup (W4D0515-MSD1)			**Source: 4D08038-DD**		Analyzed: 04/11/14 15:55						
Copper, Dissolved	106	0.036	0.50	ug/l	50.0	59.7	92	70-130	2	30	
Zinc, Dissolved	189	0.50	5.0	ug/l	50.0	143	93	70-130	2	30	
Matrix Spike Dup (W4D0515-MSD2)			**Source: 4D08038-CP**		Analyzed: 04/11/14 15:57						
Copper, Dissolved	83.6	0.036	0.50	ug/l	50.0	34.6	98	70-130	7	30	
Zinc, Dissolved	51.6	0.50	5.0	ug/l	50.0	3.02	97	70-130	5	30	

Batch W4D0516 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0516-BLK1)					Analyzed: 04/10/14 17:49						
Copper, Dissolved	ND	0.036	0.50	ug/l							
Zinc, Dissolved	ND	0.50	5.0	ug/l							
LCS (W4D0516-BS1)					Analyzed: 04/10/14 17:50						
Copper, Dissolved	45.9	0.036	0.50	ug/l	50.0		92	85-115			
Zinc, Dissolved	45.7	0.50	5.0	ug/l	50.0		91	85-115			
Matrix Spike (W4D0516-MS1)			**Source: 4D08038-CF**		Analyzed: 04/10/14 17:51						
Copper, Dissolved	101	0.036	0.50	ug/l	50.0	57.9	85	70-130			
Zinc, Dissolved	67.4	0.50	5.0	ug/l	50.0	21.7	91	70-130			
Matrix Spike (W4D0516-MS2)			**Source: 4D08038-BS**		Analyzed: 04/10/14 17:54						
Copper, Dissolved	55.9	0.036	0.50	ug/l	50.0	7.60	97	70-130			
Zinc, Dissolved	158	0.50	5.0	ug/l	50.0	101	113	70-130			
Matrix Spike Dup (W4D0516-MSD1)			**Source: 4D08038-CF**		Analyzed: 04/10/14 17:52						
Copper, Dissolved	101	0.036	0.50	ug/l	50.0	57.9	86	70-130	0.2	30	
Zinc, Dissolved	66.4	0.50	5.0	ug/l	50.0	21.7	89	70-130	2	30	
Matrix Spike Dup (W4D0516-MSD2)			**Source: 4D08038-BS**		Analyzed: 04/10/14 17:55						
Copper, Dissolved	54.1	0.036	0.50	ug/l	50.0	7.60	93	70-130	3	30	
Zinc, Dissolved	154	0.50	5.0	ug/l	50.0	101	107	70-130	2	30	

Batch W4D0517 - EPA 200.8

Analyte	Result	MDL	MRL	Units	Spike Level	Source Result	%REC	% REC Limits	RPD	RPD Limit	Data Qualifiers
Blank (W4D0517-BLK1)					Analyzed: 04/10/14 18:30						
Copper, Dissolved	ND	0.036	0.50	ug/l							
LCS (W4D0517-BS1)					Analyzed: 04/10/14 18:31						
Copper, Dissolved	47.3	0.036	0.50	ug/l	50.0		95	85-115			
Matrix Spike (W4D0517-MS1)			**Source: 4D08038-CJ**		Analyzed: 04/10/14 18:33						
Copper, Dissolved	410	0.036	0.50	ug/l	50.0	374	71	70-130			
Matrix Spike Dup (W4D0517-MSD1)			**Source: 4D08038-CJ**		Analyzed: 04/10/14 18:34						
Copper, Dissolved	405	0.036	0.50	ug/l	50.0	374	61	70-130	1	30	MS-02

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Notes and Definitions

MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
J	Estimated conc. detected <MRL and >MDL.
ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL)
NR	Not Reportable
Dil	Dilution
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
% Rec	Percent Recovery
Sub	Subcontracted analysis, original report available upon request
MDL	Method Detection Limit
MDA	Minimum Detectable Activity
MRL	Method Reporting Limit

Any remaining sample(s) will be disposed of one month from the final report date unless other arrangements are made in advance.

An Absence of Total Coliform meets the drinking water standards as established by the California Department of Health Services.

The Reporting Limit (RL) is referenced as the Laboratory's Practical Quantitation Limit (PQL) or the Detection Limit for Reporting Purposes (DLR).

All samples collected by Weck Laboratories have been sampled in accordance to laboratory SOP Number MIS002.

APPENDIX F

Reference Toxicant
Raw Data and Statistical Summaries

CETIS Summary Report

Report Date:	29 Apr-14 14:44 (p 1 of 2)
Test Code:	140405cdra | 12-2396-8429

Ceriodaphnia 96-h Acute Survival Test **Nautilus Environmental (CA)**

Batch ID:	15-9235-8604	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	05 Apr-14 17:40	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Diluted Mineral Water (8:2)
Ending Date:	09 Apr-14 16:10	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	94h	**Source:**	In-House Culture	**Age:**	<24h

Sample ID:	14-5276-7277	**Code:**	140405cdra	**Client:**	Internal
Sample Date:	05 Apr-14	**Material:**	Copper chloride	**Project:**	
Receive Date:	05 Apr-14	**Source:**	Reference Toxicant		
Sample Age:	18h	**Station:**	Copper Chloride		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-1018-9279	48h Survival Rate	10	20	14.14	49.7%		Dunnett Multiple Comparison Test
16-2157-7693	96h Survival Rate	10	20	14.14	49.7%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
18-8797-5682	48h Survival Rate	EC50	14.46	11.49	18.19		Trimmed Spearman-Kärber
15-7737-2066	96h Survival Rate	EC50	14.46	11.49	18.19		Trimmed Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
15-7737-2066	96h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
16-2157-7693	96h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1	1	1	1	1	0	0	0.0%	0.0%
5		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
10		4	0.7	0.557	0.843	0.2	1	0.1915	0.383	54.71%	30.0%
20		4	0.35	0.1735	0.5265	0	1	0.2363	0.4726	135.0%	65.0%
40		4	0	0	0	0	0	0	0		100.0%
80		4	0	0	0	0	0	0	0		100.0%

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1	1	1	1	1	0	0	0.0%	0.0%
5		4	0.95	0.9127	0.9873	0.8	1	0.05	0.1	10.53%	5.0%
10		4	0.7	0.557	0.843	0.2	1	0.1915	0.383	54.71%	30.0%
20		4	0.35	0.1735	0.5265	0	1	0.2363	0.4726	135.0%	65.0%
40		4	0	0	0	0	0	0	0		100.0%
80		4	0	0	0	0	0	0	0		100.0%

Analyst: QA: KB 5/1/14

CETIS Summary Report

Report Date: 29 Apr-14 14:44 (p 2 of 2)
Test Code: 140405cdra | 12-2396-8429

Ceriodaphnia 96-h Acute Survival Test **Nautilus Environmental (CA)**

48h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1	1	1	1
5		0.8	1	1	1
10		0.2	0.6	1	1
20		0	0	0.4	1
40		0	0	0	0
80		0	0	0	0

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1	1	1	1
5		0.8	1	1	1
10		0.2	0.6	1	1
20		0	0	0.4	1
40		0	0	0	0
80		0	0	0	0

Analyst: QA: KB 5/1/14

CETIS Analytical Report

Report Date: 29 Apr-14 14:44 (p 1 of 4)
Test Code: 140405cdra | 12-2396-8429

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID:	07-1018-9279	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	29 Apr-14 14:43	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	10	20	14.14		49.7%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		5	0.2445	2.287	0.557	6	0.6555	CDF	Non-Significant Effect
		10	1.377	2.287	0.557	6	0.2081	CDF	Non-Significant Effect
		20*	2.978	2.287	0.557	6	0.0148	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.312406	0.4374686	3	3.69	0.0432	Significant Effect
Error	1.422681	0.1185567	12			
Total	2.735087		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	3.682	5.953	0.0434	Equal Variances
Variances	Levene Equality of Variance	5.452	5.953	0.0134	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9297	0.8408	0.2415	Normal Distribution

48h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1	1	1	1	1	1	0	0.0%	0.0%
5		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
10		4	0.7	0.09061	1	0.8	0.2	1	0.1915	54.71%	30.0%
20		4	0.35	0	1	0.2	0	1	0.2363	135.0%	65.0%
40		4	0	0	0	0	0	0	0		100.0%
80		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
5		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
10		4	1.01	0.3358	1.684	1.116	0.4636	1.345	0.2119	41.95%	24.92%
20		4	0.6203	-0.2225	1.463	0.4551	0.2255	1.345	0.2648	85.39%	53.89%
40		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%
80		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%

Analyst: AD QA: KB 5/1/14

CETIS Analytical Report

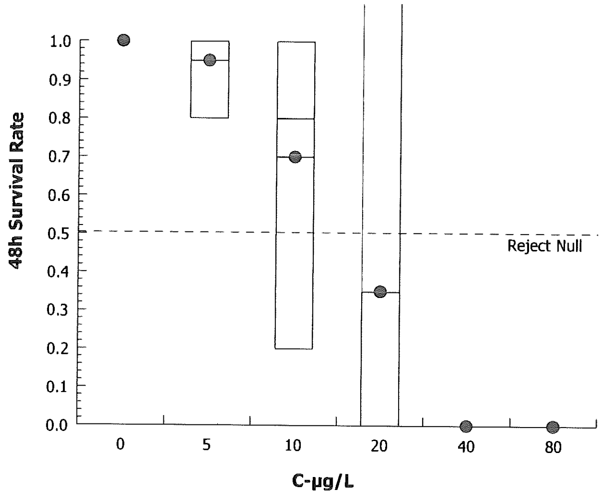
Report Date: 29 Apr-14 14:44 (p 2 of 4)
Test Code: 140405cdra | 12-2396-8429

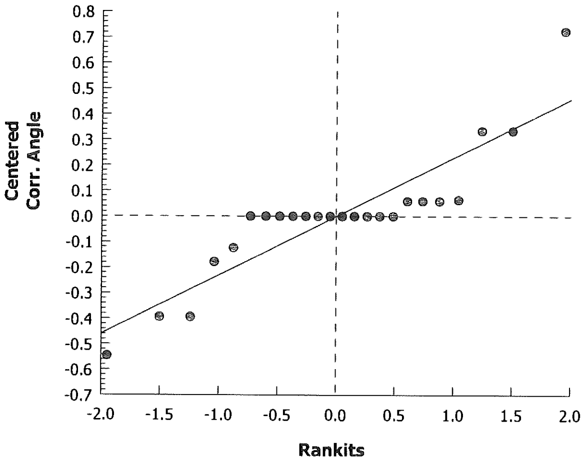
Ceriodaphnia 96-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID:	07-1018-9279	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	29 Apr-14 14:43	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Analyst: AD QA: KB 5/1/14

CETIS Analytical Report

Report Date: 29 Apr-14 14:44 (p 3 of 4)
Test Code: 140405cdra | 12-2396-8429

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Analysis ID: 16-2157-7693
Analyzed: 29 Apr-14 14:43
Endpoint: 96h Survival Rate
Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	10	20	14.14		49.7%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		5	0.2445	2.287	0.557	6	0.6555	CDF	Non-Significant Effect
		10	1.377	2.287	0.557	6	0.2081	CDF	Non-Significant Effect
		20*	2.978	2.287	0.557	6	0.0148	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.312406	0.4374686	3	3.69	0.0432	Significant Effect
Error	1.422681	0.1185567	12			
Total	2.735087		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	3.682	5.953	0.0434	Equal Variances
Variances	Levene Equality of Variance	5.452	5.953	0.0134	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9297	0.8408	0.2415	Normal Distribution

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1	1	1	1	1	1	0	0.0%	0.0%
5		4	0.95	0.7909	1	1	0.8	1	0.05	10.53%	5.0%
10		4	0.7	0.09061	1	0.8	0.2	1	0.1915	54.71%	30.0%
20		4	0.35	0	1	0.2	0	1	0.2363	135.0%	65.0%
40		4	0	0	0	0	0	0	0		100.0%
80		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
5		4	1.286	1.096	1.475	1.345	1.107	1.345	0.05953	9.26%	4.43%
10		4	1.01	0.3358	1.684	1.116	0.4636	1.345	0.2119	41.95%	24.92%
20		4	0.6203	-0.2225	1.463	0.4551	0.2255	1.345	0.2648	85.39%	53.89%
40		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%
80		4	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%

Analyst: AD QA: KB 5/1/14

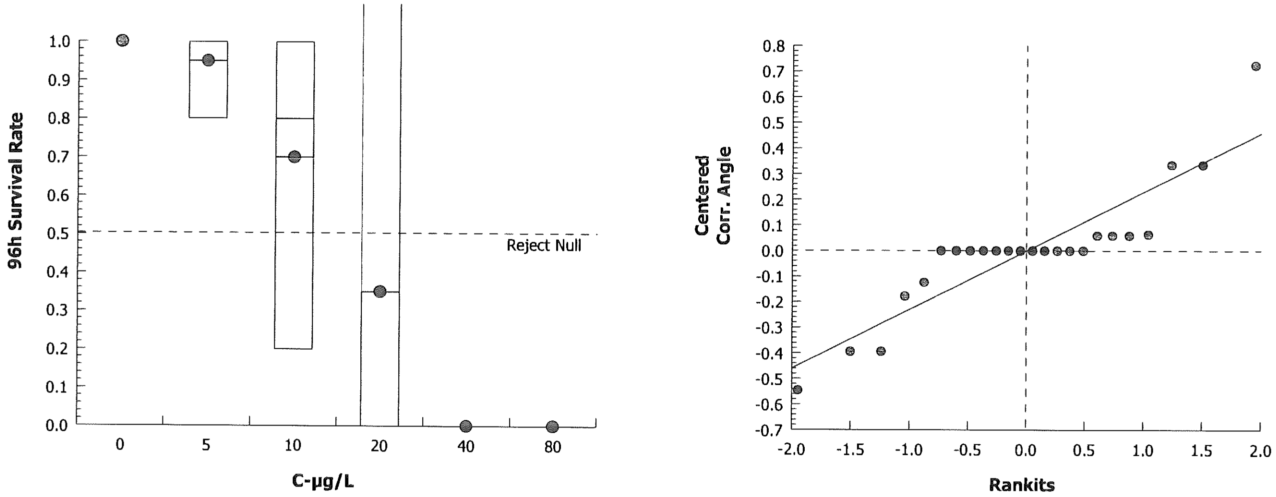
CETIS Analytical Report

Report Date: 29 Apr-14 14:44 (p 4 of 4)
Test Code: 140405cdra | 12-2396-8429

Ceriodaphnia 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID:	16-2157-7693	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	29 Apr-14 14:43	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics



Analyst: KD QA: KBS 1/1/14

CETIS Analytical Report

Report Date: 29 Apr-14 14:44 (p 1 of 2)
Test Code: 140405cdra | 12-2396-8429

Ceriodaphnia 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 18-8797-5682 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 29 Apr-14 14:43 **Analysis:** Trimmed Spearman-Kärber **Official Results:** Yes

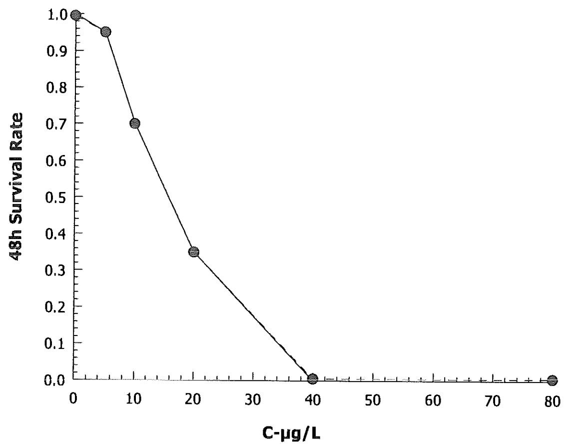
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	5.00%	1.16	0.04988	14.46	11.49	18.19

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Lab Control	4	1	1	1	0	0	0.0%	0.0%	20	20
5		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
10		4	0.7	0.2	1	0.1915	0.383	54.71%	30.0%	14	20
20		4	0.35	0	1	0.2363	0.4726	135.0%	65.0%	7	20
40		4	0	0	0	0	0		100.0%	0	20
80		4	0	0	0	0	0		100.0%	0	20

Graphics



Analyst:

QA: KB 5/1/14

CETIS Analytical Report

Report Date: 29 Apr-14 14:44 (p 2 of 2)
Test Code: 140405cdra | 12-2396-8429

Ceriodaphnia 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 15-7737-2066 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 29 Apr-14 14:43 **Analysis:** Trimmed Spearman-Kärber **Official Results:** Yes

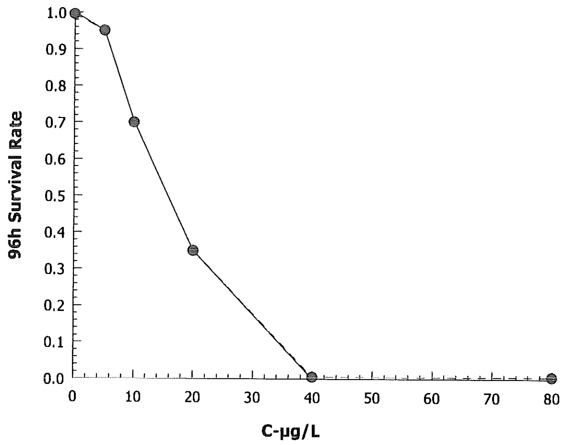
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	5.00%	1.16	0.04988	14.46	11.49	18.19

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	4	1	1	1	0	0	0.0%	0.0%	20	20
5		4	0.95	0.8	1	0.05	0.1	10.53%	5.0%	19	20
10		4	0.7	0.2	1	0.1915	0.383	54.71%	30.0%	14	20
20		4	0.35	0	1	0.2363	0.4726	135.0%	65.0%	7	20
40		4	0	0	0	0	0		100.0%	0	20
80		4	0	0	0	0	0		100.0%	0	20

Graphics



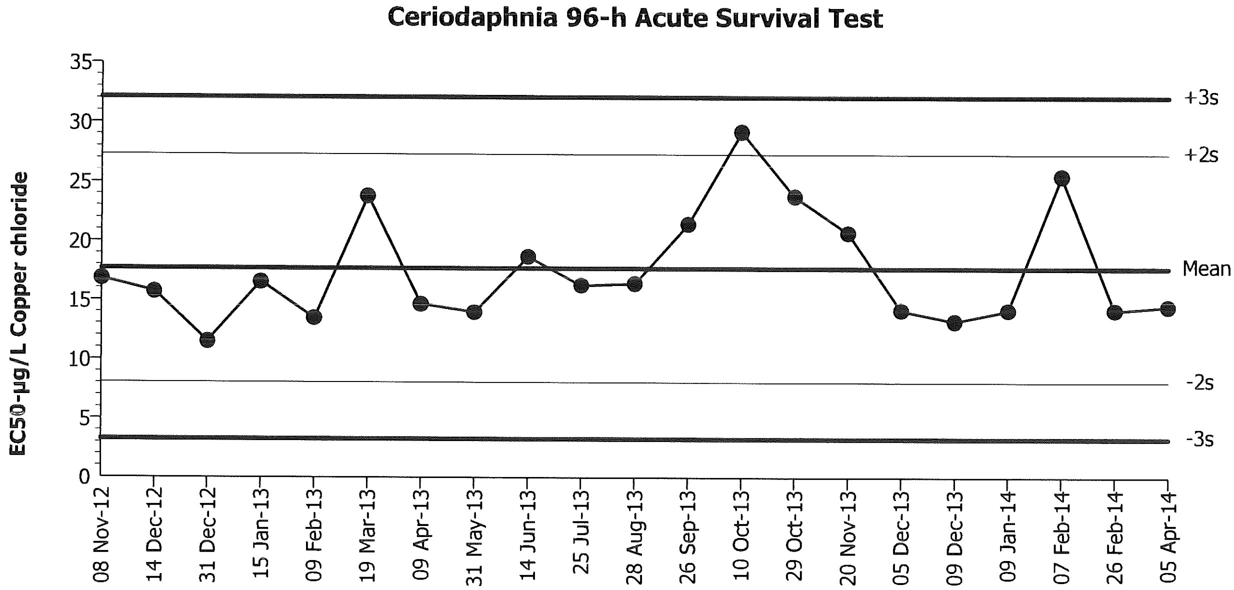
Analyst: QA: KB 5/1/14

CETIS QC Plot

Report Date: 29 Apr-14 15:13 (1 of 1)

Ceriodaphnia 96-h Acute Survival Test **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Ceriodaphnia dubia (Water Flea)	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	48h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	17.69	**Count:**	20	**-2s Warning Limit:**	8.078	**-3s Action Limit:**	3.272
Sigma:	4.806	**CV:**	27.20%	**+2s Warning Limit:**	27.3	**+3s Action Limit:**	32.11

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	Nov	8	16.82	-0.8721	-0.1815			03-8047-4826	07-0416-5998
2		Dec	14	15.69	-1.998	-0.4158			14-1353-6910	19-9536-7149
3			31	11.49	-6.203	-1.291			07-8089-7984	11-9567-4641
4	2013	Jan	15	16.53	-1.161	-0.2416			13-7870-9517	04-7172-4165
5		Feb	9	13.46	-4.231	-0.8804			19-2410-8251	21-0724-7805
6		Mar	19	23.78	6.094	1.268			10-6471-3583	16-2730-9117
7		Apr	9	14.64	-3.049	-0.6344			00-3565-4216	05-8800-9604
8		May	31	13.96	-3.728	-0.7757			06-8524-3194	11-9129-9477
9		Jun	14	18.66	0.9707	0.202			20-0171-3795	06-0059-7715
10		Jul	25	16.25	-1.445	-0.3007			14-2711-7917	04-7767-5592
11		Aug	28	16.38	-1.312	-0.273			06-3447-1947	11-5166-3772
12		Sep	26	21.44	3.745	0.7793			15-7384-3544	20-7614-9890
13		Oct	10	29.19	11.5	2.393	(+)		08-2255-0327	05-6295-1855
14			29	23.78	6.094	1.268			20-0481-4448	16-8856-2964
15		Nov	20	20.71	3.015	0.6274			01-2258-9023	13-7959-0500
16		Dec	5	14.14	-3.548	-0.7382			17-9365-5209	12-2428-8433
17			9	13.2	-4.495	-0.9353			09-8523-6679	03-5573-0127
18	2014	Jan	9	14.14	-3.548	-0.7382			21-1051-7321	11-5393-9677
19		Feb	7	25.49	7.801	1.623			10-8127-6886	09-0136-9277
20			26	14.14	-3.548	-0.7382			08-4244-9349	11-4770-3766
21		Apr	5	14.46	-3.233	-0.6727			12-2396-8429	18-8797-5682

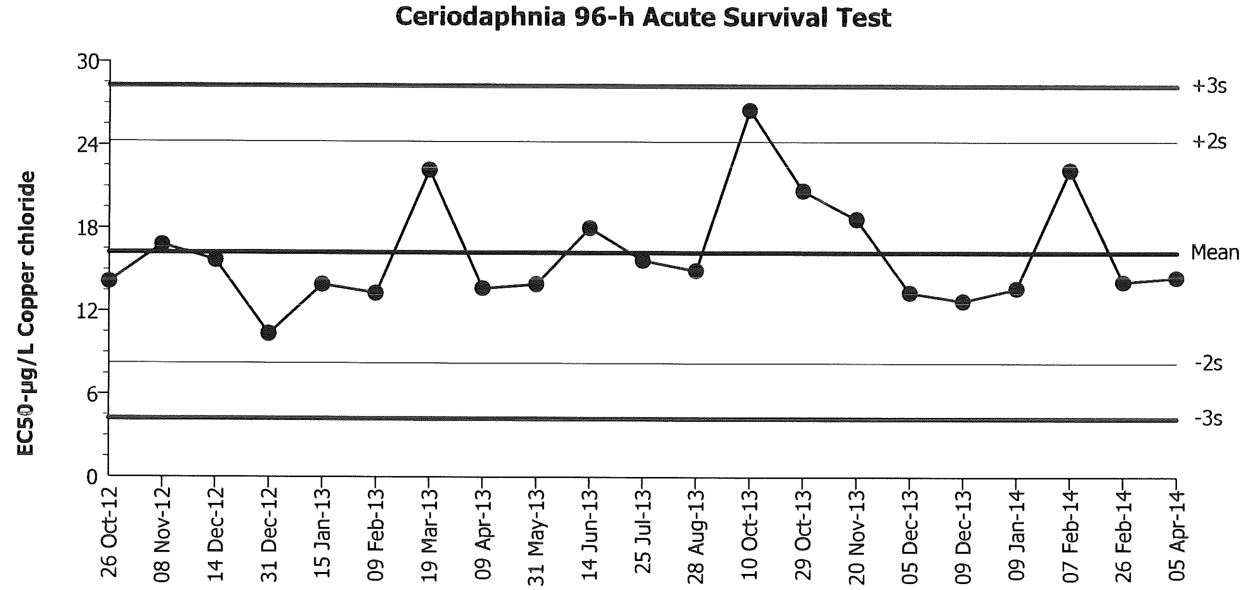
Analyst: QA: KB 5/1/14

CETIS QC Plot

Report Date: 29 Apr-14 15:13 (1 of 1)

Ceriodaphnia 96-h Acute Survival Test **Nautilus Environmental (CA)**

Test Type: Survival (96h)
Protocol: EPA/821/R-02-012 (2002)
Organism: Ceriodaphnia dubia (Water Flea)
Endpoint: 96h Survival Rate
Material: Copper chloride
Source: Reference Toxicant-REF



Mean: 16.24 **Count:** 20 **-2s Warning Limit:** 8.232 **-3s Action Limit:** 4.228
Sigma: 4.004 **CV:** 24.70% **+2s Warning Limit:** 24.25 **+3s Action Limit:** 28.25

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	Oct	26	14.14	-2.098	-0.5239			20-1209-8297	09-6559-6038
2		Nov	8	16.82	0.5779	0.1443			03-8047-4826	16-6328-7947
3		Dec	14	15.69	-0.5483	-0.1369			14-1353-6910	00-5819-1589
4			31	10.35	-5.887	-1.47			07-8089-7984	09-8530-1304
5	2013	Jan	15	13.94	-2.301	-0.5746			13-7870-9517	08-1812-9908
6		Feb	9	13.3	-2.937	-0.7335			19-2410-8251	15-4116-9360
7		Mar	19	22.19	5.951	1.486			10-6471-3583	16-1855-5213
8		Apr	9	13.66	-2.58	-0.6443			00-3565-4216	04-2431-2063
9		May	31	13.96	-2.278	-0.569			06-8524-3194	18-1400-9507
10		Jun	14	18.03	1.785	0.4458			20-0171-3795	04-7820-9302
11		Jul	25	15.69	-0.5483	-0.1369			14-2711-7917	06-7324-2929
12		Aug	28	14.94	-1.298	-0.3243			06-3447-1947	05-2836-9857
13		Oct	10	26.53	10.29	2.569	(+)		08-2255-0327	02-4903-6573
14			29	20.71	4.465	1.115			20-0481-4448	18-5138-3015
15		Nov	20	18.66	2.421	0.6046			01-2258-9023	15-7984-4805
16		Dec	5	13.36	-2.877	-0.7186			17-9365-5209	03-5376-1883
17			9	12.75	-3.494	-0.8727			09-8523-6679	02-0199-9273
18	2014	Jan	9	13.66	-2.58	-0.6443			21-1051-7321	20-7176-3590
19		Feb	7	22.19	5.951	1.486			10-8127-6886	21-4717-1140
20			26	14.14	-2.098	-0.5239			08-4244-9349	09-8213-9953
21		Apr	5	14.46	-1.783	-0.4454			12-2396-8429	15-7737-2066

Analyst: AP QA: KB 5/1/14

Item 10
Supporting Document No. 2
December 14, 2016

96-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: Internal
Sample ID: $CuCl_2$
Test No.: **140405cdra**

Test Species: *C. dubia*
Start Date/Time: 4/5/2014 1740
End Date/Time: 4/9/2014 1610

Cu stock concentration (µg/L): 9270

	Tech Initials				
	0	24	48	72	96
Counts:	AB	BK	CL	CL	ML
Readings:	AB	AB	AD	BG	AB
Dilutions made by:	ML	--	CL	--	--
High conc. made (µg/L):	80	--	20	--	--
Vol. Cu stock added (mL):	3.5	--	0.9	--	--
Final Volume (mL):	400	--	400	--	--

Concentration µg/L	Rand #	Number of Live Organisms					Conductivity (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	6	5	5	5	5	5	202	206	i 198	201	~~204~~	21.0	20.1	i 20.8	20.6	20.7	7.6	8.5	i 7.7	8.5	8.7	8.23	8.06	i 8.20	8.12	8.11
	16	5	5	5	5	5			f 223		218			f 20.1					f 7.3					f 7.88		
	5	5	5	5	5	5																				
	15	5	5	5	5	5																				
5	24	5	5	4	4	4	198	202	i 197	199	~~201~~	20.2	20.5	i 20.7	20.8	20.8	7.9	8.2	i 7.7	8.6	8.8	8.25	~~8.21~~	i 8.21	8.11	8.15
	21	5	5	5	5	5			f 220		227			f 20.1					f 7.1				8.10	f 8.04		
	9	5	5	5	5	5																				
	1	5	5	5	5	5																				
10	2	5	3	1	1	1	195	198	i 196	197	~~199~~	19.3	20.4	i 20.7	20.8	20.7	7.9	8.2	i 7.8	8.6	8.9	8.23	8.14	i 8.21	8.13	8.16
	4	5	4	3	3	3			f 219		216			f 20.1					f 7.0					f 8.02		
	13	5	5	5	5	5																				
	12	5	5	5	5	5																				
20	22	5	0	–	–	–	~~196~~	201	i 197	197	~~198~~	19.0	20.4	i 20.7	20.6	20.8	7.9	8.3	i 7.8	8.7	8.9	8.26	8.10	i 8.21	8.13	8.17
	17	5	0	–	–	–	195		f 218		210			f 20.1					f 7.0					f 8.05		
	10	5	2	2	2	2																				
	20	5	5	5	5	5																				
40	23	5	0				194	198	i —	—	—	19.2	20.4	i —	—	—	7.7	8.3	i —	—	—	8.28	8.08	i —	—	—
	11	5	0						f –					f –					f –					f –		
	18	5	0																							
	8	5	0																							
80	19	5	0				193	198	i —	—	—	19.0	20.5	i —	—	—	8.0	8.3	i —	—	—	8.29	8.08	i —	—	—
	7	5	0						f –					f –					f –					f –		
	3	5	0																							
	14	5	0																							

Initial Counts QC'd by: ML

Animal Source/Date Received: Internal / NA

Age at Initiation: < 24 hr

	Feeding Times				
	0	24	48	72	96
AM:	--	--	1600	--	--
PM:	--	--	--	--	--

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: AD 4/29/14

Final Review: KB 5/1/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

CETIS Summary Report

Report Date: 07 May-14 08:55 (p 1 of 1)
Test Code: 140404ppra | 13-2870-2407

Fathead Minnow 96-h Acute Survival Test

Nautilus Environmental (CA)

Batch ID:	07-0319-4650	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	04 Apr-14 17:55	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Diluted Mineral Water (8:2)
Ending Date:	08 Apr-14 15:55	**Species:**	Pimephales promelas	**Brine:**	Not Applicable
Duration:	94h	**Source:**	Aquatic Biosystems, CO	**Age:**	4 d

Sample ID:	11-3452-9702	**Code:**	140404ppra	**Client:**	Internal
Sample Date:	04 Apr-14	**Material:**	Copper chloride	**Project:**	
Receive Date:	04 Apr-14	**Source:**	Reference Toxicant		
Sample Age:	18h	**Station:**	Copper Chloride		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
13-4277-2615	96h Survival Rate	<15	15	NA	11.6%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
20-2803-8732	96h Survival Rate	EC50	16.56	9.623	28.5		Trimmed Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
13-4277-2615	96h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
20-2803-8732	96h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1	1	1	1	1	0	0	0.0%	0.0%
15		4	0.525	0.478	0.572	0.4	0.7	0.06292	0.1258	23.97%	47.5%
30		4	0.35	0.3284	0.3716	0.3	0.4	0.02887	0.05774	16.5%	65.0%
60		4	0.275	0.228	0.322	0.1	0.4	0.06292	0.1258	45.76%	72.5%
120		4	0.05	0.01266	0.08734	0	0.2	0.05	0.1	200.0%	95.0%
240		4	0.025	0.00633	0.04367	0	0.1	0.025	0.05	200.0%	97.5%

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1	1	1	1
15		0.7	0.5	0.5	0.4
30		0.4	0.3	0.4	0.3
60		0.3	0.3	0.4	0.1
120		0.2	0	0	0
240		0	0	0.1	0

Analyst: PG QA: KFP 5/8/14

CETIS Analytical Report

Report Date: 07 May-14 08:54 (p 1 of 2)
Test Code: 140404ppra | 13-2870-2407

Fathead Minnow 96-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID: 13-4277-2615
Analyzed: 30 Apr-14 13:49
Endpoint: 96h Survival Rate
Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.4
Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	<15	15	NA		11.6%

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Control		15*	7.643	2.407	0.189	6	<0.0001	CDF	Significant Effect
		30*	9.929	2.407	0.189	6	<0.0001	CDF	Significant Effect
		60*	11.08	2.407	0.189	6	<0.0001	CDF	Significant Effect
		120*	14.99	2.407	0.189	6	<0.0001	CDF	Significant Effect
		240*	15.44	2.407	0.189	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.973164	0.7946327	5	64.4	<0.0001	Significant Effect
Error	0.2220925	0.01233847	18			
Total	4.195256		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.4782	4.248	0.7878	Equal Variances
Variances	Levene Equality of Variance	2.095	4.248	0.1133	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9519	0.884	0.2982	Normal Distribution

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1	1	1	1	1	1	0	0.0%	0.0%
15		4	0.525	0.3248	0.7252	0.5	0.4	0.7	0.06292	23.97%	47.5%
30		4	0.35	0.2581	0.4419	0.35	0.3	0.4	0.02887	16.5%	65.0%
60		4	0.275	0.07478	0.4752	0.3	0.1	0.4	0.06292	45.76%	72.5%
120		4	0.05	0	0.2091	0	0	0.2	0.05	200.0%	95.0%
240		4	0.025	0	0.1046	0	0	0.1	0.025	200.0%	97.5%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
15		4	0.8117	0.6068	1.017	0.7854	0.6847	0.9912	0.06436	15.86%	42.52%
30		4	0.6322	0.5356	0.7287	0.6322	0.5796	0.6847	0.03033	9.6%	55.23%
60		4	0.5414	0.2954	0.7875	0.5796	0.3218	0.6847	0.0773	28.56%	61.66%
120		4	0.235	-0.00756	0.4776	0.1588	0.1588	0.4636	0.07622	64.87%	83.36%
240		4	0.1995	0.06986	0.3292	0.1588	0.1588	0.3218	0.04074	40.84%	85.87%

Analyst: AG QA: VPP 5/8/14

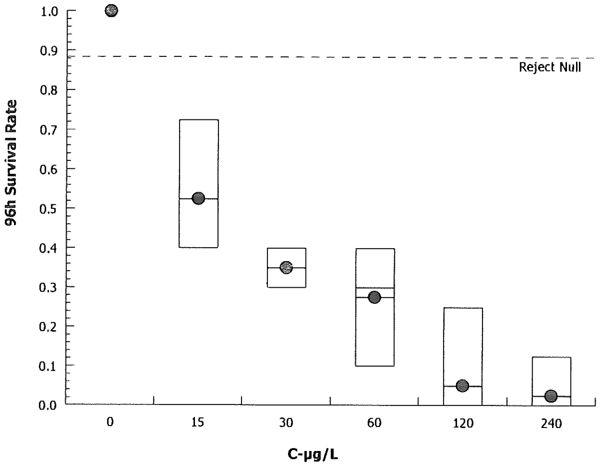
CETIS Analytical Report

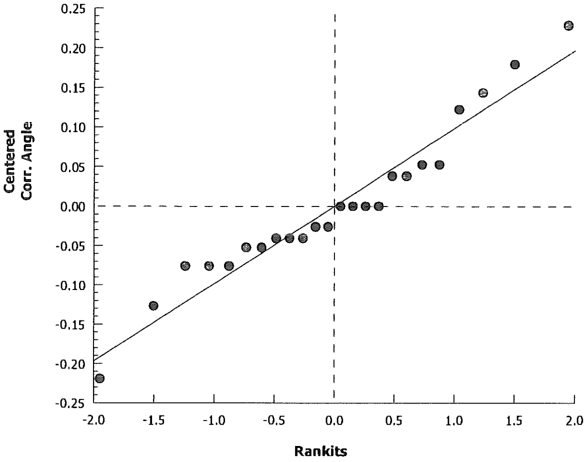
Report Date: 07 May-14 08:54 (p 2 of 2)
Test Code: 140404ppra | 13-2870-2407

Fathead Minnow 96-h Acute Survival Test **Nautilus Environmental (CA)**

Analysis ID: 13-4277-2615 **Endpoint:** 96h Survival Rate **CETIS Version:** CETISv1.8.4
Analyzed: 30 Apr-14 13:49 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Graphics





Analyst: AC QA: TP 5/8/14

CETIS Analytical Report

Report Date: 07 May-14 08:54 (p 1 of 1)
Test Code: 140404ppra | 13-2870-2407

Fathead Minnow 96-h Acute Survival Test

Nautilus Environmental (CA)

Analysis ID:	20-2803-8732	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	07 May-14 8:53	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes

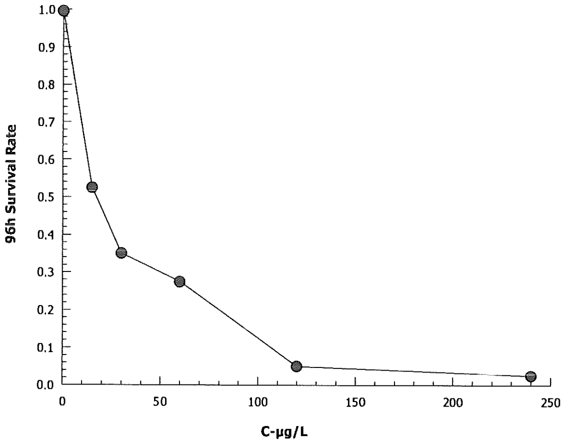
Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	47.50%	1.219	0.1179	16.56	9.623	28.5

96h Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	4	1	1	1	0	0	0.0%	0.0%	40	40
15		4	0.525	0.4	0.7	0.06292	0.1258	23.97%	47.5%	21	40
30		4	0.35	0.3	0.4	0.02887	0.05774	16.5%	65.0%	14	40
60		4	0.275	0.1	0.4	0.06292	0.1258	45.76%	72.5%	11	40
120		4	0.05	0	0.2	0.05	0.1	200.0%	95.0%	2	40
240		4	0.025	0	0.1	0.025	0.05	200.0%	97.5%	1	40

Graphics



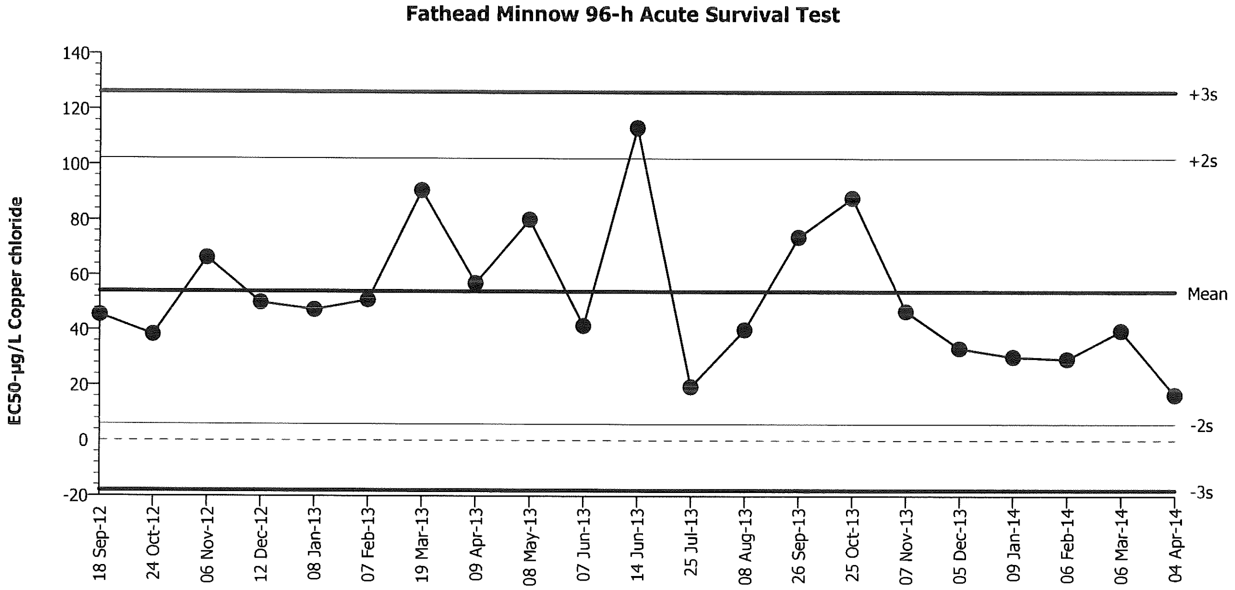
Analyst: AG QA: KFP 5/8/14

CETIS QC Plot

Report Date: 07 May-14 08:57 (1 of 1)

Fathead Minnow 96-h Acute Survival Test **Nautilus Environmental (CA)**

Test Type:	Survival (96h)	**Organism:**	Pimephales promelas (Fathead Minn	**Material:**	Copper chloride
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	54.12	**Count:**	20	**-2s Warning Limit:**	6	**-3s Action Limit:**	-18.06
Sigma:	24.06	**CV:**	44.50%	**+2s Warning Limit:**	102.2	**+3s Action Limit:**	126.3

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	Sep	18	45.47	-8.648	-0.3595			03-7324-5238	07-2495-3719
2		Oct	24	38.31	-15.81	-0.6569			15-5534-6601	17-3954-0150
3		Nov	6	66.3	12.18	0.5063			19-8626-1933	10-1220-1632
4		Dec	12	50.03	-4.092	-0.1701			12-2505-7092	06-6285-2881
5	2013	Jan	8	47.41	-6.712	-0.279			09-0163-8584	14-2831-1962
6		Feb	7	50.91	-3.212	-0.1335			13-3672-3186	03-4769-9398
7		Mar	19	90.61	36.49	1.517			03-4036-4475	02-4239-3431
8		Apr	9	57.02	2.901	0.1206			16-8647-5080	12-4676-3943
9		May	8	80.06	25.94	1.078			19-1592-9946	17-2518-1805
10		Jun	7	41.57	-12.55	-0.5216			17-3834-7224	19-4169-5477
11			14	113.3	59.14	2.458	(+)		17-7397-7812	04-4118-6028
12		Jul	25	19.45	-34.67	-1.441			15-5655-6546	05-5718-6047
13		Aug	8	40.22	-13.9	-0.5776			13-0830-2092	10-6018-8953
14		Sep	26	73.87	19.75	0.8208			05-5338-1656	19-8865-3276
15		Oct	25	87.93	33.81	1.405			06-2074-4647	16-2031-6920
16		Nov	7	46.88	-7.24	-0.3009			00-9091-1171	05-3514-4061
17		Dec	5	33.43	-20.69	-0.8599			03-5498-7590	18-6731-8860
18	2014	Jan	9	30.36	-23.76	-0.9875			02-9671-4557	13-7041-2345
19		Feb	6	29.54	-24.58	-1.022			01-4932-9675	02-7759-7858
20		Mar	6	39.82	-14.3	-0.5942			15-7137-9679	11-6247-2364
21		Apr	4	16.56	-37.56	-1.561			13-2870-2407	20-2803-8732

Analyst: AG QA: HFP 5/8/14

96-hour Freshwater Acute Bioassay
Static-Renewal Conditions

Water Quality Measurements
& Test Organism Survival

Client: Internal
Sample ID: $CuCl_2$
Test No.: 140404ppro

Test Species: *P. promelas*
Start Date/Time: 4/4/2014 1755
End Date/Time: 4/8/2014 1555

	Tech Initials				
	0	24	48	72	96
Counts:	SD	BG	LN	BK	ML
Readings:	MK	BG	AB	AD	BG
Dilutions made by:	CL	–	SG	–	–
High conc. made (µg/L):	240	--	240	--	--
Vol. Cu stock added (mL):	5.2	--	5.2	--	--
Final Volume (mL):	2000	--	2000	--	--

Cu stock concentration (µg/L): 91,600

Concentration µg/L	RAND #	Number of Live Organisms					Conductivity (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (units)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Lab Control	19	10	10	10	10	10	195	241	i 195	211	213	19.6	20.0	i 20.4	20.0	20.0	8.3	8.0	i 7.9	8.2	8.1	8.06	7.96	i 8.14	7.98	7.83
	4	10	10	10	10	10			f 242					f 20.0					f 8.0					f 7.84		
	21	10	10	10	10	10																				
	24	10	10	10	10	10																				
15	11	10	10	9	8	7	195	204	i 196	202	203	19.9	19.8	i 20.3	19.9	19.8	8.3	8.3	i 7.9	8.5	8.4	8.06	7.99	i 8.15	8.03	7.91
	13	10	10	8	5	5			f 205					f 20.0					f 8.5					f 7.94		
	20	10	10	8	6	5																				
	10	10	9	6	5	4																				
30	18	10	10	7	5	4	195	203	i 196	201	202	20.0	19.9	i 20.2	19.6	19.9	8.3	8.1	i 8.0	8.6	8.5	8.07	7.99	i 8.16	8.06	8.00
	3	10	10	6	5	3			f 205					f 20.6					f 8.3					f 7.94		
	8	10	10	6	5	4																				
	15	10	10	6	4	3																				
60	2	10	9	4	3	3	195	202	i 196	201	205	20.3	19.8	i 20.3	19.6	19.5	8.3	8.3	i 8.0	8.7	8.7	8.07	8.00	i 8.17	8.08	8.06
	14	10	10	3	3	3			f 204					f 19.6					f 8.5					f 7.94		
	22	10	9	6	4	4																				
	16	10	10	3	2	1																				
120	12	10	8	2	2	2	195	206	i 196	201	202	20.3	19.6	i 20.3	19.7	19.9	8.2	8.3	i 8.6	8.7	8.7	8.06	8.02	i 8.17	8.08	8.06
	6	10	5	1	1	0			f 208					f 19.8					f 8.3					f 7.91		
	1	10	7	0	–	–																				
	23	10	7	0	–	–																				
240	9	10	6	0	–	–	195	201	i 196	200	200	20.4	19.9	i 20.2	19.7	19.7	8.2	8.3	i 8.0	8.7	8.8	8.04	8.01	i 8.15 ~~8.05~~	8.09	8.05
	5	10	6	0	–	–			f 202					f 20.0					f 8.4					f 7.92		
	7	10	5	1	1	1																				
	17	10	4	0	–	–																				

Initial Counts QC'd by: AG

Animal Source/Date Received: ABS / 4/3/14

Age at Initiation: 4d

	Feeding Times				
	0	24	48	72	96
AM:			0830		
PM:					

Comments: i = initial reading in fresh test solution, f = final reading in test chamber prior to renewal

Organisms fed prior to initiation, circle one ([✓ y] / n)

QC Check: AG 4/30/14

Final Review: KB 5/6/14

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Item 10
Supporting Document No. 2
December 14, 2016

APPENDIX G

Qualifier Code Glossary

Glossary of Qualifier Codes:

Laboratory Procedures

Q1 - Temperatures out of recommended range; corrective action taken and recorded in Test Temperature Correction Log

Q2 - Temperatures out of recommended range; no action taken, test terminated same day

Q3 - Sample aerated prior to initiation or renewal due to dissolved oxygen (D.O.) levels below 6.0 mg/L

Q4 - Test aerated; D.O. levels dropped below 4.0 mg/L

Q5 - Test initiated with aeration due to an anticipated drop in D.O.

Q6 - Airline obstructed or fell out of replicate and replaced; drop in D.O. occurred

Q7 - Salinity out of recommended range

Q8 - Spilled test chamber/ Unable to recover test organism(s)

Q9 - Inadequate sample volume remaining, 50% renewal performed

Q10 - Inadequate sample volume remaining, no renewal performed

Q11 - Sample out of holding time; refer to QA section of report

Q12 - Replicate(s) not initiated; excluded from data analysis

Q13 - Survival counts not recorded due to poor visibility or heavy debris

Q14 - D.O. percent saturation was checked and was ≤ 110%

Data Analysis/Reporting

Q15 - Did not meet minimum test acceptability criteria. Refer to QA section of report.

Q16 - Percent minimum significant difference (PMSD) was below the lower bound limit for acceptability. This indicates that statistics may be over-sensitive in detecting a difference from the control due to low variability in the data set.

Q17 - Percent minimum significant difference (PMSD) was above the upper bound limit for acceptability. This indicates that statistics may be under-sensitive in detecting a difference from the control due to high variability in the data set.

Item 10
Supporting Document No. 2
December 14, 2016

APPENDIX H

BLM Results

Appendix H. Biotic Ligand Model Results

The following information has been excerpted from Weston, 2011.[1]

The biotic ligand model (BLM) is a conceptual framework for estimating effects of certain metals to aquatic organisms (Di Toro et al., 2001; Santore et al., 2001). This framework has been utilized to develop predictive toxicity models for a number of species and several divalent metals, including copper, lead, and zinc (e.g., Santore et al., 2001; De Schamphelaere and Janssen, 2002; De Schamphelaere et al., 2002; Heijerick et al., 2002; HDR|HydroQual, 2011; also, see Paquin et al., 2002 for an overview of the BLM). The BLM considers the effects of metal speciation, including inorganic and organic complexation, and the effect of competition with cations for binding at idealized biotic ligands on the organism surface or gill tissue in the case of fish.

The BLM was used in the early phases of this Study to provide another site-specific line-of-evidence that validates the bioavailability and potential risks associated with dissolved copper, lead, and zinc of Chollas Creek.

Subsequent to establishing reasonable concentration estimates for the necessary BLM input parameters, BLM input files were prepared for copper, lead, and zinc. The BLM was executed by HDR|HydroQual (Syracuse, NY) in toxicity mode (i.e., to predict metal-specific, 48-h LC50s for *Ceriodaphnia dubia*) and in water quality criteria mode (i.e., to predict final acute values, criterion maximum concentrations (CMC), and criterion continuous concentrations (CCC)) to provide dissolved copper and zinc results for each water sample. The BLM accomplishes water quality criteria calculations for copper and zinc by predicting the site-specific final acute value (FAV) for each metal. The CMC is subsequently calculated by dividing the FAV by 2 and the CCC is calculated by dividing the FAV by the acute to chronic ratio (3.22 for copper and 5.327 for zinc).

For lead, a BLM-derived WER was calculated for each site, with the BLM-predicted 48-hour *C. dubia* LC50 for the February 2, 2011 dilute mineral water (DMW) sample as the denominator, that is:

$$BLM - derived\ Pb\ WER_i = \frac{BLM - predicted\ 48h\ C.dubia\ LC50_i}{BLM - predicted\ 48h\ C.dubiaLC50_{DMW02-Feb-2011}}$$

Where *i* represents a specific water sample

Before performing BLM calculations for the Chollas Creek dataset, the concentrations of several necessary model inputs had to be estimated. For DPR2 and SD8(1) Chollas Creek monitoring stations, concentrations for all BLM inputs were available. Dissolved organic carbon (DOC) inputs for several of the DMW toxicity tests had to be estimated from the DMW DOC concentration measured in the February 2, 2011 sample (Table H-1). These estimates were inconsequential because BLM calculations for the February 2, 2011 DMW sample were the only ones utilized in this analysis. Several of the necessary inputs for the upstream Chollas Creek stations, Lemon Grove (LG-1) and La Mesa (LM-1), waters were missing and had to be estimated. This resulted in a large amount of uncertainty for the BLM calculations for the November 28, 2009 and February 6, 2010 LG-1 and LM-1 water samples. Since water hardness was measured for these samples, it was assumed that calcium, magnesium, sodium, potassium, sulfate, chlorine, and alkalinity concentrations varied proportionally with hardness on the basis of ratios defined from the October 6, 2010 samples. Unfortunately, DOC

[1] WESTON (Weston Solutions, Inc.). 2011. *Chollas Creek Copper, Lead, and Zinc Water-Effect Ratio Study.* Prepared for the City of San Diego Transportation and Storm Water Department. May 27.

measurements were also missing for these waters, so the values for DOC were assumed to be equal to the DOC concentrations provided for the October 6, 2010 samples. Since DOC is an extremely important parameter with respect to BLM calculations, the BLM results for the LG-1 and LM-1 samples from November 28, 2009 and February 6, 2010 should be used with caution. A summary of the BLM inputs used in this analysis is provided in Table H-1.

Sample results for dissolved copper, lead, zinc, and total hardness were compared for the upstream sites in each fork of Chollas Creek (Figure H-1). Results are generally similar between the upstream and downstream sites (SD8(1) and LM-1 in the north fork and LG-1 and DPR2 in the south fork). The mean results of each site were within the upper and lower quartiles of the data. These results demonstrate that the application of the WERs developed at the two compliance sites is appropriate for use in assessing sites upstream within the watershed.

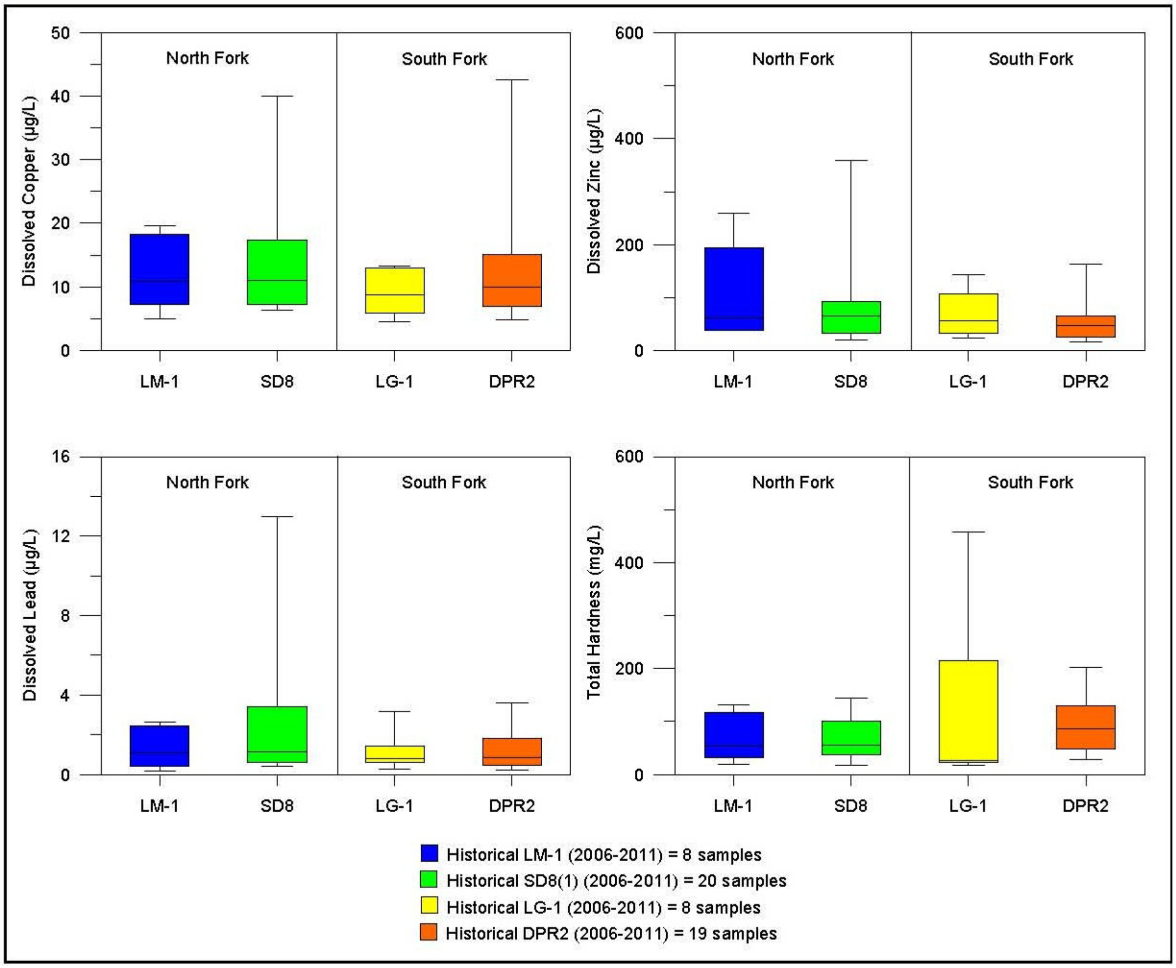


Figure H-1. Box Whisker Plot of Dissolved Copper, Lead, and Zinc and Total Hardness for Chollas Creek Site Comparison of Upstream Sites

Results of the BLM analyses are shown for each water sample in

Table 1 (dissolved copper), Table 2 (dissolved zinc), and Table 3 (dissolved lead). Additional graphical summaries for each site are provided in Figures H-1 through H-5. Overall, the BLM-predicted dissolved copper and Zn LC50s for *C. dubia* agree very well with the reported LC50s for the waters tested (i.e., stations DPR2 and SD8(1)) (Figure H-2 and Figure H-3). The BLM predictions and reported LC50s show a similar temporal pattern. This temporal pattern in BLM predictions was due to the time-varying water chemistry conditions in the waters tested. The observation that BLM results and toxicity test results were similar and follow a similar temporal pattern suggests that the BLM adequately accounted for the effects of metal bioavailability in the waters tested.

Reported copper concentrations for SD8(1) and DPR2 were generally lower than the BLM-derived CMC and CCC values (

Table 1, Figures H-2 & H-3). There were three cases where the reported copper concentrations were greater than or equal to the BLM-derived CCC values (i.e., December 20, 2010 for DPR2; October 30, 2010 and December 20, 2010 for SD8(1)). In all cases, the BLM-derived water quality criteria for all three metals were higher than the hardness-based water quality criteria, although in two cases, the CCC values were similar.

It should be noted that the BLM-derived zinc CMC and CCC values should be considered for comparison purposes only, as the BLM is not a USEPA-approved method for deriving site-specific water quality criteria for zinc. Reported zinc concentrations for SD8(1) and DPR2 were generally below the BLM-derived CMC values and the BLM-derived CCC values (Table 2, Figures H-2 & H-3). The one exception occurred for the October 30, 2010 sample for SD8(1), when the reported zinc concentration exceeded the associated CCC. The BLM-derived water quality criteria for zinc were not consistently higher than the hardness-based water quality criteria as observed in the dissolved copper water quality criteria. Regardless, the BLM provides estimates that were consistent with a bioavailability-based approach.

All BLM-predicted LC50s for lead at stations were orders of magnitude greater than the reported lead concentrations for all sites considered (Table 3, Figures H-2 through H-5). Reported lead concentrations were below the BLM-based-WER-adjusted water quality criteria for all sites, in all cases (Table H-4, Figures H-2 & H-5). The BLM-based lead water quality criteria were always higher than the hardness-based water quality criteria, although in two cases they were similar.

Caution should be used in interpreting the BLM results for the LG-1 and LM-1 stations for which many of the BLM input parameters were estimated. As a result of this observation, the City has implemented the collection of parameters, where applicable in Chollas Creek (e.g. SD8(1), DPR2, LM-1 and LG-1), that are needed to run the BLM. It should be noted that the BLM is a USEPA-approved method for deriving site-specific water quality criteria for copper, whereas the BLM is not yet USEPA approved for zinc or lead. However, the approaches described here for zinc and lead do represent bioavailability-based methods and are consistent with application of the BLM to evaluate the potential for adverse effects on a site-specific basis.

Summary of BLM Runs

- The BLM was used as a secondary method to verify the biological responses observed during the WER experiments. However, it should be noted that the BLM-predicted zinc and lead CMCs and CCCs should be considered “draft” criteria, as the BLM is not yet a USEPA-approved method for zinc and lead.

- The results of the BLM corroborated the results of the WER study indicating that the current Waste Load Allocations using the default hardness-based CTR formulas are currently over protective.

- For both DPR2 and SD8(1), BLM-predicted LC50s for dissolved copper and dissolved zinc were consistent with measured LC50s.

- BLM predictions for DPR2 and SD8(1) LC50s for *C. dubia* exposed to dissolved copper and zinc and reported LC50s show a similar temporal pattern. This temporal pattern in BLM predictions may be due to the time-varying water chemistry conditions in the waters tested. The observation that BLM results and toxicity test results were comparable and follow a similar temporal pattern, suggests that the BLM adequately accounts for bioavailability effects in the waters tested.

- Reported zinc concentrations for DPR2 and SD8(1) were always below the BLM- predicted CMCs and the BLM-predicted CCCs (i.e., there are no exceedances of water quality criteria for dissolved zinc for either station).
- Reported copper concentrations for DPR2 and SD8(1) were always below the BLM- predicted CMCs, but reported concentrations were greater than or equal to the BLM- predicted CCC in three cases (i.e., December 20, 2010 for DPR2; October 30, 2010 and December 20, 2010 for SD8(1)).
- All BLM-predicted LC50s for lead were orders of magnitude greater than the reported lead concentrations for DPR2 and SD8(1).
- Similar trends were observed in both La Mesa and Lemon Grove for all three dissolved metals compared to SD8(1) and DPR2, respectively. However, the BLM-predicted water quality criteria was greater (i.e., less conservative) by 2-4 X in the upstream stations than the water quality criteria predicted or measured for the downstream stations, indicating greater site-specific protection to aquatic beneficial uses.

Table H-1. Inputs Used for Biotic Ligand Model Analysis

Sample	Date	pH*	mg/L*							as mg CaCO3/L*		Estimated
			DOC	Ca	Mg	Na	K	SO4	Cl	Alkalinity	Hardness	
DPR2	27-Feb-10	7.65	8.5	17.5	8.6	43.1	2.5	26.8	63.8	48.0	74.0	
SD8(1)	27-Feb-10	7.51	8.1	11.2	4.2	17.6	2.5	15.0	19.2	32.5	36.6	
DMW	28-Feb-10	8.60	0.46	21.7	8.4	2.5	2.5	3.7	2.0	101.0	85.4	DOC**
SD8(1)	1-Apr-10	7.36	25.15	14.4	4.5	20.8	2.5	19.8	27.8	30.5	49.9	
DPR2	1-Apr-10	7.15	28.5	26.4	10.2	49.2	5.3	35.6	86.7	47.0	103.4	
DMW	2-Apr-10	8.20	0.46	14.2	7.0	0.3	0.3	3.8	2.2	98.0	64.1	DOC**
CC-SD8(1)	30-Oct-10	7.31	8.2	13.5	4.8	18.0	4.4	17.0	23.0	35.5	52.0	
DPR2	30-Oct-10	7.30	11	24.0	8.2	44.0	3.8	28.0	74.0	66.0	93.0	
DMW	31-Oct-10	8.20	0.46	24.0	8.0	3.2	0.4	3.9	3.0	100.0	81.2	All except pH**
CC-SD8(1)	20-Dec-10	6.93	3.9	11.0	3.1	13.0	3.0	12.0	15.0	33.0	39.0	
DPR2	20-Dec-10	6.96	4.55	13.0	4.7	22.5	3.2	15.0	35.0	39.0	53.0	
DMW	21-Dec-10	8.50	0.46	24.0	8.0	3.2	0.4	3.9	3.0	100.0	81.2	All except pH**
LG-1	28-Nov-09	7.76	21	96.0	54.9	259.1	11.9	146.3	472.4	152.4	457.2	All except pH***
LM-1	28-Nov-09	7.75	14	22.1	14.7	67.6	3.0	59.0	86.0	49.8	116.7	All except pH***
LG-1	6-Feb-10	8.06	21	5.8	3.3	15.6	0.7	8.8	28.5	9.2	27.6	All except pH***
LM-1	6-Feb-10	8.18	14	9.1	6.1	27.7	1.2	24.2	35.3	20.4	47.9	All except pH***
LG-1	6-Oct-10	7.64	21	63.0	36.0	170.0	7.8	96.0	310.0	100.0	300.0	
LM-1	6-Oct-10	7.87	14	36.0	24.0	110.0	4.9	96.0	140.0	81.0	190.0	
DMW	2-Feb-11	8.20	0.46	24.0	8.0	3.2	0.4	3.9	3.0	100.0	94.0	

*Where there were data for duplicate samples, values were averaged.

**Values assumed to be equal to those for DMW 2-Feb-11

***Values assumed to be proportional to Hardness from associated 6-Oct-10 samples; DOC assumed to be equal to values from 6-Oct-10

Table 1. Hardness-Based and Biotic Ligand Model-Based Water Quality Criteria for Copper for Sites within Chollas Creek

Water Tested*	Date	Hardness (as CaCO3)	(ug/L)		Hardness Equation		BLM Results		
			[Cu2+]	LC50	Cu CMC	Cu CCC	LC50	Cu CMC	Cu CCC
DPR2	27-Feb-10	74	6.5	82.4	10.1	6.9	157.5	51.3	31.9
SD8(1)	27-Feb-10	36.6	7.15	67.6	5.2	3.8	111.5	35.2	21.8
DMW	28-Feb-10	85.4	0.2	5.1	11.6	7.8	20.8	7.1	4.4
SD8(1)	1-Apr-10	49.9	17.2	195.0	7.0	4.9	310.7	97.3	60.4
DPR2	1-Apr-10	103.4	15.1	235.0	13.9	9.2	308.6	95.0	59.0
DMW	2-Apr-10	64.1	0.2	5.2	8.8	6.1	13.4	4.4	2.7
CC-SD8 (1)	30-Oct-10	52	16.5	102.8	7.3	5.1	87.8	27.0	16.8
DPR2	30-Oct-10	93	12	136.2	12.6	8.4	135.2	41.8	26.0
DMW	31-Oct-10	81	0.68	4.6	11.0	7.5	14.8	4.8	3.0
CC-SD8 (1)	20-Dec-10	39	6.4	59.3	5.5	4.0	23.0	6.8	4.2
DPR2	20-Dec-10	53	7	86.7	7.4	5.2	30.2	9.0	5.6
DMW	21-Dec-10	81	0.022	3.8	11.0	7.5	19.4	6.6	4.1
LG-1	28-Nov-09	457	13.2	-	56.3	32.8	655.8	230.9	143.4
LM-1	28-Nov-09	117	19.6	-	15.6	10.2	318.9	107.5	66.8
LG-1	6-Feb-10	28	4.5	-	4.1	3.0	548.9	192.3	119.4
LM-1	6-Feb-10	48	5	-	6.7	4.8	418.5	148.7	92.4
LG-1	6-Oct-10	300	10	-	37.8	22.9	527.1	179.5	111.5
LM-1	6-Oct-10	190	13	-	24.6	15.5	397.0	138.5	86.0
DMW	2-Feb-11	94	-	-	12.7	8.5	14.8	4.8	3.0

*See Table for a description of inputs and comments regarding estimates
Values shown are median lethal concentrations (LC50), criteria maximum concentrations (CMC), and criteria continuous concentrations (CCC).

Table 2. Hardness-Based and Biotic Ligand Model-Based Water Quality Criteria for Zinc for Sites Within Chollas Creek

Water Tested*	Date	Hardness (as CaCO3)	(ug/L)		Hardness Equation		BLM Results		
			[Zn2+]	LC50	Zn CMC	Zn CCC	LC50	Zn CMC	Zn CCC
DPR2	27-Feb-10	74	19.1	262.7	90.8	91.5	402.0	218.8	82.1
SD8(1)	27-Feb-10	36.6	21.15	155.3	50.0	50.4	323.5	176.0	66.1
DMW	28-Feb-10	85.4	0.05	178.9	102.5	103.4	306.9	175.4	65.9
SD8(1)	1-Apr-10	49.9	76.15	395.6	65.0	65.6	837.0	453.5	170.3
DPR2	1-Apr-10	103.4	66.2	508.1	120.5	121.5	876.9	479.3	180.0
DMW	2-Apr-10	64.1	0.11	153.7	80.4	81.0	157.3	89.6	33.6
CC-SD8 (1)	30-Oct-10	52	75.5	349.8	67.3	67.9	300.9	165.0	62.0
DPR2	30-Oct-10	93	37	313.1	110.2	111.1	441.6	242.8	91.2
DMW	31-Oct-10	81	2.2	262.3	98.0	98.8	207.1	118.2	44.4
CC-SD8 (1)	20-Dec-10	39	26	153.8	52.8	53.2	142.4	80.0	30.0
DPR2	20-Dec-10	53	21	198.0	68.4	69.0	168.8	94.7	35.5
DMW	21-Dec-10	81	0.3	177.0	98.0	98.8	277.9	158.8	59.6
LG-1	28-Nov-09	457	144	-	424.6	428.1	1602.7	878.8	330.0
LM-1	28-Nov-09	117	193.4	-	133.9	134.9	684.0	369.5	138.7
LG-1	6-Feb-10	28	23.9	-	39.9	40.2	1058.0	561.7	210.9
LM-1	6-Feb-10	48	38.9	-	62.9	63.4	757.9	403.1	151.4
LG-1	6-Oct-10	300	60	-	297.2	299.7	1246.3	678.4	254.7
LM-1	6-Oct-10	190	68	-	201.9	203.5	868.4	470.8	176.8
DMW	2-Feb-11	94	-	-	111.2	112.1	208.2	118.8	44.6

*See Table for a description of inputs and comments regarding estimates
Values shown are median lethal concentrations (LC50), criteria maximum concentrations (CMC), and criteria continuous concentrations (CCC).

Table 3. Hardness-Based and Biotic Ligand Model-Based Water Quality Criteria for Lead for Sites Within Chollas Creek

Water Tested*	Date	Hardness (as CaCO3)	(ug/L)		Hardness Equation (ug/L)		BLM Results			
			[Pb2+]	LC50	Pb CMC	Pb CCC	LC50	WER**	Pb CMC***	Pb CCC***
DPR2	27-Feb-10	74	0.89	-	46.5	1.8	1096.3	4.6	214.5	8.4
SD8(1)	27-Feb-10	36.6	1.325	-	21.3	0.8	835.8	3.5	74.9	2.9
DMW	28-Feb-10	85.4	0.1	-	54.4	2.1	250.7	1.1	57.4	2.2
SD8(1)	1-Apr-10	49.9	2.065	-	30.1	1.2	2467.8	10.4	312.5	12.2
DPR2	1-Apr-10	103.4	1.24	-	67	2.6	2882.2	12.1	812.9	31.7
DMW	2-Apr-10	64.1	0.11	-	39.7	1.5	156.7	0.7	26.2	1
CC-SD8 (1)	30-Oct-10	52	0.615	-	31.5	1.2	772.6	3.3	102.4	4
DPR2	30-Oct-10	93	0.59	-	59.7	2.3	1230.8	5.2	309.3	12.1
DMW	31-Oct-10	81	0.024	-	51.3	2	232.9	1	50.3	2
CC-SD8 (1)	20-Dec-10	39	0.51	-	22.9	0.9	256.7	1.1	24.7	1
DPR2	20-Dec-10	53	0.49	-	32.1	1.3	334.8	1.4	45.3	1.8
DMW	21-Dec-10	81	0.017	-	51.3	2	262.5	1.1	56.7	2.2
LG-1	28-Nov-09	457	3.19	-	321.8	12.5	4517	19	6121.2	238.5
LM-1	28-Nov-09	117	2.64	-	76.6	3	2029.7	8.5	654.7	25.5
LG-1	6-Feb-10	28	0.67	-	15.8	0.6	2505	10.5	166.4	6.5
LM-1	6-Feb-10	48	2.47	-	28.8	1.1	1949.5	8.2	236.5	9.2
LG-1	6-Oct-10	300	0.84	-	208.6	8.1	3771	15.9	3312.6	129.1
LM-1	6-Oct-10	190	0.41	-	128.9	5	2527.8	10.6	1372.4	53.5
DMW	2-Feb-11	94	-	-	60.4	2.4	237.5	1	60.4	2.4

*See Table for a description of inputs and comments regarding estimates

Values shown are median lethal concentrations (LC50), criteria maximum concentrations (CMC), criteria continuous concentrations (CCC), and BLM-derived water effect ratios (WER).

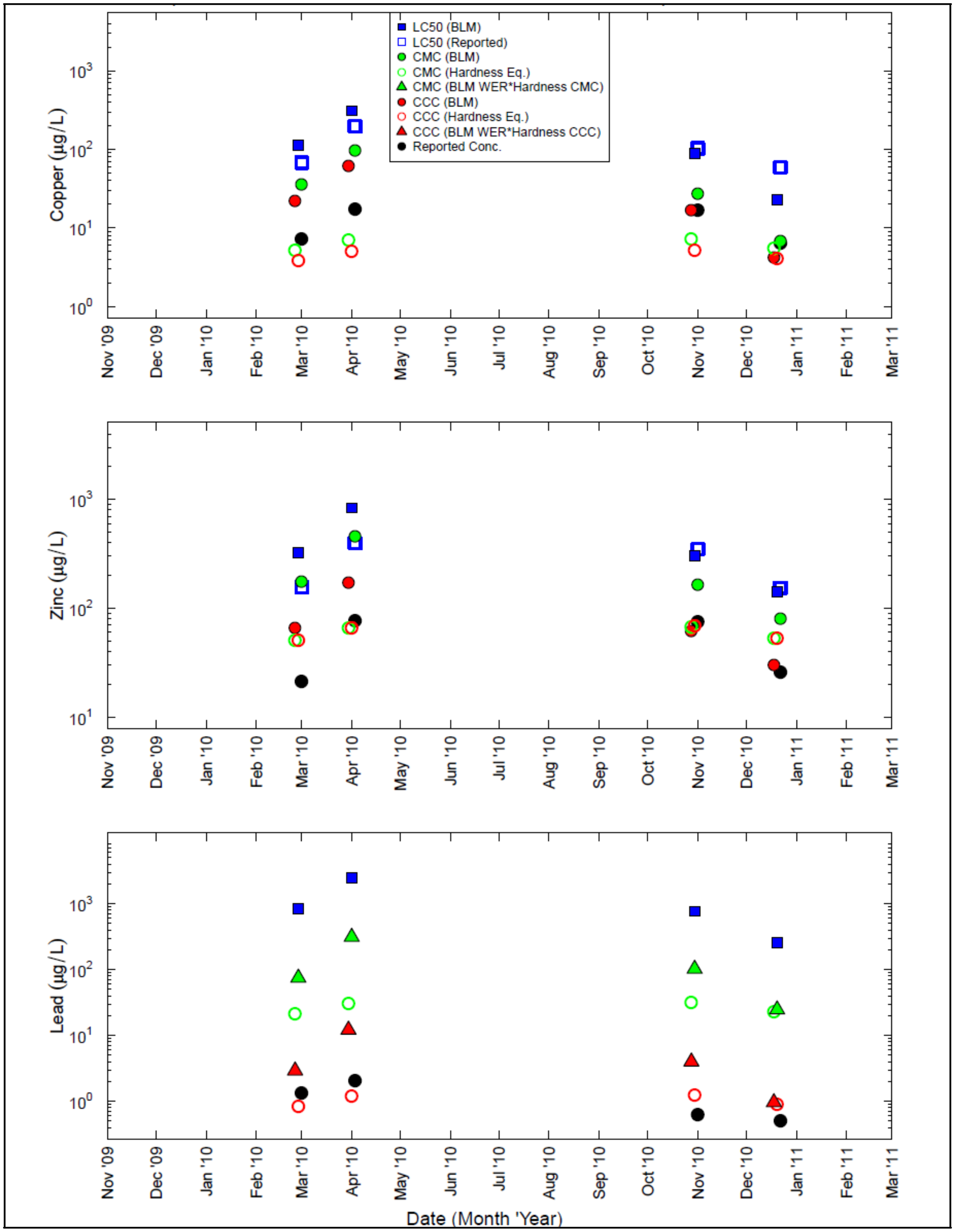


Figure H-2. Comparison of Measured Dissolved Metal Concentrations, Toxicological Effects Levels, Water Quality Criteria, and BLM Predictions for Station SD8(1), Chollas Creek North Fork

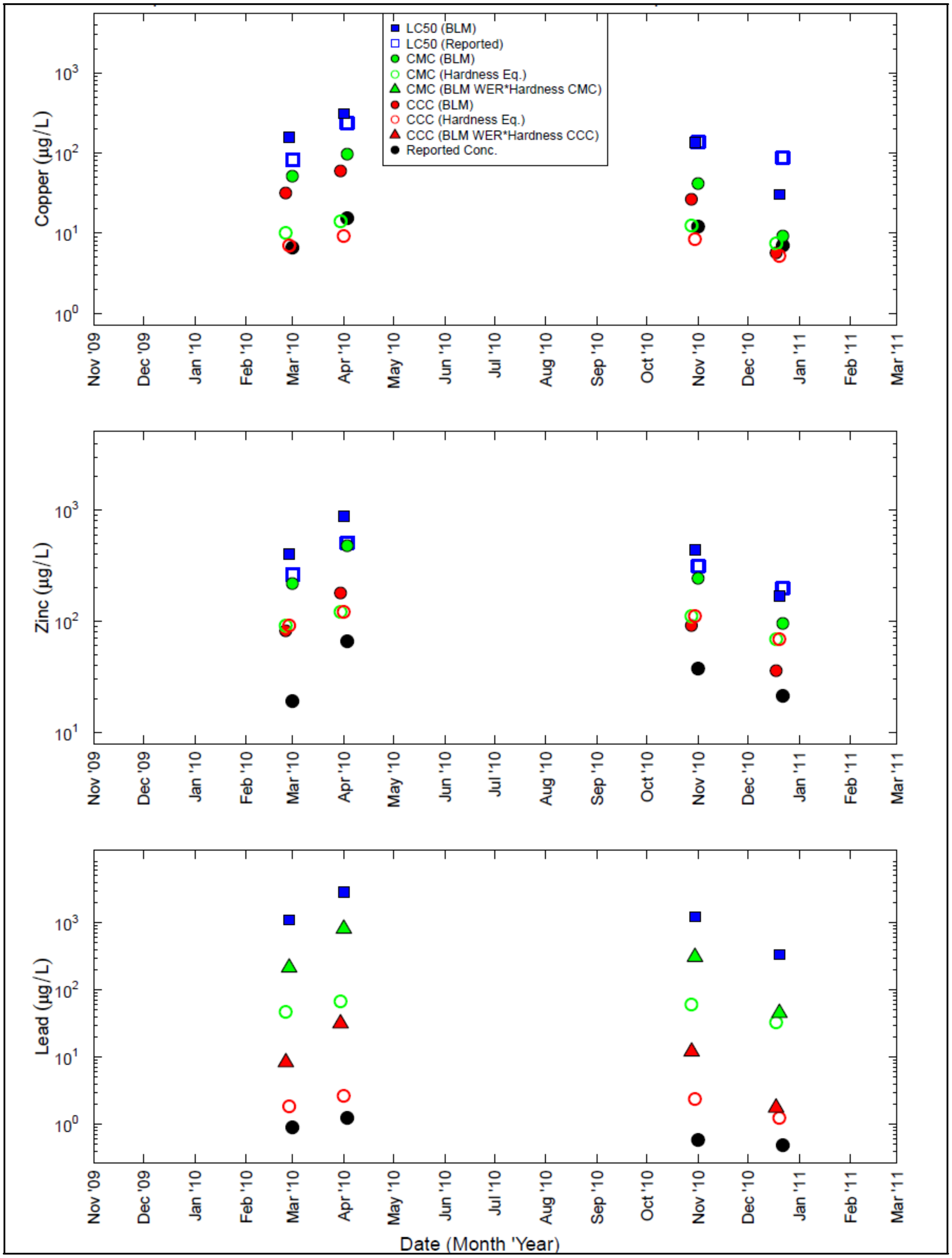


Figure H-3. Comparison of Measured Dissolved Metal Concentrations, Toxicological Effects Levels, Water Quality Criteria, and BLM Predictions for Station DPR2, Chollas Creek South Fork

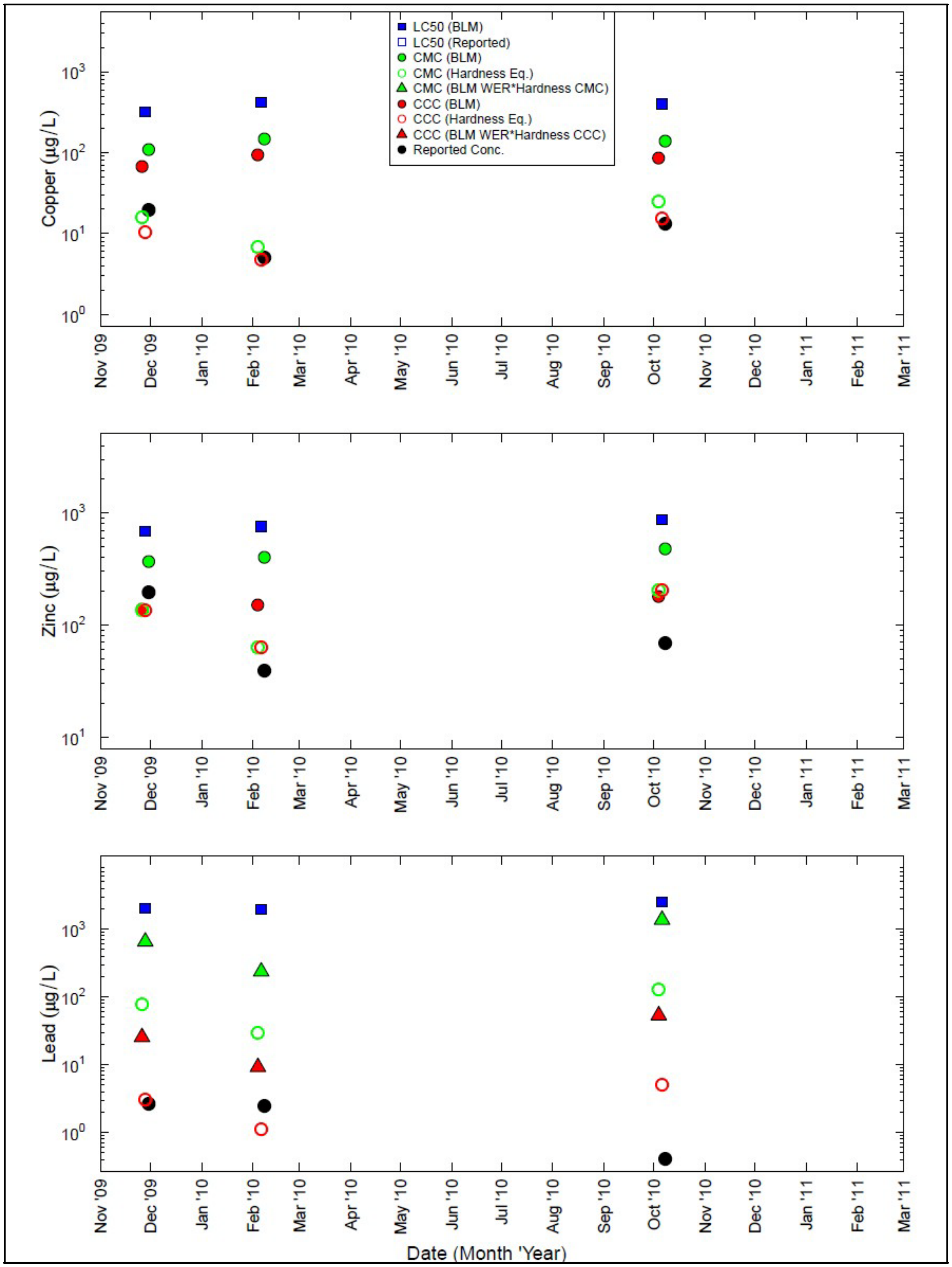


Figure H-4. Comparison of Measured Dissolved Metal Concentrations, Toxicological Effects Levels, Water Quality Criteria, and BLM Predictions for Station LM-1, Chollas Creek North Fork

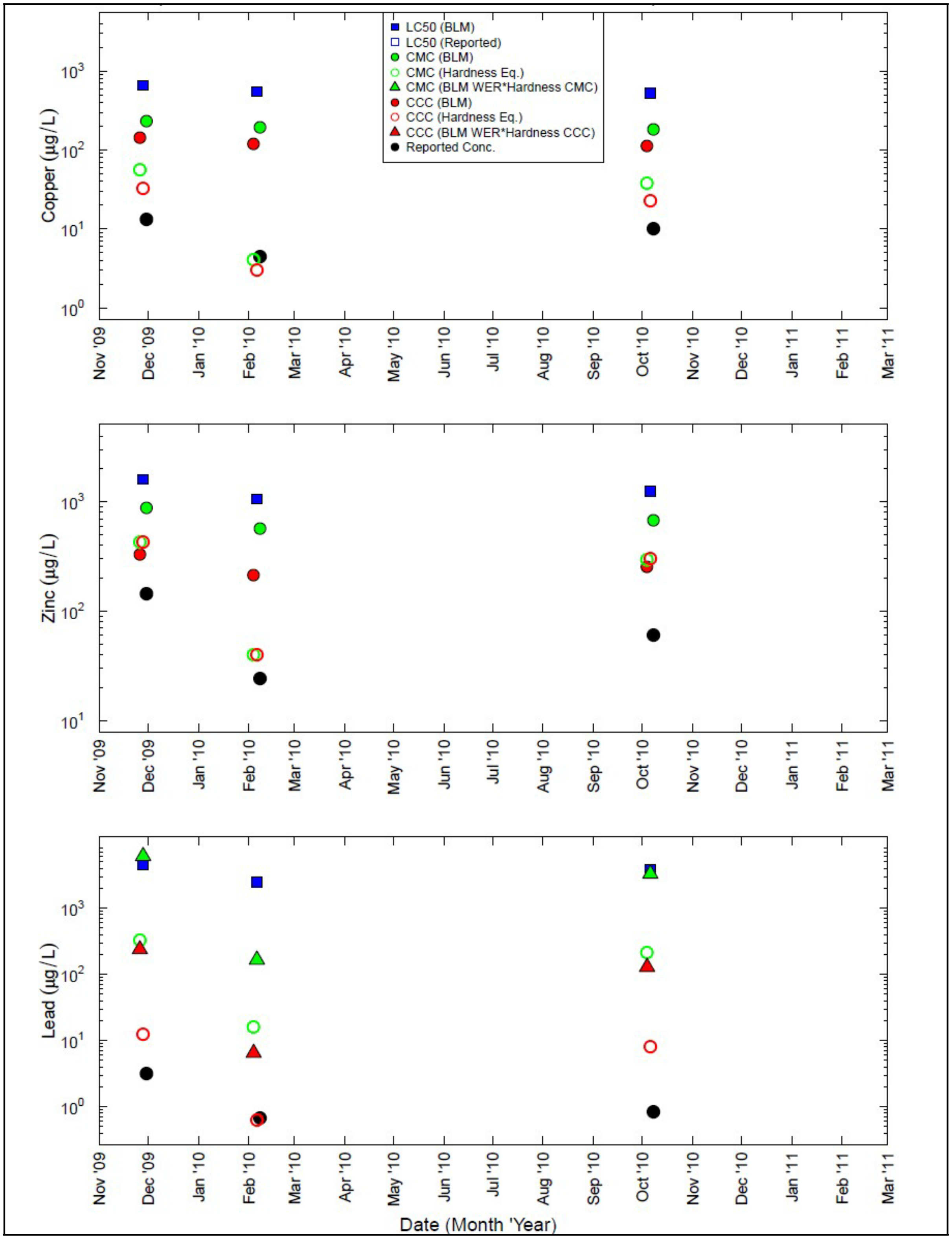


Figure H-5. Comparison of Measured Dissolved Metal Concentrations, Toxicological Effects Levels, Water Quality Criteria, and BLM Predictions for Station LG-1, Chollas Creek South Fork

APPENDIX B

SCIENTIFIC PEER REVIEW
COMMENTS AND RESPONSES

RESPONSE TO EXTERNAL PEER REVIEW COMMENTS

Response to Peer Review Comments from Dr. Marc Beutel

Comment 1 (September 31, 2016)

Perhaps my most significant question is could you more precisely present the justification for basing the WER on the geometric mean of four sampling events in the context of the USEPA's 1994 Interim Guidance on the Determination and Use of Water-Effects Ratios for Metals? Much of the guidance document was couched in terms of point source pollution, design flows, and the assessment of toxicity in "effluent" combined with "upstream waters," thus making it difficult to clearly understand how the guidelines inform assessment of toxicity in a flowing creek that is integrating non-point pollution loading from throughout its watershed. The guidelines seem to state that more than three sampling events are needed to develop a WER, and that use of the geometric mean, rather than an arithmetic mean or use of a the maximum value from a set WERs, is appropriate in some cases. But a more detailed description of how you interpreted the guidance document to support your approach would be helpful. Can you also expand on the statement on page 19 of the 2014 WER development study that four monitoring events were "able to capture site-specific variability associated with temporal seasonality and flow"? The rainfall totals and intensities appeared to be fairly similar for the monitoring events, though there was some variability in hydrograph response and peak flows. In essence I am asking if the four sampling events provide enough data on which to confidently estimate WERs for the site.

Response to Comment 1

The United States Environmental Protection Agency's (USEPA's) 1994 *Interim Guidance on Determination and Use of Water Effect Ratios* (Interim Guidance, pp. 36-38) recommends using the geometric mean of WER values to derive the final WER when the range of WERs is not greater than a factor 5. Reasons for this recommendation are that:

1. The geometric mean, as opposed to the arithmetic mean, is less influenced by high values; and
2. Using the geometric mean is consistent with USEPA's methodology for deriving water quality criteria, in terms of level of protection of aquatic life.

USEPA does suggest examining the individual WER values in cases where there is an unusually high (or low) value (Interim Guidance, p. 29).

RESPONSE TO EXTERNAL PEER REVIEW COMMENTS

WER values for the proposed Basin Plan amendment come from the study titled *Development of Site-Specific Water Quality Objectives for Trace Metals in Chollas Creek: Water-Effect Ratio Study for Copper and Zinc, and Recalculation of Lead* (WER Study). The individual WERs presented in the WER Study varied by no more than a factor of 2.5 and 2 for copper and zinc, respectively. Thus, variability amongst individual WERs was small compared to USEPA's recommendation of a factor of 5 or less.

USEPA's WER guidance recommends WER testing under conditions that are representative of the site. Stream flow occurs only when there is sufficient precipitation to produce runoff to Chollas Creek. The WER Study examined five rain events in 2010, resulting in four samples from location SD8(1) (north fork) and five samples from location DPR2 (south fork). This covered the range of precipitation typically observed in this creek (WER Study, p. 36). The use of four and five WER values from the two sites is consistent with the Interim Guidance (p. 36). Final WER values for copper and zinc in Chollas Creek were derived based on the nine individual WERs at the two sites.

Comment 2 (September 31, 2016)

A related question is the rationale for using flow-weighted composites as the method for assessing WERs. Was this an approach recommended in the 1994 WER USEPA guidance manual or an approach that has been used in California sites (e.g., Los Angeles River copper WER study)? Is there a concern that any toxicity associated with a first-flush associated with the rising arm of the hydrograph may be subsequently diluted as a storm event progresses? Is it enough of a rationale to say that sampling methods used to develop WERs should be consistent with compliance monitoring, which is also based on flow-weighted sampling?

Response to Comment 2

The Chollas WER Study used flow-weighted composite samples because that is the type of water quality sampling required by the San Diego Regional Water Quality Control Board in Order No. R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100 (Regional MS4 Permit). Flow-weighted composite samples constitute the most representative type of sample for wet weather monitoring, and for WER studies in particular, because they more accurately capture the concentration of metals and other pollutants to which aquatic life are exposed throughout the storm event. Studies such as one conducted by Caltrans in 2005, *First Flush Phenomenon Characterization*[1], demonstrate that the first flush of a wet weather event (when flow is at peak or near peak levels) contains the highest concentration of pollutants.

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[1] Stenstrom, M. and M. Kayhanian. 2005. First Flush Phenomenon Characterization. California Department of Transportation, CTSW-RT-05-73-02.6. Caltrans Division of Environmental Analysis, Sacramento, CA

RESPONSE TO EXTERNAL PEER REVIEW COMMENTS

USEPA recommends collecting WER samples when metal concentrations are likely to be highest (worst case scenario; first flush) because that is the critical condition for determining WERs (Interim Guidance, p.20). Using flow-weighted composite samples from sampling performed throughout the storm event in the WER Study helps ensure that WER samples reflect the actual metal concentrations that occurred during the storm event.

Another reason to collect flow-weighted composite samples to determine WERs is that the concentrations of water quality parameters that influence toxicity from metals are related to flow. In general, flow conditions that occur after the first flush tend to dilute metal concentrations as well as constituents in water that affect copper and zinc toxicity. For example, the 2005 study by Stenstrom and Kayhanian referred to above reported higher dissolved organic carbon (DOC) concentrations during the first flush period in other Southern California streams. Using flow-weighted composite samples helps to ensure that the actual water quality conditions that occurred over a storm event are accurately represented and used in WER testing.

Finally, it should be noted that wet weather events are generally short-lived in the Chollas Creek watershed. As shown in the WER Study (pp. 38-40), wet weather events last between four and eight hours on average. Given this fairly short period of time, it is more appropriate to collect and analyze flow-weighted composite samples rather than test particular subsamples that represent a very short exposure. For comparison, toxicity tests are conducted over a period of 48 hours.

Comment 3 (September 31, 2016)

As detailed in Tables 6-2 and 6-3 of the 2014 WER development study, the copper LC50 for C. dubia measured in dilute mineral water was an order of magnitude lower than USEPA species mean acute value, which was appropriately used to subsequently calculate WERs. Is this a common outcome in toxicity testing? How did the zinc LC50 for C. dubia measured in dilute mineral water compare to the USEPA species mean acute value, presuming there is a reported value for zinc? Why the difference in response between copper and zinc relative to USEPA species mean acute values, if any? Do the results for copper LC50 for C. dubia measured in dilute mineral water call into question the LC50 values measured for the creek water samples?

RESPONSE TO EXTERNAL PEER REVIEW COMMENTS

Response to Comment 3

The copper median lethal dose (LC50) values for *Ceriodaphnia dubia* (*C. dubia*) in lab water in the WER Study were lower than the USEPA species mean acute value (SMAV). Therefore, to be conservative, the species mean acute value was used in WER calculations rather than actual lab water LC50 values, as recommended in USEPA's streamlined copper WER guidance (pp. 5 and 14). This is a common occurrence with copper WER studies because the lab water required by USEPA for toxicity testing, including WER testing, contains almost no constituents that could bind copper and alter its toxicity to aquatic life. Therefore, the USEPA SMAV for *C. dubia* is higher than the acute value (LC50) generated by most laboratories using current toxicity test protocols. USEPA recommends using the USEPA SMAV for this species (and other closely related species) in their streamlined copper WER guidance unless the lab water LC50 is higher (more conservative) (p. 5). Using the USEPA SMAV in copper WER calculations resulted in a lower (more conservative) final WER than would have been obtained using actual lab water LC50 values.

The LC50 values for *C. dubia* in lab water in the WER Study were comparable to the USEPA SMAV. The mean lab water LC50 ± standard deviation in the study was 376 ± 78 µg/L, while the SMAV values for a similar hardness of 100 mg/L was 313 µg/L.

The reason for the different relative response of *C. dubia* copper and zinc LC50 values with respect to their USEPA SMAV values is that zinc is much less affected than copper by differences in lab water composition. This is also demonstrated in the WER values for zinc, which are much closer to 1.0 than those measured for copper, indicating that the water quality composition of the site water has relatively less effect on zinc toxicity as compared to lab water.

Comment 4 (September 31, 2016)

In Table ES-2 of the 2014 WER development study, there is a footnote stating that during dry weather the WERs are equal to 1. Is there a reason this seasonal overlay on the WERs is not a part of the recommended revisions to Table 7-21a. Is it reasonable to apply WERs developed for wet weather events between October and April to dry weather conditions? Is this considered a non-issue because of the very limited precipitation during the dry season? Is there direction in the 1994 USEPA WER guidance manual on how to handle this situation?

RESPONSE TO EXTERNAL PEER REVIEW COMMENTS

Response to Comment 4

Because of low rainfall in the area, Chollas Creek is a dry channel with intermittent inputs of urban runoff from groundwater seeps, lawn watering, and other activities under ambient conditions (WER Study, p. 4; Weston Solutions 2008-2009 TMDL Report[2]). In areas where water is present during these conditions, field observations have indicated that the water is usually absorbed back into the creek bed a short distance downstream. The tidal prism is not hydrologically connected to other portions of the creek system during dry weather conditions. Therefore, under dry conditions, the WER is considered to be equal to the national and statewide WER value of 1.0, indicating that there is no change to the current copper and zinc water quality objectives (WQOs) in the Basin Plan. The WERs and the site-specific WQOs developed based on the WER Study apply only to wet weather conditions, when there is continuous flow in Chollas Creek.

Comment 5 (October 9, 2016)

I have reviewed the CEQA checklist and the Board's response letter to comments from the San Diego Coastkeeper and US FWS dated February 5, 2016. I also reviewed key supporting documents including the executive summaries of the 2011 SCWRRP sediment toxicity study and the 2005 Navy sediment assessment. I did not find any significant areas of concern related to the scientific rationale used to support the CEQA checklist or the contention that adopting the site-specific WERs for copper and zinc will be protective of downstream water quality. The 2011 SCWRRP study clearly found that sediment toxicity was associated with exposure to organic compounds. As noted in the study, PAH concentrations in Chollas Creek mouth sediments were "greater than most other locations in southern California." In contrast, metals were not a substantial source of toxicity since "bioavailability of divalent metal contaminates in sediment and pore water was very low." The 2005 Navy study reported that sediment toxicity to aquatic-dependent life was likely associated with PAHs, PCBs, chlordane and DDT. Based on these sediment studies, it is clear that adopting site-specific WERs for copper and zinc will not substantially exacerbate toxicity in downstream sediments located at the mouth of Chollas Creek.

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[2] Weston Solutions. 2010. Chollas Creek Total Maximum Daily Load Compliance Monitoring Investigation Order No. R9-2004-0277 2008–2009 Water Quality Monitoring Final Report. Carlsbad, CA.

RESPONSE TO EXTERNAL PEER REVIEW COMMENTS

In addition, I agree with the Board's assessment that adopting site-specific WERs for copper and zinc is protective of downstream water quality. Since the WERs were developed based on storm water collected in the creek, they are reasonably representative of water quality conditions throughout Chollas Creek. And since metals have been show to not drive toxicity in sediment at the creek's mouth, the settling out of copper and zinc in the mouth is not a significant toxicity concern. As noted in the Board's February 6, 2016 letter and detailed in the WER study, even with the adoption of the WERs, the loading of copper and zinc into Chollas Creek is expected to decrease. And over the long term this will result in a decreases in metals concentration in the water column, sediments and sediment pore water in the creek and creek mouth.

Note that my comments above should be considered in the context of my original peer review summary letter dated September 31, 2016, which details a number of comments related to the WER study and proposed Basin Plan amendment.

Response to Comment 5

Comment noted. Please note the original peer review summary letter is dated August 31, 2016.

Response to Peer Review Comments from Dr. Robert Mason

Comment 1 (September 12, 2016)

Perhaps the consideration could be made that the proposed WER values be the lowest determined value, which would be more protective….Another reason for considering a lower WER value is the fact that the relative variability in the four tests for each site are quite high."

Response to Comment 1

USEPA recommends using the geometric mean of WER values to derive the final WER when the range of WERs is not greater than a factor 5 (Interim Guidance, pp. 36-38). The individual WERs presented in the WER Study varied by no more than a factor of 2.5 and 2 for copper and zinc, respectively. These represent very repeatable WER values and were the ones used to calculate the final WERs for copper and zinc. Given the similarity in WER values for individual samples, final WERs based on geometric means are consistent with USEPA recommendations (Interim Guidance, p.38).

RESPONSE TO EXTERNAL PEER REVIEW COMMENTS

Comment 2 (October 7, 2016)

My evaluation of the documentation in terms of the statements there is no downstream impact of the new WER criteria is that these statements represent a scientifically defensible position as they are based on the impact of the water quality on the bioavailability of the metals and this will not change downstream at the mouth given that these are determined by water hardness – more specifically its role on complexation of the metals as well as the impact of the major cations on interactions of the metals with biological surfaces. The criteria will remain valid downstream given the expected changes on water hardness and pH would not lead to any substantial difference in the metals' bioavailability.

The role of sediment toxicity is not an issue as explained in the documentation as the major cause of this toxicity has been shown to be organic contamination and not metals, and indeed it seems that the metal levels reflect background conditions. It is also indicated, however, that this will be further evaluated and if found to be different, then there could be further amendments in the future, But the role of sediment toxicity is a different issue and will not impact the outcome that is a consequence of the changes in the WERs on the downstream regions. As indicated as well, given the nature of the system and its "flashiness" in flow, any downstream impacts would be short-lived due to rapid mixing and dilution. While this is not a justification for allowing the new WER in lieu of other scientific validation, it represents an additional level of safety as this would potentially mitigate any effects.

Overall, based on my reading of the documents, I conclude that the statements about the lack of any downstream impacts are scientifically valid.

Response to Comment 2

Comment noted.