Michael Hansen
City of Eureka
4301 Hilfiker Lane
Eureka, CA 95503

February 23, 2016

Mr. Hansen:

I have enclosed our report "Performance of *Mytilus galloprovincialis* Toxicity Testing in Support of Development of a Copper Water-Effect Ratio for Application to the City of Eureka Elk River Wastewater Treatment Plant" for the Event 1 and Event 2 effluent samples collected on October 6, 2015 and November 10, 2015, respectively.

Please feel free to call me at (707) 207-7760 if you have any questions.

Regards,

Digitally signed by
Brant Jorgenson
Date: 2016.02.23
15:17:19 -08'00'

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Performance of *Mytilus galloprovincialis* Toxicity Testing in Support of Development of a Copper Water-Effect Ratio for Application to the City of Eureka Elk River Wastewater Treatment Plant

Event 1: Sample Collected October 6, 2015
Event 2: Sample Collected November 10, 2015

Prepared for

City of Eureka
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February 2016

PACIFIC ECORISK
ENVIRONMENTAL CONSULTING & TESTING

Performance of *Mytilus galloprovincialis* Toxicity Testing in Support of Development of a Copper Water-Effect Ratio for the City of Eureka Elk River Wastewater Treatment Plant

Event 1: Sample Collected October 6, 2015
Event 2: Sample Collected November 10, 2015

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1. INTRODUCTION

The City of Eureka (City) has contracted Pacific EcoRisk (PER) to conduct copper Water-Effect Ratio (WER) testing on Elk River Wastewater Treatment Plant (Elk River WWTP) effluent. In conducting this work, PER was specifically responsible for:

- preparation of copper spiked test solutions;
- performance of spiked toxicity tests with *Mytilus galloprovincialis* to determine the toxicity of copper in the effluent, receiving water and in lab water;
- performance of concurrent reference toxicant testing with *Mytilus galloprovincialis*; and
- analysis of the toxicity and analytical chemistry data to determine benchmark toxicity values (e.g., EC_{50} point estimates).

This report describes and summarizes the performance and results of the aquatic toxicity testing performed in support of determining the discharger-specific copper WER for use in the establishment of future effluent limitations. Supporting chemical analyses were performed by Caltest Laboratories (Napa, CA) under subcontract to PER. Supporting analytical chemistry reports are attached as appendices to this report.

2. METHODS

All methods conformed to the following guidance for development of a WER:

- *Streamlined Water-Effect Ratio Procedure for Discharges of Copper*, EPA 822-R-01-005 (EPA 2001); and
- *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, EPA/600/R-95/136 (EPA 1995).

Project specific guidance conformed to the following:

- *Water-Effect Ratio for Copper Study Plan for the City of Eureka, Elk River Wastewater Treatment Plant* (Hurst 2015).

2.1 Collection and Handling of the Effluent and Receiving Water Samples

On September 28, October 6 and November 10, City staff collected grab samples of Elk River WWTP effluent and receiving water into appropriately cleaned sample containers. These samples were placed in insulated coolers and shipped via overnight delivery, on ice and under chain-of-custody, to the PER testing laboratory in Fairfield, CA (Table 1). Upon receipt at the testing laboratory, an aliquot of each sample was collected for analyses of initial water quality characteristics (Table 2), with the remainder of the sample being stored at 0-6˚C. The chain-of-custody records for the collection and delivery of these samples are provided in Appendix A.

Table 1. Collection and testing of the effluent and receiving water samples.					
Event No.	Sample ID	Sample Collection Date	Sample Receipt Date	Test Initiation Date (Sample Age)	Definitive Test Termination Date
Range Finding	Effluent	9/28/15	9/29/15	10/1/15 (74 hr)	10/3/15
	Receiving Water	9/28/15	9/29/15	10/1/15 (75 hr)	10/3/15
Event 1	Effluent	10/6/15	10/7/15	10/7/15 (31 hr)	10/9/15
	Receiving Water	10/6/15	10/7/15	10/7/15 (32 hr)	10/9/15
Event 2	Effluent	11/10/15	11/12/15	11/12/15 (54 hr)	11/14/15
	Receiving Water	11/10/15	11/12/15	11/12/15 (54 hr)	11/14/15

Table 2. Initial water quality characteristics for the effluent, receiving water and lab water samples.							
Event No.	Test Waters	Temp. (°C)	pH	D.O. (mg/L)	Conductivity (μS/cm)	Salinity (ppt)	Total NH_3 (mg/L-N)
Range Finding	Effluent	0.5	6.56	5.7	1154	0.6	3.69
	Lab Water (30 ppt)	-[a]	7.72	7.2	47,030	30.4	<1.0
	Receiving Water	0.1	7.68	7.3	52,600	34.2	<1.0
	Lab Water (34 ppt)	-[a]	7.75	7.0	53,070	34.8	<1.0
Event 1	Effluent	1.9	7.07	7.1	1143	0.6	4.04
	Lab Water (30 ppt)	-[a]	7.70	7.6	46,800	30.0	<1.0
	Receiving Water	6.9[b]	7.60	7.8	52,300	34.2	<1.0
	Lab Water (34 ppt)	-[a]	7.83	7.1	52,700	34.3	<1.0
Event 2	Effluent	0.7	6.79	7.6	864	0.5	4.38
	Lab Water (30 ppt)	-[a]	7.88	8.1	46,600	30.0	<1.0
	Receiving Water	0.4	7.84	8.6	52,500	34.0	<1.0
	Lab Water (34 ppt)	-[a]	7.90	8.2	52,000	33.9	<1.0

[a] The lab water was prepared at room temperature (~20°C)
[b] Sample was received with visible evidence of ice having been present.

2.1.1 Lab Water

For use as the lab water in these tests, PER staff took an aliquot of 1-μm filtered seawater (obtained from the U.C. Granite Canyon Marine Laboratory, Carmel, CA) and diluted it to a salinity of 30 ppt with Type 1 lab water (reverse-osmosis, de-ionized water). Due to the elevated initial salinity of the receiving water samples, a separate "full-strength" lab water at 34 ppt (i.e., undiluted 1-μm filtered seawater) was also prepared and tested.

2.2 Preparation of the Copper Stock Solution

A 1000 mg/L copper stock solution was prepared by the addition of ACS reagent grade cupric chloride ($CuCl_2 \bullet 2H_2O$, obtained from VWR Scientific) to Type 1 water. The stock copper concentration was analytically verified prior to use in testing. No acids or bases were added to

the stock solution. A working stock solution was subsequently prepared for spiking by diluting an aliquot of the verified 1000 mg/L copper stock solution with Type 1 water to a final concentration of 500 mg/L.

2.3 Range-finding Toxicity Testing with *Mytilus galloprovincialis*

In order to ensure that an appropriate range of copper treatment concentrations would be used in the subsequent definitive tests, a preliminary range-finding test was performed on effluent, receiving water, and lab water samples prior to the first definitive testing event. Range-finding test solutions were prepared by spiking aliquots of the solutions with copper (from the previously prepared working stock solution). Copper was spiked at concentrations of 1, 10, 11, 200, and 400 µg/L Cu in the effluent test, and 0.5, 1, 5, 10, 50, and 100 µg/L Cu in the receiving water and lab water tests. Test results were used in the selection of definitive toxicity test concentrations (see Section 2.4.1).

2.4 Definitive Toxicity Test Procedures

2.4.1 Preparation of Test Solutions

Based on the range-finding test results, definitive test copper concentrations were selected so as to bracket the expected EC_{50} values for *M. galloprovincialis* development (Table 3).

Table 3. Definitive test spiked total copper concentrations for effluent, receiving water and lab water.

Event No.	Test Water	Nominal Spiked Test Concentrations (µg/L Total Cu)
Event 1	Effluent	0, 57, 82, 117, 138, 162, 190, 224, 280, and 400
	Lab Water (30 ppt)	0, 3.6, 6.0, 9.0, 12, 15, 18, 22, 30, and 50
	Receiving Water	0, 3.6, 6.0, 9.0, 12, 15, 18, 22, 30, and 50
	Lab Water (34 ppt)	0, 3.6, 6.0, 9.0, 12, 15, 18, 22, 30, and 50
Event 2	Effluent	0, 57, 82, 117, 138, 162, 190, 224, 280, and 400
	Lab Water (30 ppt)	0, 3.6, 6.0, 9.0, 12, 15, 18, 22, 30, and 50
	Receiving Water	0, 3.6, 6.0, 9.0, 12, 15, 18, 22, 30, and 50
	Lab Water (34 ppt)	0, 3.6, 6.0, 9.0, 12, 15, 18, 22, 30, and 50

Test solutions at these concentrations were prepared by spiking aliquots of effluent, receiving water, or lab water with appropriate amounts of the copper working stock solution. Test solutions were allowed to sit undisturbed for approximately 3 hours prior to test initiation to allow for copper partitioning to approach equilibrium with the test water matrix.

2.4.2 Collection of Water Samples for Chemical Analyses

Using clean techniques, samples of each test solution were collected immediately prior to test initiation for analysis of total copper. Samples for total copper analysis were collected into pre-cleaned and nitric acid preserved sample bottles (supplied by the analytical laboratory). Samples of the effluent and receiving water were also collected for analyses of total suspended solids

(TSS) and dissolved organic carbon (DOC). In addition, samples of the lab waters were collected for total organic carbon (TOC), in addition to TSS and DOC. These samples were transported on ice and under chain-of-custody to Caltest Laboratory, Napa CA.

2.4.3 Chronic Toxicity Testing with *Mytilus galloprovincialis*

Bivalve embryos were generated from gravid adult *M. galloprovincialis* obtained from commercial suppliers (Taylor Shellfish Company, Shelton, WA and David Gutoff, San Diego, CA). Prior to spawning, the adult bivalves were held in seawater at a temperature of 12°C. To induce spawning, the adults were transferred into glass trays of seawater (filtered Granite Canyon seawater) at 20°C. The increase in temperature induced the bivalves to release sperm and eggs. When an individual was observed to begin releasing sperm or eggs, it was transferred to a separate container for isolation and collection of gametes. Collected gametes were examined microscopically to evaluate viability and quality. The gametes exhibiting the best quality were used to prepare freshly fertilized embryos.

Prior to use in testing, the effluent salinity was raised to 30 ppt through the addition of artificial sea salt. Lab Water Control solutions were prepared as described in Section 2.1.1. As an additional QA measure, and in order to assess any potential adverse effects due to the use of the artificial sea salt in the effluent, a "Salt Control" consisting of Type 1 lab water (de-ionized water) adjusted to the test salinity of 30 ppt via addition of the same artificial sea salt was also prepared and tested. Water quality characteristics (pH, D.O., and salinity) were measured for each test solution immediately prior to use in these tests.

There were four replicates at each test treatment, each replicate consisting of a 30-mL glass vial containing 10 mL of appropriate test solution. Additional replicates were also established to verify the inoculation density, and additional observation vials were established at the natural seawater Lab Control treatment for monitoring of successful embryo development (i.e., to allow monitoring of the test conditions without affecting actual test replicates). Finally, water quality vials (30-mL vials containing 20 mL of test solution at the same embryo density as the test vials) were established for each treatment in order to measure water quality characteristics at test termination.

The test was initiated with the random inoculation of approximately 150-300 embryos into each vial. The test, observation, and monitoring vials were then placed into a temperature-controlled incubator at 18°C under a 16L:8D photoperiod. In accordance with the Streamlined Guidance (EPA 2001), definitive test initiation occurred within 96 hours of sample collection (Table 1).

After 48 (±1) hours, the observation vials were examined to ensure that ≥90% of the surviving embryos achieved normal development to the "D-hinge" stage. The test was terminated upon confirming adequate successful embryo development. The final water quality characteristics were determined from the water quality, and the remaining test embryos were fixed by the addition of 1 mL of 5% glutaraldehyde to each replicate vial. The contents of each preserved test

vial were subsequently examined microscopically to determine the percentage of embryos exhibiting normal development.

2.4.4 Reference Toxicant Testing of the *Mytilus galloprovincialis*

In order to assess the sensitivity of the mussel embryos to toxic stress, a concurrent reference toxicant test was performed with each definitive test event. The reference toxicant tests were performed similarly to the effluent toxicity tests, except that test solutions consisted of Lab Water Control medium (30 ppt seawater) spiked with KCl at concentrations of 0.5, 1, 2, 3, and 4 g/L. The resulting test response data were analyzed to determine key dose-response point estimates (e.g., EC_{50}). All statistical analyses were made using the CETIS® statistical software (TidePool Scientific, McKinleyville, CA). These response endpoints were then compared to the typical response range established by the mean ± 2 SD of the point estimates generated by the reference toxicant test database.

2.5 Selection of Definitive Toxicity Test Solutions for Copper Analysis

Per the Streamlined Guidance (EPA 2001), the following criteria were followed to identify the test treatments for which test solutions would be analyzed for total recoverable copper:

- the controls (i.e., the "0 µg/L" nominal concentration test treatments);
- the highest concentration that did not adversely affect the test organisms (i.e., the No Observable Effect Concentration [NOEC]);
- all statistically significant partial response test treatments (i.e., concentrations in which some, but not all, of the test organisms were adversely affected); and
- the lowest concentration that adversely affected all of the test organisms.

For the definitive test treatments selected for copper analysis, the analytical lab quantified total copper concentrations from test solution samples collected at test initiation.

2.6 Determination of Definitive Toxicity Point Estimates

Determination of a total copper EC_{50} point estimate and 95% confidence interval (CI) for each test was made following EPA guidance (EPA 1995 and 2001) and using the CETIS statistical software. Effect threshold point estimates were determined using the initial measured (i.e., analytically verified) total copper concentrations for the selected test treatments. Point estimates were determined by the linear regression method for the effluent, receiving water, and lab water tests.

3. RESULTS

The results of the definitive determinations of copper toxicity to *M. galloprovincilis* in effluent, receiving water, and lab water are presented below in Sections 3.1 and 3.2.

3.1 Toxicity of Copper in Effluent and Lab Water to *Mytilus galloprovincialis*: Event 1

The results of the Event 1 definitive *M. galloprovincialis* tests in effluent, 30 ppt lab water, receiving water, and 34 ppt lab water are presented in Tables 4 through 7, respectively. The test data sheets and the results of the statistical analyses based on the nominal copper concentrations and total recoverable copper concentrations are presented in Appendix B and Appendix C, respectively. The full analytical laboratory report containing the total copper analysis results is presented in Appendix D.

Table 4. Chronic toxicity of copper in effluent to *Mytilus galloprovincialis*: Event 1.

Nominal Spiked Copper (µg/L)	Measured Total Copper (µg/L)	% Normal Embryo Development				
		Rep A	Rep B	Rep C	Rep D	**Mean**
0	22.9	99.0	99.5	97.5	98.5	**98.6**
57	-[a]	98.5	99.0	99.5	99.4	**99.1**
82	-[a]	96.8	97.8	98.5	98.4	**97.9**
117	124	99.0	99.0	99.4	97.1	**98.6**
138	142	92.1	93.7	91.1	94.8	**92.9**
162	163	13.1	20.1	18.2	16.7	**17.2**
190	193	6.0	7.6	6.6	9.4	**7.4**
224	213	3.3	2.3	4.4	4.0	**3.5**
280	260	0	0	0	0	**0**
400	-[a]	0	0	0	0	**0**
Critical Values	Measured Total Copper (µg/L)					
NOEC =	124					
LOEC =	142					
EC_{50} (95% CI) =	159 (154-164)					

a - Test treatment not used in determination of measured Cu EC_{50} values.

Table 5. Chronic toxicity of copper in 30 ppt lab water to *Mytilus galloprovincialis*: Event 1.						
Nominal Spiked Copper (µg/L)	Measured Total Copper (µg/L)	% Normal Embryo Development				
		Rep A	Rep B	Rep C	Rep D	**Mean**
0	0.75 [a]	98.4	99.0	99.4	99.5	**99.1**
3.6	2.43	99.0	98.0	100	99.5	**99.1**
6.0	4.08	98.9	99.0	97.1	98.6	**98.4**
9.0	7.08	97.3	96.5	95.5	97.8	**96.8**
12	9.21	88.7	87.7	81.0	85.3	**85.7**
15	11.6	67.9	57.3	71.7	68.9	**66.5**
18	14.3	3.7	3.5	3.4	5.9	**4.1**
22	17.7	0	0	0	0	**0**
30	- [b]	0	0	0	0	**0**
50	- [b]	0	0	0	0	**0**
Critical Values	Measured Total Copper (µg/L)					
NOEC =	4.08					
LOEC =	7.08					
EC_{50} (95% CI) =	11.7 (11.4-12.1)					

a - Reported as not detected; laboratory method detection limit used for statistical calculations.
b - Test treatment not used in determination of measured Cu EC_{50} values.

Table 6. Chronic toxicity of copper in receiving water to *Mytilus galloprovincialis*: Event 1.						
Nominal Spiked Copper (µg/L)	Measured Total Copper (µg/L)	% Normal Embryo Development				
		Rep A	Rep B	Rep C	Rep D	**Mean**
0	0.75 [a]	99.5	100	100	100	**99.9**
3.6	- [b]	99.5	99.5	100	99.5	**99.6**
6.0	- [b]	100	100	100	98.5	**99.6**
9.0	- [b]	100	99.5	100	98.5	**99.5**
12	10.1	98.0	99.4	97.7	99.1	**98.5**
15	11.9	81.6	77.2	81.2	82.0	**80.5**
18	14.6	46.4	48.0	39.6	47.1	**45.3**
22	19.4	0	0	0	0	**0**
30	- [b]	0	0	0	0	**0**
50	- [b]	0	0	0	0	**0**
Critical Values	Measured Total Copper (µg/L)					
NOEC =	<10.1					
LOEC =	10.1					
EC_{50} (95% CI) =	14.0 (13.8-14.3)					

a - Reported as not detected; laboratory method detection limit used for statistical calculations.
b - Test treatment not used in determination of measured Cu EC_{50} values.

Table 7. Chronic toxicity of copper in 34 ppt lab water to *Mytilus galloprovincialis*: Event 1.						
Nominal Spiked Copper (µg/L)	Measured Total Copper (µg/L)	% Normal Embryo Development				
		Rep A	Rep B	Rep C	Rep D	**Mean**
0	0.75 [a]	99.5	99.4	100	99.5	**99.6**
3.6	- [b]	99.4	99.5	100	100	**99.7**
6.0	- [b]	99.5	100	99.5	99.5	**99.6**
9.0	6.94	100	97.8	100	98.0	**99.0**
12	9.54	89.0	100	88.7	89.0	**91.7**
15	11.5	56.0	59.9	51.8	65.6	**58.3**
18	14.0	8.9	10.2	11.3	10.7	**10.3**
22	17.2	0	0	0	0	**0**
30	- [b]	0	0	0	0	**0**
50	- [b]	0	0	0	0	**0**
Critical Values	Measured Total Copper (µg/L)					
NOEC =	9.54					
LOEC =	11.5					
EC_{50} (95% CI) =	11.8 (11.6-12.0)					

a - Reported as not detected; laboratory method detection limit used for statistical calculations.
b - Test treatment not used in determination of measured Cu EC_{50} values.

3.2 Toxicity of Copper in Effluent and Lab Water to *Mytilus galloprovincialis*: Event 2

The results of the Event 2 definitive *M. galloprovincialis* tests in effluent, 30 ppt lab water, receiving water, and 34 ppt lab water are presented below in Tables 8 through 11, respectively. The test data sheets and the results of the statistical analyses based on the nominal copper concentrations and total recoverable copper concentrations are presented in Appendix E and Appendix F, respectively. The full analytical laboratory report containing the total copper analysis results is presented in Appendix G.

Table 8. Chronic toxicity of copper in effluent to *Mytilus galloprovincialis*: Event 2.						
Nominal Spiked Copper (µg/L)	Measured Total Copper (µg/L)	% Normal Embryo Development				
		Rep A	Rep B	Rep C	Rep D	**Mean**
0	24.3	99.0	99.0	99.5	98.6	**99.0**
57	-[a]	98.5	99.0	98.9	98.1	**98.6**
82	97.6	99.4	98.6	98.9	98.9	**99.0**
117	126	95.0	96.2	96.3	95.9	**95.9**
138	130	75.6	77.8	72.6	72.6	**74.7**
162	148	11.8	13.5	18.9	16.6	**15.2**
190	176	1.1	1.1	0	1.0	**0.81**
224	199	0	0	0	0	**0**
280	-[a]	0	0	0	0	**0**
400	-[a]	0	0	0	0	**0**
Critical Values	Measured Total Copper (µg/L)					
NOEC =	97.6					
LOEC =	126					
EC_{50} (95% CI) =	138 (136-141)					

a - Test treatment not used in determination of measured Cu EC_{50} values.

Table 9. Chronic toxicity of copper in 30 ppt lab water to *Mytilus galloprovincialis*: Event 2.						
Nominal Spiked Copper (µg/L)	Measured Total Copper (µg/L)	% Normal Embryo Development				
		Rep A	Rep B	Rep C	Rep D	**Mean**
0	0.75 [a]	98.9	99.5	98.9	98.9	**99.0**
3.6	-[b]	100	100	98.5	99.4	**99.5**
6.0	4.97	98.5	97.3	98.9	98.1	**98.2**
9.0	7.42	95.1	95.5	94.6	95.2	**95.1**
12	10.4	76.2	80.5	83.2	81.2	**80.3**
15	12.7	25.8	39.5	29.1	28.7	**30.8**
18	15.5	0	0	0.6	0	**0.15**
22	19.4	0	0	0	0	**0**
30	-[b]	0	0	0	0	**0**
50	-[b]	0	0	0	0	**0**
Critical Values	Measured Total Copper (µg/L)					
NOEC =	4.97					
LOEC =	7.42					
EC_{50} (95% CI) =	11.8 (11.6-12.0)					

a - Reported as not detected; laboratory method detection limit used for statistical calculations.
b - Test treatment not used in determination of measured Cu EC_{50} values.

Table 10. Chronic toxicity of copper in receiving water to *Mytilus galloprovincialis*: Event 2.						
Nominal Spiked Copper (µg/L)	Measured Total Copper (µg/L)	% Normal Embryo Development				
		Rep A	Rep B	Rep C	Rep D	**Mean**
0	0.75 [a]	98.3	98.5	99.5	99.5	**99.0**
3.6	- [b]	100	98.6	98.9	98.9	**99.1**
6.0	5.57	100	97.8	100	98.9	**99.2**
9.0	7.89	96.6	93.4	95.7	95.9	**95.4**
12	11.0	77.8	82.2	79.9	79.0	**79.7**
15	15.3	25.9	28.8	24.0	26.1	**26.2**
18	18.4	1.4	0	0	0	**0.34**
22	19.6	0	0	0	0	**0**
30	- [b]	0	0	0	0	**0**
50	- [b]	0	0	0	0	**0**
Critical Values	Measured Total Copper (µg/L)					
NOEC =	5.57					
LOEC =	7.89					
EC_{50} (95% CI) =	13.1 (12.7-13.4)					

a - Reported as not detected; laboratory method detection limit used for statistical calculations.
b - Test treatment not used in determination of measured Cu EC_{50} values.

Table 11. Chronic toxicity of copper in 34 ppt lab water to *Mytilus galloprovincialis*: Event 2.						
Nominal Spiked Copper (µg/L)	Measured Total Copper (µg/L)	% Normal Embryo Development				
		Rep A	Rep B	Rep C	Rep D	**Mean**
0	0.75 [a]	99.5	98.9	99.0	99.5	**99.2**
3.6	- [b]	100	99.5	99.6	99.5	**99.6**
6.0	4.82	99.0	99.5	98.0	100	**99.1**
9.0	7.67	91.1	86.1	86.8	88.2	**88.0**
12	10.1	29.9	36.6	35.9	40.1	**35.6**
15	13.1	0.6	0	0	0	**0.14**
18	16.3	0	0	0	0	**0**
22	- [b]	0	0	0	0	**0**
30	- [b]	0	0	0	0	**0**
50	- [b]	0	0	0	0	**0**
Critical Values	Measured Total Copper (µg/L)					
NOEC =	4.82					
LOEC =	7.67					
EC_{50} (95% CI) =	9.39 (9.29-9.50)					

a - Reported as not detected; laboratory method detection limit used for statistical calculations.
b - Test treatment not used in determination of measured Cu EC_{50} values.

4. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Testing was subject to the QA/QC procedures of the EPA test method protocol (EPA 1995), Streamlined Guidance (EPA 2001), and the City's project specific work plan (2015). A QA/QC review is provided below.

4.1 Method Protocol QA/QC Assessment

The toxicity testing of the copper-spiked effluent, receiving water, and lab waters incorporated standard QA/QC procedures to ensure that the test results were valid, including the use of a negative control, positive control, test replicates, and measurement of water quality conditions during testing. These QA/QC procedures are consistent with methods described in EPA guidelines (EPA 1995).

Sample Disposition – The effluent and receiving water samples were delivered on ice, stored at 0-6˚C, and were used for definitive toxicity testing within the Streamlined Guidance specified 96-hr holding time period. The Event 1 Receiving Water sample was received at 6.9˚C via overnight delivery, which is slightly above the EPA recommended sample transport temperature of <6.0˚C (EPA 2002). Consistent with EPA recommendations, there was clear evidence at the time of sample unpacking that the sample had been transported on ice and in a chilled state. The slight exceedance of the recommended sample transport temperature is not believed to have affected the validity of the corresponding WER test result.

Test Conditions – All test conditions (pH, D.O., temperature, etc.) were within acceptable limits for these tests. All analyses were performed according to laboratory Standard Operating Procedures.

Negative Control (Lab Water) – The biological response in the negative Control treatments were within test acceptability limits of ≥90% normal development.

Concentration Response Relationships – The concentration-response relationships for these tests were evaluated as per EPA guidelines (EPA 2000), and were determined to be acceptable.

Positive Control – The results of the reference toxicant test was consistent with the typical response ranges established by the reference toxicant database for this species (Table 12). These results indicated that these test organisms were responding to toxic stress in a typical and consistent fashion. The test data and summary of statistical analyses for the reference toxicant test are presented in Appendix H and Appendix I.

Table 12. Reference toxicant testing: effects of KCl on *Mytilus galloprovincialis*.			
Test Date	Test EC_{50} (mg/L)	Control Chart Mean EC_{50} (mg/L)	Typical Response Range (mean ± 2SD)
10/7/15	2.43	2.24	1.83-2.64 mg/L
11/12/15	1.94	2.26	1.82-2.70 mg/L

4.2 Streamlined Guidance QA/QC Assessment

There were no deviations from the Streamlined Guidance (EPA 2001) or the project specific work plan (Humboldt 2015) in the testing performed. The following criteria were met for both testing events:

- The % of organisms adversely affected was <37% in at least one treatment;
- The % of organisms adversely affected was >63% in at least one treatment;
- No anomalies were observed during the testing;
- The same statistical method (i.e., linear regression) was used to calculate the EC_{50} endpoint for each concurrent effluent, receiving water, and lab water test; and
- Results of the statistical analyses were based on measured total copper.

Additional Streamlined Guidance specific QA/QC assessments are presented in Sections 4.2.1-4.2.4.

4.2.1 Lab Water Assessment

The lab water TSS, DOC, and TOC were less than 5 mg/L (Table 13) meeting the water quality requirements for use of lab water in WER determinations. The analytical reports containing these results are presented in Appendix D and Appendix G.

Table 13. Summary of lab water TSS, DOC, and TOC concentrations.				
Event No.	Test Water	TSS (mg/L)	DOC (mg/L)	TOC (mg/L)
Event 1	Lab Water (30 ppt)	<2	0.83	0.82
	Lab Water (34 ppt)	<2	0.87	0.83
Event 2	Lab Water (30 ppt)	<2	0.93	0.89
	Lab Water (34 ppt)	4	0.92	0.94

4.2.2 Definitive Toxicity Test Temperature and Dissolved Oxygen

The minimum, maximum, and mean temperature and dissolved oxygen concentrations for each test are presented in Table 14. Daily measurement are provided in Appendix B and Appendix F.

4.2.3 Analytical Chemistry Results

A detailed review of the acceptability of the analytical chemistry laboratory data was performed by PER. The Event 1 total copper analysis result of the 9.0 µg/L nominal copper treatment of the receiving water test indicated that the copper spiking was performed incorrectly for that test treatment. Sample reanalysis (triplicate) confirmed that the receiving water 9.0 µg/L nominal copper treatment was inadvertently spiked with 12.0 µg/L of copper. Accordingly, the 9.0 µg/L test treatment was excluded from the statistical analysis of the total copper EC_{50} value and the mean of the reanalysis total copper values was reported for the 12.0 µg/L nominal copper treatment.

Table 14. Summary of temperature and dissolved oxygen measurements for the definitive *Mytilus galloprovincialis* tests.

Event No.	Test Media	Temperature (°C)			Dissolved Oxygen					
					mg/L			% Saturation at 20°C		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Event 1	Effluent	18.7	19.0	18.9	6.6	8.0	7.3	71	86	79
	Receiving Water	18.7	19.0	18.9	6.2	8.3	7.4	67	90	80
	Lab Water (30 ppt)	18.7	19.0	18.9	6.5	8.3	7.5	70	90	81
	Lab Water (34 ppt)	18.7	19.0	18.9	6.5	8.7	7.8	70	94	84
Event 2	Effluent	18.3	18.8	18.6	7.0	7.9	7.6	76	85	82
	Receiving Water	18.3	18.8	18.6	6.6	7.6	7.4	71	82	80
	Lab Water (30 ppt)	18.3	18.8	18.6	6.4	7.4	7.0	69	80	75
	Lab Water (34 ppt)	18.3	18.8	18.6	6.7	7.8	7.5	72	84	81

The Event 2 total copper analysis result of the 15 µg/L and 18 µg/L nominal copper treatments of the receiving water test indicated that the total copper values were inverted. A reanalysis was performed to confirm the values were reported correctly for the samples that were submitted. The test organism responses at these two test treatments clearly suggest that the test organisms were exposed to the correct test solutions, confirming that the sample containers submitted to the analytical lab were incorrectly labeled. The values used for the corresponding statistical analysis of the total copper EC_{50} were corrected to account for this labeling error.

The initial results of the TSS analysis of the test waters yielded anomalous elevated values due residual salts from the saltwater matrix. A reanalysis was performed using a multiple rinse procedure, which, although commonly performed for saltwater matrices, was not performed as part of the initial analysis. Although the results of the reanalysis were performed outside of the hold-time for TSS analysis, it is our professional opinion that the results are acceptable. The result of the TSS reanalysis of the lab waters for both Events 1 and 2 were all <5 mg/L, therefore the lab water were determined to be acceptable for use in a WER.

All other analytical chemistry data were generated without qualification; laboratory control and matrix spike and spike duplicate recoveries were within standard laboratory control limits.

4.2.4 Water-Effect Ratio Testing Review

The Streamlined Guidance (EPA 2001) contains information on calculating, interpreting, and reporting results. Table 15 details how this lab report and supporting appendices address the requirements for reporting copper WER toxicity testing data as outlined in Streamlined Guidance Section G (Calculating and Interpreting the Results) and Section H (Reporting the Results). Only the reporting requirements related to copper WER toxicity test data are presented below.

Table 15. Summary of EPA's 2001 Streamlined Guidance Sections G and H requirements and WER testing conformance.

Requirement	Streamlined Guidance Section	Location in PER Report	Notes
Evaluate the acceptability of each toxicity test individually:	**Section G.1**		
Reject tests where deviations from the above presented laboratory practices are substantial, particularly with respect to acclimation, randomization, temperature control, measurement of metal, and/or disease or disease-treatment.	Section G.1.a	Section 2 Section 4	There were no laboratory practice deviations warranting test rejection
Reject tests where more than 10 percent of the organisms in the controls were adversely affected.	Section G.1.b	Section 3 Section 4	There was > 90% test organism normal development in the control treatment of all tests
To calculate an EC_{50}:	**Section G.2**		
Calculate the EC_{50} using methods described by U.S. EPA (1993) or ASTM (1999, 2000a). If two or more treatments affected between 0 and 100 percent in both tests in a side-by-side pair, use probit analysis to calculate results of both tests, unless the probit model is rejected by the goodness of fit test in one or both of the acute tests. If probit analysis cannot be used, either because fewer than two percentages are between 0 and 100 percent or because the model does not fit the data, use computational interpolation; do not use graphical interpolation. Use the same computational method for each of the side-by-side tests.	Section G.2	Section 3 Section 4 Statistical summaries presented in Appendices B, C, E, and F	Requirement met
For laboratory water:	**Section G.3**		
Calculate or assign the EC_{50} for the lab water only if the percent of the organisms that were adversely affected is greater than 50 percent in at least one treatment (although it is preferable if at least 63 percent of the organisms were affected). That is, if there is insufficient toxicity at all concentrations in the laboratory water, the side-by-side tests are not usable for obtaining a WER>1.	Section G.3.a	Section 3 Section 4 Statistical summaries presented in Appendices B, C, E, and F	Requirement met

Table 15. (*Cont.*) Summary of EPA's 2001 Streamlined Guidance Sections G and H requirements and WER testing conformance.

Requirement	Streamlined Guidance Section	Location in PER Report	Notes
If no treatment other than the control affected less than 50 percent of the test organisms, set the EC_{50} equal to the lowest test concentration (preceded by < sign). That is, if there is excessive toxicity at all tested concentrations (except the control), the laboratory water EC_{50} is known only to be less than the lowest treatment concentration.	Section G.3.b	Section 3	Not applicable
For effluent:	**Section G.4**		
Calculate or assign the EC_{50} for the effluent only if the percent of the organisms that were adversely affected is less than 50 percent in at least one treatment (although it is preferable if less than 37 percent of organisms were affected). That is, if there is excessive toxicity at all tested concentrations in site water, the sample is not usable for obtaining a WER>1.	Section G.4.a	Section 3	Requirement met
If no treatment affected more than 50 percent of the test organisms, set the EC_{50} equal to the highest test concentration (preceded by > sign). That is, if there is insufficient toxicity at all tested concentrations, the site water EC_{50} is known only to be greater than the highest treatment concentration.	Section G.4.b	Section 3	Not applicable
In reporting results, highlight anything unusual or questionable about the test findings:	**Section G.5.**		
Report if dissolved metal decreased by more than 50 percent from the beginning to the end of a 48-hour static test.	Section G.5.a	Section 3	Not applicable
Report if there were inversions in the data for more than two concentrations in the range of 20 to 80 percent mortality (or as modified by Abbott's formula).	Section G.5.b	Section 3 Section 4	There were no inversions Requirement met

Table 15. (*Cont.*) Summary of EPA's 2001 Streamlined Guidance Sections G and H requirements and WER testing conformance.

Requirement	Streamlined Guidance Section	Location in PER Report	Notes
Include the following general information in the report submitted to the appropriate regulatory agency:	**Section H.1**		
Identity of the investigators and the laboratory.	Section H.1.a	Section 1	Requirement met
Name, location, and description of the discharger.	Section H.1.b	Section 1	Requirement met
Procedures used to transport and store the samples of the upstream water and the effluent.	Section H.1.h	Section 2	Requirement met
Any pretreatment, such as filtration of the effluent, site water, and/or laboratory dilution water.	Section H.1.i	Section 2	Requirement met
Description of the laboratory dilution water, including source and preparation.	Section H.1.j	Section 2	Requirement met
Results of all chemical and physical measurements on upstream water, effluent, actual and/or simulated downstream water, and laboratory dilution water, including hardness, alkalinity, pH, and concentrations of total recoverable or dissolved metal, TSS, and DOC, as applicable.	Section H.1.k	Section 2 Section 4 Appendix D and G	Hardness and alkalinity were not analyzed due to the saltwater matrix of the test solutions
Description of the experimental design, test chambers, volume of solution in the chambers, photoperiod, and numbers of organisms and chambers per treatment.	Section H.1.l	Section 2	Requirement met
Source and grade of the copper salt, and how the stock solution was prepared.	Section H.1.m	Section 2	Requirement met
Species and source of the test organisms, age, and holding and acclimation procedures.	Section H.1.n	Section 2	Requirement met
The average and range of the temperature, pH, hardness, alkalinity, and the concentration of dissolved oxygen (mg/L) during acclimation.	Section H.1.o	Not applicable	Not applicable

Table 15. (*Cont.*) Summary of EPA's 2001 Streamlined Guidance Sections G and H requirements and WER testing conformance.

Requirement	Streamlined Guidance Section	Location in PER Report	Notes
Include the following information for each sample or toxicity test:	**Section H.2**		
Date and time of sampling site water and date of toxicity test	Section H.2.a	Section 2 Appendix A	Requirement met
Measurements of hardness, alkalinity, pH, and DOC.	Section H.2.e	Section 2 Appendices D and G	Hardness and alkalinity were not analyzed due to the saltwater matrix
The average and range of the measured concentrations of dissolved oxygen (in mg/L).	Section H.2.f	Section 4	Requirement met
The average and range of the test temperature.	Section H.2.g	Section 4	Requirement met
A summary table of the concentrations of copper in each treatment, including controls, and the number or organisms affected, in sufficient detail to allow independent statistical analysis of the data.	Section H.2.h	Section 3	Requirement met
The EC_{50} and the method used to calculate it.	Section H.2.i	Section 2 Appendices C and F	Requirement met
Anything unusual about the test, any deviations from the procedures described above, and any other relevant information.	Section H.2.j	Section 4	Refer to Section 4.2.4
All differences, other than the dilution water and the concentrations of metal in the test solutions, between the side-by-side tests using laboratory dilution water and effluent.	Section H.2.k	Section 2 Section 4	Requirement met
Include the following information in a summary table:	**Section H.3**		
EC_{50}s and hardness for each test in effluent and laboratory-water, not normalized for hardness.	Section H.3.a	Section 3 Section 4	Hardness was not analyzed due to the saltwater matrix
Presentation:	**Section H.4**		
Present the calculated site WER and site criterion.	Section H.4	Not applicable	Will be done in separate report

5. SUMMARY

The effluent, 30 ppt lab water, receiving water, and 34 ppt lab water copper EC_{50} values (and accompanying 95% CI) are presented in Table 16. All results were calculated as described in this report.

Table 16. Cu EC_{50} for effluent, receiving water, and lab water tests based on measured total copper concentrations.

Event No.	Test Waters	Total Cu EC_{50} value (95% CI; μg/L)
Event 1	Effluent	159 (154-164)
	30 ppt Lab Water	11.7 (11.4-12.1)
	Receiving Water	14.0 (13.8-14.3)
	34 ppt Lab Water	11.8 (11.6-12.0)
Event 2	Effluent	138 (136-141)
	30 ppt Lab Water	11.8 (11.6-12.0)
	Receiving Water	13.1 (12.7-13.4)
	34 ppt Lab Water	9.39 (9.29-9.50)

6. REFERENCES

EPA (1995). Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA 600-R-95-136. US Environmental Protection Agency, Environmental Research Laboratory, Duluth, MN. August 1995.

EPA (2000). Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing (40 CFR Part 136). EPA 821-B-00-004. Office of Water. US Environmental Protection Agency, Washington, DC. July 2000.

EPA (2001). Streamlined Water-Effect Ratio Procedure for Discharges of Copper. EPA 822-R-01-005. Office of Water. US Environmental Protection Agency, Washington, DC. March 2001.

Hurst (2015). Water-Effect Ratio for Copper Study Plan for the City of Eureka, Elk River Wastewater Treatment Plant. Prepared by Humboldt State University, Arcata, CA. September, 2015.

Appendix A

Chain-of-Custody Records for the Collection and Delivery of the Effluent and Receiving Water Samples

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	City of Eureka	**Invoice To:**	Same
Address:	4301 Hilfiker Lane Eureka, CA 95503	**Address:**	
Phone:	(707) 441-4363	**Phone:**	
Attn:	Michael Hansen	**Attn:**	
E-mail:	mphansen@ci.eureka.ca.gov	**E-mail:**	
Project Name:	City of Eureka Cu WER Study: Event 1		
P.O.#/Ref:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: *Mytilus galloprovincialis* Cu WER Rangefinding Test
1	Effluent	9/28/15	1304	EFF	GRAB	1	2.5 gallon cubitainer	X
2	Receiving Water	9/28/15	1207	SW	GRAB	1	2.5 gallon cubitainer	X
3								
4								
5								
6								
7								
8								
9								
10								

Samples collected by: DR. MATTHEW HURST AND MICHAEL HANSEN

Comments/Special Instruction:

RELIQUINSHED BY:	RECEIVED BY:
Signature: Michael P. Hansen	Signature: Christian Scroggins
Print: MICHAEL P. HANSEN	Print: Christian Scroggins
Organization: CITY OF EUREKA	Organization: Pacific Ecorisk
Date: 9-28-15 Time: 1415	Date: 9/29/15 Time: 1150
RELIQUINSHED BY:	RECEIVED BY:
Signature:	Signature:
Print:	Print:
Organization:	Organization:
Date: Time:	Date: Time:

***Example Matrix Codes**: (**EFF** - Effluent) (**FW** = Freshwater); (**SW** = Saltwater); (**WW** = Wastewater); (**STRMW** = Stormwater); (**SED** = Sediment); or other

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	City of Eureka	**Invoice To:**	Same
Address:	4301 Hilfiker Lane	**Address:**	
	Eureka, CA 95503		
Phone:	(707) 441-4363	**Phone:**	
Attn:	Michael Hansen	**Attn:**	
E-mail:	mphansen@ci.eureka.ca.gov	**E-mail:**	
Project Name:	City of Eureka Cu WER Study: Event 1		
P.O.#/Ref:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: *Mytilus galloprovincialis* Cu WER Rangefinding Test
1	Effluent	10-6-15	0915	EFF	GRAB	2	2.5 gallon cubitainer	X
2	Receiving Water	10-6-15	0815	SW	GRAB	2	2.5 gallon cubitainer	X
3								
4								
5								
6								
7								
8								
9								
10								

Samples collected by:

Comments/Special Instruction:

RELIQUINSHED BY:	RECEIVED BY:
Signature: Michael Hansen	Signature:
Print: MICHAEL HANSEN	Print: DAHLIA MA
Organization: CITY OF EUREKA	Organization: PER
Date: 10-6-15 Time: 1125	Date: 10/7/15 Time: 1005
RELIQUINSHED BY:	RECEIVED BY:
Signature:	Signature:
Print:	Print:
Organization:	Organization:
Date: Time:	Date: Time:

***Example Matrix Codes**: (**EFF** - Effluent) (**FW** = Freshwater); (**SW** = Saltwater); (**WW** = Wastewater); (**STRMW** = Stormwater); (**SED** = Sediment); or other

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	City of Eureka	**Invoice To:**	Same
Address:	4301 Hilfiker Lane Eureka, CA 95503	**Address:**	
Phone:	(707) 441-4363	**Phone:**	
Attn:	Michael Hansen	**Attn:**	
E-mail:	mphansen@ci.eureka.gov	**E-mail:**	
Project Name:	City of Eureka Cu WER Study: Event 2		
P.O.#/Ref:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: *Mytilus galloprovincialis* copper WER definitive test
1	Effluent	11/10/15	1050	EFF	Grab	2	2.5 gallon cubitainer	X
2	Receiving Water	11/10/15	0930	SW	Grab	2	2.5 gallon cubitainer	X
3								
4								
5								
6								
7								
8								
9								
10								

Samples collected by:

Comments/Special Instruction:

RELINQUISHED BY:	RECEIVED BY:
Signature: Michael P. Hansen	Signature: Christian Scroggins
Print: MICHAEL P. HANSEN	Print: Christian Scroggins
Organization: CITY OF EUREKA	Organization: PER
Date: 11/10/15 Time: 1310	Date: 11/12/15 Time: 0930
RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature:
Print:	Print:
Organization:	Organization:
Date: Time:	Date: Time:

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

Appendix B

Data Sheets and Summary of Statistical Analysis for Determination of Copper EC_{50} Values for Effluent, Receiving Water and Lab Waters Based on Nominal Copper Concentrations: Event 1

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	12-5521-6240	Test Type:	Development-Survival	Analyst:	Alison Briden
Start Date:	07 Oct-15 16:25	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Effluent
Ending Date:	09 Oct-15 16:25	Species:	Mytilus galloprovincialis	Brine:	Tropic Marin
Duration:	48h	Source:	Gutoff	Age:	N/A

Sample ID:	19-5820-3539	Code:	Cu in EFF	Client:	City of Eureka
Sample Date:	06 Oct-15 09:15	Material:	Copper in Effluent	Project:	24678
Receive Date:	07 Oct-15 10:05	Source:	City of Eureka		
Sample Age:	31h (1.9 °C)	Station:	Copper in Effluent		

Batch Note: Nominal Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-1703-8769	Development Rate	117	138	127.1	1.55%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
07-9508-0753	Development Rate	EC5	127	117	133		Linear Regression (MLE)
		EC10	133	124	139		
		EC15	137	129	143		
		EC20	140	133	146		
		EC25	143	137	149		
		EC40	151	146	156		
		EC50	156	151	162		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Effluent Control	4	0.986	0.973	1	0.975	0.995	0.00423	0.00847	0.86%	0.0%
0	Salt Control	4	0.994	0.984	1	0.986	1	0.00296	0.00593	0.6%	-0.79%
57		4	0.991	0.983	0.999	0.985	0.995	0.00241	0.00482	0.49%	-0.49%
82		4	0.979	0.966	0.992	0.968	0.985	0.00397	0.00795	0.81%	0.73%
117		4	0.986	0.97	1	0.971	0.994	0.00513	0.0103	1.04%	-0.02%
138		4	0.929	0.903	0.955	0.911	0.948	0.00819	0.0164	1.76%	5.79%
162		4	0.172	0.121	0.222	0.131	0.207	0.0158	0.0317	18.5%	82.6%
190		4	0.074	0.0503	0.0977	0.0599	0.0941	0.00745	0.0149	20.1%	92.5%
224		4	0.0347	0.0202	0.0493	0.0226	0.0435	0.00458	0.00916	26.4%	96.5%
280		4	0	0	0	0	0	0	0		100.0%
400		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Effluent Control	0.99	0.995	0.975	0.985
0	Salt Control	0.995	0.995	1	0.986
57		0.985	0.99	0.995	0.994
82		0.968	0.978	0.985	0.984
117		0.99	0.99	0.994	0.971
138		0.921	0.937	0.911	0.948
162		0.131	0.207	0.182	0.167
190		0.0599	0.0757	0.0663	0.0941
224		0.0331	0.0226	0.0435	0.0398
280		0	0	0	0
400		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Effluent Control	191/193	186/187	193/198	203/206
0	Salt Control	205/206	188/189	213/213	208/211
57		192/195	191/193	197/198	178/179
82		182/188	178/182	201/204	190/193
117		197/199	190/192	180/181	203/209
138		186/202	192/205	174/191	200/211
162		24/183	36/174	32/176	29/174
190		10/167	14/185	12/181	16/170
224		6/181	4/177	8/184	7/176
280		0/1	0/1	0/1	0/1
400		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	20-5242-6264	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 17:19	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.55%	117	138	127.1	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Effluent Control		57	-0.897	2.48	0.058	6	0.9866	CDF	Non-Significant Effect
		82	1.28	2.48	0.058	6	0.3544	CDF	Non-Significant Effect
		117	-0.0904	2.48	0.058	6	0.8961	CDF	Non-Significant Effect
		138*	6.64	2.48	0.058	6	<0.0001	CDF	Significant Effect
		162*	44.3	2.48	0.058	6	<0.0001	CDF	Significant Effect
		190*	50.8	2.48	0.058	6	<0.0001	CDF	Significant Effect
		224*	54.6	2.48	0.058	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	9.758245	1.394035	7	1290	<0.0001	Significant Effect
Error	0.02595827	0.001081595	24			
Total	9.784204		31			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.69	18.5	0.9749	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.957	0.908	0.2250	Normal Distribution

Development Rate Summary

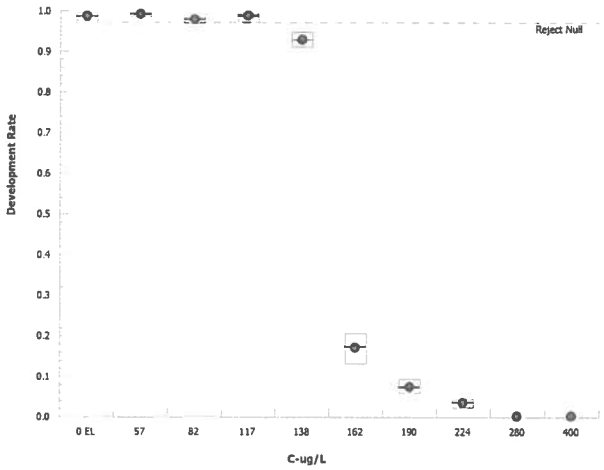
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Effluent Control	4	0.986	0.973	1	0.988	0.975	0.995	0.00423	0.86%	0.0%
57		4	0.991	0.983	0.999	0.992	0.985	0.995	0.00241	0.49%	-0.49%
82		4	0.979	0.966	0.992	0.981	0.968	0.985	0.00397	0.81%	0.73%
117		4	0.986	0.97	1	0.99	0.971	0.994	0.00513	1.04%	-0.02%
138		4	0.929	0.903	0.955	0.929	0.911	0.948	0.00819	1.76%	5.79%
162		4	0.172	0.121	0.222	0.174	0.131	0.207	0.0158	18.5%	82.6%
190		4	0.074	0.0503	0.0977	0.071	0.0599	0.0941	0.00745	20.1%	92.5%
224		4	0.0347	0.0202	0.0493	0.0365	0.0226	0.0435	0.00458	26.4%	96.5%
280		4	0	0	0	0	0	0	0		100.0%
400		4	0	0	0	0	0	0	0		100.0%

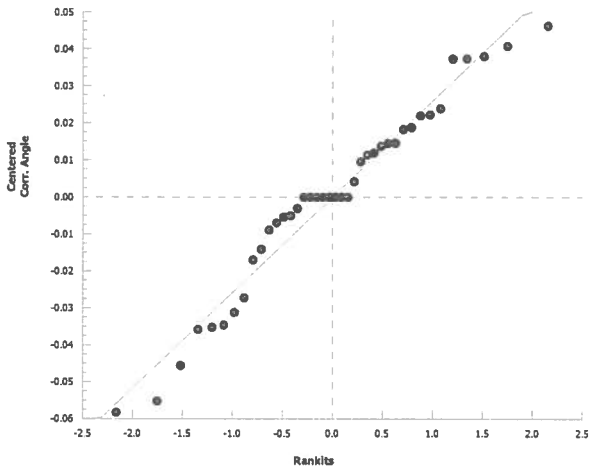
Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Effluent Control	4	1.46	1.4	1.51	1.46	1.41	1.5	0.0181	2.49%	0.0%
57		4	1.48	1.44	1.52	1.48	1.45	1.5	0.0125	1.69%	-1.43%
82		4	1.43	1.38	1.47	1.43	1.39	1.45	0.0134	1.88%	2.05%
117		4	1.46	1.39	1.52	1.47	1.4	1.5	0.0205	2.81%	-0.14%
138		4	1.3	1.25	1.35	1.3	1.27	1.34	0.0161	2.47%	10.6%
162		4	0.426	0.358	0.494	0.431	0.371	0.472	0.0213	10.0%	70.8%
190		4	0.275	0.23	0.319	0.27	0.247	0.312	0.014	10.2%	81.2%
224		4	0.186	0.145	0.228	0.192	0.151	0.21	0.013	14.0%	87.2%
280		4	0.0368	0.0368	0.0368	0.0368	0.0368	0.0368	0	0.0%	97.5%
400		4	0.0368	0.0368	0.0368	0.0368	0.0368	0.0368	0	0.0%	97.5%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	20-5242-6264	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	20 Jan-16 17:19	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	07-9508-0753	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:14	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	0.014031	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
13	-1220	2450	2450	2.19	0.0555	0.879	114	2.33	0.0000	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	127	117	133
EC10	133	124	139
EC15	137	129	143
EC20	140	133	146
EC25	143	137	149
EC40	151	146	156
EC50	156	151	162

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0117	0.00827	-0.005	0.0285	1.42	0.1636	Non-Significant Parameter
Slope	18	2.18	13.6	22.4	8.25	<0.0001	Significant Parameter
Intercept	-39.5	4.8	-49.2	-29.8	-8.23	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4284.124	4284.124	1	285	<0.0001	Significant
Lack of Fit	535.6282	76.51831	7	114	<0.0001	Significant
Pure Error	20.14226	0.671409	30			
Residual	555.7704	15.02082	37			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	556	52.2	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	347	52.2	<0.0001	Significant Heterogenity
Variances	Mod Levene Equality of Variance	2.63	2.21	0.0225	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.884	0.945	0.0007	Non-normal Distribution
	Anderson-Darling A2 Normality	2.33	2.49	<0.0001	Non-normal Distribution

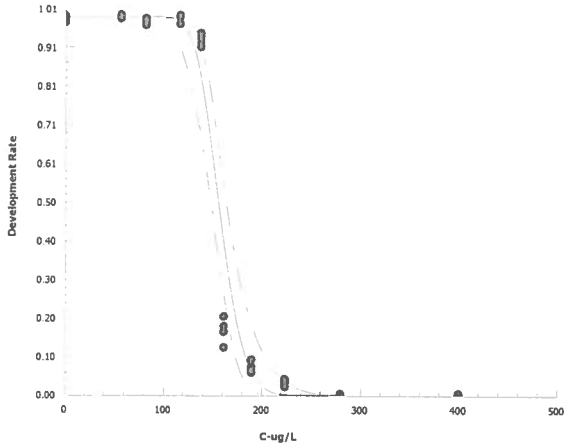
Development Rate Summary

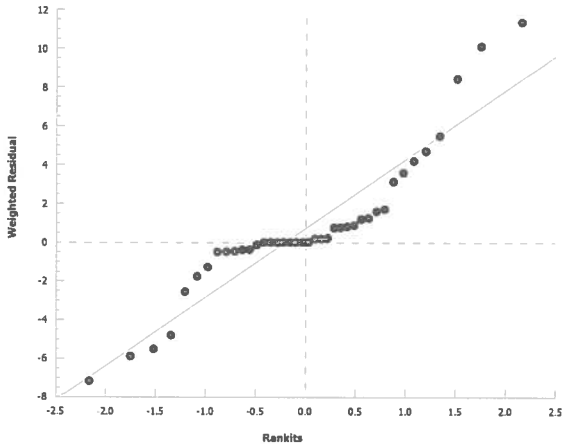
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Effluent Control	4	0.986	0.975	0.995	0.00423	0.00847	0.86%	0.0%	773	784
57		4	0.991	0.985	0.995	0.00241	0.00483	0.49%	-0.49%	758	765
82		4	0.979	0.968	0.985	0.00397	0.00795	0.81%	0.73%	751	767
117		4	0.986	0.971	0.994	0.00513	0.0103	1.04%	-0.02%	770	781
138		4	0.929	0.911	0.948	0.00819	0.0164	1.76%	5.79%	752	809
162		4	0.172	0.131	0.207	0.0158	0.0317	18.5%	82.6%	120	707
190		4	0.074	0.0599	0.0941	0.00745	0.0149	20.1%	92.5%	52	703
224		4	0.0347	0.0226	0.0435	0.00458	0.00916	26.4%	96.5%	25	718
280		4	0	0	0	0	0		100.0%	0	4
400		4	0	0	0	0	0		100.0%	0	4

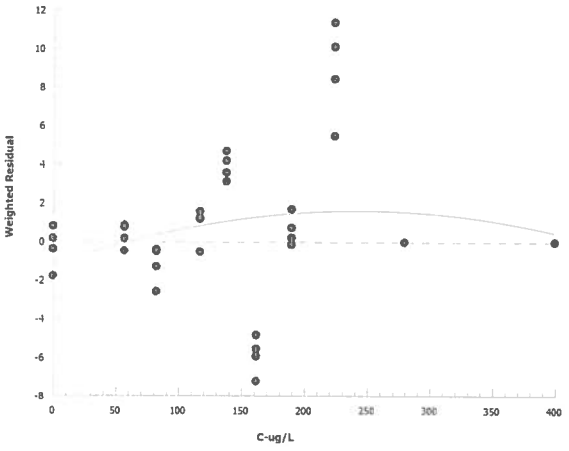
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	07-9508-0753	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:14	Analysis:	Linear Regression (MLE)	Official Results:	Yes

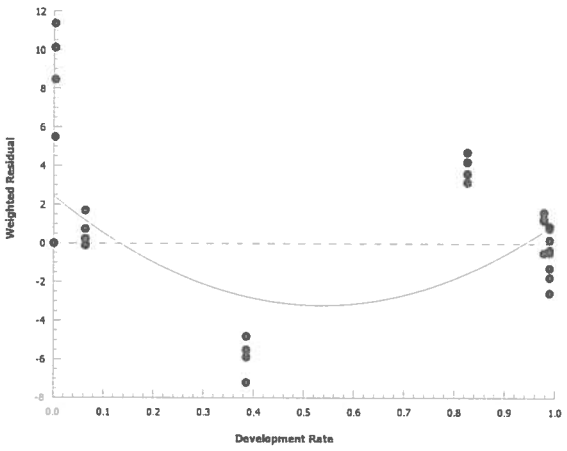
Graphics

Log-Normal [NED=A+B*log(X)]









Analyst: KB QA: SNV

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	14-0678-8982	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 10:11	Analysis:	Parametric-Two Sample	Official Results:	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	0.74%	Passes development rate

Equal Variance t Two-Sample Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Water Control		Salt Control	-0.588	1.94	0.036	6	0.7111	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002429964	0.0002429964	1	0.346	0.5777	Non-Significant Effect
Error	0.004210712	0.0007017853	6			
Total	0.004453708		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	6.8	47.5	0.1497	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.951	0.645	0.7237	Normal Distribution

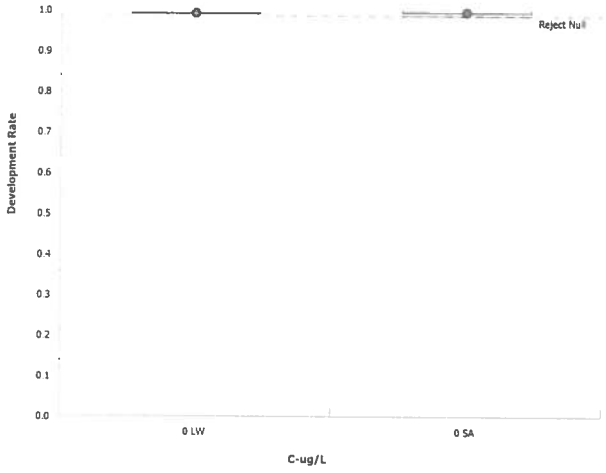
Development Rate Summary

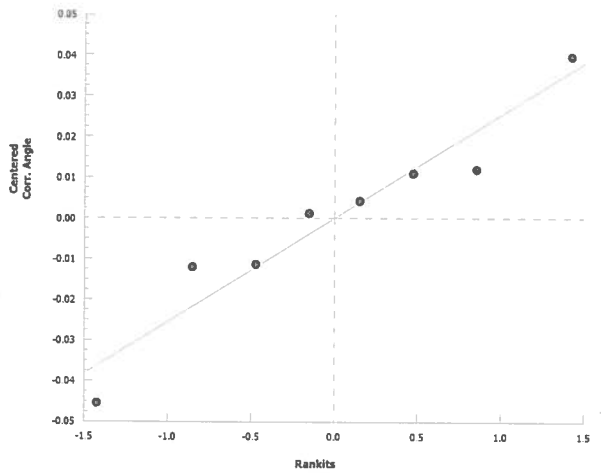
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Contr	4	0.993	0.989	0.996	0.993	0.991	0.995	0.00114	0.23%	0.0%
0	Salt Control	4	0.994	0.984	1	0.995	0.986	1	0.00296	0.6%	-0.13%

Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Cont	4	1.49	1.46	1.51	1.49	1.47	1.5	0.00671	0.9%	0.0%
0	Salt Control	4	1.5	1.44	1.55	1.5	1.45	1.54	0.0175	2.34%	-0.74%

Graphics





Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Effluent
Test ID #: 64724
Project #: 24678

Test Start Date: 10/7/15
Test End Date: 10/9/15
Enumeration Date: 10/12/15
Investigator: IA

Treatment (µg/L Cu)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
0	A	191	2	193	99.0
	B	186	1	187	99.5
	C	193	5	198	97.5
	D	203	3	206	98.5
57	A	192	3	195	98.5
	B	191	2	193	99.0
	C	197	1	198	99.5
	D	178	1	179	99.4
82	A	182	6	188	96.8
	B	178	4	182	97.8
	C	201	3	204	98.5
	D	190	3	193	98.4
117	A	197	2	199	99.0
	B	190	2	192	99.0
	C	180	1	181	99.4
	D	203	6	209	97.1
138	A	186	16	202	92.1
	B	192	13	205	93.7
	C	174	17	191	91.1
	D	200	11	211	94.8
162	A	24	159	183	13.1
	B	36	138	174	20.7
	C	32	144	176	18.2
	D	29	145	174	16.7

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Effluent
Test ID #: 64724
Project #: 24678

Test Start Date: 10/7/15
Test End Date: 10/9/15
Enumeration Date: 10/12/15
Investigator: LA

190	A	10	157	167	6.0
	B	14	171	185	7.6
	C	12	169	181	6.6
	D	16	154	170	9.4
224	A	6	175	181	3.3
	B	4	173	177	2.3
	C	8	176	184	4.3
	D	7	169	176	4.0
280	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0
400	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Effluent
Test ID#: 64724 Project #: 24678
Test Date: 10/7/15 Randomization: ^

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: Effluent

Day 0

Treatment (µg/L Cu)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.7	7.42	7.8	30.0	Sample ID: 39945
57	18.7	7.44	7.9	30.0	Test Solution Prep: PA
82	18.7	7.44	8.0	30.0	New WQ: PA
117	18.7	7.45	8.0	30.0	Inoculation Date: 10-7-15
138	18.7	7.46	8.0	30.1	Inoculation Time: 1625
162	18.7	7.45	8.0	30.1	Inoculation Signoff: SM
190	18.7	7.47	8.0	30.1	New WQ: PA
224	18.7	7.48	7.9	30.1	
280	18.7	7.47	7.9	30.1	
400	18.7	7.47	7.9	30.1	
Meter ID	69A	PH15	RD11	EC10	

Day 1

Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	19.0				Date: 10-8-15
57	19.0				Old WQ: AB
82	19.0				
117	19.0				
138	19.0				
162	19.0				
190	19.0				
224	19.0				
280	19.0				
400	19.0				
Meter ID	69A				

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Effluent
Test ID#: 64724 Project #: 24678
Test Date: 10/7/15 Randomization: -

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: Effluent

Day 2					
Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	~~18.9~~ 18.9	7.92	6.7	30.0	Termination Date: 10-9-15
57	18.9	7.91	6.7	30.0	Termination Time: 1625
82	18.9	7.91	6.6	30.0	Termination Signoff: Le
117	18.9	7.90	6.7	30.0	Old WQ: 2
138	18.9	7.91	6.7	30.0	
162	18.9	7.90	6.7	30.0	
190	18.9	7.90	6.8	30.0	
224	18.9	7.91	6.8	30.0	
280	18.9	7.90	6.8	30.0	
400	18.9	7.88	6.6	30.0	
Meter ID	69A	pH 22	RDO	E109	

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Effluent
Test ID #: 64724
Project #: 24678
Sample Salinity adjusted with : Tropic Marin

Test Start Date: 10-7-15
Test End Date: 10-9-15
Enumeration Date: 10/12/15
Investigator: CA

Concentration	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Lab Water Control	A	214	2	216	99.1
	B	187	1	188	99.5
	C	182	1	183	99.5
	D	211	2	213	99.1
Salt Control	A	205	1	206	99.5
	B	188	1	189	99.5
	C	213	0	213	100.0
	D	208	3	211	98.6

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Effluent
Test ID#: 64724 Project #: 24678
Test Date: 10-7-15 Randomization: –
Sample Salinity adjusted with : Tropic marin

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: Filtered Seawater @ 30 ppt

Day 0					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Lab Water Control	18.7	7.64	8.2	30.0	Date & Inoculation Time: 10-7-15 1625
Salt Control	18.7	7.50	8.0	30.0	Solution Prep/Inoculation: PL / SM
Meter ID	69A	pH15	12D11	EC10	New WQ: PN

Day 1					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Lab Water Control	19.0				Date: 10-8-15
Salt Control	19.0				Old WQ: *B
Meter ID	69A*B				

Day 2					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Lab Water Control	18.9	7.75	7.2	29.9	Date & Termination Time: 10-9-15 1625
Salt Control	18.9	7.79	7.1	30.1	Termination: PL
Meter ID	69A	pH22	RD10	EC09	Old WQ: 2

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	08-9870-6450	Test Type:	Development-Survival	Analyst:	Alison Briden
Start Date:	07 Oct-15 16:58	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	09 Oct-15 16:58	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Gutoff	Age:	N/A

Sample ID:	11-6356-1177	Code:	Cu in LW 30 ppt	Client:	City of Eureka
Sample Date:	07 Oct-15 11:30	Material:	Copper in Lab Water	Project:	24678
Receive Date:	07 Oct-15 11:30	Source:	City of Eureka		
Sample Age:	5h (18.7 °C)	Station:	Copper in Lab Water @ 30 ppt		

Batch Note: Nominal Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-4579-4684	Development Rate	6	9	7.348	1.8%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
01-5478-2280	Development Rate	EC5	11.9	11.2	12.4		Linear Regression (MLE)
		EC10	12.6	12	13		
		EC15	13	12.5	13.4		
		EC20	13.4	12.9	13.8		
		EC25	13.7	13.2	14.1		
		EC40	14.5	14.1	14.9		
		EC50	15.1	14.7	15.4		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Water Contr	4	0.991	0.983	0.999	0.984	0.995	0.00245	0.0049	0.5%	0.0%
3.6		4	0.991	0.977	1	0.98	1	0.00437	0.00874	0.88%	-0.04%
6		4	0.984	0.97	0.998	0.971	0.99	0.00436	0.00872	0.89%	0.67%
9		4	0.968	0.952	0.984	0.955	0.978	0.00494	0.00989	1.02%	2.33%
12		4	0.857	0.803	0.911	0.81	0.887	0.017	0.034	3.97%	13.5%
15		4	0.665	0.564	0.765	0.573	0.717	0.0316	0.0632	9.51%	32.9%
18		4	0.0411	0.0221	0.06	0.0337	0.0588	0.00595	0.0119	29.0%	95.9%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	0.984	0.99	0.994	0.995
3.6		0.99	0.98	1	0.995
6		0.989	0.99	0.971	0.986
9		0.973	0.965	0.955	0.978
12		0.887	0.877	0.81	0.853
15		0.679	0.573	0.717	0.689
18		0.0366	0.0351	0.0337	0.0588
22		0	0	0	0
30		0	0	0	0
50		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	187/190	205/207	165/166	203/204
3.6		205/207	192/196	207/207	210/211
6		179/181	205/207	204/210	218/221
9		182/187	193/200	171/179	176/180
12		180/203	171/195	158/195	163/191
15		131/193	110/192	137/191	122/177
18		7/191	6/171	6/178	11/187
22		0/168	0/143	0/152	0/164
30		0/1	0/1	0/1	0/1
50		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	20-4579-4684	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:09	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.8%	6	9	7.348	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Water Control		3.6	-0.228	2.45	0.072	6	0.9099	CDF	Non-Significant Effect
		6	1.01	2.45	0.072	6	0.4500	CDF	Non-Significant Effect
		9*	2.93	2.45	0.072	6	0.0188	CDF	Significant Effect
		12*	10	2.45	0.072	6	<0.0001	CDF	Significant Effect
		15*	17.9	2.45	0.072	6	<0.0001	CDF	Significant Effect
		18*	43.5	2.45	0.072	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.209997	0.8683329	6	506	<0.0001	Significant Effect
Error	0.03605539	0.001716923	21			
Total	5.246053		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.34	16.8	0.6314	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.952	0.897	0.2275	Normal Distribution

Development Rate Summary

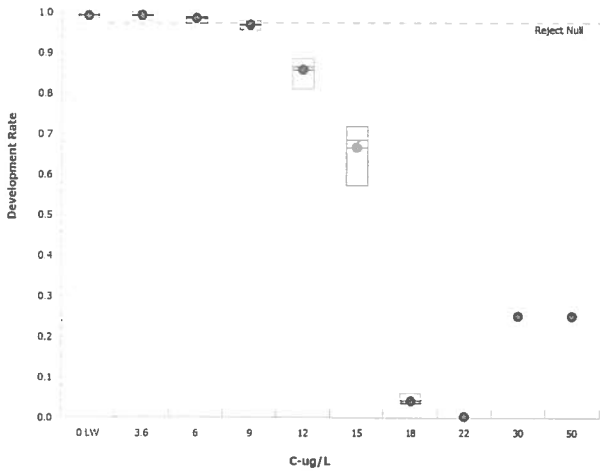
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Contr	4	0.991	0.983	0.999	0.992	0.984	0.995	0.00245	0.5%	0.0%
3.6		4	0.991	0.977	1	0.993	0.98	1	0.00437	0.88%	-0.04%
6		4	0.984	0.97	0.998	0.988	0.971	0.99	0.00436	0.89%	0.67%
9		4	0.968	0.952	0.984	0.969	0.955	0.978	0.00494	1.02%	2.33%
12		4	0.857	0.803	0.911	0.865	0.81	0.887	0.017	3.97%	13.5%
15		4	0.665	0.564	0.765	0.684	0.573	0.717	0.0316	9.51%	32.9%
18		4	0.0411	0.0221	0.06	0.0359	0.0337	0.0588	0.00595	29.0%	95.9%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

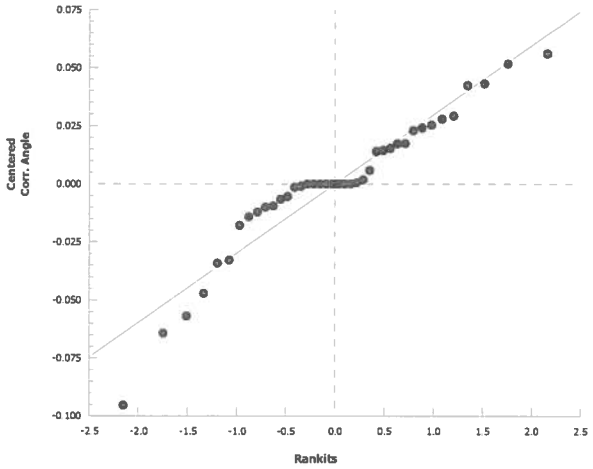
Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Cont	4	1.48	1.44	1.52	1.48	1.44	1.5	0.0125	1.69%	0.0%
3.6		4	1.48	1.41	1.56	1.49	1.43	1.54	0.023	3.1%	-0.45%
6		4	1.45	1.4	1.5	1.46	1.4	1.47	0.0162	2.24%	2.0%
9		4	1.39	1.35	1.44	1.39	1.36	1.42	0.0139	2.0%	5.8%
12		4	1.18	1.11	1.26	1.2	1.12	1.23	0.0238	4.02%	19.8%
15		4	0.954	0.849	1.06	0.974	0.859	1.01	0.0331	6.93%	35.4%
18		4	0.203	0.157	0.248	0.191	0.185	0.245	0.0142	14.0%	86.3%
22		4	0.04	0.0377	0.0424	0.0398	0.0386	0.0418	0.000739	3.69%	97.3%
30		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.6%
50		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.6%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	20-4579-4684	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:09	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	01-5478-2280	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:09	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	0.009126	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
16	-1270	2550	2560	1.18	0.0622	0.95	26.3	2.33	0.0000	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	11.9	11.2	12.4
EC10	12.6	12	13
EC15	13	12.5	13.4
EC20	13.4	12.9	13.8
EC25	13.7	13.2	14.1
EC40	14.5	14.1	14.9
EC50	15.1	14.7	15.4

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0195	0.00586	0.00768	0.0314	3.34	0.0019	Significant Parameter
Slope	16.1	1.32	13.4	18.7	12.2	<0.0001	Significant Parameter
Intercept	-18.9	1.57	-22.1	-15.8	-12.1	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4189.034	4189.034	1	737	<0.0001	Significant
Lack of Fit	180.9105	25.84435	7	26.3	<0.0001	Significant
Pure Error	29.52769	0.984256	30			
Residual	210.4382	5.687518	37			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	210	52.2	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	215	52.2	<0.0001	Significant Heterogenity
Variances	Mod Levene Equality of Variance	1.8	2.21	0.1105	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.951	0.945	0.0792	Normal Distribution
	Anderson-Darling A2 Normality	0.894	2.49	0.0223	Non-normal Distribution

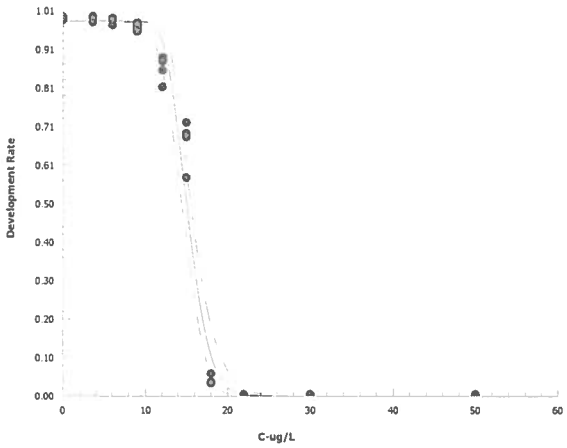
Development Rate Summary

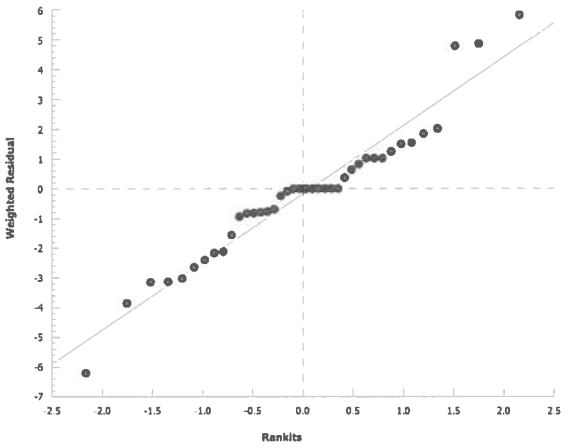
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Water Contr	4	0.991	0.984	0.995	0.00245	0.0049	0.5%	0.0%	760	767
3.6		4	0.991	0.98	1	0.00437	0.00874	0.88%	-0.04%	814	821
6		4	0.984	0.971	0.99	0.00436	0.00872	0.89%	0.67%	806	819
9		4	0.968	0.955	0.978	0.00494	0.00989	1.02%	2.33%	722	746
12		4	0.857	0.81	0.887	0.017	0.034	3.97%	13.5%	672	784
15		4	0.665	0.573	0.717	0.0316	0.0632	9.51%	32.9%	500	753
18		4	0.0411	0.0337	0.0588	0.00595	0.0119	29.0%	95.9%	30	727
22		4	0	0	0	0	0		100.0%	0	627
30		4	0	0	0	0	0		100.0%	0	4
50		4	0	0	0	0	0		100.0%	0	4

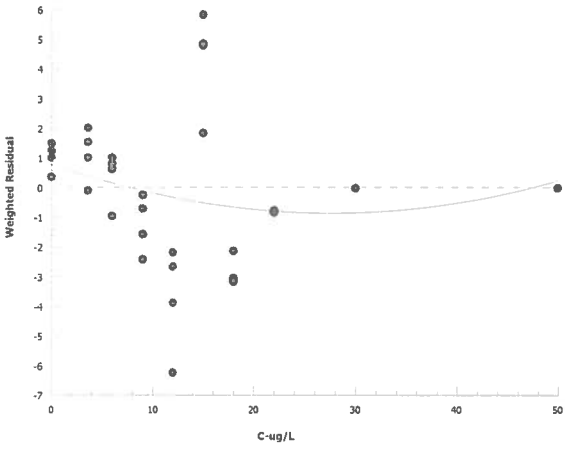
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	01-5478-2280	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:09	Analysis:	Linear Regression (MLE)	Official Results:	Yes

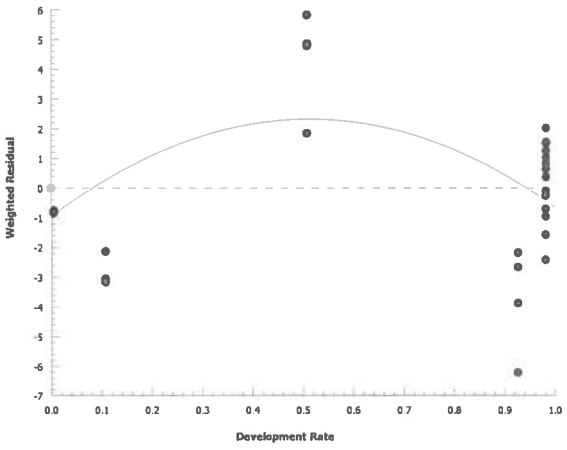
Graphics

Log-Normal [NED=A+B*log(X)]









Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Lab Water (30 ppt)
Test ID #: 64726
Project #: 24678

Test Start Date: 10/7/15
Test End Date: 10-9-15
Enumeration Date: 10/13/15
Investigator: LA

Treatment (µg/L Cu)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
0	A	187	3	SVV 10/15/14 ~~197~~ 190	SVV 10/15/14 ~~97.9~~ 98.4
	B	205	2	207	99.0
	C	165	1	166	99.4
	D	203	1	204	99.5
3.6	A	205	2	207	99.0
	B	192	4	196	98.0
	C	207	0	207	100.0
	D	210	1	211	99.5
6.0	A	179	2	181	98.9
	B	205	2	207	99.0
	C	204	6	210	97.1
	D	218	3	221	98.6
9.0	A	182	5	187	97.3
	B	193	7	200	96.5
	C	171	8	179	95.5
	D	176	4	180	97.8
12.0	A	180	23	203	88.7
	B	171	24	195	87.7
	C	158	37	195	81.0
	D	163	28	191	85.3
15.0	A	131	62	193	67.9
	B	110	82	192	57.3
	C	137	54	191	71.7
	D	122	55	177	68.9

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Lab Water (30 ppt)
Test ID #: 64726
Project #: 24678

Test Start Date: 10/7/15
Test End Date: 10/9/15
Enumeration Date: 10/13/15
Investigator: CA

18.0	A	7	184	191	3.7
	B	6	165	171	3.5
	C	6	172	178	3.4
	D	11	176	187	5.9
22.0	A	0	168	168	0.0
	B	0	143	143	0.0
	C	0	152	152	0.0
	D	0	164	164	0.0
30.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0
50.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Lab Water (30 ppt)
Test ID#: 64726 Project #: 24678
Test Date: 10/7/15 Randomization: –

Organism Log#: 9162 Age: N/A
Organism Supplier: Cutoff
Control/Diluent: Effluent

Day 0

Treatment (µg/L Cu)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.7	7.64	8.2	30.0	Sample ID: 39969
3.6	18.7	7.66	8.3	30.0	Test Solution Prep: PA
6.0	18.7	7.66	8.3	30.1	New WQ: PA
9.0	18.7	7.66	8.3	30.1	Inoculation Date: 10-7-15
12.0	18.7	7.66	8.3	30.1	Inoculation Time: 1658
15.0	18.7	7.66	8.3	30.1	Inoculation Signoff: SM
18.0	18.7	7.66	8.2	30.1	New WQ: PA
22.0	18.7	7.66	8.2	30.1	
30.0	18.7	7.66	8.2	30.1	
50.0	18.7	7.66	8.2	30.1	
Meter ID	69A	pH15	RDO	EC10	

Day 1

Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	19.0				Date: 10-8-15
3.6	19.0				Old WQ: AB
6.0	19.0				
9.0	19.0				
12.0	19.0				
15.0	19.0				
18.0	19.0				
22.0	19.0				
30.0	19.0				
50.0	19.0				
Meter ID	69A				

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Lab Water (30 ppt)
Test ID#: 64726 Project #: 24678
Test Date: 10/7/15 Randomization: –

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: Effluent

Day 2					
Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.9	7.71	6.6	30.0	Termination Date: 10-9-15
3.6	18.9	7.74	6.7	30.0	Termination Time: 1658
6.0	18.9	7.76	6.5	30.0	Termination Signoff: JV
9.0	18.9	7.78	6.7	30.0	Old WQ: JV
12.0	18.9	7.76	6.6	30.0	
15.0	18.9	7.78	6.7	30.0	
18.0	18.9	7.78	6.8	30.0	
22.0	18.9	7.78	6.6	30.0	
30.0	18.9	7.76	6.8	30.0	
50.0	18.9	7.75	6.9	30.0	
Meter ID	69A	PH22	RDO	ECO9	

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	11-3727-0257	Test Type:	Development-Survival	Analyst:	Alison Briden
Start Date:	07 Oct-15 16:32	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Receiving Water
Ending Date:	09 Oct-15 16:32	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Gutoff	Age:	N/A

Sample ID:	19-8455-4808	Code:	Cu in RW	Client:	City of Eureka
Sample Date:	06 Oct-15 08:15	Material:	Copper in Site Water	Project:	24678
Receive Date:	07 Oct-15 10:05	Source:	City of Eureka		
Sample Age:	32h (6.9 °C)	Station:	Copper in Receiving Water		

Batch Note: Nominal Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
04-7270-7462	Development Rate	9	12	10.39	0.92%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
12-4837-0631	Development Rate	EC5	13.7	13.3	14.1		Linear Regression (MLE)
		EC10	14.4	14.1	14.7		
		EC15	14.9	14.6	15.2		
		EC20	15.3	15	15.6		
		EC25	15.7	15.4	15.9		
		EC40	16.6	16.4	16.9		
		EC50	17.2	17	17.5		

Development Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Site Water	4	0.999	0.995	1	0.995	1	0.00123	0.00245	0.25%	0.0%
3.6		4	0.996	0.992	1	0.995	1	0.00125	0.0025	0.25%	0.25%
6		4	0.996	0.984	1	0.985	1	0.00383	0.00765	0.77%	0.26%
9		4	0.995	0.984	1	0.985	1	0.00354	0.00707	0.71%	0.38%
12		4	0.985	0.972	0.999	0.977	0.994	0.00419	0.00839	0.85%	1.33%
15		4	0.805	0.77	0.84	0.772	0.82	0.011	0.022	2.73%	19.4%
18		4	0.453	0.392	0.514	0.396	0.48	0.0193	0.0385	8.51%	54.7%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Site Water	0.995	1	1	1
3.6		0.995	0.995	1	0.995
6		1	1	1	0.985
9		1	0.995	1	0.985
12		0.98	0.994	0.977	0.991
15		0.816	0.772	0.812	0.82
18		0.464	0.48	0.396	0.471
22		0	0	0	0
30		0	0	0	0
50		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Site Water	203/204	204/204	185/185	206/206
3.6		216/217	206/207	202/202	183/184
6		177/177	205/205	203/203	193/196
9		189/189	201/202	214/214	197/200
12		196/200	175/176	211/216	216/218
15		146/179	129/167	155/191	137/167
18		91/196	83/173	76/192	99/210
22		0/143	0/146	0/151	0/149
30		0/119	0/113	0/120	0/116
50		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	04-7270-7462	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:04	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	0.92%	9	12	10.39	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Site Water		3.6	0.735	2.45	0.058	6	0.5762	CDF	Non-Significant Effect
		6	0.579	2.45	0.058	6	0.6466	CDF	Non-Significant Effect
		9	0.917	2.45	0.058	6	0.4918	CDF	Non-Significant Effect
		12*	3.05	2.45	0.058	6	0.0144	CDF	Significant Effect
		15*	17.4	2.45	0.058	6	<0.0001	CDF	Significant Effect
		18*	33.2	2.45	0.058	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.188174	0.3646957	6	324	<0.0001	Significant Effect
Error	0.02364875	0.001126131	21			
Total	2.211823		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.17	16.8	0.6540	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.899	0.897	0.0108	Normal Distribution

Development Rate Summary

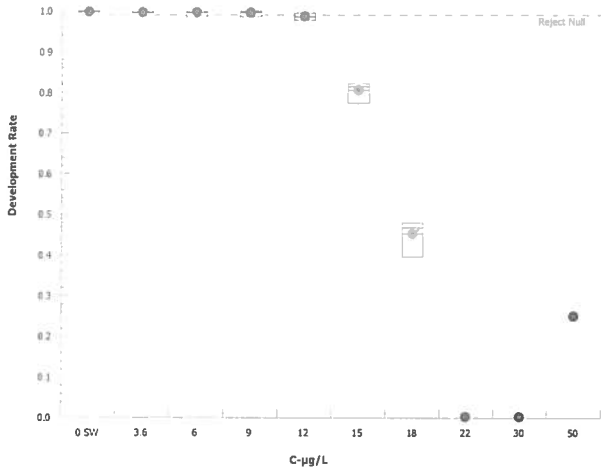
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Site Water	4	0.999	0.995	1	1	0.995	1	0.00123	0.25%	0.0%
3.6		4	0.996	0.992	1	0.995	0.995	1	0.00125	0.25%	0.25%
6		4	0.996	0.984	1	1	0.985	1	0.00383	0.77%	0.26%
9		4	0.995	0.984	1	0.998	0.985	1	0.00354	0.71%	0.38%
12		4	0.985	0.972	0.999	0.985	0.977	0.994	0.0042	0.85%	1.33%
15		4	0.805	0.77	0.84	0.814	0.772	0.82	0.011	2.73%	19.4%
18		4	0.453	0.392	0.514	0.468	0.396	0.48	0.0193	8.51%	54.7%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

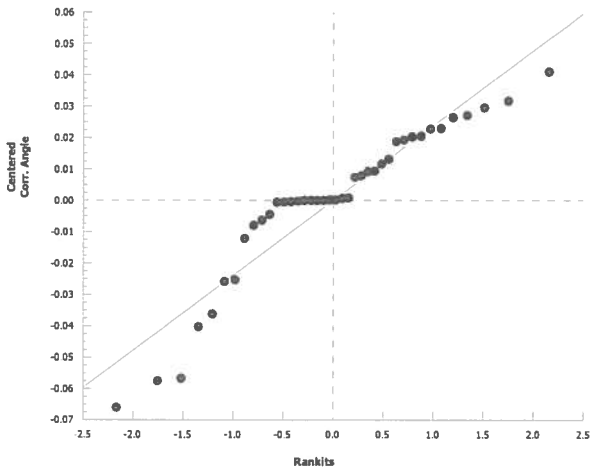
Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Site Water	4	1.53	1.5	1.55	1.53	1.5	1.54	0.00864	1.13%	0.0%
3.6		4	1.51	1.48	1.54	1.5	1.5	1.54	0.0089	1.18%	1.14%
6		4	1.51	1.44	1.58	1.53	1.45	1.54	0.022	2.91%	0.9%
9		4	1.5	1.44	1.57	1.52	1.45	1.54	0.0207	2.75%	1.43%
12		4	1.45	1.4	1.51	1.45	1.42	1.5	0.0184	2.53%	4.74%
15		4	1.11	1.07	1.16	1.12	1.07	1.13	0.0136	2.45%	27.0%
18		4	0.738	0.676	0.8	0.753	0.68	0.765	0.0194	5.27%	51.7%
22		4	0.0412	0.0404	0.042	0.0412	0.0407	0.0418	0.000246	1.19%	97.3%
30		4	0.0463	0.0452	0.0473	0.0461	0.0457	0.0471	0.000315	1.36%	97.0%
50		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	65.7%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	04-7270-7462	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:04	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	12-4837-0631	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:04	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	0.001252	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
14	-1050	2110	2110	1.24	0.0601	0.982	8.77	2.33	0.0000	Significant Lack of Fit

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	13.7	13.3	14.1
EC10	14.4	14.1	14.7
EC15	14.9	14.6	15.2
EC20	15.3	15	15.6
EC25	15.7	15.4	15.9
EC40	16.6	16.4	16.9
EC50	17.2	17	17.5

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.00427	0.00164	0.000942	0.0076	2.6	0.0133	Significant Parameter
Slope	16.6	0.881	14.8	18.4	18.9	<0.0001	Significant Parameter
Intercept	-20.6	1.09	-22.8	-18.3	-18.9	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4742.232	4742.232	1	2140	<0.0001	Significant
Lack of Fit	54.99556	7.856508	7	8.77	<0.0001	Significant
Pure Error	26.87012	0.895671	30			
Residual	81.86568	2.212586	37			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	81.9	52.2	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	104	52.2	<0.0001	Significant Heterogenity
Variances	Mod Levene Equality of Variance	1.26	2.21	0.3000	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.908	0.945	0.0033	Non-normal Distribution
	Anderson-Darling A2 Normality	1.56	2.49	<0.0001	Non-normal Distribution

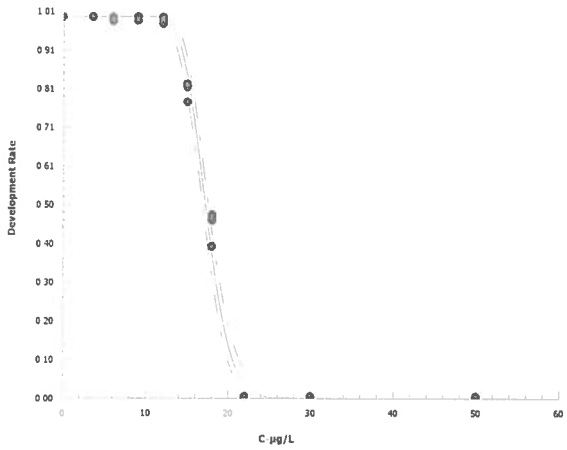
Development Rate Summary

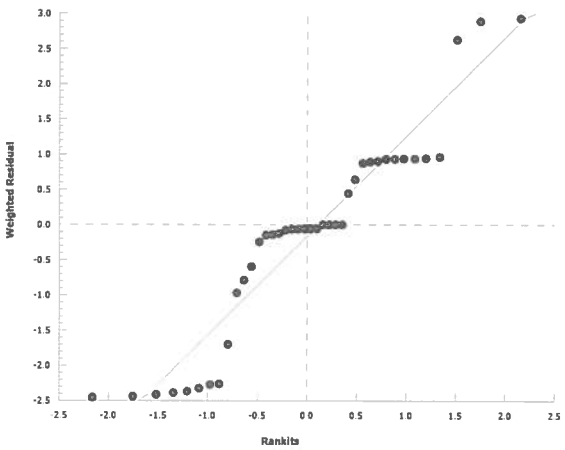
			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Site Water	4	0.999	0.995	1	0.00123	0.00245	0.25%	0.0%	798	799
3.6		4	0.996	0.995	1	0.00125	0.00251	0.25%	0.25%	807	810
6		4	0.996	0.985	1	0.00383	0.00765	0.77%	0.26%	778	781
9		4	0.995	0.985	1	0.00354	0.00707	0.71%	0.38%	801	805
12		4	0.985	0.977	0.994	0.0042	0.00839	0.85%	1.33%	798	810
15		4	0.805	0.772	0.82	0.011	0.022	2.73%	19.4%	567	704
18		4	0.453	0.396	0.48	0.0193	0.0385	8.51%	54.7%	349	771
22		4	0	0	0	0	0		100.0%	0	589
30		4	0	0	0	0	0		100.0%	0	468
50		4	0	0	0	0	0		100.0%	0	4

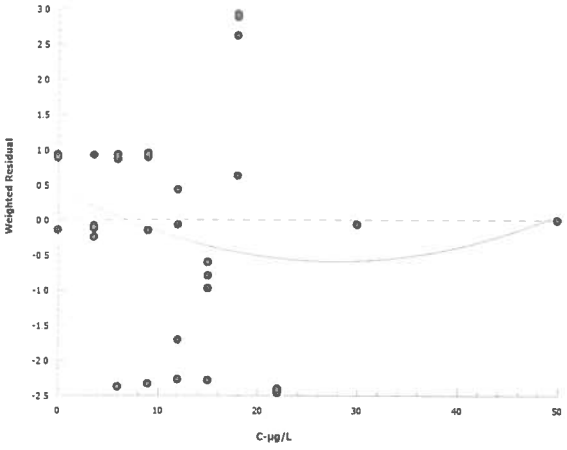
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	12-4837-0631	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 14:04	Analysis:	Linear Regression (MLE)	Official Results:	Yes

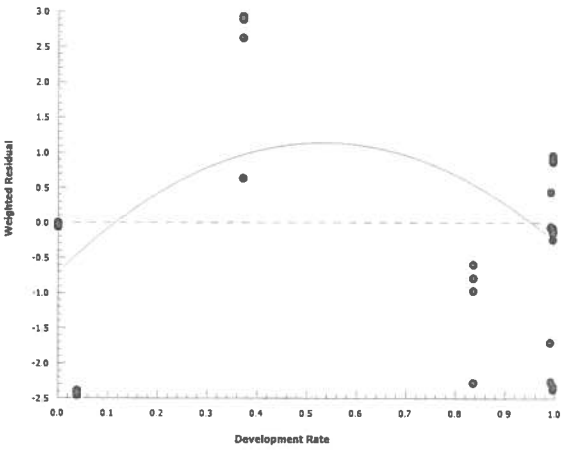
Graphics

Log-Normal [NED=A+B*log(X)]









Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Receiving Water
Test ID #: 64725
Project #: 24678

Test Start Date: 10/7/15
Test End Date: 10/9/15
Enumeration Date: 10/12/15
Investigator: CA

Treatment (µg/L Cu)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
0	A	203	1	204	99.5
	B	204	0	204	100.0
	C	185	0	185	100.0
	D	206	0	206	100.0
3.6	A	216	1	217	99.5
	B	206	1	207	99.5
	C	202	0	202	100.0
	D	183	1	184	99.5
6.0	A	177	0	177	100.0
	B	205	0	205	100.0
	C	203	0	203	100.0
	D	193	3	196	98.5
9.0	A	189	0	189	100.0
	B	201	1	202	99.5
	C	214	0	214	100.0
	D	197	3	200	98.5
12.0	A	196	4	200	98.0
	B	175	1	176	99.4
	C	211	5	216	97.7
	D	216	2	218	99.1
15.0	A	146	33	179	81.6
	B	129	38	167	77.2
	C	155	36	191	81.2
	D	137	30	167	82.0

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Receiving Water
Test ID #: 64725
Project #: 24678

Test Start Date: 10/17/15
Test End Date: 10/19/15
Enumeration Date: 10/12/15
Investigator: IA

18.0	A	91	105	196	46.4
	B	83	90	173	48.0
	C	76	116	192	39.6
	D	99	111	210	47.1
22.0	A	0	143	143	0.0
	B	0	146	146	0.0
	C	0	151	151	0.0
	D	0	149	149	0.0
30.0	A	0	119	119	0.0
	B	0	113	113	0.0
	C	0	120	120	0.0
	D	0	116	116	0.0
50.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Receiving Water
Test ID#: 64725 Project #: 24678
Test Date: 10/7/15 Randomization: _____

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: Effluent

Day 0

Treatment (µg/L Cu)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.7	7.57	7.8	34.2	Sample ID: 39946
3.6	18.7	7.59	8.1	34.3	Test Solution Prep: AB
6.0	18.7	7.60	8.3	34.3	New WQ: PQ
9.0	18.7	7.59	8.1	34.3	Inoculation Date: 10-7-15
12.0	18.7	7.60	8.1	34.3	Inoculation Time: 1632
15.0	18.7	7.60	8.2	34.3	Inoculation Signoff: SM
18.0	18.7	7.59	8.2	34.3	New WQ: PQ
22.0	18.7	7.60	8.2	34.3	
30.0	18.7	7.59	8.1	34.3	
50.0	18.7	7.60	8.1	34.3	
Meter ID	69A	pH15	RDO	EC10	

Day 1

Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	19.0				Date: 10-8-15
3.6	19.0				Old WQ: AB
6.0	19.0				
9.0	19.0				
12.0	19.0				
15.0	19.0				
18.0	19.0				
22.0	19.0				
30.0	19.0				
50.0	19.0				
Meter ID	69A				

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Receiving Water
Test ID#: 64725 Project #: 24678
Test Date: 10/7/15 Randomization: –

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: Effluent

Day 2					
Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.9	7.74	6.2	34.3	Termination Date: 10-9-15
3.6	18.9	7.76	6.6	34.3	Termination Time: 1632
6.0	18.9	7.77	6.7	34.4	Termination Signoff: Le
9.0	18.9	7.77	6.7	34.3	Old WQ: ✓
12.0	18.9	7.78	6.8	34.4	
15.0	18.9	7.77	6.9	34.3	
18.0	18.9	7.77	6.9	34.3	
22.0	18.9	7.78	6.9	34.3	
30.0	18.9	7.78	6.8	34.3	
50.0	18.9	7.79	7.0	34.4	
Meter ID	69A	PH22	RDO	ECON	

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Lab Water Control
Test ID #: 64725
Project #: 24678
Sample Salinity adjusted with :

Test Start Date: 10/7/15
Test End Date: 10/9/15
Enumeration Date: 10/12/15
Investigator: IA

Concentration	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Control	A	188	1	189	99.5
	B	182	0	182	100.0
	C	193	1	194	99.5
	D	217	2	219	99.1

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Lab Water Control
Test ID#: 64725 Project #: 24678
Test Date: 10/7/15 Randomization: -
Sample Salinity adjusted with : N/A

Organism Log#: 9162 Age: N/A
Organism Supplier: Cutta Pf
Control/Diluent: FSW@30ppt.
Light Intensity -

Day 0					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.7	7.64	8.2	30.0	Date & Inoculation Time: 10-7-15 1632
					Solution Prep/Inoculation: PO / SM
Meter ID	69A	pH15	RD11	EC10	New WQ:

Day 1					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	19.0				Date: 10-8-15
					Old WQ: XB
Meter ID	69A				

Day 2					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.9	7.67	6.3	30.7	Date: 10-9-15 1632
					Termination:
Meter ID	69A	PH22	RD10	EC09	Old WQ:

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	18-5618-3326	Test Type:	Development-Survival	Analyst:	Alison Briden
Start Date:	07 Oct-15 17:05	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	09 Oct-15 17:05	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Gutoff	Age:	N/A

Sample ID:	10-9178-9017	Code:	Cu in LW 34 ppt	Client:	City of Eureka
Sample Date:	07 Oct-15 11:15	Material:	Copper in Lab Water	Project:	24678
Receive Date:	07 Oct-15 11:15	Source:	City of Eureka		
Sample Age:	6h (18.7 °C)	Station:	Copper in Lab Water @ 34 ppt		

Batch Note: Nominal Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
06-6936-4704	Development Rate	12	15	13.42	2.86%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
20-5767-0211	Development Rate	EC5	11.9	11.6	12.3		Linear Regression (MLE)
		EC10	12.6	12.2	12.9		
		EC15	13	12.7	13.3		
		EC20	13.4	13.1	13.7		
		EC25	13.7	13.5	14		
		EC40	14.6	14.4	14.8		
		EC50	15.2	14.9	15.4		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Water Contr	4	0.996	0.991	1	0.994	1	0.00139	0.00278	0.28%	0.0%
3.6		4	0.997	0.992	1	0.994	1	0.00156	0.00312	0.31%	-0.14%
6		4	0.996	0.992	1	0.995	1	0.00126	0.00251	0.25%	-0.04%
9		4	0.99	0.97	1	0.978	1	0.00607	0.0121	1.23%	0.64%
12		4	0.917	0.828	1	0.887	1	0.0278	0.0556	6.07%	7.96%
15		4	0.583	0.49	0.676	0.518	0.656	0.0293	0.0585	10.0%	41.4%
18		4	0.103	0.0866	0.119	0.0894	0.113	0.00506	0.0101	9.85%	89.7%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	0.995	0.994	1	0.995
3.6		0.994	0.995	1	1
6		0.995	1	0.995	0.995
9		1	0.978	1	0.98
12		0.89	1	0.887	0.89
15		0.56	0.599	0.518	0.656
18		0.0894	0.102	0.113	0.107
22		0	0	0	0
30		0	0	0	0
50		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	197/198	166/167	201/201	181/182
3.6		180/181	189/190	215/215	199/199
6		217/218	192/192	188/189	195/196
9		187/187	177/181	204/204	198/202
12		161/181	185/185	172/194	154/173
15		93/166	112/187	85/164	122/186
18		16/179	20/197	23/203	19/178
22		0/164	0/175	0/157	0/180
30		0/141	0/129	0/121	0/133
50		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	06-6936-4704	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	15 Oct-15 11:05	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	2.86%	12	15	13.42	

Steel Many-One Rank Sum Test

Control	vs	C-ug/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Lab Water Control		3.6	20	10	1	6	0.9616	Asymp	Non-Significant Effect
		6	20.5	10	1	6	0.9742	Asymp	Non-Significant Effect
		9	17	10	1	6	0.7639	Asymp	Non-Significant Effect
		12	13.5	10	1	6	0.3133	Asymp	Non-Significant Effect
		15*	10	10	0	6	0.0480	Asymp	Significant Effect
		18*	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	5.00199	0.833665	6	182	<0.0001	Significant Effect
Error	0.09610004	0.004576192	21			
Total	5.09809		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	23.8	16.8	0.0006	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.828	0.897	0.0004	Non-normal Distribution

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Contr	4	0.996	0.991	1	0.995	0.994	1	0.00139	0.28%	0.0%
3.6		4	0.997	0.992	1	0.997	0.994	1	0.00156	0.31%	-0.14%
6		4	0.996	0.992	1	0.995	0.995	1	0.00126	0.25%	-0.04%
9		4	0.99	0.97	1	0.99	0.978	1	0.00607	1.23%	0.64%
12		4	0.917	0.828	1	0.89	0.887	1	0.0278	6.07%	7.96%
15		4	0.583	0.49	0.676	0.58	0.518	0.656	0.0293	10.0%	41.4%
18		4	0.103	0.0866	0.119	0.104	0.0894	0.113	0.00506	9.85%	89.7%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

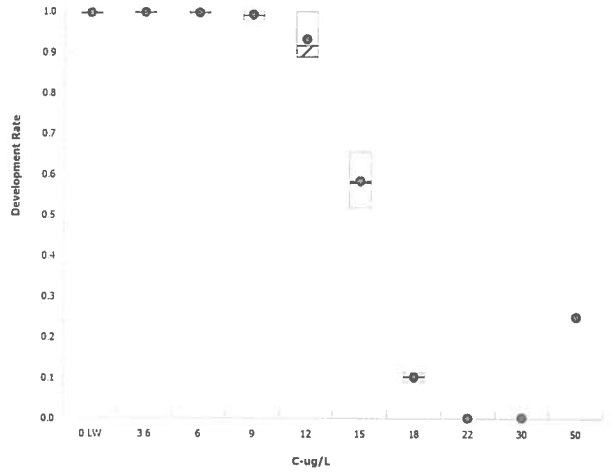
Angular (Corrected) Transformed Summary

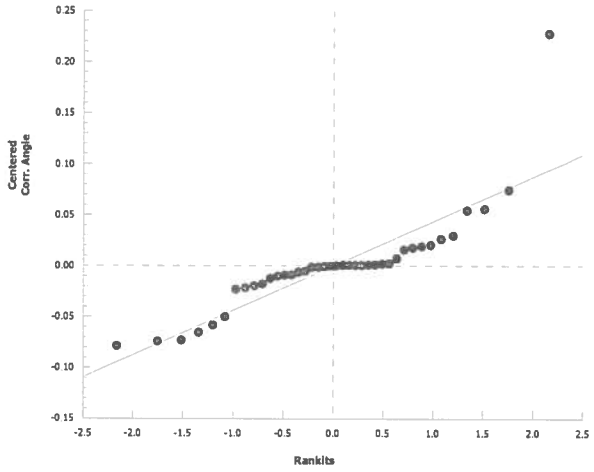
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Cont	4	1.51	1.47	1.54	1.5	1.49	1.54	0.00983	1.31%	0.0%
3.6		4	1.52	1.48	1.55	1.52	1.5	1.54	0.0112	1.48%	-0.69%
6		4	1.51	1.48	1.54	1.5	1.5	1.53	0.00872	1.16%	-0.16%
9		4	1.48	1.38	1.58	1.48	1.42	1.54	0.0316	4.27%	1.72%
12		4	1.31	1.07	1.55	1.23	1.23	1.53	0.0758	11.6%	13.3%
15		4	0.87	0.775	0.965	0.865	0.804	0.944	0.0298	6.86%	42.3%
18		4	0.326	0.299	0.353	0.329	0.304	0.343	0.00842	5.16%	78.4%
22		4	0.0385	0.0366	0.0404	0.0384	0.0373	0.0399	0.000598	3.1%	97.4%
30		4	0.0437	0.0415	0.046	0.0437	0.0421	0.0455	0.000698	3.19%	97.1%
50		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	65.2%

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	06-6936-4704	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 11:05	Analysis:	Nonparametric-Control vs Treatments	Official Results:	Yes

Graphics





Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	20-5767-0211	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	15 Oct-15 11:05	**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	0.004011	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
11	-1050	2110	2110	1.18	0.0632	0.983	4.06	2.33	0.0030	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	11.9	11.6	12.3
EC10	12.6	12.2	12.9
EC15	13	12.7	13.3
EC20	13.4	13.1	13.7
EC25	13.7	13.5	14
EC40	14.6	14.4	14.8
EC50	15.2	14.9	15.4

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.00548	0.00201	0.00141	0.00954	2.73	0.0096	Significant Parameter
Slope	15.8	0.768	14.3	17.4	20.6	<0.0001	Significant Parameter
Intercept	-18.7	0.915	-20.5	-16.8	-20.4	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	5051.577	5051.577	1	2220	<0.0001	Significant
Lack of Fit	40.94518	5.849312	7	4.06	0.0030	Significant
Pure Error	43.17522	1.439174	30			
Residual	84.12041	2.273525	37			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	84.1	52.2	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	93.9	52.2	<0.0001	Significant Heterogenity
Variances	Mod Levene Equality of Variance	1.97	2.21	0.0800	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.904	0.945	0.0026	Non-normal Distribution
	Anderson-Darling A2 Normality	1.87	2.49	<0.0001	Non-normal Distribution

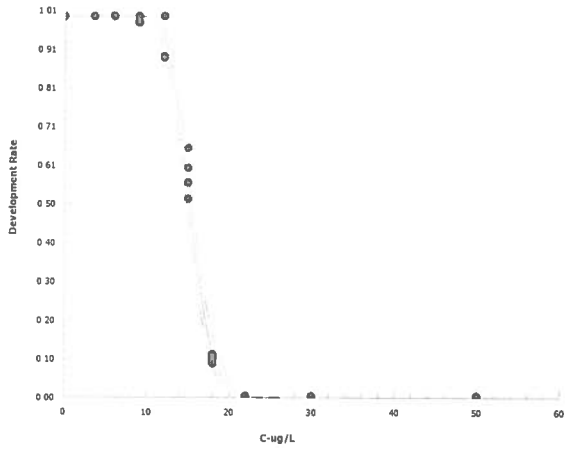
Development Rate Summary

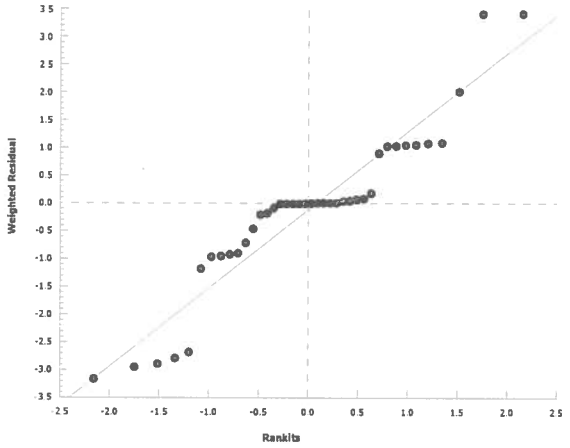
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Water Contr	4	0.996	0.994	1	0.00139	0.00279	0.28%	0.0%	745	748
3.6		4	0.997	0.994	1	0.00156	0.00312	0.31%	-0.14%	783	785
6		4	0.996	0.995	1	0.00126	0.00252	0.25%	-0.04%	792	795
9		4	0.99	0.978	1	0.00607	0.0121	1.23%	0.64%	766	774
12		4	0.917	0.887	1	0.0278	0.0556	6.07%	7.96%	672	733
15		4	0.583	0.518	0.656	0.0293	0.0585	10.0%	41.4%	411	703
18		4	0.103	0.0894	0.113	0.00506	0.0101	9.85%	89.7%	78	757
22		4	0	0	0	0	0		100.0%	0	676
30		4	0	0	0	0	0		100.0%	0	524
50		4	0	0	0	0	0		100.0%	0	4

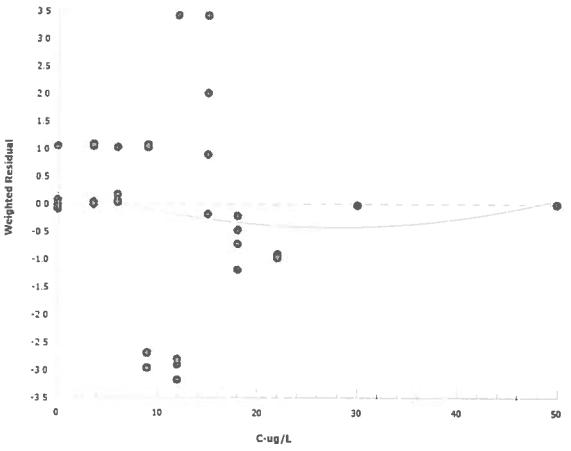
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	20-5767-0211	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	15 Oct-15 11:05	Analysis:	Linear Regression (MLE)	Official Results:	Yes

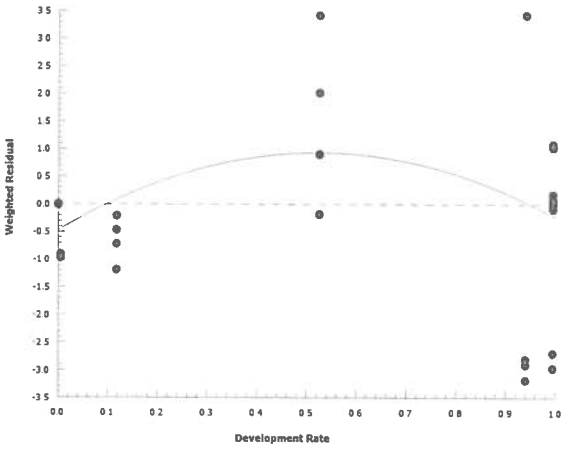
Graphics

Log-Normal [NED=A+B*log(X)]









Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Lab Water (34 ppt)
Test ID #: 64727
Project #: 24678

Test Start Date: 10/7/15
Test End Date: 10-9-15
Enumeration Date: 10/14/15
Investigator: IA

Treatment (µg/L Cu)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
0	A	197	1	198	99.5
	B	166	1	167	99.4
	C	201	0	201	100.0
	D	101	1	102	99.5
3.6	A	100	1	101	99.4
	B	109	1	190	99.5
	C	215	0	215	100.0
	D	199	0	199	100.0
6.0	A	217	1	218	99.5
	B	192	0	192	100.0
	C	108	1	109	99.5
	D	195	1	196	99.5
9.0	A	107	0	107	100.0
	B	177	4	101	97.8
	C	204	0	204	100.0
	D	198	4	202	98.0
12.0	A	161	20	101	89.0
	B	185	0	185	100.0
	C	172	22	194	88.7
	D	154	19	173	89.0
15.0	A	93	73	166	56.0
	B	112	75	187	59.9
	C	85	79	164	51.8
	D	122	64	186	65.6

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Lab Water (34 ppt)
Test ID #: 64727
Project #: 24678

Test Start Date: 10/7/15
Test End Date: 10/9/15
Enumeration Date: 10/14/15
Investigator: JA

18.0	A	16	163	179	8.9
	B	20	177	197	10.2
	C	23	180	203	11.3
	D	19	159	178	10.7
22.0	A	0	164	164	0.0
	B	0	175	175	0.0
	C	0	157	157	0.0
	D	0	190	190	0.0
30.0	A	0	141	141	0.0
	B	0	129	129	0.0
	C	0	121	121	0.0
	D	0	133	133	0.0
50.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Lab Water (34 ppt)
Test ID#: 64727 Project #: 24678
Test Date: 10/7/15 Randomization: -

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: Effluent

Day 0

Treatment (µg/L Cu)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	~~17.6~~ 18.7 10-7-15	7.62	8.6	34.2	Sample ID: 39970
3.6	18.7	7.63	8.7	34.2	Test Solution Prep: PA
6.0	18.7	7.63	8.6	34.2	New WQ: PA
9.0	18.7	7.63	8.7	34.2	Inoculation Date: 10-7-15
12.0	18.7	7.63	8.7	34.2	Inoculation Time: 1705
15.0	18.7	7.63	8.7	34.2	Inoculation Signoff: SM
18.0	18.7	7.63	8.5	34.3	New WQ: PA
22.0	18.7	7.63	8.5	34.3	
30.0	18.7	7.63	8.4	34.3	
50.0	18.7	7.63	8.4	34.3	
Meter ID	69A	pH15	RDO	~~EC~~ EC10 10-7-15	

Day 1

Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	19.0				Date: 10-8-15
3.6	19.0				Old WQ: AB
6.0	19.0				
9.0	19.0				
12.0	19.0				
15.0	19.0				
18.0	19.0				
22.0	19.0				
30.0	19.0				
50.0	19.0				
Meter ID	69A				

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Lab Water (34 ppt)
Test ID#: 64727 Project #: 24678
Test Date: 10/7/15 Randomization: -

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: Effluent

Day 2					
Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.9	7.76	7.0	34.3	Termination Date: 10-9-15
3.6	18.9	7.77	6.9	34.3	Termination Time: 1705
6.0	18.9	7.77	6.9	34.4	Termination Signoff: JV
9.0	18.9	7.79	6.6	34.4	Old WQ: JV
12.0	18.9	7.79	6.5	34.4	
15.0	18.9	7.80	6.9	34.5	
18.0	18.9	7.80	7.1	34.3	
22.0	18.9	7.80	7.1	34.3	
30.0	18.9	7.80	7.1	34.5	
50.0	18.9	7.76	7.2	34.5	
Meter ID	69A	pH22	RDO	Ecoq	

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Lab Water Control
Test ID #: 64727
Project #: 24678
Sample Salinity adjusted with : N/A

Test Start Date: 10/7/15
Test End Date: 10/9/15
Enumeration Date: 10/14/15
Investigator: IA

Concentration	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Control	A	195	0	195	100.0
	B	198	0	198	100.0
	C	204	3	207	98.6
	D	185	3	188	98.4

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: **City of Eureka Cu WER**
Test Material: Lab Water Control
Test ID#: 64727 Project #: 24678
Test Date: 10/7/15 Randomization: –
Sample Salinity adjusted with : [redacted]

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: FSW @ ~~30~~
Light Intensity: – SM 10/7/15

Day 0					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.7	7.64	8.2	30.0	Date & Inoculation Time: 10-7-15 1705
					Solution Prep/Inoculation: PD / SM
Meter ID	69A	pH15	RD11	EC10	New WQ: PD

Day 1					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	19.0				Date: 10-8-15
					Old WQ: AB
Meter ID	69A				

Day 2					
Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.9	7.75	6.8	30.2	Date: 10-9-15
					Termination: JW / 1705
Meter ID	69A	pH22	RD10	EC09	Old WQ: JW

Appendix C

Summary of Statistical Analysis for Determination of Copper EC_{50} Values for Effluent, Receiving Water and Lab Waters Based on Measured Total Copper Concentrations: Event 1

CETIS Summary Report

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Batch ID:	14-0015-4313	**Test Type:**	Development-Survival	**Analyst:**	Stevi Vasquez
Start Date:	07 Oct-15 16:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Effluent
Ending Date:	09 Oct-15 16:25	**Species:**	Mytilus galloprovincialis	**Brine:**	Tropic Marin
Duration:	48h	**Source:**	Gutoff	**Age:**	N/A

Sample ID:	08-4895-9684	**Code:**	Cu in EFF	**Client:**	City of Eureka
Sample Date:	06 Oct-15 09:15	**Material:**	Copper in Effluent	**Project:**	24678
Receive Date:	07 Oct-15 10:05	**Source:**	City of Eureka		
Sample Age:	31h (1.9 °C)	**Station:**	Copper in Effluent		

Batch Note: Total Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-7098-2922	Development Rate	124	142	132.7	1.61%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
06-0526-0658	Development Rate	EC5	131	122	138		Linear Regression (MLE)
		EC10	137	129	143		
		EC15	141	134	146		
		EC20	144	137	149		
		EC25	147	141	152		
		EC40	154	149	159		
		EC50	159	154	164		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
22.9	Effluent Control	4	0.986	0.973	1	0.975	0.995	0.00423	0.00847	0.86%	0.0%
124		4	0.986	0.97	1	0.971	0.994	0.00513	0.0103	1.04%	-0.02%
142		4	0.929	0.903	0.955	0.911	0.948	0.00819	0.0164	1.76%	5.79%
163		4	0.172	0.121	0.222	0.131	0.207	0.0158	0.0317	18.5%	82.6%
193		4	0.074	0.0503	0.0977	0.0599	0.0941	0.00745	0.0149	20.1%	92.5%
213		4	0.0347	0.0202	0.0493	0.0226	0.0435	0.00458	0.00916	26.4%	96.5%
260		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
22.9	Effluent Control	0.99	0.995	0.975	0.985
124		0.99	0.99	0.994	0.971
142		0.921	0.937	0.911	0.948
163		0.131	0.207	0.182	0.167
193		0.0599	0.0757	0.0663	0.0941
213		0.0331	0.0226	0.0435	0.0398
260		0	0	0	0

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
22.9	Effluent Control	191/193	186/187	193/198	203/206
124		197/199	190/192	180/181	203/209
142		186/202	192/205	174/191	200/211
163		24/183	36/174	32/176	29/174
193		10/167	14/185	12/181	16/170
213		6/181	4/177	8/184	7/176
260		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	10-8779-4456	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 17:16	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.61%	124	142	132.7	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
22.9		124	-0.0852	2.41	0.059	6	0.8572	CDF	Non-Significant Effect
22.9		142*	6.25	2.41	0.059	6	<0.0001	CDF	Significant Effect
22.9		163*	41.8	2.41	0.059	6	<0.0001	CDF	Significant Effect
22.9		193*	47.9	2.41	0.059	6	<0.0001	CDF	Significant Effect
22.9		213*	51.5	2.41	0.059	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.581924	1.516385	5	1240	<0.0001	Significant Effect
Error	0.02193028	0.001218349	18			
Total	7.603854		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.04	15.1	0.9597	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.951	0.884	0.2832	Normal Distribution

Development Rate Summary

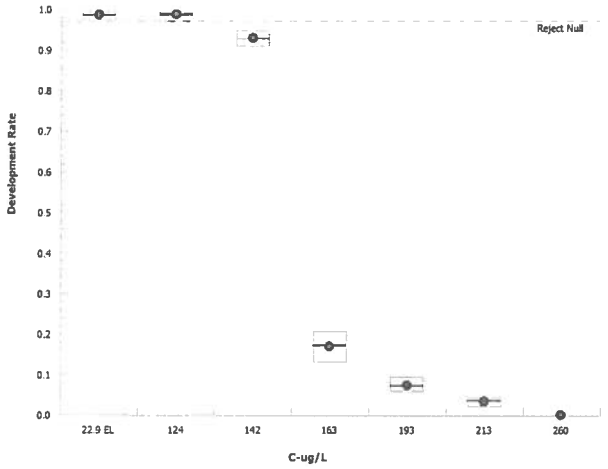
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
22.9	Effluent Control	4	0.986	0.973	1	0.988	0.975	0.995	0.00423	0.86%	0.0%
124		4	0.986	0.97	1	0.99	0.971	0.994	0.00513	1.04%	-0.02%
142		4	0.929	0.903	0.955	0.929	0.911	0.948	0.00819	1.76%	5.79%
163		4	0.172	0.121	0.222	0.174	0.131	0.207	0.0158	18.5%	82.6%
193		4	0.074	0.0503	0.0977	0.071	0.0599	0.0941	0.00745	20.1%	92.5%
213		4	0.0347	0.0202	0.0493	0.0365	0.0226	0.0435	0.00458	26.4%	96.5%
260		4	0	0	0	0	0	0	0		100.0%

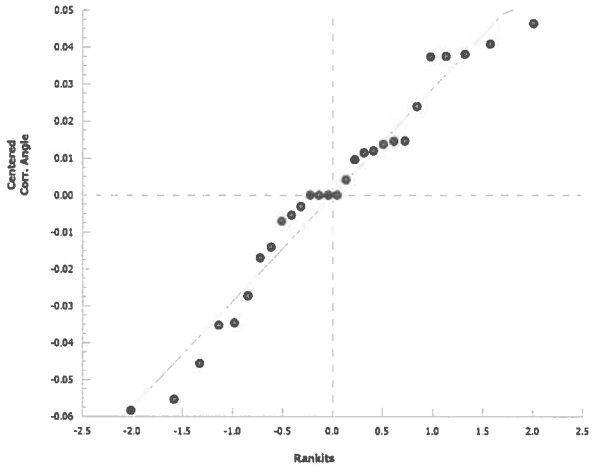
Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
22.9	Effluent Control	4	1.46	1.4	1.51	1.46	1.41	1.5	0.0181	2.49%	0.0%
124		4	1.46	1.39	1.52	1.47	1.4	1.5	0.0205	2.81%	-0.14%
142		4	1.3	1.25	1.35	1.3	1.27	1.34	0.0161	2.47%	10.6%
163		4	0.426	0.358	0.494	0.431	0.371	0.472	0.0213	10.0%	70.8%
193		4	0.275	0.23	0.319	0.27	0.247	0.312	0.014	10.2%	81.2%
213		4	0.186	0.145	0.228	0.192	0.151	0.21	0.013	14.0%	87.2%
260		4	0.0368	0.0368	0.0368	0.0368	0.0368	0.0368	0	0.0%	97.5%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	10-8779-4456	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 17:16	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	06-0526-0658	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:21	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	0.014031	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
41	-1100	2210	2210	2.2	0.0502	0.883	113	2.84	0.0000	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	131	122	138
EC10	137	129	143
EC15	141	134	146
EC20	144	137	149
EC25	147	141	152
EC40	154	149	159
EC50	159	154	164

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.00809	0.0115	-0.0157	0.0318	0.702	0.4893	Non-Significant Parameter
Slope	19.9	2.32	15.1	24.7	8.57	<0.0001	Significant Parameter
Intercept	-43.8	5.12	-54.4	-33.3	-8.57	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	3129.792	3129.792	1	206	<0.0001	Significant
Lack of Fit	362.8871	90.72177	4	113	<0.0001	Significant
Pure Error	16.87596	0.803617	21			
Residual	379.7631	15.19052	25			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	380	37.7	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	343	37.7	<0.0001	Significant Heterogenity
Variances	Mod Levene Equality of Variance	1.54	2.57	0.2149	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.943	0.926	0.1298	Normal Distribution
	Anderson-Darling A2 Normality	0.702	2.49	0.0668	Normal Distribution

Development Rate Summary

			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
22.9	Effluent Control	4	0.986	0.975	0.995	0.00423	0.00847	0.86%	0.0%	773	784
124		4	0.986	0.971	0.994	0.00513	0.0103	1.04%	-0.02%	770	781
142		4	0.929	0.911	0.948	0.00819	0.0164	1.76%	5.79%	752	809
163		4	0.172	0.131	0.207	0.0158	0.0317	18.5%	82.6%	120	707
193		4	0.074	0.0599	0.0941	0.00745	0.0149	20.1%	92.5%	52	703
213		4	0.0347	0.0226	0.0435	0.00458	0.00916	26.4%	96.5%	25	718
260		4	0	0	0	0	0		100.0%	0	4

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	06-0526-0658	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:21	Analysis:	Linear Regression (MLE)	Official Results:	Yes

Graphics

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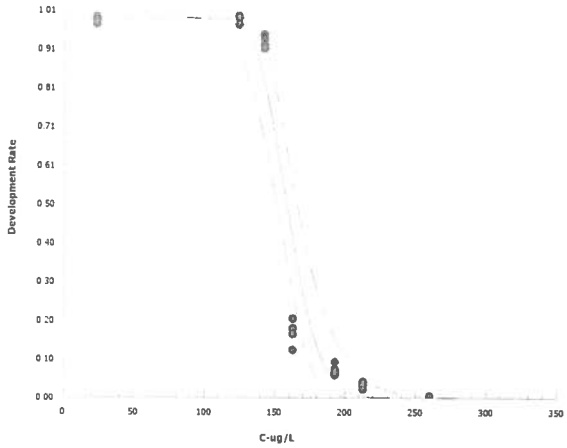
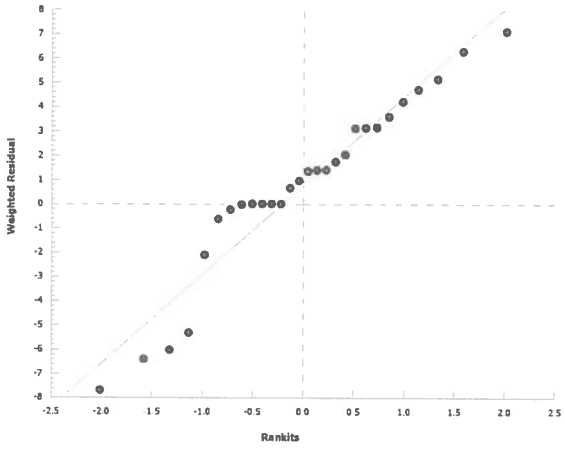
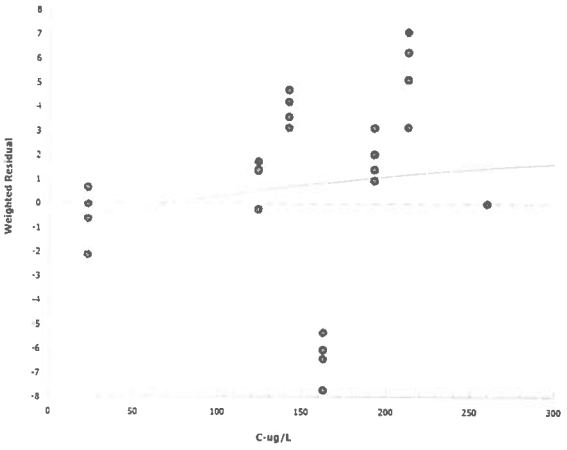
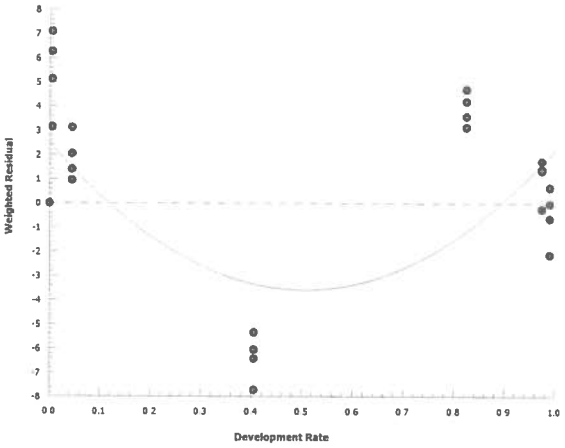








Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	05-4168-8928	Test Type:	Development-Survival	Analyst:	Stevi Vasquez
Start Date:	07 Oct-15 16:58	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	09 Oct-15 16:58	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Gutoff	Age:	N/A

Sample ID:	08-0463-1744	Code:	Cu in LW 30 ppt	Client:	City of Eureka
Sample Date:	07 Oct-15 11:30	Material:	Copper in Lab Water	Project:	24678
Receive Date:	07 Oct-15 11:30	Source:	City of Eureka		
Sample Age:	5h (18.7 °C)	Station:	Copper in Lab Water @ 30 ppt		

Batch Note: Total Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-0422-1391	Development Rate	4.08	7.08	5.375	1.8%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
01-6661-4848	Development Rate	EC5	9.09	8.51	9.54		Linear Regression (MLE)
		EC10	9.62	9.09	10		
		EC15	9.99	9.51	10.4		
		EC20	10.3	9.85	10.7		
		EC25	10.6	10.1	10.9		
		EC40	11.3	10.9	11.6		
		EC50	11.7	11.4	12.1		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0.75	Lab Water Contr	4	0.991	0.983	0.999	0.984	0.995	0.00245	0.0049	0.5%	0.0%
2.43		4	0.991	0.977	1	0.98	1	0.00437	0.00874	0.88%	-0.04%
4.08		4	0.984	0.97	0.998	0.971	0.99	0.00436	0.00872	0.89%	0.67%
7.08		4	0.968	0.952	0.984	0.955	0.978	0.00494	0.00989	1.02%	2.33%
9.21		4	0.857	0.803	0.911	0.81	0.887	0.017	0.034	3.97%	13.5%
11.6		4	0.665	0.564	0.765	0.573	0.717	0.0316	0.0632	9.51%	32.9%
14.3		4	0.0411	0.0221	0.06	0.0337	0.0588	0.00595	0.0119	29.0%	95.9%
17.7		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Lab Water Contr	0.984	0.99	0.994	0.995
2.43		0.99	0.98	1	0.995
4.08		0.989	0.99	0.971	0.986
7.08		0.973	0.965	0.955	0.978
9.21		0.887	0.877	0.81	0.853
11.6		0.679	0.573	0.717	0.689
14.3		0.0366	0.0351	0.0337	0.0588
17.7		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Lab Water Contr	187/190	205/207	165/166	203/204
2.43		205/207	192/196	207/207	210/211
4.08		179/181	205/207	204/210	218/221
7.08		182/187	193/200	171/179	176/180
9.21		180/203	171/195	158/195	163/191
11.6		131/193	110/192	137/191	122/177
14.3		7/191	6/171	6/178	11/187
17.7		0/168	0/143	0/152	0/164

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	07-0422-1391	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:30	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.8%	4.08	7.08	5.375	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
0.75		2.43	-0.228	2.45	0.072	6	0.9099	CDF	Non-Significant Effect
0.75		4.08	1.01	2.45	0.072	6	0.4500	CDF	Non-Significant Effect
0.75		7.08*	2.93	2.45	0.072	6	0.0188	CDF	Significant Effect
0.75		9.21*	10	2.45	0.072	6	<0.0001	CDF	Significant Effect
0.75		11.6*	17.9	2.45	0.072	6	<0.0001	CDF	Significant Effect
0.75		14.3*	43.5	2.45	0.072	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.209997	0.8683329	6	506	<0.0001	Significant Effect
Error	0.03605539	0.001716923	21			
Total	5.246053		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.34	16.8	0.6314	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.952	0.897	0.2275	Normal Distribution

Development Rate Summary

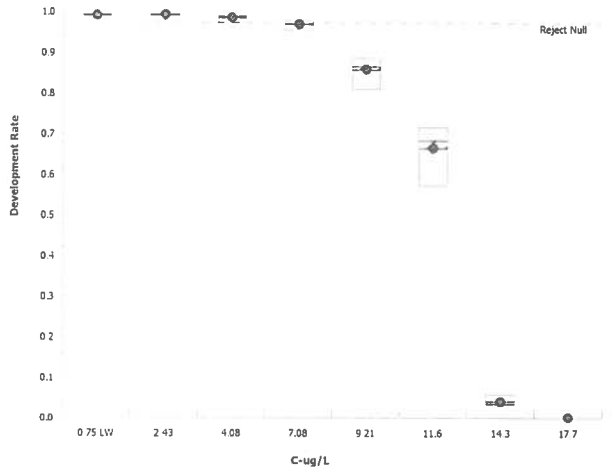
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Lab Water Contr	4	0.991	0.983	0.999	0.992	0.984	0.995	0.00245	0.5%	0.0%
2.43		4	0.991	0.977	1	0.993	0.98	1	0.00437	0.88%	-0.04%
4.08		4	0.984	0.97	0.998	0.988	0.971	0.99	0.00436	0.89%	0.67%
7.08		4	0.968	0.952	0.984	0.969	0.955	0.978	0.00494	1.02%	2.33%
9.21		4	0.857	0.803	0.911	0.865	0.81	0.887	0.017	3.97%	13.5%
11.6		4	0.665	0.564	0.765	0.684	0.573	0.717	0.0316	9.51%	32.9%
14.3		4	0.0411	0.0221	0.06	0.0359	0.0337	0.0588	0.00595	29.0%	95.9%
17.7		4	0	0	0	0	0	0	0		100.0%

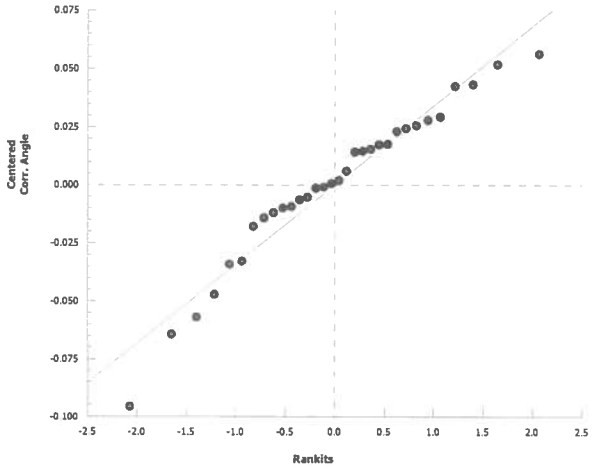
Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Lab Water Cont	4	1.48	1.44	1.52	1.48	1.44	1.5	0.0125	1.69%	0.0%
2.43		4	1.48	1.41	1.56	1.49	1.43	1.54	0.023	3.1%	-0.45%
4.08		4	1.45	1.4	1.5	1.46	1.4	1.47	0.0162	2.24%	2.0%
7.08		4	1.39	1.35	1.44	1.39	1.36	1.42	0.0139	2.0%	5.8%
9.21		4	1.18	1.11	1.26	1.2	1.12	1.23	0.0238	4.02%	19.8%
11.6		4	0.954	0.849	1.06	0.974	0.859	1.01	0.0331	6.93%	35.4%
14.3		4	0.203	0.157	0.248	0.191	0.185	0.245	0.0142	14.0%	86.3%
17.7		4	0.04	0.0377	0.0424	0.0398	0.0386	0.0418	0.000739	3.69%	97.3%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	07-0422-1391	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:30	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	01-6661-4848	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:30	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	0.009126	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
16	-1260	2530	2530	1.07	0.0672	0.955	25.2	2.62	0.0000	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	9.09	8.51	9.54
EC10	9.62	9.09	10
EC15	9.99	9.51	10.4
EC20	10.3	9.85	10.7
EC25	10.6	10.1	10.9
EC40	11.3	10.9	11.6
EC50	11.7	11.4	12.1

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0189	0.00613	0.00634	0.0314	3.08	0.0045	Significant Parameter
Slope	14.9	1.27	12.3	17.5	11.7	<0.0001	Significant Parameter
Intercept	-15.9	1.37	-18.7	-13.1	-11.6	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4203.651	4203.651	1	660	<0.0001	Significant
Lack of Fit	155.0815	31.01629	5	25.2	<0.0001	Significant
Pure Error	29.52769	1.23032	24			
Residual	184.6091	6.365833	29			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	185	42.6	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	189	42.6	<0.0001	Significant Heterogenity
Variances	Bartlett Equality of Variance	24.5	14.1	0.0009	Unequal Variances
	Mod Levene Equality of Variance	1.19	2.42	0.3463	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.969	0.934	0.4735	Normal Distribution
	Anderson-Darling A2 Normality	0.436	2.49	0.3028	Normal Distribution

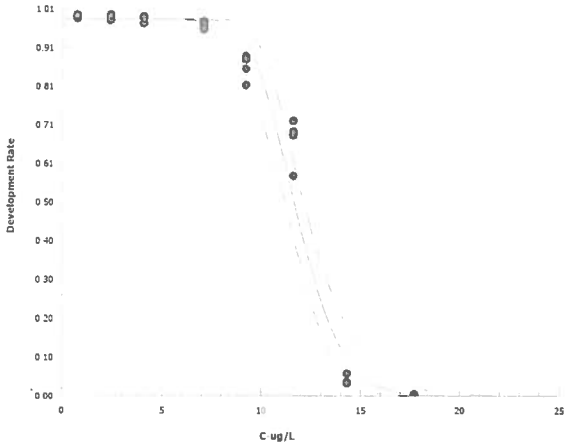
Development Rate Summary

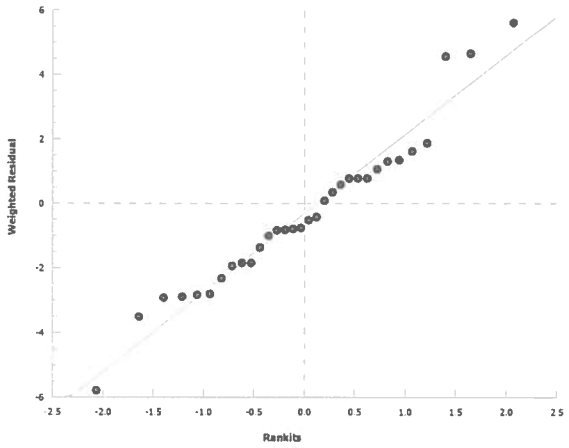
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0.75	Lab Water Contr	4	0.991	0.984	0.995	0.00245	0.0049	0.5%	0.0%	760	767
2.43		4	0.991	0.98	1	0.00437	0.00874	0.88%	-0.04%	814	821
4.08		4	0.984	0.971	0.99	0.00436	0.00872	0.89%	0.67%	806	819
7.08		4	0.968	0.955	0.978	0.00494	0.00989	1.02%	2.33%	722	746
9.21		4	0.857	0.81	0.887	0.017	0.034	3.97%	13.5%	672	784
11.6		4	0.665	0.573	0.717	0.0316	0.0632	9.51%	32.9%	500	753
14.3		4	0.0411	0.0337	0.0588	0.00595	0.0119	29.0%	95.9%	30	727
17.7		4	0	0	0	0	0		100.0%	0	627

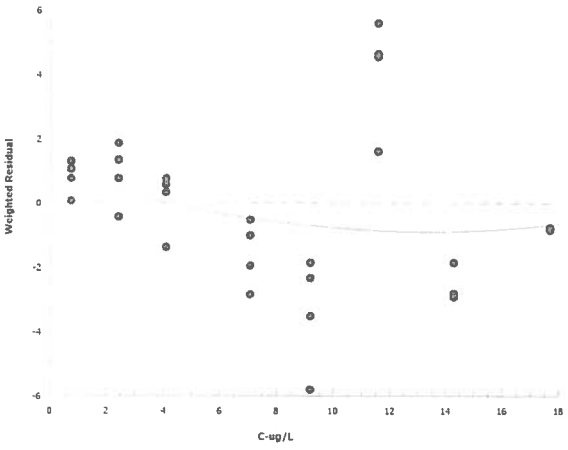
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	01-6661-4848	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:30	Analysis:	Linear Regression (MLE)	Official Results:	Yes

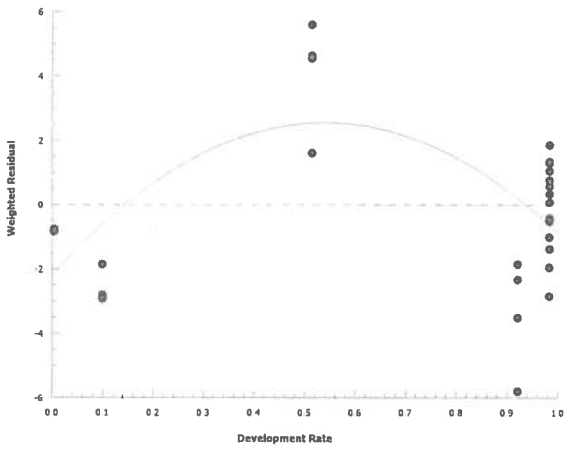
Graphics

Log-Normal [NED=A+B*log(X)]









CETIS Summary Report

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Batch ID:	17-7640-6603	**Test Type:**	Development-Survival	**Analyst:**	Stevi Vasquez
Start Date:	07 Oct-15 16:32	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Receiving Water
Ending Date:	09 Oct-15 16:32	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Gutoff	**Age:**	N/A

Sample ID:	07-1889-5386	**Code:**	Cu in RW	**Client:**	City of Eureka
Sample Date:	06 Oct-15 08:15	**Material:**	Copper in Site Water	**Project:**	24678
Receive Date:	07 Oct-15 10:05	**Source:**	City of Eureka		
Sample Age:	32h (6.9 °C)	**Station:**	Copper in Receiving Water		

Batch Note: Total Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-5019-7741	Development Rate	<10.1	10.1	NA	0.77%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
10-6591-5535	Development Rate	EC5	10.8	10.5	11.1		Linear Regression (MLE)
		EC10	11.4	11.1	11.7		
		EC15	11.9	11.6	12.2		
		EC20	12.3	12	12.5		
		EC25	12.6	12.3	12.8		
		EC40	13.5	13.2	13.7		
		EC50	14	13.8	14.3		

Development Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0.75	Site Water	4	0.999	0.995	1	0.995	1	0.00123	0.00245	0.25%	0.0%
10.1		4	0.985	0.972	0.999	0.977	0.994	0.00419	0.00839	0.85%	1.33%
11.9		4	0.805	0.77	0.84	0.772	0.82	0.011	0.022	2.73%	19.4%
14.6		4	0.453	0.392	0.514	0.396	0.48	0.0193	0.0385	8.51%	54.7%
19.4		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Site Water	0.995	1	1	1
10.1		0.98	0.994	0.977	0.991
11.9		0.816	0.772	0.812	0.82
14.6		0.464	0.48	0.396	0.471
19.4		0	0	0	0

Development Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Site Water	203/204	204/204	185/185	206/206
10.1		196/200	175/176	211/216	216/218
11.9		146/179	129/167	155/191	137/167
14.6		91/196	83/173	76/192	99/210
19.4		0/143	0/146	0/151	0/149

CETIS Analytical Report

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	18-5019-7741	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	24 Dec-15 12:34	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	0.77%	<10.1	10.1	NA	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
0.75		10.1*	3.27	2.29	0.051	6	0.0087	CDF	Significant Effect
0.75		11.9*	18.7	2.29	0.051	6	<0.0001	CDF	Significant Effect
0.75		14.6*	35.7	2.29	0.051	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.567699	0.5225664	3	535	<0.0001	Significant Effect
Error	0.01173174	0.0009776454	12			
Total	1.579431		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.83	11.3	0.6079	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.892	0.841	0.0609	Normal Distribution

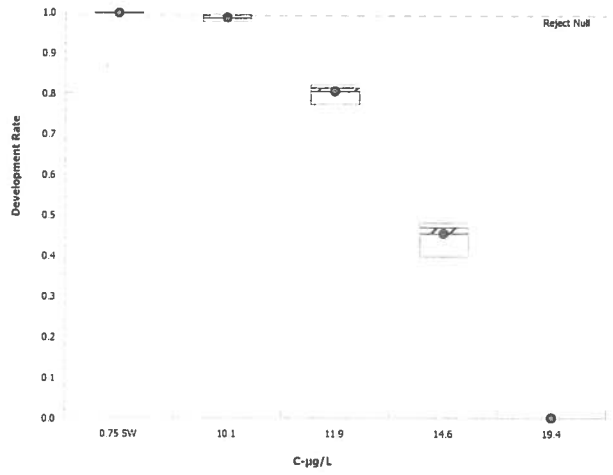
Development Rate Summary

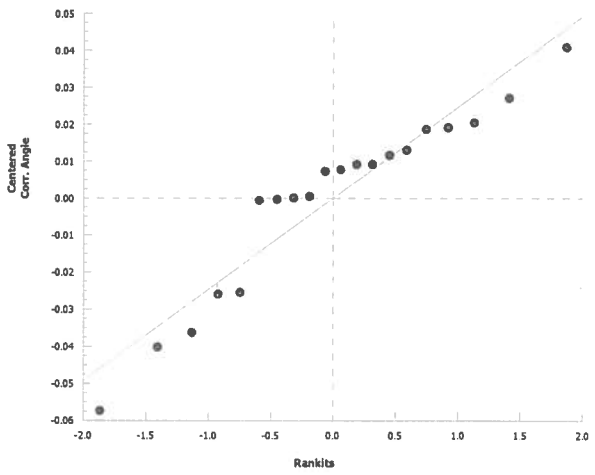
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Site Water	4	0.999	0.995	1	1	0.995	1	0.00123	0.25%	0.0%
10.1		4	0.985	0.972	0.999	0.985	0.977	0.994	0.0042	0.85%	1.33%
11.9		4	0.805	0.77	0.84	0.814	0.772	0.82	0.011	2.73%	19.4%
14.6		4	0.453	0.392	0.514	0.468	0.396	0.48	0.0193	8.51%	54.7%
19.4		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
0.75	Site Water	4	1.53	1.5	1.55	1.53	1.5	1.54	0.00864	1.13%	0.0%
10.1		4	1.45	1.4	1.51	1.45	1.42	1.5	0.0184	2.53%	4.74%
11.9		4	1.11	1.07	1.16	1.12	1.07	1.13	0.0136	2.45%	27.0%
14.6		4	0.738	0.676	0.8	0.753	0.68	0.765	0.0194	5.27%	51.7%
19.4		4	0.0412	0.0404	0.042	0.0412	0.0407	0.0418	0.000246	1.19%	97.3%

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	10-6591-5535	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	24 Dec-15 12:34	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	0.001252	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
7	-970	1950	1950	1.15	0.0681	0.978	23.5	3.68	0.0000	Significant Lack of Fit

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	10.8	10.5	11.1
EC10	11.4	11.1	11.7
EC15	11.9	11.6	12.2
EC20	12.3	12	12.5
EC25	12.6	12.3	12.8
EC40	13.5	13.2	13.7
EC50	14	13.8	14.3

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.00115	0.00192	-0.00291	0.00521	0.6	0.5567	Non-Significant Parameter
Slope	14.7	0.773	13.1	16.3	19	<0.0001	Significant Parameter
Intercept	-16.8	0.875	-18.7	-15	-19.2	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	2180.3	2180.3	1	831	<0.0001	Significant
Lack of Fit	33.82816	16.91408	2	23.5	<0.0001	Significant
Pure Error	10.779	0.7186	15			
Residual	44.60716	2.62395	17			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	44.6	27.6	0.0003	Significant Heterogenity
	Likelihood Ratio GOF	54.8	27.6	<0.0001	Significant Heterogenity
Variances	Bartlett Equality of Variance	17.9	9.49	0.0013	Unequal Variances
	Mod Levene Equality of Variance	0.607	3.06	0.6638	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.932	0.904	0.1678	Normal Distribution
	Anderson-Darling A2 Normality	0.6	2.49	0.1201	Normal Distribution

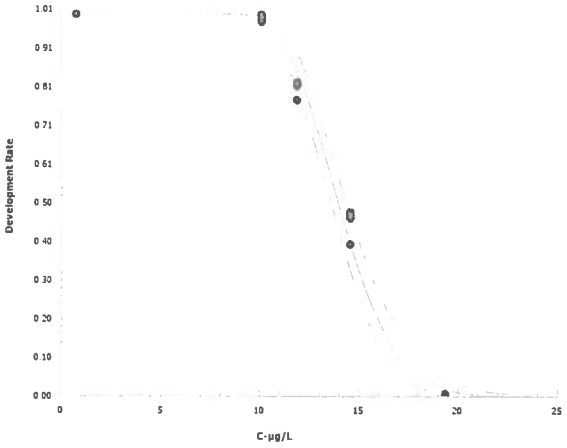
Development Rate Summary

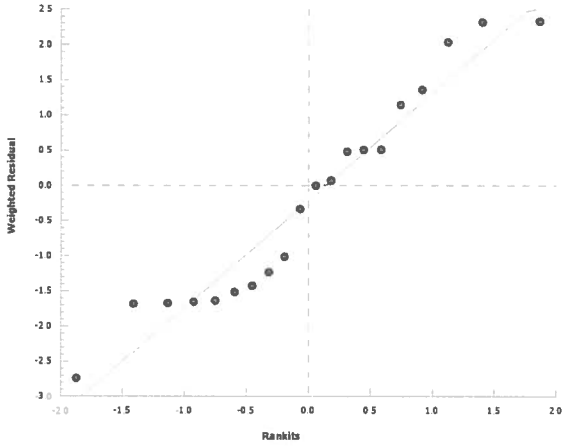
			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0.75	Site Water	4	0.999	0.995	1	0.00123	0.00245	0.25%	0.0%	798	799
10.1		4	0.985	0.977	0.994	0.0042	0.00839	0.85%	1.33%	798	810
11.9		4	0.805	0.772	0.82	0.011	0.022	2.73%	19.4%	567	704
14.6		4	0.453	0.396	0.48	0.0193	0.0385	8.51%	54.7%	349	771
19.4		4	0	0	0	0	0		100.0%	0	589

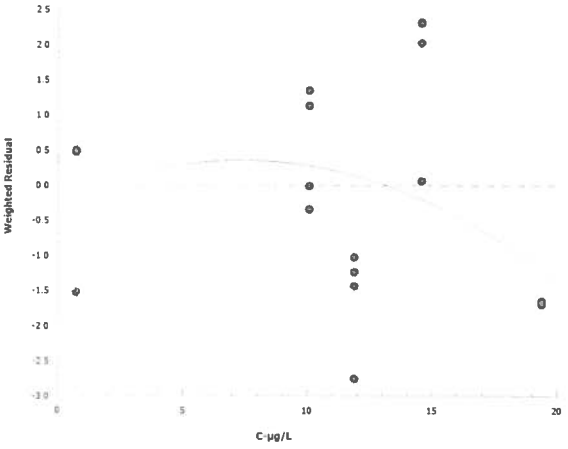
Bivalve Larval Survival and Development Test — Pacific EcoRisk

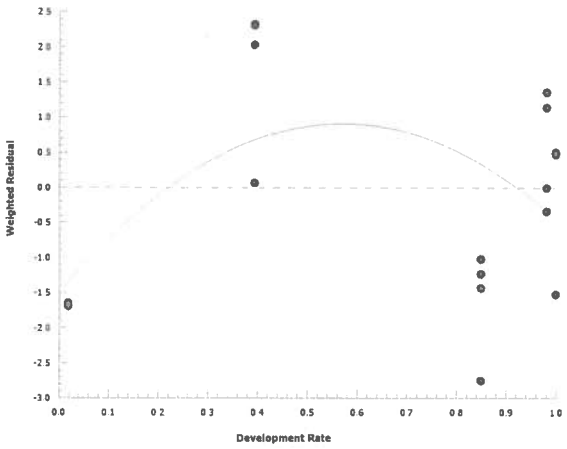
Analysis ID:	10-6591-5535	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	24 Dec-15 12:34	Analysis:	Linear Regression (MLE)	Official Results:	Yes

Graphics — Log-Normal [NED=A+B*log(X)]









CETIS Summary Report

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Batch ID:	11-1549-6849	Test Type:	Development-Survival	Analyst:	Stevi Vasquez
Start Date:	07 Oct-15 17:05	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	09 Oct-15 17:05	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Gutoff	Age:	N/A

Sample ID:	07-9639-6447	Code:	Cu in LW 34 ppt	Client:	City of Eureka
Sample Date:	07 Oct-15 11:15	Material:	Copper in Lab Water	Project:	24678
Receive Date:	07 Oct-15 11:15	Source:	City of Eureka		
Sample Age:	6h (18.7 °C)	Station:	Copper in Lab Water @ 34 ppt		

Batch Note: Total Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
16-4422-3327	Development Rate	9.54	11.5	10.47	3.4%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
09-9571-0748	Development Rate	EC5	9.38	9.07	9.64		Linear Regression (MLE)
		EC10	9.86	9.59	10.1		
		EC15	10.2	9.95	10.4		
		EC20	10.5	10.2	10.7		
		EC25	10.7	10.5	10.9		
		EC40	11.4	11.2	11.5		
		EC50	11.8	11.6	12		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0.75	Lab Water Contr	4	0.996	0.991	1	0.994	1	0.00139	0.00278	0.28%	0.0%
6.94		4	0.99	0.97	1	0.978	1	0.00607	0.0121	1.23%	0.64%
9.54		4	0.917	0.828	1	0.887	1	0.0278	0.0556	6.07%	7.96%
11.5		4	0.583	0.49	0.676	0.518	0.656	0.0293	0.0585	10.0%	41.4%
14		4	0.103	0.0866	0.119	0.0894	0.113	0.00506	0.0101	9.85%	89.7%
17.2		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Lab Water Contr	0.995	0.994	1	0.995
6.94		1	0.978	1	0.98
9.54		0.89	1	0.887	0.89
11.5		0.56	0.599	0.518	0.656
14		0.0894	0.102	0.113	0.107
17.2		0	0	0	0

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Lab Water Contr	197/198	166/167	201/201	181/182
6.94		187/187	177/181	204/204	198/202
9.54		161/181	185/185	172/194	154/173
11.5		93/166	112/187	85/164	122/186
14		16/179	20/197	23/203	19/178
17.2		0/164	0/175	0/157	0/180

CETIS Analytical Report

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	16-4422-3327	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:34	Analysis:	Nonparametric-Control vs Treatments	Official Results:	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.4%	9.54	11.5	10.47	

Steel Many-One Rank Sum Test

Control	vs	C-ug/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
0.75		6.94	17	10	1	6	0.6926	Asymp	Non-Significant Effect
0.75		9.54	13.5	10	1	6	0.2524	Asymp	Non-Significant Effect
0.75		11.5*	10	10	0	6	0.0350	Asymp	Significant Effect
0.75		14*	10	10	0	6	0.0350	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.017957	1.004489	4	161	<0.0001	Significant Effect
Error	0.09368646	0.006245764	15			
Total	4.111644		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	14.8	13.3	0.0052	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.846	0.866	0.0046	Non-normal Distribution

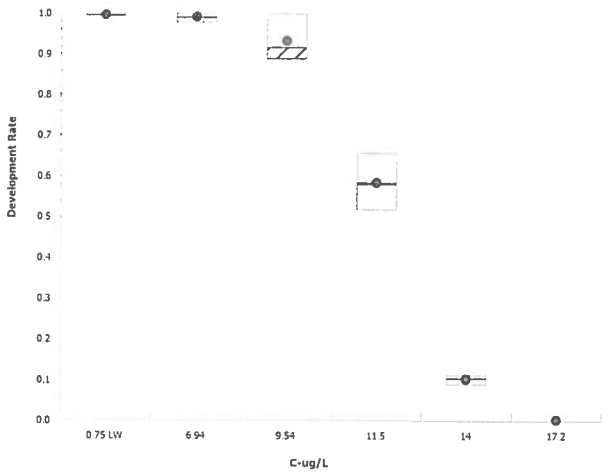
Development Rate Summary

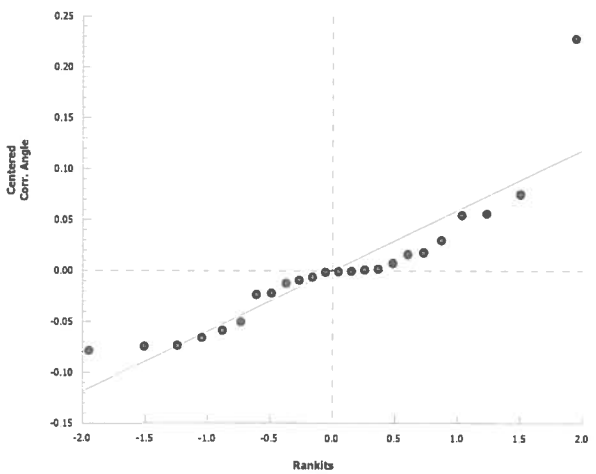
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Lab Water Contr	4	0.996	0.991	1	0.995	0.994	1	0.00139	0.28%	0.0%
6.94		4	0.99	0.97	1	0.99	0.978	1	0.00607	1.23%	0.64%
9.54		4	0.917	0.828	1	0.89	0.887	1	0.0278	6.07%	7.96%
11.5		4	0.583	0.49	0.676	0.58	0.518	0.656	0.0293	10.0%	41.4%
14		4	0.103	0.0866	0.119	0.104	0.0894	0.113	0.00506	9.85%	89.7%
17.2		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
0.75	Lab Water Cont	4	1.51	1.47	1.54	1.5	1.49	1.54	0.00983	1.31%	0.0%
6.94		4	1.48	1.38	1.58	1.48	1.42	1.54	0.0316	4.27%	1.72%
9.54		4	1.31	1.07	1.55	1.23	1.23	1.53	0.0758	11.6%	13.3%
11.5		4	0.87	0.775	0.965	0.865	0.804	0.944	0.0298	6.86%	42.3%
14		4	0.326	0.299	0.353	0.329	0.304	0.343	0.00842	5.16%	78.4%
17.2		4	0.0385	0.0366	0.0404	0.0384	0.0373	0.0399	0.000598	3.1%	97.4%

Graphics





Analyst: SNV QA: BT

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	09-9571-0748	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:34	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	0.004011	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
8	-1010	2020	2020	1.07	0.0601	0.981	1.91	3.16	0.1650	Non-Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	9.38	9.07	9.64
EC10	9.86	9.59	10.1
EC15	10.2	9.95	10.4
EC20	10.5	10.2	10.7
EC25	10.7	10.5	10.9
EC40	11.4	11.2	11.5
EC50	11.8	11.6	12

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.00762	0.00353	0.000287	0.015	2.16	0.0424	Significant Parameter
Slope	16.6	0.856	14.8	18.4	19.4	<0.0001	Significant Parameter
Intercept	-17.8	0.922	-19.7	-15.9	-19.3	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	3063.353	3063.353	1	1220	<0.0001	Significant
Lack of Fit	12.69216	4.23072	3	1.91	0.1649	Non-Significant
Pure Error	39.96179	2.220099	18			
Residual	52.65395	2.507331	21			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	52.7	32.7	0.0002	Significant Heterogenity
	Likelihood Ratio GOF	68	32.7	<0.0001	Significant Heterogenity
Variances	Bartlett Equality of Variance	31.7	11.1	<0.0001	Unequal Variances
	Mod Levene Equality of Variance	1.37	2.77	0.2801	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.946	0.917	0.2233	Normal Distribution
	Anderson-Darling A2 Normality	0.427	2.49	0.3179	Normal Distribution

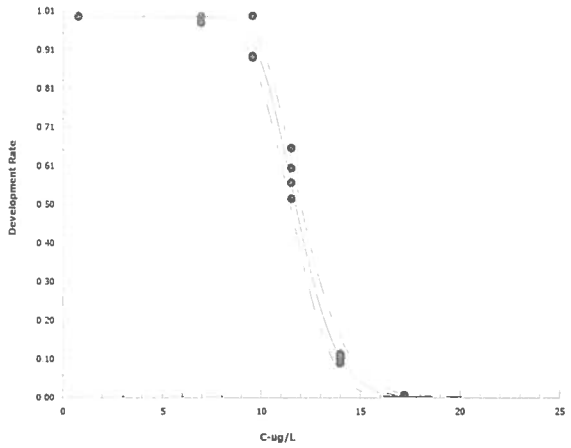
Development Rate Summary

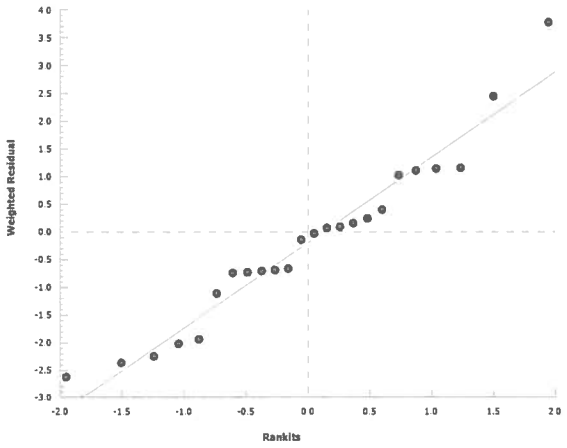
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0.75	Lab Water Contr	4	0.996	0.994	1	0.00139	0.00279	0.28%	0.0%	745	748
6.94		4	0.99	0.978	1	0.00607	0.0121	1.23%	0.64%	766	774
9.54		4	0.917	0.887	1	0.0278	0.0556	6.07%	7.96%	672	733
11.5		4	0.583	0.518	0.656	0.0293	0.0585	10.0%	41.4%	411	703
14		4	0.103	0.0894	0.113	0.00506	0.0101	9.85%	89.7%	78	757
17.2		4	0	0	0	0	0		100.0%	0	676

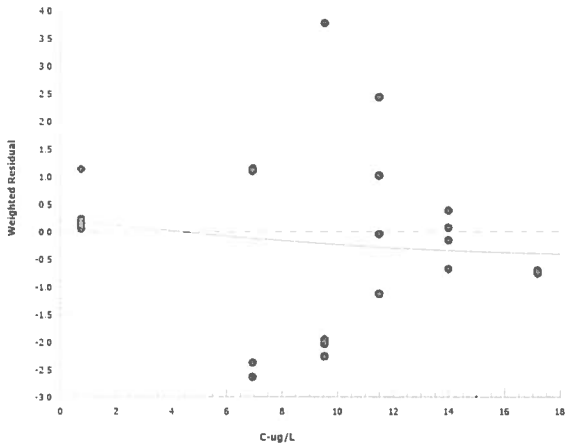
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	09-9571-0748	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	17 Nov-15 10:34	Analysis:	Linear Regression (MLE)	Official Results:	Yes

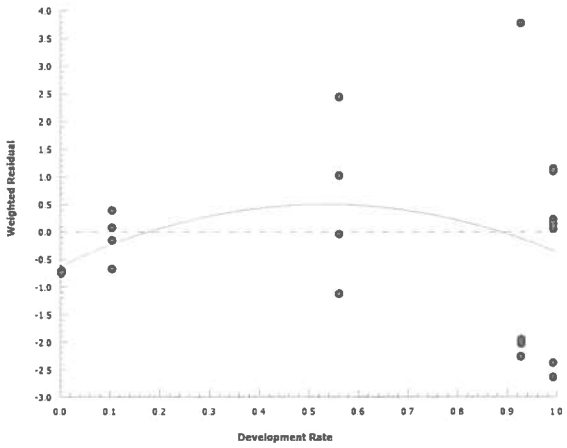
Graphics

Log-Normal [NED=A+B*log(X)]









Appendix D

Results of Total Copper and Auxiliary Analyses of Test Waters: Event 1

NELAP/ORELAP Certification 4036

Caltest
ANALYTICAL LABORATORY
ENVIRONMENTAL ANALYSES

ELAP Certification 1664

Alison Briden
Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

October 29, 2015

Dear Alison Briden,

Please find attached revised report Q100307 for the *Eureka Copper WER Study*. On 10/24/15 the laboratory re-analyzed the four submitted samples [-001 (Effluent); -002 (Receiving Water); -003 (30 PPT Lab Water); and -004 (34 PPT Lab Water)] for Total Suspended Solids (TSS) using a multiple rinse procedure. This procedure is commonly done with saltwater matrices and was not done with the first analysis which likely contributed to the high initial result. Because of the short method-specified holding time of seven days, the re-analysis was not done within hold time. The analysis did meet all other requirements of the SM 2540 D97 method.

Please feel free to contact me if I can be of any further assistance.

Thank you.

Sincerely,

Melinda Kelley, Project Manager
Caltest Analytical Laboratory

1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • Fax: (707) 226-1001 • e-mail: info@caltestlabs.com

REVISED

Thursday, October 29, 2015

Alison Briden
Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

Re Lab Order: Q100307 Collected By: ALISON BRIDEN
Project ID: EUREKA CU WER EVENT #1 PO/Contract #:

Dear Alison Briden:

Enclosed are the analytical results for sample(s) received by the laboratory on Thursday, October 08, 2015. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Enclosures

Project Manager: Melinda F. Kelley

1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • Fax (707) 226-1001 • e-mail: info@caltestlabs.com

REVISED

SAMPLE SUMMARY

Lab Order: Q100307
Project ID: EUREKA CU WER EVENT #1

Lab ID	Sample ID	Matrix	Date Collected	Date Received
Q100307001	EFFLUENT	Water	10/07/2015 17:00	10/08/2015 09:37
Q100307002	RECEIVING WATER	Water	10/07/2015 17:05	10/08/2015 09:37
Q100307003	30 PPT LAB WATER	Water	10/07/2015 17:10	10/08/2015 09:37
Q100307004	34 PPT LAB WATER	Water	10/07/2015 17:15	10/08/2015 09:37

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REVISED

NARRATIVE

Lab Order: Q100307
Project ID: EUREKA CU WER EVENT #1

General Qualifiers and Notes

Caltest authorizes this report to be reproduced only in its entirety. Results are specific to the sample(s) as submitted and only to the parameter(s) reported.

Caltest certifies that all test results for wastewater and hazardous waste analyses meet all applicable NELAC requirements; all microbiology and drinking water testing meet applicable ELAP requirements, unless stated otherwise.

All analyses performed by EPA Methods or Standard Methods (SM) 20th Edition except where noted (SMOL=online edition).

Caltest collects samples in compliance with 40 CFR, EPA Methods, Cal. Title 22, and Standard Methods.

Dilution Factors (DF) reported greater than '1' have been used to adjust the result, Reporting Limit (RL), and Method Detection Limit (MDL).

All Solid, sludge, and/or biosolids data is reported in Wet Weight, unless otherwise specified.

Filtrations performed at Caltest for dissolved metals (excluding mercury) and/or pH analysis are not performed within the 15 minute holding time as specified by 40CFR 136.3 table II.

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

ND - Non Detect - indicates analytical result has not been detected.

RL - Reporting Limit is the quantitation limit at which the laboratory is able to detect an analyte. An analyte not detected at or above the RL is reported as ND unless otherwise noted or qualified. For analyses pertaining to the State Implementation Plan of the California Toxics Rule, the Caltest Reporting Limit (RL) is equivalent to the Minimum Level (ML). A standard is always run at or below the ML. Where Reporting Limits are elevated due to dilution, the ML calibration criteria has been met.

J - reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL). The 'J' flag is equivalent to the DNQ Estimated Concentration flag.

E - indicates an estimated analytical result value.

B - indicates the analyte has been detected in the blank associated with the sample.

NC - means not able to be calculated for RPD or Spike Recoveries.

SS - compound is a Surrogate Spike used per laboratory quality assurance manual.

NOTE: This document represents a complete Analytical Report for the samples referenced herein and should be retained as a permanent record thereof.

Workorder Notes

Report revised to reflect TSS reanalysis results for all samples. Reanalysis was done with multiple rinses due to high salinity of samples.

1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • Fax (707) 226-1001 • e-mail: info@caltestlabs.com

REVISED

ANALYTICAL RESULTS

Lab Order: Q100307
Project ID: EUREKA CU WER EVENT #1

Lab ID Q100307001 Date Collected 10/7/2015 17:00 Matrix Water
Sample ID EFFLUENT Date Received 10/8/2015 09:37

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Total Suspended Solids Analysis	**Analytical Method:**		SM 2540 D-97					**Analyzed by:**	CCZ	
Total Suspended Solids	5	mg/L	3	2	1			10/24/15 13:10	BIO 15699	
Dissolved Organic Carbon Analysis	**Analytical Method:**		SM 5310 B-00					**Analyzed by:**	CLM	
Dissolved Organic Carbon	11.7	mg/L	1	0.30	1			10/09/15 21:56	WET 8285	

Lab ID Q100307002 Date Collected 10/7/2015 17:05 Matrix Water
Sample ID RECEIVING WATER Date Received 10/8/2015 09:37

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Total Suspended Solids Analysis	**Analytical Method:**		SM 2540 D-97					**Analyzed by:**	CCZ	
Total Suspended Solids	4	mg/L	3	2	1			10/24/15 13:10	BIO 15699	
Dissolved Organic Carbon Analysis	**Analytical Method:**		SM 5310 B-00					**Analyzed by:**	CLM	
Dissolved Organic Carbon	J0.836	mg/L	1	0.30	1			10/09/15 22:18	WET 8285	

Lab ID Q100307003 Date Collected 10/7/2015 17:10 Matrix Water
Sample ID 30 PPT LAB WATER Date Received 10/8/2015 09:37

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Total Suspended Solids Analysis	**Analytical Method:**		SM 2540 D-97					**Analyzed by:**	CCZ	
Total Suspended Solids	ND	mg/L	3	2	1			10/24/15 13:10	BIO 15699	
Dissolved Organic Carbon Analysis	**Analytical Method:**		SM 5310 B-00					**Analyzed by:**	CLM	
Dissolved Organic Carbon	J0.830	mg/L	1	0.30	1			10/09/15 22:30	WET 8285	
Total Organic Carbon Analysis	**Analytical Method:**		SM 5310 B-00					**Analyzed by:**	CLM	
Total Organic Carbon	0.822	mg/L	0.5	0.30	1			10/09/15 22:41	WET 8285	

Lab ID Q100307004 Date Collected 10/7/2015 17:15 Matrix Water
Sample ID 34 PPT LAB WATER Date Received 10/8/2015 09:37

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Total Suspended Solids Analysis	**Analytical Method:**		SM 2540 D-97					**Analyzed by:**	CCZ	
Total Suspended Solids	ND	mg/L	3	2	1			10/24/15 13:10	BIO 15699	
Dissolved Organic Carbon Analysis	**Analytical Method:**		SM 5310 B-00					**Analyzed by:**	CLM	
Dissolved Organic Carbon	J0.866	mg/L	1	0.30	1			10/09/15 22:52	WET 8285	
Total Organic Carbon Analysis	**Analytical Method:**		SM 5310 B-00					**Analyzed by:**	CLM	
Total Organic Carbon	0.825	mg/L	0.5	0.30	1			10/09/15 23:04	WET 8285	

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QUALITY CONTROL DATA

Lab Order: Q100307
Project ID: EUREKA CU WER EVENT #1

Analysis Description:	Total Suspended Solids Analysis	**QC Batch:**	BIO/15699
Analysis Method:	SM 2540 D-97	**QC Batch Method:**	SM 2540 D-97

METHOD BLANK: 663696

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Suspended Solids	ND	3	2	mg/L	

LABORATORY CONTROL SAMPLE: 663687

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Total Suspended Solids	mg/L	500	514	103	80-120	

SAMPLE DUPLICATE: 663695

Parameter	Units	Q100695001 Result	DUP Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	1390	1350	2.9	20	

Analysis Description:	Dissolved Organic Carbon Analysis	**QC Batch:**	WET/8285
Analysis Method:	SM 5310 B-00	**QC Batch Method:**	SM 5310 B-00

METHOD BLANK: 661436

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Organic Carbon	ND	0.5	0.3	mg/L	
Dissolved Organic Carbon	ND	1	0.3	mg/L	

FILTER BLANK: 661472

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Organic Carbon	ND	0.5	0.3	mg/L	
Dissolved Organic Carbon	ND	1	0.3	mg/L	

LABORATORY CONTROL SAMPLE & LCSD: 661437 661438

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% REC Limits	RPD	Max RPD	Qualifier
Total Organic Carbon	mg/L	10	9.99	10.3	100	103	80-120	3.1	20	
Dissolved Organic Carbon	mg/L	10	9.99	10.3	100	103	80-120	3.1	20	

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QUALITY CONTROL DATA

Lab Order: Q100307
Project ID: EUREKA CU WER EVENT #1

Analysis Description:	Dissolved Organic Carbon Analysis	**QC Batch:**	WET/8285
Analysis Method:	SM 5310 B-00	**QC Batch Method:**	SM 5310 B-00

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 661441 661442

Parameter	Units	Q090849005 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Total Organic Carbon	mg/L	7.9	10	18.8	19.1	109	112	80-120	1.6	20	
Dissolved Organic Carbon	mg/L	7.9	10	18.8	19.1	109	112	80-120	1.6	20	

Analysis Description:	Total Organic Carbon Analysis	**QC Batch:**	WET/8285
Analysis Method:	SM 5310 B-00	**QC Batch Method:**	SM 5310 B-00

METHOD BLANK: 661436

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Organic Carbon	ND	0.5	0.3	mg/L	
Dissolved Organic Carbon	ND	1	0.3	mg/L	

FILTER BLANK: 661472

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Organic Carbon	ND	0.5	0.3	mg/L	
Dissolved Organic Carbon	ND	1	0.3	mg/L	

LABORATORY CONTROL SAMPLE & LCSD: 661437 661438

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% REC Limits	RPD	Max RPD	Qualifier
Total Organic Carbon	mg/L	10	9.99	10.3	100	103	80-120	3.1	20	
Dissolved Organic Carbon	mg/L	10	9.99	10.3	100	103	80-120	3.1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 661441 661442

Parameter	Units	Q090849005 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Total Organic Carbon	mg/L	7.9	10	18.8	19.1	109	112	80-120	1.6	20	
Dissolved Organic Carbon	mg/L	7.9	10	18.8	19.1	109	112	80-120	1.6	20	

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QUALITY CONTROL DATA QUALIFIERS

Lab Order: Q100307
Project ID: EUREKA CU WER EVENT #1

QUALITY CONTROL PARAMETER QUALIFIERS

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

NS - means not spiked and will not have recoveries reported for Analyte Spike Amounts

QC Codes Keys: These descriptors are used to help identify the specific QC samples and clarify the report.

MB - Method Blank

Method Blanks are reported to the same Method Detection Limits (MDLs) or Reporting Limits (RLs) as the analytical samples in the corresponding QC batch.

LCS/LCSD - Laboratory Control Spike / Laboratory Control Spike Duplicate

DUP - Duplicate of Original Sample Matrix

MS/MSD - Matrix Spike / Matrix Spike Duplicate

RPD - Relative Percent Difference

%Recovery - Spike Recovery stated as a percentage

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Lab Order: Q100307
Project ID: EUREKA CU WER EVENT #1

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
Q100307001	**EFFLUENT**	SM 2540 D-97	BIO/15699		
Q100307002	**RECEIVING WATER**	SM 2540 D-97	BIO/15699		
Q100307003	**30 PPT LAB WATER**	SM 2540 D-97	BIO/15699		
Q100307004	**34 PPT LAB WATER**	SM 2540 D-97	BIO/15699		
Q100307001	**EFFLUENT**	SM 5310 B-00	WET/8285		
Q100307002	**RECEIVING WATER**	SM 5310 B-00	WET/8285		
Q100307003	**30 PPT LAB WATER**	SM 5310 B-00	WET/8285		
Q100307004	**34 PPT LAB WATER**	SM 5310 B-00	WET/8285		

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Q100307

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road Fairfield, CA 94534	**Address:**	
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 1		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: TOC	TSS	DOC
1	-1 Effluent	10/7/15	17:00	FW	Grab	1	1 x 500 mL poly		X	
2	↓ Effluent	10/7/15	17:00	FW	Grab	1	250 mL AG			X
3	-2 Receiving Water	10/7/15	17:05	FW	Grab	1	1 x 500 mL poly		X	
4	↓ Receiving Water	10/7/15	17:05	FW	Grab	1	250 mL AG			X
5	-3 30 ppt Lab Water	10/7/15	17:10	FW	Grab	3	40 mL AG + HCl	X		
6	↓ 30 ppt Lab Water	10/7/15	17:10	FW	Grab	1	1 x 500 mL poly		X	
7	↓ 30 ppt Lab Water	10/7/15	17:10	FW	Grab	1	250 mL AG			X
8	-4 34 ppt Lab Water	10/7/15	17:15	FW	Grab	3	40 mL AG + HCl	X		
9	↓ 34 ppt Lab Water	10/7/15	17:15	FW	Grab	1	1 x 500 mL poly		X	
10	↓ 34 ppt Lab Water	10/7/15	17:15	FW	Grab	1	250 mL AG			X

Samples collected by: Alison Briden

Comments/Special Instruction:

AG = amber glass

TEMP. (°C): 4.2
SEALED: YES
INTACT: YES

RELIQUINSHED BY:	**RECEIVED BY:**
Signature: Alison Briden	**Signature:** Glen Imrie
Print: Alison Briden	**Print:** GLEN IMRIE
Organization: PER	**Organization:** CALTEST
Date: 10-8-15 **Time:** 0910	**Date:** 10/8/15 **Time:** 0910
RELIQUINSHED BY:	**RECEIVED BY:**
Signature: Glen Imrie	**Signature:** Leah Gaeta
Print: GLEN IMRIE	**Print:** Leah Gaeta
Organization: CALTEST	**Organization:** Caltest
Date: 10/8/15 **Time:** 0937	**Date:** 10/8/15 **Time:** 0937

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

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Friday, December 11, 2015

Alison Briden
Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

Re Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Collected By: ALISON BRIDEN
PO/Contract #:

Dear Alison Briden:

Enclosed are the analytical results for sample(s) received by the laboratory on Monday, October 26, 2015. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Enclosures

Project Manager: Melinda F. Kelley

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SAMPLE SUMMARY

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Lab ID	Sample ID	Matrix	Date Collected	Date Received
Q100833001	EFF-CuTot-0-Ti	Water	10/07/2015 15:38	10/26/2015 13:54
Q100833002	EFF-CuTot-117-Ti	Water	10/07/2015 15:44	10/26/2015 13:54
Q100833003	EFF-CuTot-138-Ti	Water	10/07/2015 15:46	10/26/2015 13:54
Q100833004	EFF-CuTot-162-Ti	Water	10/07/2015 15:48	10/26/2015 13:54
Q100833005	EFF-CuTot-190-Ti	Water	10/07/2015 15:50	10/26/2015 13:54
Q100833006	EFF-CuTot-224-Ti	Water	10/07/2015 15:52	10/26/2015 13:54
Q100833007	EFF-CuTot-280-Ti	Water	10/07/2015 15:54	10/26/2015 13:54
Q100833008	LW30-CuTot-0-Ti	Water	10/07/2015 16:26	10/26/2015 13:54
Q100833009	LW30-CuTot-3.6-Ti	Water	10/07/2015 16:28	10/26/2015 13:54
Q100833010	LW30-CuTot-6.0-Ti	Water	10/07/2015 16:30	10/26/2015 13:54
Q100833011	LW30-CuTot-9.0-Ti	Water	10/07/2015 16:32	10/26/2015 13:54
Q100833012	LW30-CuTot-12.0-Ti	Water	10/07/2015 16:34	10/26/2015 13:54
Q100833013	LW30-CuTot-15.0-Ti	Water	10/07/2015 16:36	10/26/2015 13:54
Q100833014	LW30-CuTot-18.0-Ti	Water	10/07/2015 16:38	10/26/2015 13:54
Q100833015	LW30-CuTot-22.0-Ti	Water	10/07/2015 16:40	10/26/2015 13:54
Q100833016	LW34-CuTot-0-Ti	Water	10/07/2015 16:20	10/26/2015 13:54
Q100833017	LW34-CuTot-9.0-Ti	Water	10/07/2015 16:26	10/26/2015 13:54
Q100833018	LW34-CuTot-12.0-Ti	Water	10/07/2015 16:28	10/26/2015 13:54
Q100833019	LW34-CuTot-15.0-Ti	Water	10/07/2015 16:30	10/26/2015 13:54
Q100833020	LW34-CuTot-18.0-Ti	Water	10/07/2015 16:32	10/26/2015 13:54
Q100833021	LW34-CuTot-22.0-Ti	Water	10/07/2015 16:34	10/26/2015 13:54
Q100833022	RW-CuTot-0-Ti	Water	10/07/2015 15:30	10/26/2015 13:54
Q100833023	RW-CuTot-9.0-Ti	Water	10/07/2015 15:33	10/26/2015 13:54
Q100833024	RW-CuTot-12.0-Ti	Water	10/07/2015 15:34	10/26/2015 13:54
Q100833025	RW-CuTot-15.0-Ti	Water	10/07/2015 15:35	10/26/2015 13:54
Q100833026	RW-CuTot-18.0-Ti	Water	10/07/2015 15:36	10/26/2015 13:54
Q100833027	RW-CuTot-22.0-Ti	Water	10/07/2015 15:37	10/26/2015 13:54

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NARRATIVE

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

General Qualifiers and Notes

Caltest authorizes this report to be reproduced only in its entirety. Results are specific to the sample(s) as submitted and only to the parameter(s) reported.

Caltest certifies that all test results for wastewater and hazardous waste analyses meet all applicable NELAC requirements; all microbiology and drinking water testing meet applicable ELAP requirements, unless stated otherwise.

All analyses performed by EPA Methods or Standard Methods (SM) 20th Edition except where noted (SMOL=online edition).

Caltest collects samples in compliance with 40 CFR, EPA Methods, Cal. Title 22, and Standard Methods.

Dilution Factors (DF) reported greater than '1' have been used to adjust the result, Reporting Limit (RL), and Method Detection Limit (MDL).

All Solid, sludge, and/or biosolids data is reported in Wet Weight, unless otherwise specified.

Filtrations performed at Caltest for dissolved metals (excluding mercury) and/or pH analysis are not performed within the 15 minute holding time as specified by 40CFR 136.3 table II.

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

ND - Non Detect - indicates analytical result has not been detected.

RL - Reporting Limit is the quantitation limit at which the laboratory is able to detect an analyte. An analyte not detected at or above the RL is reported as ND unless otherwise noted or qualified. For analyses pertaining to the State Implementation Plan of the California Toxics Rule, the Caltest Reporting Limit (RL) is equivalent to the Minimum Level (ML). A standard is always run at or below the ML. Where Reporting Limits are elevated due to dilution, the ML calibration criteria has been met.

J - reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL). The 'J' flag is equivalent to the DNQ Estimated Concentration flag.

E - indicates an estimated analytical result value.

B - indicates the analyte has been detected in the blank associated with the sample.

NC - means not able to be calculated for RPD or Spike Recoveries.

SS - compound is a Surrogate Spike used per laboratory quality assurance manual.

NOTE: This document represents a complete Analytical Report for the samples referenced herein and should be retained as a permanent record thereof.

Workorder Notes

Report revised to include results for re-prep and re-analysis in triplicate of samples -023 and -024.

Qualifiers and Compound Notes

1	Sample diluted prior to analysis in an effort to reduce matrix interferences resulting in higher reporting limit(s).

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ANALYTICAL RESULTS

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Lab ID Q100833001 Date Collected 10/7/2015 15:38 Matrix Water
Sample ID EFF-CuTot-0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	22.9	ug/L	2.5	0.75	5	10/29/15 00:00	MPR 13921	10/30/15 16:11	MMS 7796	

Lab ID Q100833002 Date Collected 10/7/2015 15:44 Matrix Water
Sample ID EFF-CuTot-117-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	124	ug/L	2.5	0.75	5	10/29/15 00:00	MPR 13921	10/30/15 16:17	MMS 7796	

Lab ID Q100833003 Date Collected 10/7/2015 15:46 Matrix Water
Sample ID EFF-CuTot-138-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	142	ug/L	2.5	0.75	5	10/29/15 00:00	MPR 13921	10/30/15 16:23	MMS 7796	

Lab ID Q100833004 Date Collected 10/7/2015 15:48 Matrix Water
Sample ID EFF-CuTot-162-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	163	ug/L	2.5	0.75	5	10/29/15 00:00	MPR 13921	10/30/15 16:28	MMS 7796	

Lab ID Q100833005 Date Collected 10/7/2015 15:50 Matrix Water
Sample ID EFF-CuTot-190-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	193	ug/L	2.5	0.75	5	10/29/15 00:00	MPR 13921	10/30/15 16:34	MMS 7796	

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ANALYTICAL RESULTS

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Lab ID	**Q100833006**	Date Collected	10/7/2015 15:52	Matrix	Water
Sample ID	**EFF-CuTot-224-Ti**	Date Received	10/26/2015 13:54		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	213	ug/L	2.5	0.75	5	10/29/15 00:00	MPR 13921	10/30/15 16:40	MMS 7796	

Lab ID	**Q100833007**	Date Collected	10/7/2015 15:54	Matrix	Water
Sample ID	**EFF-CuTot-280-Ti**	Date Received	10/26/2015 13:54		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	260	ug/L	2.5	0.75	5	10/29/15 00:00	MPR 13921	10/30/15 16:45	MMS 7796	

Lab ID	**Q100833008**	Date Collected	10/7/2015 16:26	Matrix	Water
Sample ID	**LW30-CuTot-0-Ti**	Date Received	10/26/2015 13:54		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	ND	ug/L	2.5	0.75	5	10/29/15 00:00	MPR 13921	10/30/15 17:08	MMS 7796	1

Lab ID	**Q100833009**	Date Collected	10/7/2015 16:28	Matrix	Water
Sample ID	**LW30-CuTot-3.6-Ti**	Date Received	10/26/2015 13:54		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	J2.43	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 18:33	MMS 7798	

Lab ID	**Q100833010**	Date Collected	10/7/2015 16:30	Matrix	Water
Sample ID	**LW30-CuTot-6.0-Ti**	Date Received	10/26/2015 13:54		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	4.08	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 18:39	MMS 7798	

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ANALYTICAL RESULTS

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Lab ID Q100833011 Date Collected 10/7/2015 16:32 Matrix Water
Sample ID LW30-CuTot-9.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	7.08	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 18:45	MMS 7798	

Lab ID Q100833012 Date Collected 10/7/2015 16:34 Matrix Water
Sample ID LW30-CuTot-12.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	9.21	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 18:50	MMS 7798	

Lab ID Q100833013 Date Collected 10/7/2015 16:36 Matrix Water
Sample ID LW30-CuTot-15.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	11.6	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 18:56	MMS 7798	

Lab ID Q100833014 Date Collected 10/7/2015 16:38 Matrix Water
Sample ID LW30-CuTot-18.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	14.3	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 19:02	MMS 7798	

Lab ID Q100833015 Date Collected 10/7/2015 16:40 Matrix Water
Sample ID LW30-CuTot-22.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	17.7	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 19:07	MMS 7798	

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ANALYTICAL RESULTS

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Lab ID Q100833016 Date Collected 10/7/2015 16:20 Matrix Water
Sample ID LW34-CuTot-0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	ND	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 19:13	MMS 7798	1

Lab ID Q100833017 Date Collected 10/7/2015 16:26 Matrix Water
Sample ID LW34-CuTot-9.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	6.94	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 19:36	MMS 7798	

Lab ID Q100833018 Date Collected 10/7/2015 16:28 Matrix Water
Sample ID LW34-CuTot-12.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	9.54	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 19:41	MMS 7798	

Lab ID Q100833019 Date Collected 10/7/2015 16:30 Matrix Water
Sample ID LW34-CuTot-15.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	11.5	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 19:47	MMS 7798	

Lab ID Q100833020 Date Collected 10/7/2015 16:32 Matrix Water
Sample ID LW34-CuTot-18.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	14.0	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 19:53	MMS 7798	

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ANALYTICAL RESULTS

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Lab ID Q100833021 Date Collected 10/7/2015 16:34 Matrix Water
Sample ID LW34-CuTot-22.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	17.2	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 19:58	MMS 7798	

Lab ID Q100833022 Date Collected 10/7/2015 15:30 Matrix Water
Sample ID RW-CuTot-0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	JS			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	ND	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 20:04	MMS 7798	1

Lab ID Q100833023 Date Collected 10/7/2015 15:33 Matrix Water
Sample ID RW-CuTot-9.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	10.2	ug/L	2.5	0.75	5	11/19/15 00:00	MPR 13957	11/20/15 19:27	MMS 7819	
Copper	10.4	ug/L	2.5	0.75	5	11/19/15 00:00	MPR 13957	11/20/15 19:33	MMS 7819	
Copper	10.9	ug/L	2.5	0.75	5	11/19/15 00:00	MPR 13957	11/20/15 19:22	MMS 7819	

Lab ID Q100833024 Date Collected 10/7/2015 15:34 Matrix Water
Sample ID RW-CuTot-12.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	10.1	ug/L	2.5	0.75	5	11/19/15 00:00	MPR 13957	11/20/15 19:50	MMS 7819	
Copper	9.70	ug/L	2.5	0.75	5	11/19/15 00:00	MPR 13957	11/20/15 19:44	MMS 7819	
Copper	10.5	ug/L	2.5	0.75	5	11/19/15 00:00	MPR 13957	11/20/15 19:39	MMS 7819	

Lab ID Q100833025 Date Collected 10/7/2015 15:35 Matrix Water
Sample ID RW-CuTot-15.0-Ti Date Received 10/26/2015 13:54

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual

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ANALYTICAL RESULTS

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Lab ID	**Q100833025**	Date Collected	10/7/2015 15:35	Matrix	Water
Sample ID	**RW-CuTot-15.0-Ti**	Date Received	10/26/2015 13:54		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	11.9	ug/L	2.5	0.75	5	10/30/15 00:00	MPR 13925	10/30/15 20:21	MMS 7798	

Lab ID	**Q100833026**	Date Collected	10/7/2015 15:36	Matrix	Water
Sample ID	**RW-CuTot-18.0-Ti**	Date Received	10/26/2015 13:54		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	14.6	ug/L	2.5	0.75	5	11/02/15 00:00	MPR 13926	11/03/15 15:25	MMS 7800	

Lab ID	**Q100833027**	Date Collected	10/7/2015 15:37	Matrix	Water
Sample ID	**RW-CuTot-22.0-Ti**	Date Received	10/26/2015 13:54		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	JS			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	19.4	ug/L	2.5	0.75	5	11/02/15 00:00	MPR 13926	11/03/15 15:30	MMS 7800	

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QUALITY CONTROL DATA

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13921
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

METHOD BLANK: 664201

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Copper	ND	0.50	0.15	ug/L	

LABORATORY CONTROL SAMPLE: 664202

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Copper	ug/L	20	19.4	97	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 664204 664205

Parameter	Units	Q100869001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	5.7	20	24.5	24.5	94	94	70-130	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 664206 664207

Parameter	Units	Q100818001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	6.2	20	25.1	25.4	95	96	70-130	1.2	20	

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13925
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

METHOD BLANK: 664564

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Copper	ND	0.50	0.15	ug/L	

LABORATORY CONTROL SAMPLE: 664565

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Copper	ug/L	20	18.9	95	85-115	

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QUALITY CONTROL DATA

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13925
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 664567 664568

Parameter	Units	Q100872001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	0.3	20	17.5	17.7	86	87	70-130	1.1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 664569 664570

Parameter	Units	Q100911003 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	0.21	20	17	17.4	84	86	70-130	2.3	20	

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13926
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

METHOD BLANK: 664852

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Copper	ND	0.50	0.15	ug/L	

LABORATORY CONTROL SAMPLE: 664853

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Copper	ug/L	20	18.5	93	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 664855 664856

Parameter	Units	Q100969001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	21	20	40.2	38.9	96	90	70-130	3.3	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 664857 664858

Parameter	Units	Q100953001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	4.8	20	22.8	22.9	90	91	70-130	0.4	20	

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13957
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

METHOD BLANK: 668414

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QUALITY CONTROL DATA

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13957
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Copper	ND	0.50	0.15	ug/L	

LABORATORY CONTROL SAMPLE: 668415

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Copper	ug/L	20	18.5	93	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 668417 668418

Parameter	Units	Q110617003 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	7.3	20	25.5	25.3	91	90	70-130	0.8	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 668419 668420

Parameter	Units	Q110619001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	0.63	20	18.7	18.6	90	90	70-130	0.5	20	

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QUALITY CONTROL DATA QUALIFIERS

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

QUALITY CONTROL PARAMETER QUALIFIERS

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

NS - means not spiked and will not have recoveries reported for Analyte Spike Amounts

QC Codes Keys: These descriptors are used to help identify the specific QC samples and clarify the report.

MB - Method Blank

Method Blanks are reported to the same Method Detection Limits (MDLs) or Reporting Limits (RLs) as the analytical samples in the corresponding QC batch.

LCS/LCSD - Laboratory Control Spike / Laboratory Control Spike Duplicate

DUP - Duplicate of Original Sample Matrix

MS/MSD - Matrix Spike / Matrix Spike Duplicate

RPD - Relative Percent Difference

%Recovery - Spike Recovery stated as a percentage

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Lab Order: Q100833
Project ID: EUREKA COPPER WER EVENT 1

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
Q100833001	EFF-CuTot-0-Ti	EPA 200.8	MPR/13921	EPA 200.8	MMS/7796
Q100833002	EFF-CuTot-117-Ti	EPA 200.8	MPR/13921	EPA 200.8	MMS/7796
Q100833003	EFF-CuTot-138-Ti	EPA 200.8	MPR/13921	EPA 200.8	MMS/7796
Q100833004	EFF-CuTot-162-Ti	EPA 200.8	MPR/13921	EPA 200.8	MMS/7796
Q100833005	EFF-CuTot-190-Ti	EPA 200.8	MPR/13921	EPA 200.8	MMS/7796
Q100833006	EFF-CuTot-224-Ti	EPA 200.8	MPR/13921	EPA 200.8	MMS/7796
Q100833007	EFF-CuTot-280-Ti	EPA 200.8	MPR/13921	EPA 200.8	MMS/7796
Q100833008	LW30-CuTot-0-Ti	EPA 200.8	MPR/13921	EPA 200.8	MMS/7796
Q100833009	LW30-CuTot-3.6-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833010	LW30-CuTot-6.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833011	LW30-CuTot-9.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833012	LW30-CuTot-12.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833013	LW30-CuTot-15.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833014	LW30-CuTot-18.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833015	LW30-CuTot-22.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833016	LW34-CuTot-0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833017	LW34-CuTot-9.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833018	LW34-CuTot-12.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833019	LW34-CuTot-15.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833020	LW34-CuTot-18.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833021	LW34-CuTot-22.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833022	RW-CuTot-0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833025	RW-CuTot-15.0-Ti	EPA 200.8	MPR/13925	EPA 200.8	MMS/7798
Q100833026	RW-CuTot-18.0-Ti	EPA 200.8	MPR/13926	EPA 200.8	MMS/7800
Q100833027	RW-CuTot-22.0-Ti	EPA 200.8	MPR/13926	EPA 200.8	MMS/7800
Q100833023	RW-CuTot-9.0-Ti	EPA 200.8	MPR/13957	EPA 200.8	MMS/7819
Q100833024	RW-CuTot-12.0-Ti	EPA 200.8	MPR/13957	EPA 200.8	MMS/7819

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Q100833

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road	**Address:**	
	Fairfield, CA 94534		
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 1		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: Total Cu
1	EFF-CuTot-0-Ti	10/7/15	1538	SW	Grab	1	500 mL plastic + HNO3	x
2	EFF-CuTot-117-Ti	10/7/15	1544	SW	Grab	1	500 mL plastic + HNO3	x
3	EFF-CuTot-138-Ti	10/7/15	1546	SW	Grab	1	500 mL plastic + HNO3	x
4	EFF-CuTot-162-Ti	10/7/15	1548	SW	Grab	1	500 mL plastic + HNO3	x
5	EFF-CuTot-190-Ti	10/7/15	1550	SW	Grab	1	500 mL plastic + HNO3	x
6	EFF-CuTot-224-Ti	10/7/15	1552	SW	Grab	1	500 mL plastic + HNO3	x
7	EFF-CuTot-280-Ti	10/7/15	1554	SW	Grab	1	500 mL plastic + HNO3	x
8								
9								
10								

Samples collected by: Alison Briden

Comments/Special Instruction:
Report of the maximum number of significant figures possible
MDL Reporting Format

RELINQUISHED BY:	**RECEIVED BY:**
Signature: Alison Briden	**Signature:**
Print: Alison Briden	**Print:** Matthew Kerr
Organization: PER	**Organization:** Caltest
Date: 10-26-15 **Time:** 0945	**Date:** 10-26-15 **Time:** 0945
RELINQUISHED BY:	**RECEIVED BY:**
Signature:	**Signature:** L Gaeta
Print: Matthew Kerr	**Print:** L Gaeta
Organization: Caltest	**Organization:** Caltest
Date: 10-26-15 **Time:** 1554	**Date:** 10/26/15 **Time:** 0945 (10/27) 1354

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

TEMP. (°C): 1.8
SEALED: Y
INTACT: Y

Q100833

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road	**Address:**	
	Fairfield, CA 94534		
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 1		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: Total Cu
1	LW30-CuTot-0-Ti	10/7/15	1626	SW	Grab	1	500 mL plastic + HNO3	x
2	LW30-CuTot-3.6-Ti	10/7/15	1628	SW	Grab	1	500 mL plastic + HNO3	x
3	LW30-CuTot-6.0-Ti	10/7/15	1630	SW	Grab	1	500 mL plastic + HNO3	x
4	LW30-CuTot-9.0-Ti	10/7/15	1632	SW	Grab	1	500 mL plastic + HNO3	x
5	LW30-CuTot-12.0-Ti	10/7/15	1634	SW	Grab	1	500 mL plastic + HNO3	x
6	LW30-CuTot-15.0-Ti	10/7/15	1636	SW	Grab	1	500 mL plastic + HNO3	x
7	LW30-CuTot-18.0-Ti	10/7/15	1638	SW	Grab	1	500 mL plastic + HNO3	x
8	LW30-CuTot-22.0-Ti	10/7/15	1640	SW	Grab	1	500 mL plastic + HNO3	x
9								
10								

Samples collected by: Alison Briden

Comments/Special Instruction:
Report of the maximum number of significant figures possible
MDL Reporting Format

RELINQUISHED BY:		**RECEIVED BY:**
Signature:	Alison Briden	**Signature:**
Print:	Alison Briden	**Print:** Matthew Kerr
Organization:	PER	**Organization:** Caltest
Date:	10/26/15 **Time:** 0945	**Date:** 10-26-15 **Time:** 0945
RELINQUISHED BY:		**RECEIVED BY:**
Signature:		**Signature:**
Print:	Matthew Kerr	**Print:** L. Gaeta
Organization:	Caltest	**Organization:** Caltest AM 10/26
Date:	10-26-15 **Time:** 1354	**Date:** 10/26/15 **Time:** 09 1354

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

TEMP. (°C): 4.8
SEALED: Y
INTACT: Y

Q100833

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road Fairfield, CA 94534	**Address:**	
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 1		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: Total Cu
1	LW34-CuTot-0-Ti	10/7/15	1620	SW	Grab	1	500 mL plastic + HNO3	x
2	LW34-CuTot-9.0-Ti	10/7/15	1626	SW	Grab	1	500 mL plastic + HNO3	x
3	LW34-CuTot-12.0-Ti	10/7/15	1628	SW	Grab	1	500 mL plastic + HNO3	x
4	LW34-CuTot-15.0-Ti	10/7/15	1630	SW	Grab	1	500 mL plastic + HNO3	x
5	LW34-CuTot-18.0-Ti	10/7/15	1632	SW	Grab	1	500 mL plastic + HNO3	x
6	LW34-CuTot-22.0-Ti	10/7/15	1634	SW	Grab	1	500 mL plastic + HNO3	x
7								
8								
9								
10								

Samples collected by: Alison Briden

Comments/Special Instruction:
Report of the maximum number of significant figures possible
MDL Reporting Format

RELINQUISHED BY:		**RECEIVED BY:**
Signature:	Alison Briden	**Signature:**
Print:	ALISON Briden	**Print:** Matthew Kerr
Organization:	PER	**Organization:** Caltest
Date:	10-26-15 **Time:** 0945	**Date:** 10-26-15 **Time:** 0945
RELINQUISHED BY:		**RECEIVED BY:**
Signature:		**Signature:** L. Gaeta
Print:	Matthew Kerr	**Print:** L. Gaeta
Organization:	Caltest	**Organization:** Caltest
Date:	10-26-15 **Time:** 354	**Date:** 10/26/15 **Time:** 1354

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

TEMP. (°C): 1.8
SEALED: Y
INTACT: Y

Q100833

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road	**Address:**	
	Fairfield, CA 94534		
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 1		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: Total Cu
1	RW-CuTot-0-Ti	10/7/15	1530	SW	Grab	1	500 mL plastic + HNO3	x
2	RW-CuTot-9.0-Ti	10/7/15	1533	SW	Grab	1	500 mL plastic + HNO3	x
3	RW-CuTot-12.0-Ti	10/7/15	1534	SW	Grab	1	500 mL plastic + HNO3	x
4	RW-CuTot-15.0-Ti	10/7/15	1535	SW	Grab	1	500 mL plastic + HNO3	x
5	RW-CuTot-18.0-Ti	10/7/15	1536	SW	Grab	1	500 mL plastic + HNO3	x
6	RW-CuTot-22.0-Ti	10/7/15	1537	SW	Grab	1	500 mL plastic + HNO3	x
7								
8								
9								
10								

Samples collected by: Alison Briden

Comments/Special Instruction:
Report of the maximum number of significant figures possible
MDL Reporting Format

RELINQUISHED BY:		**RECEIVED BY:**
Signature:	Alison Briden	**Signature:** Matthew Karr
Print:	Alison Briden	**Print:** Matthew Karr
Organization:	PER	**Organization:** Caltest
Date:	10-26-15 **Time:** 0945	**Date:** 10-26-15 **Time:** 0945
RELINQUISHED BY:		**RECEIVED BY:**
Signature:	Matthew Karr	**Signature:** L. Gaeta
Print:	Matthew Karr	**Print:** L. Gaeta
Organization:	Caltest	**Organization:** Caltest
Date:	10-26-15 **Time:** 1354	**Date:** 10/26/15 **Time:** 1354

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

TEMP. (°C): 4.8
SEALED: Y
INTACT: Y

Appendix E

Data Sheets and Summary of Statistical Analysis for Determination of Copper EC_{50} Values for Effluent, Receiving Water and Lab Waters Based on Nominal Copper Concentrations: Event 2

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	12-1839-2406	Test Type:	Development-Survival	Analyst:	Stevi Vasquez
Start Date:	12 Nov-15 16:25	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Effluent
Ending Date:	14 Nov-15 16:25	Species:	Mytilus galloprovincialis	Brine:	Tropic Marin
Duration:	48h	Source:	Taylor Shellfish Company	Age:	N/A

Sample ID:	01-6589-5116	Code:	Cu in EFF	Client:	City of Eureka
Sample Date:	10 Nov-15 10:50	Material:	Copper in Effluent	Project:	24828
Receive Date:	12 Nov-15 09:30	Source:	City of Eureka		
Sample Age:	54h (0.7 °C)	Station:	Copper in Effluent		

Batch Note: Nominal Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
02-5599-7053	Development Rate	82	117	97.95	1.11%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
00-1427-7828	Development Rate	EC5	124	122	126		Linear Regression (MLE)
		EC10	129	127	130		
		EC15	132	131	133		
		EC20	135	133	136		
		EC25	137	136	138		
		EC40	143	142	144		
		EC50	147	146	148		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Effluent Control	4	0.99	0.985	0.996	0.986	0.995	0.00182	0.00364	0.37%	0.0%
0	Salt Control	4	0.994	0.987	1	0.988	1	0.00242	0.00484	0.49%	-0.41%
57		4	0.986	0.98	0.993	0.981	0.99	0.00204	0.00408	0.41%	0.42%
82		4	0.99	0.984	0.995	0.986	0.994	0.00178	0.00355	0.36%	0.07%
117		4	0.959	0.949	0.968	0.95	0.963	0.00298	0.00596	0.62%	3.21%
138		4	0.747	0.706	0.787	0.726	0.778	0.0126	0.0253	3.39%	24.6%
162		4	0.152	0.101	0.203	0.118	0.189	0.0159	0.0318	20.9%	84.6%
190		4	0.00808	0	0.0167	0	0.0114	0.00271	0.00541	67.0%	99.2%
224		4	0	0	0	0	0	0	0		100.0%
280		4	0	0	0	0	0	0	0		100.0%
400		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Effluent Control	0.99	0.99	0.995	0.986
0	Salt Control	0.995	0.994	1	0.988
57		0.985	0.99	0.989	0.981
82		0.994	0.986	0.989	0.989
117		0.95	0.962	0.963	0.959
138		0.756	0.778	0.726	0.726
162		0.118	0.135	0.189	0.166
190		0.0114	0.0108	0	0.0102
224		0	0	0	0
280		0	0	0	0
400		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Effluent Control	203/205	201/203	195/196	211/214
0	Salt Control	190/191	179/180	196/196	167/169
57		194/197	192/194	181/183	206/210
82		177/178	208/211	181/183	184/186
117		171/180	201/209	184/191	188/196
138		149/197	154/198	143/197	159/219
162		22/187	26/192	35/185	32/193
190		2/175	2/186	0/176	2/197
224		0/27	0/18	0/21	0/23
280		0/1	0/1	0/1	0/1
400		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	02-5599-7053	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Nov-15 9:19	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.11%	82	117	97.95	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Effluent Control		57	1.04	2.45	0.047	6	0.4343	CDF	Non-Significant Effect
		82	0.191	2.45	0.047	6	0.7994	CDF	Non-Significant Effect
		117*	5.6	2.45	0.047	6	<0.0001	CDF	Significant Effect
		138*	22.4	2.45	0.047	6	<0.0001	CDF	Significant Effect
		162*	56	2.45	0.047	6	<0.0001	CDF	Significant Effect
		190*	72.2	2.45	0.047	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.87465	1.312442	6	1780	<0.0001	Significant Effect
Error	0.01547767	0.0007370318	21			
Total	7.890128		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.43	16.8	0.4901	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.97	0.897	0.5778	Normal Distribution

Development Rate Summary

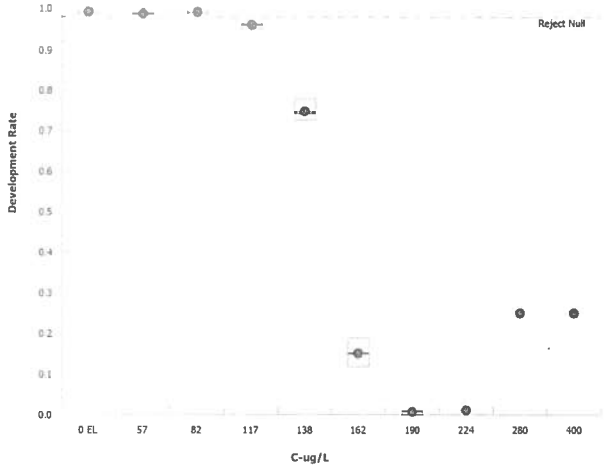
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Effluent Control	4	0.99	0.985	0.996	0.99	0.986	0.995	0.00182	0.37%	0.0%
57		4	0.986	0.98	0.993	0.987	0.981	0.99	0.00204	0.41%	0.42%
82		4	0.99	0.984	0.995	0.989	0.986	0.994	0.00178	0.36%	0.07%
117		4	0.959	0.949	0.968	0.96	0.95	0.963	0.00298	0.62%	3.21%
138		4	0.747	0.706	0.787	0.741	0.726	0.778	0.0126	3.39%	24.6%
162		4	0.152	0.101	0.203	0.151	0.118	0.189	0.0159	20.9%	84.6%
190		4	0.00808	0	0.0167	0.0105	0	0.0114	0.00271	67.0%	99.2%
224		4	0	0	0	0	0	0	0		100.0%
280		4	0	0	0	0	0	0	0		100.0%
400		4	0	0	0	0	0	0	0		100.0%

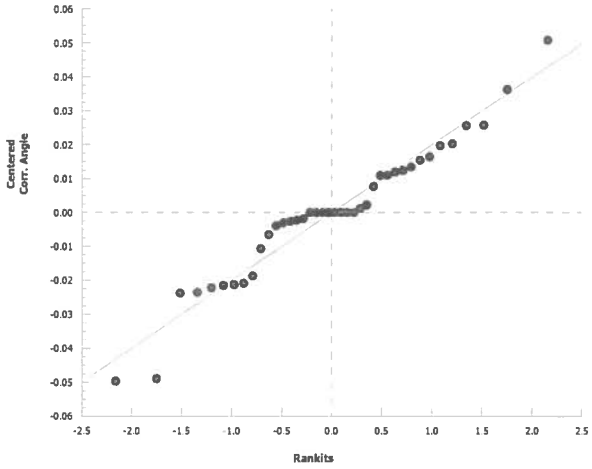
Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Effluent Control	4	1.47	1.44	1.5	1.47	1.45	1.5	0.00971	1.32%	0.0%
57		4	1.45	1.43	1.48	1.46	1.43	1.47	0.00861	1.18%	1.36%
82		4	1.47	1.44	1.5	1.47	1.45	1.5	0.00931	1.27%	0.25%
117		4	1.37	1.34	1.39	1.37	1.35	1.38	0.00731	1.07%	7.29%
138		4	1.04	0.997	1.09	1.04	1.02	1.08	0.0146	2.8%	29.2%
162		4	0.399	0.329	0.47	0.398	0.35	0.45	0.0222	11.1%	72.9%
190		4	0.0874	0.0345	0.14	0.102	0.0377	0.107	0.0166	38.0%	94.1%
224		4	0.107	0.0926	0.122	0.107	0.0964	0.118	0.00455	8.5%	92.7%
280		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.5%
400		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.5%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	02-5599-7053	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Nov-15 9:19	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	00-1427-7828	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 9:19	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	0.00978	Yes	No	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
13	-1100	2210	2220	2.17	0.0446	0.994	4.89	2.33	0.0009	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	124	122	126
EC10	129	127	130
EC15	132	131	133
EC20	135	133	136
EC25	137	136	138
EC40	143	142	144
EC50	147	146	148

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0135	0.00227	0.00909	0.018	5.96	<0.0001	Significant Parameter
Slope	22.4	0.785	20.9	23.9	28.5	<0.0001	Significant Parameter
Intercept	-48.6	1.71	-51.9	-45.2	-28.5	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4053.04	4053.04	1	6300	<0.0001	Significant
Lack of Fit	12.68419	1.812027	7	4.89	0.0009	Significant
Pure Error	11.12092	0.370697	30			
Residual	23.80511	0.643381	37			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	23.8	52.2	0.9542	Non-Significant Heterogenity
	Likelihood Ratio GOF	24.5	52.2	0.9421	Non-Significant Heterogenity
Variances	Mod Levene Equality of Variance	2.62	2.21	0.0229	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.933	0.945	0.0208	Non-normal Distribution
	Anderson-Darling A2 Normality	1.42	2.49	0.0006	Non-normal Distribution

Development Rate Summary

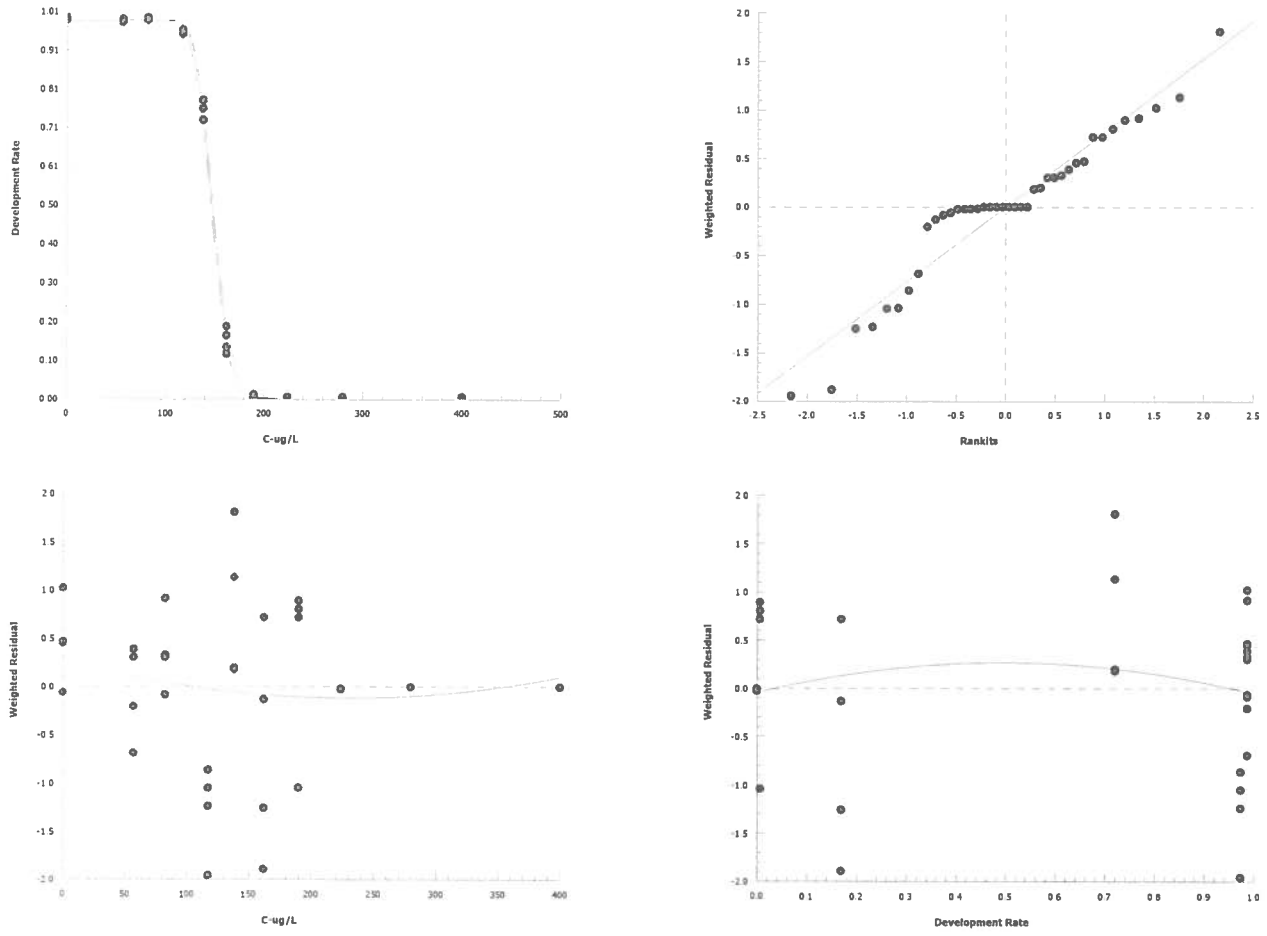
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Effluent Control	4	0.99	0.986	0.995	0.00182	0.00365	0.37%	0.0%	810	818
57		4	0.986	0.981	0.99	0.00204	0.00408	0.41%	0.42%	773	784
82		4	0.99	0.986	0.994	0.00178	0.00356	0.36%	0.07%	750	758
117		4	0.959	0.95	0.963	0.00298	0.00596	0.62%	3.21%	744	776
138		4	0.747	0.726	0.778	0.0126	0.0253	3.39%	24.6%	605	811
162		4	0.152	0.118	0.189	0.0159	0.0318	20.9%	84.6%	115	757
190		4	0.00808	0	0.0114	0.00271	0.00541	67.0%	99.2%	6	734
224		4	0	0	0	0	0		100.0%	0	89
280		4	0	0	0	0	0		100.0%	0	4
400		4	0	0	0	0	0		100.0%	0	4

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	00-1427-7828	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 9:19	Analysis:	Linear Regression (MLE)	Official Results:	Yes

Graphics

Log-Normal [NED=A+B*log(X)]



Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	05-4666-4208	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Nov-15 9:19	**Analysis:**	Parametric-Two Sample	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Angular (Corrected)	NA	C > T	NA	NA	0.77%	Passes development rate

Equal Variance t Two-Sample Test

Control	vs	Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Effluent Control		Salt Control	-1.36	1.94	0.035	6	0.8881	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001170698	0.001170698	1	1.84	0.2238	Non-Significant Effect
Error	0.003818956	0.0006364927	6			
Total	0.004989654		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.38	47.5	0.4952	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.935	0.645	0.5652	Normal Distribution

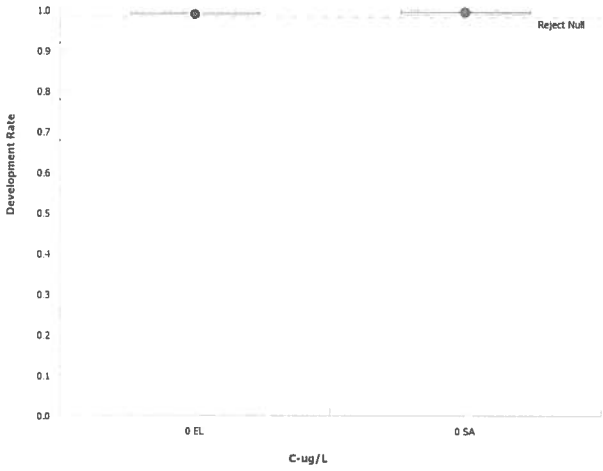
Development Rate Summary

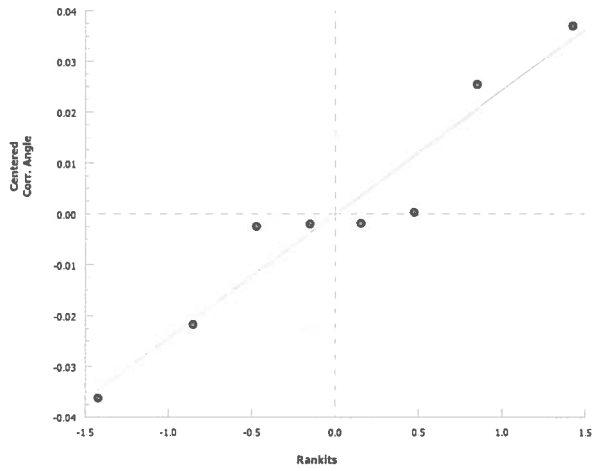
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Salt Control	4	0.994	0.987	1	0.995	0.988	1	0.00242	0.49%	0.0%
0	Effluent Control	4	0.99	0.985	0.996	0.99	0.986	0.995	0.00182	0.37%	0.41%

Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Salt Control	4	1.5	1.45	1.55	1.5	1.46	1.54	0.015	2.0%	0.0%
0	Effluent Control	4	1.47	1.44	1.5	1.47	1.45	1.5	0.00971	1.32%	1.62%

Graphics





Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Effluent
Test ID #: 65124
Project #: 24828

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/16/15
Investigator: VA

Treatment (µg/L Cu)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
0	A	203	2	205	99.0
	B	201	2	203	99.0
	C	195	1	196	99.5
	D	211	3	214	98.6
57	A	194	3	197	98.5
	B	192	2	194	99.0
	C	181	2	183	98.9
	D	206	4	210	98.1
82	A	177	1	178	99.4
	B	208	3	211	98.6
	C	181	2	183	98.9
	D	184	2	186	98.9
117	A	171	9	180	95.0
	B	201	8	209	96.2
	C	184	7	191	96.3
	D	188	8	196	95.9
138	A	149	48	197	75.6
	B	154	44	198	77.8
	C	143	54	197	72.6
	D	159	60	219	72.6
162	A	22	165	187	11.8
	B	26	166	192	13.5
	C	35	150	185	18.9
	D	32	161	193	16.6

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Effluent
Test ID #: 65124
Project #: 24828

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/16/15
Investigator: JA

190	A	2	173	175	1.1
	B	2	184	186	1.1
	C	0	176	176	0.0
	D	2	195	197	1.0
224	A	0	27	27	0.0
	B	0	18	18	0.0
	C	0	21	21	0.0
	D	0	23	23	0.0
280	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0
400	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Effluent
Test ID#: 65124 Project #: 24828
Test Date: 11/12/15 Randomization: —

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: Effluent

Day 0

Treatment (µg/L Cu)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.7	7.53	7.2	29.9	Sample ID: 40288
57	18.7	7.57	7.2	30.0	Test Solution Prep: SV
82	18.7	7.58	7.2	29.9	New WQ: SV
117	18.7	7.58	7.1	29.9	Inoculation Date: 11/12/15
138	18.7	7.59	7.1	30.0	Inoculation Time: 1625
162	18.7	7.59	7.2	30.0	Inoculation Signoff: SM
190	18.7	7.60	7.2	30.0	New WQ: —
224	18.7	7.60	7.1	29.9	
280	18.7	7.61	7.0	29.9	
400	18.7	7.62	7.1	29.9	
Meter ID	31A	pH22	RD11	EC09	

Day 1

Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.3				Date: 11/13/15
57	18.3				Old WQ: YJ
82	18.3				
117	18.3				
138	18.3				
162	18.3				
190	18.3				
224	18.3				
280	18.3				
400	18.3				
Meter ID	31A				

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Effluent
Test ID#: 65124 Project #: 24828
Test Date: 11/12/15 Randomization: —

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: Effluent

Day 2					
Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.8	7.89	6.4	30.0	Termination Date: 11/14/15
57	18.8	7.92	6.5	30.0	Termination Time: 1625
82	18.8	7.95	6.7	30.0	Termination Signoff: QD
117	18.8	7.93	6.8	30.0	Old WQ: POUB
138	18.8	7.93	6.8	30.0	
162	18.8	7.96	6.9	30.1	
190	18.8	7.93	6.9	30.0	
224	18.8	7.97	7.0	30.0	
280	18.8	7.99	7.2	30.1	
400	18.8	7.99	7.4	29.9	
Meter ID	31A	PH22	RD11	EC09	

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Effluent
Test ID #: 65124
Project #: 24828
Sample Salinity adjusted with : Tropic marin

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/16/15
Investigator: IA

Concentration	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Lab Water Control	A	203	5	208	97.6
	B	177	2	179	98.9
	C	182	1	183	99.5
	D	191	1	192	99.5
Salt Control	A	190	1	191	99.5
	B	179	1	180	99.4
	C	196	0	196	100.0
	D	167	2	169	98.8

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Effluent
Test ID#: 65124 Project #: 24828
Test Date: 11/12/15 Randomization: —
Sample Salinity adjusted with : Tropic Marin

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: Filtered Seawater @ 30 ppt

Day 0

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Lab Water Control	18.7	7.84	7.9	30.1	Date & Inoculation Time: 11/12/15 1625
Salt Control	18.7	8.24	7.4	30.5	Solution Prep/Inoculation: SVV / SM
Meter ID	31A	pH22	RD11	EC09	New WQ: SVV

Day 1

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Lab Water Control	18.3				Date: 11/13/15
Salt Control	18.3				Old WQ: VJ
Meter ID	31A				

Day 2

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Lab Water Control	18.8	7.83	~~FENS 8.5~~ 11-14-15 7.3	29.6	Date & Termination Time: 11/14/15 1625
Salt Control	18.8	7.87	7.4	30.0	Termination: CD
Meter ID	31A	pH22	RD11	EC09	Old WQ: FENS

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	10-8833-6133	Test Type:	Development-Survival	Analyst:	Stevi Vasquez
Start Date:	12 Nov-15 16:27	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	14 Nov-15 16:27	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Taylor Shellfish Company	Age:	N/A

Sample ID:	10-4598-2331	Code:	Cu in LW 30 ppt	Client:	City of Eureka
Sample Date:	12 Nov-15 11:00	Material:	Copper in Lab Water	Project:	24828
Receive Date:	12 Nov-15 11:00	Source:	City of Eureka		
Sample Age:	5h (18.7 °C)	Station:	Copper in Lab Water @ 30 ppt		

Batch Note: Nominal Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
04-9826-6212	Development Rate	6	9	7.348	1.48%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
08-5188-8659	Development Rate	EC5	10.9	10.6	11.3		Linear Regression (MLE)
		EC10	11.5	11.2	11.8		
		EC15	11.9	11.6	12.2		
		EC20	12.2	11.9	12.5		
		EC25	12.5	12.3	12.7		
		EC40	13.3	13	13.5		
		EC50	13.7	13.5	13.9		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Water Contr	4	0.99	0.986	0.995	0.989	0.995	0.00137	0.00275	0.28%	0.0%
3.6		4	0.995	0.984	1	0.985	1	0.00346	0.00691	0.7%	-0.44%
6		4	0.982	0.971	0.993	0.973	0.989	0.0034	0.0068	0.69%	0.88%
9		4	0.951	0.945	0.957	0.946	0.955	0.00186	0.00371	0.39%	3.99%
12		4	0.803	0.756	0.849	0.762	0.832	0.0146	0.0292	3.64%	18.9%
15		4	0.308	0.212	0.403	0.258	0.395	0.03	0.06	19.5%	68.9%
18		4	0.00151	0	0.0063	0	0.00602	0.00151	0.00301	200.0%	99.8%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	0.989	0.995	0.989	0.989
3.6		1	1	0.985	0.994
6		0.985	0.973	0.989	0.981
9		0.951	0.955	0.946	0.952
12		0.762	0.805	0.832	0.812
15		0.258	0.395	0.291	0.287
18		0	0	0.00602	0
22		0	0	0	0
30		0	0	0	0
50		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	179/181	184/185	188/190	179/181
3.6		160/160	186/186	202/205	171/172
6		195/198	178/183	173/175	208/212
9		174/183	170/178	193/204	158/166
12		154/202	149/185	163/196	147/181
15		51/198	60/152	53/182	58/202
18		0/147	0/149	1/166	0/154
22		0/133	0/124	0/137	0/129
30		0/1	0/1	0/1	0/1
50		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	04-9826-6212	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Nov-15 8:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.48%	6	9	7.348	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Water Control		3.6	-1.17	2.45	0.059	6	0.9922	CDF	Non-Significant Effect
		6	1.52	2.45	0.059	6	0.2430	CDF	Non-Significant Effect
		9*	5.21	2.45	0.059	6	<0.0001	CDF	Significant Effect
		12*	14.9	2.45	0.059	6	<0.0001	CDF	Significant Effect
		15*	36.6	2.45	0.059	6	<0.0001	CDF	Significant Effect
		18*	58.7	2.45	0.059	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.350037	1.225006	6	1040	<0.0001	Significant Effect
Error	0.02474939	0.001178542	21			
Total	7.374786		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	12.3	16.8	0.0562	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.929	0.897	0.0576	Normal Distribution

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Contr	4	0.99	0.986	0.995	0.989	0.989	0.995	0.00137	0.28%	0.0%
3.6		4	0.995	0.984	1	0.997	0.985	1	0.00346	0.7%	-0.44%
6		4	0.982	0.971	0.993	0.983	0.973	0.989	0.0034	0.69%	0.88%
9		4	0.951	0.945	0.957	0.951	0.946	0.955	0.00186	0.39%	3.99%
12		4	0.803	0.756	0.849	0.809	0.762	0.832	0.0146	3.64%	18.9%
15		4	0.308	0.212	0.403	0.289	0.258	0.395	0.03	19.5%	68.9%
18		4	0.00151	0	0.0063	0	0	0.00602	0.00151	200.0%	99.8%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

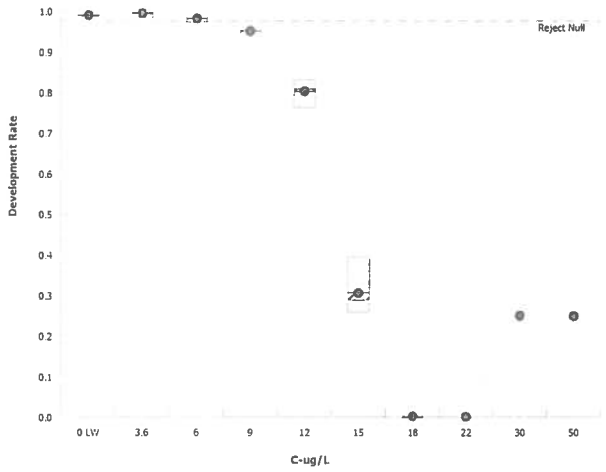
Angular (Corrected) Transformed Summary

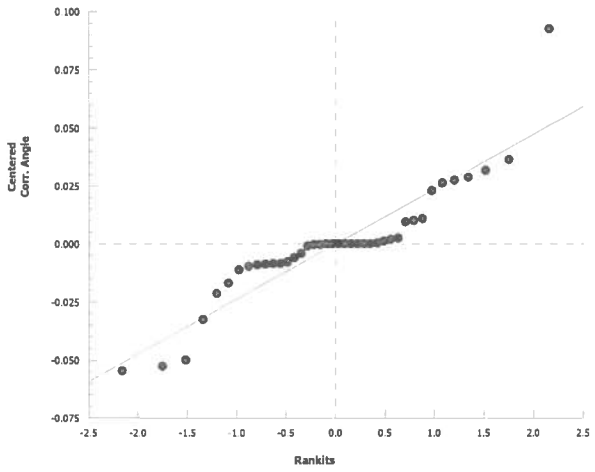
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Cont	4	1.47	1.45	1.5	1.47	1.47	1.5	0.00774	1.05%	0.0%
3.6		4	1.5	1.44	1.57	1.51	1.45	1.53	0.0198	2.63%	-1.92%
6		4	1.44	1.4	1.48	1.44	1.4	1.46	0.0125	1.74%	2.5%
9		4	1.35	1.33	1.36	1.35	1.34	1.36	0.00428	0.64%	8.58%
12		4	1.11	1.05	1.17	1.12	1.06	1.15	0.0181	3.26%	24.6%
15		4	0.587	0.485	0.689	0.568	0.532	0.679	0.032	10.9%	60.2%
18		4	0.0501	0.0207	0.0794	0.0411	0.0403	0.0777	0.00921	36.8%	96.6%
22		4	0.0438	0.0423	0.0453	0.0437	0.0427	0.0449	0.000468	2.14%	97.0%
30		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.5%
50		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.5%

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	04-9826-6212	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 8:52	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	08-5188-8659	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 8:52	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	0.009498	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
13	-1150	2310	2310	1.14	0.0599	0.98	11.6	2.33	0.0000	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	10.9	10.6	11.3
EC10	11.5	11.2	11.8
EC15	11.9	11.6	12.2
EC20	12.2	11.9	12.5
EC25	12.5	12.3	12.7
EC40	13.3	13	13.5
EC50	13.7	13.5	13.9

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0203	0.00383	0.0125	0.028	5.28	<0.0001	Significant Parameter
Slope	16.7	0.88	14.9	18.5	19	<0.0001	Significant Parameter
Intercept	-19	1.01	-21	-16.9	-18.8	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4024.563	4024.563	1	1880	<0.0001	Significant
Lack of Fit	57.93906	8.277009	7	11.6	<0.0001	Significant
Pure Error	21.32505	0.710835	30			
Residual	79.26411	2.142273	37			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	79.3	52.2	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	91.3	52.2	<0.0001	Significant Heterogenity
Variances	Mod Levene Equality of Variance	1.58	2.21	0.1668	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.946	0.945	0.0566	Normal Distribution
	Anderson-Darling A2 Normality	1.12	2.49	0.0063	Non-normal Distribution

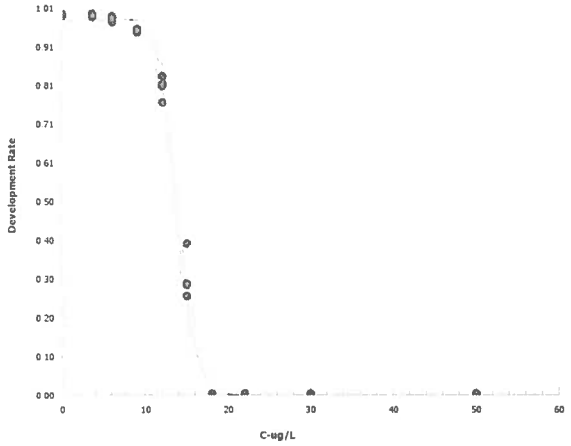
Development Rate Summary

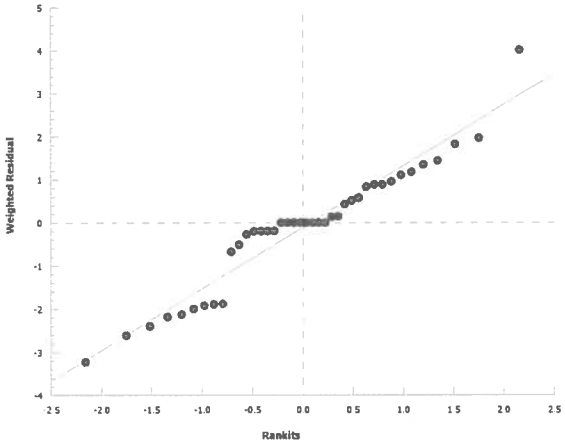
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Water Contr	4	0.99	0.989	0.995	0.00137	0.00274	0.28%	0.0%	730	737
3.6		4	0.995	0.985	1	0.00346	0.00691	0.7%	-0.44%	719	723
6		4	0.982	0.973	0.989	0.0034	0.0068	0.69%	0.88%	754	768
9		4	0.951	0.946	0.955	0.00186	0.00371	0.39%	3.99%	695	731
12		4	0.803	0.762	0.832	0.0146	0.0292	3.64%	18.9%	613	764
15		4	0.308	0.258	0.395	0.03	0.06	19.5%	68.9%	222	734
18		4	0.00151	0	0.00602	0.00151	0.00301	200.0%	99.8%	0	616
22		4	0	0	0	0	0		100.0%	0	523
30		4	0	0	0	0	0		100.0%	0	4
50		4	0	0	0	0	0		100.0%	0	4

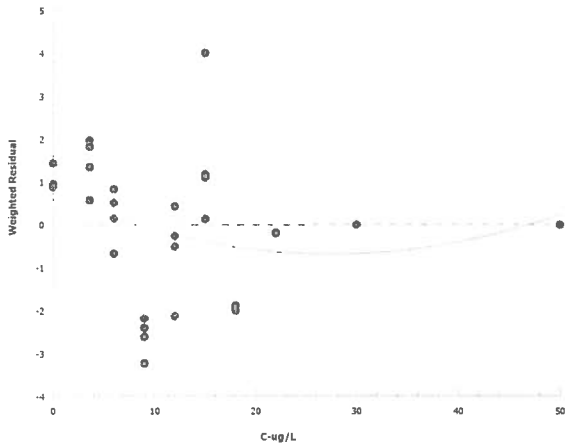
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	08-5188-8659	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 8:52	Analysis:	Linear Regression (MLE)	Official Results:	Yes

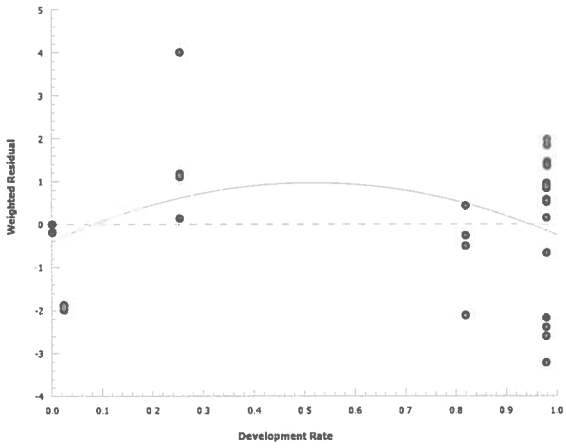
Graphics

Log-Normal [NED=A+B*log(X)]









Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in 30 ppt Lab Water
Test ID #: 65126
Project #: 24828

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/17/15
Investigator: ik

Treatment (µg/L Cu)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
0	A	179	2	181	98.9
	B	184	1	185	99.5
	C	188	2	190	98.9
	D	179	2	181	98.9
3.6	A	160	0	160	100.0
	B	186	0	186	100.0
	C	202	3	205	98.5
	D	171	1	172	99.4
6.0	A	195	3	198	98.5
	B	178	5	183	97.3
	C	173	2	175	98.9
	D	200	4	212	98.1
9.0	A	174	9	183	95.1
	B	170	8	178	95.5
	C	193	11	204	94.6
	D	158	8	SVV 11/19/15 ~~164~~ 166	SVV 11/19/15 ~~96.3~~ 95.2
12.0	A	154	48	202	76.2
	B	149	36	185	80.5
	C	163	33	SVV 11/19/15 ~~199~~ 196	SVV 11/19/15 ~~81.9~~ 83.2
	D	147	34	181	81.2
15.0	A	51	147	198	25.8
	B	60	92	152	39.5
	C	53	129	182	29.1
	D	58	144	202	28.7

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in 30 ppt Lab Water
Test ID #: 65126
Project #: 24828

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/17/15
Investigator: LA

18.0	A	0	147	147	0.0
	B	0	149	149	0.0
	C	1	165	166	SVV 11/19/15 ~~1.0 0.000~~ 0.6
	D	0	154	154	0.0
22.0	A	0	133	133	0.0
	B	0	124	124	0.0
	C	0	137	137	0.0
	D	0	129	129	0.0
30.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0
50.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in 30 ppt Lab Water
Test ID#: 65126 Project #: 24828
Test Date: 11/12/15 Randomization: —

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: 30 ppt Lab Water

Day 0

Treatment (µg/L Cu)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.7	7.84	7.9	30.1	Sample ID: 40304
3.6	18.7	7.86	7.8	30.2	Test Solution Prep: ~~AB~~
6.0	18.7	7.87	7.8	30.2	New WQ: 8VV
9.0	18.7	7.88	7.8	30.2	Inoculation Date: 11/12/15
12.0	18.7	7.88	7.8	30.2	Inoculation Time: 1627
15.0	18.7	7.88	7.8	30.2	Inoculation Signoff: SM
18.0	18.7	7.88	7.7	30.1	New WQ: —
22.0	18.7	7.88	7.8	30.1	
30.0	18.7	7.88	7.7	30.1	
50.0	18.7	7.88	7.8	30.1	
Meter ID	31A	pH22	RD11	EC09	

Day 1

Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.3				Date: 11/13/15
3.6	18.3				Old WQ: YJ
6.0	18.3				
9.0	18.3				
12.0	18.3				
15.0	18.3				
18.0	18.3				
22.0	18.3				
30.0	18.3				
50.0	18.3				
Meter ID	31A				

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in 30 ppt Lab Water
Test ID#: 65126 Project #: 24828
Test Date: 11/12/15 Randomization: —

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: 30 ppt Lab Water

Day 2					
Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.8	7.84	7.0	29.9	Termination Date: 11/14/15
3.6	18.8	7.88	7.4	30.2	Termination Time: 1627
6.0	18.8	7.88	7.5	30.2	Termination Signoff: CD
9.0	18.8	7.89	7.6	30.2	Old WQ: FOMS
12.0	18.8	7.89	7.6	30.2	
15.0	18.8	7.89	7.6	30.2	
18.0	18.8	7.89	7.6	30.2	
22.0	18.8	7.89	7.6	30.3	
30.0	18.8	7.89	7.6	30.2	
50.0	18.8	7.89	7.2	30.3	
Meter ID	31A	PH22	RDII	EC09	

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Batch ID:	20-5871-2036	Test Type:	Development-Survival	Analyst:	Stevi Vasquez
Start Date:	12 Nov-15 15:35	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Receiving Water
Ending Date:	14 Nov-15 15:35	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Taylor Shellfish Company	Age:	N/A

Sample ID:	05-4670-1586	Code:	Cu in RW	Client:	City of Eureka
Sample Date:	10 Nov-15 09:30	Material:	Copper in Site Water	Project:	24828
Receive Date:	12 Nov-15 09:30	Source:	City of Eureka		
Sample Age:	54h (0.4 °C)	Station:	Copper in Receiving Water		

Batch Note: Nominal Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
02-6137-0265	Development Rate	6	9	7.348	1.54%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
00-7232-5544	Development Rate	EC5	10.9	10.6	11.1		Linear Regression (MLE)
		EC10	11.4	11.2	11.6		
		EC15	11.8	11.6	12		
		EC20	12.1	11.9	12.3		
		EC25	12.4	12.2	12.6		
		EC40	13.1	13	13.3		
		EC50	13.6	13.5	13.7		

Development Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Site Water	4	0.99	0.979	1	0.983	0.995	0.00319	0.00638	0.65%	0.0%
3.6		4	0.991	0.981	1	0.986	1	0.00315	0.00629	0.64%	-0.14%
6		4	0.992	0.975	1	0.978	1	0.00516	0.0103	1.04%	-0.24%
9		4	0.954	0.932	0.976	0.934	0.966	0.00687	0.0137	1.44%	3.61%
12		4	0.797	0.767	0.827	0.778	0.822	0.0094	0.0188	2.36%	19.4%
15		4	0.262	0.231	0.293	0.24	0.288	0.00982	0.0196	7.49%	73.5%
18		4	0.0034	0	0.0142	0	0.0136	0.0034	0.0068	200.0%	99.7%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Site Water	0.983	0.985	0.995	0.995
3.6		1	0.986	0.989	0.989
6		1	0.978	1	0.989
9		0.966	0.934	0.957	0.959
12		0.778	0.822	0.799	0.79
15		0.259	0.288	0.24	0.261
18		0.0136	0	0	0
22		0	0	0	0
30		0	0	0	0
50		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Site Water	173/176	199/202	203/204	195/196
3.6		197/197	205/208	177/179	181/183
6		198/198	182/186	216/216	180/182
9		169/175	184/197	178/186	185/193
12		154/198	162/197	151/189	147/186
15		42/162	51/177	44/183	47/180
18		2/147	0/153	0/171	0/160
22		0/130	0/141	0/164	0/166
30		0/1	0/1	0/1	0/1
50		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	02-6137-0265	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Nov-15 9:29	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.54%	6	9	7.348	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Site Water		3.6	-0.274	2.45	0.063	6	0.9185	CDF	Non-Significant Effect
		6	-0.714	2.45	0.063	6	0.9719	CDF	Non-Significant Effect
		9*	4.56	2.45	0.063	6	0.0005	CDF	Significant Effect
		12*	14.4	2.45	0.063	6	<0.0001	CDF	Significant Effect
		15*	36.6	2.45	0.063	6	<0.0001	CDF	Significant Effect
		18*	55.4	2.45	0.063	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.579384	1.263231	6	970	<0.0001	Significant Effect
Error	0.02734605	0.001302193	21			
Total	7.60673		27			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.2	16.8	0.7838	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.956	0.897	0.2867	Normal Distribution

Development Rate Summary

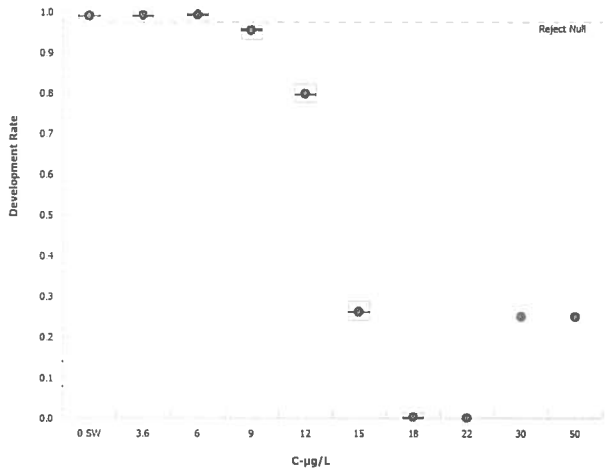
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Site Water	4	0.99	0.979	1	0.99	0.983	0.995	0.00319	0.65%	0.0%
3.6		4	0.991	0.981	1	0.989	0.986	1	0.00315	0.64%	-0.14%
6		4	0.992	0.975	1	0.995	0.978	1	0.00516	1.04%	-0.24%
9		4	0.954	0.932	0.976	0.958	0.934	0.966	0.00687	1.44%	3.61%
12		4	0.797	0.767	0.827	0.795	0.778	0.822	0.0094	2.36%	19.4%
15		4	0.262	0.231	0.293	0.26	0.24	0.288	0.00982	7.49%	73.5%
18		4	0.0034	0	0.0142	0	0	0.0136	0.0034	200.0%	99.7%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

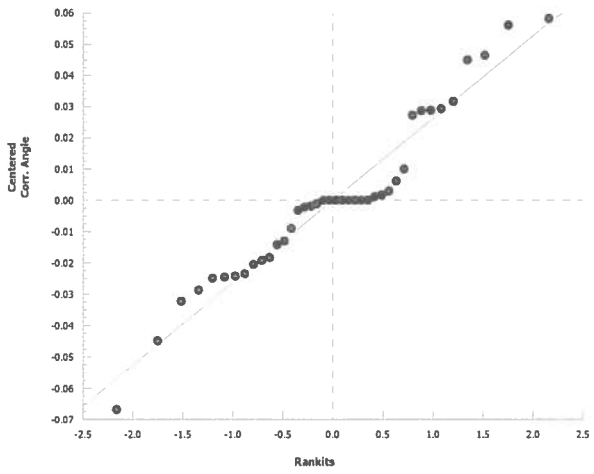
Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Site Water	4	1.47	1.42	1.52	1.47	1.44	1.5	0.0162	2.2%	0.0%
3.6		4	1.48	1.42	1.54	1.47	1.45	1.54	0.019	2.57%	-0.48%
6		4	1.49	1.4	1.58	1.5	1.42	1.54	0.0277	3.72%	-1.24%
9		4	1.36	1.31	1.41	1.36	1.31	1.38	0.0157	2.32%	7.9%
12		4	1.1	1.07	1.14	1.1	1.08	1.14	0.0118	2.13%	25.0%
15		4	0.537	0.502	0.573	0.535	0.512	0.567	0.0111	4.14%	63.5%
18		4	0.0588	-0.0029	0.12	0.04	0.0382	0.117	0.0194	65.9%	96.0%
22		4	0.041	0.0371	0.0449	0.0406	0.0388	0.0439	0.00123	5.98%	97.2%
30		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.4%
50		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.4%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	02-6137-0265	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	19 Nov-15 9:29	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID: 00-7232-5544 Endpoint: Development Rate CETIS Version: CETISv1.8.7
Analyzed: 19 Nov-15 9:29 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	0.010283	Yes	No	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
14	-1090	2190	2200	1.13	0.0589	0.983	8.11	2.33	0.0000	Significant Lack of Fit

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	10.9	10.6	11.1
EC10	11.4	11.2	11.6
EC15	11.8	11.6	12
EC20	12.1	11.9	12.3
EC25	12.4	12.2	12.6
EC40	13.1	13	13.3
EC50	13.6	13.5	13.7

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0176	0.0024	0.0128	0.0223	7.32	<0.0001	Significant Parameter
Slope	17	0.612	15.8	18.2	27.8	<0.0001	Significant Parameter
Intercept	-19.2	0.699	-20.6	-17.9	-27.5	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4312.258	4312.258	1	2260	<0.0001	Significant
Lack of Fit	46.29449	6.613498	7	8.11	<0.0001	Significant
Pure Error	24.4511	0.815037	30			
Residual	70.74558	1.912043	37			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Collapsed Chi-Sq GOF	9.11	11.1	0.1049	Non-Significant Heterogenity
	Likelihood Ratio GOF	79.2	52.2	<0.0001	Significant Heterogenity
Variances	Mod Levene Equality of Variance	1.64	2.21	0.1474	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.902	0.945	0.0022	Non-normal Distribution
	Anderson-Darling A2 Normality	1.29	2.49	0.0019	Non-normal Distribution

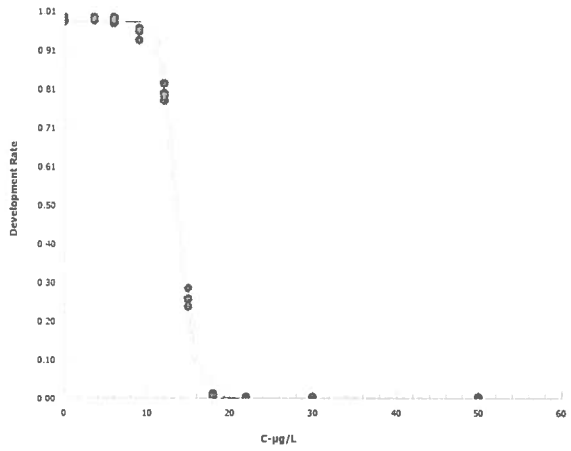
Development Rate Summary

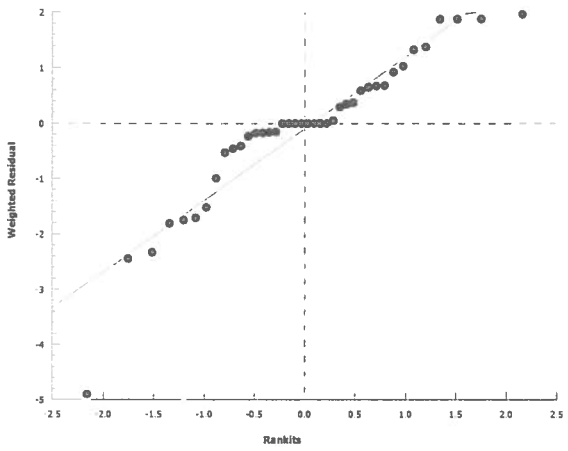
			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Site Water	4	0.99	0.983	0.995	0.00319	0.00639	0.65%	0.0%	770	778
3.6		4	0.991	0.986	1	0.00315	0.00629	0.64%	-0.14%	760	767
6		4	0.992	0.978	1	0.00516	0.0103	1.04%	-0.24%	776	782
9		4	0.954	0.934	0.966	0.00687	0.0137	1.44%	3.61%	716	751
12		4	0.797	0.778	0.822	0.0094	0.0188	2.36%	19.4%	614	770
15		4	0.262	0.24	0.288	0.00982	0.0196	7.49%	73.5%	184	702
18		4	0.0034	0	0.0136	0.0034	0.0068	200.0%	99.7%	2	631
22		4	0	0	0	0	0		100.0%	0	601
30		4	0	0	0	0	0		100.0%	0	4
50		4	0	0	0	0	0		100.0%	0	4

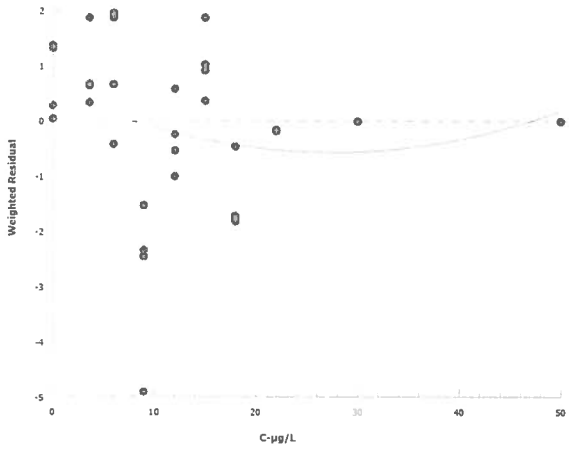
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	00-7232-5544	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 9:29	Analysis:	Linear Regression (MLE)	Official Results:	Yes

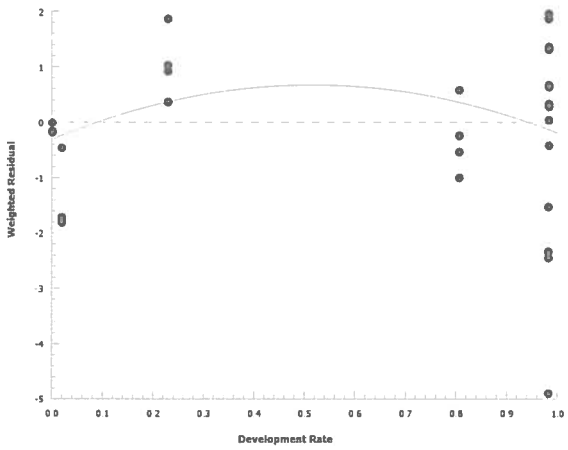
Graphics

Log-Normal [NED=A+B*log(X)]









Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Receiving Water
Test ID #: 65125
Project #: 24828

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/16/15
Investigator: IA

Treatment (µg/L Cu)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
0	A	173	3	176	98.3
	B	199	3	202	98.5
	C	203	1	204	99.5
	D	195	1	196	99.5
3.6	A	197	0	197	100.0
	B	205	3	208	98.6
	C	177	2	179	98.9
	D	181	2	183	98.9
6.0	A	198	0	198	100.0
	B	182	4	186	97.8
	C	216	0	216	100.0
	D	180	2	182	98.9
9.0	A	169	6	175	96.6
	B	184	13	197	93.4
	C	178	8	186	95.7
	D	185	8	193	95.9
12.0	A	154	44	198	77.8
	B	162	35	197	82.2
	C	151	38	189	79.9
	D	147	39	186	79.0
15.0	A	42	120	162	25.9
	B	51	126	177	28.8
	C	44	139	183	24.0
	D	47	133	180	26.1

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in Receiving Water
Test ID #: 65125
Project #: 24828

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/16/15
Investigator: CA

18.0	A	2	145	147	1.4
	B	0	153	153	0.0
	C	0	171	171	0.0
	D	0	160	160	0.0
22.0	A	0	130	130	0.0
	B	0	141	141	0.0
	C	0	164	164	0.0
	D	0	166	166	0.0
30.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0
50.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Receiving Water
Test ID#: 65125 Project #: 24828
Test Date: 11/12/15 Randomization: –

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: Receiving Water

Day 0

Treatment (µg/L Cu)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.7	7.81	7.6	34.1	Sample ID: 40287
3.6	18.7	7.84	7.6	34.1	Test Solution Prep: SVV
6.0	18.7	7.84	7.6	34.1	New WQ: SVV
9.0	18.7	7.84	7.6	34.2	Inoculation Date: 11/12/15
12.0	18.7	7.85	7.6	34.1	Inoculation Time: 1535
15.0	18.7	7.84	7.6	34.2	Inoculation Signoff: SM
18.0	18.7	7.84	7.5	34.2	New WQ: –
22.0	18.7	7.84	7.6	34.1	
30.0	18.7	7.83	7.5	34.1	
50.0	18.7	7.83	7.5	34.1	
Meter ID	31A	pH22	RD11	EC09	

Day 1

Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.3				Date: 11/13/15
3.6	18.3				Old WQ: YJ
6.0	18.3				
9.0	18.3				
12.0	18.3				
15.0	18.3				
18.0	18.3				
22.0	18.3				
30.0	18.3				
50.0	18.3				
Meter ID	31A				

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in Receiving Water
Test ID#: 65125 Project #: 24828
Test Date: 11/12/15 Randomization: —

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: Receiving Water

Day 2					
Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.8	7.86	6.6	33.9	Termination Date: 11/14/15
3.6	18.8	7.90	7.2	34.1	Termination Time: 1535
6.0	18.8	7.90	7.2	34.0	Termination Signoff:
9.0	18.8	7.91	7.3	34.0	Old WQ: FOUS
12.0	18.8	7.91	7.4	34.0	
15.0	18.8	7.91	7.4	34.0	
18.0	18.8	7.91	7.4	34.0	
22.0	18.8	7.91	7.4	34.0	
30.0	18.8	7.91	7.3	34.0	
50.0	18.8	7.92	7.3	34.1	
Meter ID	31A	PH22	R011	ECO9	

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Lab Water Control
Test ID #: 65125
Project #: 24828
Sample Salinity adjusted with : –

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/16/15
Investigator: IA

Concentration	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Control	A	181	2	183	98.9
	B	209	0	209	100.0
	C	205	2	207	99.0
	D	204	2	206	99.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Lab Water Control
Test ID#: 65125 Project #: 24828
Test Date: 11/12/15 Randomization: —
Sample Salinity adjusted with : —

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: FSW @30ppt
Light Intensity —

Day 0

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.7	7.84	7.9	30.1	Date & Inoculation Time: 11/12/15 1535
					Solution Prep/Inoculation: SV / SM
Meter ID	31A	pH22	RD11	EC09	New WQ: SV

Day 1

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.3				Date: 11/13/15
					Old WQ: YJ
Meter ID	31A				

Day 2

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.8	7.84	7.0	30.3	Date: 11/14/15/1535
					Termination: Re
Meter ID	31A	pH22	RD11	EC09	Old WQ: FOUB

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	08-9818-5657	Test Type:	Development-Survival	Analyst:	Stevi Vasquez
Start Date:	12 Nov-15 15:37	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Water
Ending Date:	14 Nov-15 15:37	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Taylor Shellfish Company	Age:	N/A

Sample ID:	04-8878-8674	Code:	Cu in LW 34 ppt	Client:	City of Eureka
Sample Date:	12 Nov-15 11:15	Material:	Copper in Lab Water	Project:	24828
Receive Date:	12 Nov-15 11:15	Source:	City of Eureka		
Sample Age:	4h (18.7 °C)	Station:	Copper in Lab Water @ 34 ppt		

Batch Note: Nominal Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
19-4468-0441	Development Rate	6	9	7.348	1.22%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
16-7198-2528	Development Rate	EC5	8.58	8.39	8.75		Linear Regression (MLE)
		EC10	9.08	8.91	9.23		
		EC15	9.43	9.27	9.57		
		EC20	9.71	9.57	9.85		
		EC25	9.97	9.83	10.1		
		EC40	10.6	10.5	10.8		
		EC50	11.1	10.9	11.2		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Water Contr	4	0.992	0.987	0.997	0.989	0.995	0.00157	0.00314	0.32%	0.0%
3.6		4	0.996	0.992	1	0.995	1	0.00123	0.00247	0.25%	-0.4%
6		4	0.991	0.978	1	0.98	1	0.00429	0.00858	0.87%	0.12%
9		4	0.88	0.845	0.915	0.861	0.911	0.011	0.022	2.49%	11.3%
12		4	0.356	0.289	0.424	0.299	0.401	0.0212	0.0424	11.9%	64.1%
15		4	0.0014	0	0.00587	0	0.00562	0.0014	0.00281	200.0%	99.9%
18		4	0	0	0	0	0	0	0		100.0%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	0.995	0.989	0.99	0.995
3.6		1	0.995	0.996	0.995
6		0.99	0.995	0.98	1
9		0.911	0.861	0.868	0.882
12		0.299	0.366	0.359	0.401
15		0.00562	0	0	0
18		0	0	0	0
22		0	0	0	0
30		0	0	0	0
50		0	0	0	0

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	214/215	180/182	207/209	190/191
3.6		205/205	203/204	237/238	184/185
6		196/198	197/198	195/199	199/199
9		173/190	167/194	171/197	187/212
12		61/204	70/191	65/181	81/202
15		1/178	0/182	0/192	0/157
18		0/185	0/182	0/172	0/168
22		0/109	0/81	0/144	0/125
30		0/1	0/1	0/1	0/1
50		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID: 19-4468-0441 Endpoint: Development Rate CETIS Version: CETISv1.8.7
Analyzed: 19 Nov-15 8:39 Analysis: Parametric-Control vs Treatments Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.22%	6	9	7.348	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Lab Water Control		3.6	-1.1	2.41	0.055	6	0.9868	CDF	Non-Significant Effect
		6	0.0639	2.41	0.055	6	0.8138	CDF	Non-Significant Effect
		9*	11.7	2.41	0.055	6	<0.0001	CDF	Significant Effect
		12*	37	2.41	0.055	6	<0.0001	CDF	Significant Effect
		15*	63	2.41	0.055	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.161836	1.432367	5	1370	<0.0001	Significant Effect
Error	0.01875492	0.00104194	18			
Total	7.180591		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.19	15.1	0.3934	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.961	0.884	0.4490	Normal Distribution

Development Rate Summary

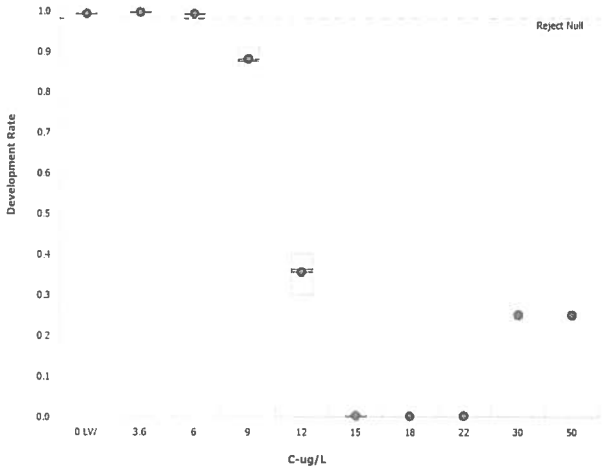
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Contr	4	0.992	0.987	0.997	0.993	0.989	0.995	0.00157	0.32%	0.0%
3.6		4	0.996	0.992	1	0.995	0.995	1	0.00123	0.25%	-0.4%
6		4	0.991	0.978	1	0.992	0.98	1	0.00429	0.87%	0.12%
9		4	0.88	0.845	0.915	0.875	0.861	0.911	0.011	2.49%	11.3%
12		4	0.356	0.289	0.424	0.363	0.299	0.401	0.0212	11.9%	64.1%
15		4	0.0014	0	0.00587	0	0	0.00562	0.0014	200.0%	99.9%
18		4	0	0	0	0	0	0	0		100.0%
22		4	0	0	0	0	0	0	0		100.0%
30		4	0	0	0	0	0	0	0		100.0%
50		4	0	0	0	0	0	0	0		100.0%

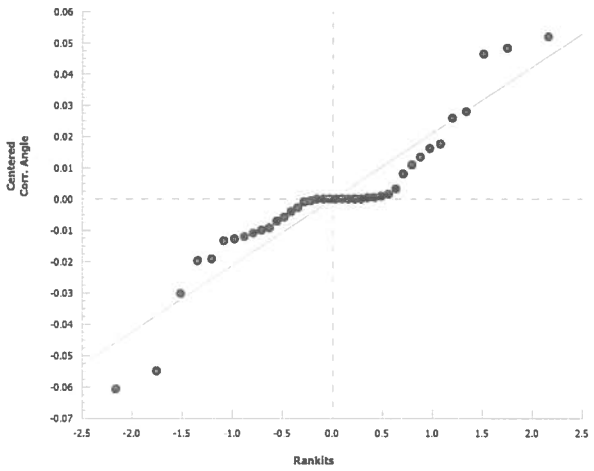
Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Water Cont	4	1.48	1.46	1.51	1.49	1.47	1.5	0.00915	1.23%	0.0%
3.6		4	1.51	1.48	1.54	1.5	1.5	1.54	0.00883	1.17%	-1.69%
6		4	1.48	1.41	1.56	1.48	1.43	1.54	0.0226	3.05%	0.1%
9		4	1.22	1.16	1.27	1.21	1.19	1.27	0.0174	2.86%	17.9%
12		4	0.639	0.568	0.71	0.646	0.579	0.686	0.0223	6.98%	56.9%
15		4	0.047	0.0172	0.0768	0.0385	0.0361	0.075	0.00937	39.8%	96.8%
18		4	0.0376	0.0363	0.039	0.0376	0.0368	0.0386	0.00043	2.29%	97.5%
22		4	0.0475	0.038	0.057	0.0463	0.0417	0.0556	0.00299	12.6%	96.8%
30		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.7%
50		4	0.524	0.523	0.524	0.524	0.524	0.524	0	0.0%	64.7%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	19-4468-0441	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 8:39	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	16-7198-2528	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 8:39	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	0.007528	Yes	No	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
8	-924	1850	1860	1.04	0.0672	0.989	8.53	2.33	0.0000	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	8.58	8.39	8.75
EC10	9.08	8.91	9.23
EC15	9.43	9.27	9.57
EC20	9.71	9.57	9.85
EC25	9.97	9.83	10.1
EC40	10.6	10.5	10.8
EC50	11.1	10.9	11.2

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.00698	0.00169	0.00367	0.0103	4.13	0.0002	Significant Parameter
Slope	14.9	0.48	13.9	15.8	31	<0.0001	Significant Parameter
Intercept	-15.5	0.507	-16.5	-14.5	-30.6	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	4689.711	4689.711	1	3370	<0.0001	Significant
Lack of Fit	34.2822	4.897457	7	8.53	<0.0001	Significant
Pure Error	17.22786	0.574262	30			
Residual	51.51006	1.392164	37			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	51.5	52.2	0.0569	Non-Significant Heterogenity
	Likelihood Ratio GOF	65.9	52.2	0.0024	Significant Heterogenity
Variances	Mod Levene Equality of Variance	3.22	2.21	0.0076	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.912	0.945	0.0044	Non-normal Distribution
	Anderson-Darling A2 Normality	1.7	2.49	<0.0001	Non-normal Distribution

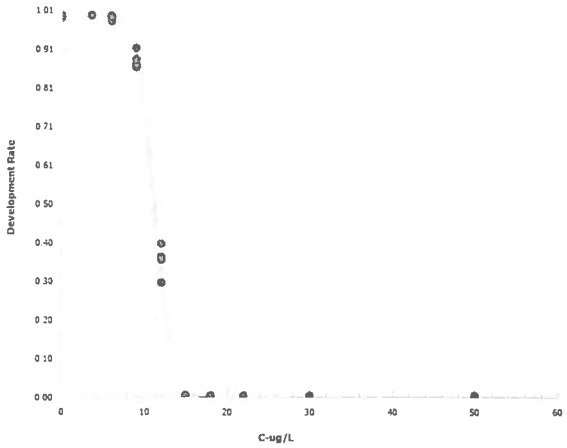
Development Rate Summary

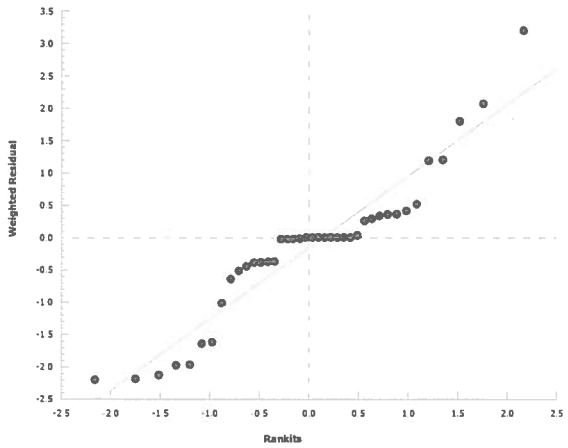
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Water Contr	4	0.992	0.989	0.995	0.00157	0.00314	0.32%	0.0%	791	797
3.6		4	0.996	0.995	1	0.00123	0.00247	0.25%	-0.4%	829	832
6		4	0.991	0.98	1	0.00429	0.00858	0.87%	0.12%	787	794
9		4	0.88	0.861	0.911	0.011	0.022	2.49%	11.3%	698	793
12		4	0.356	0.299	0.401	0.0212	0.0424	11.9%	64.1%	277	778
15		4	0.0014	0	0.00562	0.0014	0.00281	200.0%	99.9%	1	709
18		4	0	0	0	0	0		100.0%	0	707
22		4	0	0	0	0	0		100.0%	0	459
30		4	0	0	0	0	0		100.0%	0	4
50		4	0	0	0	0	0		100.0%	0	4

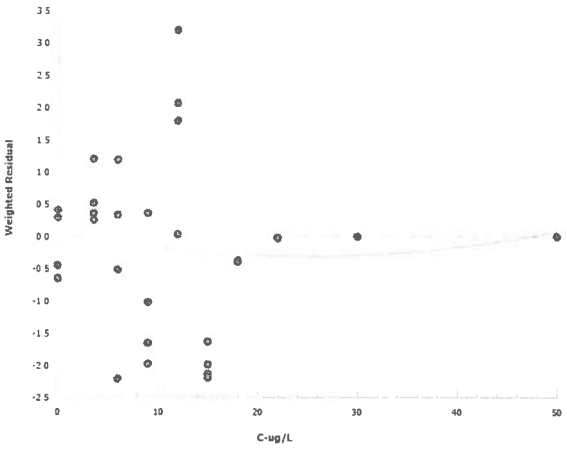
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	16-7198-2528	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	19 Nov-15 8:39	Analysis:	Linear Regression (MLE)	Official Results:	Yes

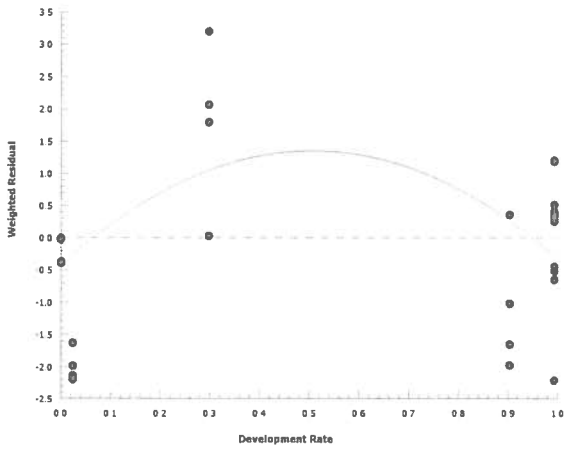
Graphics

Log-Normal [NED=A+B*log(X)]









Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in 34 ppt Lab Water
Test ID #: 65127
Project #: 24828

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/17/15
Investigator: JA

Treatment (µg/L Cu)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
0	A	214	1	215	99.5
	B	180	2	182	98.9
	C	207	2	209	99.0
	D	190	1	191	99.5
3.6	A	205	0	205	100.0
	B	203	1	204	99.5
	C	237	1	238	99.6
	D	184	1	185	99.5
6.0	A	196	2	198	99.0
	B	197	1	198	99.5
	C	195	4	199	98.0
	D	199	0	199	100.0
9.0	A	173	17	190	91.1
	B	167	27	194	86.1
	C	171	26	197	86.8
	D	187	25	212	88.2
12.0	A	61	143	204	29.9
	B	70	121	191	36.6
	C	65	116	181	35.9
	D	81	121	202	40.1
15.0	A	1	177	178	SVV 11/19/15 0.6 ~~0.006~~
	B	0	182	182	0.0
	C	0	192	192	0.0
	D	0	157	157	0.0

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Cu in 34 ppt Lab Water
Test ID #: 65127
Project #: 24828

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/17/15
Investigator: CA

18.0	A	0	185	185	0.0
	B	0	182	182	0.0
	C	0	172	172	0.0
	D	0	168	168	0.0
22.0	A	0	109	109	0.0
	B	0	81	81	0.0
	C	0	144	144	0.0
	D	0	125	125	0.0
30.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0
50.0	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in 34 ppt Lab Water
Test ID#: 65127 Project #: 24828
Test Date: 11/12/15 Randomization: —

Organism Log#: SVV 915 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: 34 ppt Lab Water

Day 0

Treatment (µg/L Cu)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.7	7.83	7.7	34.0	Sample ID: 40305
3.6	18.7	7.89	7.7	34.0	Test Solution Prep: AB
6.0	18.7	7.89	7.7	34.1	New WQ: SVV
9.0	18.7	7.89	7.8	34.0	Inoculation Date: 11/12/15
12.0	18.7	7.89	7.7	34.1	Inoculation Time: 1537
15.0	18.7	7.89	7.7	34.1	Inoculation Signoff: SM
18.0	18.7	7.90	7.7	34.0	New WQ: —
22.0	18.7	7.89	7.7	34.0	
30.0	18.7	7.89	7.6	34.0	
50.0	18.7	7.89	7.6	34.0	
Meter ID	31A	pH22	RDO1	EC09	

Day 1

Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.3				Date: 11/13/15
3.6	18.3				Old WQ: YJ
6.0	18.3				
9.0	18.3				
12.0	18.3				
15.0	18.3				
18.0	18.3				
22.0	18.3				
30.0	18.3				
50.0	18.3				
Meter ID	31A				

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Cu in 34 ppt Lab Water
Test ID#: 65127 Project #: 24828
Test Date: 11/12/15 Randomization: —

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: 34 ppt Lab Water

Day 2					
Treatment (%)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
0	18.8	7.84	6.7	34.1	Termination Date: 11/14/15
3.6	18.8	7.88	7.2	34.1	Termination Time: 1537
6.0	18.8	7.90	7.4	34.2	Termination Signoff: Le
9.0	18.8	7.89	7.4	34.2	Old WQ: POOR
12.0	18.8	7.90	7.5	34.2	
15.0	18.8	7.90	7.5	34.1	
18.0	18.8	7.90	7.5	34.2	
22.0	18.8	7.90	7.5	34.2	
30.0	18.8	7.91	7.5	34.1	
50.0	18.8	7.92	~~8.21~~ 7.6	34.3	
Meter ID	31A	pH22	RDO11	EC09	

Mytilus sp. Development Toxicity Test Count Data

Client: **City of Eureka Cu WER**
Test Material: Lab Water Control
Test ID #: 65127
Project #: 24828
Sample Salinity adjusted with : —

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/17/15
Investigator: CA

Concentration	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Control	A	206	1	207	99.5
	B	213	0	213	100.0
	C	180	3	183	98.4
	D	231	1	232	99.6

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: City of Eureka Cu WER
Test Material: Lab Water Control
Test ID#: 65127 Project #: 24828
Test Date: 11/12/15 Randomization: —
Sample Salinity adjusted with: —

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co.
Control/Diluent: FSW @ 30ppt
Light Intensity —

Day 0

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.7	7.84	7.9	30.1	Date & Inoculation Time: 11/12/15 1537
					Solution Prep/Inoculation: SVV/SM
Meter ID	31A	pH22	RD11	EC09	New WQ: SVV

Day 1

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.3				Date: 11/13/15
					Old WQ: YJ
Meter ID	31A				

Day 2

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.8	7.83	7.0	30.4	Date: 11/14/15/1537
					Termination: JL
Meter ID	31A	pH22	RD11	EC09	Old WQ: FOVS

Appendix F

Summary of Statistical Analysis for Determination of Copper EC_{50} Values for Effluent, Receiving Water and Lab Waters Based on Measured Total Copper Concentrations: Event 2

CETIS Summary Report

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Batch ID:	14-9100-9818	**Test Type:**	Development-Survival	**Analyst:**	Stevi Vasquez
Start Date:	12 Nov-15 16:25	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Effluent
Ending Date:	14 Nov-15 16:25	**Species:**	Mytilus galloprovincialis	**Brine:**	Tropic Marin
Duration:	48h	**Source:**	Taylor Shellfish Company	**Age:**	N/A

Sample ID:	06-9660-6789	**Code:**	Cu in EFF	**Client:**	City of Eureka
Sample Date:	10 Nov-15 10:50	**Material:**	Copper in Effluent	**Project:**	24828
Receive Date:	12 Nov-15 09:30	**Source:**	City of Eureka		
Sample Age:	54h (0.7 °C)	**Station:**	Copper in Effluent		

Batch Note: Total Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-0254-4157	Development Rate	97.6	126	110.9	1.15%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
10-2387-8515	Development Rate	EC5	123	120	126		Linear Regression (MLE)
		EC10	126	123	129		
		EC15	129	126	131		
		EC20	130	128	132		
		EC25	132	130	134		
		EC40	136	134	138		
		EC50	138	136	141		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
24.3	Effluent Control	4	0.99	0.985	0.996	0.986	0.995	0.00182	0.00364	0.37%	0.0%
97.6		4	0.99	0.984	0.995	0.986	0.994	0.00178	0.00355	0.36%	0.07%
126		4	0.959	0.949	0.968	0.95	0.963	0.00298	0.00596	0.62%	3.21%
130		4	0.747	0.706	0.787	0.726	0.778	0.0126	0.0253	3.39%	24.6%
148		4	0.152	0.101	0.203	0.118	0.189	0.0159	0.0318	20.9%	84.6%
176		4	0.00808	0	0.0167	0	0.0114	0.00271	0.00541	67.0%	99.2%
199		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
24.3	Effluent Control	0.99	0.99	0.995	0.986
97.6		0.994	0.986	0.989	0.989
126		0.95	0.962	0.963	0.959
130		0.756	0.778	0.726	0.726
148		0.118	0.135	0.189	0.166
176		0.0114	0.0108	0	0.0102
199		0	0	0	0

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
24.3	Effluent Control	203/205	201/203	195/196	211/214
97.6		177/178	208/211	181/183	184/186
126		171/180	201/209	184/191	188/196
130		149/197	154/198	143/197	159/219
148		22/187	26/192	35/185	32/193
176		2/175	2/186	0/176	2/197
199		0/27	0/18	0/21	0/23

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	14-0254-4157	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 14:08	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.15%	97.6	126	110.9	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
24.3		97.6	0.182	2.41	0.049	6	0.7743	CDF	Non-Significant Effect
24.3		126*	5.34	2.41	0.049	6	0.0001	CDF	Significant Effect
24.3		130*	21.4	2.41	0.049	6	<0.0001	CDF	Significant Effect
24.3		148*	53.4	2.41	0.049	6	<0.0001	CDF	Significant Effect
24.3		176*	68.9	2.41	0.049	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.083622	1.416724	5	1750	<0.0001	Significant Effect
Error	0.01458803	0.0008104463	18			
Total	7.098209		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.51	15.1	0.4784	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.971	0.884	0.7033	Normal Distribution

Development Rate Summary

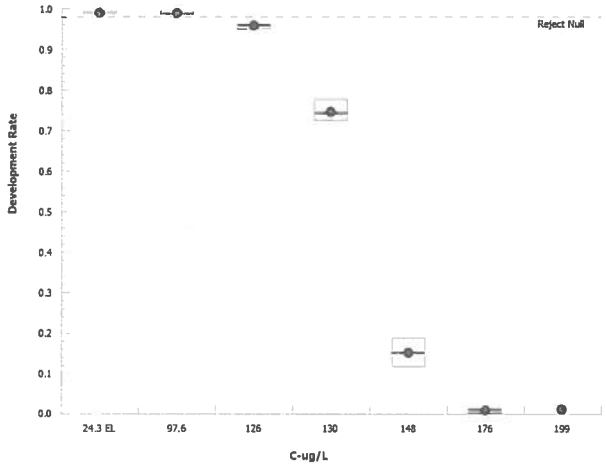
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
24.3	Effluent Control	4	0.99	0.985	0.996	0.99	0.986	0.995	0.00182	0.37%	0.0%
97.6		4	0.99	0.984	0.995	0.989	0.986	0.994	0.00178	0.36%	0.07%
126		4	0.959	0.949	0.968	0.96	0.95	0.963	0.00298	0.62%	3.21%
130		4	0.747	0.706	0.787	0.741	0.726	0.778	0.0126	3.39%	24.6%
148		4	0.152	0.101	0.203	0.151	0.118	0.189	0.0159	20.9%	84.6%
176		4	0.00808	0	0.0167	0.0105	0	0.0114	0.00271	67.0%	99.2%
199		4	0	0	0	0	0	0	0		100.0%

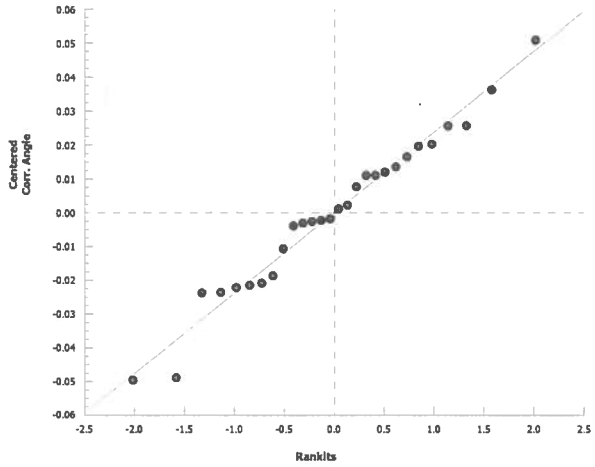
Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
24.3	Effluent Control	4	1.47	1.44	1.5	1.47	1.45	1.5	0.00971	1.32%	0.0%
97.6		4	1.47	1.44	1.5	1.47	1.45	1.5	0.00931	1.27%	0.25%
126		4	1.37	1.34	1.39	1.37	1.35	1.38	0.00731	1.07%	7.29%
130		4	1.04	0.997	1.09	1.04	1.02	1.08	0.0146	2.8%	29.2%
148		4	0.399	0.329	0.47	0.398	0.35	0.45	0.0222	11.1%	72.9%
176		4	0.0874	0.0345	0.14	0.102	0.0377	0.107	0.0166	38.0%	94.1%
199		4	0.107	0.0926	0.122	0.107	0.0964	0.118	0.00455	8.5%	92.7%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	14-0254-4157	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 14:08	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	10-2387-8515	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 14:08	**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	0.00978	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
7	-1080	2170	2170	2.14	0.031	0.931	105	2.84	0.0000	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	123	120	126
EC10	126	123	129
EC15	129	126	131
EC20	130	128	132
EC25	132	130	134
EC40	136	134	138
EC50	138	136	141

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.00893	0.00699	-0.00547	0.0233	1.28	0.2131	Non-Significant Parameter
Slope	32.3	3.13	25.8	38.7	10.3	<0.0001	Significant Parameter
Intercept	-69.1	6.67	-82.8	-55.3	-10.4	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	3213.024	3213.024	1	368	<0.0001	Significant
Lack of Fit	207.7629	51.94073	4	105	<0.0001	Significant
Pure Error	10.39693	0.495092	21			
Residual	218.1599	8.726394	25			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	218	37.7	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	95.1	37.7	<0.0001	Significant Heterogenity
Variances	Mod Levene Equality of Variance	0.919	2.57	0.5010	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.823	0.926	0.0003	Non-normal Distribution
	Anderson-Darling A2 Normality	2.2	2.49	<0.0001	Non-normal Distribution

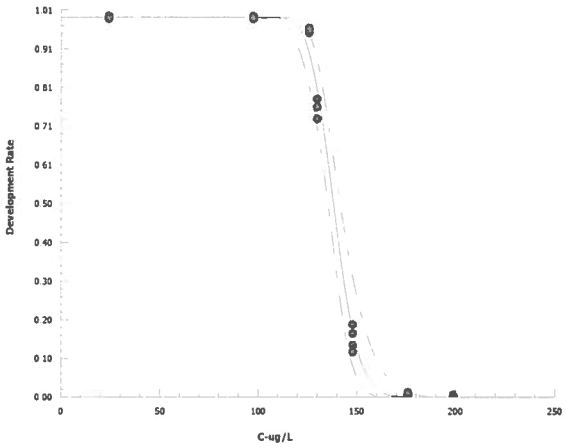
Development Rate Summary

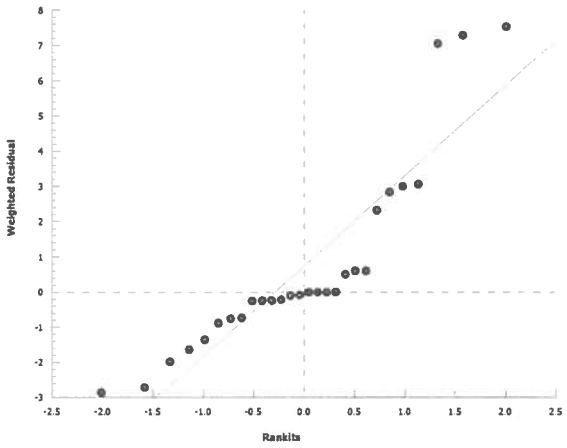
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
24.3	Effluent Control	4	0.99	0.986	0.995	0.00182	0.00365	0.37%	0.0%	810	818
97.6		4	0.99	0.986	0.994	0.00178	0.00356	0.36%	0.07%	750	758
126		4	0.959	0.95	0.963	0.00298	0.00596	0.62%	3.21%	744	776
130		4	0.747	0.726	0.778	0.0126	0.0253	3.39%	24.6%	605	811
148		4	0.152	0.118	0.189	0.0159	0.0318	20.9%	84.6%	115	757
176		4	0.00808	0	0.0114	0.00271	0.00541	67.0%	99.2%	6	734
199		4	0	0	0	0	0		100.0%	0	89

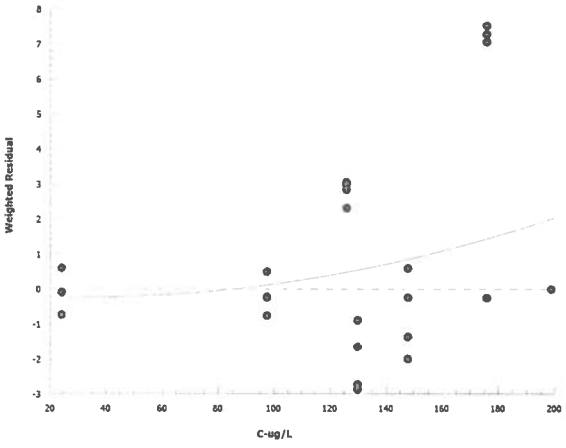
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	10-2387-8515	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	20 Jan-16 14:08	Analysis:	Linear Regression (MLE)	Official Results:	Yes

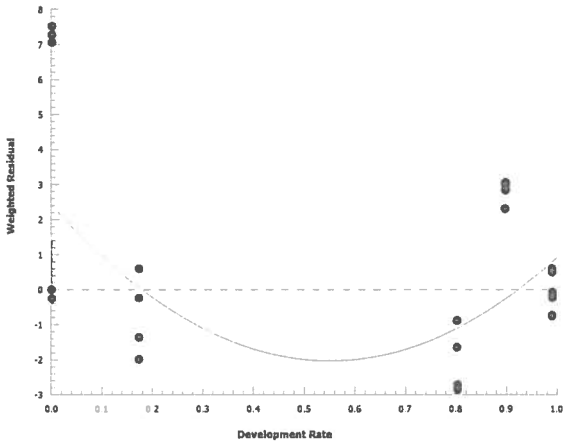
Graphics

Log-Normal [NED=A+B*log(X)]









CETIS Summary Report

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Batch ID:	06-7298-8364	**Test Type:**	Development-Survival	**Analyst:**	Stevi Vasquez
Start Date:	12 Nov-15 16:27	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	14 Nov-15 16:27	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Taylor Shellfish Company	**Age:**	N/A

Sample ID:	05-0385-6266	**Code:**	Cu in LW 30 ppt	**Client:**	City of Eureka
Sample Date:	12 Nov-15 11:00	**Material:**	Copper in Lab Water	**Project:**	24828
Receive Date:	12 Nov-15 11:00	**Source:**	City of Eureka		
Sample Age:	5h (18.7 °C)	**Station:**	Copper in Lab Water @ 30 ppt		

Batch Note: Total Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
20-5221-8518	Development Rate	4.97	7.42	6.073	1.4%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
05-1526-9188	Development Rate	EC5	9.58	9.28	9.84		Linear Regression (MLE)
		EC10	10	9.77	10.3		
		EC15	10.3	10.1	10.6		
		EC20	10.6	10.4	10.8		
		EC25	10.8	10.6	11		
		EC40	11.4	11.2	11.6		
		EC50	11.8	11.6	12		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0.75	Lab Water Contr	4	0.99	0.986	0.995	0.989	0.995	0.00137	0.00275	0.28%	0.0%
4.97		4	0.982	0.971	0.993	0.973	0.989	0.0034	0.0068	0.69%	0.88%
7.42		4	0.951	0.945	0.957	0.946	0.955	0.00186	0.00371	0.39%	3.99%
10.4		4	0.803	0.756	0.849	0.762	0.832	0.0146	0.0292	3.64%	18.9%
12.7		4	0.308	0.212	0.403	0.258	0.395	0.03	0.06	19.5%	68.9%
15.5		4	0.00151	0	0.0063	0	0.00602	0.00151	0.00301	200.0%	99.8%
19.4		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Lab Water Contr	0.989	0.995	0.989	0.989
4.97		0.985	0.973	0.989	0.981
7.42		0.951	0.955	0.946	0.952
10.4		0.762	0.805	0.832	0.812
12.7		0.258	0.395	0.291	0.287
15.5		0	0	0.00602	0
19.4		0	0	0	0

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Lab Water Contr	179/181	184/185	188/190	179/181
4.97		195/198	178/183	173/175	208/212
7.42		174/183	170/178	193/204	158/166
10.4		154/202	149/185	163/196	147/181
12.7		51/198	60/152	53/182	58/202
15.5		0/147	0/149	1/166	0/154
19.4		0/133	0/124	0/137	0/129

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	20-5221-8518	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 14:01	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.4%	4.97	7.42	6.073	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
0.75		4.97	1.56	2.41	0.057	6	0.2089	CDF	Non-Significant Effect
0.75		7.42*	5.36	2.41	0.057	6	0.0001	CDF	Significant Effect
0.75		10.4*	15.4	2.41	0.057	6	<0.0001	CDF	Significant Effect
0.75		12.7*	37.6	2.41	0.057	6	<0.0001	CDF	Significant Effect
0.75		15.5*	60.3	2.41	0.057	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.488946	1.297789	5	1160	<0.0001	Significant Effect
Error	0.02005176	0.001113987	18			
Total	6.508998		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	12.1	15.1	0.0335	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.909	0.884	0.0336	Normal Distribution

Development Rate Summary

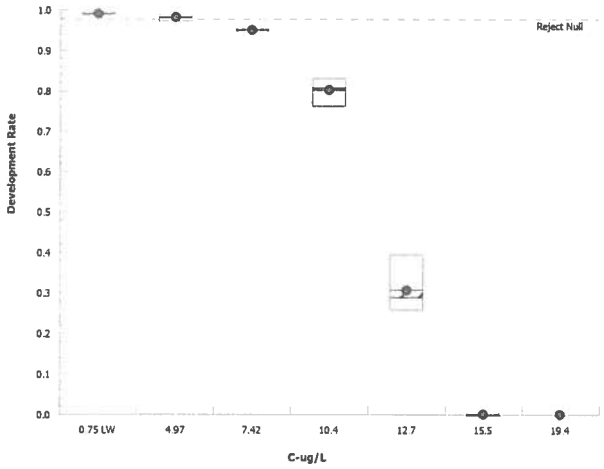
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Lab Water Contr	4	0.99	0.986	0.995	0.989	0.989	0.995	0.00137	0.28%	0.0%
4.97		4	0.982	0.971	0.993	0.983	0.973	0.989	0.0034	0.69%	0.88%
7.42		4	0.951	0.945	0.957	0.951	0.946	0.955	0.00186	0.39%	3.99%
10.4		4	0.803	0.756	0.849	0.809	0.762	0.832	0.0146	3.64%	18.9%
12.7		4	0.308	0.212	0.403	0.289	0.258	0.395	0.03	19.5%	68.9%
15.5		4	0.00151	0	0.0063	0	0	0.00602	0.00151	200.0%	99.8%
19.4		4	0	0	0	0	0	0	0		100.0%

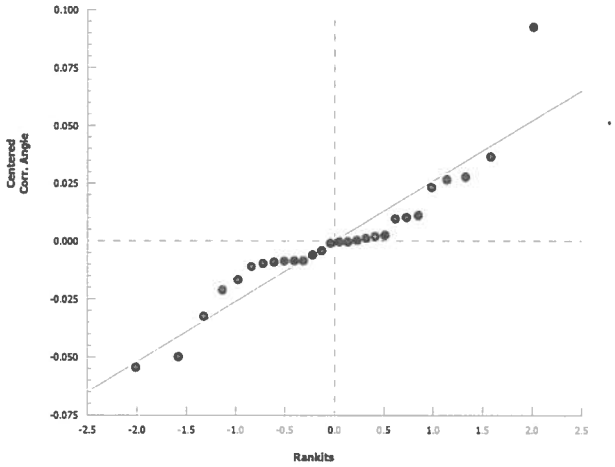
Angular (Corrected) Transformed Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Lab Water Cont	4	1.47	1.45	1.5	1.47	1.47	1.5	0.00774	1.05%	0.0%
4.97		4	1.44	1.4	1.48	1.44	1.4	1.46	0.0125	1.74%	2.5%
7.42		4	1.35	1.33	1.36	1.35	1.34	1.36	0.00428	0.64%	8.58%
10.4		4	1.11	1.05	1.17	1.12	1.06	1.15	0.0181	3.26%	24.6%
12.7		4	0.587	0.485	0.689	0.568	0.532	0.679	0.032	10.9%	60.2%
15.5		4	0.0501	0.0207	0.0794	0.0411	0.0403	0.0777	0.00921	36.8%	96.6%
19.4		4	0.0438	0.0423	0.0453	0.0437	0.0427	0.0449	0.000468	2.14%	97.0%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	20-5221-8518	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	20 Jan-16 14:01	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	05-1526-9188	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 14:01	**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	0.009498	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
9	-1110	2230	2230	1.07	0.0546	0.984	11.4	2.84	0.0000	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	9.58	9.28	9.84
EC10	10	9.77	10.3
EC15	10.3	10.1	10.6
EC20	10.6	10.4	10.8
EC25	10.8	10.6	11
EC40	11.4	11.2	11.6
EC50	11.8	11.6	12

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0259	0.00484	0.0159	0.0359	5.35	<0.0001	Significant Parameter
Slope	18.3	1.01	16.2	20.4	18.2	<0.0001	Significant Parameter
Intercept	-19.6	1.09	-21.8	-17.4	-18.1	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	3423.983	3423.983	1	1650	<0.0001	Significant
Lack of Fit	35.54465	8.886162	4	11.4	<0.0001	Significant
Pure Error	16.31108	0.776718	21			
Residual	51.85572	2.074229	25			

Residual Analysis

Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	51.9	37.7	0.0013	Significant Heterogenity
	Likelihood Ratio GOF	57.4	37.7	0.0002	Significant Heterogenity
Variances	Bartlett Equality of Variance	45.8	12.6	<0.0001	Unequal Variances
	Mod Levene Equality of Variance	1.29	2.57	0.3053	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.964	0.926	0.4295	Normal Distribution
	Anderson-Darling A2 Normality	0.404	2.49	0.3586	Normal Distribution

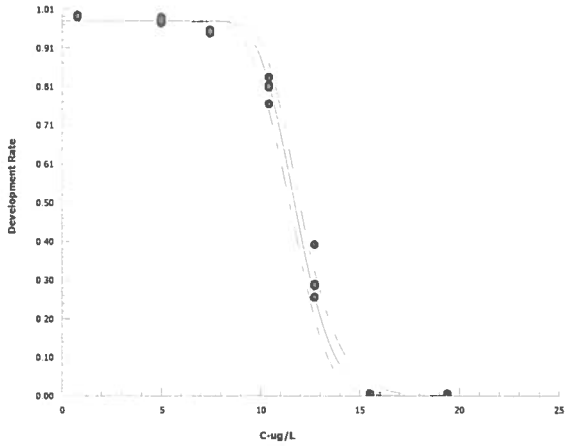
Development Rate Summary

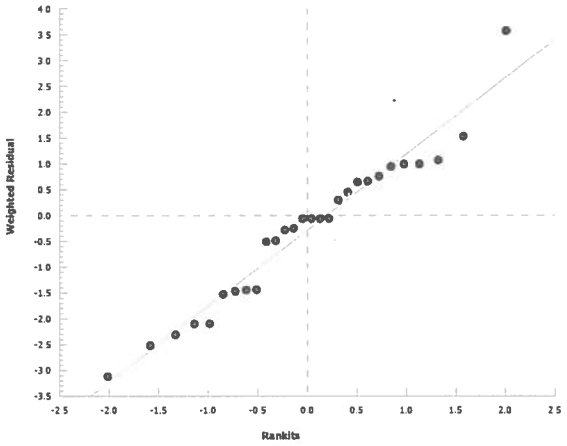
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0.75	Lab Water Contr	4	0.99	0.989	0.995	0.00137	0.00274	0.28%	0.0%	730	737
4.97		4	0.982	0.973	0.989	0.0034	0.0068	0.69%	0.88%	754	768
7.42		4	0.951	0.946	0.955	0.00186	0.00371	0.39%	3.99%	695	731
10.4		4	0.803	0.762	0.832	0.0146	0.0292	3.64%	18.9%	613	764
12.7		4	0.308	0.258	0.395	0.03	0.06	19.5%	68.9%	222	734
15.5		4	0.00151	0	0.00602	0.00151	0.00301	200.0%	99.8%	0	616
19.4		4	0	0	0	0	0		100.0%	0	523

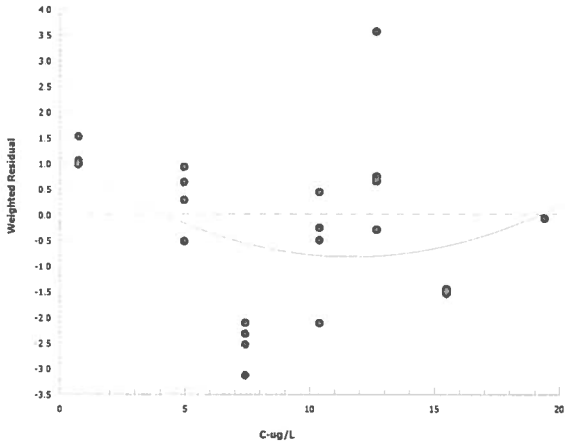
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	05-1526-9188	Endpoint:	Development Rate	CETIS Version:	CETISv1.8.7
Analyzed:	20 Jan-16 14:01	Analysis:	Linear Regression (MLE)	Official Results:	Yes

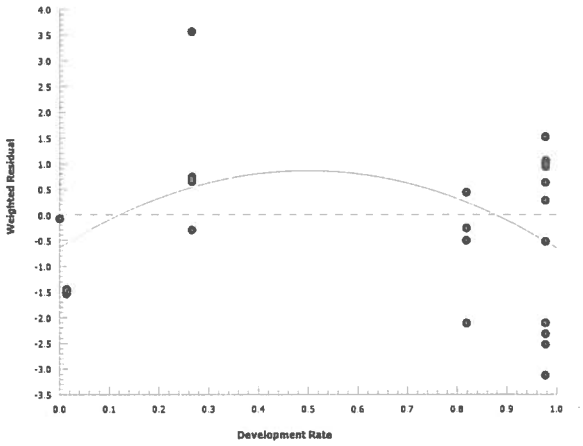
Graphics

Log-Normal [NED=A+B*log(X)]









Analyst: SNV QA: BJ

CETIS Summary Report

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Batch ID:	15-4342-1054	**Test Type:**	Development-Survival	**Analyst:**	Stevi Vasquez
Start Date:	12 Nov-15 15:35	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Receiving Water
Ending Date:	14 Nov-15 15:35	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Taylor Shellfish Company	**Age:**	N/A

Sample ID:	05-0646-1226	**Code:**	Cu in RW	**Client:**	City of Eureka
Sample Date:	10 Nov-15 09:30	**Material:**	Copper in Site Water	**Project:**	24828
Receive Date:	12 Nov-15 09:30	**Source:**	City of Eureka		
Sample Age:	54h (0.4 °C)	**Station:**	Copper in Receiving Water		

Batch Note: Total Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
21-1733-3208	Development Rate	5.57	7.89	6.629	1.49%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
11-1645-9133	Development Rate	EC5	9.73	9.18	10.2		Linear Regression (MLE)
		EC10	10.4	9.88	10.8		
		EC15	10.9	10.4	11.3		
		EC20	11.2	10.8	11.6		
		EC25	11.6	11.2	12		
		EC40	12.5	12.1	12.9		
		EC50	13.1	12.7	13.4		

Development Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0.75	Site Water	4	0.99	0.979	1	0.983	0.995	0.00319	0.00638	0.65%	0.0%
5.57		4	0.992	0.975	1	0.978	1	0.00516	0.0103	1.04%	-0.24%
7.89		4	0.954	0.932	0.976	0.934	0.966	0.00687	0.0137	1.44%	3.61%
11		4	0.797	0.767	0.827	0.778	0.822	0.0094	0.0188	2.36%	19.4%
15.3		4	0.262	0.231	0.293	0.24	0.288	0.00982	0.0196	7.49%	73.5%
18.4		4	0.0034	0	0.0142	0	0.0136	0.0034	0.0068	200.0%	99.7%
19.6		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Site Water	0.983	0.985	0.995	0.995
5.57		1	0.978	1	0.989
7.89		0.966	0.934	0.957	0.959
11		0.778	0.822	0.799	0.79
15.3		0.259	0.288	0.24	0.261
18.4		0.0136	0	0	0
19.6		0	0	0	0

Development Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Site Water	173/176	199/202	203/204	195/196
5.57		198/198	182/186	216/216	180/182
7.89		169/175	184/197	178/186	185/193
11		154/198	162/197	151/189	147/186
15.3		42/162	51/177	44/183	47/180
18.4		2/147	0/153	0/171	0/160
19.6		0/130	0/141	0/164	0/166

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Analysis ID:	21-1733-3208	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 15:51	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.49%	5.57	7.89	6.629	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
0.75		5.57	-0.721	2.41	0.061	6	0.9644	CDF	Non-Significant Effect
0.75		7.89*	4.6	2.41	0.061	6	0.0005	CDF	Significant Effect
0.75		11*	14.6	2.41	0.061	6	<0.0001	CDF	Significant Effect
0.75		15.3*	37	2.41	0.061	6	<0.0001	CDF	Significant Effect
0.75		18.4*	55.9	2.41	0.061	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.802463	1.360492	5	1060	<0.0001	Significant Effect
Error	0.02300788	0.001278215	18			
Total	6.82547		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.17	15.1	0.6737	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.966	0.884	0.5731	Normal Distribution

Development Rate Summary

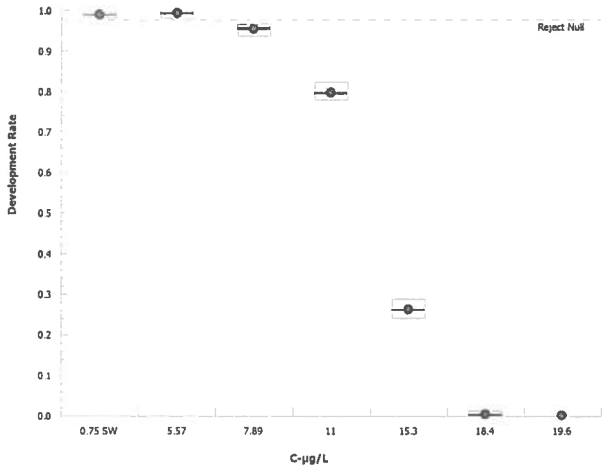
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Site Water	4	0.99	0.979	1	0.99	0.983	0.995	0.00319	0.65%	0.0%
5.57		4	0.992	0.975	1	0.995	0.978	1	0.00516	1.04%	-0.24%
7.89		4	0.954	0.932	0.976	0.958	0.934	0.966	0.00687	1.44%	3.61%
11		4	0.797	0.767	0.827	0.795	0.778	0.822	0.0094	2.36%	19.4%
15.3		4	0.262	0.231	0.293	0.26	0.24	0.288	0.00982	7.49%	73.5%
18.4		4	0.0034	0	0.0142	0	0	0.0136	0.0034	200.0%	99.7%
19.6		4	0	0	0	0	0	0	0		100.0%

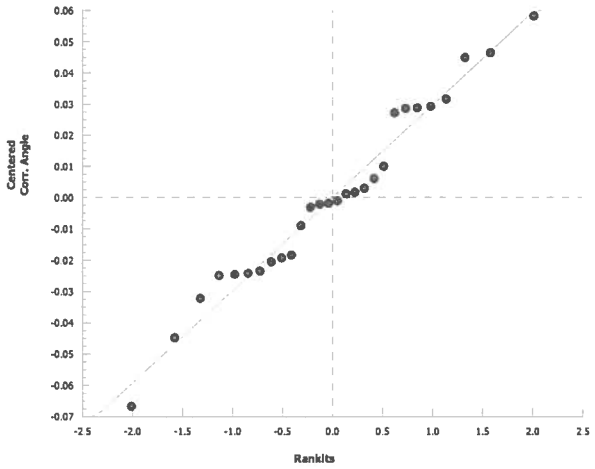
Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Site Water	4	1.47	1.42	1.52	1.47	1.44	1.5	0.0162	2.2%	0.0%
5.57		4	1.49	1.4	1.58	1.5	1.42	1.54	0.0277	3.72%	-1.24%
7.89		4	1.36	1.31	1.41	1.36	1.31	1.38	0.0157	2.32%	7.9%
11		4	1.1	1.07	1.14	1.1	1.08	1.14	0.0118	2.13%	25.0%
15.3		4	0.537	0.502	0.573	0.535	0.512	0.567	0.0111	4.14%	63.5%
18.4		4	0.0588	-0.0029	0.12	0.04	0.0382	0.117	0.0194	65.9%	96.0%
19.6		4	0.041	0.0371	0.0449	0.0406	0.0388	0.0439	0.00123	5.98%	97.2%

Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	21-1733-3208	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 15:51	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	11-1645-9133	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 15:51	**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	0.010283	Yes	No	Yes	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
14	-1070	2150	2150	1.12	0.0785	0.974	16.5	2.84	0.0000	Significant Lack of Fit

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	9.73	9.18	10.2
EC10	10.4	9.88	10.8
EC15	10.9	10.4	11.3
EC20	11.2	10.8	11.6
EC25	11.6	11.2	12
EC40	12.5	12.1	12.9
EC50	13.1	12.7	13.4

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0199	0.00571	0.00811	0.0316	3.48	0.0019	Significant Parameter
Slope	12.7	0.76	11.2	14.3	16.8	<0.0001	Significant Parameter
Intercept	-14.2	0.873	-16	-12.4	-16.3	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	3625.864	3625.864	1	1000	<0.0001	Significant
Lack of Fit	68.70686	17.17671	4	16.5	<0.0001	Significant
Pure Error	21.84269	1.040128	21			
Residual	90.54955	3.621982	25			

Residual Analysis

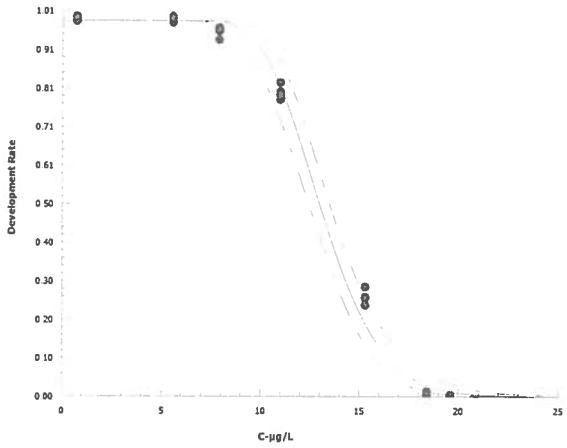
Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	90.5	37.7	<0.0001	Significant Heterogenity
	Likelihood Ratio GOF	113	37.7	<0.0001	Significant Heterogenity
Variances	Bartlett Equality of Variance	13.2	12.6	0.0404	Unequal Variances
	Mod Levene Equality of Variance	1.05	2.57	0.4228	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.956	0.926	0.2836	Normal Distribution
	Anderson-Darling A2 Normality	0.645	2.49	0.0931	Normal Distribution

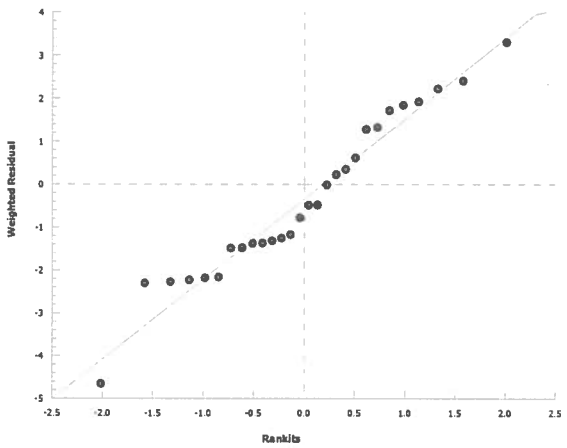
Development Rate Summary

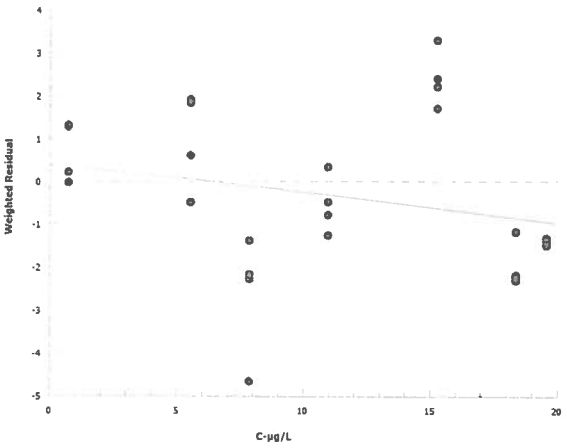
			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0.75	Site Water	4	0.99	0.983	0.995	0.00319	0.00639	0.65%	0.0%	770	778
5.57		4	0.992	0.978	1	0.00516	0.0103	1.04%	-0.24%	776	782
7.89		4	0.954	0.934	0.966	0.00687	0.0137	1.44%	3.61%	716	751
11		4	0.797	0.778	0.822	0.0094	0.0188	2.36%	19.4%	614	770
15.3		4	0.262	0.24	0.288	0.00982	0.0196	7.49%	73.5%	184	702
18.4		4	0.0034	0	0.0136	0.0034	0.0068	200.0%	99.7%	2	631
19.6		4	0	0	0	0	0		100.0%	0	601

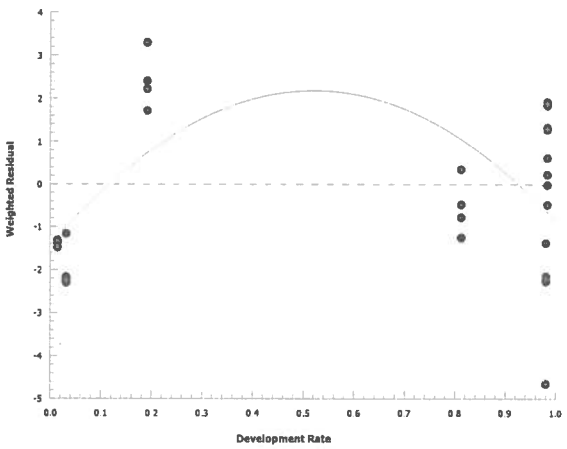
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	11-1645-9133	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 15:51	**Analysis:**	Linear Regression (MLE)	**Official Results:**	Yes

Graphics Log-Normal [NED=A+B*log(X)]









CETIS Summary Report

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Batch ID:	11-8843-7506	**Test Type:**	Development-Survival	**Analyst:**	Stevi Vasquez
Start Date:	12 Nov-15 15:37	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	14 Nov-15 15:37	**Species:**	Mytilus galloprovincialis	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Taylor Shellfish Company	**Age:**	N/A

Sample ID:	13-6199-6765	**Code:**	Cu in LW 34 ppt	**Client:**	City of Eureka
Sample Date:	12 Nov-15 11:15	**Material:**	Copper in Lab Water	**Project:**	24828
Receive Date:	12 Nov-15 11:15	**Source:**	City of Eureka		
Sample Age:	4h (18.7 °C)	**Station:**	Copper in Lab Water @ 34 ppt		

Batch Note: Total Copper Concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
08-7303-5899	Development Rate	4.82	7.67	6.08	1.29%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	ug/L	95% LCL	95% UCL	TU	Method
18-1866-4434	Development Rate	EC5	7.29	7.12	7.43		Linear Regression (MLE)
		EC10	7.71	7.56	7.84		
		EC15	8	7.87	8.13		
		EC20	8.25	8.12	8.37		
		EC25	8.46	8.34	8.58		
		EC40	9.03	8.93	9.14		
		EC50	9.39	9.29	9.5		

Development Rate Summary

C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0.75	Lab Water Contr	4	0.992	0.987	0.997	0.989	0.995	0.00157	0.00314	0.32%	0.0%
4.82		4	0.991	0.978	1	0.98	1	0.00429	0.00858	0.87%	0.12%
7.67		4	0.88	0.845	0.915	0.861	0.911	0.011	0.022	2.49%	11.3%
10.1		4	0.356	0.289	0.424	0.299	0.401	0.0212	0.0424	11.9%	64.1%
13.1		4	0.0014	0	0.00587	0	0.00562	0.0014	0.00281	200.0%	99.9%
16.3		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Lab Water Contr	0.995	0.989	0.99	0.995
4.82		0.99	0.995	0.98	1
7.67		0.911	0.861	0.868	0.882
10.1		0.299	0.366	0.359	0.401
13.1		0.00562	0	0	0
16.3		0	0	0	0

Development Rate Binomials

C-ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0.75	Lab Water Contr	214/215	180/182	207/209	190/191
4.82		196/198	197/198	195/199	199/199
7.67		173/190	167/194	171/197	187/212
10.1		61/204	70/191	65/181	81/202
13.1		1/178	0/182	0/192	0/157
16.3		0/185	0/182	0/172	0/168

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	08-7303-5899	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 14:13	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	1.29%	4.82	7.67	6.08	

Dunnett Multiple Comparison Test

Control	vs	C-ug/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
0.75		4.82	0.0598	2.36	0.057	6	0.7801	CDF	Non-Significant Effect
0.75		7.67*	10.9	2.36	0.057	6	<0.0001	CDF	Significant Effect
0.75		10.1*	34.7	2.36	0.057	6	<0.0001	CDF	Significant Effect
0.75		13.1*	59	2.36	0.057	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.206778	1.551695	4	1310	<0.0001	Significant Effect
Error	0.01781959	0.001187973	15			
Total	6.224597		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.71	13.3	0.4463	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.964	0.866	0.6195	Normal Distribution

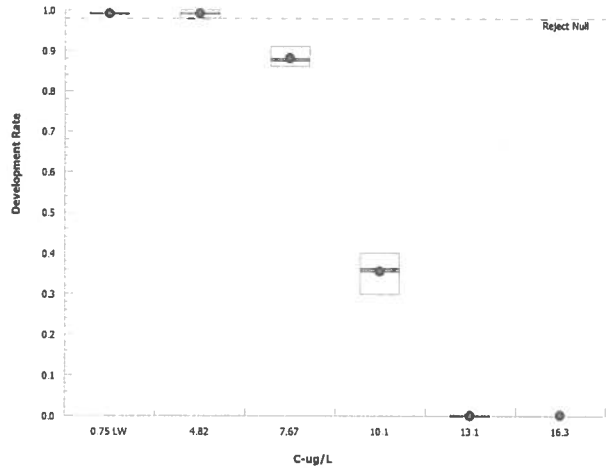
Development Rate Summary

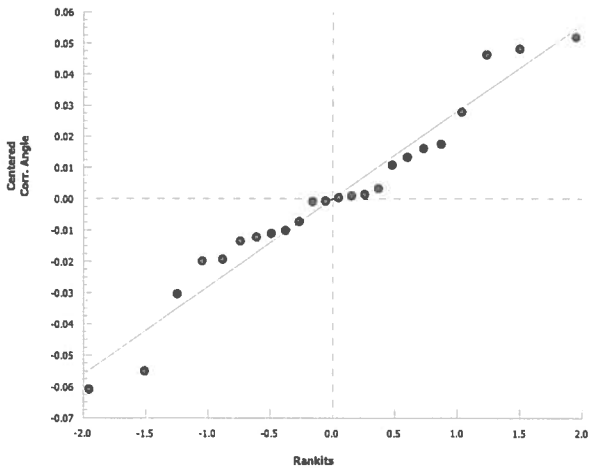
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0.75	Lab Water Contr	4	0.992	0.987	0.997	0.993	0.989	0.995	0.00157	0.32%	0.0%
4.82		4	0.991	0.978	1	0.992	0.98	1	0.00429	0.87%	0.12%
7.67		4	0.88	0.845	0.915	0.875	0.861	0.911	0.011	2.49%	11.3%
10.1		4	0.356	0.289	0.424	0.363	0.299	0.401	0.0212	11.9%	64.1%
13.1		4	0.0014	0	0.00587	0	0	0.00562	0.0014	200.0%	99.9%
16.3		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
0.75	Lab Water Cont	4	1.48	1.46	1.51	1.49	1.47	1.5	0.00915	1.23%	0.0%
4.82		4	1.48	1.41	1.56	1.48	1.43	1.54	0.0226	3.05%	0.1%
7.67		4	1.22	1.16	1.27	1.21	1.19	1.27	0.0174	2.86%	17.9%
10.1		4	0.639	0.568	0.71	0.646	0.579	0.686	0.0223	6.98%	56.9%
13.1		4	0.047	0.0172	0.0768	0.0385	0.0361	0.075	0.00937	39.8%	96.8%
16.3		4	0.0376	0.0363	0.039	0.0376	0.0368	0.0386	0.00043	2.29%	97.5%

Graphics





Bivalve Larval Survival and Development Test — Pacific EcoRisk

Analysis ID:	18-1866-4434	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 14:13	**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	0.007528	Yes	No	No	Yes

Regression Summary

Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
8	-892	1790	1790	0.973	0.067	0.99	5.78	3.16	0.0060	Significant Lack of Fit

Point Estimates

Level	ug/L	95% LCL	95% UCL
EC5	7.29	7.12	7.43
EC10	7.71	7.56	7.84
EC15	8	7.87	8.13
EC20	8.25	8.12	8.37
EC25	8.46	8.34	8.58
EC40	9.03	8.93	9.14
EC50	9.39	9.29	9.5

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)
Threshold	0.0087	0.00233	0.00415	0.0133	3.74	0.0012	Significant Parameter
Slope	14.9	0.513	13.9	15.9	29.1	<0.0001	Significant Parameter
Intercept	-14.5	0.503	-15.5	-13.5	-28.9	<0.0001	Significant Parameter

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Model	3433.439	3433.439	1	2270	<0.0001	Significant
Lack of Fit	15.59842	5.199474	3	5.78	0.0060	Significant
Pure Error	16.20032	0.900018	18			
Residual	31.79874	1.514226	21			

Residual Analysis

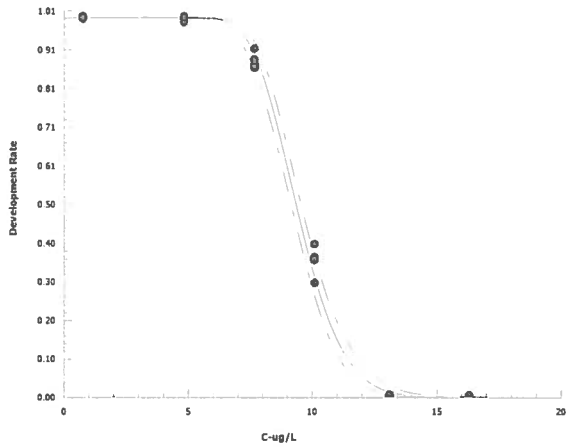
Attribute	Method	Test Stat	Critical	P-Value	Decision(α:5%)
Goodness-of-Fit	Pearson Chi-Sq GOF	31.8	32.7	0.0614	Non-Significant Heterogenity
	Likelihood Ratio GOF	40.8	32.7	0.0059	Significant Heterogenity
Variances	Bartlett Equality of Variance	32.8	11.1	<0.0001	Unequal Variances
	Mod Levene Equality of Variance	1.96	2.77	0.1337	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.942	0.917	0.1788	Normal Distribution
	Anderson-Darling A2 Normality	0.506	2.49	0.2060	Normal Distribution

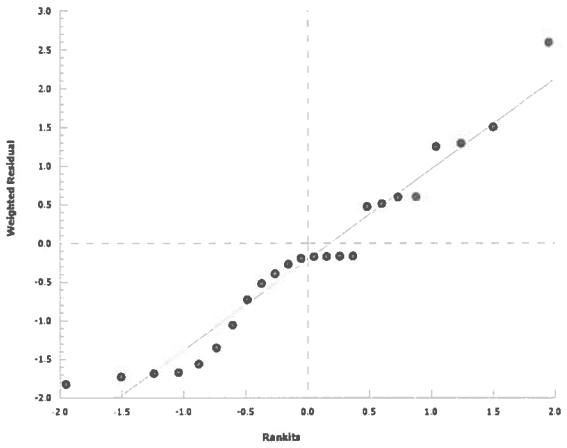
Development Rate Summary

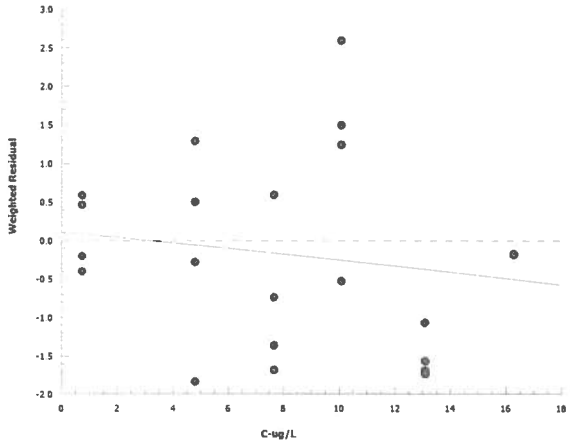
			Calculated Variate(A/B)								
C-ug/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0.75	Lab Water Contr	4	0.992	0.989	0.995	0.00157	0.00314	0.32%	0.0%	791	797
4.82		4	0.991	0.98	1	0.00429	0.00858	0.87%	0.12%	787	794
7.67		4	0.88	0.861	0.911	0.011	0.022	2.49%	11.3%	698	793
10.1		4	0.356	0.299	0.401	0.0212	0.0424	11.9%	64.1%	277	778
13.1		4	0.0014	0	0.00562	0.0014	0.00281	200.0%	99.9%	1	709
16.3		4	0	0	0	0	0		100.0%	0	707

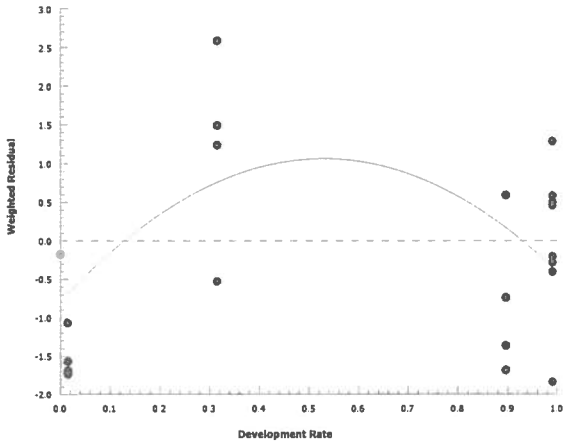
Bivalve Larval Survival and Development Test					Pacific EcoRisk
Analysis ID:	18-1866-4434	**Endpoint:**	Development Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	20 Jan-16 14:13	**Analysis:**	Linear Regression (MLE)	**Official Results:**	Yes

Graphics Log-Normal [NED=A+B*log(X)]









Appendix G

Results of Total Copper and Auxiliary Analyses of Test Waters: Event 2

December 7, 2015

Alison Briden
Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

RE: Q110616 Eureka Copper WER Study

Dear Alison Briden,

Please find attached revised report Q110616 for the *Eureka Copper WER Study*. On 11/24/15 the laboratory re-analyzed two of the four submitted samples [-001 (Effluent); and -004 (34 PPT Lab Water)] for Total Suspended Solids (TSS) using a multiple rinse procedure. This procedure is commonly done with saltwater matrices and, while this was done with the first round of analyses, additional rinses were also done on the reanalysis. Because of the short method-specified holding time of seven days, the re-analysis was not done within hold time. The analysis did meet all other requirements of the SM 2540 D97 method.

Please feel free to contact me if I can be of any further assistance.

Thank you.

Sincerely,

Melinda Kelley, Project Manager
Caltest Analytical Laboratory

REVISED

Monday, December 07, 2015

Alison Briden
Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

Re Lab Order: Q110616 Collected By: CLIENT
Project ID: EUREKA CU WER STUDY:EVENT 2 PO/Contract #:

Dear Alison Briden:

Enclosed are the analytical results for sample(s) received by the laboratory on Friday, November 13, 2015. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Enclosures

Project Manager: Melinda F. Kelley

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(707) 258-4000 • Fax (707) 226-1001 • e-mail: info@caltestlabs.com

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SAMPLE SUMMARY

Lab Order: Q110616
Project ID: EUREKA CU WER STUDY:EVENT 2

Lab ID	Sample ID	Matrix	Date Collected	Date Received
Q110616001	**EFFLUENT**	Water	11/12/2015 16:35	11/13/2015 14:27
Q110616002	**RECEIVING WATER**	Water	11/12/2015 16:40	11/13/2015 14:27
Q110616003	**30 ppt LAB WATER**	Water	11/12/2015 16:45	11/13/2015 14:27
Q110616004	**34 ppt LAB WATER**	Water	11/12/2015 16:50	11/13/2015 14:27

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NARRATIVE

Lab Order: Q110616
Project ID: EUREKA CU WER STUDY:EVENT 2

General Qualifiers and Notes

Caltest authorizes this report to be reproduced only in its entirety. Results are specific to the sample(s) as submitted and only to the parameter(s) reported.

Caltest certifies that all test results for wastewater and hazardous waste analyses meet all applicable NELAC requirements; all microbiology and drinking water testing meet applicable ELAP requirements, unless stated otherwise.

All analyses performed by EPA Methods or Standard Methods (SM) 20th Edition except where noted (SMOL=online edition).

Caltest collects samples in compliance with 40 CFR, EPA Methods, Cal. Title 22, and Standard Methods.

Dilution Factors (DF) reported greater than '1' have been used to adjust the result, Reporting Limit (RL), and Method Detection Limit (MDL).

All Solid, sludge, and/or biosolids data is reported in Wet Weight, unless otherwise specified.

Filtrations performed at Caltest for dissolved metals (excluding mercury) and/or pH analysis are not performed within the 15 minute holding time as specified by 40CFR 136.3 table II.

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

ND - Non Detect - indicates analytical result has not been detected.

RL - Reporting Limit is the quantitation limit at which the laboratory is able to detect an analyte. An analyte not detected at or above the RL is reported as ND unless otherwise noted or qualified. For analyses pertaining to the State Implementation Plan of the California Toxics Rule, the Caltest Reporting Limit (RL) is equivalent to the Minimum Level (ML). A standard is always run at or below the ML. Where Reporting Limits are elevated due to dilution, the ML calibration criteria has been met.

J - reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL). The 'J' flag is equivalent to the DNQ Estimated Concentration flag.

E - indicates an estimated analytical result value.

B - indicates the analyte has been detected in the blank associated with the sample.

NC - means not able to be calculated for RPD or Spike Recoveries.

SS - compound is a Surrogate Spike used per laboratory quality assurance manual.

NOTE: This document represents a complete Analytical Report for the samples referenced herein and should be retained as a permanent record thereof.

Workorder Notes

Samples analyzed for TSS had multiple rinses due to high salinity of samples.

Report revised to reflect TSS reanalysis results for samples -001 and -004. Reanalysis was done beyond the method-prescribed 7-day holding time with additional multiple rinses due to high salinity of samples.

Qualifiers and Compound Notes

1 Sample re-analyzed beyond method-prescribed 7-day hold time.

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ANALYTICAL RESULTS

Lab Order: Q110616
Project ID: EUREKA CU WER STUDY:EVENT 2

Lab ID Q110616001 Date Collected 11/12/2015 16:35 Matrix Water
Sample ID EFFLUENT Date Received 11/13/2015 14:27

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Total Suspended Solids Analysis		**Analytical Method:**	SM 2540 D-97					**Analyzed by:**	DR	
Total Suspended Solids	10	mg/L	3	2	1			11/24/15 12:38	BIO 15845	1
Dissolved Organic Carbon Analysis		**Analytical Method:**	SM 5310 B-00					**Analyzed by:**	CLM	
Dissolved Organic Carbon	12.0	mg/L	1	0.30	1			11/20/15 18:42	WET 8342	

Lab ID Q110616002 Date Collected 11/12/2015 16:40 Matrix Water
Sample ID RECEIVING WATER Date Received 11/13/2015 14:27

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Total Suspended Solids Analysis		**Analytical Method:**	SM 2540 D-97					**Analyzed by:**	DR	
Total Suspended Solids	6	mg/L	3	2	1			11/19/15 10:17	BIO 15825	
Dissolved Organic Carbon Analysis		**Analytical Method:**	SM 5310 B-00					**Analyzed by:**	CLM	
Dissolved Organic Carbon	J0.926	mg/L	1	0.30	1			11/20/15 19:28	WET 8342	

Lab ID Q110616003 Date Collected 11/12/2015 16:45 Matrix Water
Sample ID 30 ppt LAB WATER Date Received 11/13/2015 14:27

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Total Suspended Solids Analysis		**Analytical Method:**	SM 2540 D-97					**Analyzed by:**	DR	
Total Suspended Solids	ND	mg/L	3	2	1			11/19/15 10:17	BIO 15825	
Dissolved Organic Carbon Analysis		**Analytical Method:**	SM 5310 B-00					**Analyzed by:**	CLM	
Dissolved Organic Carbon	J0.933	mg/L	1	0.30	1			11/20/15 19:40	WET 8342	
Total Organic Carbon Analysis		**Analytical Method:**	SM 5310 B-00					**Analyzed by:**	CLM	
Total Organic Carbon	0.894	mg/L	0.5	0.30	1			11/20/15 14:45	WET 8342	

Lab ID Q110616004 Date Collected 11/12/2015 16:50 Matrix Water
Sample ID 34 ppt LAB WATER Date Received 11/13/2015 14:27

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Total Suspended Solids Analysis		**Analytical Method:**	SM 2540 D-97					**Analyzed by:**	DR	
Total Suspended Solids	4	mg/L	3	2	1			11/24/15 12:38	BIO 15845	1
Dissolved Organic Carbon Analysis		**Analytical Method:**	SM 5310 B-00					**Analyzed by:**	CLM	
Dissolved Organic Carbon	J0.919	mg/L	1	0.30	1			11/20/15 19:51	WET 8342	
Total Organic Carbon Analysis		**Analytical Method:**	SM 5310 B-00					**Analyzed by:**	CLM	
Total Organic Carbon	0.937	mg/L	0.5	0.30	1			11/20/15 14:59	WET 8342	

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QUALITY CONTROL DATA

Lab Order: Q110616
Project ID: EUREKA CU WER STUDY:EVENT 2

Analysis Description:	Total Suspended Solids Analysis	**QC Batch:**	BIO/15825
Analysis Method:	SM 2540 D-97	**QC Batch Method:**	SM 2540 D-97

METHOD BLANK: 668205

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Suspended Solids	ND	3	2	mg/L	

LABORATORY CONTROL SAMPLE: 668206

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Total Suspended Solids	mg/L	500	490	98	80-120	

SAMPLE DUPLICATE: 668245

Parameter	Units	Q110001018 Result	DUP Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	1890	1780	6	20	

SAMPLE DUPLICATE: 668207

Parameter	Units	Q110632001 Result	DUP Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	45	44	2.2	20	

Analysis Description:	Total Suspended Solids Analysis	**QC Batch:**	BIO/15845
Analysis Method:	SM 2540 D-97	**QC Batch Method:**	SM 2540 D-97

METHOD BLANK: 668938

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Suspended Solids	ND	3	2	mg/L	

LABORATORY CONTROL SAMPLE: 668939

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Total Suspended Solids	mg/L	500	472	94	80-120	

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QUALITY CONTROL DATA

Lab Order: Q110616
Project ID: EUREKA CU WER STUDY:EVENT 2

Analysis Description:	Total Suspended Solids Analysis	**QC Batch:**	BIO/15845
Analysis Method:	SM 2540 D-97	**QC Batch Method:**	SM 2540 D-97

SAMPLE DUPLICATE: 668940

Parameter	Units	Q110793001 Result	DUP Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	111	114	2.7	20	

Analysis Description:	Dissolved Organic Carbon Analysis	**QC Batch:**	WET/8342
Analysis Method:	SM 5310 B-00	**QC Batch Method:**	SM 5310 B-00

METHOD BLANK: 668338

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Organic Carbon	ND	0.5	0.3	mg/L	
Dissolved Organic Carbon	ND	1	0.3	mg/L	

FILTER BLANK: 668341

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Organic Carbon	ND	0.5	0.3	mg/L	
Dissolved Organic Carbon	ND	1	0.3	mg/L	

LABORATORY CONTROL SAMPLE & LCSD: 668339 668340

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% REC Limits	RPD	Max RPD	Qualifier
Total Organic Carbon	mg/L	10	9.72	9.91	97	99	80-120	1.9	20	
Dissolved Organic Carbon	mg/L	10	9.72	9.91	97	99	80-120	1.9	20	

Analysis Description:	Total Organic Carbon Analysis	**QC Batch:**	WET/8342
Analysis Method:	SM 5310 B-00	**QC Batch Method:**	SM 5310 B-00

METHOD BLANK: 668338

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Organic Carbon	ND	0.5	0.3	mg/L	
Dissolved Organic Carbon	ND	1	0.3	mg/L	

FILTER BLANK: 668341

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Total Organic Carbon	ND	0.5	0.3	mg/L	

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QUALITY CONTROL DATA

Lab Order: Q110616
Project ID: EUREKA CU WER STUDY:EVENT 2

Analysis Description:	Total Organic Carbon Analysis	**QC Batch:**	WET/8342
Analysis Method:	SM 5310 B-00	**QC Batch Method:**	SM 5310 B-00

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Dissolved Organic Carbon	ND	1	0.3	mg/L	

LABORATORY CONTROL SAMPLE & LCSD: 668339 668340

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% REC Limits	RPD	Max RPD	Qualifier
Total Organic Carbon	mg/L	10	9.72	9.91	97	99	80-120	1.9	20	
Dissolved Organic Carbon	mg/L	10	9.72	9.91	97	99	80-120	1.9	20	

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QUALITY CONTROL DATA QUALIFIERS

Lab Order: Q110616
Project ID: EUREKA CU WER STUDY:EVENT 2

QUALITY CONTROL PARAMETER QUALIFIERS

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

NS - means not spiked and will not have recoveries reported for Analyte Spike Amounts

QC Codes Keys: These descriptors are used to help identify the specific QC samples and clarify the report.

MB - Method Blank

Method Blanks are reported to the same Method Detection Limits (MDLs) or Reporting Limits (RLs) as the analytical samples in the corresponding QC batch.

LCS/LCSD - Laboratory Control Spike / Laboratory Control Spike Duplicate

DUP - Duplicate of Original Sample Matrix

MS/MSD - Matrix Spike / Matrix Spike Duplicate

RPD - Relative Percent Difference

%Recovery - Spike Recovery stated as a percentage

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Lab Order: Q110616
Project ID: EUREKA CU WER STUDY:EVENT 2

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
Q110616002	**RECEIVING WATER**	SM 2540 D-97	BIO/15825		
Q110616003	**30 ppt LAB WATER**	SM 2540 D-97	BIO/15825		
Q110616001	**EFFLUENT**	SM 2540 D-97	BIO/15845		
Q110616004	**34 ppt LAB WATER**	SM 2540 D-97	BIO/15845		
Q110616001	**EFFLUENT**	SM 5310 B-00	WET/8342		
Q110616002	**RECEIVING WATER**	SM 5310 B-00	WET/8342		
Q110616003	**30 ppt LAB WATER**	SM 5310 B-00	WET/8342		
Q110616004	**34 ppt LAB WATER**	SM 5310 B-00	WET/8342		

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Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Q110616

Results To:	City of Eureka	**Invoice To:**	Same
Address:	4301 Hilfiker Lane Eureka, CA 95503	**Address:**	
Phone:	(707) 441-4363	**Phone:**	
Attn:	Michael Hansen	**Attn:**	
E-mail:	mphansen@ci.eureka.gov	**E-mail:**	
Project Name:	City of Eureka Cu WER Study: Event 2		
P.O.#/Ref:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	TOC	TSS	DOC	REQUESTED ANALYSIS
-1	1 Effluent	11/12/15	1635	SW	Grab	1	500 mL poly		X		
↓	2 Effluent	11/12/15	1635	SW	Grab	1	250 mL AG			X	
-2	3 Receiving Water	11/12/15	1640	SW	Grab	1	500 mL poly		X		
↓	4 Receiving Water	11/12/15	1640	SW	Grab	1	250 mL AG			X	
-3	5 30 ppt Lab Water	11/12/15	1645	SW	Grab	3	40 mL AG + HCl	X			
↓	6 30 ppt Lab Water	11/12/15	1645	SW	Grab	1	500 mL poly		X		
↓	7 30 ppt Lab Water	11/12/15	1645	SW	Grab	1	250 mL AG			X	
-4	8 34 ppt Lab Water	11/12/15	1650	SW	Grab	3	40 mL AG + HCl	X			
↓	9 34 ppt Lab Water	11/12/15	1650	SW	Grab	1	500 mL poly		X		
↓	10 34 ppt Lab Water	11/12/15	1650	SW	Grab	1	250 mL AG			X	

Samples collected by:

Comments/Special Instruction:

Samples are a saltwater matrix. Please perform multipe rinses for TSS.

TEMP. (°C): 0.2
SEALED: YES
INTACT: YES

RELINQUISHED BY:		**RECEIVED BY:**
Signature:		**Signature:**
Print:	Y. Khadiyeva	**Print:** GLEN IMRIE
Organization:	PER	**Organization:** CALTEST
Date:	11-13-15 **Time:** 1045	**Date:** 11/13/15 **Time:** 1045
RELINQUISHED BY:		**RECEIVED BY:**
Signature:		**Signature:**
Print:	GLEN IMRIE	**Print:** L. Gaeta
Organization:	CATEST	**Organization:** Caltest
Date:	11/13/15 **Time:** 1427	**Date:** 11/13/15 **Time:** 1427

***Example Matrix Codes**: (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

Monday, December 07, 2015

Alison Briden
Pacific EcoRisk
2250 Cordelia Road
Fairfield, CA 94534

Re Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Collected By: CLIENT
PO/Contract #:

Dear Alison Briden:

Enclosed are the analytical results for sample(s) received by the laboratory on Monday, November 23, 2015. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Enclosures

Project Manager: Melinda F. Kelley

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SAMPLE SUMMARY

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Lab ID	Sample ID	Matrix	Date Collected	Date Received
Q110807001	LW30-CUTOT-0-TI	Water	11/12/2015 15:42	11/23/2015 10:26
Q110807002	LW30-CUTOT-6.0-TI	Water	11/12/2015 15:46	11/23/2015 10:26
Q110807003	LW30-CUTOT-9.0-TI	Water	11/12/2015 15:48	11/23/2015 10:26
Q110807004	LW30-CUTOT-12.0-TI	Water	11/12/2015 15:50	11/23/2015 10:26
Q110807005	LW30-CUTOT-15.0-TI	Water	11/12/2015 15:52	11/23/2015 10:26
Q110807006	LW30-CUTOT-18.0-TI	Water	11/12/2015 15:54	11/23/2015 10:26
Q110807007	LW30-CUTOT-22.0-TI	Water	11/12/2015 15:56	11/23/2015 10:26
Q110807008	LW34-CUTOT-0-TI	Water	11/12/2015 14:46	11/23/2015 10:26
Q110807009	LW34-CUTOT-6.0-TI	Water	11/12/2015 14:50	11/23/2015 10:26
Q110807010	LW34-CUTOT-9.0-TI	Water	11/12/2015 14:52	11/23/2015 10:26
Q110807011	LW34-CUTOT-12.0-TI	Water	11/12/2015 14:54	11/23/2015 10:26
Q110807012	LW34-CUTOT-15.0-TI	Water	11/12/2015 14:56	11/23/2015 10:26
Q110807013	LW34-CUTOT-18.0-TI	Water	11/12/2015 14:58	11/23/2015 10:26
Q110807014	RW-CUTOT-0-TI	Water	11/12/2015 14:49	11/23/2015 10:26
Q110807015	RW-CUTOT-6.0-TI	Water	11/12/2015 14:53	11/23/2015 10:26
Q110807016	RW-CUTOT-9.0-TI	Water	11/12/2015 14:55	11/23/2015 10:26
Q110807017	RW-CUTOT-12.0-TI	Water	11/12/2015 14:57	11/23/2015 10:26
Q110807018	RW-CUTOT-15.0-TI	Water	11/12/2015 14:59	11/23/2015 10:26
Q110807019	RW-CUTOT-18.0-TI	Water	11/12/2015 15:01	11/23/2015 10:26
Q110807020	RW-CUTOT-22.0-TI	Water	11/12/2015 15:03	11/23/2015 10:26
Q110807021	EFF-CUTOT-0-TI	Water	11/12/2015 15:45	11/23/2015 10:26
Q110807022	EFF-CUTOT-82-TI	Water	11/12/2015 15:49	11/23/2015 10:26
Q110807023	EFF-CUTOT-117-TI	Water	11/12/2015 15:51	11/23/2015 10:26
Q110807024	EFF-CUTOT-138-TI	Water	11/12/2015 15:53	11/23/2015 10:26
Q110807025	EFF-CUTOT-162-TI	Water	11/12/2015 15:55	11/23/2015 10:26
Q110807026	EFF-CUTOT-190-TI	Water	11/12/2015 15:57	11/23/2015 10:26
Q110807027	EFF-CUTOT-224-TI	Water	11/12/2015 15:59	11/23/2015 10:26

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NARRATIVE

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

General Qualifiers and Notes

Caltest authorizes this report to be reproduced only in its entirety. Results are specific to the sample(s) as submitted and only to the parameter(s) reported.

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All analyses performed by EPA Methods or Standard Methods (SM) 20th Edition except where noted (SMOL=online edition).

Caltest collects samples in compliance with 40 CFR, EPA Methods, Cal. Title 22, and Standard Methods.

Dilution Factors (DF) reported greater than '1' have been used to adjust the result, Reporting Limit (RL), and Method Detection Limit (MDL).

All Solid, sludge, and/or biosolids data is reported in Wet Weight, unless otherwise specified.

Filtrations performed at Caltest for dissolved metals (excluding mercury) and/or pH analysis are not performed within the 15 minute holding time as specified by 40CFR 136.3 table II.

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

ND - Non Detect - indicates analytical result has not been detected.

RL - Reporting Limit is the quantitation limit at which the laboratory is able to detect an analyte. An analyte not detected at or above the RL is reported as ND unless otherwise noted or qualified. For analyses pertaining to the State Implementation Plan of the California Toxics Rule, the Caltest Reporting Limit (RL) is equivalent to the Minimum Level (ML). A standard is always run at or below the ML. Where Reporting Limits are elevated due to dilution, the ML calibration criteria has been met.

J - reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL). The 'J' flag is equivalent to the DNQ Estimated Concentration flag.

E - indicates an estimated analytical result value.

B - indicates the analyte has been detected in the blank associated with the sample.

NC - means not able to be calculated for RPD or Spike Recoveries.

SS - compound is a Surrogate Spike used per laboratory quality assurance manual.

NOTE: This document represents a complete Analytical Report for the samples referenced herein and should be retained as a permanent record thereof.

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ANALYTICAL RESULTS

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Lab ID Q110807001 Date Collected 11/12/2015 15:42 Matrix Water
Sample ID LW30-CUTOT-0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	ND	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 17:02	MMS 7826	

Lab ID Q110807002 Date Collected 11/12/2015 15:46 Matrix Water
Sample ID LW30-CUTOT-6.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	4.97	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 17:25	MMS 7826	

Lab ID Q110807003 Date Collected 11/12/2015 15:48 Matrix Water
Sample ID LW30-CUTOT-9.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	7.42	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 17:31	MMS 7826	

Lab ID Q110807004 Date Collected 11/12/2015 15:50 Matrix Water
Sample ID LW30-CUTOT-12.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	10.4	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 17:37	MMS 7826	

Lab ID Q110807005 Date Collected 11/12/2015 15:52 Matrix Water
Sample ID LW30-CUTOT-15.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	12.7	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 17:42	MMS 7826	

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ANALYTICAL RESULTS

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Lab ID Q110807006 Date Collected 11/12/2015 15:54 Matrix Water
Sample ID LW30-CUTOT-18.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	15.5	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 17:48	MMS 7826	

Lab ID Q110807007 Date Collected 11/12/2015 15:56 Matrix Water
Sample ID LW30-CUTOT-22.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	19.4	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 17:54	MMS 7826	

Lab ID Q110807008 Date Collected 11/12/2015 14:46 Matrix Water
Sample ID LW34-CUTOT-0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	ND	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 17:59	MMS 7826	

Lab ID Q110807009 Date Collected 11/12/2015 14:50 Matrix Water
Sample ID LW34-CUTOT-6.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	4.82	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 18:05	MMS 7826	

Lab ID Q110807010 Date Collected 11/12/2015 14:52 Matrix Water
Sample ID LW34-CUTOT-9.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	7.67	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 18:11	MMS 7826	

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ANALYTICAL RESULTS

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Lab ID Q110807011 Date Collected 11/12/2015 14:54 Matrix Water
Sample ID LW34-CUTOT-12.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	10.1	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/02/15 18:16	MMS 7826	

Lab ID Q110807012 Date Collected 11/12/2015 14:56 Matrix Water
Sample ID LW34-CUTOT-15.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	13.1	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/03/15 16:39	MMS 7826	

Lab ID Q110807013 Date Collected 11/12/2015 14:58 Matrix Water
Sample ID LW34-CUTOT-18.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	16.3	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/03/15 16:44	MMS 7826	

Lab ID Q110807014 Date Collected 11/12/2015 14:49 Matrix Water
Sample ID RW-CUTOT-0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	ND	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/03/15 16:50	MMS 7826	

Lab ID Q110807015 Date Collected 11/12/2015 14:53 Matrix Water
Sample ID RW-CUTOT-6.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	5.57	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/03/15 16:56	MMS 7826	

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ANALYTICAL RESULTS

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Lab ID Q110807016 Date Collected 11/12/2015 14:55 Matrix Water
Sample ID RW-CUTOT-9.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	7.89	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/03/15 17:19	MMS 7826	

Lab ID Q110807017 Date Collected 11/12/2015 14:57 Matrix Water
Sample ID RW-CUTOT-12.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	11.0	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/03/15 17:24	MMS 7826	

Lab ID Q110807018 Date Collected 11/12/2015 14:59 Matrix Water
Sample ID RW-CUTOT-15.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	18.4	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13971	12/03/15 17:30	MMS 7826	

Lab ID Q110807019 Date Collected 11/12/2015 15:01 Matrix Water
Sample ID RW-CUTOT-18.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	15.3	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/03/15 22:42	MMS 7825	

Lab ID Q110807020 Date Collected 11/12/2015 15:03 Matrix Water
Sample ID RW-CUTOT-22.0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	19.6	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/03/15 22:48	MMS 7825	

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ANALYTICAL RESULTS

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Lab ID Q110807021 Date Collected 11/12/2015 15:45 Matrix Water
Sample ID EFF-CUTOT-0-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	24.3	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/03/15 22:54	MMS 7825	

Lab ID Q110807022 Date Collected 11/12/2015 15:49 Matrix Water
Sample ID EFF-CUTOT-82-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	97.6	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/03/15 22:59	MMS 7825	

Lab ID Q110807023 Date Collected 11/12/2015 15:51 Matrix Water
Sample ID EFF-CUTOT-117-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	126	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/03/15 23:05	MMS 7825	

Lab ID Q110807024 Date Collected 11/12/2015 15:53 Matrix Water
Sample ID EFF-CUTOT-138-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	130	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/02/15 21:07	MMS 7825	

Lab ID Q110807025 Date Collected 11/12/2015 15:55 Matrix Water
Sample ID EFF-CUTOT-162-TI Date Received 11/23/2015 10:26

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total	**Prep Method:**		EPA 200.8			**Prep by:**	UK			
	Analytical Method:		EPA 200.8					**Analyzed by:**	LM	
Copper	148	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/02/15 21:13	MMS 7825	

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ANALYTICAL RESULTS

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Lab ID	**Q110807026**	Date Collected	11/12/2015 15:57	Matrix	Water
Sample ID	**EFF-CUTOT-190-TI**	Date Received	11/23/2015 10:26		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	176	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/02/15 21:18	MMS 7825	

Lab ID	**Q110807027**	Date Collected	11/12/2015 15:59	Matrix	Water
Sample ID	**EFF-CUTOT-224-TI**	Date Received	11/23/2015 10:26		

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Metals by ICPMS Collision Mode, Total		**Prep Method:**	EPA 200.8			**Prep by:**	UK			
		Analytical Method:	EPA 200.8					**Analyzed by:**	LM	
Copper	199	ug/L	2.5	0.75	5	11/25/15 00:00	MPR 13970	12/02/15 21:24	MMS 7825	

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QUALITY CONTROL DATA

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13970
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

METHOD BLANK: 669331

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Copper	ND	0.50	0.15	ug/L	

LABORATORY CONTROL SAMPLE: 669332

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Copper	ug/L	20	17	85	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 669334 669335

Parameter	Units	Q110823001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	0.7	20	16.7	16.6	80	80	70-130	0.6	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 669336 669337

Parameter	Units	Q110877002 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	3.8	20	20.2	20.3	82	83	70-130	0.5	20	

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13971
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

METHOD BLANK: 669340

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Copper	ND	0.50	0.15	ug/L	

LABORATORY CONTROL SAMPLE: 669341

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Copper	ug/L	20	17.3	87	85-115	

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QUALITY CONTROL DATA

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Analysis Description:	Metals by ICPMS Collision Mode, Total	**QC Batch:**	MPR/13971
Analysis Method:	EPA 200.8	**QC Batch Method:**	EPA 200.8

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 669343 669344

Parameter	Units	Q110889001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	0.34	20	17	17.2	83	84	70-130	1.2	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 669345 669346

Parameter	Units	Q110879001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Copper	ug/L	72	20	85.1	85.9	RNC	70	70-130	0.9	20	1

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QUALITY CONTROL DATA QUALIFIERS

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

QUALITY CONTROL PARAMETER QUALIFIERS

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

NS - means not spiked and will not have recoveries reported for Analyte Spike Amounts

QC Codes Keys: These descriptors are used to help identify the specific QC samples and clarify the report.

MB - Method Blank

Method Blanks are reported to the same Method Detection Limits (MDLs) or Reporting Limits (RLs) as the analytical samples in the corresponding QC batch.

LCS/LCSD - Laboratory Control Spike / Laboratory Control Spike Duplicate

DUP - Duplicate of Original Sample Matrix

MS/MSD - Matrix Spike / Matrix Spike Duplicate

RPD - Relative Percent Difference

%Recovery - Spike Recovery stated as a percentage

1 RNC = Recovery Not Calculated. Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries were not calculated due to the high native concentration in the sample selected for MS/MSD versus the laboratory spike concentration.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Lab Order: Q110807
Project ID: EUREKA COPPER WER EVENT 2

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
Q110807019	RW-CUTOT-18.0-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807020	RW-CUTOT-22.0-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807021	EFF-CUTOT-0-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807022	EFF-CUTOT-82-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807023	EFF-CUTOT-117-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807024	EFF-CUTOT-138-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807025	EFF-CUTOT-162-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807026	EFF-CUTOT-190-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807027	EFF-CUTOT-224-TI	EPA 200.8	MPR/13970	EPA 200.8	MMS/7825
Q110807001	LW30-CUTOT-0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807002	LW30-CUTOT-6.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807003	LW30-CUTOT-9.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807004	LW30-CUTOT-12.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807005	LW30-CUTOT-15.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807006	LW30-CUTOT-18.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807007	LW30-CUTOT-22.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807008	LW34-CUTOT-0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807009	LW34-CUTOT-6.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807010	LW34-CUTOT-9.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807011	LW34-CUTOT-12.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807012	LW34-CUTOT-15.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807013	LW34-CUTOT-18.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807014	RW-CUTOT-0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807015	RW-CUTOT-6.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807016	RW-CUTOT-9.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807017	RW-CUTOT-12.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826
Q110807018	RW-CUTOT-15.0-TI	EPA 200.8	MPR/13971	EPA 200.8	MMS/7826

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CHAIN-OF-CUSTODY RECORD

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road	**Address:**	
	Fairfield, CA 94534		
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 2		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: Total Cu
1	LW30-CuTot-0-Ti	11/12/15	1542	SW	Grab	1	500 mL plastic + HNO3	x
2	LW30-CuTot-6.0-Ti	11/12/15	1546	SW	Grab	1	500 mL plastic + HNO3	x
3	LW30-CuTot-9.0-Ti	11/12/15	1548	SW	Grab	1	500 mL plastic + HNO3	x
4	LW30-CuTot-12.0-Ti	11/12/15	1550	SW	Grab	1	500 mL plastic + HNO3	x
5	LW30-CuTot-15.0-Ti	11/12/15	1552	SW	Grab	1	500 mL plastic + HNO3	x
6	LW30-CuTot-18.0-Ti	11/12/15	1554	SW	Grab	1	500 mL plastic + HNO3	x
7	LW30-CuTot-22.0-Ti	11/12/15	1556	SW	Grab	1	500 mL plastic + HNO3	x
8								
9								
10								

Samples collected by: Alison Briden

Comments/Special Instruction:
Report of the maximum number of significant figures possible
MDL Reporting Format

	RELINQUISHED BY:	RECEIVED BY:
Signature:	Alison Briden	
Print:	Alison Briden	Derrick Davidson
Organization:	PER	CalTest
Date:	11-23-15	11/23/15
Time:	0921	0921
RELINQUISHED BY:		**RECEIVED BY:**
Signature:		
Print:	Derrick Davidson	L. Gaeta
Organization:	CalTest	caltest
Date:	11/23/15	11/23/15
Time:	~~0921~~ 1026	1026

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

0.4

Q110807

CHAIN-OF-CUSTODY RECORD

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road	**Address:**	
	Fairfield, CA 94534		
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 2		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: Total Cu
1	LW34-CuTot-0-Ti	11/12/15	1446	SW	Grab	1	500 mL plastic + HNO3	x
2	LW34-CuTot-6.0-Ti	11/12/15	1450	SW	Grab	1	500 mL plastic + HNO3	x
3	LW34-CuTot-9.0-Ti	11/12/15	1452	SW	Grab	1	500 mL plastic + HNO3	x
4	LW34-CuTot-12.0-Ti	11/12/15	1454	SW	Grab	1	500 mL plastic + HNO3	x
5	LW34-CuTot-15.0-Ti	11/12/15	1456	SW	Grab	1	500 mL plastic + HNO3	x
6	LW34-CuTot-18.0-Ti	11/12/15	1458	SW	Grab	1	500 mL plastic + HNO3	x
7								
8								
9								
10								

Samples collected by: Alison Briden

Comments/Special Instruction:
Report of the maximum number of significant figures possible
MDL Reporting Format

RELINQUISHED BY:	**RECEIVED BY:**
Signature: Alison Briden	**Signature:**
Print: Alison Briden	**Print:** Dennis Dowdy
Organization: PER	**Organization:** CALTEST
Date: 11-23-15 **Time:** 0921	**Date:** 11/23/15 **Time:** 0921
RELINQUISHED BY:	**RECEIVED BY:**
Signature:	**Signature:**
Print: Dennis Dowdy	**Print:** L. Gaeta
Organization: CALTEST 1026	**Organization:** Caltest
Date: 11/23/15 **Time:** ~~0427~~	**Date:** 11/23/15 **Time:** 1026

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

0-4

Q110807

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road	**Address:**	
	Fairfield, CA 94534		
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 2		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: Total Cu
1	RW-CuTot-0-Ti	11/12/15	1449	SW	Grab	1	500 mL plastic + HNO3	x
2	RW-CuTot-6.0-Ti	11/12/15	1453	SW	Grab	1	500 mL plastic + HNO3	x
3	RW-CuTot-9.0-Ti	11/12/15	1455	SW	Grab	1	500 mL plastic + HNO3	x
4	RW-CuTot-12.0-Ti	11/12/15	1457	SW	Grab	1	500 mL plastic + HNO3	x
5	RW-CuTot-15.0-Ti	11/12/15	1459	SW	Grab	1	500 mL plastic + HNO3	x
6	RW-CuTot-18.0-Ti	11/12/15	1501	SW	Grab	1	500 mL plastic + HNO3	x
7	RW-CuTot-22.0-Ti	11/12/15	1503	SW	Grab	1	500 mL plastic + HNO3	x
8								
9								
10								

Samples collected by: Stevi Vasquez

Comments/Special Instruction:
Report of the maximum number of significant figures possible
MDL Reporting Format

RELINQUISHED BY:	**RECEIVED BY:**	
Signature:	**Signature:**	
Print: Alison Briden	**Print:** Demi Davis	
Organization: PER	**Organization:** CalTest	
Date: 11-23-15 **Time:** 0921	**Date:** 11/23/15 **Time:** 0921	
RELINQUISHED BY:	**RECEIVED BY:**	
Signature:	**Signature:**	
Print: Demi Davis	**Print:** L. Gaeta	
Organization: CalTest 1026	**Organization:** caltest	
Date: 11/23/15 **Time:** ~~0921~~	**Date:** 11/23/15 **Time:** 1026	

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

0.4

Q110807

Pacific EcoRisk
2250 Cordelia Rd., Fairfield, CA 94534
(707) 207-7760 FAX (707) 207-7916

CHAIN-OF-CUSTODY RECORD

Results To:	Pacific EcoRisk	**Invoice To:**	Same
Address:	2250 Cordelia Road	**Address:**	
	Fairfield, CA 94534		
Phone:	(707) 207-7760	**Phone:**	
Attn:	Alison Briden	**E-mail:**	
E-mail:	abriden@pacificecorisk.com	**Attn:**	
Project Name:	Eureka Copper WER Event 2		
Project # / P.O.#:			

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Grab/ Comp	Container Number	Container Type	REQUESTED ANALYSIS: Total Cu
1	EFF-CuTot-0-Ti	11/12/15	1545	SW	Grab	1	500 mL plastic + HNO3	x
2	EFF-CuTot-82-Ti	11/12/15	1549	SW	Grab	1	500 mL plastic + HNO3	x
3	EFF-CuTot-117-Ti	11/12/15	1551	SW	Grab	1	500 mL plastic + HNO3	x
4	EFF-CuTot-138-Ti	11/12/15	1553	SW	Grab	1	500 mL plastic + HNO3	x
5	EFF-CuTot-162-Ti	11/12/15	1555	SW	Grab	1	500 mL plastic + HNO3	x
6	EFF-CuTot-190-Ti	11/12/15	1557	SW	Grab	1	500 mL plastic + HNO3	x
7	EFF-CuTot-224-Ti	11/12/15	1559	SW	Grab	1	500 mL plastic + HNO3	x
8								
9								
10								

Samples collected by: Stevi Vasquez

Comments/Special Instruction:
Report of the maximum number of significant figures possible
MDL Reporting Format

RELINQUISHED BY:	**RECEIVED BY:**
Signature: Alison Briden	**Signature:**
Print: Alison Briden	**Print:** Dennd Davidson
Organization: PER	**Organization:** CALTEST
Date: 11-23-15 **Time:** 0921	**Date:** 11/23/815 **Time:** 0921
RELINQUISHED BY:	**RECEIVED BY:**
Signature:	**Signature:** L Gacta
Print: Dennd Davidson	**Print:** L Gacta
Organization: CALTEST 1026	**Organization:** Caltest
Date: 11/23/15 **Time:** 0921	**Date:** 11/23/15 **Time:** 1026

***Example Matrix Codes:** (EFF - Effluent) (FW = Freshwater); (SW = Saltwater); (WW = Wastewater); (STRMW = Stormwater); (SED = Sediment); or other

0.4

Appendix H

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of *Mytilus galloprovincialis* Initiated on October 7, 2015

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	06-6993-3614	Test Type:	Development-Survival	Analyst:	Krista Prosser
Start Date:	07 Oct-15 16:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Diluted Seawater
Ending Date:	09 Oct-15 15:30	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	48h	Source:	Gutoff	Age:	NA

Sample ID:	14-2204-4632	Code:	NaCl	Client:	Reference Toxicant
Sample Date:	07 Oct-15 16:00	Material:	Potassium chloride	Project:	23979
Receive Date:	07 Oct-15 16:00	Source:	Reference Toxicant		
Sample Age:	NA (18.9 °C)	Station:	In House		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
05-2731-5799	Development Rate	1	2	1.414	0.63%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	g/L	95% LCL	95% UCL	TU	Method
19-2748-3124	Development Rate	EC50	2.43	2.42	2.44		Spearman-Kärber

Development Rate Summary

C-g/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Water Contr	4	0.996	0.992	1	0.995	1	0.00124	0.00247	0.25%	0.0%
0.5		4	0.999	0.995	1	0.995	1	0.00124	0.00248	0.25%	-0.24%
1		4	0.999	0.995	1	0.995	1	0.00121	0.00242	0.24%	-0.25%
2		4	0.983	0.969	0.996	0.976	0.995	0.00413	0.00827	0.84%	1.38%
3		4	0	0	0	0	0	0	0		100.0%
4		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

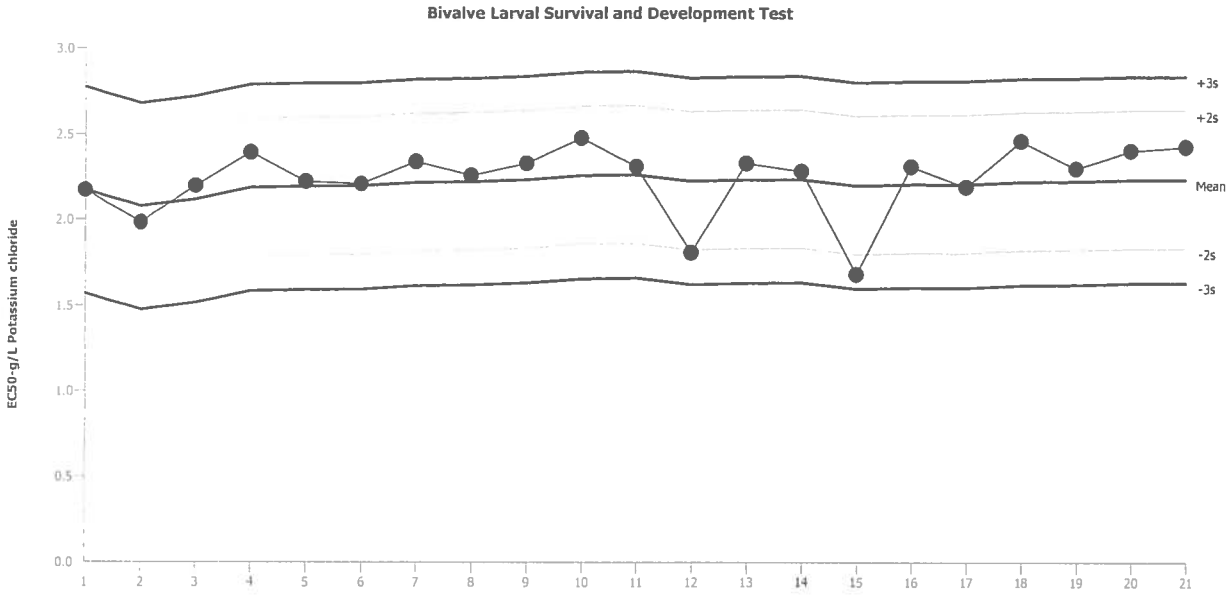
C-g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	0.996	0.995	1	0.995
0.5		1	1	1	0.995
1		1	1	1	0.995
2		0.995	0.981	0.979	0.976
3		0	0	0	0
4		0	0	0	0

Development Rate Binomials

C-g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	226/227	208/209	191/191	183/184
0.5		185/185	174/174	195/195	201/202
1		180/180	181/181	185/185	206/207
2		189/190	202/206	187/191	205/210
3		0/154	0/166	0/158	0/155
4		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Test Type:	Development-Survival	Organism:	Mytilus galloprovincialis (Bay Mussel	Material:	Potassium chloride
Protocol:	EPA/600/R-95/136 (1995)	Endpoint:	Development Rate	Source:	Reference Toxicant-REF



Mean:	2.236	Count:	20	-2s Warning Limit:	1.834	-3s Action Limit:	1.633
Sigma:	0.201	CV:	8.99%	+2s Warning Limit:	2.638	+3s Action Limit:	2.839

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2015	Jun	4	15:02	2.175	-0.06058	-0.3014			14-5989-4485	09-4503-4492
2			10	15:06	1.986	-0.2501	-1.244			17-5117-3090	09-9651-2367
3			17	15:35	2.201	-0.03548	-0.1765			07-1269-8748	17-6400-3820
4			18	14:43	2.396	0.1603	0.7977			04-5581-8724	05-4528-7508
5			24	15:20	2.226	-0.01037	-0.05159			00-7647-1657	16-2754-1617
6			26	16:33	2.211	-0.02484	-0.1236			00-7259-7183	07-1186-0006
7		Jul	2	15:18	2.342	0.106	0.5276			20-9458-8109	02-0035-8612
8			8	16:30	2.262	0.02573	0.128			04-8723-7971	12-9180-4594
9			16	15:41	2.332	0.0961	0.4781			19-8769-2934	18-0269-6882
10			22	14:43	2.48	0.2437	1.212			15-9867-5965	18-7997-8755
11			30	15:22	2.313	0.07737	0.3849			03-9880-4752	15-3150-1590
12		Aug	5	13:41	1.812	-0.4245	-2.112	(-)		04-3367-8602	05-0884-8190
13			13	14:45	2.333	0.09675	0.4814			01-2287-9888	03-2280-0224
14			19	15:31	2.287	0.05071	0.2523			19-0503-2732	18-5911-9861
15			22	19:13	1.685	-0.5511	-2.742	(-)		11-6852-1356	12-8277-0939
16			27	14:32	2.314	0.07809	0.3885			10-9705-1899	19-5617-1761
17		Sep	3	15:40	2.193	-0.04312	-0.2145			21-3900-4916	18-4916-1672
18			10	12:55	2.461	0.2249	1.119			05-8966-9878	19-8439-5478
19			17	15:00	2.301	0.06547	0.3257			18-5852-7061	04-7085-1435
20		Oct	1	14:59	2.405	0.1694	0.8429			12-8596-0898	09-0389-8387
21			7	16:00	2.429	0.1927	0.9589			20-0897-1839	19-2748-3124

Mytilus sp. Development Toxicity Test Count Data

Client: **Reference Toxicant**
Test Material: Potassium Chloride
Test ID #: 62141
Project #: 23979

Test Start Date: 10/7/15
Test End Date: 10/9/15
Enumeration Date: 10/21/15
Investigator: IA

Treatment (g/L)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Control	A	226	1	227	99.6
	B	208	1	209	99.5
	C	191	0	191	100.0
	D	183	1	184	99.5
0.5	A	185	0	185	100.0
	B	174	0	174	100.0
	C	195	0	195	100.0
	D	201	1	202	99.5
1	A	180	0	180	100.0
	B	181	0	181	100.0
	C	185	0	185	100.0
	D	206	1	207	99.5
2	A	189	1	190	99.5
	B	202	4	206	98.1
	C	187	4	191	97.9
	D	205	5	210	97.6
3	A	0	154	154	0.0
	B	0	166	166	0.0
	C	0	158	158	0.0
	D	0	155	155	0.0
4	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: **Reference Toxicant**
Test Material: Potassium Chloride
Test ID#: 62141 Project #: 23979
Test Date: 10/7/15

Organism Log#: 9162 Age: N/A
Organism Supplier: Gutoff
Control/Diluent: FSW @ 30ppt

Day 0

Treatment (g/L)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.7	7.52	8.2	29.6	Ref Tox Stock # –
0.5	18.7	7.59	8.6	30.6	Test Solution Prep: SM
1	18.7	7.64	8.5	31.3	New WQ: WC
2	18.7	7.68	8.5	32.3	Innoculation Date: 10/7/15
3	18.7	7.70	8.6	33.3	Innoculation Time: 1600
4	18.7	7.73	8.7	34.3	Innoculation Signoff: SM
Meter ID	69A	PH15	RD10	EC11	

Day 1

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.9				Date: 10/8/15
0.5	18.9				WQ: Le
1	18.9				
2	18.9				
3	18.9				
4	18.9				
Meter ID	69A				

Day 2

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	18.9	7.77	~~9.0~~ 7.5	~~31.4~~ 29.7	Termination Date: 10/9/15
0.5	18.9	7.78	~~9.1~~ 7.5	30.8	Termination Time: 1530
1	18.9	7.74	7.5	31.4	Termination Signoff: Le
2	18.9	7.72	7.5	31.7	Old WQ: WC
3	18.9	7.76	7.6	33.5	
4	18.9	7.78	7.6	34.6	
Meter ID	69A	PH22	RD10	EC09	

Appendix I

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of *Mytilus galloprovincialis* Initiated on November 12, 2015

CETIS Summary Report

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Batch ID:	07-7926-2730	Test Type:	Development-Survival	Analyst:	Aaron Edgington
Start Date:	12 Nov-15 16:45	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Diluted Seawater
Ending Date:	14 Nov-15 15:45	Species:	Mytilus galloprovincialis	Brine:	Not Applicable
Duration:	47h	Source:	Gutoff	Age:	NA

Sample ID:	21-2361-6267	Code:	KCl	Client:	Reference Toxicant
Sample Date:	12 Nov-15 16:45	Material:	Potassium chloride	Project:	23984
Receive Date:	12 Nov-15 16:45	Source:	Reference Toxicant		
Sample Age:	NA (17.9 °C)	Station:	In House		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
17-7423-3242	Development Rate	1	2	1.414	0.71%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	g/L	95% LCL	95% UCL	TU	Method
01-2606-2689	Development Rate	EC50	1.94	1.9	1.98		Trimmed Spearman-Kärber

Development Rate Summary

C-g/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Water Contr	4	0.993	0.985	1	0.989	1	0.00267	0.00534	0.54%	0.0%
0.5		4	0.983	0.98	0.986	0.98	0.985	0.000992	0.00198	0.2%	1.05%
1		4	0.99	0.98	1	0.982	0.995	0.00302	0.00604	0.61%	0.33%
2		4	0.575	0.548	0.602	0.549	0.587	0.00857	0.0171	2.98%	42.1%
3		4	0	0	0	0	0	0	0		100.0%
4		4	0	0	0	0	0	0	0		100.0%

Development Rate Detail

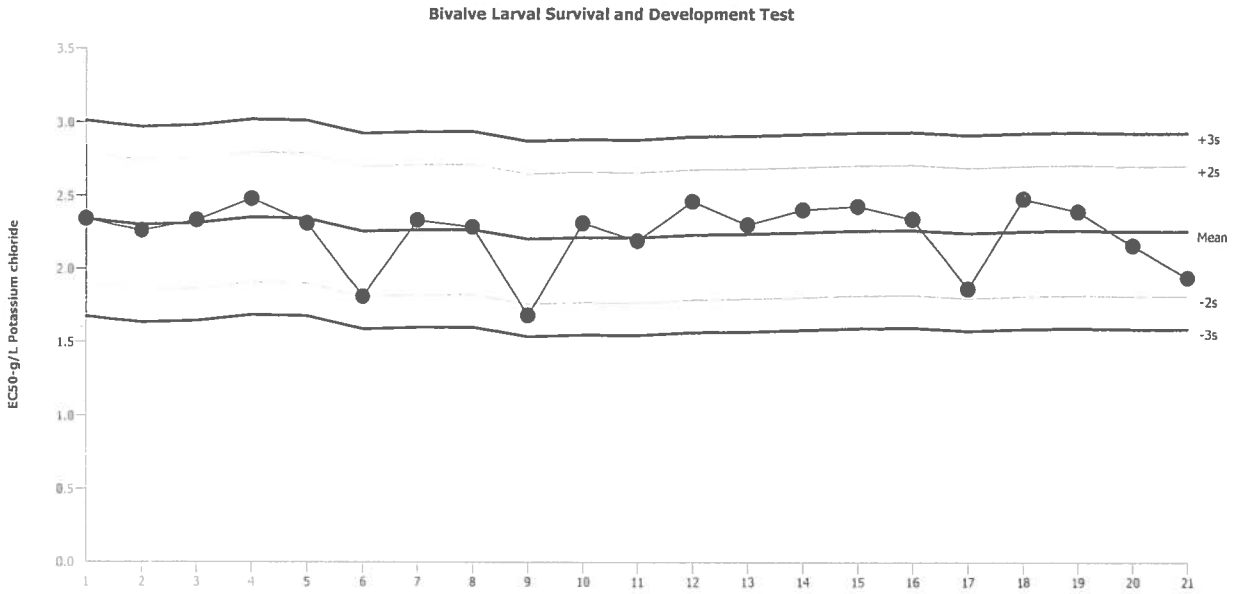
C-g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	0.989	1	0.989	0.995
0.5		0.983	0.984	0.985	0.98
1		0.99	0.982	0.994	0.995
2		0.549	0.587	0.581	0.582
3		0	0	0	0
4		0	0	0	0

Development Rate Binomials

C-g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water Contr	178/180	180/180	183/185	216/217
0.5		172/175	181/184	197/200	199/203
1		197/199	160/163	161/162	196/197
2		100/182	88/150	100/172	85/146
3		0/159	0/160	0/157	0/163
4		0/1	0/1	0/1	0/1

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Test Type:	Development-Survival	**Organism:**	Mytilus galloprovincialis (Bay Mussel	**Material:**	Potassium chloride
Protocol:	EPA/600/R-95/136 (1995)	**Endpoint:**	Development Rate	**Source:**	Reference Toxicant-REF



Mean:	2.259	**Count:**	20	**-2s Warning Limit:**	1.815	**-3s Action Limit:**	1.593
Sigma:	0.222	**CV:**	9.83%	**+2s Warning Limit:**	2.703	**+3s Action Limit:**	2.925

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2015	Jul	2	15:18	2.342	0.08305	0.3741			20-9458-8109	02-0035-8612
2			8	16:30	2.262	0.002734	0.01232			04-8723-7971	12-9180-4594
3			16	15:41	2.332	0.0731	0.3293			19-8769-2934	18-0269-6882
4			22	14:43	2.48	0.2207	0.9939			15-9867-5965	18-7997-8755
5			30	15:22	2.313	0.05437	0.2449			03-9880-4752	15-3150-1590
6		Aug	5	13:41	1.812	-0.4475	-2.016	(-)		04-3367-8602	05-0884-8190
7			13	14:45	2.333	0.07375	0.3322			01-2287-9888	03-2280-0224
8			19	15:31	2.287	0.02771	0.1248			19-0503-2732	18-5911-9861
9			22	19:13	1.685	-0.5741	-2.586	(-)		11-6852-1356	12-8277-0939
10			27	14:32	2.314	0.05509	0.2482			10-9705-1899	19-5617-1761
11		Sep	3	15:40	2.193	-0.06612	-0.2979			21-3900-4916	18-4916-1672
12			10	12:55	2.461	0.2019	0.9092			05-8966-9878	19-8439-5478
13			17	15:00	2.301	0.04247	0.1913			18-5852-7061	04-7085-1435
14		Oct	1	14:59	2.405	0.1464	0.6595			12-8596-0898	09-0389-8387
15			7	16:00	2.429	0.1697	0.7646			20-0897-1839	19-2748-3124
16			15	15:01	2.342	0.08253	0.3718			20-8140-7576	18-1485-0053
17			16	14:30	1.866	-0.3931	-1.771			14-3247-8613	01-3507-5945
18			21	14:46	2.478	0.2186	0.9846			00-7722-0072	09-6956-3721
19			31	13:52	2.392	0.1328	0.5983			13-6731-9149	02-9930-7267
20		Nov	4	16:30	2.161	-0.09817	-0.4422			17-1197-4253	11-1225-9849
21			12	16:45	1.941	-0.3183	-1.434			15-8426-4889	01-2606-2689

Analyst: [signature] QA: KP

Mytilus sp. Development Toxicity Test Count Data

Client: **Reference Toxicant**
Test Material: Potassium Chloride
Test ID #: 62146
Project #: 23984

Test Start Date: 11/12/15
Test End Date: 11/14/15
Enumeration Date: 11/19/15
Investigator: LA

Treatment (g/L)	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Control	A	178	2	180	98.9
	B	180	0	180	100.0
	C	183	2	185	98.9
	D	216	1	217	99.5
0.5	A	172	3	175	98.3
	B	181	3	184	98.4
	C	197	3	200	98.5
	D	199	4	203	98.0
1	A	197	2	199	99.0
	B	160	3	163	98.2
	C	161	1	162	99.4
	D	196	1	197	99.5
2	A	100	82	182	54.9
	B	88	62	150	58.7
	C	100	72	172	58.1
	D	85	61	146	58.2
3	A	0	159	159	0.0
	B	0	160	160	0.0
	C	0	157	157	0.0
	D	0	163	163	0.0
4	A	0	0	0	0.0
	B	0	0	0	0.0
	C	0	0	0	0.0
	D	0	0	0	0.0

Mytilus sp. Development Toxicity Test Water Chemistry Data

Client: **Reference Toxicant**
Test Material: Potassium Chloride
Test ID#: 62146 Project #: 23984
Test Date: 11/12/15

Organism Log#: 9251 Age: N/A
Organism Supplier: Taylor Shellfish Co
Control/Diluent: FSW @ 30ppt

Day 0

Treatment (g/L)	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	17.9	7.96	9.1	30.3	Ref Tox Stock # —
0.5	17.9	7.94	9.0	31.4	Test Solution Prep: YJ
1	17.9	7.93	9.0	32.1	New WQ: 11
2	17.9	7.92	8.0	33.1	Innoculation Date: 11/12/15
3	17.9	7.92	8.7	34.2	Innoculation Time: 1645
4	17.9	7.92	8.7	35.2	Innoculation Signoff: YJ
Meter ID	69A	pH19	RD12	EC11	

Day 1

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	17.8				Date: 11/13/15
0.5	17.8				WQ: YJ
1	17.8				
2	17.8				
3	17.8				
4	17.8				
Meter ID	69A				

Day 2

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	17.6	7.84	7.1	31.4	Termination Date: 11/14/15
0.5	17.6	7.87	7.3	32.0	Termination Time: 1545 ~~1525~~ 1530 11/14/15
1	17.6	7.87	7.4	32.5	Termination Signoff: CD
2	17.6	7.87	7.4	33.6	Old WQ: WC
3	17.6	7.87	7.3	34.7	
4	17.6	7.85	7.2	35.8	
Meter ID	69A	P1121	RD10	EC11	