California Oil Spill Study and Evaluation Program

Evaluation of Subchronic and Developmental Toxicity of the Dispersant Corexit EC9500A

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Table of Contents

Evaluation of Subchronic and Developmental Toxicity of the Dispersant Corexit EC9500A 1

Introduction 3

Methods 3

Results and Discussion 7

Dispersant-Only Tests 7

CEWAF (Dispersant/Oil) Results 10

Conclusions 12

References 13

Appendix A – Data Figures and Summary Tables 15

Appendix B – Chain of Custody Documentation 25

Appendix C – Scans of Laboratory Toxicity Test Packets and Analytical Reports 26

Introduction

The United States Environmental Protection Agency (U.S. EPA) regulates the testing and listing of various categories of oil spill cleanup agents (OSCA) under Subpart J of the National Contingency Plan. At the California state level, the Office of Spill Prevention and Response (OSPR) is mandated to regulate the licensing and use of OSCAs, including dispersants.

Both programs require acute toxicity testing of most OSCAs, but the U.S. EPA program does not have established OSCA toxicity thresholds, while the OSPR program does. The U.S. EPA program does not yet require toxicity or developmental effects testing of endemic species, while the OSPR program has required embryo-larval development tests using red abalone (*Haliotis rufescens*) embryos since 1996. Neither program currently requires toxicity testing for chronic/subchronic effects, although there has been a large demand for this since the Deepwater Horizon spill. The two programs have also used different approaches to other aspects of OSCA testing (e.g., different dispersant efficacy tests, different subject oils and weathering states).

These circumstances have led to OSCA toxicity and efficacy data that were not directly comparable between the two agencies and did not allow OSPR to consider most of the other dispersants previously reviewed by U.S. EPA as having adequate toxicity and efficacy data. In addition, it did not allow OSPR to fully and adequately determine what other dispersant products should be considered for California licensing.

The U.S. EPA has proposed revisions to Subpart J that would (U.S. EPA 2015), in addition to the acute toxicity testing on two new reference oils (Alaska North Slope crude, IFO 120), add subchronic toxicity testing and tests for developmental effects on purple sea urchin embryos (considered a comparable test endpoint to red abalone). Updates to the OSPR licensing program are intended to follow and align with the U.S. EPA program to the degree possible and as determined by the results of comparative toxicity and efficacy testing.

This project fully evaluated the dispersant Corexit 9500A based on the proposed revisions to Subpart J. This evaluation includes acute toxicity tests on dispersant and dispersant/oil mixtures with Alaska North Slope oil, as well as sub-chronic toxicity tests and embryo-larval urchin toxicity tests on dispersants only. To link proposed results with fish, mysids, and sea urchins, as well as historic abalone embryo-larval data with other dispersants, red abalone embryo-larval development tests were also conducted.

Methods

Six separate toxicity test protocols were used in this study. Two acute protocols: the 48-hour test with mysid shrimp (*Americamysis bahia*) and the 96-hour test with topsmelt (*Atherinops affinis*), as well as four chronic protocols: 7-day tests with mysid shrimp and topsmelt, the 72-

hour test with purple urchins (*Strongylocentrotus purpuratus*), and the 48-hour test with red abalone (*Haliotis rufescens*). Acute tests followed protocols described in U.S. EPA (2002a), and chronic tests followed protocols described by U.S. EPA (1995), except for the chronic mysid shrimp tests, which followed U.S. EPA (2002b). Specific method names and protocol summaries are included in Table 1.

Mysids were obtained from Aquatic BioSystems (Fort Collins, CO) or Aquatic Research Organisms (Hampton, NH), and topsmelt were obtained from Aquatic BioSystems. Abalone brood stock were previously obtained from The Cultured Abalone (Goleta, CA), but had been held at the Marine Pollution Studies Laboratory at Granite Canyon (MPSL) for approximately one year. Acclimation conditions for purchased test organisms are included in scanned test packets (Appendix C). In-house cultures were maintained in flow-through conditions with seawater at ambient temperature and salinity.

Positive control reference toxicant tests were conducted using dilutions of copper or zinc chosen to bracket the various effects concentrations for each test organism. Reference toxicant tests are designed to track ongoing laboratory performance and relative organism health (U.S. EPA 1995). The preparation of control charts demonstrating the cumulative trend of statistical point estimates, and the relative variability among charted statistics, are necessary to interpret overall lab and organism performance.

Corexit EC9500A dispersant was obtained through Robert Grosser of Pegasus Technical Services, Inc. (on-site contractor for EPA) and received in September 2018 (Lot #CX3E0010A0). Alaska North Slope (ANS) oil was obtained through Paul Meyer of the Bureau of Safety and Environmental Enforcement and received in June 2019 (Lot #PET105002. See Appendix B for chain of custody). All toxicity test experiments were conducted at MPSL. MPSL is accredited under the California Environmental Laboratory Accreditation Program (ELAP #2821).

Corexit EC9500A was tested in duplicate with all toxicity test protocols. Rangefinder tests were conducted with dispersant concentration ranges based on previously published median-lethal concentrations for other formulations of Corexit 9500 (George-Ares and Clark 2000; Singer et al. 1995; 1996; Singer et al. 1991; Word et al. 2015). In some cases, the series of concentrations used in the rangefinder experiment was repeated for the definitive experiment (Table 1). Dispersant/oil mixtures were tested in duplicate with only the acute protocols. All dispersant concentrations and dispersant/oil concentrations were prepared with MPSL seawater filtered to one µm. Ambient salinity was 34 ±1‰. Dissolved oxygen ranged from approximately 7.50 mg/L to 8.00 mg/L, and pH ranged from 7.50 to 8.10. All tests were conducted under ambient laboratory illumination with a photoperiod of 16-hour light, 8- hour dark with a light intensity of 10 – 20 $\mu E/m^2/s$.

Table 1. Summary of test conditions for dispersant toxicity.

Details	Acute *A. affinis*	Acute *A. bahia*	Chronic *A. affinis*	Chronic *A. bahia*	Chronic *S. purpuratus*	Chronic *H. rufescens*
Common Name	Topsmelt	Mysid Shrimp	Topsmelt	Mysid Shrimp	Purple Urchin	Red Abalone
Test Type	Static renewal (48-hours)	Static non-renewal	Static renewal (daily)	Static renewal (daily)	Static non-renewal	Static non-renewal
Duration	96-Hour	48-Hour	7-Day	7-Day	72-Hour	48-Hour
Salinity	34 ± 2‰	20 ± 2‰	34 ± 2‰	20 ± 2‰	34 ± 2‰	34 ± 2‰
Temperature	20 ± 1°C	25 ± 1°C	20 ± 1°C	25 ± 1°C	15 ± 1°C	15 ± 1°C
Chamber Size	1 liter	N/A	1 liter	N/A	20 mL	20 mL
Volume	200 mL	N/A	200 mL	N/A	10 mL	10 mL
Organism Supplier	Aquatic Biosystems	Aquatic Biosystems	Aquatic Biosystems	Aquatic Biosystems or Aquatic Research Organisms	MPSL	MPSL
Date Received	Rangefinder: 12/4/19 Definitive: 12/13/19	Rangefinder: 10/22/19 Definitive: 2/11/20	Rangefinder: 12/13/19 Definitive: 3/10/20	Rangefinder: 11/19/19 Definitive: 12/12/19	In-House Culture	In-House Culture
Organism Age	9-13 days	4-5 days	9-13 days	7 days	Newly fertilized embryos	Newly fertilized embryos
No. Organisms per replicate	5	10	5	5	250	100
No. Replicates	5	5	5	5	5	5
Feeding	40 Artemia nauplii per fish twice daily	50 Artemia nauplii per mysid twice daily	40 Artemia nauplii per fish twice daily	75 Artemia nauplii per mysid twice daily	None	None
Aeration	None, unless DO falls below 4.0 mg/L, then aerate all	None, unless DO falls below 4.0 mg/L, then aerate all	None, unless DO falls below 4.0 mg/L, then aerate all	None, unless DO falls below 4.0 mg/L, then aerate all	N/A	N/A
Concentrations	5 exposure concentrations and negative control	5 exposure concentrations and negative control	5 exposure concentrations and negative control	5 exposure concentrations and negative control	5 exposure concentrations and negative control	5 exposure concentrations and negative control
Endpoints	Survival	Survival	Survival and Biomass	Survival and Growth	Normal Development	Normal Development
Acceptability	≥90% Survival in Controls	≥90% Survival in Controls	≥80% survival in controls, Control larval biomass = 0.85 mg average	N/A	≥80% Normal Development in Controls	≥80% Normal Development in Controls
Dispersant Rangefinder Concentrations	0, 5.6, 10, 18, 32, 58, 100, 180 ppm	0, 5.6, 10, 18, 32, 58, 100, 180 ppm	0, 5.6, 10, 18, 32, 58, 100, 180 ppm	0, 3.2, 5.6, 10, 18, 32, 58, 100 ppm	0, 1.8, 3.2, 5.6, 10, 18, 32, 58, 100 ppm	0, 1.8, 3.2, 5.6, 10, 18, 32, 58, 100 ppm

Details	Acute *A. affinis*	Acute *A. bahia*	Chronic *A. affinis*	Chronic *A. bahia*	Chronic *S. purpuratus*	Chronic *H. rufescens*
Dispersant Definitive Concentrations	0, 5.6, 10, 18, 32, 58, 100, 180 ppm	0, 5.6, 10, 18, 32, 58, 100, 180 ppm	0, 5.6, 10, 18, 32, 58, 100, 180 ppm	0, 3.2, 5.6, 10, 18, 32, 58, 100 ppm	0, 1.8, 3.2, 5.6, 10, 18, 32, 58, 100 ppm	0, 0.56, 1.0 1.8, 3.2, 5.6, 10, 18, 32 ppm

Dispersant test solutions were prepared by creating a 1000 µL/L primary stock solution by adding one mL of dispersant to one liter of seawater in a one-liter glass beaker. The stock solution was mixed using a laboratory top stirrer equipped with a stainless steel blade. The stirrer blade was centered in the mixing vessel one inch off the bottom. The solution was mixed at 1250 rpm to achieve a 70% vortex. A glass pipette was used to remove appropriate aliquots of stock solution from between the mixing vessel wall and edge of the vortex. Aliquots were placed directly into pre-measured dilution water within individual exposure replicates. Each replicate was stirred individually. Renewal solutions were prepared using a similar stock solution preparation but were prepared in volumetric flasks and not in the individual replicates.

Chemically enhanced water accommodated fractions (CEWAF - dispersant/oil mixtures) were prepared by adding 19 liters of 1 µm-filtered seawater to a polycarbonate carboy equipped with a hose bib at the base, including a length of silicon tubing sealed with a hose clamp. Oil was added to the water at a rate of 25g per liter of water (475g). The stir plate beneath the carboy was adjusted to obtain an oil vortex of 25% of the total volume of the seawater, then dispersant was added at a ratio of 1:10 dispersant to oil. The carboy was securely sealed to reduce the loss of volatiles and the mixture was stirred for 18 hours, then allowed to settle for 6 hours. Temperature was maintained at 25°C during stirring and settling. The following day, the contents of the silicone tube was purged, and the CEWAF mixture was drained into clean glass containers without disturbing the surface oil slick. A two-liter subsample was sent to the Water Pollution Control Laboratory (Rancho Cordova, CA) to be analyzed for total petroleum hydrocarbons (TPH). Total petroleum hydrocarbons were measured using GC/MS (SWRCB 2012).

Median lethal concentrations (LC_{50}), no observed effect concentrations (NOECs) and lowest observed effect concentrations (LOEC) were calculated for each rangefinder and definitive test using Comprehensive Environmental Toxicity Information System (CETIS™) software, and the standard U.S. EPA statistical flow chart for hypothesis testing. Statistical calculations for dispersant-only tests used nominal dispersant concentrations in ppm, and calculations with dispersant/oil mixtures used TPH concentrations.

Results and Discussion

Dispersant-Only Tests

All toxicity tests have a minimum test acceptability criterion for survival (Table 1), but the topsmelt chronic test also has a criterion for minimum biomass. All tests met test acceptability criteria for survival, but the topsmelt rangefinder test did not meet the minimum test acceptability criterion for biomass, which is 0.85 mg. Although the control fish in this test had a lower than acceptable biomass of 0.65 mg, there was still a robust dose response, and the data were used to indicate the appropriate range of dispersant concentrations for use in the definitive test.

Organism response in dispersant reference toxicant tests for acute and chronic topsmelt, chronic mysids, abalone, and urchin tests were within two standard deviations of the running mean, indicating that the test organisms responded to the positive control in a manner consistent with previous tests. Dispersant reference toxicant tests for acute mysid tests were not responding to the copper due to insufficiently high concentrations for such a short exposure. This issue was not corrected until the definitive CEWAF test. Although there was only one successful acute mysid reference toxicant test, the calculated LC_{50} was similar to the LC_{50} of 60 ug/L reported in the literature (Ho et al. 1999). Issues with the strength of the copper chloride stock solutions were also noted with reference toxicant tests associated with acute topsmelt tests. Stock solutions gave the appearance of losing their potency. The issue was resolved with the purchase of new copper chloride, but tests were not repeated.

Water quality parameters were all within acceptable limits for the organisms and test duration except for some salinity values (Table 2). Salinity concentrations in all topsmelt and mysid tests were slightly outside the recommended ranges of 34 ± 2‰ and 20 ± 2‰, respectively. These minor deviations generally do not affect either organism because both can tolerate a wide range of salinities. Salinities for the larval tests were all within range. Some final dissolved oxygen concentrations were below 4.0 mg/L, but these samples were not aerated because the test was being terminated and these were the final measurements.

In most cases, rangefinder and definitive dispersant concentrations were identical (Figures 1 to 6, Appendix A), with the exception of the range of concentrations tested for the red abalone (Figure 5). Additional concentrations beyond the recommended five were tested to ensure a broad range of responses, and guarantee that at least the two highest concentrations had complete, or near-complete responses. Replicate data, daily organism counts, daily water quality measurements, and organism logs are all included in the scanned test packets in Appendix C. This appendix also includes printouts of all statistical analyses for dispersant, dispersant/oil and reference toxicant data, as well as the analytical reports for the TPH analysis.

Although similar concentrations were used in rangefinder and definitive experiments, NOECs and LOECs were not always identical, but were often within one concentration of each other (Table 3). The red abalone was the most sensitive organism to dispersant, with EC_{50} values that averaged 6.3 ppm. This concentration was less than half the average EC_{50} of 15.4 ppm reported by Singer et al. (1996) for an earlier formulation of Corexit 9500 (Table 4), but the exposure methods differed between static exposures in the current study and a flow-through exposure-recovery system in the previous study.

Table 2. Water quality summary for dispersant-only tests. DO indicates dissolved oxygen.

Species	Test	Start Date	DO Min/Max (mg/L)	pH Min/Max	Salinity Min/Max (‰)	Temperature Min/Max (°C)
A. bahia	48-Hour Rangefinder	10/23/19	4.85/7.18	7.23/7.78	20.0/22.0	25.5/26.2
A. bahia	48-Hour Definitive	2/12/20	2.50/7.54	7.52/8.06	21.2/23.3	24.8/25.5
A. affinis	96-Hour Rangefinder	12/5/19	2.94/7.52	7.44/7.67	30.0/42.9	18.4/20.6
A. affinis	96-Hour Definitive	12/16/19	3.57/7.34	7.49/8.10	33.8/35.7	20.0/21.0
A. bahia	7-Day Chronic Rangefinder	11/20/19	4.20/7.71	6.70/7.54	19.1/24.2	24.1/25.1
A. bahia	7-Day Chronic Definitive	12/13/19	3.79/6.82	7.20/8.01	20.9/24.9	23.9/27.3
A. affinis	7-Day Chronic Rangefinder	12/16/19	7.34/3.81	7.49/8.11	33.6/36.5	19.4/21.0
A. affinis	7-Day Chronic Definitive	3/11/20	5.10/7.42	7.84/8.10	33.3/36.9	19.2/20.0
H. rufescens	48-Hour Chronic Rangefinder	11/13/19	6.82/7.96	7.23/7.53	34.2/34.7	15.4/15.7
H. rufescens	48-Hour Chronic Definitive	12/11/19	7.31/8.05	7.03/7.73	33.6/34.6	16.0/15.9
S. purpuratus	72-Hour Chronic Rangefinder	10/1/19	7.68/8.03	7.40/7.70	34.0/35.9	14.9/14.9
S. purpuratus	72-Hour Chronic Definitive	4/17/20	8.39/8.59	7.65/8.00	33.8/35.4	13.8/14.1

As expected, the chronic mysid test had a lower average LC_{50} than that of the acute test because of its longer exposure (27.1 ppm vs. 38.8 ppm, Table 3). The average acute LC_{50} was similar to a previous static exposure study with Corexit 9500 (Table 4). The chronic mysid growth endpoint was less sensitive than the corresponding survival endpoint. The rangefinder

tests produced an IC_{25} of 43.9 ppm, whereas the IC_{25} of the definitive test could not be calculated because of lack of dose response.

Table 3. Statistical endpoints for dispersant-only tests. NOEC = no observed effect concentration. LOEC = lowest observed effect concentration. LC_{50} = median lethal concentration. IC_{25} = 25% inhibition concentration (for growth or biomass). EC_{50} = median effect concentration (for normal development). LCL and UCL = lower and upper confidence limits around the point estimate, respectively.

Species	Test	NOEC (ppm)	LOEC (ppm)	Point Est. Type	Point Est. Result (ppm)	95% LCL (ppm)	95% UCL (ppm)
A. bahia	48-Hour Rangefinder	18	32	LC_{50}	35.0	32.2	38.0
A. bahia	48-Hour Definitive	18	32	LC_{50}	42.6	37.7	48.1
A. affinis	96-Hour Rangefinder	32	56	LC_{50}	48.8	42.9	55.5
A. affinis	96-Hour Definitive	56	100	LC_{50}	71.5	67.1	76.2
A. bahia	7-Day Chronic Rangefinder (survival)	10	18	LC_{50}	20.9	17.8	24.6
A. bahia	7-Day Chronic Rangefinder (growth)	32	56	IC_{25}	43.9	26.2	49.4
A. bahia	7-Day Chronic Definitive (survival)	18	32	LC_{50}	33.2	29.8	37.1
A. bahia	7-Day Chronic Definitive (growth)	32	56	IC_{25}	>56	N/A	N/A
A. affinis	7-Day Chronic Rangefinder (survival)	56	100	LC_{50}	72.0	65.9	78.7
A. affinis	7-Day Chronic Definitive (biomass)	56	>56	IC_{25}	>56	N/A	N/A
A. affinis	7-Day Chronic Definitive (survival)	32	56	LC_{50}	62.3	54.8	70.7
A. affinis	7-Day Chronic Definitive (biomass)	56	>56	IC_{25}	>56	N/A	N/A
H. rufescens	48-Hour Chronic Rangefinder	1.8	3.2	EC_{50}	5.50	5.31	5.70
H. rufescens	48-Hour Chronic Definitive	5.6	10	EC_{50}	7.05	6.92	7.19
S. purpuratus	72-Hour Chronic Rangefinder	18	32	EC_{50}	32.3	31.2	33.3
S. purpuratus	72-Hour Chronic Definitive	10	18	EC_{50}	27.1	26.2	27.9

Table 4. Effect concentrations from current study compared to those from previous dispersant studies.

Species	Duration	Method	E/LC_{50} (ppm)	Reference
A. bahia	48-Hour	Static	38.8	Current Study (average from Table 3)
A. bahia	48-Hour	Static	42.4	Word et al. 2015
A. affinis	96-Hour	Static	60.2	Current Study (average from Table 3)
H. rufescens	48-Hour	Static	6.28	Current Study (average from Table 3)
H. rufescens	48-Hour	Exp./Rec.	15.4	Singer et al. 1996
S. purpuratus	72-Hour	Static	29.7	Current Study (average from Table 3)
S. purpuratus	72-Hour	Static	16.7->50	Echols et al. 2019

Tests with the purple sea urchin produced an average EC_{50} of 29.7 ppm, only slightly lower than the LC_{50} value for the chronic mysid test. The urchin EC_{50} was within the range of static EC_{50}s reported by Echols et al. (2019).

The topsmelt acute and chronic tests were the least sensitive with average LC_{50}s of 60.2 ppm and 67.2 ppm, respectively. The biomass endpoint of the chronic topsmelt test was also not as sensitive as the acute endpoint. Neither chronic topsmelt test was able to produce a biomass IC_{25} because of lack of dose response. There were no previous evaluations of Corexit 9500 with 96-hour topsmelt tests.

CEWAF (Dispersant/Oil) Results

CEWAFs were prepared on January 29, 2020, March 3, 2020, and June 17, 2020. After spinning for 18 hours and settling for 6 hours, underlying water was drained from beneath the oil layer and sampled for testing and chemical analysis of total petroleum hydrocarbons. Although prepared in a similar manner, the second CEWAF samples had a different appearance, and appeared “lighter” than the first (Martice Vasquez, CDFW, personal communication). This CEWAF sample had a significantly lower concentration of TPH, and it was determined that insufficient dispersant was added to the oil during preparation. A third CEWAF was prepared and produced appropriate dose responses, as well as a comparable TPH concentration to that of the rangefinder.

All tests met test acceptability criteria, and all water quality parameters were within acceptable limits for the organisms and test duration (Table 5). Some salinity values for the topsmelt tests were outside of the range, but this organism can tolerate a much wider range of salinity than utilized in this test, and the deviations likely did not affect the test organisms. Reference toxicant tests were discussed in the previous section.

Table 5. Water quality summary for CEWAF tests. DO indicates dissolved oxygen.

Species	Test	Start Date	DO Min/Max (mg/L)	pH Min/Max	Salinity Min/Max (‰)	Temperature Min/Max (°C)
A. bahia	48-Hour Rangefinder	1/29/20	3.57/8.14	7.56/8.17	30.1/31.7	25.4/25.6
A. bahia	48-Hour Definitive	6/17/20	4.55/6.59	7.64/7.99	30.9/31.5	24.9./25.1
A. affinis	96-Hour Rangefinder	1/29/20	5.66/8.14	7.91/8.17	30.1/36.1	19.0/20.6
A. affinis	96-Hour Definitive	6/17/20	4.89/6.77	7.58/7.99	30.9/35.0	19.5/19.6

Analytical reports for TPH analysis are listed in Appendix C and include quality assurance summaries for the analyses. Briefly, all criteria for the following quality controls met internal acceptance criteria for analyses performed, all sample holding times were met, all blanks were non-detect, lab control sample recoveries were within acceptable ranges, and surrogate compound recoveries were within acceptable ranges.

The final TPH concentrations of the rangefinder and definitive samples had to be adjusted for interference introduced by the addition of dispersant. These adjustments were made by analyzing the dispersant alone (without the presence of oil) to determine a correction factor. TPH concentrations for each test concentration were calculated by subtracting the correction factor from the total concentration. This dispersant-only correction factor was not determined during the analysis of the first CEWAF sample but was conducted as part of the analysis of the second and third CEWAF samples. Additional interference amounting to TPH concentrations higher than the oil mixture was measured in the dispersant-only sample that was part of the third analysis event. For this reason, the dispersant-only correction factor from the second analysis event was used to determine final CEWAF TPH concentrations. The TPH concentrations for the first and last CEWAF samples were 638 mg TPH/L and 483 mg TPH/L, respectively. All statistical calculations for CEWAF exposures were conducted based on TPH concentrations.

The rangefinder concentrations for the *A. bahia* CEWAF test proved to be above the range of the sensitivity of the mysid. The lowest concentration of CEWAF contained 19.9 mg TPH/L and caused 70% mortality. A NOEC could not be calculated, but the LC_{50} was interpolated as 7.77 mg TPH/L (Table 6). The definitive test used a lower range of CEWAF concentrations (Figure 7), and produced a NOEC of 3.78 mg/L, a LOEC of 7.55 mg/L and an LC_{50} of 12.9 mg TPH/L. Although the concentration ranges of both tests were different, the point estimates had overlapping confidence intervals, indicating they were not significantly different.

The rangefinder and definitive tests for the acute topsmelt test utilized the same CEWAF concentrations, but these translated to different TPH concentrations based on the hydrocarbon analysis of the 100% CEWAF sample (Appendix A, Figure 8). The concentration responses for both tests were fairly similar, but it is clear that the definitive test had a more sensitive

response. The LC_{50} for the rangefinder test was 83.9 mg/L TPH, whereas the LC_{50} for the definitive test was 56.7 mg/L TPH. These point estimates had overlapping confidence intervals, indicating they were not significantly different.

Table 6. Statistical endpoints for dispersant/oil CEWAF tests. NOEC = no observed effect concentration. LOEC = lowest observed effect concentration. LC_{50} = median lethal concentration. LCL and UCL = lower and upper confidence limits around the point estimate, respectively.

Species	Test Type & Duration	NOEC (mg TPH/L)	LOEC (mg TPH/L)	Point Est. Type	Point Est. Result (mg TPH/L)	95% LCL (mg TPH/L)	95% UCL (mg TPH/L)
A. bahia	48-Hour Rangefinder	<19.9	19.9	LC_{50}	7.77	4.64	13.5
A. bahia	48-Hour Definitive	3.78	7.55	LC_{50}	12.9	11.1	14.9
A. affinis	96-Hour Rangefinder	39.9	79.8	LC_{50}	83.9	67.7	104
A. affinis	96-Hour Definitive	30.3	61.0	LC_{50}	56.7	45.1	71.2

Conclusions

Among the dispersant-only tests, the red abalone was the most sensitive organism with an EC50 of 6.28 ppm (Table 7 and 8). The survival endpoint of the chronic mysid test was the second-most sensitive endpoint (LC50 = 27.1 ppm) followed closely by the urchin development endpoint (EC50 = 29.7 ppm). The mysids were the more sensitive of the two CEWAF test organisms. Topsmelt had a mean acute LC50 that was seven times that of the mean mysid LC50.

Table 7. Summary table of point estimate results for dispersant-only testing. LC_{50} = median lethal concentration. IC_{25} = 25% inhibition concentration (for growth or biomass). EC_{50} = median effect concentration (for normal development).

Species	Test Duration	Test Type	Point Estimate	Mean Conc. (ppm)
A. bahia	48-Hour	Acute	LC_{50}	38.8
A. bahia	7-Day	Chronic	LC_{50}	27.1
A. bahia	7-Day	Chronic	IC_{50}	43.9
A. affinis	96-Hour	Acute	LC_{50}	60.2
A. affinis	7-Day	Chronic	LC_{50}	67.2
A. affinis	7-Day	Chronic	IC_{50}	>56
H. rufescens	48-Hour	Chronic	EC_{50}	6.28
S. pupuratus	72-Hour	Chronic	EC_{50}	29.7

Table 8. Summary table of point estimate results for CEWAF testing. LC_{50} = median lethal concentration.

Species	Test Duration	Test Type	Point Estimate	Mean Conc. (mg TPH/L)
A. bahia	48-Hour	Acute	LC_{50}	10.3
A. affinis	96-Hour	Acute	LC_{50}	70.3

References

Echols BS, Langdon CJ, Stubblefield WA, G.M. R, Gardinali PR. 2019. A Comparative Assessment of the Aquatic Toxicity of Corexit 9500 to Marine Organisms. *Arch Environ Contam Toxicol* 77:40–50.

George-Ares A, Clark JR. 2000. Aquatic toxicity of two Corexit dispersants. *Chemosphere* 40 897-906.

Ho KT, Kuhn A, Pelletier MC, Hendricks TL, Helmstetter A. 1999. pH dependent toxicity of five metals to three marine organisms. *Environmental Toxicology* 14(2):235-240.

Singer MM, Smalheer DL, Tjeerdema RS, Martin M. 1991. Effects of spiked exposure to an oil dispersant on the early life stages of 4 marine species. *Environmental Toxicology and Chemistry* 10(10):1367-1374.

Singer MM, George S, Jacobson S, Lee I, Weetman LL, Tjeerdema R, Sowby ML. 1995. Acute toxicity of the oil dispersant Corexit 9554 to marine organisms. *Ecotoxicol Environ Saf* 32:81-86.

Singer MM, George S, Jacobson S, Lee I, Weetman LL, Tjeerdema R, Sowby ML. 1996. Comparison of Acute Aquatic Effects of the Oil Dispersant Corexit 9500 with Those of Other Corexit Series Dispersants. *Ecotoxicol Environ Saf* 35:183-189.

SWRCB. 2012. Leaking Underground Fuel Tank Guidance Manual. Sacramento, CA: California State Water Resources Control Board.

U.S. 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. Office of Research and Development. Washington DC, USA.

U.S. EPA. 2002a. Methods for measuring acute toxicity of effluents and receiving water to freshwater and marine organisms. EPA-821-R-02-012. Washington, D.C.: Office of Research and Development.

U.S. EPA. 2002b. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to marine and estuarine organisms. EPA-821-R-02-014. Office of Water, Washington DC, USA.

U.S. EPA. 2015. Federal Register, 40 CFR Parts 110 and 300, National Oil and Hazardous Substances Pollution Contingency Plan; Proposed Rule. In: Affairs OoP, editor. Washington DC. p. 68.

Word JQ, Clark JR, Word LS. 2015. Comparison of the Acute Toxicity of Corexit 9500 and Household Cleaning Products. *Human and Ecological Risk Assessment: An International Journal*(21):707-725.

Appendix A – Data Figures and Summary Tables

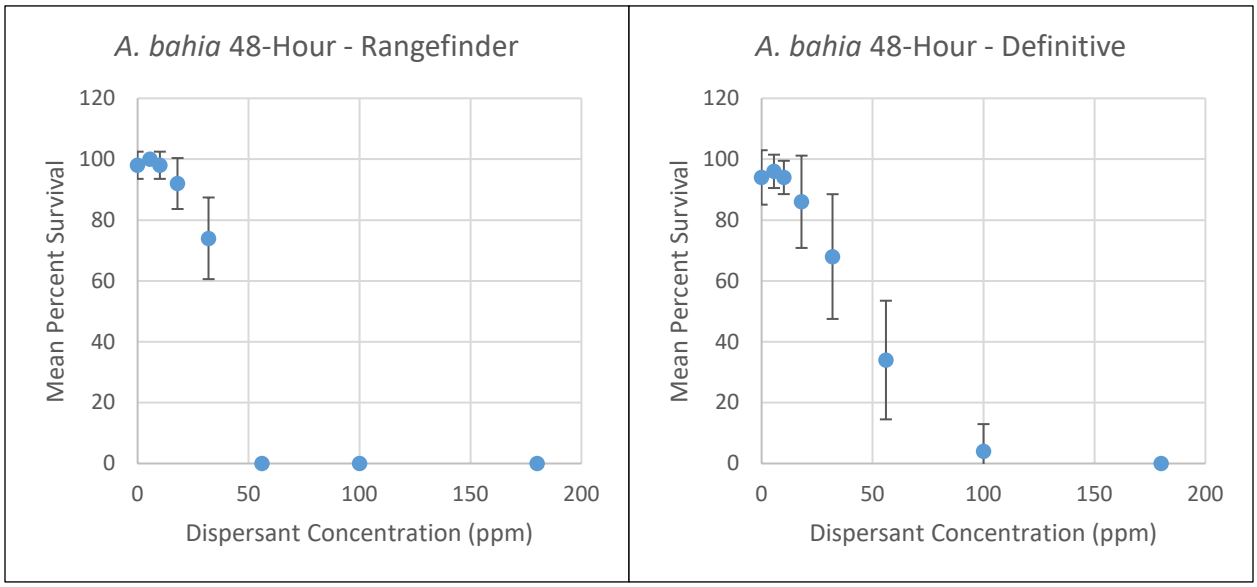


Figure 1. Mean percent survival vs. dispersant concentration for acute 48-hour dispersant tests with mysid shrimp (*Americamysis bahia*). Error bars indicate standard deviation. Data also presented in tabular format.

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)
0	98 ± 4.5	0	94 ± 8.9
5.6	100 ± 0	5.6	96 ± 5.5
10	98 ± 4.5	10	94 ± 5.5
18	92 ± 8.4	18	86 ± 15.2
32	74 ± 13.4	32	68 ± 20.5
56	0 ± 0	56	34 ± 19.5
100	0 ± 0	100	4 ± 8.9
180	0 ± 0	180	0 ± 0

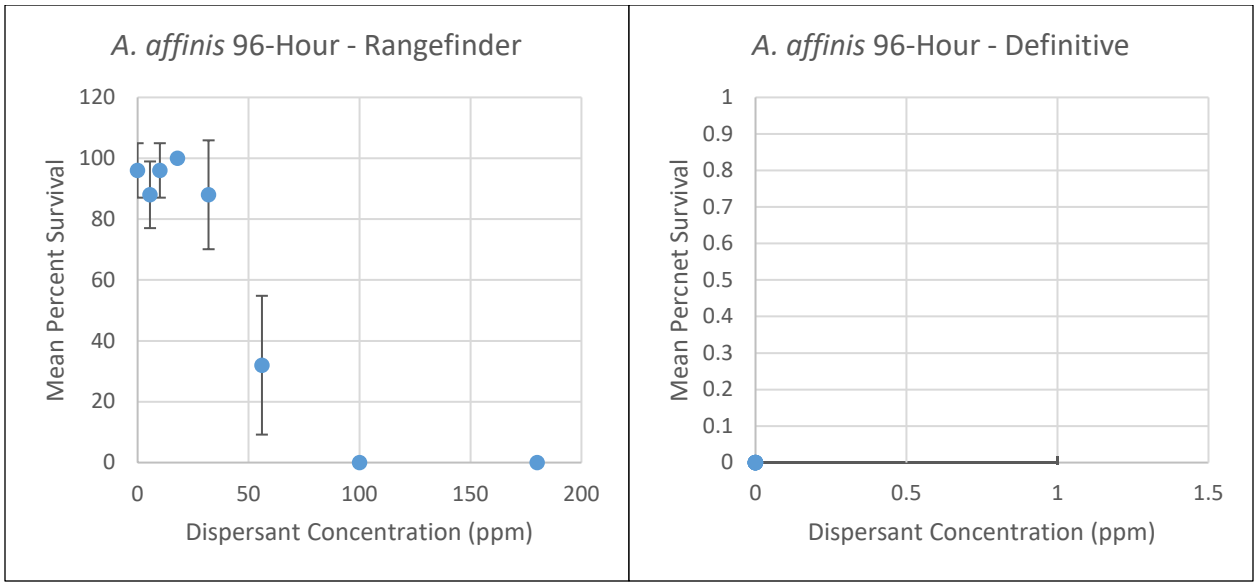


Figure 2. Mean percent survival vs. dispersant concentration for acute 96-hour dispersant tests with topsmelt (*Atherinops affinis*). Error bars indicate standard deviation. Data also presented in tabular format.

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)
0	96 ± 8.9	0	100 ± 0
5.6	88 ± 11.0	5.6	100 ± 0
10	96 ± 8.9	10	100 ± 0
18	100 ± 0	18	100 ± 0
32	88 ± 17.9	32	92 ± 11.0
56	32 ± 22.8	56	100 ± 0
100	0 ± 0	100	0 ± 0
180	0 ± 0	180	0 ± 0

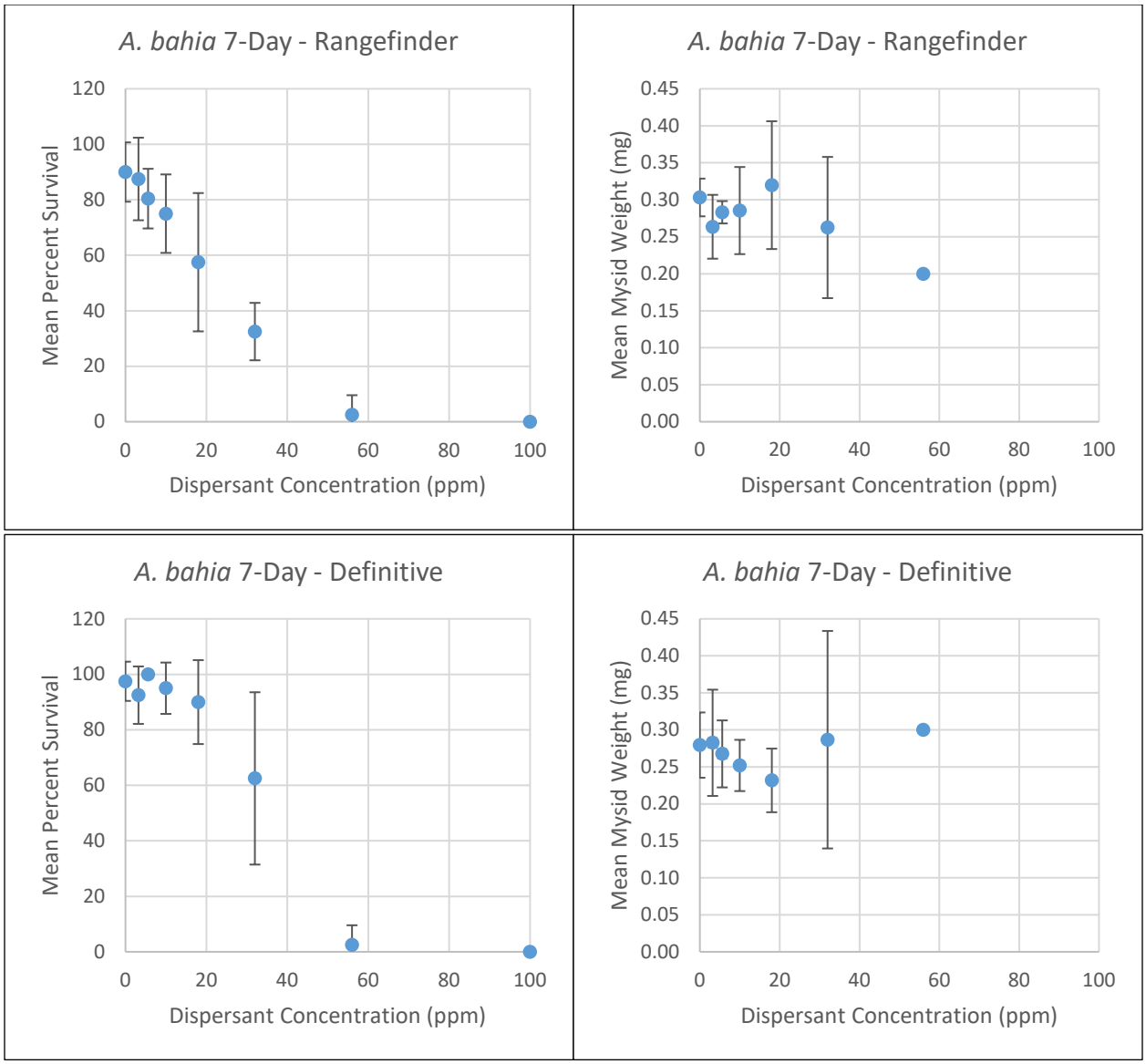


Figure 3. Mean percent survival vs. dispersant concentration for acute 7-Day dispersant tests with mysid (*Americamysis bahia*). Error bars indicate standard deviation. Data also presented in tabular format.

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Weight/Mysid (mg) (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)	Weight/Mysid (mg) (mean ± SD)
0	90 ± 10.7	0.303 ± 0.025	0	98 ± 7.1	0.279 ± 0.044
3.2	88 ± 14.9	0.264 ± 0.043	3.2	93 ± 10.4	0.283 ± 0.072
5.6	80 ± 10.8	0.283 ± 0.015	5.6	100 ± 0.0	0.268 ± 0.045
10	75 ± 14.1	0.285 ± 0.059	10	95 ± 9.3	0.252 ± 0.035
18	58 ± 24.9	0.320 ± 0.086	18	90 ± 15.1	0.232 ± 0.043
32	33 ± 10.4	0.263 ± 0.095	32	63 ± 31.1	0.287 ± 0.147

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Weight/Mysid (mg) (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)	Weight/Mysid (mg) (mean ± SD)
56	3 ± 7.1	0.200 ± NA	56	3 ± 7.1	0.300 ± NA
100	0 ± 0	NA	100	0 ± 0	NA ± NA

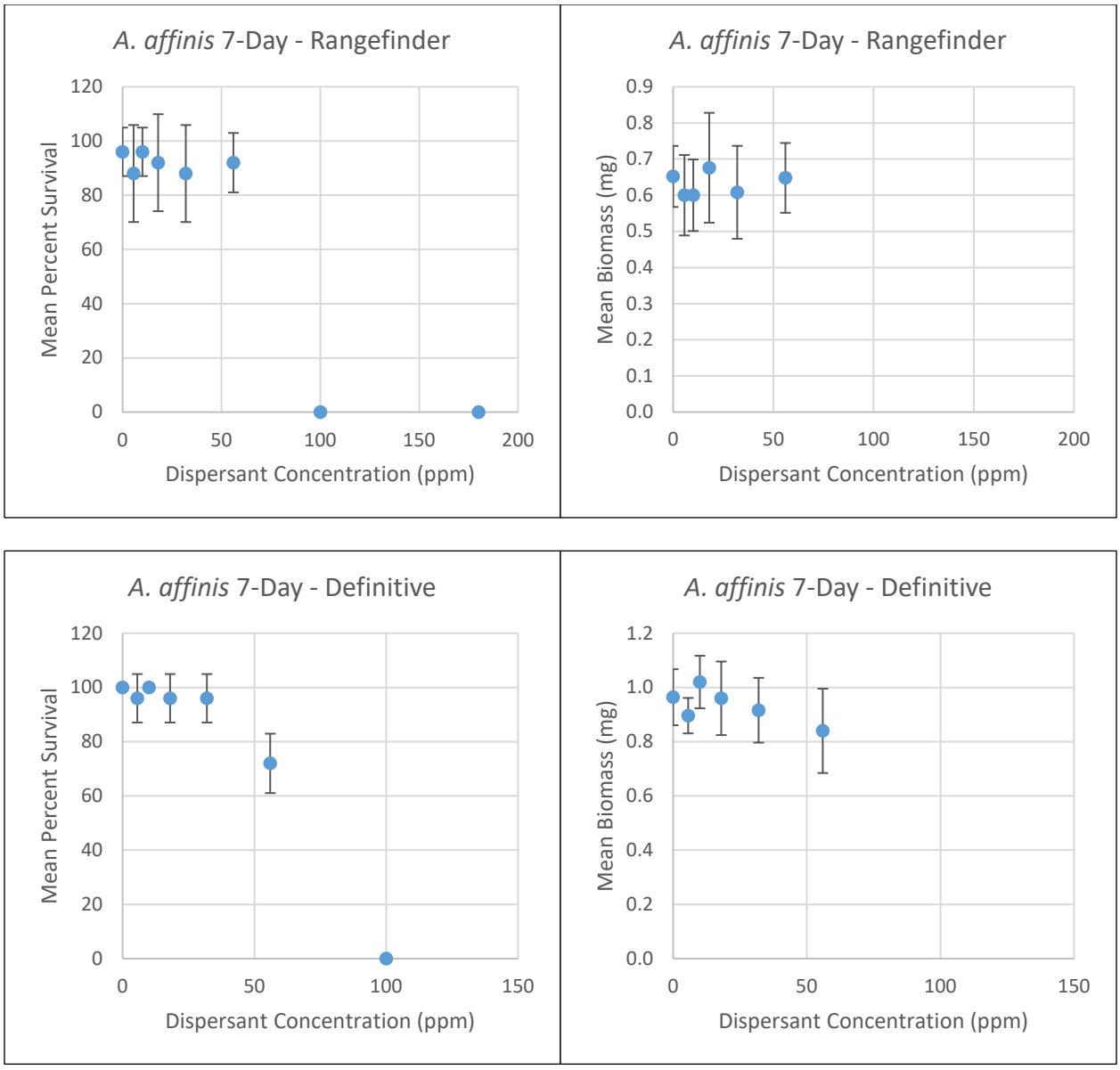


Figure 4. Mean percent survival vs. dispersant concentration for acute 7-Day dispersant tests with topsmelt (*Atherinops affinis*). Error bars indicate standard deviation. Data also presented in tabular format. NA indicates not analyzed.

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Weight/Mysid (mg) (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)	Weight/Mysid (mg) (mean ± SD)
0	96 ± 8.9	0.652 ± 0.025	0	100 ± 0	0.964 ± 0.103
5.6	88 ± 17.9	0.600 ± 0.043	5.6	96 ± 8.9	0.896 ± 0.065
10	96 ± 8.9	0.600 ± 0.015	10	100 ± 0	1.020 ± 0.097
18	92 ± 17.9	0.676 ± 0.059	18	96 ± 8.9	0.960 ± 0.136
32	88 ± 17.9	0.608 ± 0.086	32	96 ± 8.9	0.916 ± 0.119

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Weight/Mysid (mg) (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)	Weight/Mysid (mg) (mean ± SD)
56	92 ± 11.0	0.648 ± 0.095	56	72 ± 11.1	0.840 ± 0.156
100	0 ± 0	NA ± NA	100	0 ± 0	NA ± NA
180	0 ± 0	NA	NA	NA ± NA	NA ± NA

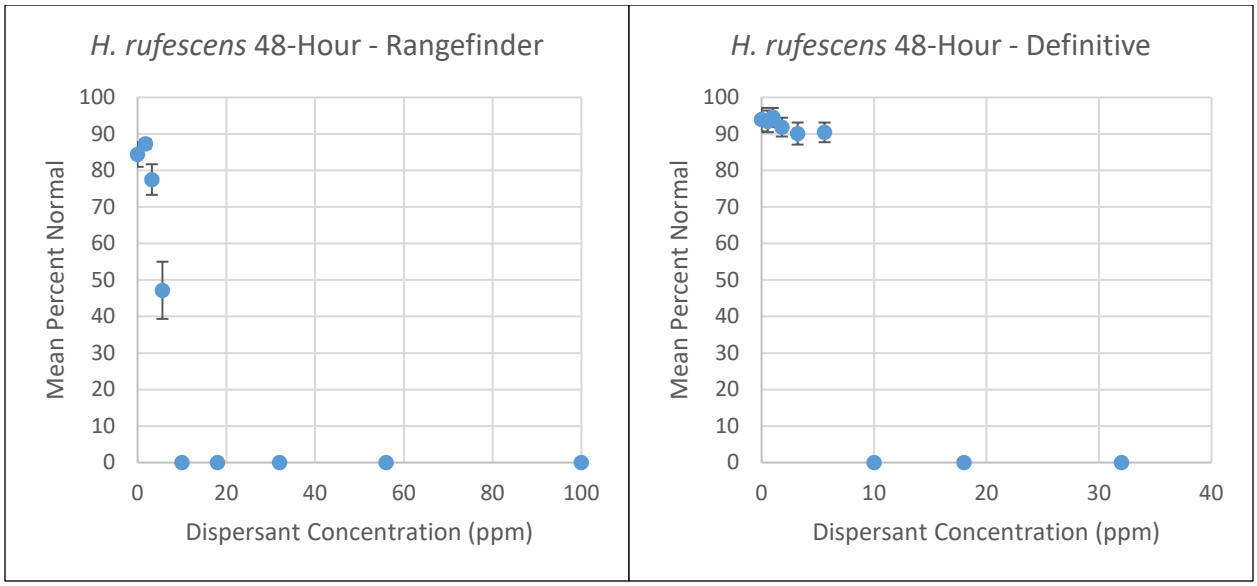


Figure 5. Mean percent survival vs. dispersant concentration for acute 48-Hour dispersant tests with red abalone larvae (*Haliotis rufescens*). Error bars indicate standard deviation. Data also presented in tabular format.

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)
0	84 ± 3.4	0	94 ± 3.2
1.8	87 ± 1.2	0.56	93 ± 3.0
3.2	78 ± 4.2	1	95 ± 2.6
5.6	47 ± 7.8	1.8	92 ± 2.6
10	0 ± 0	3.2	90 ± 3.0
18	0 ± 0	5.6	90 ± 2.7
32	0 ± 0	10	0 ± 0
56	0 ± 0	18	0 ± 0
100	0 ± 0	32	0 ± 0

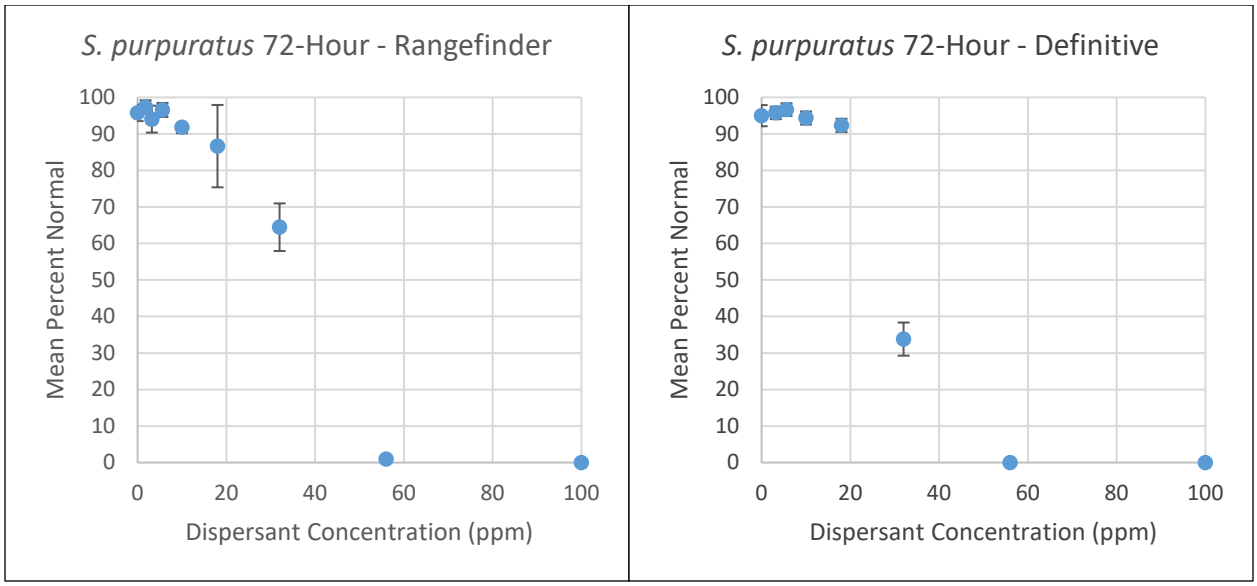


Figure 6. Mean percent survival vs. dispersant concentration for acute 48-Hour dispersant tests with purple urchin larvae (*Strongylocentrotus purpuratus*). Error bars indicate standard deviation. Data also presented in tabular format. NA indicates "not analyzed."

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)
0	96 ± 3.4	0	95 ± 2.9
1.8	97 ± 1.2	NA	NA
3.2	94 ± 4.2	3.2	96 ± 1.7
5.6	97 ± 7.8	5.6	97 ± 1.7
10	92 ± 0	10	94 ± 1.8
18	87 ± 0	18	92 ± 1.8
32	64 ± 0	32	34 ± 4.5
56	1 ± 0	56	0 ± 0
100	0 ± 0	100	0 ± 0

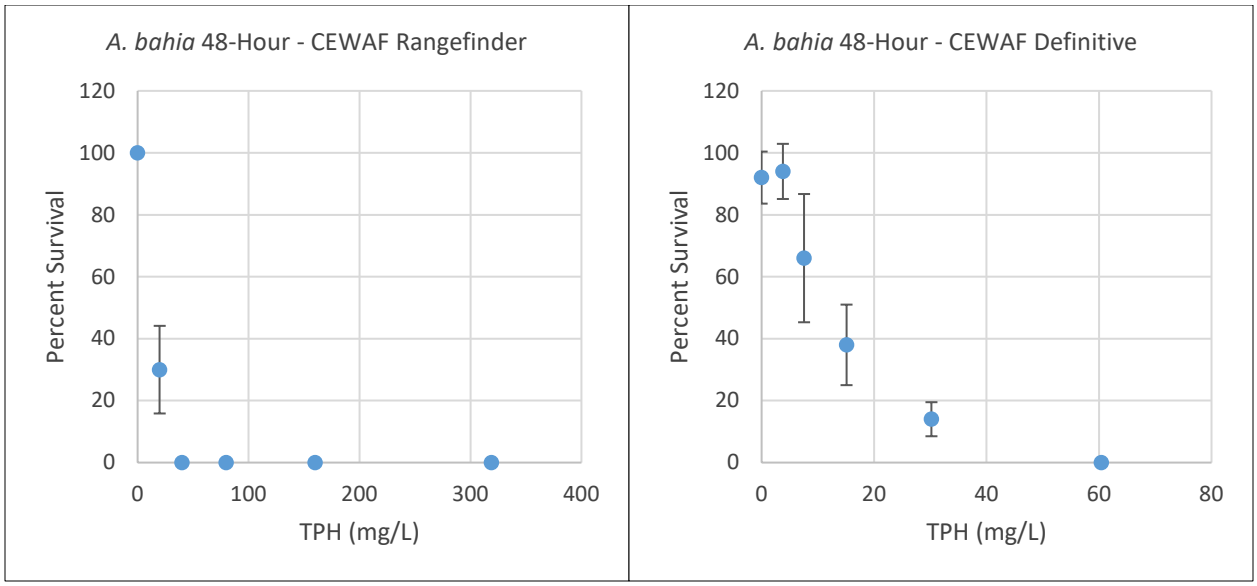


Figure 7. Mean percent survival vs. dispersant concentration for acute 48-hour CEWAF tests with mysid shrimp (*Americamysis bahia*). Error bars indicate standard deviation. Data also presented in tabular format.

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)
0	100 ± 0	0	92 ± 8.4
19.9	30 ± 14.1	3.78	94 ± 8.9
39.9	0 ± 0.0	7.55	66 ± 20.7
79.8	0 ± 0.0	15.1	38 ± 13.0
160	0 ± 0.0	30.2	14 ± 5.5
319	0 ± 0.0	60.4	0 ± 0.0

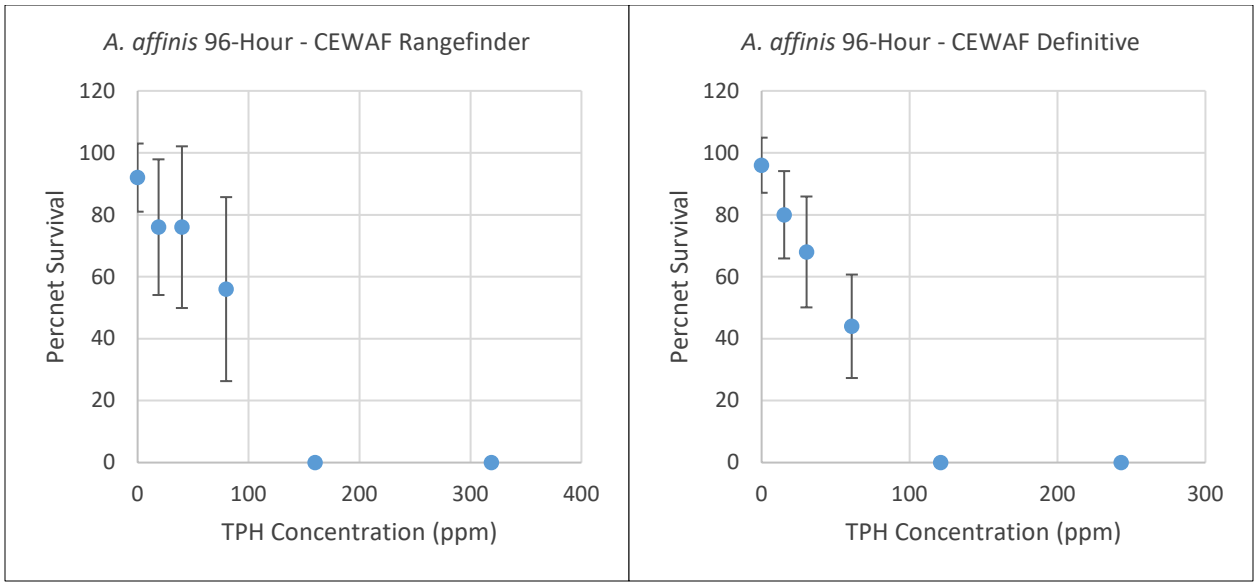


Figure 8. Mean percent survival vs. dispersant concentration for acute 96-hour CEWAF tests with topsmelt (*Atherinops affinis*). Error bars indicate standard deviation. Data also presented in tabular format.

Rangefinder Concentration (ppm)	Percent Survival (mean ± SD)	Definitive Concentration (ppm)	Percent Survival (mean ± SD)
0	92 ± 11.0	0	96 ± 8.9
19.9	76 ± 21.9	15.2	80 ± 14.1
39.9	76 ± 26.1	30.3	68 ± 17.9
79.8	56 ± 29.7	61	44 ± 16.7
160	0 ± 0.0	121	0 ± 0.0
319	0 ± 0.0	243	0 ± 0.0

Appendix B – Chain of Custody Documentation

DFW REQUEST FOR ANALYSIS AND CHAIN OF CUSTODY RECORD

Page_____ of _____

Sampler	Ph #	Send Results To	Lab Number
OHMSETT		JUDD MUSKAT	PET 1905002
Address		Address	Field Number
City	Zip	City / CA / Zip	Lab Storage OSPR R1
	CA	Copies To	Spill Title
Date Required/Reason		Address	Suspect
Shipped Via		City / Zip	Index-PCA

Fish & Wildlife Loss Date:_____ Region:_____

DFG Code Violation:_____

Suspected or Potential Problem

Routine Analysis

Water Temp: F or C pH: DO: mg/L Conductivity: u mhos/cm

Analysis Requested >>>

Sample Identification/Location (Draw map on separate sheet if necessary)	Collection Date	Collection Time	Petroleum Fingerprint	Trace Elements (Specify Below)	Pesticides (Specify Below)	Sample Type: Water	Sample Type: Filtered Water	Sample Type: Soil	Sample Type: Tissue	Number of Containers: Plastic	Number of Containers: Glass	Number of Containers: VOA Vial	Preservation: Temp	Preservation: Acid
Crude Oil (8 1L metal containers														
Containers labeled														
PET1905002 A – H														
5/17/19 Bottles A, B, C relinquished to Ellen Faurot Daniels														

Problem Description: For Judd's OSSRP Project – HOLD

Suspect/Incident Location

Comments/Special Instructions

Pollution Action Kit: Yes / No

Glove Size: Large / Medium

Hazmat Shipper Requested: Yes / No

Samples Relinquished By (Signature)	Print Name	Date	Received By (Signature)	Print Name	Date
				M. VASQUEZ	5/14/19
A, B, C Martin Vg	M. VASQUEZ	5/17/19	Ellen Faurot-Daniels	Ellen Faurot-Daniels	5/17/19

LAB COPIES: WHITE, CANARY, PINK SUBMITTER: GOLDENROD OSP 14 135117 FG 1000 (Rev. 8/14)

Aquatic Bioassessment Lab
9300 Elk Grove-Florin Road
Elk Grove, CA 95624
(916) 685-1880

Petroleum Chemistry Lab
1995 Nimbus Road
Rancho Cordova, CA 95670
(916) 358-2803

Water Pollution Control Lab
2005 Nimbus Road
Rancho Cordova, CA 95670
(916) 358-2858

Appendix C – Scans of Laboratory Toxicity Test Packets and Analytical Reports

Dispersant - *Americamysis* (Mysid) 48 Hour Range Finder - 10/23/19

Sample	Beaker	Rep	Day 0	Day 1	Day 2	Prop.	Mean	SD
0	1	1	10	10	10	1.00	0.98	0.04
	2	2	10	10	10	1.00		
	3	3	10	9	9	0.90		
	4	4	10	10	10	1.00		
	5	5	10	10	10	1.00		
5.6	6	1	10	10	10	1.00	1.00	0.00
	7	2	10	10	10	1.00		
	8	3	10	10	10	1.00		
	9	4	10	10	10	1.00		
	10	5	10	10	10	1.00		
10	11	1	10	10	10	1.00	0.98	0.04
	12	2	10	10	9	0.90		
	13	3	10	10	10	1.00		
	14	4	10	10	10	1.00		
	15	5	10	10	10	1.00		
18	16	1	10	10	10	1.00	0.92	0.08
	17	2	10	10	9	0.90		
	18	3	10	10	10	1.00		
	19	4	10	8	8	0.80		
	20	5	10	9	9	0.90		
32	21	1	10	10	9	0.90	0.74	0.13
	22	2	10	10	8	0.80		
	23	3	10	9	8	0.80		
	24	4	10	10	6	0.60		
	25	5	10	10	6	0.60		
56	26	1	10	3	0	0.00	0.00	0.00
	27	2	10	5	0	0.00		
	28	3	10	9	0	0.00		
	29	4	10	8	0	0.00		
	30	5	10	6	0	0.00		
100	31	1	10	5	0	0.00	0.00	0.00
	32	2	10	3	0	0.00		
	33	3	10	3	0	0.00		
	34	4	10	7	0	0.00		
	35	5	10	7	0	0.00		
180	36	1	10	0	0	0.00	0.00	0.00
	37	2	10	0	0	0.00		
	38	3	10	0	0	0.00		
	39	4	10	0	0	0.00		
	40	5	10	0	0	0.00		

CETIS Analytical Report

Mysidopsis 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	13-1194-1995	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:21	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	10-9639-0868	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	23 Oct-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	25 Oct-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	48h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	01-4097-9455	**Code:**	8672CFF	**Client:**	
Sample Date:	23 Oct-19	**Material:**	Corexit	**Project:**	
Receive Date:	23 Oct-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	18	32	24		9.33%

Dunnett Multiple Comparison Test

Control	vs	C-uL/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		5.6	-0.5044	2.3	0.149	8	0.9226	CDF	Non-Significant Effect
		10	0	2.3	0.149	8	0.8000	CDF	Non-Significant Effect
		18	1.448	2.3	0.149	8	0.2148	CDF	Non-Significant Effect
		32*	5.142	2.3	0.149	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4465959	0.111649	4	10.69	<0.0001	Significant Effect
Error	0.2088245	0.01044122	20			
Total	0.6554204		24			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	2.405	4.89	0.0956	Equal Variances
Variances	Levene Equality of Variance	5.187	4.43	0.0049	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.91	0.888	0.0305	Normal Distribution

48h Survival Rate Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.98	0.9245	1	1	0.9	1	0.02	4.56%	0.0%
5.6		5	1	1	1	1	1	1	0	0.0%	-2.04%
10		5	0.98	0.9245	1	1	0.9	1	0.02	4.56%	0.0%
18		5	0.92	0.8161	1	0.9	0.8	1	0.03742	9.09%	6.12%
32		5	0.74	0.5734	0.9066	0.8	0.6	0.9	0.06	18.1%	24.5%
56		5	0	0	0	0	0	0	0		100.0%
100		5	0	0	0	0	0	0	0		100.0%
180		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.379	1.289	1.47	1.412	1.249	1.412	0.03259	5.28%	0.0%
5.6		5	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	-2.36%
10		5	1.379	1.289	1.47	1.412	1.249	1.412	0.03259	5.28%	0.0%
18		5	1.286	1.126	1.446	1.249	1.107	1.412	0.05765	10.0%	6.78%
32		5	1.047	0.8509	1.243	1.107	0.8861	1.249	0.07066	15.1%	24.1%
56		5	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.5%
100		5	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.5%
180		5	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.5%

Mysidopsis 96-h Acute Survival Test **Granite Canyon**

Analysis ID:	13-1194-1995	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:21	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

48h Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1	1	0.9	1	1
5.6		1	1	1	1	1
10		1	0.9	1	1	1
18		1	0.9	1	0.8	0.9
32		0.9	0.8	0.8	0.6	0.6
56		0	0	0	0	0
100		0	0	0	0	0
180		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D					
5.6						
10						
18						
32						
56						
100						
180						

CETIS Analytical Report

Mysidopsis 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	00-9600-9581	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:21	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	10-9639-0868	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	23 Oct-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	25 Oct-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	48h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	01-4097-9455	**Code:**	8672CFF	**Client:**	
Sample Date:	23 Oct-19	**Material:**	Corexit	**Project:**	
Receive Date:	23 Oct-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.02	0.00%	1.544	0.01806	35	32.2	38.03

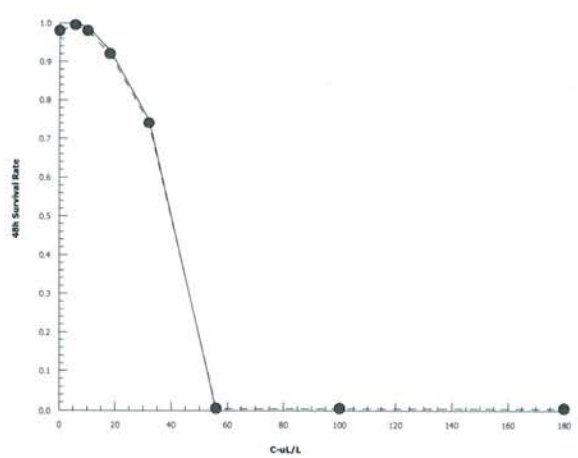
48h Survival Rate Summary

			Calculated Variate(A/B)								
C-uL/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Dilution Water	5	0.98	0.9	1	0.02	0.04472	4.56%	0.0%	49	50
5.6		5	1	1	1	0	0	0.0%	-2.04%	50	50
10		5	0.98	0.9	1	0.02	0.04472	4.56%	0.0%	49	50
18		5	0.92	0.8	1	0.03742	0.08367	9.09%	6.12%	46	50
32		5	0.74	0.6	0.9	0.06	0.1342	18.1%	24.5%	37	50
56		5	0	0	0	0	0		100.0%	0	50
100		5	0	0	0	0	0		100.0%	0	50
180		5	0	0	0	0	0		100.0%	0	50

48h Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	0.9	1	1
5.6		1	1	1	1	1
10		1	0.9	1	1	1
18		1	0.9	1	0.8	0.9
32		0.9	0.8	0.8	0.6	0.6
56		0	0	0	0	0
100		0	0	0	0	0
180		0	0	0	0	0

Graphics



Dispersant - *Americamysis* (Mysid) 48 Hour Range Finder - Ref Tox - 10/23/19

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Prop.	Mean	SD
0	1	1	10	10	10	1.00	0.98	0.04
	2	2	10	9	10	1.00		
	3	3	10	10	10	1.00		
	4	4	10	10	10	1.00		
	5	5	10	10	9	0.90		
32	6	1	10	10	10	1.00	0.98	0.04
	7	2	10	10	10	1.00		
	8	3	10	10	10	1.00		
	9	4	10	10	10	1.00		
	10	5	10	10	9	0.90		
56	11	1	10	10	10	1.00	0.92	0.11
	12	2	10	10	10	1.00		
	13	3	10	8	8	0.80		
	14	4	10	10	10	1.00		
	15	5	10	9	8	0.80		
100	16	1	10	10	10	1.00	0.96	0.05
	17	2	10	10	10	1.00		
	18	3	10	10	9	0.90		
	19	4	10	10	9	0.90		
	20	5	10	10	10	1.00		
180	21	1	10	9	7	0.70	0.88	0.13
	22	2	10	10	9	0.90		
	23	3	10	10	10	1.00		
	24	4	10	10	10	1.00		
	25	5	10	9	8	0.80		
320	26	1	10	9	6	0.60	0.64	0.11
	27	2	10	7	7	0.70		
	28	3	10	7	5	0.50		
	29	4	10	7	6	0.60		
	30	5	10	9	8	0.80		

Marine Pollution Studies Laboratory
Americamysis 4-day Reference Toxicant Test
Feeding: 50 Artemia nauplii per mysid, 2x daily

Project: Dispersant RF **Start Date/Time:** 10/23/19

Water Batch #: NA **End Date/Time:** 10/25/19

Lot #: AB102219

Cont.#	Concentration	Number at Start	Number Alive				Notes
			Day 1	Day 2	Day 3	Day 4	
1		10	10	10			
2			9	10			
3			10	10			
4			10	10			
5			10	9			
6			10	10			
7			10	10			
8			10	10			
9			10	10			
10			10	9			
11			10	10			
12			10	10			
13			8	8			
14			10	10			
15			9	8			
16			10	10			
17			10	10			
18			10	9			
19			10	9			
20			10	10			
21			9	7			
22			10	9			
23			10	10			
24			10	10			
25			9	8			
26			9	6			
27			7	7			
28			7	5			
29			7	6			
30		10	9	8			
Initials		JV, LD, ML	JV	JV			

Americamysis 48-h Acute Survival Test — **Granite Canyon**

Analysis ID:	10-1817-0719	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 15:08	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	07-3036-4115	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	23 Oct-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	25 Oct-19	**Species:**	Americamysis bahia	**Brine:**	
Test Length:	48h	**Taxon:**		**Source:**	**Age:**
Sample ID:	14-6000-3820	**Code:**	5705E3EC	**Project:**	Dispersant
Sample Date:	10 Apr-20 15:04	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 15:04	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	180	320	240		12.03%

Dunnett Multiple Comparison Test

Control vs	Conc-ug/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	32	0	2.362	0.189	8	CDF	0.8333	Non-Significant Effect
	56	1.116	2.362	0.189	8	CDF	0.3692	Non-Significant Effect
	100	0.4072	2.362	0.189	8	CDF	0.6866	Non-Significant Effect
	180	1.813	2.362	0.189	8	CDF	0.1373	Non-Significant Effect
	320*	5.6	2.362	0.189	8	CDF	2.2E-05	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.728781	0.145756	5	9.099	5.9E-05	Significant Effect
Error	0.384452	0.0160188	24			
Total	1.11323		29			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	6.006	15.09	0.3057	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9387	0.9031	0.0839	Normal Distribution

48h Survival Rate Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9800	0.9245	1.0000	1.0000	0.9000	1.0000	0.0200	4.56%	0.00%
32		5	0.9800	0.9245	1.0000	1.0000	0.9000	1.0000	0.0200	4.56%	0.00%
56		5	0.9200	0.7840	1.0000	1.0000	0.8000	1.0000	0.0490	11.91%	6.12%
100		5	0.9600	0.8920	1.0000	1.0000	0.9000	1.0000	0.0245	5.71%	2.04%
180		5	0.8800	0.7181	1.0000	0.9000	0.7000	1.0000	0.0583	14.82%	10.20%
320		5	0.6400	0.4984	0.7816	0.6000	0.5000	0.8000	0.0510	17.82%	34.69%

Angular (Corrected) Transformed Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.379	1.289	1.47	1.412	1.249	1.412	0.03259	5.28%	0.00%
32		5	1.379	1.289	1.47	1.412	1.249	1.412	0.03259	5.28%	0.00%
56		5	1.29	1.083	1.497	1.412	1.107	1.412	0.07468	12.94%	6.48%
100		5	1.347	1.236	1.458	1.412	1.249	1.412	0.03992	6.63%	2.36%
180		5	1.234	1.003	1.465	1.249	0.9912	1.412	0.08327	15.09%	10.52%
320		5	0.9312	0.7792	1.083	0.8861	0.7854	1.107	0.05472	13.14%	32.50%

Americamysis 48-h Acute Survival Test — **Granite Canyon**

Analysis ID:	10-1817-0719	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 15:08	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

48h Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	0.9000
32		1.0000	1.0000	1.0000	1.0000	0.9000
56		1.0000	1.0000	0.8000	1.0000	0.8000
100		1.0000	1.0000	0.9000	0.9000	1.0000
180		0.7000	0.9000	1.0000	1.0000	0.8000
320		0.6000	0.7000	0.5000	0.6000	0.8000

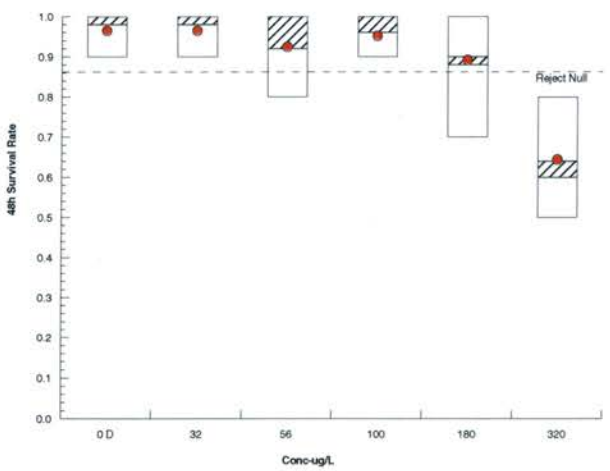
Angular (Corrected) Transformed Detail

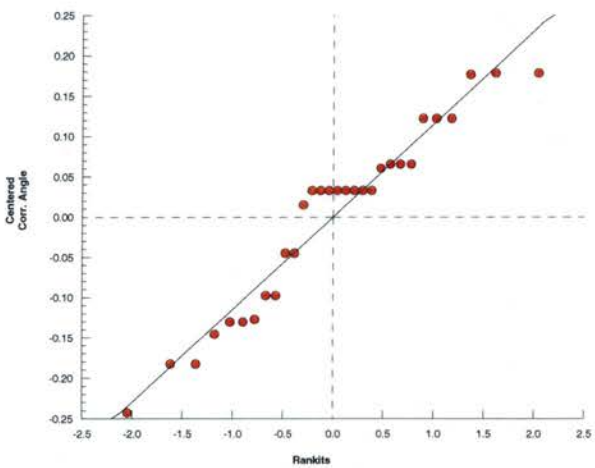
Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.412	1.412	1.412	1.412	1.249
32		1.412	1.412	1.412	1.412	1.249
56		1.412	1.412	1.107	1.412	1.107
100		1.412	1.412	1.249	1.249	1.412
180		0.9912	1.249	1.412	1.412	1.107
320		0.8861	0.9912	0.7854	0.8861	1.107

48h Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	10/10	10/10	10/10	9/10
32		10/10	10/10	10/10	10/10	9/10
56		10/10	10/10	8/10	10/10	8/10
100		10/10	10/10	9/10	9/10	10/10
180		7/10	9/10	10/10	10/10	8/10
320		6/10	7/10	5/10	6/10	8/10

Graphics





CETIS Analytical Report

Americamysis 48-h Acute Survival Test — **Granite Canyon**

Analysis ID:	19-1989-9366	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 15:08	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	07-3036-4115	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	23 Oct-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	25 Oct-19	**Species:**	Americamysis bahia	**Brine:**	
Test Length:	48h	**Taxon:**		**Source:**	**Age:**
Sample ID:	14-6000-3820	**Code:**	5705E3EC	**Project:**	Dispersant
Sample Date:	10 Apr-20 15:04	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 15:04	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1063842	200	Yes	Two-Point Interpolation

Point Estimates

Level	ug/L	95% LCL	95% UCL
LC5	109.2	n/a	229.5
LC10	176.5	77.21	219.1
LC15	201.5	109.1	241.4
LC20	226.6	137.6	283
LC25	254.9	180.3	335.6
LC40	>320	n/a	n/a
LC50	>320	n/a	n/a

48h Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-ug/L	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	A/B	Mean	%Effect
0	D	5	0.9800	0.9000	1.0000	0.0447	4.56%	0.0%	49/50	0.98	0.0%
32		5	0.9800	0.9000	1.0000	0.0447	4.56%	0.0%	49/50	0.98	0.0%
56		5	0.9200	0.8000	1.0000	0.1095	11.91%	6.12%	46/50	0.94	4.08%
100		5	0.9600	0.9000	1.0000	0.0548	5.71%	2.04%	48/50	0.94	4.08%
180		5	0.8800	0.7000	1.0000	0.1304	14.82%	10.2%	44/50	0.88	10.2%
320		5	0.6400	0.5000	0.8000	0.1140	17.82%	34.69%	32/50	0.64	34.69%

48h Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	0.9000
32		1.0000	1.0000	1.0000	1.0000	0.9000
56		1.0000	1.0000	0.8000	1.0000	0.8000
100		1.0000	1.0000	0.9000	0.9000	1.0000
180		0.7000	0.9000	1.0000	1.0000	0.8000
320		0.6000	0.7000	0.5000	0.6000	0.8000

48h Survival Rate Binomials

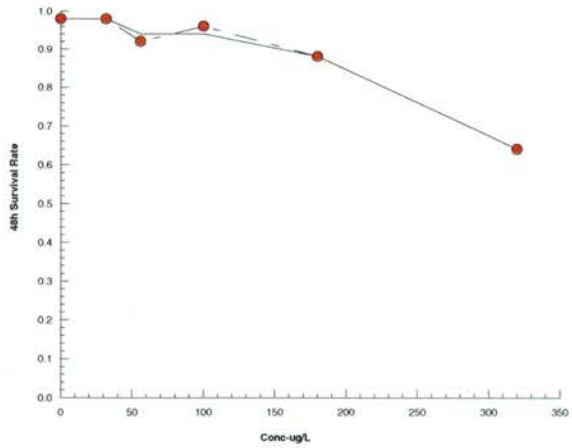
Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	10/10	10/10	10/10	9/10
32		10/10	10/10	10/10	10/10	9/10
56		10/10	10/10	8/10	10/10	8/10
100		10/10	10/10	9/10	9/10	10/10
180		7/10	9/10	10/10	10/10	8/10
320		6/10	7/10	5/10	6/10	8/10

Americamysis 48-h Acute Survival Test

Granite Canyon

Analysis ID:	19-1989-9366	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 15:08	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 10/23/19

End Date/Time: 10/25/19

Project: Dispersant RF

Spp./Species Lot #: AB10229

Sample Type: Water

WQ Meter ID: A2

Date: 10/23/19

Test Temperature: 25.5

Water Batch #: NA

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.32	8.01	0.892	7.14	20	UR	
5.6	7.60	7.84	0.887	6.95	21		
10	7.62	7.94	0.887	7.04	21		
18	7.65	8.09	0.887	7.18	21		
32	7.68	7.99	0.887	7.09	21		
56	7.70	7.99	0.887	7.09	21		
100	7.76	7.99	0.887	7.09	21		
180	7.78	7.97	0.887	7.07	21	UR	
Ø	7.32	8.01	0.892	7.14	20	UR	
32	7.81	8.01	0.887	7.10	21		
56	7.83	8.02	0.887	7.11	21		
100	7.83	8.08	0.887	7.17	21		
180	7.83	8.10	0.887	7.18	21		
320	7.83	8.05	0.887	7.14	21		
Initials	JV	JV	JV	JV	JV	JV	

~Cu RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt) Refractometer Read w/ SW		Ammonia (mg/L N)
7.00	100.2	33	Certified Std.	9.0
7.10	100.4	33		9.2
Initials	JV	JV	JV		JV

pH slope: 97.7 DO temp: 23.3

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 10/23/19

End Date/Time: 10/25/19

Project: Dispersant RF

Spp./Species Lot #: AB102219

Sample Type: Water

WQ Meter ID: A2

Date: 10/25/19

Test Temperature: 20.2

Water Batch #: NA

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.23	6.88	0.882	6.07	22	0.7	
5.6	7.67	6.62	0.882	5.84	22	0.1	
10	7.41	6.37	0.887	5.65	21	0.2	
18	7.38	6.29	0.887	5.58	21	0.1	
32	7.35	6.13	0.882	5.41	22	0.1	
56	7.35	6.56	0.882	5.79	22	-0.9 UR	
100	7.29	5.88	0.882	5.19	22	-1.6 UR	
180	7.23	5.50	0.882	4.85	22	-0.8 UR	
Initials	LD	LD	LD	LD	JV	LD	

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt) Refractometer Read our SW		Ammonia (mg/L N)
7.01	100.6	33	Certified Std.	9.2
7.07	101.4	33		9.3
Initials LD	LD	JV		LD

pH slope: 97.6 DO temp: 23.2

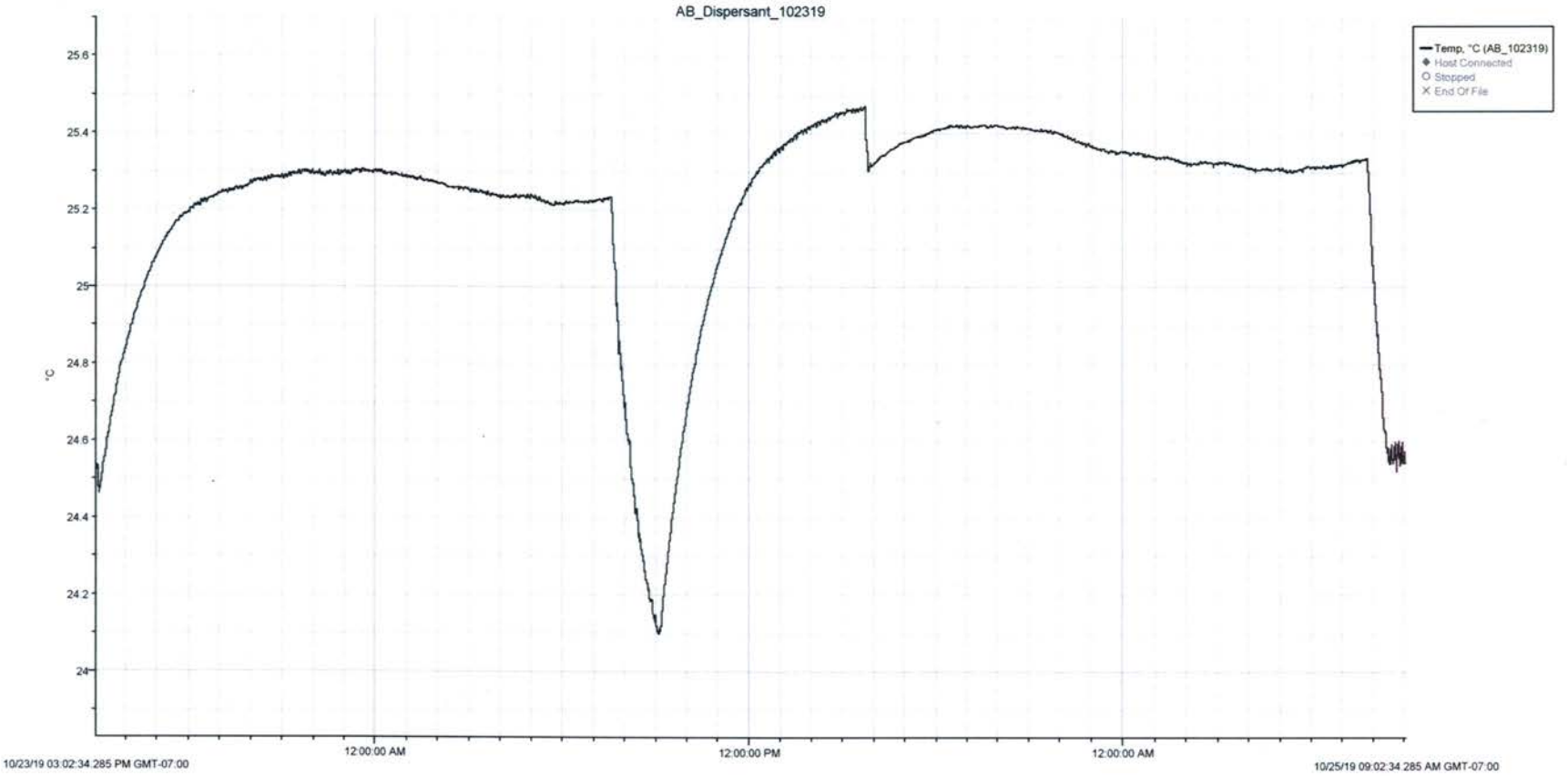
Marine Pollution Studies Laboratory
Americamysis Water Test Daily Log

Start Date/Time: 10/23/19
End Date/Time: 10/25/19
Species Lot #: AB102219
WQ Meter ID: A2

Project: Dispersant RF
Sample Type: Water

	Wed	Thu	Fri
Day	0	1	2
Start Temp Logger	✓		
Test Temperature	25.5	25.6	26.2 *
Ref Tox Temperature	24.3	25.3	25.3
Count Critters	✓	✓	✓
Feed (50 naups/mysid) AM	✓	✓	—
Feed (50 nausp/mysid) PM	✓	✓	—
Initials	LD, ML, JV	JV/LM	JV

* Unseasonably warm in our area.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Temp, °C (AB_102319)
Host Connected
Stopped
End Of File
°C
25.6
25.4
25.2
25
24.8
24.6
24.4
24.2
24
12:00:00 AM
12:00:00 PM
12:00:00 AM
10/23/19 03:02:34.285 PM GMT-07:00
10/25/19 09:02:34.285 AM GMT-07:00

Marine Pollution Studies Laboratory
Culture Log

Organism: ~~ABS~~ A. bahia

Organism Source: ABS

Collection Date: 10/21/19

Arrival Date at MPSL: 10/22/19

Test Start Date: 10/23/19

Arrival Temperature at MPSL: 20.2

Arrival Conductivity/Salinity at MPSL: 25‰

WQ Meter ID: ~~A2~~ Refractometer

Species Lot #: ABIO2219

Date	10/22	10/23							
Temperature	22.4	20.7							
Conductivity/ Salinity	21	20							
Aeration	Y	Y							
Organism Health	E	E							
Initials	JV	JV							
Notes	fed naups RN 50% Fed P.M. -KF	RN 50% fed naups ↓temp							

Temperature: Measured value (make note if it is adjusted up/down).
Conductivity: Measured value
~~Water flow: yes/no~~
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

Quality Assurance/Quality Control Criteria:

Organisms acclimated to test conductivity at least 48 hours prior to test: (Yes) No

Organisms held at MPSL no more than 2 weeks: (Yes) No

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 10/21/2019

SPECIES: *Americamysis bahia* (formerly Mysidopsis)

AGE: 2 day

LIFE STAGE: Juvenile

HATCH DATE: 10/19/2019

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	25 °C	23-26 °C
SALINITY/CONDUCTIVITY:	25 ppt	21-30 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	150 mg/l	140-175 mg/l
pH:	7.95	7.83-8.26

Comments:

Facility Supervisor

Dispersant - *Americamysis* (Mysid) 48 Hour Definitive - 2/12/20

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Prop.	Mean	SD
0	1	1	10	10	10	1.00	0.94	0.09
	2	2	10	10	10	1.00		
	3	3	10	10	10	1.00		
	4	4	10	10	8	0.80		
	5	5	10	10	9	0.90		
5.6	6	1	10	10	10	1.00	0.96	0.05
	7	2	10	9	9	0.90		
	8	3	10	10	10	1.00		
	9	4	10	10	9	0.90		
	10	5	10	10	10	1.00		
10	11	1	10	10	9	0.90	0.94	0.05
	12	2	10	10	9	0.90		
	13	3	10	9	9	0.90		
	14	4	10	10	10	1.00		
	15	5	10	10	10	1.00		
18	16	1	10	10	7	0.70	0.86	0.15
	17	2	10	10	10	1.00		
	18	3	10	9	7	0.70		
	19	4	10	9	9	0.90		
	20	5	10	10	10	1.00		
32	21	1	10	9	5	0.50	0.60	0.10
	22	2	10	10	7	0.70		
	23	3	10	9	7	0.70		
	24	4	10	9	5	0.50		
	25	5	10	9	6	0.60		
56	26	1	10	5	1	0.10	0.26	0.13
	27	2	10	8	4	0.40		
	28	3	10	7	4	0.40		
	29	4	10	7	2	0.20		
	30	5	10	8	2	0.20		
100	31	1	10	6	0	0.00	0.00	0.00
	32	2	10	2	0	0.00		
	33	3	10	3	0	0.00		
	34	4	10	2	0	0.00		
	35	5	10	3	0	0.00		
180	36	1	10	1	0	0.00	0.00	0.00
	37	2	10	1	0	0.00		
	38	3	10	4	0	0.00		
	39	4	10	1	0	0.00		
	40	5	10	0	0	0.00		

Marine Pollution Studies Laboratory
Americamysis 4-day Acute Toxicity Test
Feeding: 50 Artemia nauplii per mysid, 2x daily

Project: Dispersant AB48hr DEF **Start Date/Time:** 2/12/20

~~**Water Batch #:**~~ _____ **End Date/Time:** 2/14/20

Lot #: AB021120

Cont.#	Station Name	Number at Start	Number Alive		Notes
			Day 1	Day 2	
1	Ø	10	10	10	
2			10	10	
3			10	10	
4			10	8	
5			10	9	
6	56		10	10	
7			9	9	
8			10	10	
9			10	9	
10			10	10	
11	10		10	9	
12			10	9	
13			9	9	
14			10	10	
15			10	10	
16	18		10	7	
17			10	10	
18			9	7	
19			9	9	
20			10	10	
21	32		9	5	
22			10	7	
23			9	7	
24			9	5	
25			9	6	
26	50		5	1	
27			8	4	
28			7	4	
29			7	2	
30		10	8	2	
Initials		JN	LM	KF	

Marine Pollution Studies Laboratory
Americamysis 4-day Acute Toxicity Test
Feeding: 50 Artemia nauplii per mysid, 2x daily

Project: Dispersant AB 48hr DEF **Start Date/Time:** 2/12/20

~~**Water Batch #:**~~ _____ **End Date/Time:** 2/14/20

Lot #: AB021120

Cont.#	Station Name	Number at Start	Number Alive		Notes
			Day 1	Day 2	
31	100	10	6	0	
32			2	0	
33			3	0	
34			2	0	
35			3	0	
36	80		1	0	
37			1	0	
38			4	0	
39			1	0	
40		10	0	—	
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
Initials		JV	LM	KF	

Mysidopsis 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	06-8115-1356	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:29	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	16-4089-7202	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	12 Feb-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	14 Feb-20	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	48h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	14-9328-1816	**Code:**	5901AC18	**Client:**	
Sample Date:	12 Feb-20	**Material:**	Corexit	**Project:**	
Receive Date:	12 Feb-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	18	32	24		19.6%

Dunnett Multiple Comparison Test

Control	vs	C-uL/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		5.6	-0.2581	2.41	0.265	8	0.9157	CDF	Non-Significant Effect
		10	0.03833	2.41	0.265	8	0.8465	CDF	Non-Significant Effect
		18	0.9764	2.41	0.265	8	0.4631	CDF	Non-Significant Effect
		32*	2.959	2.41	0.265	8	0.0149	CDF	Significant Effect
		56*	6.459	2.41	0.265	8	<0.0001	CDF	Significant Effect
		100*	9.992	2.41	0.265	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.636654	0.9394423	6	31.08	<0.0001	Significant Effect
Error	0.8464045	0.03022873	28			
Total	6.483058		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.286	16.8	0.2952	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9636	0.915	0.2919	Normal Distribution

48h Survival Rate Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.94	0.8289	1	1	0.8	1	0.04	9.52%	0.0%
5.6		5	0.96	0.892	1	1	0.9	1	0.02449	5.71%	-2.13%
10		5	0.94	0.872	1	0.9	0.9	1	0.02449	5.83%	0.0%
18		5	0.86	0.6717	1	0.9	0.7	1	0.06782	17.6%	8.51%
32		5	0.68	0.4255	0.9345	0.7	0.5	1	0.09165	30.1%	27.7%
56		5	0.34	0.09796	0.582	0.4	0.1	0.6	0.08718	57.3%	63.8%
100		5	0.04	0	0.1511	0	0	0.2	0.04	224.0%	95.7%
180		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.318	1.148	1.489	1.412	1.107	1.412	0.06153	10.4%	0.0%
5.6		5	1.347	1.236	1.458	1.412	1.249	1.412	0.03992	6.63%	-2.15%
10		5	1.314	1.203	1.425	1.249	1.249	1.412	0.03992	6.79%	0.32%
18		5	1.211	0.9485	1.474	1.249	0.9912	1.412	0.09458	17.5%	8.14%
32		5	0.993	0.6754	1.311	0.9912	0.7854	1.412	0.1144	25.8%	24.7%
56		5	0.6082	0.3362	0.8801	0.6847	0.3218	0.8861	0.09795	36.0%	53.9%
100		5	0.2198	0.05046	0.389	0.1588	0.1588	0.4636	0.06097	62.0%	83.3%
180		5	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.0%

Mysidopsis 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	06-8115-1356	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:29	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

48h Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	0.8	0.9
5.6		1	0.9	1	0.9	1
10		0.9	0.9	0.9	1	1
18		0.7	1	0.7	1	0.9
32		1	0.5	0.7	0.7	0.5
56		0.6	0.1	0.4	0.4	0.2
100		0.2	0	0	0	0
180		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D					
5.6						
10						
18						
32						
56						
100						
180						

CETIS Analytical Report

Mysidopsis 96-h Acute Survival Test

Granite Canyon

Analysis ID:	11-9954-2556	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:29	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	16-4089-7202	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	12 Feb-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	14 Feb-20	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	48h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	14-9328-1816	**Code:**	5901AC18	**Client:**	
Sample Date:	12 Feb-20	**Material:**	Corexit	**Project:**	
Receive Date:	12 Feb-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.06	0.00%	1.629	0.02652	42.58	37.69	48.12

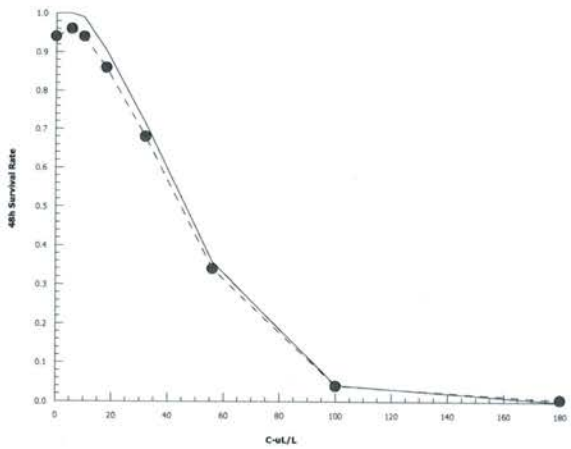
48h Survival Rate Summary

			Calculated Variate(A/B)								
C-uL/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Dilution Water	5	0.94	0.8	1	0.04	0.08944	9.52%	0.0%	47	50
5.6		5	0.96	0.9	1	0.02449	0.05477	5.71%	-2.13%	48	50
10		5	0.94	0.9	1	0.02449	0.05477	5.83%	0.0%	47	50
18		5	0.86	0.7	1	0.06782	0.1517	17.6%	8.51%	43	50
32		5	0.68	0.5	1	0.09165	0.2049	30.1%	27.7%	34	50
56		5	0.34	0.1	0.6	0.08718	0.1949	57.3%	63.8%	17	50
100		5	0.04	0	0.2	0.04	0.08944	224.0%	95.7%	2	50
180		5	0	0	0	0	0		100.0%	0	50

48h Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	0.8	0.9
5.6		1	0.9	1	0.9	1
10		0.9	0.9	0.9	1	1
18		0.7	1	0.7	1	0.9
32		1	0.5	0.7	0.7	0.5
56		0.6	0.1	0.4	0.4	0.2
100		0.2	0	0	0	0
180		0	0	0	0	0

Graphics



Dispersant - *Americamysis* (Mysid) 48 Hour Definitive - Ref Tox - 2/12/20

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Prop.	Mean	SD
0	1	1	10	10	10	1.00	1.00	0.00
	2	2	10	10	10	1.00		
	3	3	10	10	10	1.00		
	4	4	10	10	10	1.00		
	5	5	10	10	10	1.00		
32	6	1	10	10	10	1.00	0.98	0.04
	7	2	10	10	10	1.00		
	8	3	10	9	9	0.90		
	9	4	10	10	10	1.00		
	10	5	10	10	10	1.00		
56	11	1	10	10	10	1.00	1.00	0.00
	12	2	10	10	10	1.00		
	13	3	10	10	10	1.00		
	14	4	10	10	10	1.00		
	15	5	10	10	10	1.00		
100	16	1	10	10	10	1.00	0.98	0.04
	17	2	10	10	9	0.90		
	18	3	10	10	10	1.00		
	19	4	10	10	10	1.00		
	20	5	10	10	10	1.00		
180	21	1	10	10	10	1.00	0.98	0.04
	22	2	10	10	9	0.90		
	23	3	10	10	10	1.00		
	24	4	10	10	10	1.00		
	25	5	10	10	10	1.00		
320	26	1	10	10	10	1.00	0.96	0.09
	27	2	10	10	10	1.00		
	28	3	10	10	8	0.80		
	29	4	10	10	10	1.00		
	30	5	10	10	10	1.00		

Ref. Tox. not statistically analyzed
- No dose response
- LM 4/10/20

RefTox

Marine Pollution Studies Laboratory
Americamysis 4-day Acute Toxicity Test
Feeding: 50 Artemia nauplii per mysid, 2x daily

Project: Dispersant AB 48hr DEF **Start Date/Time:** 2/12/20

~~**Water Batch #:**~~ Cu Lot# 1671 **End Date/Time:** 2/14/20

Lot #: AB021120

Cont.#	Station Name	Number at Start	Number Alive		Notes
			Day 1	Day 2	
1	Ø	10	10	10	
2			10	10	
3			10	10	
4			10	10	
5			10	10	
6	32		10	10	
7			10	10	
8			9	9	
9			10	10	
10			10	10	
11	56		10	10	
12			10	10	
13			10	10	
14			10	10	
15			10	10	
16	100		10	10	
17			10	9	
18			10	10	
19			10	10	
20			10	10	
21	180		10	10	
22			10	9	
23			10	10	
24			10	10	
25			10	10	
26	320		10	10	
27			10	10	
28			10	8	
29			10	10	
30			10	10	
Initials		KF, LM	LM	KF	

RefTox

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 2/12/20

End Date/Time: 2/14/20

Project: Dispersant AB 48hr DEF

Spp./Species Lot #: AB021120

Sample Type: water

WQ Meter ID: A2

Date: 2/12/20

Test Temperature: 25.5

Water Batch #:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.80	8.55	0.882	7.54	22.1	0.0	
5.6	8.01	8.41	0.882	7.42	22.0		
10	8.04	8.36	0.882	7.37	22.0		
18	8.06	8.29	0.882	7.31	22.0		
32	8.06	8.21	0.882	7.24	22.0		
56	8.06	8.14	0.882	7.18	22.0		
100	8.06	8.14	0.882	7.18	22.0		
180	8.06	8.08	0.882	7.13	22.1	0.3	
Ø	7.80	8.55	0.882	7.54	22.0	0.0	
32	8.04	8.17	0.882	7.20	22.0		
56	8.06	8.14	0.882	7.18	22.0		
100	8.05	8.08	0.882	7.13	21.9		
180	8.05	8.05	0.882	7.10	21.7		
320	8.05	8.05	0.887	7.14	21.3		
Initials	JV	JV	JV	JV	JV	JV	

C3 RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.02	101.1	34.9	Certified Std.	10.0
			35	
7.01	101.3	35.3		9.9
Initials JV	JV	JV		JV

pH slope: 96.9 DO temp: 20.7

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 2/12/20

End Date/Time: 2/14/20

Project: Dispersant AB48hr DEF

Spp./Species Lot #: AB021120

Sample Type: water

WQ Meter ID: A2

Date: 2/14/20

Test Temperature: 24.8 °C

~~Water Batch #~~:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.53	7.00	0.877	6.14	23.3	0.7	
5.6	7.82	6.01	0.877	5.27	23.2	0.9	
10	7.74	5.11	0.877	4.48	22.6	0.6	
18	7.74	4.69	0.882	4.14	22.4	0.5	
32	7.68	4.23	0.887	3.75	21.0	0.2	
56	7.65	3.91	0.882	3.45	21.7	0.6	
100	7.65	3.90	0.882	3.44	22.3	0.5	
180	7.52	2.82	0.887	2.50	21.2	0.1	
Initials	KF	KF	KF	KF	KF	KF	

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.01	100.4	36.5	Certified Std.	9.4
—	—	—	35ppt	10.3
6.97	93.9	33.1		9.3
Initials: KF	KF	KF		KF

pH slope: 97.4 DO temp: 19.6

Marine Pollution Studies Laboratory

Americamysis Water Test Daily Log

Start Date/Time: 2/12/20

End Date/Time: 2/14/20

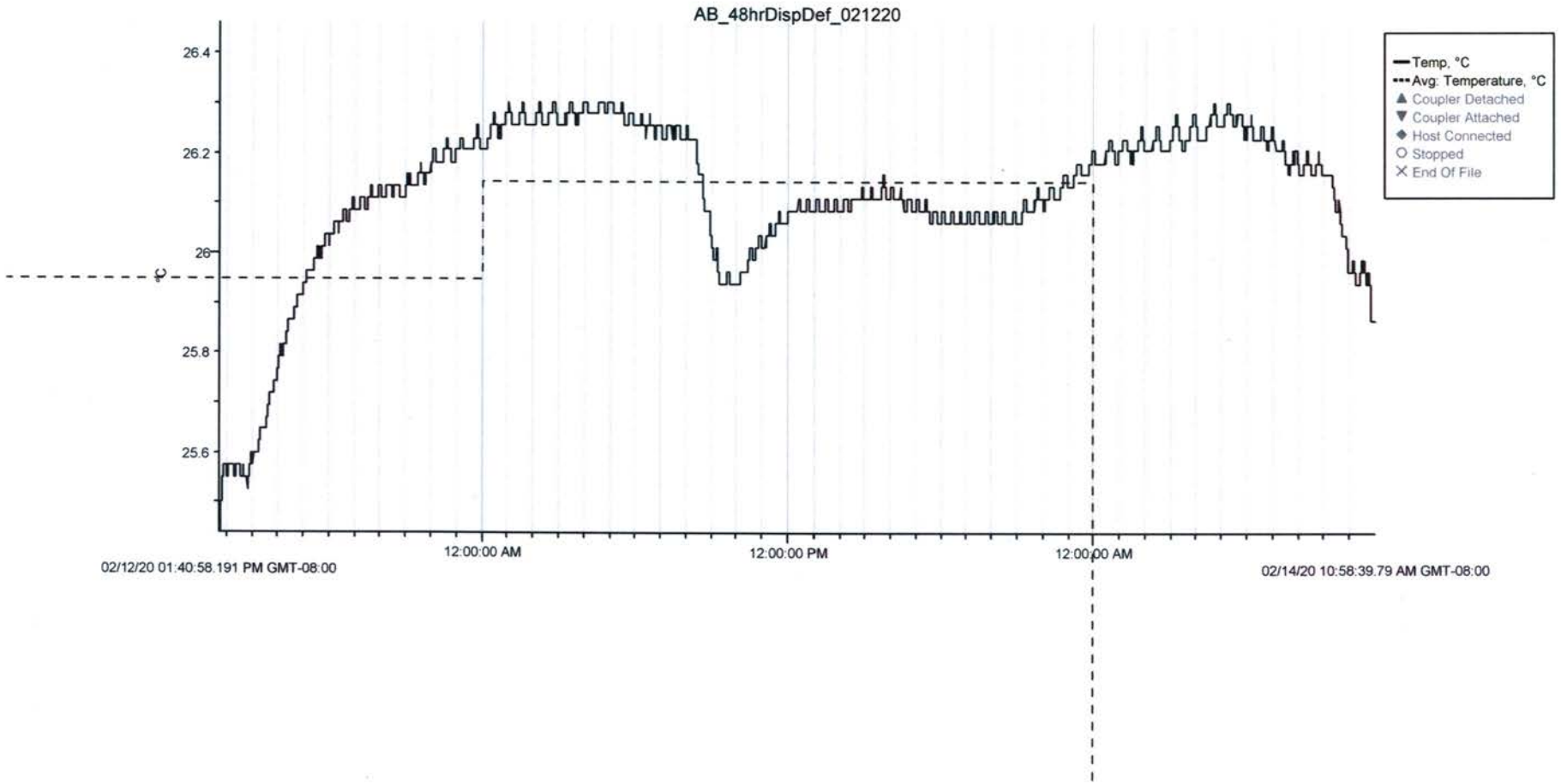
Project: Dispersant AB 48hr DEF

Species Lot #: AB021120

Sample Type: Water

WQ Meter ID: A2

	Wed	Thu	Fri
Day	0	1	2
Start Temp Logger	✓		
Test Temperature	25.5	25.0	24.8
Ref Tox Temperature	24.8	24.6	24.9
Count Critters	✓	✓	✓
Feed (50 naups/mysid) AM	—	✓	✓
Feed (50 nausp/mysid) PM	✓	✓	—
Initials	JV/ALL	LM	KF


AB_48hrDispDef_021220
26.4
26.2
26
25.8
25.6
°C
Temp, °C
Avg: Temperature, °C
Coupler Detached
Coupler Attached
Host Connected
Stopped
End Of File
12:00:00 AM
12:00:00 PM
12:00:00 AM
02/12/20 01:40:58.191 PM GMT-08:00
02/14/20 10:58:39.79 AM GMT-08:00

Marine Pollution Studies Laboratory
Culture Log

Organism: A. bahia

Organism Source: ABS

Collection Date: 2/10/20

Arrival Date at MPSL: 2/11/20

Test Start Date: 2/12/20

Arrival Temperature at MPSL: 20.3

Arrival Conductivity/Salinity at MPSL: 15

WQ Meter ID: ~~A~~ Refractometer

Species Lot #: AB021120

Date	2/11/20	2/12							
Temperature	23.4	24.2							
Conductivity/ Salinity	16 ‰	16							
Aeration	Y	Y							
Organism Health	E	E							
Initials	LM	JV							
Notes	Seal RET ~~RW 25‰~~ Added ~50% 26ppt	RW 35‰ Seal Naupl							

Temperature: Measured value (make note if it is adjusted up/down).
Conductivity: Measured value
~~Water flow: yes/no~~
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

Quality Assurance/Quality Control Criteria:

Organisms acclimated to test conductivity at least 48 hours prior to test: (Yes) No

Organisms held at MPSL no more than 2 weeks: ~~Yes~~ No

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 2/10/2020

SPECIES: *Americamysis bahia* (formerly Mysidopsis)

AGE: 2 day

LIFE STAGE: Juvenile

HATCH DATE: 2/8/2020

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	25 °C	23-26 °C
SALINITY/CONDUCTIVITY:	21 ppt	21-33 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	135 mg/l	135-195 mg/l
pH:	8.33	7.87-8.34

Comments:

Facility Supervisor

Dispersant - *Americamysis* (Mysid) 7 Day Range Finder - 11/20/19

Concentration	Beaker	Rep	Alive	Initial	Prop.	Mean	SD	Tare (g)	Total (g)	Mysids	Wt/Mysid (mg)	Mean	SD
0	1	1	5	5	1.00	0.90	0.11	0.7135	0.7149	5	0.280	0.30	0.03
	2	2	5	5	1.00			0.6887	0.6900	5	0.260		
	3	3	5	5	1.00			0.6870	0.6886	5	0.320		
	4	4	4	5	0.80			0.7267	0.7279	4	0.300		
	5	5	4	5	0.80			0.7180	0.7193	4	0.325		
	6	6	4	5	0.80			0.7028	0.7040	4	0.300		
	7	7	4	5	0.80			0.6985	0.6997	4	0.300		
	8	8	5	5	1.00			0.6848	0.6865	5	0.340		
3.2	9	1	5	5	1.00	0.88	0.15	0.6789	0.6800	5	0.220	0.26	0.04
	10	2	3	5	0.60			0.7073	0.7080	3	0.233		
	11	3	4	5	0.80			0.6966	0.6977	4	0.275		
	12	4	5	5	1.00			0.6946	0.6960	5	0.280		
	13	5	5	5	1.00			0.7105	0.7119	5	0.280		
	14	6	4	5	0.80			0.7069	0.7079	4	0.250		
	15	7	4	5	0.80			0.6989	0.7003	4	0.350		
	16	8	5	5	1.00			0.7156	0.7167	5	0.220		
5.6	17	1	4	5	0.80	0.80	0.11	0.7105	0.7116	4	0.275	0.28	0.02
	18	2	4	5	0.80			0.7083	0.7094	4	0.275		
	19	3	5	6	0.83			0.7128	0.7142	5	0.280		
	20	4	4	5	0.80			0.7134	0.7146	4	0.300		
	21	5	4	5	0.80			0.7059	0.7070	4	0.275		
	22	6	3	5	0.60			0.7083	0.7092	3	0.300		
	23	7	4	5	0.80			0.7028	0.7040	4	0.300		
	24	8	5	5	1.00			0.6943	0.6956	5	0.260		
10	25	1	3	5	0.60	0.75	0.14	0.7236	0.7248	3	0.400	0.29	0.06
	26	2	4	5	0.80			0.6774	0.6784	4	0.250		
	27	3	4	5	0.80			0.6701	0.6713	4	0.300		
	28	4	3	5	0.60			0.6859	0.6867	3	0.267		
	29	5	4	5	0.80			0.6758	0.6771	4	0.325		
	30	6	3	5	0.60			0.6757	0.6765	3	0.267		
	31	7	4	5	0.80			0.7015	0.7026	4	0.275		
	32	8	5	5	1.00			0.7005	0.7015	5	0.200		
18	33	1	3	5	0.60	0.58	0.25	0.7151	0.7159	3	0.267	0.32	0.09
	34	2	1	5	0.20			0.7032	0.7037	1	0.500		
	35	3	4	5	0.80			0.7038	0.7049	4	0.275		
	36	4	4	5	0.80			0.7099	0.7109	4	0.250		
	37	5	1	5	0.20			0.7017	0.7021	1	0.400		
	38	6	3	5	0.60			0.7008	0.7016	3	0.267		
	39	7	3	5	0.60			0.7307	0.7316	3	0.300		
	40	8	4	5	0.80			0.7218	0.7230	4	0.300		
32	41	1	1	5	0.20	0.33	0.10	0.7136	0.7140	1	0.400	0.26	0.10
	42	2	1	5	0.20			0.7079	0.7083	1	0.400		
	43	3	1	5	0.20			0.6999	0.7002	1	0.300		
	44	4	2	5	0.40			0.6936	0.6940	2	0.200		
	45	5	2	5	0.40			0.6903	0.6907	2	0.200		
	46	6	2	5	0.40			0.6913	0.6917	2	0.200		
	47	7	2	5	0.40			0.6843	0.6846	2	0.150		
	48	8	2	5	0.40			0.6707	0.6712	2	0.250		
56	49	1	0	6	0.00	0.03	0.07	-	-	-	-	0.20	-
	50	2	1	5	0.20			0.6861	0.6863	1	0.200		
	51	3	0	5	0.00			-	-	-	-		
	52	4	0	5	0.00			-	-	-	-		
	53	5	0	5	0.00			-	-	-	-		
	54	6	0	5	0.00			-	-	-	-		
	55	7	0	5	0.00			-	-	-	-		
	56	8	0	5	0.00			-	-	-	-		
100	57	1	0	5	0.00	0.00	0.00	-	-	-	-	-	-
	58	2	0	5	0.00			-	-	-	-		
	59	3	0	5	0.00			-	-	-	-		
	60	4	0	5	0.00			-	-	-	-		
	61	5	0	5	0.00			-	-	-	-		
	62	6	0	5	0.00			-	-	-	-		
	63	7	0	5	0.00			-	-	-	-		
	64	8	0	5	0.00			-	-	-	-		

		Rep	Tare Weight (g)	Total Weight (g)	Mysids	Wt/Mysid (mg)	Mean	SD
Baseline		1	0.7010	0.7025	10	0.150	0.13	0.03
		2	0.6958	0.6974	10	0.160		
		3	0.7038	0.7048	10	0.100		
		4	0.7071	0.7082	10	0.110		
		5	0.7133	0.7147	10	0.140		

Dispersant - Americamysis (Mysid) 7 Day Range Finder - Daily Counts - 11/20/19

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	5	5	5	1.00	0.90	0.11
	2	2	5	5	5	5	5	5	5	5	1.00		
	3	3	5	5	5	5	5	5	5	5	1.00		
	4	4	5	4	4	4	4	4	4	4	0.80		
	5	5	5	5	5	4	4	4	4	4	0.80		
	6	6	5	5	5	5	5	5	5	4	0.80		
	7	7	5	4	4	4	4	4	4	4	0.80		
	8	8	5	5	5	5	5	5	5	5	1.00		
3.2	9	1	5	5	5	5	5	5	5	5	1.00	0.88	0.15
	10	2	5	5	4	4	3	3	3	3	0.60		
	11	3	5	5	5	5	5	5	4	4	0.80		
	12	4	5	5	5	5	5	5	5	5	1.00		
	13	5	5	5	5	5	5	5	5	5	1.00		
	14	6	5	5	5	4	4	4	4	4	0.80		
	15	7	5	5	5	5	5	5	5	4	0.80		
	16	8	5	5	5	5	5	5	5	5	1.00		
5.6	17	1	5	5	4	4	4	4	4	4	0.80	0.80	0.11
	18	2	5	5	5	5	4	4	4	4	0.80		
	19	3	6	6	6	6	6	6	6	5	0.83		
	20	4	5	5	5	5	4	4	4	4	0.80		
	21	5	5	5	5	5	5	5	5	4	0.80		
	22	6	5	5	5	5	4	4	3	3	0.60		
	23	7	5	5	5	5	5	5	4	4	0.80		
	24	8	5	5	5	5	5	5	5	5	1.00		
10	25	1	5	5	5	5	5	4	3	3	0.60	0.75	0.14
	26	2	5	5	5	5	5	5	5	4	0.80		
	27	3	5	5	5	4	4	4	4	4	0.80		
	28	4	5	5	4	4	4	4	3	3	0.60		
	29	5	5	5	5	5	5	5	5	4	0.80		
	30	6	5	5	5	5	5	4	4	3	0.60		
	31	7	5	5	5	5	5	5	5	4	0.80		
	32	8	5	5	5	5	5	5	5	5	1.00		
18	33	1	5	5	4	4	4	4	3	3	0.60	0.58	0.25
	34	2	5	5	4	4	4	4	3	1	0.20		
	35	3	5	5	5	5	4	4	4	4	0.80		
	36	4	5	5	5	5	5	5	4	4	0.80		
	37	5	5	5	5	5	5	4	2	1	0.20		
	38	6	5	5	5	5	4	4	4	3	0.60		
	39	7	5	5	5	5	5	4	4	3	0.60		
	40	8	5	5	5	5	5	5	4	4	0.80		
32	41	1	5	5	5	5	5	3	2	1	0.20	0.33	0.10
	42	2	5	4	4	4	4	3	2	1	0.20		
	43	3	5	5	5	5	5	4	3	1	0.20		
	44	4	5	5	5	5	5	4	4	2	0.40		
	45	5	5	4	4	4	4	3	2	2	0.40		
	46	6	5	5	5	5	5	3	2	2	0.40		
	47	7	5	5	5	5	5	4	3	2	0.40		
	48	8	5	5	5	5	5	4	3	2	0.40		
56	49	1	6	6	4	1	0	0	0	0	0.00	0.03	0.07
	50	2	5	5	5	4	1	1	1	1	0.20		
	51	3	5	4	4	2	2	1	1	0	0.00		
	52	4	5	4	4	3	0	0	0	0	0.00		
	53	5	5	4	1	1	0	0	0	0	0.00		
	54	6	5	5	5	5	3	0	0	0	0.00		
	55	7	5	4	3	3	2	0	0	0	0.00		
	56	8	5	4	3	3	1	0	0	0	0.00		
100	57	1	5	4	0	0	0	0	0	0	0.00	0.00	0.00
	58	2	5	3	0	0	0	0	0	0	0.00		
	59	3	5	3	0	0	0	0	0	0	0.00		
	60	4	5	2	0	0	0	0	0	0	0.00		
	61	5	5	4	0	0	0	0	0	0	0.00		
	62	6	5	3	0	0	0	0	0	0	0.00		
	63	7	5	5	0	0	0	0	0	0	0.00		
	64	8	5	2	0	0	0	0	0	0	0.00		

Marine Pollution Studies Laboratory

Data Sheet for Americamysis Chronic Toxicity Test Start Date/Time: 11/20/19

Project: Dispersant Mysids End Date/Time: 11/27/19

Sample Type: water Species Lot #: AB111919

Balance #: 1

Container Number	Number at Start	Number Alive	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of Mysids	Notes
1	5	5	JV	1	0.7135	0.7149	5	no eggs
2		5	JV		0.6887	0.6900	5	no eggs
3		5	JV		0.6870	0.6886	5	no eggs
4		4	JV		0.7267	0.7279	4	no eggs
5		4	JV		0.7180	0.7193	4	no eggs
6		4	JV		0.7028	0.7040	4	no eggs
7		4	JV		0.6985	0.6997	4	no eggs
8		5	JV		0.6848	0.6865	5	no eggs
9		5	KF		0.6789	0.6800	5	
10		3	JV		0.7073	0.7080	3	
11		4	KF		0.6966	0.6977	4	
12		5	JV		0.6946	0.6960	5	
13		5	KF		0.7105	0.7119	5	
14		4	JV		0.7069	0.7079	4	
15		4	KF		0.6989	0.7003	4	
16		5	JV		0.7156	0.7167	5	
17		4	KF		0.7105	0.7116	4	
18	1	4	JV		0.7083	0.7094	4	
19	6	5	JV		0.7128	0.7142	5	
20	5	4	KF		0.7134	0.7146	4	
21		4	JV	KF	0.7060	0.7070	4	
22		3	KF		0.7083	0.7092	3	
23		4	JV		0.7028	0.7040	4	
24		5	JV		0.6943	0.6956	5	
25		3	KF		0.7236	0.7248	3	
26		4	JV		0.6774	0.6784	4	
27		4	KF		0.6701	0.6713	4	
28		3	JV		0.6859	0.6867	3	
29		4	KF		0.6758	0.6771	4	
30		3	JV		0.6757	0.6765	3	
31		4	KF		0.7015	0.7026	4	
32		5	JV		0.7005	0.7015	5	
33		3	KF		0.7151	0.7159	3	
34		1	KF		0.7032	0.7037	1	
35		4	JV		0.7038	0.7049	4	
36		4	KF		0.7099	0.7109	4	
37		1	JV		0.7017	0.7021	1	
38		3	JV		0.7008	0.7016	3	
39		3	KF		0.7307	0.7316	3	
40		4	JV		0.7218	0.7230	4	
41		1	KF		0.7136	0.7140	1	
42		1	JV		0.7079	0.7083	1	
43		1	KF		0.6999	0.7002	1	
44		2	JV		0.6936	0.6940	2	
45		2	KF		0.6903	0.6907	2	
46		2	KF		0.6913	0.6917	2	
47		2	JV		0.6843	0.6846	2	
48	2	2	JV	48	0.6707	0.6712	2	
Initials	JV/MM				KF	SZ	SZ	

	Tare weight	Total weight	# Mysids
Baseline 1	0.7010	0.7025	10
Baseline 2	0.6958	0.6974	10
Baseline 3	0.7038	0.7048	10
Baseline 4	0.7071	0.7082	10
Baseline 5	0.7133	0.7147	10

Marine Pollution Studies Laboratory

Data Sheet for Americamysis Chronic Toxicity Test

Start Date/Time: 11/20/19

Project: Dispersant Mysids

End Date/Time: 11/27/19

Sample Type: Water

Species Lot #: AB 111919

Balance #: 1

Container Number	Number at Start	Number Alive KF	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of Mysids	Notes
49	6	~~1~~ 0	~~KF~~	49	0.6758			
50	5	1	KF	50	0.6861	0.6863	1	
51		0	JV	51	0.6770		~~1~~ 0 SZ	
52		0	SZ					all dead on day 6
53		0						
54		0						
55		0						
56		0						
57		0						
58		0						
59		0						
60		0						
61		0						
62		0						
63		0						
64		0						
65								
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86								
87								
88								
89								
90								
91								
92								
93								
94								
95								
96								
Initials					SZ	SZ		

Mysidopsis 7-d Survival, Growth and Fecundity Test

Granite Canyon

Analysis ID:	03-5609-7775	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	15-1554-8488	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	20 Nov-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	27 Nov-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	07-5362-3375	**Code:**	2CEB614F	**Client:**	
Sample Date:	20 Nov-19	**Material:**	Corexit	**Project:**	
Receive Date:	20 Nov-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	10	18	13.42		17.6%

Dunnett Multiple Comparison Test

Control	vs	C-uL/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		3.2	0.3457	2.36	0.188	14	0.7427	CDF	Non-Significant Effect
		5.6	1.396	2.36	0.188	14	0.2797	CDF	Non-Significant Effect
		10	2.154	2.36	0.188	14	0.0766	CDF	Non-Significant Effect
		18*	4.54	2.36	0.188	14	0.0001	CDF	Significant Effect
		32*	7.812	2.36	0.188	14	<0.0001	CDF	Significant Effect
		56*	12.18	2.36	0.188	14	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.195935	1.032656	6	40.41	<0.0001	Significant Effect
Error	1.252144	0.02555395	49			
Total	7.448079		55			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11.28	16.8	0.0802	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9695	0.943	0.1668	Normal Distribution

7d Survival Rate Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.9	0.8106	0.9894	0.9	0.8	1	0.0378	11.9%	0.0%
3.2		8	0.875	0.7506	0.9994	0.9	0.6	1	0.05261	17.0%	2.78%
5.6		8	0.8042	0.7143	0.8941	0.8	0.6	1	0.03803	13.4%	10.6%
10		8	0.75	0.6318	0.8682	0.8	0.6	1	0.05	18.9%	16.7%
18		8	0.575	0.3666	0.7834	0.6	0.2	0.8	0.08814	43.4%	36.1%
32		8	0.325	0.2385	0.4115	0.4	0.2	0.4	0.0366	31.8%	63.9%
56		8	0.025	0	0.08412	0	0	0.2	0.025	283.0%	97.2%
100		8	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	8	1.226	1.12	1.333	1.226	1.107	1.345	0.045	10.4%	0.0%
3.2		8	1.199	1.054	1.343	1.226	0.8861	1.345	0.06107	14.4%	2.25%
5.6		8	1.115	1.011	1.218	1.107	0.8861	1.345	0.04371	11.1%	9.1%
10		8	1.054	0.9197	1.188	1.107	0.8861	1.345	0.05681	15.2%	14.0%
18		8	0.8634	0.6401	1.087	0.8861	0.4636	1.107	0.09443	30.9%	29.6%
32		8	0.6018	0.5062	0.6975	0.6847	0.4636	0.6847	0.04045	19.0%	50.9%
56		8	0.2528	0.1813	0.3243	0.2255	0.2056	0.4636	0.03022	33.8%	79.4%
100		8	0.2255	0.2255	0.2255	0.2255	0.2255	0.2255	0	0.0%	81.6%

Mysidopsis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	03-5609-7775	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:30	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

7d Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	D	1	1	1	0.8	0.8	0.8	0.8	1
3.2		1	0.6	0.8	1	1	0.8	0.8	1
5.6		0.8	0.8	0.8333	0.8	0.8	0.6	0.8	1
10		0.6	0.8	0.8	0.6	0.8	0.6	0.8	1
18		0.6	0.2	0.8	0.8	0.2	0.6	0.6	0.8
32		0.2	0.2	0.2	0.4	0.4	0.4	0.4	0.4
56		0	0.2	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	D								
3.2									
5.6									
10									
18									
32									
56									
100									

CETIS Analytical Report

Test Code: CXAB7-112019 | 01-8297-7742

Mysidopsis 7-d Survival, Growth and Fecundity Test

Granite Canyon

Analysis ID:	17-3624-9741	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:30	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	15-1554-8488	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	20 Nov-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	27 Nov-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	07-5362-3375	**Code:**	2CEB614F	**Client:**	
Sample Date:	20 Nov-19	**Material:**	Corexit	**Project:**	
Receive Date:	20 Nov-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.1	2.78%	1.32	0.03515	20.91	17.78	24.58

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9	0.8 - NL	Yes	Passes Acceptability Criteria

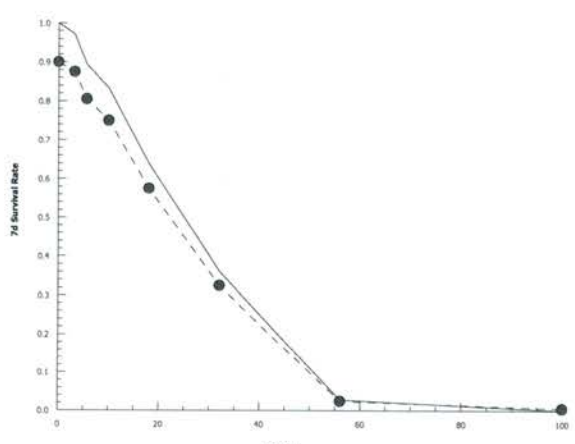
7d Survival Rate Summary

			Calculated Variate(A/B)								
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	8	0.9	0.8	1	0.0378	0.1069	11.9%	0.0%	36	40
3.2		8	0.875	0.6	1	0.05261	0.1488	17.0%	2.78%	35	40
5.6		8	0.8042	0.6	1	0.03803	0.1076	13.4%	10.6%	33	41
10		8	0.75	0.6	1	0.05	0.1414	18.9%	16.7%	30	40
18		8	0.575	0.2	0.8	0.08814	0.2493	43.4%	36.1%	23	40
32		8	0.325	0.2	0.4	0.0366	0.1035	31.8%	63.9%	13	40
56		8	0.025	0	0.2	0.025	0.07071	283.0%	97.2%	1	41
100		8	0	0	0	0	0		100.0%	0	40

7d Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1	1	1	0.8	0.8	0.8	0.8	1
3.2		1	0.6	0.8	1	1	0.8	0.8	1
5.6		0.8	0.8	0.8333	0.8	0.8	0.6	0.8	1
10		0.6	0.8	0.8	0.6	0.8	0.6	0.8	1
18		0.6	0.2	0.8	0.8	0.2	0.6	0.6	0.8
32		0.2	0.2	0.2	0.4	0.4	0.4	0.4	0.4
56		0	0.2	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0

Graphics



Mysidopsis 7-d Survival, Growth and Fecundity Test

Granite Canyon

Analysis ID:	16-3143-6492	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:31	**Analysis:**	Nonparametric-Multiple Comparison	**Official Results:**	Yes
Batch ID:	15-1554-8488	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	20 Nov-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	27 Nov-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	07-5362-3375	**Code:**	2CEB614F	**Client:**	
Sample Date:	20 Nov-19	**Material:**	Corexit	**Project:**	
Receive Date:	20 Nov-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	NA	C > T	NA	NA	32	56	42.33		24.6%

Wilcoxon/Bonferroni Adj Test

Control	vs	C-uL/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		3.2	48	NA	1	14	0.0894	Exact	Non-Significant Effect
		5.6	53	NA	3	14	0.2945	Exact	Non-Significant Effect
		10	57	NA	2	14	0.6503	Exact	Non-Significant Effect
		18	59	NA	0	14	0.9215	Exact	Non-Significant Effect
		32	57	NA	0	14	0.6554	Exact	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.99991E-08	3.99982E-09	5	1.054	0.3995	Non-Significant Effect
Error	1.594335E-07	3.796035E-09	42			
Total	1.794326E-07		47			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	25.39	15.1	0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9127	0.934	0.0017	Non-normal Distribution

Mean Dry Weight-mg Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.000303	0.000282	0.000324	0.0003	0.00026	0.00034	9.01E-06	8.41%	0.0%
3.2		8	0.000264	0.000228	0.0003	0.000263	0.00022	0.00035	1.53E-05	16.4%	13.1%
5.6		8	0.000283	0.000271	0.000296	0.000278	0.00026	0.0003	5.34E-06	5.34%	6.6%
10		8	0.000285	0.000236	0.000335	0.000271	0.0002	0.0004	2.08E-05	20.6%	5.84%
18		8	0.00032	0.000248	0.000392	0.000288	0.00025	0.0005	3.05E-05	27.0%	-5.5%
32		8	0.000263	0.000183	0.000342	0.000225	0.00015	0.0004	3.37E-05	36.4%	13.4%
56		1	0.0002			0.0002	0.0002	0.0002	0	0.0%	34.0%

Mean Dry Weight-mg Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.00028	0.00026	0.00032	0.0003	0.000325	0.0003	0.0003	0.00034
3.2		0.00022	0.000233	0.000275	0.00028	0.00028	0.00025	0.00035	0.00022
5.6		0.000275	0.000275	0.00028	0.0003	0.000275	0.0003	0.0003	0.00026
10		0.0004	0.00025	0.0003	0.000267	0.000325	0.000267	0.000275	0.0002
18		0.000267	0.0005	0.000275	0.00025	0.0004	0.000267	0.0003	0.0003
32		0.0004	0.0004	0.0003	0.0002	0.0002	0.0002	0.00015	0.00025
56		0.0002							

CETIS Analytical Report

Mysidopsis 7-d Survival, Growth and Fecundity Test

Granite Canyon

Analysis ID:	04-8467-2732	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:31	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	15-1554-8488	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	20 Nov-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	27 Nov-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	07-5362-3375	**Code:**	2CEB614F	**Client:**	
Sample Date:	20 Nov-19	**Material:**	Corexit	**Project:**	
Receive Date:	20 Nov-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	584468	200	Yes	Two-Point Interpolation

Point Estimates

Level	uL/L	95% LCL	95% UCL
IC5	18	0.7357	34.8
IC10	25.39	2.012	37.91
IC15	33.43	19.76	41.29
IC20	38.31	22.98	44.95
IC25	43.87	26.17	49.4
IC40	>56	N/A	N/A
IC50	>56	N/A	N/A

Mean Dry Weight-mg Summary

			Calculated Variate						
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.000303	0.00026	0.00034	9.01E-06	2.55E-05	8.41%	0.0%
3.2		8	0.000264	0.00022	0.00035	1.53E-05	4.32E-05	16.4%	13.1%
5.6		8	0.000283	0.00026	0.0003	5.34E-06	1.51E-05	5.34%	6.6%
10		8	0.000285	0.0002	0.0004	2.08E-05	5.89E-05	20.6%	5.84%
18		8	0.00032	0.00025	0.0005	3.05E-05	8.64E-05	27.0%	-5.5%
32		8	0.000263	0.00015	0.0004	3.37E-05	9.54E-05	36.4%	13.4%
56		1	0.0002	0.0002	0.0002	0	0	0.0%	34.0%

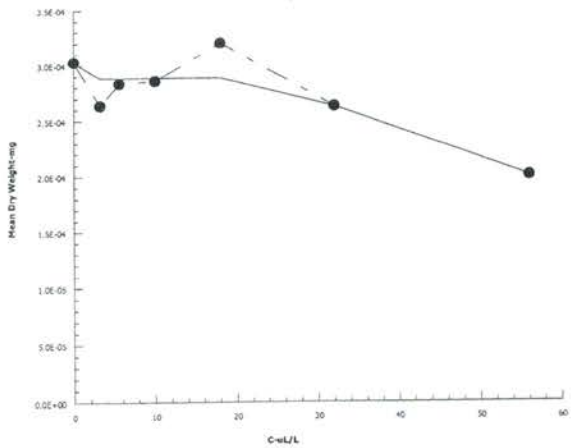
Mean Dry Weight-mg Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.00028	0.00026	0.00032	0.0003	0.000325	0.0003	0.0003	0.00034
3.2		0.00022	0.000233	0.000275	0.00028	0.00028	0.00025	0.00035	0.00022
5.6		0.000275	0.000275	0.00028	0.0003	0.000275	0.0003	0.0003	0.00026
10		0.0004	0.00025	0.0003	0.000267	0.000325	0.000267	0.000275	0.0002
18		0.000267	0.0005	0.000275	0.00025	0.0004	0.000267	0.0003	0.0003
32		0.0004	0.0004	0.0003	0.0002	0.0002	0.0002	0.00015	0.00025
56		0.0002							

Mysidopsis 7-d Survival, Growth and Fecundity Test — Granite Canyon

Analysis ID:	04-8467-2732	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:31	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Dispersant - *Americamysis* (Mysid) 7 Day Range Finder - Ref Tox - 11/20/19

Concentration	Beaker	Rep	Alive	Initial	Prop.	Mean	SD	Tare (g)	Total (g)	Mysids	Wt/Mysid (mg)	Mean	SD
0	1	1	4	5	0.80	0.93	0.10	0.7009	0.7020	4	0.275	0.31	0.04
	2	2	4	5	0.80			0.6837	0.6847	4	0.250		
	3	3	5	5	1.00			0.7008	0.7023	5	0.300		
	4	4	4	5	0.80			0.6940	0.6955	4	0.375		
	5	5	5	5	1.00			0.6914	0.6931	5	0.340		
	6	6	5	5	1.00			0.6857	0.6873	5	0.320		
	7	7	5	5	1.00			0.6767	0.6782	5	0.300		
	8	8	5	5	1.00			0.6828	0.6843	5	0.300		
32	9	1	4	5	0.80	0.88	0.15	0.6698	0.6710	4	0.300	0.28	0.01
	10	2	4	5	0.80			0.6702	0.6714	4	0.300		
	11	3	4	5	0.80			0.6562	0.6573	4	0.275		
	12	4	3	5	0.60			0.7122	0.7131	3	0.300		
	13	5	5	5	1.00			0.7017	0.7031	5	0.280		
	14	6	5	5	1.00			0.7131	0.7144	5	0.260		
	15	7	5	5	1.00			0.7061	0.7075	5	0.280		
	16	8	5	5	1.00			0.7033	0.7047	5	0.280		
56	17	1	4	5	0.80	0.98	0.07	0.7052	0.7064	4	0.300	0.30	0.02
	18	2	5	5	1.00			0.7068	0.7082	5	0.280		
	19	3	5	5	1.00			0.7077	0.7091	5	0.280		
	20	4	5	5	1.00			0.7036	0.7051	5	0.300		
	21	5	5	5	1.00			0.7004	0.7020	5	0.320		
	22	6	5	5	1.00			0.6968	0.6984	5	0.320		
	23	7	5	5	1.00			0.7166	0.7180	5	0.280		
	24	8	5	5	1.00			0.7187	0.7202	5	0.300		
100	25	1	5	5	1.00	0.93	0.10	0.7188	0.7200	5	0.240	0.27	0.02
	26	2	5	5	1.00			0.6838	0.6852	5	0.280		
	27	3	5	5	1.00			0.6810	0.6824	5	0.280		
	28	4	5	5	1.00			0.6798	0.6811	5	0.264		
	29	5	4	5	0.80			0.6840	0.6852	4	0.300		
	30	6	4	5	0.80			0.6886	0.6897	4	0.275		
	31	7	5	5	1.00			0.6884	0.6898	5	0.276		
	32	8	4	5	0.80			0.6738	0.6749	4	0.275		
180	33	1	5	5	1.00	0.73	0.18	0.6687	0.6699	5	0.240	0.67	1.18
	34	2	3	5	0.60			0.6646	0.6654	3	0.267		
	35	3	5	5	1.00			0.6695	0.6708	5	0.260		
	36	4	4	5	0.80			0.6696	0.6705	4	0.225		
	37	5	3	5	0.60			0.6636	0.6644	3	0.267		
	38	6	3	5	0.60			0.6986	0.6994	3	0.267		
	39	7	3	5	0.60			0.6826	0.6934	3	3.600		
	40	8	3	5	0.60			0.6967	0.6975	3	0.267		
320	41	1	2	5	0.40	0.38	0.20	0.7023	0.7032	2	0.450	0.25	0.10
	42	2	2	5	0.40			0.6947	0.6951	2	0.200		
	43	3	0	5	0.00			-	-	-	-		
	44	4	2	5	0.40			0.7032	0.7037	2	0.250		
	45	5	1	5	0.20			0.6974	0.6976	1	0.200		
	46	6	3	5	0.60			0.7009	0.7014	3	0.167		
	47	7	3	5	0.60			0.7116	0.7124	3	0.267		
	48	8	2	5	0.40			0.7020	0.7024	2	0.200		

Dispersant - Americamysis (Mysid) 7 Day Range Finder - Ref Tox Daily Counts - 11/20/19

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	5	5	4	0.80	0.93	0.10
	2	2	5	5	5	5	4	4	4	4	0.80		
	3	3	5	5	5	5	5	5	5	5	1.00		
	4	4	5	5	5	5	4	4	4	4	0.80		
	5	5	5	5	5	5	5	5	5	5	1.00		
	6	6	5	5	5	5	5	5	5	5	1.00		
	7	7	5	5	5	5	5	5	5	5	1.00		
	8	8	5	5	5	5	5	5	5	5	1.00		
32	9	1	5	5	5	5	5	4	4	4	0.80	0.88	0.15
	10	2	5	5	5	5	5	4	4	4	0.80		
	11	3	5	5	5	5	5	5	4	4	0.80		
	12	4	5	5	4	4	4	4	3	3	0.60		
	13	5	5	5	5	5	5	5	5	5	1.00		
	14	6	5	5	5	5	5	5	5	5	1.00		
	15	7	5	5	5	5	5	5	5	5	1.00		
	16	8	5	5	5	5	5	5	5	5	1.00		
56	17	1	5	5	5	4	4	4	4	4	0.80	0.98	0.07
	18	2	5	5	5	5	5	5	5	5	1.00		
	19	3	5	5	5	5	5	5	5	5	1.00		
	20	4	5	5	5	5	5	5	5	5	1.00		
	21	5	5	5	5	5	5	5	5	5	1.00		
	22	6	5	5	5	5	5	5	5	5	1.00		
	23	7	5	5	5	5	5	5	5	5	1.00		
	24	8	5	5	5	5	5	5	5	5	1.00		
100	25	1	5	5	5	5	5	5	5	5	1.00	0.93	0.10
	26	2	5	5	5	5	5	5	5	5	1.00		
	27	3	5	5	5	5	5	5	5	5	1.00		
	28	4	5	5	5	5	5	5	5	5	1.00		
	29	5	5	5	5	5	5	5	5	4	0.80		
	30	6	5	5	5	5	5	5	5	4	0.80		
	31	7	5	5	5	5	5	5	5	5	1.00		
	32	8	5	5	5	5	4	4	4	4	0.80		
180	33	1	5	5	5	5	5	5	5	5	1.00	0.70	0.15
	34	2	5	4	4	4	4	4	4	3	0.60		
	35	3	6	6	6	6	6	6	5	5	0.83		
	36	4	5	5	5	5	5	4	4	4	0.80		
	37	5	5	5	5	5	4	4	3	3	0.60		
	38	6	5	5	5	5	5	5	4	3	0.60		
	39	7	5	5	5	5	5	4	3	3	0.60		
	40	8	5	5	5	5	4	4	4	3	0.60		
320	41	1	5	5	5	4	4	4	4	2	0.40	0.38	0.20
	42	2	5	5	3	3	3	3	3	2	0.40		
	43	3	5	5	3	3	2	1	0	0	0.00		
	44	4	5	5	5	4	3	3	2	2	0.40		
	45	5	5	4	4	4	4	1	1	1	0.20		
	46	6	5	5	5	4	4	4	4	3	0.60		
	47	7	5	5	5	4	4	3	3	3	0.60		
	48	8	5	5	4	3	3	2	2	2	0.40		

Marine Pollution Studies Laboratory
Data Sheet for Americamysis Chronic Toxicity Test

Project: Dispersant Mysids
Sample Type: Water
Balance #: 1

Start Date/Time: 11/20/19
End Date/Time: 11/27/19
Species Lot #: AB 111919

Ref Tox

Container Number	Number at Start	Number Alive	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of Mysids	Notes
1	5	4	JV		0.7009	0.7020	4	No eggs
2		4	JV		0.6837	0.6847	4	No eggs
3		5	JV		0.7008	0.7023	5	No eggs
4		4	JV		0.6940	0.6955	4	No eggs
5		5	JV		0.6914	0.6931	5	No eggs
6		5	JV		0.6857	0.6873	5	No eggs
7		5	JV		0.6767	0.6782	5	No eggs
8		5	JV		0.6828	0.6843	5	No eggs
9		4	KF		0.6698	0.6710	4	
10		4	JV		0.6702	0.6714	4	
11		4	JV		0.6562	0.6573	4	
12		3	KF	KF	0.7122	0.7131	3	
13		5	JV		0.7017	0.7031	5	
14		5	KF		0.7131	0.7144	5	
15		5	JV		0.7061	0.7075	5	
16		5	KF		0.7033	0.7047	5	
17		4	JV		0.7052	0.7064	4	
18		5	KF	KF 0.7068	~~0.7137~~	0.7082	5	
19		5	JV	0.7077	~~0.7068~~	0.7091	5	
20		5	KF	0.7036	~~0.7077~~	0.7051	5	
21		5	KF	0.7004	~~0.7036~~	0.7020	5	
22		5	JV	0.6968	~~0.7004~~	0.6984	5	
23		5	JV	0.7166	~~0.6968~~	0.7180	5	
24		5	KF	~~KF~~	0.7167	0.7202	5	
25		5	JV		0.7188	0.7200	5	
26		5	JV		0.6838	0.6852	5	
27		5	KF		0.6810	0.6824	5	
28		5	JV		0.6798	0.6811	5	
29		4	KF		0.6840	0.6852	4	
30		4	JV		0.6886	0.6897	4	
31		5	KF		0.6884	0.6898	5	
32		4	JV		0.6738	0.6749	4	
33		5	KF		0.6687	0.6699	5	
34		3	JV		0.6646	0.6654	3	
35		5	JV		0.6695	0.6708	5	
36		4	JV		0.6696	0.6705	4	
37		3	JV		0.6636	0.6644	3	
38		3	JV		0.6986	0.6994	3	
39		3	KF		0.6926	0.6934	3	
40		3	JV		0.6967	0.6975	3	
41		2	KF		0.7023	0.7032	2	
42		2	JV		0.6947	0.6951	2	
43		—	—		0.6959			
44		2	JV		0.7032	0.7037	2	
45		1	KF		0.6974	0.6976	1	
46		3	JV		0.7009	0.7014	3	
47		3	KF		0.7116	0.7124	3	
48		2	KF		0.7020	0.7024	2	
Initials	JV/LM				KF	SZ	SZ	

	Tare weight	Total weight	# Mysids
Baseline 1			
Baseline 2			
Baseline 3			
Baseline 4			
Baseline 5			

Marine Pollution Studies Laboratory
Americamysis 4-day Acute Toxicity Test
Feeding: 15 Artemia nauplii per mysid, 2x daily

Project: Mysid RT **Start Date/Time:** 11/20/19

~~Water Batch #:~~ _____ **End Date/Time:** 11/27/19

Lot #: AB11919

RefTox

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
1		5	5	5	5	5	5	5		
2			5	5	5	4	4	4		
3			5	5	5	5	5	5		
4			5	5	5	~~5~~ 4	4	4		
5			5	5	5	5	5	5		
6			5	5	5	~~4~~ 5	5	5		
7			5	5	5	5	5	5		
8			5	5	5	5	5	5		
9			5	5	5	5	4	4		
10			5	5	5	5	4	4		
11			5	5	5	5	5	4		
12			5	4	4	4	4	3		D6: black blob on side (dead?)
13			5	5	5	5	5	5		
14			5	5	5	5	5	5		
15			5	5	5	5	5	5		
16			5	5	5	5	5	5		
17			5	5	4	4	4	4		
18			5	5	5	5	5	5		
19			5	5	5	5	5	5		
20			5	5	5	5	5	5		
21			5	5	5	5	5	5		
22			5	5	5	5	5	5		
23			5	5	5	5	5	5		
24			5	5	5	5	5	5		
25			5	5	5	5	5	5		
26			5	5	5	5	5	5		
27			5	5	5	5	5	5		
28			5	5	5	5	5	5		
29			5	5	5	5	5	5		
30			5	5	5	5	5	5		
31			5	5	5	5	5	5		
32			5	5	5	4	4	4		
33			5	5	5	5	5	5		
34			4	4	4	4	4	4		
35		6	6	6	6	6	6	5		
36			5	5	5	5	4	4		
37			5	5	5	4	4	3		
38			5	5	5	5	5	4		
39			5	5	5	5	4	3		
40		5	5	5	5	4	4	4		
Initials		JV/LM	JV	JV	JV	S2	JV			

RefTox

Marine Pollution Studies Laboratory
Americamysis 4-day Acute Toxicity Test
Feeding: 15 Artemia nauplii per mysid, 2x daily

Project: Mysid RT **Start Date/Time:** 11/20/19

~~**Water Batch #:**~~ _____ **End Date/Time:** 11/27/19

Ref Tox

Lot #: AB111919

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
41		5	5	5	4	4	4	4		
42		|	5	3	3	3	3	3		
43		|	5	3	3	2	1 *	0	——	*spilled cup @AM feeding
44		|	5	5	4	3	3	2		
45		|	4	4	4	4	1	1		
46		|	5	5	4	4	4	4		
47		|	5	5	4	4	3	3		
48		5	5	4	3	3	2	2		
49										
50										
51										
52										
53										
54										
55										
56										
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69										
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
Initials		JV/JM	JV	JV	JV	SZ	JV	KF		

DATA SHEET 1 OF 3 ONLY

Ref Tox

CETIS Analytical Report

Americamysis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	17-1759-6568	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	07 Apr-20 14:49	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	13-1014-8059	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	20 Nov-19 12:00	**Protocol:**	EPA/600/4-87/028 (1987)	**Diluent:**	
Ending Date:	27 Nov-19 12:00	**Species:**	Americamysis bahia	**Brine:**	
Test Length:	7d 0h	**Taxon:**		**Source:**	**Age:**
Sample ID:	04-1891-4162	**Code:**	18F81F72	**Project:**	Dispersant
Sample Date:	07 Apr-20 14:47	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	07 Apr-20 14:47	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	180	134.2		16.95%

Dunnett Multiple Comparison Test

Control	vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
SW Control		32	0.706	2.305	0.187	14	CDF	0.5529	Non-Significant Effect
		56	-0.7322	2.305	0.187	14	CDF	0.9667	Non-Significant Effect
		100	0	2.305	0.187	14	CDF	0.8333	Non-Significant Effect
		180*	2.798	2.305	0.187	14	CDF	0.0161	Significant Effect
		320*	7.453	2.305	0.187	14	CDF	8.5E-07	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.48474	0.496947	5	18.79	<1.0E-37	Significant Effect
Error	1.11061	0.0264431	42			
Total	3.59535		47			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	8.042	15.09	0.1539	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9445	0.9345	0.0242	Normal Distribution

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	8	0.9250	0.8385	1.0000	1.0000	0.8000	1.0000	0.0366	11.19%	0.00%
32		8	0.8750	0.7506	0.9994	0.9000	0.6000	1.0000	0.0526	17.01%	5.41%
56		8	0.9750	0.9159	1.0000	1.0000	0.8000	1.0000	0.0250	7.25%	-5.41%
100		8	0.9250	0.8385	1.0000	1.0000	0.8000	1.0000	0.0366	11.19%	0.00%
180		8	0.7250	0.5718	0.8782	0.6000	0.6000	1.0000	0.0648	25.27%	21.62%
320		8	0.3750	0.2093	0.5407	0.4000	0.0000	0.6000	0.0701	52.85%	59.46%

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	8	1.256	1.153	1.359	1.345	1.107	1.345	0.04357	9.81%	0.00%
32		8	1.199	1.054	1.343	1.226	0.8861	1.345	0.06107	14.41%	4.57%
56		8	1.316	1.245	1.386	1.345	1.107	1.345	0.02977	6.40%	-4.74%
100		8	1.256	1.153	1.359	1.345	1.107	1.345	0.04357	9.81%	0.00%
180		8	1.029	0.8531	1.204	0.8861	0.8861	1.345	0.0742	20.40%	18.11%
320		8	0.65	0.4682	0.8319	0.6847	0.2255	0.8861	0.0769	33.46%	48.25%

Americamysis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID: 17-1759-6568 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.6
Analyzed: 07 Apr-20 14:49 **Analysis:** Parametric-Control vs Treatments **Status Level:** 1

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	0.8000	0.8000	1.0000	0.8000	1.0000	1.0000	1.0000	1.0000
32		0.8000	0.8000	0.8000	0.6000	1.0000	1.0000	1.0000	1.0000
56		0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	0.8000	0.8000	1.0000	0.8000
180		1.0000	0.6000	1.0000	0.8000	0.6000	0.6000	0.6000	0.6000
320		0.4000	0.4000	0.0000	0.4000	0.2000	0.6000	0.6000	0.4000

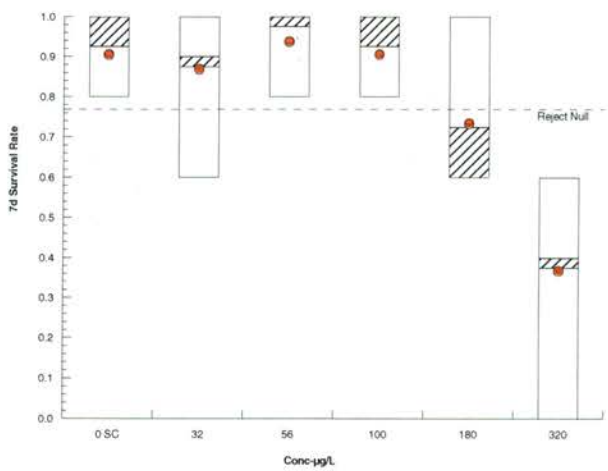
Angular (Corrected) Transformed Detail

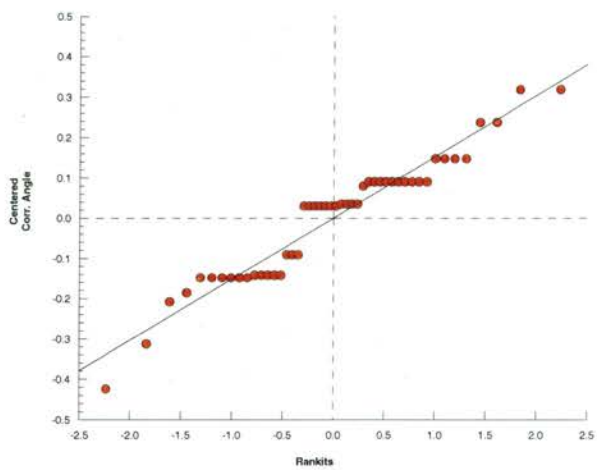
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	1.107	1.107	1.345	1.107	1.345	1.345	1.345	1.345
32		1.107	1.107	1.107	0.8861	1.345	1.345	1.345	1.345
56		1.107	1.345	1.345	1.345	1.345	1.345	1.345	1.345
100		1.345	1.345	1.345	1.345	1.107	1.107	1.345	1.107
180		1.345	0.8861	1.345	1.107	0.8861	0.8861	0.8861	0.8861
320		0.6847	0.6847	0.2255	0.6847	0.4636	0.8861	0.8861	0.6847

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	4/5	4/5	5/5	4/5	5/5	5/5	5/5	5/5
32		4/5	4/5	4/5	3/5	5/5	5/5	5/5	5/5
56		4/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5	4/5	4/5	5/5	4/5
180		5/5	3/5	5/5	4/5	3/5	3/5	3/5	3/5
320		2/5	2/5	0/5	2/5	1/5	3/5	3/5	2/5

Graphics





CETIS Analytical Report

Americamysis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	09-4898-8927	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	07 Apr-20 14:49	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	13-1014-8059	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	20 Nov-19 12:00	**Protocol:**	EPA/600/4-87/028 (1987)	**Diluent:**	
Ending Date:	27 Nov-19 12:00	**Species:**	Americamysis bahia	**Brine:**	
Test Length:	7d 0h	**Taxon:**		**Source:**	**Age:**
Sample ID:	04-1891-4162	**Code:**	18F81F72	**Project:**	Dispersant
Sample Date:	07 Apr-20 14:47	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	07 Apr-20 14:47	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.075	40.54%	2.442681	0.039923	277.1	230.6	333.1

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	SC	8	0.9250	0.8000	1.0000	0.1035	11.19%	0.0%	37/40	0.925	0.0%
32		8	0.8750	0.6000	1.0000	0.1488	17.01%	5.41%	35/40	0.925	0.0%
56		8	0.9750	0.8000	1.0000	0.0707	7.25%	-5.41%	39/40	0.925	0.0%
100		8	0.9250	0.8000	1.0000	0.1035	11.19%	0.0%	37/40	0.925	0.0%
180		8	0.7250	0.6000	1.0000	0.1832	25.27%	21.62%	29/40	0.725	21.62%
320		8	0.3750	0.0000	0.6000	0.1982	52.85%	59.46%	15/40	0.375	59.46%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	0.8000	0.8000	1.0000	0.8000	1.0000	1.0000	1.0000	1.0000
32		0.8000	0.8000	0.8000	0.6000	1.0000	1.0000	1.0000	1.0000
56		0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	0.8000	0.8000	1.0000	0.8000
180		1.0000	0.6000	1.0000	0.8000	0.6000	0.6000	0.6000	0.6000
320		0.4000	0.4000	0.0000	0.4000	0.2000	0.6000	0.6000	0.4000

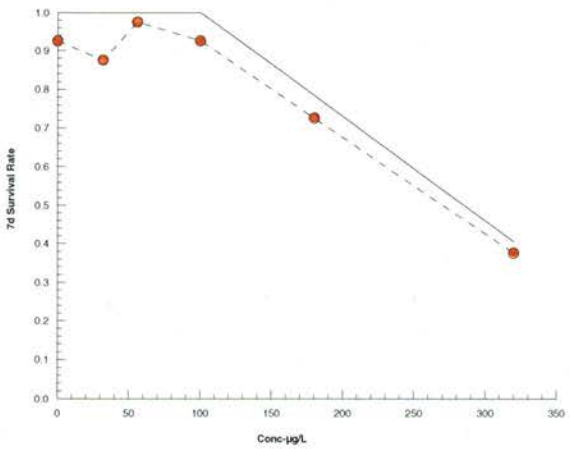
7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	4/5	4/5	5/5	4/5	5/5	5/5	5/5	5/5
32		4/5	4/5	4/5	3/5	5/5	5/5	5/5	5/5
56		4/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5	4/5	4/5	5/5	4/5
180		5/5	3/5	5/5	4/5	3/5	3/5	3/5	3/5
320		2/5	2/5	0/5	2/5	1/5	3/5	3/5	2/5

Americamysis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	09-4898-8927	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	07 Apr-20 14:49	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1

Graphics



Marine Pollution Studies Laboratory
Water Quality
Americamysis Chronic 7-day

Project: Dispersant Mysid
Lot # AB111919
Toxicant: Water

Start Date/Time: 11/20/19
End Date/Time: 11/27/19
WQ Meter ID: A2

Sample	Day 0 Date: 11/20/19 Temp: 24.1						Day 1 Date: 11/21/19 Temp: 24.8								
							New				Old				
	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Old pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	7.10	8.10	0.897	7.27	19.4	0.1	7.41	0.902	6.68	18.1	7.08	6.69	0.887	5.93	20.7
3.2	7.34	7.75	"	6.95	19.3	"	7.03	0.897	6.27	19.5	7.42	6.61	"	5.86	21.0
5.6	7.44	7.56	"	6.78	19.2	"	6.89	"	6.15	19.5	7.50	6.60	"	5.85	20.7
10	7.46	7.37	"	6.61	19.2	"	6.77	"	6.04	19.5	7.53	6.60	"	5.85	20.8
18	7.49	7.24	"	6.49	19.2	"	6.70	"	5.98	19.5	7.51	6.57	"	5.83	21.0
32	7.49	7.17	"	6.43	19.1	"	6.67	0.897	5.98	19.4	7.51	6.41	0.882	5.65	22.0
56	7.52	7.17	"	6.43	19.1	"	6.68	0.897	5.99	19.3	7.44	~~5.79~~	0.892	6.01	20.4
100	7.54	7.19	"	6.45	19.1	0.2	6.68	0.892	5.96	19.5	7.32	~~4.17~~	0.892	4.20	20.2
		KF									56→	6.74 KF			
Ø	7.10	~~7.19~~ 8.10		7.27	19.4						100→	4.71 KF			
32	7.60	7.34		6.58	19.0										
56	7.63	7.35		6.59	18.9										
100	7.65	7.30		6.55	18.9										
180	7.65	7.30	—	6.55	18.6										
320	7.65	7.34	~~0.902~~	6.62	18.3										
Initials	KF	KF	KF	KF	KF	KF	KF	KF	KF	KF	KF	KF	KF	KF	KF

Cu KCl

Quality Assurance	pH 7.00	DO 100%	Salinity (ppt)	Ammonia 10 mg/L
	6.99	98.7	34.9	9.6
	—	—	—	—
	7.09	100.2	34.7	9.1
Initials	KF	KF	KF	KF
	Slope:	Temp: 21.1		

	DO 100%	Salinity (ppt)
	99.9	34.7
	—	—
	99.6	35.4
Initials	KF	KF
	Temp: 24.9	

	pH 7.00	DO 100%	Salinity (ppt)
	7.03	99.9	34.7
	—	—	—
	7.03	99.6	35.4
Initials	KF	KF	KF
	Slope: 97.9	Temp: 24.6	

Marine Pollution Studies Laboratory
Water Quality
Americamysis Chronic 7-day

Project: Dispersant Mysids
Lot #: 11/19/19
Toxicant: Water

Start Date/Time: 11/20/19
End Date/Time: 11/27/19
WQ Meter ID: A2

Day 2
Date: 11/22/19 Temp: 24.5

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	8.08	0.892	7.21	20.2	7.11	7.29	0.892	6.50	19.9
3.2	7.94	0.892	7.08	20.0	7.33	7.18	0.887	6.37	20.8
5.6	7.86	0.892	7.01	20.0	7.36	7.13	0.887	6.32	20.8
10	7.75	0.892	6.91	19.9	7.36	7.10	0.887	6.30	20.9
18	7.64	0.892	6.81	19.9	7.36	7.03	0.887	6.24	21.2
32	7.54	0.892	6.72	19.9	7.36	6.99	0.887	6.13	22.8
56	7.49	0.892	6.72	19.9	7.34	6.74	0.887	5.98	20.5
100	—				7.34	6.58	0.892	5.87	20.2
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Quality Assurance	DO 100%	Salinity (ppt)
	100.7	34.9
Initials	95.9	34.8
	JV	JV
	Temp: 24.9	

	pH 7.00	DO 100%	Salinity (ppt)
	7.04		
Initials	7.09		
	JV		
	Slope: 98.6	Temp: 25.2	

Day 3
Date: 11/23/19 Temp: 24.5

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	7.86	0.887	6.97	21.2	7.11	7.03	0.882	6.20	21.7
3.2	7.66	0.892	6.83	20.1	7.36	7.06	0.882	6.23	22.0
5.6	7.49	0.887	6.64	21.0	7.39	6.88	0.882	6.07	21.6
10	7.40	0.887	6.56	21.1	7.39	6.92	0.882	6.10	22.0
18	7.24	0.887	6.42	21.1	7.40	6.85	0.882	6.04	22.2
32	7.17	0.887	6.36	21.1	7.40	6.76	0.882	5.89	24.0
56	7.22	0.887	6.40	21.2	7.39	6.55	0.887	5.81	21.2
100	—								
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Quality Assurance	DO 100%	Salinity (ppt)
	100.8	34.9
	92.5	34.9
Initials	JV	JV
	Temp: 25.1	

	pH 7.00	DO 100%	Salinity (ppt)
	7.02		
Initials	7.07		
	JV		
	Slope: 98.6	Temp: 25.1	

Marine Pollution Studies Laboratory
Water Quality
Americamysis Chronic 7-day

Project: Dispersant Mysid
Lot #: 11R19 ABI19R9
Toxicant: Water

Start Date/Time: 11/20/19
End Date/Time: 11/27/19
WQ Meter ID: A2

Day 4
Date: 11/24/19 Temp:

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	7.93	0.882	6.99	21.7	7.27	7.24	0.872	6.31	23.8
3.2	7.69		6.78	21.7	7.35	7.22	0.877	6.33	23.0
5.6	7.42		6.54	21.7	7.38	7.14	0.877	6.26	23.0
10	7.36		6.49	21.6	7.41	7.18	0.872	6.26	23.7
18	7.19		6.34	21.6	7.42	7.24	0.872	6.31	23.7
32	7.15		6.31	21.6	7.42	7.14	0.872	6.23	24.2
56	7.11		6.27	21.6	7.42	7.24	0.877	6.34	22.7
100									
Initials					SZ	SZ	SZ	SZ	SZ

Quality Assurance	DO 100%	Salinity (ppt)
	100.5	34.9
Initials	99.2	35.0
	SZ	SZ
	Temp: 24.1	

	pH 7.00	DO 100%	Salinity (ppt)
	7.03		34.9
Initials	7.06		35.0
	SZ		SZ
	Slope: 98.2	Temp:	

Day 5
Date: 11/25/19 Temp: 24.6

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	7.60	0.882	6.70	21.8	7.47	6.67	0.872	5.82	23.7
3.2	7.19	0.882	6.34	22.0	7.48	6.60	0.877	5.79	23.2
5.6	7.01	0.882	6.18	21.9	7.48	6.54	0.872	5.70	23.6
10	6.90	0.882	6.08	21.9	7.48	6.44	0.872	5.62	23.8
18	6.76	0.882	5.96	21.9	7.48	6.40	0.872	5.58	23.6
32	6.68	0.882	5.89	21.9	7.46	6.28	0.872	5.48	23.8
56	6.67	0.882	5.88	21.7	7.46	6.28	0.877	5.51	22.8
100									
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Quality Assurance	DO 100%	Salinity (ppt)
	100.3	34.9
	98.7	35.4
Initials	JV	JV
	Temp: 24.9	

	pH 7.00	DO 100%	Salinity (ppt)
	7.03		
	7.14		
Initials	JV		
	Slope: 99.0	Temp: 25.1	

Marine Pollution Studies Laboratory
Water Quality
Americamysis Chronic 7-day

Project: Dispersant Mysid
Lot #: AB 11919
Toxicant: Water

Start Date/Time: 11/20/19
End Date/Time: 11/27/19
WQ Meter ID: A2

Day 6
Date: 11/26/19 Temp: 25.1

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
0	7.94	0.887	~~8.8~~ 7.04	20.8	7.19	6.98	0.872	6.09	23.8
3.2	7.65	0.887	6.79	20.7	7.24	6.98	0.872	6.09	24.1
5.6	7.41	0.887	6.57	20.7	7.29	6.99	0.877	6.13	23.4
10	7.26	0.887	6.44	20.7	7.29	6.93	0.872	6.04	24.2
18	7.14	0.887	6.33	20.8	7.33	6.91	0.872	6.03	24.2
32	7.05	0.887	6.25	20.8	7.33	6.86	0.872	5.98	24.4
56	7.04	0.887	6.24	20.7	7.36	6.83	0.877	5.99	23.0
100									
Initials	SZ	SZ	SZ	SZ	SZ	SZ	SZ	SZ	SZ

Quality Assurance	DO 100%	Salinity (ppt)
	100.2	34.9
	—	—
Initials	100.6	35.1
	SZ	SZ
	Temp: 22.2	

	pH 7.00	DO 100%	Salinity (ppt)
	7.03	100.2	34.9
	—	—	—
	7.07	101.6	35.1
Initials	SZ	SZ	SZ
	Slope: 98.4	Temp: 22.6	

Day 7
Date: 11/27/19 Temp: 24.5

Sample	Old					
	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)
0	7.38	8.79	7.71	0.877	23.4	-0.1 UR
3.2	7.42	8.34	7.31	0.877	23.0	-0.4 UR
5.6	7.45	8.33	7.35	0.882	22.3	-0.4 UR
10	7.45	8.16	7.16	0.877	22.5	-0.5 UR
18	7.49	8.14	7.14	0.877	22.8	0.2
32	7.50	7.91	6.94	0.877	22.9	0.4
56	7.48	7.60	6.70	0.882	21.5	-0.4 UR
100						0.2
Initials	LM	LM	LM	LM	LM	LM

10.1/9.8 11/22/19 JV

LM wrote in wrong boxes.

Quality Assurance	pH 7.00	DO 100%	Salinity (ppt)	Ammonia 10 mg/L
	7.09	98.8	34.9	10.6
	—	—	—	—
	7.08	94.4	35.2	10.9
Initials	LM	LM	LM	LM
	Slope: 98.2	Temp: 15.8		

Marine Pollution Studies Laboratory
Water Quality Data Sheet

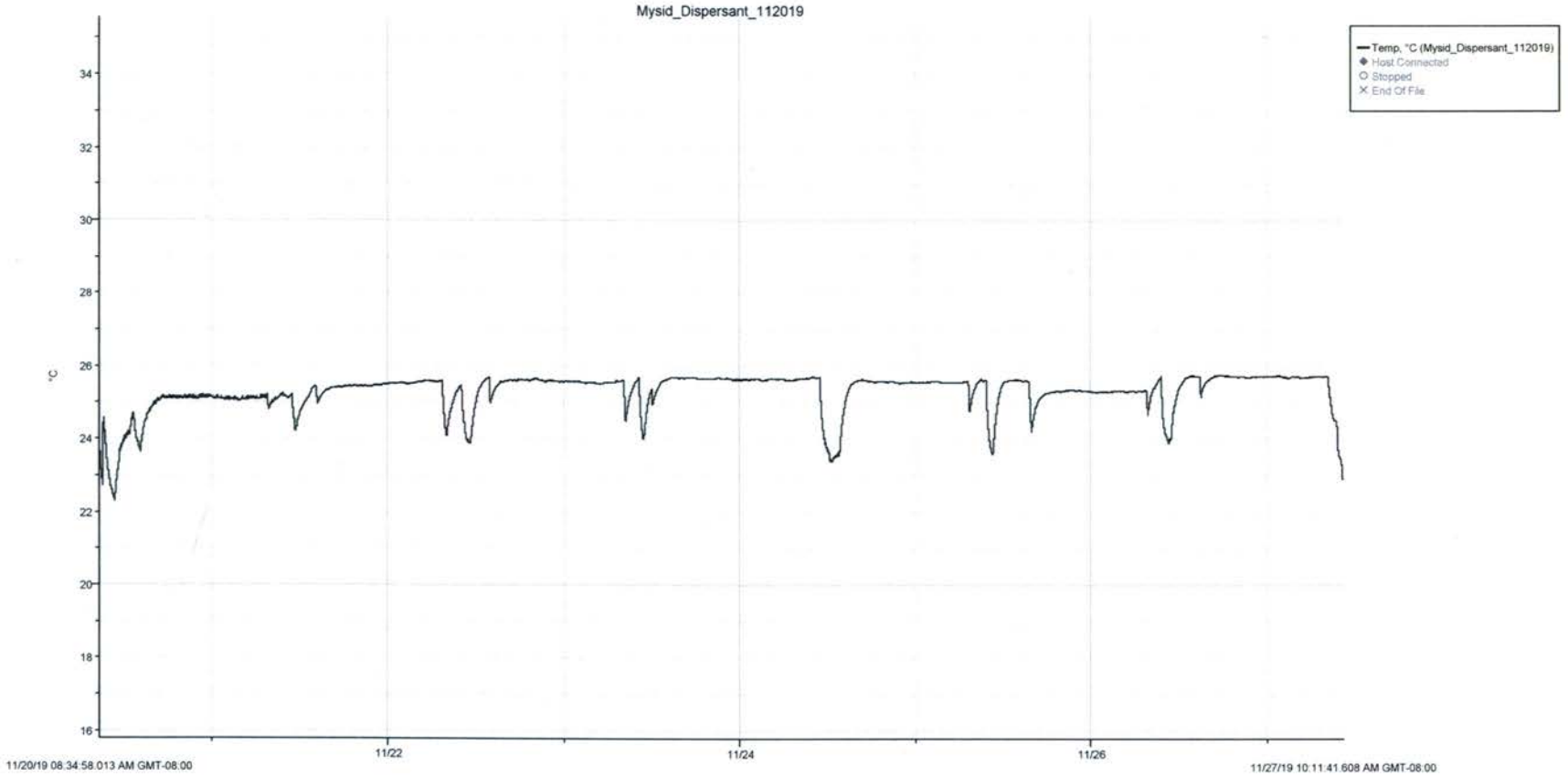
Americamysis Daily Log

Project: Dispersant Mysid
Sample Type: Water
WQ Meter ID: A2

Start Date/Time: 11/20/19
End Date/Time: 11/27/19
Species Lot #: AB111919

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	Mon
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Start temp logger	✓							
Temperature Test	24.1	24.8	24.5	24.5	24.9	24.6	25.1	24.5
Temperature Ref Tox	24.0	24.3	24.6	24.6	24.9	25.0	25.2	24.8
Feed 15 naups/mysid AM		✓	✓	✓	✓	✓	✓	
Renew Test/Ref Tox		✓	✓	✓	✓	✓	✓	
Measure Test WQ	✓	✓	✓	✓	✓	✓	✓	✓
Feed 15 naups/mysid PM	✓	✓	✓	✓	✓	✓	✓	
Initials	ALL	JV KF	JV	JV	SZ	JV	SZ, KF	ALL

NOTE: DO should be above 4.0 mg/L. If it is not, aerate the entire test at 1 bubble/second.


Mysid_Dispersant_112019
Temp, °C (Mysid_Dispersant_112019)
Host Connected
Stopped
End Of File
°C
34
32
30
28
26
24
22
20
18
16
11/22
11/24
11/26
11/20/19 08:34:58.013 AM GMT-08:00
11/27/19 10:11:41.608 AM GMT-08:00

Marine Pollution Studies Laboratory
Culture Log

Organism: A. bahia

Organism Source: ABS

Collection Date: 11/18/19

Arrival Date at MPSL: 11/18/19

Test Start Date: 11/20/19

Arrival Temperature at MPSL: 18.4°

Arrival Conductivity/Salinity at MPSL: 17.

WQ Meter ID: Refractometer

Species Lot #: AB111919

Date	11/19	11/20							
Temperature	22.2	25.0							
Conductivity/ Salinity	15 20 JV	20							
Aeration	Y	Y							
Organism Health	E	E							
Initials	JV	JV							
Notes	RW 50% fed naups	fed naups							

Temperature: Measured value (make note if it is adjusted up/down).
Conductivity: Measured value
~~Water flow: yes/no~~
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

Quality Assurance/Quality Control Criteria:

Organisms acclimated to test conductivity at least 48 hours prior to test: (Yes) No

Organisms held at MPSL no more than 2 weeks: (Yes) No

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 11/18/2019

SPECIES: *Americamysis bahia* (formerly Mysidopsis)

AGE: 5 day

LIFE STAGE: Juvenile

HATCH DATE: 11/13/2019

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	25 °C	23-26 °C
SALINITY/CONDUCTIVITY:	21 ppt	21-30 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	140 mg/l	140-175 mg/l
pH:	7.96	7.83-8.26

Comments:

Facility Supervisor

Dispersant - *Americamysis* (Mysid) 7 Day Definitive - 12/13/19

Concentration	Beaker	Rep	Alive	Initial	Prop.	Mean	SD	Tare (g)	Total (g)	Mysids	Wt/Mysid (mg)	Mean	SD
0	1	1	5	5	1.00	0.98	0.07	0.6877	0.6892	5	0.300	0.28	0.04
	2	2	5	5	1.00			0.6769	0.6785	5	0.320		
	3	3	5	5	1.00			0.6792	0.6804	5	0.240		
	4	4	4	5	0.80			0.6856	0.6867	4	0.275		
	5	5	5	5	1.00			0.6809	0.6823	5	0.280		
	6	6	5	5	1.00			0.6796	0.6810	5	0.280		
	7	7	5	5	1.00			0.6568	0.6585	5	0.340		
	8	8	5	5	1.00			0.6660	0.6670	5	0.200		
3.2	9	1	5	5	1.00	0.93	0.10	0.6590	0.6601	5	0.220	0.28	0.07
	10	2	4	5	0.80			0.6636	0.6644	4	0.200		
	11	3	5	5	1.00			0.6598	0.6609	5	0.220		
	12	4	5	5	1.00			0.6569	0.6583	5	0.280		
	13	5	4	5	0.80			0.6358	0.6368	4	0.250		
	14	6	5	5	1.00			0.6402	0.6417	4	0.375		
	15	7	4	5	0.80			0.6333	0.6348	4	0.375		
	16	8	5	5	1.00			0.6008	0.6025	5	0.340		
5.6	17	1	5	5	1.00	1.00	0.00	0.6217	0.6228	5	0.220	0.27	0.05
	18	2	5	5	1.00			0.6145	0.6157	5	0.240		
	19	3	5	5	1.00			0.6871	0.6883	5	0.240		
	20	4	5	5	1.00			0.6732	0.6748	5	0.320		
	21	5	5	5	1.00			0.6713	0.6725	5	0.240		
	22	6	5	5	1.00			0.6506	0.6518	5	0.240		
	23	7	5	5	1.00			0.6587	0.6602	5	0.300		
	24	8	5	5	1.00			0.6656	0.6673	5	0.340		
10	25	1	5	5	1.00	0.95	0.09	0.6681	0.6695	5	0.280	0.25	0.03
	26	2	4	5	0.80			0.6650	0.6659	4	0.225		
	27	3	5	5	1.00			0.6771	0.6784	5	0.260		
	28	4	5	5	1.00			0.6619	0.6631	5	0.240		
	29	5	5	5	1.00			0.6571	0.6587	5	0.320		
	30	6	4	5	0.80			0.6694	0.6704	4	0.250		
	31	7	5	5	1.00			0.6798	0.6809	5	0.220		
	32	8	5	5	1.00			0.6686	0.6697	5	0.220		
18	33	1	5	5	1.00	0.90	0.15	0.6769	0.6779	5	0.200	0.23	0.04
	34	2	5	5	1.00			0.6707	0.6722	5	0.300		
	35	3	4	5	0.80			0.6856	0.6865	4	0.225		
	36	4	5	5	1.00			0.6778	0.6789	5	0.220		
	37	5	3	5	0.60			0.6784	0.6791	3	0.233		
	38	6	4	5	0.80			0.6810	0.6821	4	0.275		
	39	7	5	5	1.00			0.6631	0.6639	5	0.160		
	40	8	5	5	1.00			0.6600	0.6612	5	0.240		
32	41	1	1	5	0.20	0.63	0.31	0.6606	0.6610	1	0.400	0.30	0.14
	42	2	3	5	0.60			0.6494	0.6502	3	0.267		
	43	3	4	5	0.80			0.6682	0.6692	4	0.250		
	44	4	3	5	0.60			0.6540	0.6548	3	0.267		
	45	5	3	5	0.60			0.6675	0.6681	3	0.200		
	46	6	5	5	1.00			0.6523	0.6531	5	0.160		
	47	7	5	5	1.00			0.6557	0.6568	5	0.220		
	48	8	1	5	0.20			0.6696	0.6702	1	0.600		
56	49	1	0	5	0.00	0.03	0.07	-	-	-	-	0.30	-
	50	2	0	5	0.00			-	-	-	-		
	51	3	0	5	0.00			-	-	-	-		
	52	4	0	5	0.00			-	-	-	-		
	53	5	0	5	0.00			-	-	-	-		
	54	6	1	5	0.20			0.6860	0.6863	1	0.300		
	55	7	0	5	0.00			-	-	-	-		
	56	8	0	5	0.00			-	-	-	-		
100	57	1	0	5	0.00	0.00	0.00	-	-	-	-	-	-
	58	2	0	5	0.00			-	-	-	-		
	59	3	0	5	0.00			-	-	-	-		
	60	4	0	5	0.00			-	-	-	-		

Dispersant - Americamysis (Mysid) 7 Day Definitive - Daily Counts - 12/13/19

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	5	5	5	1.00	0.98	0.07
	2	2	5	5	5	5	5	5	5	5	1.00		
	3	3	5	5	5	5	5	5	5	5	1.00		
	4	4	5	5	5	5	5	4	4	4	0.80		
	5	5	5	5	5	5	5	5	5	5	1.00		
	6	6	5	5	5	5	5	5	5	5	1.00		
	7	7	5	5	5	5	5	5	5	5	1.00		
	8	8	5	5	5	5	5	5	5	5	1.00		
3.2	9	1	5	5	5	5	5	5	5	5	1.00	0.93	0.10
	10	2	5	5	4	4	4	4	4	4	0.80		
	11	3	5	5	5	5	5	5	5	5	1.00		
	12	4	5	5	5	5	5	5	5	5	1.00		
	13	5	5	5	5	4	4	4	4	4	0.80		
	14	6	5	5	5	5	5	5	5	5	1.00		
	15	7	5	5	5	5	5	5	4	4	0.80		
	16	8	5	5	5	5	5	5	5	5	1.00		
5.6	17	1	5	5	5	5	5	5	5	5	1.00	1.00	0.00
	18	2	5	5	5	5	5	5	5	5	1.00		
	19	3	5	5	5	5	5	5	5	5	1.00		
	20	4	5	5	5	5	5	5	5	5	1.00		
	21	5	5	5	5	5	5	5	5	5	1.00		
	22	6	5	5	5	5	5	5	5	5	1.00		
	23	7	5	5	5	5	5	5	5	5	1.00		
	24	8	5	5	5	5	5	5	5	5	1.00		
10	25	1	5	5	5	5	5	5	5	5	1.00	0.95	0.09
	26	2	5	5	5	5	5	5	5	4	0.80		
	27	3	5	5	5	5	5	5	5	5	1.00		
	28	4	5	5	5	5	5	5	5	5	1.00		
	29	5	5	5	5	5	5	5	5	5	1.00		
	30	6	5	5	5	5	5	5	5	4	0.80		
	31	7	5	5	5	5	5	5	5	5	1.00		
	32	8	5	5	5	5	5	5	5	5	1.00		
18	33	1	5	5	5	5	5	5	5	5	1.00	0.90	0.15
	34	2	5	5	5	5	5	5	5	5	1.00		
	35	3	5	5	5	5	5	4	4	4	0.80		
	36	4	5	5	5	5	5	5	5	5	1.00		
	37	5	5	4	4	4	4	4	4	3	0.60		
	38	6	5	5	5	5	5	5	4	4	0.80		
	39	7	5	5	5	5	5	5	5	5	1.00		
	40	8	5	5	5	5	5	5	5	5	1.00		
32	41	1	5	4	4	4	4	4	3	1	0.20	0.63	0.31
	42	2	5	4	3	3	3	3	3	3	0.60		
	43	3	5	5	5	5	5	5	5	4	0.80		
	44	4	5	5	5	5	5	5	5	3	0.60		
	45	5	5	4	4	3	3	3	3	3	0.60		
	46	6	5	5	5	5	5	5	5	5	1.00		
	47	7	5	5	5	5	5	5	5	5	1.00		
	48	8	5	3	2	2	2	1	1	1	0.20		
56	49	1	5	4	1	0	0	0	0	0	0.00	0.03	0.07
	50	2	5	0	0	0	0	0	0	0	0.00		
	51	3	5	1	0	0	0	0	0	0	0.00		
	52	4	5	1	0	0	0	0	0	0	0.00		
	53	5	5	1	0	0	0	0	0	0	0.00		
	54	6	5	4	1	1	1	1	1	1	0.20		
	55	7	5	0	0	0	0	0	0	0	0.00		
	56	8	5	1	0	0	0	0	0	0	0.00		
100	57	1	5	2	0	0	0	0	0	0	0.00	0.00	0.00
	58	2	5	0	0	0	0	0	0	0	0.00		
	59	3	5	0	0	0	0	0	0	0	0.00		
	60	4	5	1	0	0	0	0	0	0	0.00		
	61	5	5	0	0	0	0	0	0	0	0.00		
	62	6	5	1	0	0	0	0	0	0	0.00		
	63	7	5	1	0	0	0	0	0	0	0.00		
	64	8	5	0	0	0	0	0	0	0	0.00		

Marine Pollution Studies Laboratory

Data Sheet for Americamysis Chronic Toxicity Test

Start Date/Time: 12/13/19

Project: Dispersant Mysids 2

End Date/Time: 12/20/19

Sample Type: Water

Species Lot #: AB121219

Balance #: 1

7d Chronic Def.

Container Number	Number at Start	Number Alive	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of Mysids	Notes
1	5		JV	Mysid 7d Disp Def	0.6877	0.6892	5	
2					0.6769	0.6785	5	
3					0.6792	0.6804	5	
4					0.6856	0.6867	4	
5					0.6809	0.6823	5	
6					0.6796	0.6810	5	
7					0.6568	0.6585	5	
8					0.6660	0.6670	5	
9					0.6590	0.6601	5	
10					0.6636	0.6644	5 SZ 4	
11					0.6598	0.6609	5	
12					0.6569	0.6583	5	
13					0.6358	0.6368	4	
14					0.6402	0.6417	4	
15					0.6333	0.6348	4	
16					0.6008	0.6025	5	
17					0.6217	0.6228	5	
18					0.6145	0.6157	5	
19					0.6871	0.6883	5	
20					0.6732	0.6748	5	
21					0.6713	0.6725	5	
22					0.6506	0.6518	5	
23					0.6587	0.6602	5	
24					0.6656	0.6673	5	
25					0.6681	0.6695	5	
26				KF	0.6650	0.6659	4	
27					0.6771	0.6784	5	
28					0.6619	0.6631	5	
29					0.6571	0.6587	5	
30					0.6694	0.6704	4	
31					0.6798	0.6809	5	
32					0.6686	0.6697	5	
33					0.6769	0.6779	5	
34					0.6707	0.6722	5	
35					0.6856	0.6865	4	
36					0.6778	0.6789	5	
37					0.6784	0.6791	3	
38					0.6810	0.6821	4	
39					0.6631	0.6639	5	
40					0.6600	0.6612	5	
41					0.6606	0.6610	1	
42					0.6494	0.6502	3	
43					0.6682	0.6692	4	
44					0.6540	0.6548	3	
45					0.6675	0.6681	3	
46					0.6523	0.6531	5	
47					0.6557	0.6568	5	
48					0.6696	0.6702	1	
Initials	SZ, KF			KF	KF	SZ	SZ	

Shed Count Daily

See

	Tare weight	Total weight	# Mysids
Baseline 1	0.7090	0.7097	10
Baseline 2	0.6933	0.6938	10
Baseline 3	0.6817	0.6822	10
Baseline 4	0.6775	0.6780	10
Baseline 5	0.6809	0.6816	10

#54 5 1 JV 0.6860 0.6863 1 -KF

Marine Pollution Studies Laboratory

Americamysis 4-day Acute Toxicity Test

Feeding: 15 Artemia nauplii per mysid, 2x daily

Project: Dispersant Mysids 2 **Start Date/Time:** 12/13/19

~~Water Batch #:~~ _____ **End Date/Time:** 12/20/19

Lot #: AB121219

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Females w/eggs?
1	Ø	5	5	5	5	5	5	5	5	Ø
2			5	5	5	5	5	5	5	no
3			5	5	5	5	5	5	5	no
4			5	5	5	5	4	4	4	no
5			5	5	5	5	5	5	5	no
6			5	5	5	5	5	5	5	no
7			5	5	5	5	5	5	5	no
8	↓		5	5	5	5	5	5	5	no
9	3.2		5	5	5	5	5	5	5	
10			5	4	4	4	4	4	4	
11			5	5	5	5	5	5	5	
12			5	5	5	5	5	5	5	
13			5	5	4	4	4	4	4	
14			5	5	5	5	5	5	5	
15			5	5	5	5	5	4	4	
16	↓		5	5	5	5	5	5	5	
17	5.6		5	5	5	5	5	5	5	
18			5	5	5	5	5	5	5	
19	~~5.6~~		5	5	5	5	5	5	5	
20			5	5	5	5	5	5	5	
21			5	5	5	5	5	5	5	
22			5	5	5	5	5	5	5	
23			5	5	5	5	5	5	5	
24	↓		5	5	5	5	5	5	5	
25	10		5	5	5	5	5	5	5	
26			5	5	5	5	5	5	4	1 high + dry
27			5	5	5	5	5	5	5	
28			5	5	5	5	5	5	5	
29	~~10~~		5	5	5	5	5	5	5	
30			5	5	5	5	5	5	4	
31			5	5	5	5	5	5	5	
32	↓		5	5	5	5	5	5	5	
33	18		5	5	5	5	5	5	5	
34			5	5	5	5	5	5	5	
35			5	5	5	5	4	4	4	
36			5	5	5	5	5	5	5	
37			1	4	4	4	4	4	3	
38			5	5	5	5	5	~~4~~ F 4	4	
39			5	5	5	5	5	5	5	
40	↓	↓	5	5	5	5	5	5	5	
Initials		JV	~~RP~~	SZ	~~SZ~~	KF	JM	KF	JV	

Mysidopsis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	15-2033-1727	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:40	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	09-1275-8371	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	13 Dec-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	20 Dec-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	17-7749-9564	**Code:**	69F27DAC	**Client:**	
Sample Date:	13 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	13 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	18	32	24		16.7%

Steel Many-One Rank Sum Test

Control	vs	C-uL/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		3.2	60	46	2	14	0.5231	Asymp	Non-Significant Effect
		5.6	72	46	1	14	0.9427	Asymp	Non-Significant Effect
		10	64	46	2	14	0.7125	Asymp	Non-Significant Effect
		18	59.5	46	2	14	0.4981	Asymp	Non-Significant Effect
		32*	45.5	46	2	14	0.0422	Asymp	Significant Effect
		56*	36	46	0	14	0.0021	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.405204	1.234201	6	45.74	<0.0001	Significant Effect
Error	1.32218	0.02698327	49			
Total	8.727385		55			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	3.227	3.19	0.0094	Unequal Variances
Variances	Levene Equality of Variance	6.564	3.19	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8938	0.943	0.0001	Non-normal Distribution

7d Survival Rate Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.975	0.9159	1	1	0.8	1	0.025	7.25%	0.0%
3.2		8	0.925	0.8385	1	1	0.8	1	0.0366	11.2%	5.13%
5.6		8	1	1	1	1	1	1	0	0.0%	-2.56%
10		8	0.95	0.8726	1	1	0.8	1	0.03273	9.75%	2.56%
18		8	0.9	0.7736	1	1	0.6	1	0.05345	16.8%	7.69%
32		8	0.625	0.3654	0.8846	0.6	0.2	1	0.1098	49.7%	35.9%
56		8	0.025	0	0.08412	0	0	0.2	0.025	283.0%	97.4%
100		8	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	8	1.316	1.245	1.386	1.345	1.107	1.345	0.02977	6.4%	0.0%
3.2		8	1.256	1.153	1.359	1.345	1.107	1.345	0.04357	9.81%	4.53%
5.6		8	1.345	1.345	1.345	1.345	1.345	1.345	0	0.0%	-2.26%
10		8	1.286	1.194	1.378	1.345	1.107	1.345	0.03897	8.57%	2.26%
18		8	1.228	1.082	1.375	1.345	0.8861	1.345	0.06195	14.3%	6.63%
32		8	0.9229	0.6374	1.208	0.8861	0.4636	1.345	0.1208	37.0%	29.8%
56		8	0.2553	0.1849	0.3257	0.2255	0.2255	0.4636	0.02977	33.0%	80.6%
100		8	0.2255	0.2255	0.2255	0.2255	0.2255	0.2255	0	0.0%	82.9%

Mysidopsis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	15-2033-1727	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:40	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

7d Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	D	1	1	1	0.8	1	1	1	1
3.2		1	0.8	1	1	0.8	1	0.8	1
5.6		1	1	1	1	1	1	1	1
10		1	0.8	1	1	1	0.8	1	1
18		1	1	0.8	1	0.6	0.8	1	1
32		0.2	0.6	0.8	0.6	0.6	1	1	0.2
56		0	0	0	0	0	0.2	0	0
100		0	0	0	0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	D								
3.2									
5.6									
10									
18									
32									
56									
100									

CETIS Analytical Report

Mysidopsis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	11-8935-5557	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:40	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	09-1275-8371	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	13 Dec-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	20 Dec-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	17-7749-9564	**Code:**	69F27DAC	**Client:**	
Sample Date:	13 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	13 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.025	1.28%	1.522	0.02378	33.23	29.79	37.08

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.975	0.8 - NL	Yes	Passes Acceptability Criteria

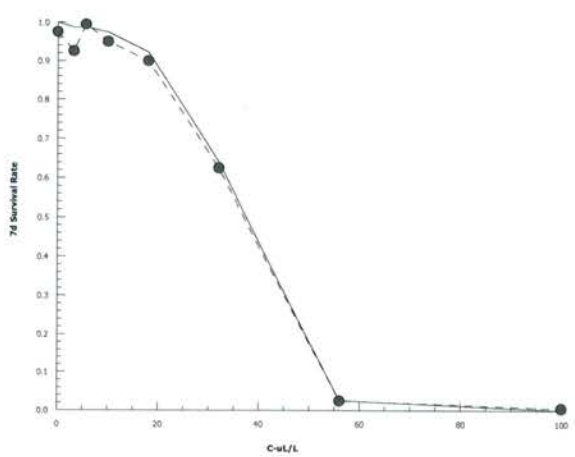
7d Survival Rate Summary

			Calculated Variate(A/B)								
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	8	0.975	0.8	1	0.025	0.07071	7.25%	0.0%	39	40
3.2		8	0.925	0.8	1	0.0366	0.1035	11.2%	5.13%	37	40
5.6		8	1	1	1	0	0	0.0%	-2.56%	40	40
10		8	0.95	0.8	1	0.03273	0.09258	9.75%	2.56%	38	40
18		8	0.9	0.6	1	0.05345	0.1512	16.8%	7.69%	36	40
32		8	0.625	0.2	1	0.1098	0.3105	49.7%	35.9%	25	40
56		8	0.025	0	0.2	0.025	0.07071	283.0%	97.4%	1	40
100		8	0	0	0	0	0		100.0%	0	40

7d Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1	1	1	0.8	1	1	1	1
3.2		1	0.8	1	1	0.8	1	0.8	1
5.6		1	1	1	1	1	1	1	1
10		1	0.8	1	1	1	0.8	1	1
18		1	1	0.8	1	0.6	0.8	1	1
32		0.2	0.6	0.8	0.6	0.6	1	1	0.2
56		0	0	0	0	0	0.2	0	0
100		0	0	0	0	0	0	0	0

Graphics



Mysidopsis 7-d Survival, Growth and Fecundity Test

Granite Canyon

Analysis ID:	04-4693-1682	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:40	**Analysis:**	Nonparametric-Multiple Comparison	**Official Results:**	Yes
Batch ID:	09-1275-8371	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	13 Dec-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	20 Dec-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	17-7749-9564	**Code:**	69F27DAC	**Client:**	
Sample Date:	13 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	13 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	NA	C > T	NA	NA	32	56	42.33		32.5%

Wilcoxon/Bonferroni Adj Test

Control	vs	C-uL/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		3.2	67.5	NA	2	14	1.0000	Exact	Non-Significant Effect
		5.6	61.5	NA	3	14	1.0000	Exact	Non-Significant Effect
		10	55	NA	3	14	0.4627	Exact	Non-Significant Effect
		18	48.5	NA	3	14	0.1030	Exact	Non-Significant Effect
		32	57	NA	0	14	0.6682	Exact	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.805211E-08	3.610422E-09	5	0.6409	0.6698	Non-Significant Effect
Error	2.366026E-07	5.633396E-09	42			
Total	2.546548E-07		47			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	23.07	15.1	0.0003	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8749	0.934	0.0001	Non-normal Distribution

Mean Dry Weight-mg Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	8	0.000279	0.000243	0.000316	0.00028	0.0002	0.00034	1.56E-05	15.8%	0.0%
3.2		8	0.000283	0.000223	0.000343	0.000265	0.0002	0.000375	2.54E-05	25.4%	-1.12%
5.6		8	0.000268	0.00023	0.000305	0.00024	0.00022	0.00034	1.60E-05	16.9%	4.25%
10		8	0.000252	0.000223	0.000281	0.000245	0.00022	0.00032	1.22E-05	13.8%	9.84%
18		8	0.000232	0.000196	0.000268	0.000229	0.00016	0.0003	1.52E-05	18.6%	17.1%
32		8	0.000287	0.000164	0.00041	0.000243	0.00016	0.0006	5.2E-05	51.3%	-2.61%
56		1	0.0003			0.0003	0.0003	0.0003	0	0.0%	-7.38%

Mean Dry Weight-mg Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.0003	0.00032	0.00024	0.000275	0.00028	0.00028	0.00034	0.0002
3.2		0.00022	0.0002	0.00022	0.00028	0.00025	0.000375	0.000375	0.00034
5.6		0.00022	0.00024	0.00024	0.00032	0.00024	0.00024	0.0003	0.00034
10		0.00028	0.000225	0.00026	0.00024	0.00032	0.00025	0.00022	0.00022
18		0.0002	0.0003	0.000225	0.00022	0.000233	0.000275	0.00016	0.00024
32		0.0004	0.000267	0.00018	0.000267	0.0002	0.00016	0.00022	0.0006
56		0.0003							

Mysidopsis 7-d Survival, Growth and Fecundity Test

Granite Canyon

Analysis ID:	20-1555-5291	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	09-1275-8371	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	13 Dec-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	20 Dec-19	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	17-7749-9564	**Code:**	69F27DAC	**Client:**	
Sample Date:	13 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	13 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	39286	200	Yes	Two-Point Interpolation

Point Estimates

Level	uL/L	95% LCL	95% UCL
IC5	>56	N/A	N/A
IC10	>56	N/A	N/A
IC15	>56	N/A	N/A
IC20	>56	N/A	N/A
IC25	>56	N/A	N/A
IC40	>56	N/A	N/A
IC50	>56	N/A	N/A

Mean Dry Weight-mg Summary

			Calculated Variate						
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.000279	0.0002	0.00034	1.56E-05	4.41E-05	15.8%	0.0%
3.2		8	0.000283	0.0002	0.000375	2.54E-05	7.18E-05	25.4%	-1.12%
5.6		8	0.000268	0.00022	0.00034	1.60E-05	4.53E-05	16.9%	4.25%
10		8	0.000252	0.00022	0.00032	1.22E-05	3.46E-05	13.8%	9.84%
18		8	0.000232	0.00016	0.0003	1.52E-05	4.3E-05	18.6%	17.1%
32		8	0.000287	0.00016	0.0006	5.2E-05	0.000147	51.3%	-2.61%
56		1	0.0003	0.0003	0.0003	0	0	0.0%	-7.38%

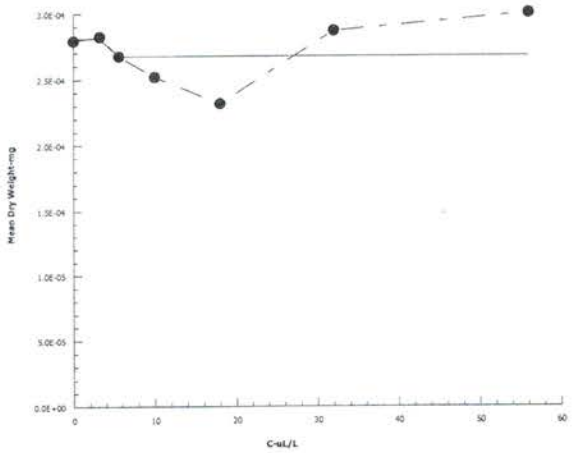
Mean Dry Weight-mg Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.0003	0.00032	0.00024	0.000275	0.00028	0.00028	0.00034	0.0002
3.2		0.00022	0.0002	0.00022	0.00028	0.00025	0.000375	0.000375	0.00034
5.6		0.00022	0.00024	0.00024	0.00032	0.00024	0.00024	0.0003	0.00034
10		0.00028	0.000225	0.00026	0.00024	0.00032	0.00025	0.00022	0.00022
18		0.0002	0.0003	0.000225	0.00022	0.000233	0.000275	0.00016	0.00024
32		0.0004	0.000267	0.00018	0.000267	0.0002	0.00016	0.00022	0.0006
56		0.0003							

Mysidopsis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	20-1555-5291	**Endpoint:**	Mean Dry Weight-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Dispersant - *Americamysis* (Mysid) 7 Day Definitive - Ref Tox - 12/13/19

Concentration	Beaker	Rep	Alive	Initial	Prop.	Mean	SD	Tare (g)	Total (g)	Mysids	Wt/Mysid (mg)	Mean	SD
0	1	1	5	5	1.00	0.93	0.10	0.6462	0.6474	5	0.240	0.20	0.02
	2	2	5	5	1.00			0.6392	0.6402	5	0.200		
	3	3	5	5	1.00			0.6315	0.6325	5	0.200		
	4	4	4	5	0.80			0.6221	0.6229	4	0.200		
	5	5	5	5	1.00			0.6285	0.6294	5	0.180		
	6	6	4	5	0.80			0.6223	0.6231	4	0.200		
	7	7	4	5	0.80			0.6593	0.6600	4	0.175		
	8	8	5	5	1.00			0.6719	0.6729	5	0.200		
32	9	1	5	5	1.00	1.00	0.00	0.6581	0.6593	5	0.240	0.23	0.02
	10	2	5	5	1.00			0.6713	0.6725	5	0.240		
	11	3	5	5	1.00			0.6764	0.6773	5	0.180		
	12	4	5	5	1.00			0.6636	0.6648	5	0.240		
	13	5	5	5	1.00			0.6755	0.6767	5	0.240		
	14	6	5	5	1.00			0.6767	0.6778	5	0.220		
	15	7	5	5	1.00			0.6781	0.6792	5	0.220		
	16	8	5	5	1.00			0.6804	0.6817	5	0.260		
56	17	1	4	5	0.80	0.93	0.10	0.6735	0.6743	4	0.200	0.21	0.04
	18	2	5	5	1.00			0.6786	0.6797	5	0.220		
	19	3	5	5	1.00			0.6803	0.6813	5	0.200		
	20	4	4	5	0.80			0.6700	0.6707	4	0.175		
	21	5	5	5	1.00			0.6781	0.6789	5	0.160		
	22	6	5	5	1.00			0.6527	0.6540	5	0.260		
	23	7	4	5	0.80			0.6528	0.6539	4	0.275		
	24	8	5	5	1.00			0.6591	0.6602	5	0.220		
100	25	1	5	5	1.00	0.98	0.07	0.6801	0.6813	5	0.240	0.19	0.03
	26	2	4	5	0.80			0.6616	0.6625	4	0.225		
	27	3	5	5	1.00			0.6688	0.6698	5	0.200		
	28	4	5	5	1.00			0.6716	0.6725	5	0.180		
	29	5	5	5	1.00			0.6739	0.6748	5	0.180		
	30	6	5	5	1.00			0.6759	0.6768	5	0.180		
	31	7	5	5	1.00			0.6734	0.6742	5	0.160		
	32	8	5	5	1.00			0.6741	0.6749	5	0.160		
180	33	1	5	5	1.00	0.88	0.15	0.6671	0.6675	5	0.080	0.14	0.05
	34	2	4	5	0.80			0.6536	0.6542	4	0.150		
	35	3	4	5	0.80			0.6650	0.6655	5	0.100		
	36	4	4	5	0.80			0.6497	0.6503	4	0.150		
	37	5	3	5	0.60			0.6441	0.6447	3	0.200		
	38	6	5	5	1.00			0.6501	0.6506	5	0.100		
	39	7	5	5	1.00			0.6417	0.6424	5	0.140		
	40	8	5	5	1.00			0.6868	0.6878	5	0.200		
320	41	1	0	5	0.00	0.20	0.15	-	-	-	-	0.17	0.13
	42	2	1	5	0.20			0.6780	0.6784	1	0.400		
	43	3	2	5	0.40			0.7015	0.7016	2	0.050		
	44	4	1	5	0.20			0.6860	0.6861	1	0.100		
	45	5	1	5	0.20			0.6848	0.6849	2	0.050		
	46	6	0	5	0.00			-	-	-	-		
	47	7	2	5	0.40			0.6885	0.6887	1	0.200		
	48	8	1	5	0.20			0.6882	0.6884	1	0.200		

Dispersant - Americamysis (Mysid) 7 Day Definitive - Ref Tox Daily Counts - 12/13/19

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	5	5	5	1.00	0.93	0.10
	2	2	5	5	5	5	5	5	5	5	1.00		
	3	3	5	5	5	5	5	5	5	5	1.00		
	4	4	5	5	4	4	4	4	4	4	0.80		
	5	5	5	5	5	5	5	5	5	5	1.00		
	6	6	5	5	4	4	4	4	4	4	0.80		
	7	7	5	5	4	4	4	4	4	4	0.80		
	8	8	5	5	5	5	5	5	5	5	1.00		
32	9	1	5	5	5	5	5	5	5	5	1.00	1.00	0.00
	10	2	5	5	5	5	5	5	5	5	1.00		
	11	3	5	5	5	5	5	5	5	5	1.00		
	12	4	5	5	5	5	5	5	5	5	1.00		
	13	5	5	5	5	5	5	5	5	5	1.00		
	14	6	5	5	5	5	5	5	5	5	1.00		
	15	7	5	5	5	5	5	5	5	5	1.00		
	16	8	5	5	5	5	5	5	5	5	1.00		
56	17	1	5	5	5	5	5	5	5	4	0.80	0.93	0.10
	18	2	5	5	5	5	5	5	5	5	1.00		
	19	3	5	5	5	5	5	5	5	5	1.00		
	20	4	5	5	5	5	4	4	4	4	0.80		
	21	5	5	5	5	5	5	5	5	5	1.00		
	22	6	5	5	5	5	5	5	5	5	1.00		
	23	7	5	5	5	5	4	4	4	4	0.80		
	24	8	5	5	5	5	5	5	5	5	1.00		
100	25	1	5	5	5	5	5	5	5	5	1.00	0.98	0.07
	26	2	5	5	5	5	5	5	5	4	0.80		
	27	3	5	5	5	5	5	5	5	5	1.00		
	28	4	5	5	5	5	5	5	5	5	1.00		
	29	5	5	5	5	5	5	5	5	5	1.00		
	30	6	5	5	5	5	5	5	5	5	1.00		
	31	7	5	5	5	5	5	5	5	5	1.00		
	32	8	5	5	5	5	5	5	5	5	1.00		
180	33	1	5	5	5	5	5	5	5	5	1.00	0.88	0.15
	34	2	5	4	4	4	4	4	4	4	0.80		
	35	3	5	4	4	4	4	4	4	4	0.80		
	36	4	5	5	4	4	4	4	4	4	0.80		
	37	5	5	5	4	3	3	3	3	3	0.60		
	38	6	5	5	5	5	5	5	5	5	1.00		
	39	7	5	5	5	5	5	5	5	5	1.00		
	40	8	5	5	5	5	5	5	5	5	1.00		
320	41	1	5	2	1	1	1	1	1	0	0.00	0.20	0.15
	42	2	5	2	2	2	2	2	1	1	0.20		
	43	3	5	4	4	3	2	2	2	2	0.40		
	44	4	5	2	1	1	1	1	1	1	0.20		
	45	5	5	2	1	1	1	1	1	1	0.20		
	46	6	5	2	1	1	1	0	0	0	0.00		
	47	7	5	2	2	2	2	2	2	2	0.40		
	48	8	5	1	1	1	1	1	1	1	0.20		

Ref Tox

Marine Pollution Studies Laboratory

Data Sheet for Americamysis Chronic Toxicity Test

Start Date/Time: 12/13/19

Project: Dispersant Mysids 2

End Date/Time: 12/20/19

Sample Type: Water

Species Lot #: AB12-12-19

Balance #: 1

Container Number	Number at Start	Number Alive	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of Mysids	Notes
1					0.6462	0.6474	5	
2					0.6392	0.6402	5	
3					0.6315	0.6325	5	
4					0.6221	0.6229	4	
5					0.6285	0.6294	5	
6					0.6223	0.6231	4	
7					0.6593	0.6600	4	
8					0.6719	0.6729	5	
9					0.6581	0.6593	5	
10					0.6713	0.6725	5	
11					0.6764	0.6773	5	
12					0.6636	0.6648	5	
13					0.6755	0.6767	5	
14					0.6767	0.6778	5	
15					0.6781	0.6792	5	
16					0.6804	0.6817	5	
17					0.6735	0.6743	4	
18					0.6786	0.6797	5	
19					0.6803	0.6813	5	
20					0.6700	0.6707	4	
21					0.6781	0.6789	5	
22					0.6527	0.6540	5	
23					0.6528	0.6539	4	
24					0.6591	0.6602	5	
25					0.6801	0.6813	5	
26					0.6616	0.6625	4	
27					0.6688	0.6698	5	
28					0.6716	0.6725	5	
29					0.6739	0.6748	5	
30					0.6759	0.6768	5	
31					0.6734	0.6742	5	
32					0.6741	0.6749	5	
33					0.6671	0.6675	5	
34					0.6536	0.6542	4	
35					0.6650	0.6655	5	
36					0.6497	0.6503	4	
37					0.6441	0.6447	3	
38					0.6501	0.6506	5	
39					0.6417	0.6424	5	
40					0.6868	0.6878	5	
41					0.6786			
42					0.6780	0.6784	1	
43					0.7015	~~0.6~~ 0.7014	+ 2	
44					0.6860	~~0.7016~~	~~2~~ 1	0.6861
45					0.6848	~~0.6861~~	+ 2	0.6849
46					0.7018	~~0.6851~~	~~2~~ wrong box	
47					0.6885	0.6887	1	
48					0.6882	0.688~~3~~ 4	1	
Initials					KF	SZ	SZ	

	Tare weight	Total weight	# Mysids
Baseline 1			
Baseline 2			
Baseline 3			
Baseline 4			
Baseline 5			

~~#54~~

~~0.6860~~ KF

Ref Tox

Ref Tox

Marine Pollution Studies Laboratory
Americamysis 4-day Acute Toxicity Test
Feeding: 15 Artemia nauplii per mysid, 2x daily

Project: Dispersant Mysids Ref Tox **Start Date/Time:** 12/13/19

Water Batch #: _____ **End Date/Time:** 12/20/19

Lot #: AB12219

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Females w/eggs?
1	Ø	5	5	5	5	5	5	5	5	Ø
2			5	5	5	5	5	5	5	no
3			5	5	5	5	5	5	5	no
4			5	4	4	4	4	4	4	no
5			5	5	5	5	5	5	5	no
6			5	4	4	4	4	4	4	no
7			5	4	4	4	4	4	4	no
8	↓		5	5	5	5	5	5	5	no
9	32		5	5	5	5	5	5	5	
10			5	5	5	5	5	5	5	
11			5	5	5	5	5	5	5	
12			5	5	5	5	5	5	5	
13			5	5	5	5	5	5	5	
14			5	5	5	5	5	5	5	
15			5	5	5	5	5	5	5	
16	↓		5	5	5	5	5	5	5	
17	56		5	5	5	5	5	5	4	
18			5	5	5	5	5	5	5	
19			5	5	5	5	5	5	5	
20			5	5	5	4	4	4	4	
21			5	5	5	5	5	5	5	
22			5	5	5	5	5	5	5	
23			5	5	5	4	4	4	4	
24	↓		5	5	5	5	5	5	5	
25	100		5	5	5	5	5	5	5	
26			5	5	5	5	5	5	4	
27			5	5	5	5	5	5	5	
28			5	5	5	5	5	5	5	
29			5	5	5	5	5	5	5	
30			5	5	5	5	5	5	5	
31			5	5	5	5	5	5	5	
32	↓		5	5	5	5	5	5	5	
33	180		5	5	5	5	5	5	5	
34			4	4	4	4	4	4	4	
35			4	4	4	4	4	4	4	
36			5	4	4	4	4	4	4	
37			5	4	3	3	3	3	3	
38			5	5	5	5	5	5	5	
39			5	5	5	5	5	5	5	
40	↓	↓	5	5	5	5	5	5	5	
Initials		JV	BP	SZ, KF	SZ	SZ	KF	LM	JV KF	

RT © look less mature than test ©.

Ref Tox

Marine Pollution Studies Laboratory

Americamysis 4-day Acute Toxicity Test

Feeding: 15 Artemia nauplii per mysid, 2x daily

Ref Tox

Project: Dispersant mysids Ref Tox **Start Date/Time:** 12/13/19

~~Water Batch #:~~ _____ **End Date/Time:** 12/20/19

Lot #: AB12129

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
41	320	5	2	1	1	1	1	1	~~0~~	
42			2	2	2	~~2~~ + 2	2	1	1	
43			~~4~~	4	3	2	2	2	2	
44			~~2~~	1	1	1	1	1	1	
45			2	1	1	1	1	1	1	
46			2	1	1	1	~~0~~	—	—	
47			2	2	2	2	2	2	2	
48			1	1	1	1	1	1	1	
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
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68										
69										
70										
71										
72										
73										
74										
75										
76										
77										
78										
79										
80										
Initials		JV	BT	SB/KF	SZ	SZ	KF	LM	KF	

Ref Tox

Americamysis 7-d Survival, Growth and Fecundity Test

Granite Canyon

Analysis ID:	10-3394-6856	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	07 Apr-20 14:53	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	18-8427-9983	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	13 Dec-19 12:00	**Protocol:**	EPA/600/4-87/028 (1987)	**Diluent:**	
Ending Date:	20 Dec-19 12:00	**Species:**	Americamysis bahia	**Brine:**	
Test Length:	7d 0h	**Taxon:**		**Source:**	**Age:**
Sample ID:	17-9996-5874	**Code:**	6B494CB2	**Project:**	Dispersant
Sample Date:	07 Apr-20 14:52	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	07 Apr-20 14:52	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	180	320	240		13.35%

Dunnett Multiple Comparison Test

Control	vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
SW Control		32	-1.401	2.305	0.147	14	CDF	0.9954	Non-Significant Effect
		56	0	2.305	0.147	14	CDF	0.8333	Non-Significant Effect
		100	-0.9343	2.305	0.147	14	CDF	0.9808	Non-Significant Effect
		180	0.9008	2.305	0.147	14	CDF	0.4626	Non-Significant Effect
		320*	12.5	2.305	0.147	14	CDF	8.4E-07	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.53207	0.906415	5	55.81	<1.0E-37	Significant Effect
Error	0.682114	0.0162408	42			
Total	5.21419		47			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.9394	0.9345	0.0153	Normal Distribution

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	8	0.9250	0.8385	1.0000	1.0000	0.8000	1.0000	0.0366	11.19%	0.00%
32		8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	-8.11%
56		8	0.9250	0.8385	1.0000	1.0000	0.8000	1.0000	0.0366	11.19%	0.00%
100		8	0.9750	0.9159	1.0000	1.0000	0.8000	1.0000	0.0250	7.25%	-5.41%
180		8	0.8750	0.7506	0.9994	0.9000	0.6000	1.0000	0.0526	17.01%	5.41%
320		8	0.2000	0.0736	0.3264	0.2000	0.0000	0.4000	0.0535	75.59%	78.38%

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	8	1.256	1.153	1.359	1.345	1.107	1.345	0.04357	9.81%	0.00%
32		8	1.345	1.345	1.345	1.345	1.345	1.345	0	0.00%	-7.11%
56		8	1.256	1.153	1.359	1.345	1.107	1.345	0.04357	9.81%	0.00%
100		8	1.316	1.245	1.386	1.345	1.107	1.345	0.02977	6.40%	-4.74%
180		8	1.199	1.054	1.343	1.226	0.8861	1.345	0.06107	14.41%	4.57%
320		8	0.4594	0.3142	0.6045	0.4636	0.2255	0.6847	0.06139	37.79%	63.42%

Americamysis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID: 10-3394-6856 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.6
Analyzed: 07 Apr-20 14:53 **Analysis:** Parametric-Control vs Treatments **Status Level:** 1

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	1.0000	1.0000	1.0000	0.8000	1.0000	0.8000	0.8000	1.0000
32		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
56		0.8000	1.0000	1.0000	0.8000	1.0000	1.0000	0.8000	1.0000
100		1.0000	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
180		1.0000	0.8000	0.8000	0.8000	0.6000	1.0000	1.0000	1.0000
320		0.0000	0.2000	0.4000	0.2000	0.2000	0.0000	0.4000	0.2000

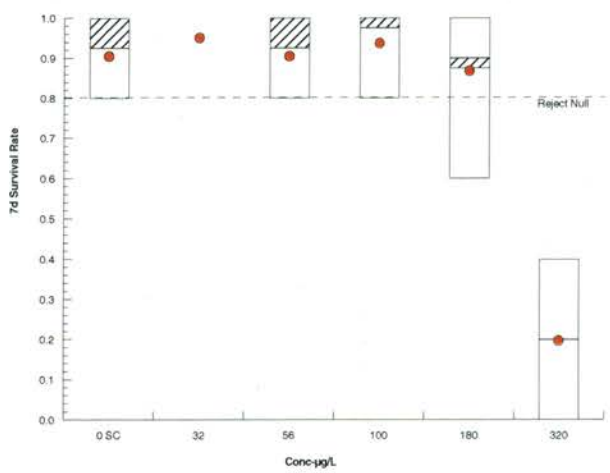
Angular (Corrected) Transformed Detail

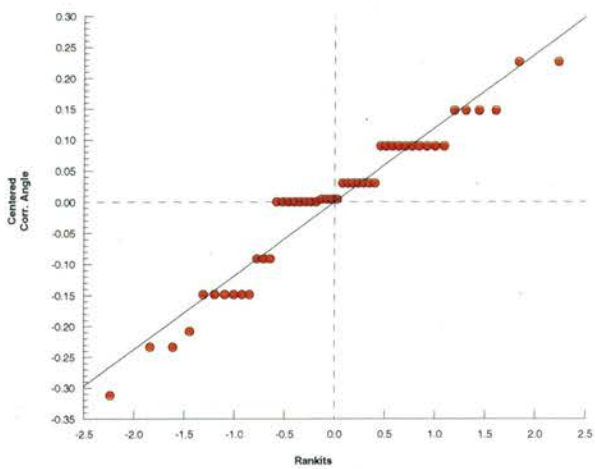
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	1.345	1.345	1.345	1.107	1.345	1.107	1.107	1.345
32		1.345	1.345	1.345	1.345	1.345	1.345	1.345	1.345
56		1.107	1.345	1.345	1.107	1.345	1.345	1.107	1.345
100		1.345	1.107	1.345	1.345	1.345	1.345	1.345	1.345
180		1.345	1.107	1.107	1.107	0.8861	1.345	1.345	1.345
320		0.2255	0.4636	0.6847	0.4636	0.4636	0.2255	0.6847	0.4636

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	5/5	5/5	5/5	4/5	5/5	4/5	4/5	5/5
32		5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
56		4/5	5/5	5/5	4/5	5/5	5/5	4/5	5/5
100		5/5	4/5	5/5	5/5	5/5	5/5	5/5	5/5
180		5/5	4/5	4/5	4/5	3/5	5/5	5/5	5/5
320		0/5	1/5	2/5	1/5	1/5	0/5	2/5	1/5

Graphics





Americamysis 7-d Survival, Growth and Fecundity Test

Granite Canyon

Analysis ID:	20-5459-8575	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	07 Apr-20 14:53	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	18-8427-9983	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	13 Dec-19 12:00	**Protocol:**	EPA/600/4-87/028 (1987)	**Diluent:**	
Ending Date:	20 Dec-19 12:00	**Species:**	Americamysis bahia	**Brine:**	
Test Length:	7d 0h	**Taxon:**		**Source:**	**Age:**
Sample ID:	17-9996-5874	**Code:**	6B494CB2	**Project:**	Dispersant
Sample Date:	07 Apr-20 14:52	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	07 Apr-20 14:52	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.075	20.78%	2.401034	0.014944	251.8	235	269.7

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	SC	8	0.9250	0.8000	1.0000	0.1035	11.19%	0.0%	37/40	0.9625	0.0%
32		8	1.0000	1.0000	1.0000	0.0000	0.00%	-8.11%	40/40	0.9625	0.0%
56		8	0.9250	0.8000	1.0000	0.1035	11.19%	0.0%	37/40	0.95	1.3%
100		8	0.9750	0.8000	1.0000	0.0707	7.25%	-5.41%	39/40	0.95	1.3%
180		8	0.8750	0.6000	1.0000	0.1488	17.01%	5.41%	35/40	0.875	9.09%
320		8	0.2000	0.0000	0.4000	0.1512	75.59%	78.38%	8/40	0.2	79.22%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	1.0000	1.0000	1.0000	0.8000	1.0000	0.8000	0.8000	1.0000
32		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
56		0.8000	1.0000	1.0000	0.8000	1.0000	1.0000	0.8000	1.0000
100		1.0000	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
180		1.0000	0.8000	0.8000	0.8000	0.6000	1.0000	1.0000	1.0000
320		0.0000	0.2000	0.4000	0.2000	0.2000	0.0000	0.4000	0.2000

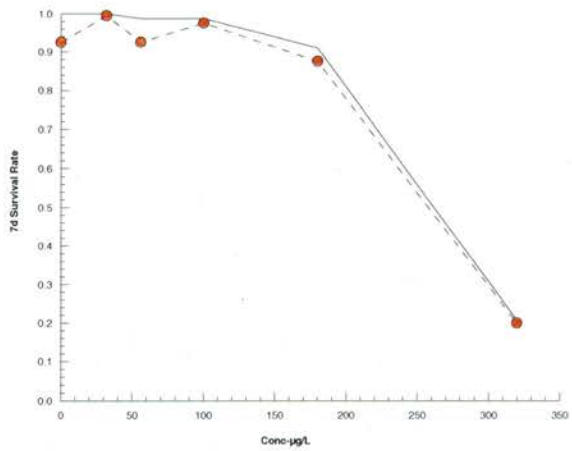
7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	SC	5/5	5/5	5/5	4/5	5/5	4/5	4/5	5/5
32		5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
56		4/5	5/5	5/5	4/5	5/5	5/5	4/5	5/5
100		5/5	4/5	5/5	5/5	5/5	5/5	5/5	5/5
180		5/5	4/5	4/5	4/5	3/5	5/5	5/5	5/5
320		0/5	1/5	2/5	1/5	1/5	0/5	2/5	1/5

Americamysis 7-d Survival, Growth and Fecundity Test — **Granite Canyon**

Analysis ID:	20-5459-8575	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	07 Apr-20 14:53	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1

Graphics



Marine Pollution Studies Laboratory
Water Quality
Americamysis Chronic 7-day

Project: Dispersant Mysids 2 **Start Date/Time:** 12/13/19
Lot # AB121319 **End Date/Time:** 12/20/19
Toxicant: Water **WQ Meter ID:** A2

Sample	Day 0 Date: 12/13/19 Temp: 26.4						Day 1 Date: 12/14/19 Temp: 26.3									
							New				Old					
	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Old pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	
Ø	7.84	6.99	0.887	6.20	20.9	0.0	7.73	0.882	6.82	21.5	7.41	7.09	0.882	6.25	22.0	
32	7.80	~~7.036.73~~ KF		6.24	21.3		7.23		6.38	21.7	7.41	6.87	0.882	6.06	22.0	
56	7.80	~~7.036.79~~ KF		6.25	20.9		7.18		6.33	21.7	7.44	6.65	0.887	5.90	21.1	
10	7.80	7.10		6.30	20.9		7.10		6.26	21.9	7.44	6.65	0.882	5.86	22.2	
18	7.80	7.14		6.33	20.9		7.09		6.25	22.0	7.44	6.62	0.882	5.84	22.4	
32	7.77	7.19		6.34	20.9		6.96		6.14	22.2	7.44	6.47	0.887	5.67	22.5	
56	7.77	7.12		6.32	20.9		6.96	↓	6.14	22.4	7.40	6.39	0.887	5.60	22.5	
100	7.74	7.11	↓	6.31	20.9	0.0	6.91	0.887	6.12	23.0	7.40	5.87	0.882	5.12	22.2	
Ø	7.85	6.99	0.887	6.20	20.9											
32	7.85	6.73		5.97	21.1											
56	7.82	6.79		6.02	20.8											
100	7.82	6.75		5.99	21.1											
180	7.82	6.82		6.05	21.0											
320	7.79	6.89	↓	6.11	20.7											
Initials	KF	KF	KF	KF	KF	KF					BF	BF	BF	BF	BF	

Quality Assurance	pH 7.00	DO 100%	Salinity (ppt)	Ammonia 10 mg/L
	7.05	100.9	34.9	10.2
	—	—	—	—
	7.13	104.0	35.5	9.7
Initials	KF	KF	KF	KF
	Slope: 98.5	Temp: 23.6		

	DO 100%	Salinity (ppt)
	100.5	34.4
	—	—
	100.1	34.5
Initials	BF	BF
	Temp: 25.6	

	pH 7.00	DO 100%	Salinity (ppt)
	7.14	100.1	34.5
	—	—	—
	7.12	100.1	34.9
Initials	BF	BF	BF
	Slope: 97.9	Temp: 25.6	18.7

Marine Pollution Studies Laboratory
Water Quality
Americamysis Chronic 7-day

Project: Dispersant Mysids 2
Lot #: AB12121 9
Toxicant: Water

Start Date/Time: 12/3/19
End Date/Time: 12/20/19
WQ Meter ID: A2

Day 2
Date: 12/15/19 Temp: 23.9°C

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	6.86	0.887	6.08	21.1	7.20	6.44	0.872	5.62	24.0
3.2	6.59	↓	5.85	21.0	7.42	6.30	↓	5.49	23.6
5.6	6.64		5.89	21.0	7.47	6.17		5.38	23.9
10	6.63		5.88	20.9	7.49	6.13	0.877	5.38	23.3
18	6.58		5.84	21.1	2.52	6.06	0.877	5.31	23.4
32	6,58		5.84	21.1	7.49	5.88	0.867	5.10	24.7
56	6.63		5.88	21.1	7.59	5.81	0.872	5.07	24.2
100	—	—	—	—	7.59	5.55	0.872	4.84	23.7
Initials	KF	KF	KF	KF	KF	KF	KF	KF	KF

Quality Assurance	DO 100%	Salinity (ppt)
	101.0	34.9
	—	—
Initials	92.7	35.6
	KF	KF
	Temp: 22.9	

	pH 7.00	DO 100%	Salinity (ppt)
	7.02	101.0	34.9
	—	—	—
Initials	7.08	92.7	35.6
	KF	KF	KF
	Slope: 98.1	Temp: 22.4	

Day 3
Date: 12/16/19 Temp: 24.8

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	6.46	0.882	5.70	21.8	7.59	6.16	0.877	5.40	23.5
3.2	6.29	0.882	5.55	21.8	7.56	6.06	0.877	5.31	22.8
5.6	6.26	0.882	5.52	21.7	7.56	5.89	0.877	5.17	22.8
10	6.22	0.882	5.49	21.7	7.53	5.67	0.877	4.97	22.8
18	6.37	0.882	5.62	21.7	7.61	5.61	0.877	4.92	23.0
32	6.47	0.882	5.71	21.6	7.51	5.75	0.867	4.98	24.7
56	6.48	0.882	5.72	21.7	7.56	5.75	0.882	5.07	21.8
100	—	—	—	—	—	—	—	—	—
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Read D2-KF

Quality Assurance	DO 100%	Salinity (ppt)
	101.8	34.9
	—	—
Initials	100.7	35.4
	JV	JV
	Temp: 25.5	

	pH 7.00	DO 100%	Salinity (ppt)
	7.14		
	—		
Initials	7.18		
	JV		
	Slope: 98.2	Temp: 25.8	

Marine Pollution Studies Laboratory
Water Quality
Americamysis Chronic 7-day

Project: Dispersant Mysids 2
Lot #: AB12219
Toxicant: Water

Start Date/Time: 12/13/19
End Date/Time: 12/20/19
WQ Meter ID:

Day 4
Date: 12/17/19 Temp: 26.4

Sample	New Oxygen (0ppt)	New Oxygen Multiplier	New Oxygen (mg/L)	New Salinity (ppt)	Old pH	Old Oxygen (0ppt)	Old Oxygen Multiplier	Old Oxygen (mg/L)	Old Salinity (ppt)
0	5.43	0.882	4.79	22.1	7.83	5.38	0.877	4.72	23.3
3.2	5.29		4.67	22.0	7.87	5.24		4.60	22.7
5.6	5.37		4.74	22.0	7.85	5.17		4.53	23.2
10	5.43		4.79	21.9	7.89	5.11	0.872	4.46	23.5
18	5.40		4.76	21.8	7.88	5.01		4.37	23.5
32	5.45		4.81	21.8	7.87	4.85		4.23	24.4
56	5.53		4.88	21.8	8.01	5.00	0.882	4.41	22.2
100									Dead D2
Initials	KF	KF	KF	KF	KF	KF	KF	KF	KF

Quality Assurance	DO 100%	Salinity (ppt)
	100.8	34.9
	—	—
Initials	100.7	35.0
	KF	KF
	Temp: 25.6	

	pH 7.00	DO 100%	Salinity (ppt)
	6.95		34.9
	—		—
	6.95		35.0
Initials	KF		KF
	Slope: 96.2	Temp: 25.2	

Day 5
Date: 12/18/19 Temp: ~~26.4~~ KF 26.1

Sample	New Oxygen (0ppt)	New Oxygen Multiplier	New Oxygen (mg/L)	New Salinity (ppt)	Old pH	Old Oxygen (0ppt)	Old Oxygen Multiplier	Old Oxygen (mg/L)	Old Salinity (ppt)
0	5.67	0.887	5.03	21.2	~~8.09~~	5.08	0.867	4.40	24.5
3.2	5.40	0.887	4.79	21.1	7.93	5.02	0.872	4.38	24.0
5.6	5.32	0.887	4.72	21.4	7.87	4.78	0.872	4.17	24.2
10	5.25	0.887	4.66	21.4	7.80	4.64	~~0.827~~ ⊛	~~4.12~~ ⊛	~~21.4~~ ⊛ LM
18	5.22	0.887	4.63	21.4	7.77	4.26	0.867	~~4.02~~ *	~~21.3~~ * LM
32	⊛ ~~4.70~~ LM	0.882	4.38	22.3	7.77	4.37	0.867	3.79	24.9
56	5.25	0.887	4.66	21.4	7.91	4.88	0.872	4.25	23.5
100									Dead D2
	⊛ 4.97				7.95 ⊛		0.867 ⊛	4.02 ⊛	24.9 ⊛ LM
							~~0.~~ LM	3.69 *	24.7 * LM
Initials	LM	LM	LM	LM	LM	LM	LM	LM	LM

Quality Assurance	DO 100%	Salinity (ppt)
	100.3	~~35.3~~ LM
	—	34.9
	103.1	—
Initials	LM	LM
	Temp: 25.2	

	pH 7.00	DO 100%	Salinity (ppt)
	6.98	100.3	~~35.3~~ LM
	—	—	34.9
	7.01	103.1	35.4
Initials	LM	LM	LM
	Slope: ~~96.7%~~	Temp: ~~25.2~~	~~LM~~

Must Aerate Days

Marine Pollution Studies Laboratory
Water Quality
Americamysis Chronic 7-day

Project: Dispersant Mysids 2
Lot #: AB121219
Toxicant: Water

Start Date/Time: 12/13/19
End Date/Time: 12/20/19
WQ Meter ID: A8

Day 6 Date: 12/19/19 Temp:

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	5.73	0.887	5.08	21.0	7.75	5.35	0.872	4.66	23.6
3.2	5.53	0.887	4.90	20.9	7.86	5.12	0.872	4.46	23.7
5.6	5.48	0.887	4.86	20.8	7.86	5.08	0.872	4.43	24.3
10	5.47	0.887	4.85	20.7	7.84	5.01	0.872	4.37	24.4
18	5.47	0.887	4.85	20.7	7.82	4.95	0.872	4.32	24.0
32	5.68	0.887	5.04	20.6	7.80	5.05	0.872	4.40	24.3
56	5.75	0.887	5.10	20.6	7.85	5.42	0.877	4.75	22.9
100	—	—	—	—	—	—	—	—	—
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Dead D2

Quality Assurance	DO 100%	Salinity (ppt)
	101.6	34.9
Initials	102.7 JV	35.5 JV
Temp: 20.9		

	pH 7.00	DO 100%	Salinity (ppt)
	7.00		
Initials	7.07 JV		
Slope: 97.2	Temp: 20.8		

Day 7 Date: 12/20/19 Temp: 27.3

Sample	Old					
	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)
Ø	7.99	7.77	0.877	~~0.877~~ *	22.7	0.3
3.2	8.03	7.50	0.877	6.58	22.8	0.1
5.6	8.03	7.51	0.877	6.59	23.4	-0.2 UR
10	8.00	7.40	0.877	6.49	22.9	UR -0.2
18	8.00	7.18	0.877	6.30	22.6	UR -0.2
32	8.00	6.98	0.877	6.12	21.55 switch E	-0.3 UR
56	8.00	7.05	0.882	6.22	22.8 SZ	-0.1
100	7.59	5.55	0.872	4.84	23.7	0.1
				*6.81		
Initials	SZ	SZ	SZ	SZ	SZ	KF

12/15/19 -KF std1: 9.9 mg/L N std2: 10.0 mg/L

Quality Assurance	pH 7.00	DO 100%	Salinity (ppt)	Ammonia 10 mg/L
	7.00	100.2	~~35~~ 34.9	9.4
	7.00	99.3	35.0	9.6
Initials	SZ	SZ	SZ	KF
Slope: 98.2	Temp: 19.0			

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Americamysis Daily Log

Project: Dispersant Mysids 2 Start Date/Time: 12/13/19
Sample Type: Water End Date/Time: 12/20/19
WQ Meter ID: A2 Species Lot #: AB121219

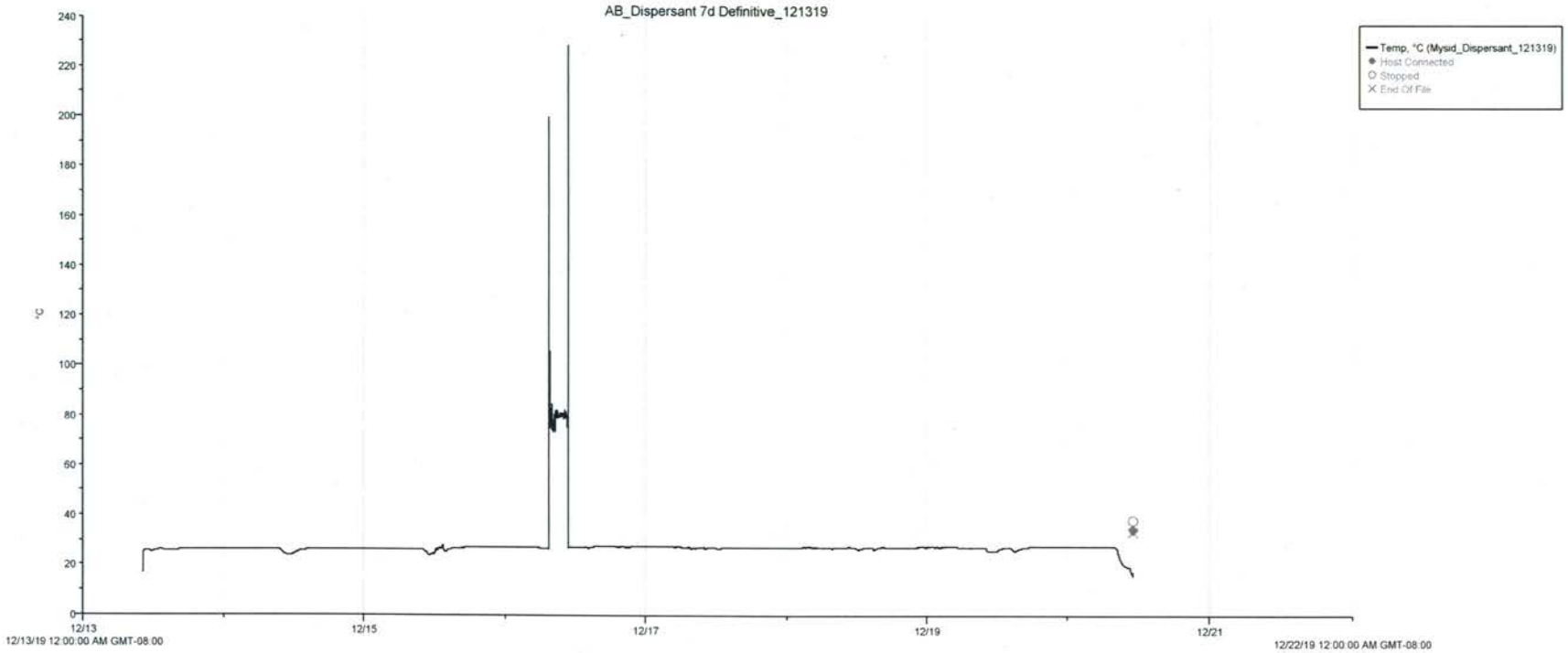
	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Start temp logger	✓							
Temperature Test	26.4	25.3	23.9	26.8	26.4	26.1	26.3	27.3
Temperature Ref Tox	25.4	25.8	24.6	26.3	25.7	26.7	26.2	26.8
Feed 75 naups/mysid AM		✓	✓	✓	✓	✓	✓	
Renew Test/Ref Tox		✓	✓	✓	✓	✓	✓	
Measure Test WQ	✓	✓	✓	✓	✓	✓	✓	
Feed 75 naups/mysid PM	✓	✓	✓	✓	✓	✓	✓	
Initials	SZ, KF	~~BB~~	SZ, KF	SZ, KF JV	SZ, KF	KF, LM	ALL	

NOTE: DO should be above 4.0 mg/L. If it is not, aerate the entire test at 1 bubble/second.

D2: ↑Temps by ~~0.5°C~~ 1.0°C -KF. Temp logger was out of beaker for a while, there might be a period of time above range leading up to 13:24 -KF

D3: Checked temp first thing (25.5) → ↑ temp JV ↓temp by 0.5°C
D3: Probe was making (probe = temp logger) readings >70°C, unplugged + replugged it and it went back to ~26°C (10:46 AM) -KF

~~D4: Ae~~ KF


AB_Dispersant 7d Definitive_121319
Temp, °C (Mysid_Dispersant_121319)
Host Connected
Stopped
End Of File
°C
240
220
200
180
160
140
120
100
80
60
40
20
0
12/13
12/15
12/17
12/19
12/21
12/13/19 12:00:00 AM GMT-08:00
12/22/19 12:00:00 AM GMT-08:00

Marine Pollution Studies Laboratory
Culture Log

Organism: A. bahia

Organism Source: ARO

Collection Date: 12/11/19

Arrival Date at MPSL: 12/12/19

Test Start Date: 12/13/19

Arrival Temperature at MPSL: 18.1°

Arrival Conductivity/Salinity at MPSL: ~~17~~ 27‰

WQ Meter ID: Refractometer

Species Lot #: AB121219

Date	12/12	12/13							
Temperature	22.3	26.3							
Conductivity/ Salinity	23.5	22.							
Aeration	Y	Y							
Organism Health	E	E							
Initials	JV	JV							
Notes	RW 50% fed tet (artemia didn't hatch)	RW 50% fed naups							

Temperature: Measured value (make note if it is adjusted up/down).
Conductivity: Measured value
~~Water flow: yes/no~~
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

Quality Assurance/Quality Control Criteria:

Organisms acclimated to test conductivity at least 48 hours prior to test: (Yes) No

Organisms held at MPSL no more than 2 weeks: ~~Yes~~ (Yes) No

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species AMERICAMYSIS BAHIA

Source: Lab reared ✓ Hatchery reared _____ Field collected _____

Hatch date 12-6-19 Receipt date _____

Lot number 120619MS Strain _____

Brood origination FLORIDA

II. Water Quality

Temperature 25 °C Salinity ~28 ppt D.O. — ppm

pH 7.8 su Hardness — ppm Alkalinity — ppm

III. Culture Conditions

Freshwater _____ Saltwater ✓ Other _____

Recirculating ✓ Flow through _____ Static renewal _____

DIET: Flake food ✓ Phytoplankton _____ Trout chow _____

Artemia ✓ Rotifers _____ YCT _____ Other ENCAP. SHRIMP DIET

Prophylactic treatments: _____

Comments: _____

_____

IV. Shipping Information

Client: UC DAVIS MPSL # of Organisms 600+

Carrier: FEDEX Date shipped 12-11-19

Biologist: Mark Rosenquist

PO BOX 1271 HAMPTON NH 03843-1271 (603) 926-1650 AROFISH@AOL.COM

Dispersant - *Atherinops* (Topsmelt) 4 Day Range Finder - 12/5/19

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	1.00	0.96	0.09
	2	2	5	5	5	5	5	1.00		
	3	3	5	4	4	4	4	0.80		
	4	4	5	5	5	5	5	1.00		
	5	5	5	5	5	5	5	1.00		
5.6	6	1	5	5	5	5	4	0.80	0.88	0.11
	7	2	5	5	5	5	4	0.80		
	8	3	5	5	5	5	5	1.00		
	9	4	5	5	5	5	4	0.80		
	10	5	5	5	5	5	5	1.00		
10	11	1	5	5	5	5	5	1.00	0.96	0.09
	12	2	5	5	5	5	5	1.00		
	13	3	5	5	4	4	4	0.80		
	14	4	5	5	5	5	5	1.00		
	15	5	5	5	5	5	5	1.00		
18	16	1	5	5	5	5	5	1.00	1.00	0.00
	17	2	5	5	5	5	5	1.00		
	18	3	5	5	5	5	5	1.00		
	19	4	5	5	5	5	5	1.00		
	20	5	5	5	5	5	5	1.00		
32	21	1	5	5	5	5	5	1.00	0.88	0.18
	22	2	5	5	5	5	5	1.00		
	23	3	5	5	5	5	5	1.00		
	24	4	5	5	4	3	3	0.60		
	25	5	5	5	4	4	4	0.80		
56	26	1	5	5	3	2	2	0.40	0.32	0.23
	27	2	5	5	3	2	2	0.40		
	28	3	5	5	0	0	0	0.00		
	29	4	5	5	2	2	1	0.20		
	30	5	5	5	4	3	3	0.60		
100	31	1	5	5	0	0	0	0.00	0.00	0.00
	32	2	5	5	0	0	0	0.00		
	33	3	5	4	0	0	0	0.00		
	34	4	5	5	0	0	0	0.00		
	35	5	5	4	0	0	0	0.00		
180	36	1	5	0	0	0	0	0.00	0.00	0.00
	37	2	5	0	0	0	0	0.00		
	38	3	5	0	0	0	0	0.00		
	39	4	5	0	0	0	0	0.00		
	40	5	5	0	0	0	0	0.00		

Marine Pollution Studies Laboratory
Atherinops 4-day Acute Toxicity Test
Feeding: 40 Artemia nauplii per fish, 2x daily

Project: Dispersant Topsmelt **Start Date/Time:** 12/5/19

~~Water Batch #:~~ **End Date/Time:** 12/9/19

Fish Lot #: AA120419

Cont.#	Station Name	Number at Start	Number Alive				Notes
			Day 1	Day 2	Day 3	Day 4	
1	Ø	5	5	5	5	5	
2			5	5	5	5	
3			4	4	4	4	
4			5	5	5	5	
5			5	5	5	5	
6	5.6		5	5	5	4	
7			5	5	5	4	
8			5	5	5	5	
9			5	5	5	4	
10			5	5	5	5	
11	10		5	5	5	5	
12			~~5~~ 5 KF	5	5	5	
13			5	4	4	4	
14			5	5	5	5	
15			5	5	5	5	
16	18		5	5	5	5	
17			5	5	5	5	
18			5	5	5	5	
19			5	5	5	5	
20			5	5	5	5	
21	32		5	5	5	5	
22			5	5	5	5	
23			5	5	5	5	
24			5	4	3	3	
25			5	4	4	4	
26	56		5	3	2	2	
27			5	3	2	2	
28			5	Ø			
29			5	2	2	1	
30			5	4	3	3	
Initials		SZ, KF	KF	KS	LM	SZ	

CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	15-0063-9005	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	27 Feb-20 9:12	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	07-1144-4078	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	05 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	09 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	07-4048-4727	**Code:**	CXAA4-120519	**Client:**	
Sample Date:	05 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	05 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	32	56	42.33		20.3%

Dunnett Multiple Comparison Test

Control	vs	C-uL/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		5.6	0.9659	2.36	0.233	8	0.4352	CDF	Non-Significant Effect
		10	0	2.36	0.233	8	0.8333	CDF	Non-Significant Effect
		18	-0.4829	2.36	0.233	8	0.9377	CDF	Non-Significant Effect
		32	0.9313	2.36	0.233	8	0.4508	CDF	Non-Significant Effect
		56*	7.187	2.36	0.233	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.010787	0.4021575	5	16.54	<0.0001	Significant Effect
Error	0.5835182	0.02431326	24			
Total	2.594306		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.225	4.25	0.3381	Equal Variances
Variances	Levene Equality of Variance	4.622	3.9	0.0043	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9307	0.903	0.0511	Normal Distribution

96h Survival Rate Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	0.0%
5.6		5	0.88	0.744	1	0.8	0.8	1	0.04899	12.4%	8.33%
10		5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	0.0%
18		5	1	1	1	1	1	1	0	0.0%	-4.17%
32		5	0.88	0.6579	1	1	0.6	1	0.08	20.3%	8.33%
56		5	0.32	0.03686	0.6031	0.4	0	0.6	0.102	71.3%	66.7%
100		5	0	0	0	0	0	0	0		100.0%
180		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.0%
5.6		5	1.202	1.04	1.364	1.107	1.107	1.345	0.05833	10.8%	7.34%
10		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.0%
18		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-3.67%
32		5	1.206	0.9496	1.462	1.345	0.8861	1.345	0.09228	17.1%	7.08%
56		5	0.5889	0.2758	0.9021	0.6847	0.2255	0.8861	0.1128	42.8%	54.6%
100		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.6%
180		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.6%

Pacific Topsmelt 96-h Acute Survival Test **Granite Canyon**

Analysis ID:	15-0063-9005	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	27 Feb-20 9:12	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

96h Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1	1	0.8	1	1
5.6		0.8	0.8	1	0.8	1
10		1	1	0.8	1	1
18		1	1	1	1	1
32		1	1	1	0.6	0.8
56		0.4	0.4	0	0.2	0.6
100		0	0	0	0	0
180		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type
0	D
5.6	
10	
18	
32	
56	
100	
180	

CETIS Analytical Report

Test Code: CXAA4-120519 | 03-1549-4594

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	02-9614-1148	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	27 Feb-20 9:12	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	07-1144-4078	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	05 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	09 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	07-4048-4727	**Code:**	CXAA4-120519	**Client:**	
Sample Date:	05 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	05 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.04	1.39%	1.689	0.02793	48.82	42.93	55.53

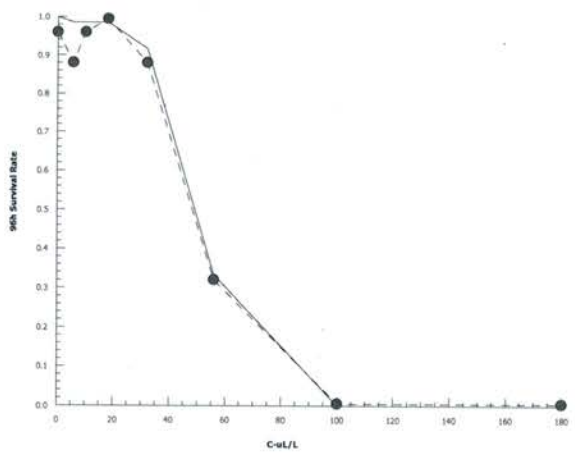
96h Survival Rate Summary

			Calculated Variate(A/B)								
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	5	0.96	0.8	1	0.04	0.08944	9.32%	0.0%	24	25
5.6		5	0.88	0.8	1	0.04899	0.1095	12.4%	8.33%	22	25
10		5	0.96	0.8	1	0.04	0.08944	9.32%	0.0%	24	25
18		5	1	1	1	0	0	0.0%	-4.17%	25	25
32		5	0.88	0.6	1	0.08	0.1789	20.3%	8.33%	22	25
56		5	0.32	0	0.6	0.102	0.228	71.3%	66.7%	8	25
100		5	0	0	0	0	0		100.0%	0	25
180		5	0	0	0	0	0		100.0%	0	25

96h Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	0.8	1	1
5.6		0.8	0.8	1	0.8	1
10		1	1	0.8	1	1
18		1	1	1	1	1
32		1	1	1	0.6	0.8
56		0.4	0.4	0	0.2	0.6
100		0	0	0	0	0
180		0	0	0	0	0

Graphics



Dispersant - *Atherinops* (Topsmelt) 4 Day Range Finder - Ref Tox - 12/5/19

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Prop Alive	Mean	SD
0	1	1	5	4	4	4	4	0.80	0.96	0.09
	2	2	5	5	5	5	5	1.00		
	3	3	5	5	5	5	5	1.00		
	4	4	5	5	5	5	5	1.00		
	5	5	5	5	5	5	5	1.00		
56	6	1	5	3	3	3	3	0.60	0.88	0.18
	7	2	5	5	5	5	5	1.00		
	8	3	5	5	5	4	4	0.80		
	9	4	5	5	5	5	5	1.00		
	10	5	5	5	5	5	5	1.00		
100	11	1	5	3	3	3	3	0.60	0.84	0.17
	12	2	5	4	4	4	4	0.80		
	13	3	5	5	5	5	5	1.00		
	14	4	5	5	5	5	5	1.00		
	15	5	5	5	5	5	4	0.80		
180	16	1	5	5	5	3	2	0.40	0.76	0.26
	17	2	5	5	5	4	4	0.80		
	18	3	5	5	4	5	5	1.00		
	19	4	5	5	5	5	5	1.00		
	20	5	5	3	3	3	3	0.60		
320	21	1	5	0	0	0	0	0.00	0.00	0.00
	22	2	5	0	0	0	0	0.00		
	23	3	5	1	0	0	0	0.00		
	24	4	5	0	0	0	0	0.00		
	25	5	5	1	0	0	0	0.00		

Marine Pollution Studies Laboratory
Atherinops 4-day Reference Toxicant Test
Feeding: 40 Artemia nauplii per fish, 2x daily

Project: Dispersant Topsmelt **Start Date/Time:** 12/5/19

~~Water Batch #:~~ _____ **End Date/Time:** 12/9/19

Fish Lot #: AA120419

Cont.#	Concentration	Number at Start	Number Alive				Notes
			Day 1	Day 2	Day 3	Day 4	
1	Ø	5	4	4	4	4	
2	↓	↓	5	5	5	5	
3	↓	↓	5	5	5	5	
4	↓	↓	5	5	5	5	
5	↓	↓	5	5	5	5	
6	56	↓	3	3	3	3	
7	↓	↓	5	5	5	5	
8	↓	↓	5	5	4	4	
9	↓	↓	5	5	5	5	
10	↓	↓	5	5	5	5	
11	100	↓	3	3	3	3	
12	↓	↓	4	4	4	4	
13	↓	↓	5	5	5	5	
14	↓	↓	5	5	5	5	
15	↓	↓	5	5	5	4	
16	180	↓	5	5	3	2	
17	↓	↓	5	5	4	4	
18	↓	↓	5	4	5	5	
19	↓	↓	5	5	5	5	
20	↓	↓	3	3	3	3	
21	320	↓	Ø	—	—	—	
22	↓	↓	Ø	—	—	—	
23	↓	↓	1	Ø	—	—	
24	↓	↓	Ø	—	—	—	
25	↓	↓	1	Ø	—	—	
Initials		KF SZ	KF	KS	LM	SZ	

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	20-7312-9101	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 13:17	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	15-0512-9251	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	05 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	09 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	96h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	00-0471-9507	**Code:**	480393	**Project:**	Dispersant
Sample Date:	10 Apr-20 13:15	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 13:15	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	180	320	240		25.96%

Dunnett Multiple Comparison Test

Control vs	Conc-ug/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	56	0.6942	2.227	0.295	8	CDF	0.4591	Non-Significant Effect
	100	1.054	2.227	0.295	8	CDF	0.3110	Non-Significant Effect
	180	1.693	2.227	0.295	8	CDF	0.1259	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.131127	0.0437089	3	0.9989	0.4187	Non-Significant Effect
Error	0.700093	0.0437558	16			
Total	0.83122		19			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	3.213	11.34	0.3599	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.944	0.866	0.2846	Normal Distribution

96h Survival Rate Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	0.00%
56		5	0.8800	0.6579	1.0000	1.0000	0.6000	1.0000	0.0800	20.33%	8.33%
100		5	0.8400	0.6322	1.0000	0.8000	0.6000	1.0000	0.0748	19.92%	12.50%
180		5	0.7600	0.4362	1.0000	0.8000	0.4000	1.0000	0.1166	34.31%	20.83%
320		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Angular (Corrected) Transformed Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.00%
56		5	1.206	0.9496	1.462	1.345	0.8861	1.345	0.09228	17.11%	7.08%
100		5	1.158	0.9183	1.398	1.107	0.8861	1.345	0.08639	16.68%	10.75%
180		5	1.074	0.7143	1.433	1.107	0.6847	1.345	0.1294	26.96%	17.26%
320		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.00%	82.62%

96h Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.8000	1.0000	1.0000	1.0000	1.0000
56		0.6000	1.0000	0.8000	1.0000	1.0000
100		0.6000	0.8000	1.0000	1.0000	0.8000
180		0.4000	0.8000	1.0000	1.0000	0.6000
320		0.0000	0.0000	0.0000	0.0000	0.0000

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	20-7312-9101	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 13:17	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

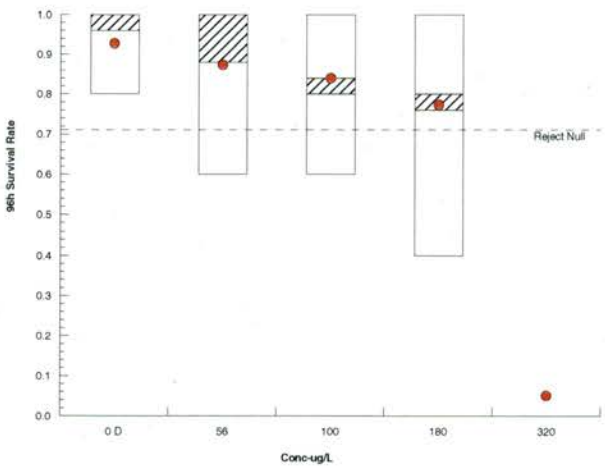
Angular (Corrected) Transformed Detail

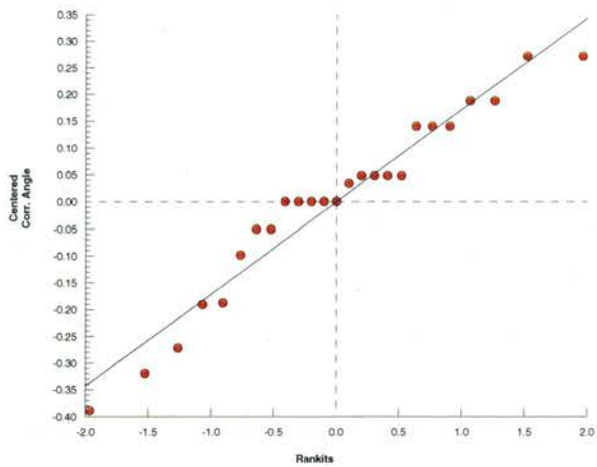
Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.107	1.345	1.345	1.345	1.345
56		0.8861	1.345	1.107	1.345	1.345
100		0.8861	1.107	1.345	1.345	1.107
180		0.6847	1.107	1.345	1.345	0.8861
320		0.2255	0.2255	0.2255	0.2255	0.2255

96h Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	4/5	5/5	5/5	5/5	5/5
56		3/5	5/5	4/5	5/5	5/5
100		3/5	4/5	5/5	5/5	4/5
180		2/5	4/5	5/5	5/5	3/5
320		0/5	0/5	0/5	0/5	0/5

Graphics





CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	20-3728-4049	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 13:17	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	15-0512-9251	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	05 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	09 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	96h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	00-0471-9507	**Code:**	480393	**Project:**	Dispersant
Sample Date:	10 Apr-20 13:15	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 13:15	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.04	8.33%	2.318469	0.032774	208.2	179	242.1

96h Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-ug/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	D	5	0.9600	0.8000	1.0000	0.0894	9.32%	0.0%	24/25	0.96	0.0%
56		5	0.8800	0.6000	1.0000	0.1789	20.33%	8.33%	22/25	0.88	8.33%
100		5	0.8400	0.6000	1.0000	0.1673	19.92%	12.5%	21/25	0.84	12.5%
180		5	0.7600	0.4000	1.0000	0.2608	34.31%	20.83%	19/25	0.76	20.83%
320		5	0.0000	0.0000	0.0000	0.0000		100.0%	0/25	0	100.0%

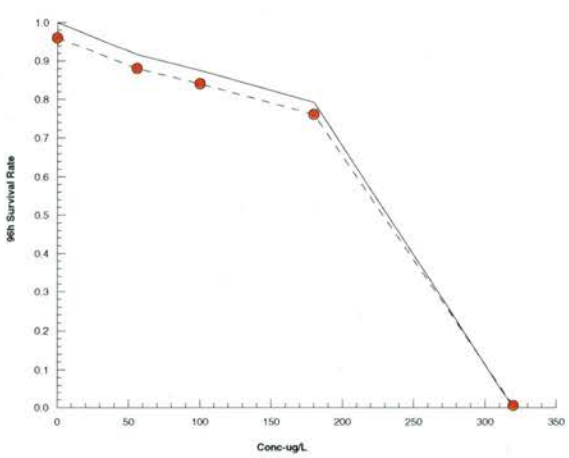
96h Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.8000	1.0000	1.0000	1.0000	1.0000
56		0.6000	1.0000	0.8000	1.0000	1.0000
100		0.6000	0.8000	1.0000	1.0000	0.8000
180		0.4000	0.8000	1.0000	1.0000	0.6000
320		0.0000	0.0000	0.0000	0.0000	0.0000

96h Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	4/5	5/5	5/5	5/5	5/5
56		3/5	5/5	4/5	5/5	5/5
100		3/5	4/5	5/5	5/5	4/5
180		2/5	4/5	5/5	5/5	3/5
320		0/5	0/5	0/5	0/5	0/5

Graphics



Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 12/5/19

End Date/Time: 12/9/19

Project: Dispersant Topsmelt

Spp./Species Lot #: AA120419

Sample Type: Water

WQ Meter ID: A2

Date: 12/5/19

Test Temperature: 18.4

~~Water Batch #:~~

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.47	9.07	0.829	7.52	33.0	0.2	
5.6	7.541	9.00		7.46	33.0	0.0	
10	7.57	8.90		7.38	33.0	0.1	
18	7.60	8.87		7.35	33.0	0.1	
32	7.65	8.76		7.26	33.0	0.7	
56	7.65	8.71		7.22	33.3	0.8	
100	7.68	8.68		7.20	33.3	0.5	
180	7.70	8.72		7.23	33.3	0.1	
Ø	7.73	8.96	0.829	7.43	33.3	0.5	
56	7.73	8.77		7.27	33.2		
100	7.76	8.64		7.16	33.0		
180	7.76	8.65		7.17	32.8		
320	7.85	8.65		7.17	32.5		
Initials	SZ	SZ	SZ	SZ	SZ	SZ	

Cu RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.10	100.5	34.9	Certified Std.	10.2
—	—	—	35 ppt	—
7.09	100.5	35.3		9.7
SZ	SZ	SZ		SZ

Initials

pH slope: 98.6 DO temp: 18.8

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 12/5/19

End Date/Time: 12/9/19

Project: Dispersant Topsmelt

Spp./Species Lot #: AA 120419

Sample Type: Water

WQ Meter ID: A2

Date: 12/7/19

Test Temperature: 20.2

~~Water Batch #:~~

	Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
New	Ø	7.52	8.86	0.824	7.30	33.9		
	5.6	7.61	8.85	0.824	7.29	33.9		
	10	7.86	8.85	0.824	7.29	33.9		
	18	7.86	8.79	0.824	7.17	33.9		
	32	7.86	8.79	0.824	7.24	33.8		
	56	7.86	8.75	0.824	7.17	34.1		
	100							All dead D2 - KS
	180							All dead D1 - KF
OLD	Ø	7.82	8.63	0.805	6.95	37.8		
	5.6	7.82	8.48	0.805	6.83	37.7		
	10	7.82	8.39	0.810	6.80	36.8		
	18	7.80	8.32	0.810	6.74	36.7		
	32	7.81	8.29	0.810	6.71	36.7		
	56	7.77	8.09	0.810	6.55	36.6		
	100	7.79	7.79	0.810	6.31	36.6	0.9	All dead D2
	180							All dead D1 - KF
	Initials	KS	KS	KS	KS	KS	KS	

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.02	100.2	–	Certified Std.	9.2
–	–	35.1	35	–
7.18	98.7	35.3		10.1
KS	KS	KS		KS

pH slope: 95.2 DO temp: 20.2

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 12/5/19

End Date/Time: 12/9/19

Project: Dispersant Topsmelt

Spp./Species Lot #: AA12Ø419

Sample Type: Water

WQ Meter ID: A2

Date: 12/9/19

Test Temperature: 20.6

Water Batch #:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)	Notes
Ø	7.44	7.75	0.792	6.14	41.3	0.8	Checked Salinity
5.6	7.70	7.50	0.783	5.87	42.8	0.8	with refractometer-KF
10	7.83	7.41	0.783	5.80	42.9	0.8	
18	7.86	7.33	0.783	5.74	42.9	0.7	
32	7.89	7.27	0.787	5.72	42.2	0.5	
56	7.97	7.43	0.774	5.75	* 45	1.0	~~refractometer~~ see 12/7/19
100	7.79	7.79	0.810	6.31	36.6	0.9	12/7/19-KS & WQ sheet for Std's
180	6.90	3.61	0.824	2.97	34.4	0.8	12/6/19 -KF
Initials	KF	KF	KF	KF	KF	KF	

Water Quality Precision and Accuracy

pH 7	DO 100%	Salinity (ppt)		Ammonia (10 mg/L N)
7.03	100.7	34.9	Certified Std.	9.3
—	—	—	35 ppt	9.5
7.07	104.0	35.2		9.4
Initials KF	KF	KF		KF

pH slope: 98.3 DO temp: 19.8

*WQ for 12/6/19 -KF →

6.96 pH 7.05 pH

100.3% 101.0% (20.0°C)

34.9 ppt 35.1 ppt

9.6 mg/L N 10.1 mg/L N

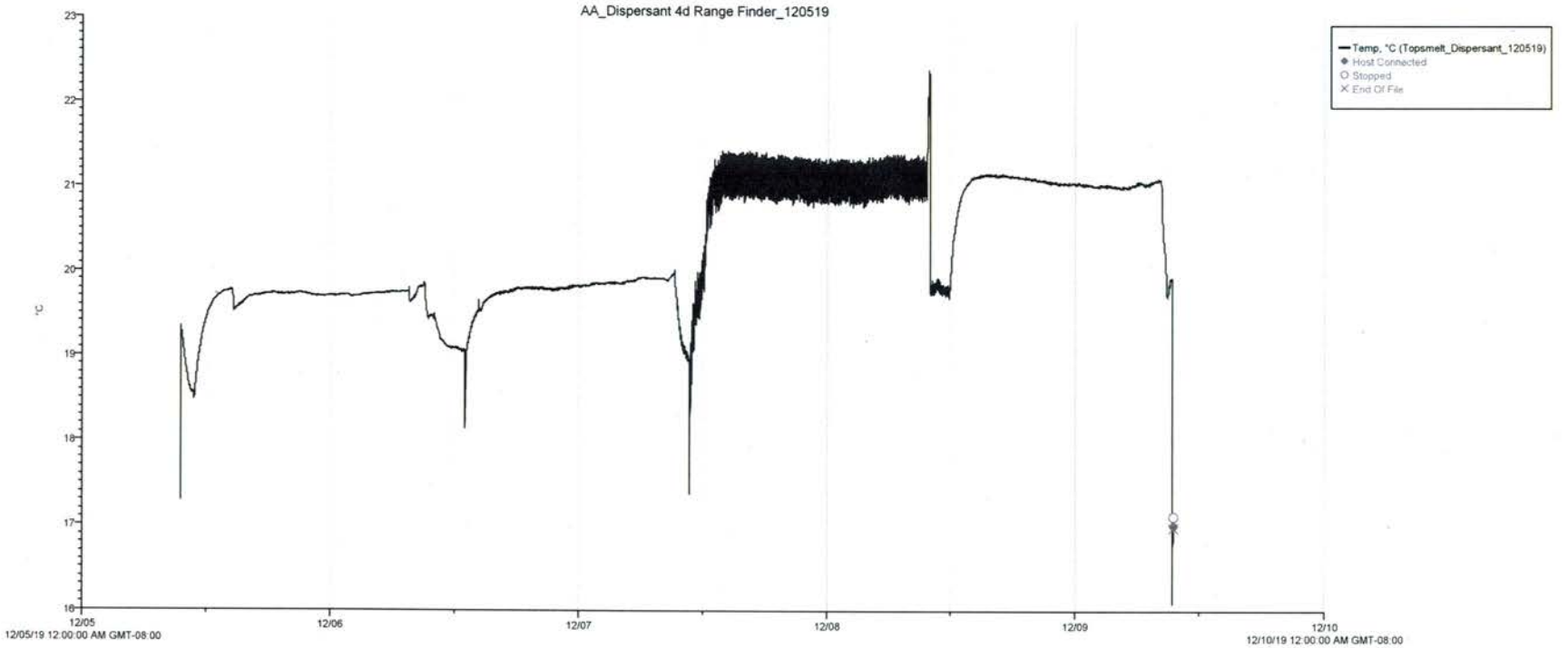
Marine Pollution Studies Laboratory
Atherinops Water Test Daily Log

Start Date/Time: 12/5/19
End Date/Time: 12/9/19
Project: Dispersant Topsmelt
Species Lot #: AA120419
Sample Type: Water
WQ Meter ID: A2

	Thur	Fri	Sat	Sun	Mon
Day	0	1	2	3	4
Test Temperature	18.4	18.9	20.2	18.5	20.6
Ref Tox Temperature	19.4	19.1	20.5	18.6	21.1
Count critters	✓	✓	✓	✓	✓
Feed (40 naups/fish) AM	—	✓	✓	✓	—
Renew test			✓		
Measure old/new WQ	✓		✓		✓
Feed (40 naups/fish) PM	✓	✓	✓	✓	—
Initials	SZ KF	KF, SZ	KS	LM	SZ KF

D1 - ↑ Room temp by 1°C because of recorded D0 ~~temps~~ + D1 temps - KF

D3 - ↑ Room temp by 1°C - LM


AA_Dispersant 4d Range Finder_120519
Temp, °C (Topsmelt_Dispersant_120519)
Host Connected
Stopped
End Of File
°C
23
22
21
20
19
18
17
16
12/05
12/06
12/07
12/08
12/09
12/10
12/05/19 12:00:00 AM GMT-08:00
12/10/19 12:00:00 AM GMT-08:00

Marine Pollution Studies Laboratory
Culture Log

Atherinops affinis

Lot # AA120419

Organism Source: ABS
Collection Date: 12/3/19
Arrival Date/Time at MPSL: 12/4/19
Arrival Temperature at MPSL: 18.7
Arrival Salinity at MPSL: 31 ‰
Hatch Date: 11/24/19

Date	12/4/19	12/5/19							
Temp.	19.9	21.0							
Salinity	32	32							
Water flow	—	—							
Aeration	Y	Y							
Organism Health	E	E							
Feeding	artemia	Naups							
Initials	JV	JV							
Notes	fed artemia RN 50% ~50 dead	↓ temp 21 dead							

Temperature: Measured value (make note if it is adjusted up/down).
Salinity: Measured value
Water flow: yes/no
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 12/3/2019

SPECIES: *Atherinops affinis*

AGE: 9 day

LIFE STAGE: Larvae

HATCH DATE: 11/24/2019

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	20°C	18-21°C
SALINITY/CONDUCTIVITY:	32 ppt	28-32 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	155 mg/l	140-195 mg/l
pH:	7.66	7.61-8.33

Comments:

Facility Supervisor

Dispersant - *Atherinops* (Topsmelt) 4 Day Definitive - 12/16/19

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	1.00	1.00	0.00
	2	2	5	5	5	5	5	1.00		
	3	3	5	5	5	5	5	1.00		
	4	4	5	5	5	5	5	1.00		
	5	5	5	5	5	5	5	1.00		
5.6	6	1	5	5	5	5	5	1.00	1.00	0.00
	7	2	5	5	5	5	5	1.00		
	8	3	5	5	5	5	5	1.00		
	9	4	5	5	5	5	5	1.00		
	10	5	5	5	5	5	5	1.00		
10	11	1	5	5	5	5	5	1.00	1.00	0.00
	12	2	5	5	5	5	5	1.00		
	13	3	5	5	5	5	5	1.00		
	14	4	5	5	5	5	5	1.00		
	15	5	5	5	5	5	5	1.00		
18	16	1	5	5	5	5	5	1.00	1.00	0.00
	17	2	5	5	5	5	5	1.00		
	18	3	5	5	5	5	5	1.00		
	19	4	5	5	5	5	5	1.00		
	20	5	5	5	5	5	5	1.00		
32	21	1	5	4	4	4	4	0.80	0.92	0.11
	22	2	5	5	5	5	5	1.00		
	23	3	5	5	4	4	4	0.80		
	24	4	5	5	5	5	5	1.00		
	25	5	5	5	5	5	5	1.00		
56	26	1	5	5	5	5	5	1.00	1.00	0.00
	27	2	5	5	5	5	5	1.00		
	28	3	5	5	5	5	5	1.00		
	29	4	5	5	5	5	5	1.00		
	30	5	5	5	5	5	5	1.00		
100	31	1	5	5	3	0	0	0.00	0.00	0.00
	32	2	5	5	1	0	0	0.00		
	33	3	5	5	1	1	0	0.00		
	34	4	5	5	3	0	0	0.00		
	35	5	5	5	1	0	0	0.00		
180	36	1	5	4	0	0	0	0.00	0.00	0.00
	37	2	5	4	0	0	0	0.00		
	38	3	5	5	0	0	0	0.00		
	39	4	5	4	0	0	0	0.00		
	40	5	5	5	0	0	0	0.00		

Marine Pollution Studies Laboratory
Atherinops 4-day Acute Toxicity Test
Feeding: 40 Artemia nauplii per fish, 2x daily

Project: Dispersant Topsmelt Def **Start Date/Time:** 12/11e/19

~~Water Batch #:~~ _____ **End Date/Time:** 12/20/19

Fish Lot #: AA121319

Cont.#	Station Name	Number at Start	Number Alive				Notes
			Day 1	Day 2	Day 3	Day 4	
1	Ø	5	5	5	5	5	
2			5	5	5	5	
3			5	5	5	5	
4			5	5	5	5	
5			5	5	5	5	
6	5.6		5	5	5	5	
7			5	5	5	5	
8			5	5	5	5	
9			5	5	5	5	
10			5	5	5	5	
11	10		5	5	5	5	
12			5	5	5	5	
13			5	5	5	5	
14			5	5	5	5	
15			5	5	5	5	
16	18		5	5	5	5	
17			5	5	5	5	
18			5	5	5	5	
19			5	5	5	5	
20			5	5	5	5	
21	32		4	4	4	4	
22			5	5	5	5	
23			5	4	4	4	
24			5	5	5	5	
25			5	5	5	5	
26	56		5	5	5	5	
27			5	5	5	5	
28			5	5	5	5	
29			5	5	5	5	
30		5	5	5	5	5	
Initials		SE, JV	JV	[illegible]	JV	JV	

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	19-8965-4637	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	27 Feb-20 9:15	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	20-3242-1294	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	19 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Duration:	72h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	13-3152-8482	**Code:**	4F5D8322	**Client:**	
Sample Date:	16 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	16 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	56	100	74.83		9.02%

Steel Many-One Rank Sum Test

Control	vs	C-uL/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		5.6	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		10	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		18	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		32	22.5	16	1	8	0.3937	Asymp	Non-Significant Effect
		56	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03780527	0.007561053	5	2.667	0.0471	Significant Effect
Error	0.06804948	0.002835395	24			
Total	0.1058547		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	3	4.25	0.0384	Equal Variances
Variances	Levene Equality of Variance	96	3.9	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.5565	0.903	<0.0001	Non-normal Distribution

96h Survival Rate Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1	1	1	1	1	1	0	0.0%	0.0%
5.6		5	1	1	1	1	1	1	0	0.0%	0.0%
10		5	1	1	1	1	1	1	0	0.0%	0.0%
18		5	1	1	1	1	1	1	0	0.0%	0.0%
32		5	0.92	0.784	1	1	0.8	1	0.04899	11.9%	8.0%
56		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	0	0	0	0	0	0	0		100.0%
180		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
5.6		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
10		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
18		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
32		5	1.25	1.088	1.412	1.345	1.107	1.345	0.05833	10.4%	7.08%
56		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
100		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.2%
180		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.2%

Pacific Topsmelt 96-h Acute Survival Test **Granite Canyon**

Analysis ID:	19-8965-4637	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	27 Feb-20 9:15	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

96h Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1	1	1	1	1
5.6		1	1	1	1	1
10		1	1	1	1	1
18		1	1	1	1	1
32		0.8	1	0.8	1	1
56		1	1	1	1	1
100		0	0	0	0	0
180		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type
0	D
5.6	
10	
18	
32	
56	
100	
180	

CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	09-1244-6820	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	27 Feb-20 9:15	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	20-3242-1294	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	19 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Duration:	72h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	13-3152-8482	**Code:**	4F5D8322	**Client:**	
Sample Date:	16 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	16 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0	0.00%	1.854	0.01369	71.51	67.14	76.16

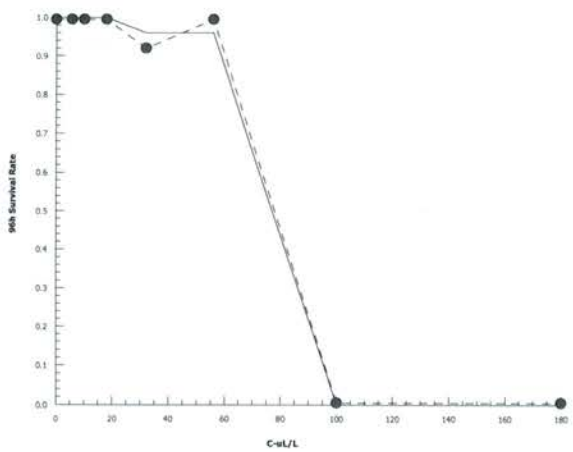
96h Survival Rate Summary

			Calculated Variate(A/B)								
C-uL/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Dilution Water	5	1	1	1	0	0	0.0%	0.0%	25	25
5.6		5	1	1	1	0	0	0.0%	0.0%	25	25
10		5	1	1	1	0	0	0.0%	0.0%	25	25
18		5	1	1	1	0	0	0.0%	0.0%	25	25
32		5	0.92	0.8	1	0.04899	0.1095	11.9%	8.0%	23	25
56		5	1	1	1	0	0	0.0%	0.0%	25	25
100		5	0	0	0	0	0		100.0%	0	25
180		5	0	0	0	0	0		100.0%	0	25

96h Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	1	1
5.6		1	1	1	1	1
10		1	1	1	1	1
18		1	1	1	1	1
32		0.8	1	0.8	1	1
56		1	1	1	1	1
100		0	0	0	0	0
180		0	0	0	0	0

Graphics



Dispersant - *Atherinops* (Topsmelt) 4 Day Definitive - Ref Tox - 12/16/19

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	1.00	0.88	0.27
	2	2	5	5	5	5	5	1.00		
	3	3	5	5	5	5	5	1.00		
	4	4	5	5	5	5	5	1.00		
	5	5	5	5	4	3	2	0.40		
56	6	1	5	5	5	5	5	1.00	0.88	0.11
	7	2	5	5	5	5	5	1.00		
	8	3	5	5	5	4	4	0.80		
	9	4	5	5	4	4	4	0.80		
	10	5	5	4	4	4	4	0.80		
100	11	1	5	4	4	3	3	0.60	0.76	0.17
	12	2	5	4	3	3	3	0.60		
	13	3	5	5	4	4	4	0.80		
	14	4	5	4	4	4	4	0.80		
	15	5	5	5	5	5	5	1.00		
180	16	1	5	3	3	3	1	0.20	0.40	0.14
	17	2	5	5	4	4	3	0.60		
	18	3	5	4	4	3	2	0.40		
	19	4	5	3	3	3	2	0.40		
	20	5	5	3	2	2	2	0.40		
320	21	1	5	3	3	2	1	0.20	0.32	0.18
	22	2	5	2	2	1	1	0.20		
	23	3	5	5	4	3	3	0.60		
	24	4	5	4	4	4	2	0.40		
	25	5	5	4	4	3	1	0.20		

Ref Tox

Marine Pollution Studies Laboratory
Atherinops 4-day Acute Toxicity Test
Feeding: 40 Artemia nauplii per fish, 2x daily

Project: ~~Dispersant Topsmelt~~ Ref Tox **Start Date/Time:** 12/16/19

~~**Water Batch #:**~~ _____ **End Date/Time:** 12/20/19

Fish Lot #: AA121319

Cont.#	Station Name	Number at Start	Number Alive				Notes
			Day 1	Day 2	Day 3	Day 4	
1	Ø	5	5	5	5	5	
2			5	5	5	5	
3			5	5	5	5	
4			5	5	5	5	
5			5	4	3	2	
6	56		5	5	5	5	
7			5	5	5	5	
8			5	5	4	4	
9			5	4	4	4	
10			4	4	4	4	
11	100		4	4	3	3	
12			4	3	3	3	
13			5	4	4	4	
14			4	4	4	4	
15			5	5	5	5	
16	180		3	3	3	1	
17			5	4	4	3	
18			4	4	3	2	
19			3	3	3	2	
20			3	2	2	2	
21	320		3	3	2	1	
22			2	2	1	1	
23			5	4	3	3	
24			4	4	4	2	
25		5	4	4	3	1	
26							
27							
28							
29							
30							
Initials		SZ, JV	JV	AP	JV	JV	

Ref Tox

CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	07-4105-4889	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 13:20	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	01-4162-6320	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	20 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	96h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	08-0332-5312	**Code:**	2FE1C580	**Project:**	Dispersant
Sample Date:	10 Apr-20 13:19	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 13:19	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	180	134.2		27.83%

Dunnett Multiple Comparison Test

Control	vs	Conc-ug/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		56	0.08528	2.305	0.291	8	CDF	0.7711	Non-Significant Effect
		100	1.163	2.305	0.291	8	CDF	0.3146	Non-Significant Effect
		180*	4.217	2.305	0.291	8	CDF	7.7E-04	Significant Effect
		320*	4.917	2.305	0.291	8	CDF	1.5E-04	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.73447	0.433617	4	10.88	7.5E-05	Significant Effect
Error	0.797095	0.0398547	20			
Total	2.53156		24			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	3.025	13.28	0.5536	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9379	0.8877	0.1325	Normal Distribution

96h Survival Rate Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.8800	0.5468	1.0000	1.0000	0.4000	1.0000	0.1200	30.49%	0.00%
56		5	0.8800	0.7440	1.0000	0.8000	0.8000	1.0000	0.0490	12.45%	0.00%
100		5	0.7600	0.5522	0.9678	0.8000	0.6000	1.0000	0.0748	22.02%	13.64%
180		5	0.4000	0.2244	0.5756	0.4000	0.2000	0.6000	0.0633	35.36%	54.55%
320		5	0.3200	0.0979	0.5421	0.2000	0.2000	0.6000	0.0800	55.90%	63.64%

Angular (Corrected) Transformed Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.213	0.8464	1.58	1.345	0.6847	1.345	0.1321	24.35%	0.00%
56		5	1.202	1.04	1.364	1.107	1.107	1.345	0.05833	10.85%	0.89%
100		5	1.066	0.829	1.304	1.107	0.8861	1.345	0.08548	17.92%	12.10%
180		5	0.6808	0.4952	0.8663	0.6847	0.4636	0.8861	0.06684	21.95%	43.88%
320		5	0.5923	0.3563	0.8283	0.4636	0.4636	0.8861	0.085	32.09%	51.17%

96h Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	0.4000
56		1.0000	1.0000	0.8000	0.8000	0.8000
100		0.6000	0.6000	0.8000	0.8000	1.0000
180		0.2000	0.6000	0.4000	0.4000	0.4000
320		0.2000	0.2000	0.6000	0.4000	0.2000

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	07-4105-4889	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 13:20	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

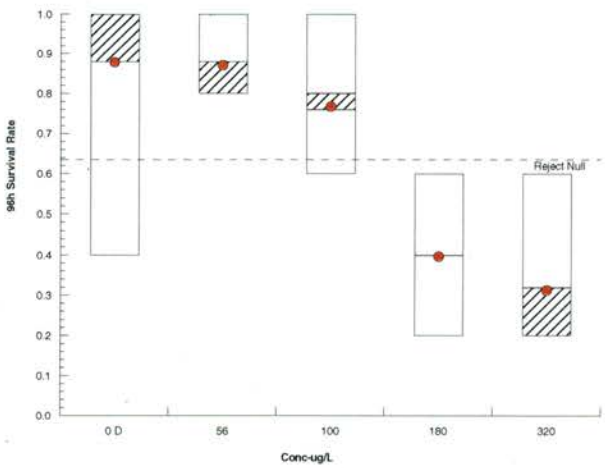
Angular (Corrected) Transformed Detail

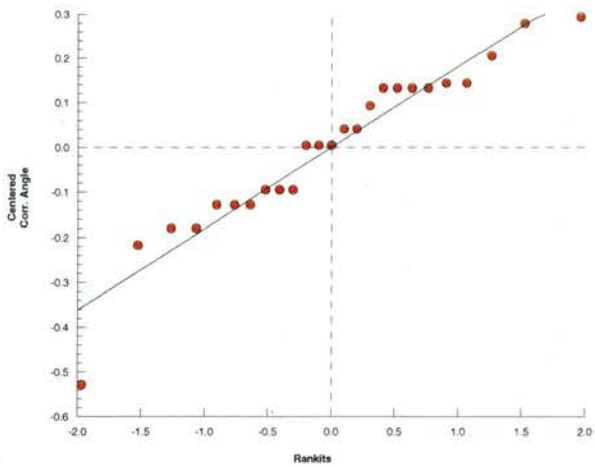
Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.345	1.345	1.345	1.345	0.6847
56		1.345	1.345	1.107	1.107	1.107
100		0.8861	0.8861	1.107	1.107	1.345
180		0.4636	0.8861	0.6847	0.6847	0.6847
320		0.4636	0.4636	0.8861	0.6847	0.4636

96h Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	5/5	5/5	5/5	5/5	2/5
56		5/5	5/5	4/5	4/5	4/5
100		3/5	3/5	4/5	4/5	5/5
180		1/5	3/5	2/5	2/5	2/5
320		1/5	1/5	3/5	2/5	1/5

Graphics





CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	15-6735-4897	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 13:20	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	01-4162-6320	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	20 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	96h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	08-0332-5312	**Code:**	2FE1C580	**Project:**	Dispersant
Sample Date:	10 Apr-20 13:19	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 13:19	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.12	36.36%	2.259101	0.115538	181.6	106.7	309.2

96h Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-ug/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	D	5	0.8800	0.4000	1.0000	0.2683	30.49%	0.0%	22/25	0.88	0.0%
56		5	0.8800	0.8000	1.0000	0.1095	12.45%	0.0%	22/25	0.88	0.0%
100		5	0.7600	0.6000	1.0000	0.1673	22.02%	13.64%	19/25	0.76	13.64%
180		5	0.4000	0.2000	0.6000	0.1414	35.36%	54.55%	10/25	0.4	54.55%
320		5	0.3200	0.2000	0.6000	0.1789	55.90%	63.64%	8/25	0.32	63.64%

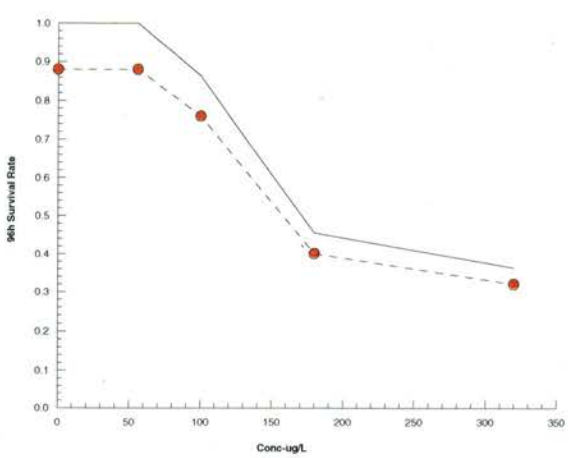
96h Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	0.4000
56		1.0000	1.0000	0.8000	0.8000	0.8000
100		0.6000	0.6000	0.8000	0.8000	1.0000
180		0.2000	0.6000	0.4000	0.4000	0.4000
320		0.2000	0.2000	0.6000	0.4000	0.2000

96h Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	5/5	5/5	5/5	5/5	2/5
56		5/5	5/5	4/5	4/5	4/5
100		3/5	3/5	4/5	4/5	5/5
180		1/5	3/5	2/5	2/5	2/5
320		1/5	1/5	3/5	2/5	1/5

Graphics



Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 12/16/19

End Date/Time: 12/20/19

Project: Dispersant Topsmelt Def

Spp./Species Lot #: AA121319

Sample Type: water

WQ Meter ID: A2

Date: 12/16/19

Test Temperature: 21.0

~~Water Batch #~~:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.49	8.91	0.824	7.34	33.8	0.1	
5.6	7.52	8.71	0.824	7.18	33.9	0.3	
10	7.54	8.50	0.824	7.00	33.9	0.3	
18	7.57	8.38	0.824	6.90	34.0	UR	
32	7.60	8.37	0.824	6.90	34.0	0.1	
56	7.62	8.32	0.824	6.86	34.0	0.2	
100	7.62	8.28	0.824	6.82	34.3	0.4	
180	7.62	8.28	0.824	6.82	34.4	0.2	
Ø	7.49	8.91	0.824	7.34	33.8	0.1	
56	7.66	8.28	0.824	6.82	34.2	0.5	
100	7.66	8.31	0.824	6.85	34.1	0.4	
180	7.66	8.31	0.824	6.85	33.8	0.2	
320	7.66	8.28	0.829	6.86	33.3	0.0	
Initials	JV	JV	JV	JV	JV	JV	

Cu RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.14	101.2	34.9	Certified Std.	9.9
			35	
7.18	91.8	35.4		10.4
Initials JV	JV	JV		JV

pH slope: 98.2 DO temp: 18.6

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 12/16/19

End Date/Time: 12/20/19

Project: Dispersant Topsmelt Def

Spp./Species Lot #: AA121319

Sample Type: Water

WQ Meter ID: A2

Date: 12/18/19

~~Water Batch #~~:

Test Temperature: 20.6

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
New							
Ø	8.03	8.25	0.824	6.80	34.2		
5.6	8.04	7.92	0.824	6.53	34.3		
10	8.05	7.85	0.824	6.47	~~34.4~~ LM		34.4 LM
18	8.10	7.85	0.824	6.47	34.3		
32	8.09	7.83	0.824	6.45	34.1		
56	8.06	7.81	0.824	6.44	33.8		
100	8.02	7.77	0.829	6.44	33.2		
180							All dead 12/18/19
Old							
Ø	7.93	7.45	0.814	6.06	35.7		
5.6	7.98	7.50	0.824	6.18	34.2		
10	7.85	7.15	0.819	5.86	35.2		
18	7.83	7.06	0.819	5.78	35.2		
32	~~7.6~~ 7.73 LM	6.92	0.819	5.67	35.2		
56	7.92	6.46	0.819	5.29	35.0		
100	7.74	6.21	0.819	5.09	35.3		
180	7.57	4.39	0.814	3.57	35.7	-0.1 LM	All dead 12/18/19
Initials	LM	LM	LM	LM	LM	LM	

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.00	100.3	34.9	Certified Std.	10.4
—	—	—	35.0 ppt	—
6.98	96.7	35.3		9.0
Initials LM	LM	LM		LM

pH slope: 96.7 DO temp: 20.5

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 12/16/19

End Date/Time: 12/20/19

Project: Dispersant Topsmelt Def

Spp./Species Lot #: AA121319

Sample Type: water

WQ Meter ID: A2

Date: 12/20/19

~~Water Batch #:~~

Test Temperature: 20.5

switch

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
0	7.88	7.76	6.32	0.814	35.6	-0.1	
56	7.93	7.71	6.31	0.819	35.1	0.1	
10	7.92	7.66	6.27	0.819	35.3	-0.1	
18	7.91	7.51	6.15	0.819	35.1	UR -0.3	
32	7.88	7.37	6.04	0.819	34.7	UR -0.2	
56	7.~~8~~84	6.60	5.44	0.824	34.3	-0.1	
100	7.82	5.75	4.74	0.824	34.0	UR -0.5	
180						-0.1 UR - LM 12/18/19	
Initials	SZ	SZ	SZ	SZ	SZ	KF	

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.00	100.2	34.9	Certified Std.	9.6
—	—	—	35 ppt	9.6
6.99	99.2	35.0		—
Initials SZ	SZ	SZ		KF

pH slope: 98.2 DO temp: 18.4

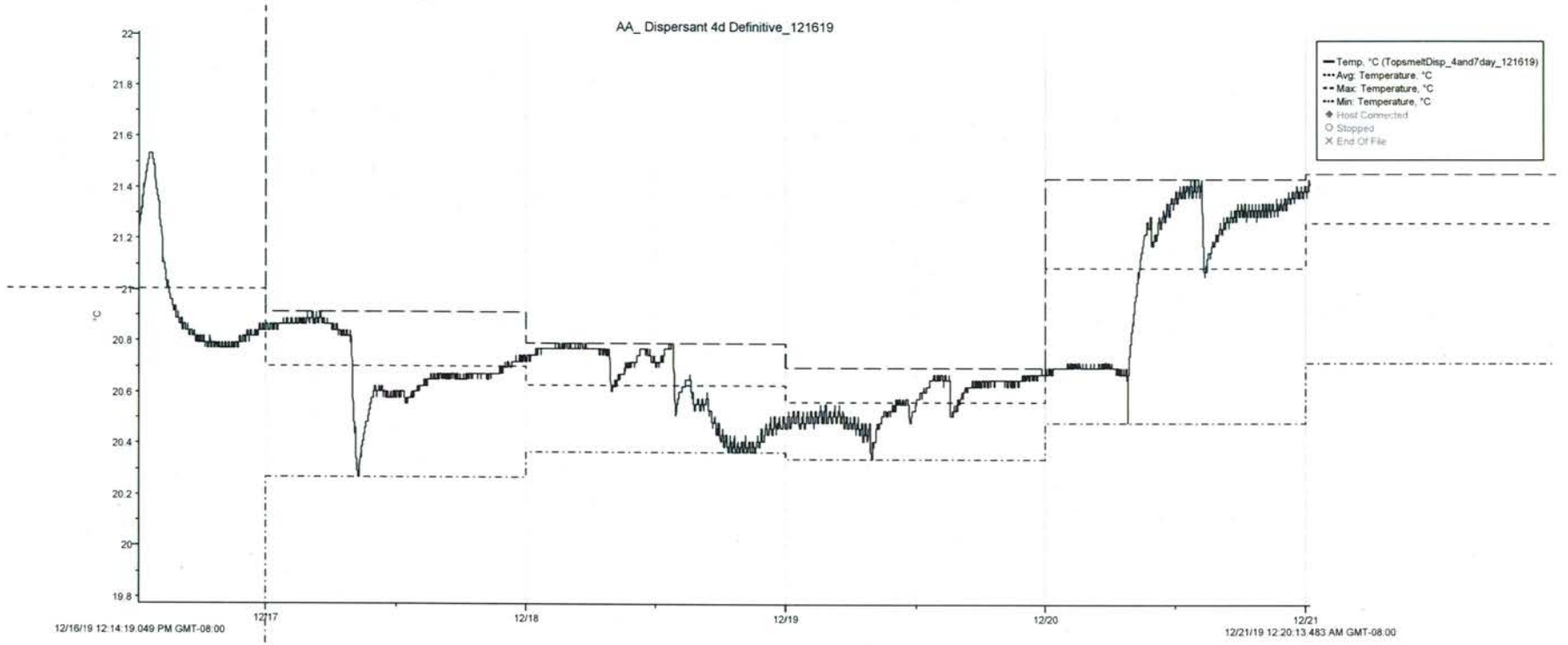
Marine Pollution Studies Laboratory
Atherinops Water Test Daily Log

Start Date/Time: 12/4/19
End Date/Time: 12/20/19
Project: Dispersant Topsmelt
Species Lot #: AA 12/3/19
Sample Type: water
WQ Meter ID: A7

	Mon	Tue	Wed	Thu	Fri
Day	0	1	2	3	4
Test Temperature	21.0	20.0	20.6	20.5	20.5
Ref Tox Temperature	21.4*	20.6	20.7	20.7	20.7
Count critters	✓	✓	✓	✓	✓
Feed (40 naups/fish) AM	—	✓	✓	✓	—
Warm renewal water		—			
Renew test			✓		
Measure old/new WQ	✓		✓		✓
Feed (40 naups/fish) PM	✓	✓	✓	✓	—
Initials	ALL	JV	ALL	JV	JV/ALL

* ↓ temp

20° ± 1°
200 mL Vol.
1000 mL beakers
5 reps
5 fish/rep
Full strength SW
40 naups/fish 2x daily
↳ feed 200/beaker 2x daily


AA_ Dispersant 4d Definitive_121619
Temp. °C (TopsmeltDisp_4and7day_121619)
Avg: Temperature, °C
Max: Temperature, °C
Min: Temperature, °C
Host Connected
Stopped
End Of File
22
21.8
21.6
21.4
21.2
21
20.8
20.6
20.4
20.2
20
19.8
°C
12/17
12/18
12/19
12/20
12/21
12/16/19 12:14:19.049 PM GMT-08:00
12/21/19 12:20:13.483 AM GMT-08:00

Marine Pollution Studies Laboratory
Culture Log

Atherinops affinis

Lot # AA121319

Organism Source: ABS
Collection Date: 12/12/19
Arrival Date/Time at MPSL: 12/13/19
Arrival Temperature at MPSL: 17.5
Arrival Salinity at MPSL: 28
Hatch Date: 12/5/19

Date	12/13	12/14	12/15	12/16					
Temp.	18.5	19.1	18.6	18.5					
Salinity	30	31	32	32					
Water flow	—	—	—	—					
Aeration	Y	Y	Y	Y					
Organism Health	E	E	E	E					
Feeding	naups	NAUPS	naups	naups					
Initials	JV	RP	KF	JV					
Notes	RN 50%	SOME DEAD	RN 50%	RN 50% ↑temp					

Temperature: Measured value (make note if it is adjusted up/down).
Salinity: Measured value
Water flow: yes/no
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 12/12/2019

SPECIES: *Atherinops affinis*

AGE: 7 day

LIFE STAGE: Larvae

HATCH DATE: 12/5/2019

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	18°C	18-21°C
SALINITY/CONDUCTIVITY:	32 ppt	28-32 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	150 mg/l	140-195 mg/l
pH:	7.66	7.61-8.33

Comments:

Facility Supervisor

Dispersant - Atherinops (Topsmelt) 7 Day Range Finder - 12/16/19

Concentration	Vial	Replicate	Alive	Start	% Survival	Mean	SD	Tare	Total	Biomass	Mean	SD
0	1	1	5	5	100	96	8.9	0.6626	0.6656	0.600	0.652	0.084
	2	2	4	5	80			0.6695	0.6726	0.620		
	3	3	5	5	100			0.6644	0.6676	0.640		
	4	4	5	5	100			0.6580	0.6610	0.600		
	5	5	5	5	100			0.6667	0.6707	0.800		
5.6	6	1	3	5	60	88	17.9	0.6504	0.6525	0.420	0.600	0.111
	7	2	4	5	80			0.6911	0.6940	0.580		
	8	3	5	5	100			0.6815	0.6850	0.700		
	9	4	5	5	100			0.6866	0.6900	0.680		
	10	5	5	5	100			0.7101	0.7132	0.620		
10	11	1	5	5	100	96	8.9	0.6884	0.6914	0.600	0.600	0.099
	12	2	5	5	100			0.6884	0.6922	0.760		
	13	3	4	5	80			0.7112	0.7137	0.500		
	14	4	5	5	100			0.6994	0.7021	0.540		
	15	5	5	5	100			0.6917	0.6947	0.600		
18	16	1	5	5	100	92	17.9	0.7072	0.7115	0.860	0.676	0.152
	17	2	5	5	100			0.6973	0.7008	0.700		
	18	3	3	5	60			0.6920	0.6942	0.440		
	19	4	5	5	100			0.6934	0.6967	0.660		
	20	5	5	5	100			0.6888	0.6924	0.720		
32	21	1	4	5	80	88	17.9	0.6777	0.6807	0.600	0.608	0.129
	22	2	3	5	60			0.6982	0.7003	0.420		
	23	3	5	5	100			0.6866	0.6898	0.640		
	24	4	5	5	100			0.6886	0.6925	0.780		
	25	5	5	5	100			0.6698	0.6728	0.600		
56	26	1	4	5	80	92	11.0	0.6633	0.6660	0.540	0.648	0.097
	27	2	5	5	100			0.6552	0.6588	0.720		
	28	3	5	5	100			0.7031	0.7069	0.760		
	29	4	5	5	100			0.6863	0.6896	0.660		
	30	5	4	5	80			0.6921	0.6949	0.560		
100	31	1	0	5	0	0	0.0					
	32	2	0	5	0							
	33	3	0	5	0							
	34	4	0	5	0							
	35	5	0	5	0							
180	36	1	0	5	0	0	0.0					
	37	2	0	5	0							
	38	3	0	5	0							
	39	4	0	5	0							
	40	5	0	5	0							

Dispersant - *Atherinops* (Topsmelt) 7 Day Range Finder - Daily Counts - 12/16/19

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	5	Not Counted	5	1.00	0.96	0.09
	2	2	5	5	5	5	4	4		4	0.80		
	3	3	5	5	5	5	5	5		5	1.00		
	4	4	5	5	5	5	5	5		5	1.00		
	5	5	5	5	5	5	5	5		5	1.00		
5.6	6	1	5	3	3	3	3	3		3	0.60	0.88	0.18
	7	2	5	5	5	5	5	5		4	0.80		
	8	3	5	5	5	5	5	5		5	1.00		
	9	4	5	5	5	5	5	5		5	1.00		
	10	5	5	5	5	5	5	5		5	1.00		
10	11	1	5	5	5	5	5	5		5	1.00	0.96	0.09
	12	2	5	5	5	5	5	5		5	1.00		
	13	3	5	5	4	4	4	4		4	0.80		
	14	4	5	5	5	5	5	5		5	1.00		
	15	5	5	5	5	5	5	5		5	1.00		
18	16	1	5	5	5	5	5	5		5	1.00	0.92	0.18
	17	2	5	5	5	5	5	5		5	1.00		
	18	3	5	5	4	3	3	3		3	0.60		
	19	4	5	5	5	5	5	5		5	1.00		
	20	5	5	5	5	5	5	5		5	1.00		
32	21	1	5	5	5	5	5	5		4	0.80	0.88	0.18
	22	2	5	5	4	4	4	4		3	0.60		
	23	3	5	5	5	5	5	5		5	1.00		
	24	4	5	5	5	5	5	5		5	1.00		
	25	5	5	5	5	5	5	5		5	1.00		
56	26	1	5	5	5	5	5	5		4	0.80	0.92	0.11
	27	2	5	5	5	5	5	5		5	1.00		
	28	3	5	5	5	5	5	5		5	1.00		
	29	4	5	5	5	5	5	5		5	1.00		
	30	5	5	4	4	4	4	4		4	0.80		
100	31	1	5	5	0	0	0	0		0	0.00	0.00	0.00
	32	2	5	5	0	0	0	0		0	0.00		
	33	3	5	5	0	0	0	0		0	0.00		
	34	4	5	5	0	0	0	0		0	0.00		
	35	5	5	4	0	0	0	0		0	0.00		
180	36	1	5	5	0	0	0	0		0	0.00	0.00	0.00
	37	2	5	3	0	0	0	0		0	0.00		
	38	3	5	3	0	0	0	0		0	0.00		
	39	4	5	4	0	0	0	0		0	0.00		
	40	5	5	3	0	0	0	0		0	0.00		

Marine Pollution Studies Laboratory

Data Sheet for Topsmelt Chronic Toxicity Test

Project: Dispersant Topsmelt RF

Sample Type: Water

Balance #: 1

Start Date/Time: 12/10/19

End Date/Time: 12/23/19

Species Lot #: AA121319

Container Number	Number at Start	Number Alive	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of fish	~~Females w/ eggs~~
1	5	5	JV	1	0.6626	0.6656	5	
2		4	JV		0.6695	0.6726	4	
3		5	JV		0.6644	0.6676	5	
4		5	JV		0.6580	0.6610	5	
5		5	JV		0.6667	0.6707	5	
6		3	JV		0.6504	0.6525	3	
7		4 JV 4	JV		0.6911	0.6940	4	
8		5	JV		0.6815	0.6850	5	
9		5	JV		0.6866	0.6900	5	
10		5	JV		0.7101	0.7132	5	
11		5	JV		0.6884	0.6914	5	
12		5	JV		0.6884	0.6922	5	
13		4	JV		0.7112	0.7137	4	
14		5	JV		0.6994	0.7021	5	
15		5	JV		0.6917	0.6947	5	
16		5	JV		0.7072	0.7115	5	
17		5	JV		0.6973	0.7008	5	
18		3	JV		0.6920	0.6942	3	
19		5	JV		0.6934	0.6967	5	
20		5	JV		0.6888	0.6924	5	
21		4	JV		0.6777	0.6807	4	
22		3	JV		0.6982	0.7003	3	
23		5	JV		0.6866	0.6898	5	
24		5	JV		0.6886	0.6925	5	
25		5	JV		0.6698	0.6728	5	
26		4	JV		0.6633	0.6660	4	
27		5	JV		0.6552	0.6588	5	
28		5	JV		0.7031	0.7069	5	
29		5	JV		0.6863	0.6896	5	
30		4	JV	—	—0.6921	0.6946	4	
31	5	0						
32		0						
33		0						
34		0						
35		0						
36		0						
37		0						
38		0						
39		0						
40								
41								
42								
43								
44								
45								
46								
47								
48								
Initials	SZ JV				SZ	JV	JV	

	Tare weight	Total weight	# fish
Baseline 1			
Baseline 2			
Baseline 3	N/A		
Baseline 4			
Baseline 5			

Marine Pollution Studies Laboratory

Topsmelt 7-day Chronic Toxicity Test

Feeding: 40 Artemia nauplii per fish, 2x daily

Project: Dispersant / Topsmelt RF **Start Date/Time:** 12/16/19

~~Water Batch #:~~ _____ **End Date/Time:** 12/23/19

Lot #: ~~AA~~ 1213/19

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
1		5	5	5	5	5	5			
2			5	5	5	4	4			
3			5	5	5	5	5			
4			5	5	5	5	5			
5			5	5	5	5	5			
6			3	3	3	3	3			
7			5	5	5	5	5			
8			5	5	5	5	5			
9			5	5	5	5	5			
10			5	5	5	5	5			
11			5	5	5	5	5			
12			5	5	5	5	5			
13			5	A	4	4	4			
14			5	5	5	5	5			
15			5	5	5	5	5			
16			5	5	5	5	5			
17			5	5	5	5	5			
18			5	A	3	3	3			
19			5	5	5	5	5			
20			5	5	5	5	5			
21			5	5	5	5	5			
22			5	A	4	4	4			
23			5	5	5	5	5			
24			5	5	5	5	5			
25			5	5	5	5	5			
26			5	5	5	5	5			
27			5	5	5	5	5			
28			5	5	5	5	5			
29			5	5	5	5	5			
30			4	A	4	4	4			
31			5	KF↓ 0						
32			5	0						
33			5	0						
34			5	0						
35			4	0						
36			5	0						
37			3	0						
38			3	0						
39			4	0						
40		5	3	0						
Initials		SZ JV	JV	BK	JV	SZ	SZ			

DATA WEIGHT FINAL

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	10-6176-0274	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:51	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	07-2249-5205	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	23 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	11-7605-0406	**Code:**	46191AE6	**Client:**	
Sample Date:	16 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	16 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	56	100	74.83		21.8%

Steel Many-One Rank Sum Test

Control	vs	C-uL/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		5.6	24.5	16	2	8	0.5880	Asymp	Non-Significant Effect
		10	27.5	16	2	8	0.8333	Asymp	Non-Significant Effect
		18	27	16	1	8	0.8003	Asymp	Non-Significant Effect
		32	24.5	16	2	8	0.5880	Asymp	Non-Significant Effect
		56	25	16	2	8	0.6353	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.04220311	0.008440621	5	0.3032	0.9061	Non-Significant Effect
Error	0.6681206	0.02783836	24			
Total	0.7103237		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.729	15.1	0.5890	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8051	0.903	<0.0001	Non-normal Distribution

7d Survival Rate Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	0.0%
5.6		5	0.88	0.6579	1	1	0.6	1	0.08	20.3%	8.33%
10		5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	0.0%
18		5	0.92	0.6979	1	1	0.6	1	0.08	19.4%	4.17%
32		5	0.88	0.6579	1	1	0.6	1	0.08	20.3%	8.33%
56		5	0.92	0.784	1	1	0.8	1	0.04899	11.9%	4.17%
100		5	0	0	0	0	0	0	0		100.0%
1180		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.0%
5.6		5	1.206	0.9496	1.462	1.345	0.8861	1.345	0.09228	17.1%	7.08%
10		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.0%
18		5	1.253	0.9984	1.508	1.345	0.8861	1.345	0.09184	16.4%	3.41%
32		5	1.206	0.9496	1.462	1.345	0.8861	1.345	0.09228	17.1%	7.08%
56		5	1.25	1.088	1.412	1.345	1.107	1.345	0.05833	10.4%	3.67%
100		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.6%
1180		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.6%

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	10-6176-0274	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:51	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

7d Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	0.8	1	1	1
5.6		0.6	0.8	1	1	1
10		1	1	0.8	1	1
18		1	1	0.6	1	1
32		0.8	0.6	1	1	1
56		0.8	1	1	1	0.8
100		0	0	0	0	0
1180		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D					
5.6						
10						
18						
32						
56						
100						
1180						

CETIS Analytical Report

Test Code: CXAA7-121619 | 09-1869-3939

Pacific Topsmelt 7-d Survival and Growth Test

Granite Canyon

Analysis ID:	15-5639-0093	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:51	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	07-2249-5205	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	23 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	11-7605-0406	**Code:**	46191AE6	**Client:**	
Sample Date:	16 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	16 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.04	4.17%	1.857	0.01922	72.01	65.91	78.68

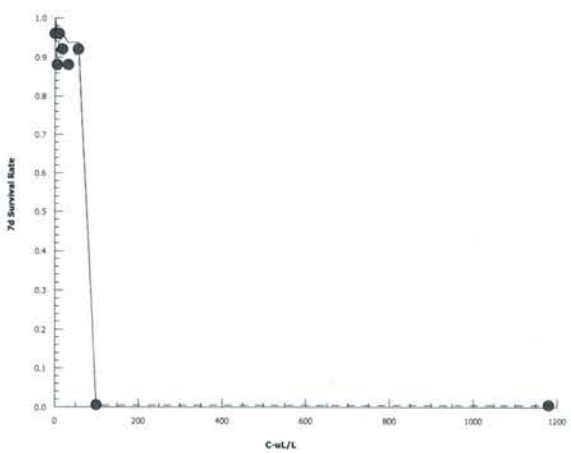
7d Survival Rate Summary

			Calculated Variate(A/B)								
C-uL/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Dilution Water	5	0.96	0.8	1	0.04	0.08944	9.32%	0.0%	24	25
5.6		5	0.88	0.6	1	0.08	0.1789	20.3%	8.33%	22	25
10		5	0.96	0.8	1	0.04	0.08944	9.32%	0.0%	24	25
18		5	0.92	0.6	1	0.08	0.1789	19.4%	4.17%	23	25
32		5	0.88	0.6	1	0.08	0.1789	20.3%	8.33%	22	25
56		5	0.92	0.8	1	0.04899	0.1095	11.9%	4.17%	23	25
100		5	0	0	0	0	0		100.0%	0	25
1180		5	0	0	0	0	0		100.0%	0	25

7d Survival Rate Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	0.8	1	1	1
5.6		0.6	0.8	1	1	1
10		1	1	0.8	1	1
18		1	1	0.6	1	1
32		0.8	0.6	1	1	1
56		0.8	1	1	1	0.8
100		0	0	0	0	0
1180		0	0	0	0	0

Graphics



Analyst: RS QA: RS

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	19-6706-5171	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:51	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	07-2249-5205	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	23 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	11-7605-0406	**Code:**	46191AE6	**Client:**	
Sample Date:	16 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	16 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	NA	C > T	NA	NA	56	>56	NA		26.2%

Dunnett Multiple Comparison Test

Control	vs	C-uL/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		5.6	0.7201	2.36	0.0002	8	0.5478	CDF	Non-Significant Effect
		10	0.72	2.36	0.0002	8	0.5478	CDF	Non-Significant Effect
		18	-0.3323	2.36	0.0002	8	0.9130	CDF	Non-Significant Effect
		32	0.6092	2.36	0.0002	8	0.5984	CDF	Non-Significant Effect
		56	0.05539	2.36	0.0002	8	0.8164	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.602605E-08	5.20521E-09	5	0.3992	0.8445	Non-Significant Effect
Error	3.129591E-07	1.303996E-08	24			
Total	3.389851E-07		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.711	15.1	0.8875	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9725	0.903	0.6083	Normal Distribution

Mean Dry Biomass-mg Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.000652	0.000547	0.000757	0.00062	0.0006	0.0008	3.77E-05	12.9%	0.0%
5.6		5	0.0006	0.000462	0.000738	0.00062	0.00042	0.0007	4.98E-05	18.6%	7.98%
10		5	0.0006	0.000477	0.000723	0.0006	0.0005	0.00076	4.43E-05	16.5%	7.98%
18		5	0.000676	0.000487	0.000865	0.0007	0.00044	0.00086	6.79E-05	22.5%	-3.68%
32		5	0.000608	0.000448	0.000768	0.0006	0.00042	0.00078	5.75E-05	21.1%	6.75%
56		5	0.000648	0.000528	0.000768	0.00066	0.00054	0.00076	4.32E-05	14.9%	0.61%

Mean Dry Biomass-mg Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.0006	0.00062	0.00064	0.0006	0.0008
5.6		0.00042	0.00058	0.0007	0.00068	0.00062
10		0.0006	0.00076	0.0005	0.00054	0.0006
18		0.00086	0.0007	0.00044	0.00066	0.00072
32		0.0006	0.00042	0.00064	0.00078	0.0006
56		0.00054	0.00072	0.00076	0.00066	0.00056

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	16-5481-8568	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	07-2249-5205	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	23 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	11-7605-0406	**Code:**	46191AE6	**Client:**	
Sample Date:	16 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	16 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1210666	200	Yes	Two-Point Interpolation

Point Estimates

Level	uL/L	95% LCL	95% UCL
IC5	>56	N/A	N/A
IC10	>56	N/A	N/A
IC15	>56	N/A	N/A
IC20	>56	N/A	N/A
IC25	>56	N/A	N/A
IC40	>56	N/A	N/A
IC50	>56	N/A	N/A

Mean Dry Biomass-mg Summary

			Calculated Variate						
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	5	0.000652	0.0006	0.0008	3.77E-05	8.44E-05	12.9%	0.0%
5.6		5	0.0006	0.00042	0.0007	4.98E-05	0.000111	18.6%	7.98%
10		5	0.0006	0.0005	0.00076	4.43E-05	0.000099	16.5%	7.98%
18		5	0.000676	0.00044	0.00086	6.79E-05	0.000152	22.5%	-3.68%
32		5	0.000608	0.00042	0.00078	5.75E-05	0.000129	21.1%	6.75%
56		5	0.000648	0.00054	0.00076	4.32E-05	9.65E-05	14.9%	0.61%

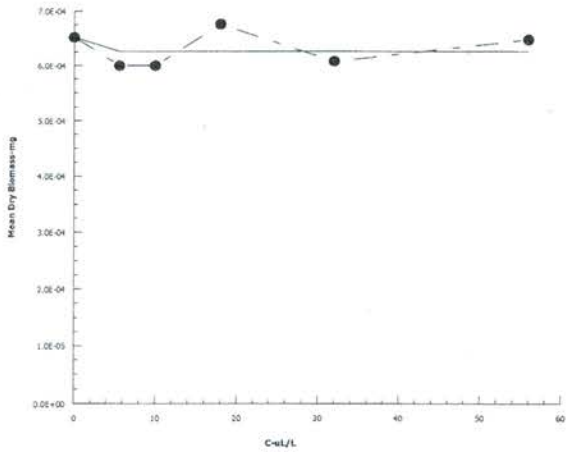
Mean Dry Biomass-mg Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.0006	0.00062	0.00064	0.0006	0.0008
5.6		0.00042	0.00058	0.0007	0.00068	0.00062
10		0.0006	0.00076	0.0005	0.00054	0.0006
18		0.00086	0.0007	0.00044	0.00066	0.00072
32		0.0006	0.00042	0.00064	0.00078	0.0006
56		0.00054	0.00072	0.00076	0.00066	0.00056

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	16-5481-8568	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 14:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Dispersant - *Atherinops* (Topsmelt) 7 Day Range Finder - Ref Tox - 12/16/19

Concentration (CuCl2)	Beaker	Rep	Alive	Initial	Prop.	Mean	SD	Tare (g)	Total (g)	Biomass (mg)	Mean	SD
0	1	1	5	5	1.00	0.92	0.11	0.7200	0.7229	0.580	0.61	0.11
	2	2	5	5	1.00			0.7185	0.7224	0.780		
	3	3	4	5	0.80			0.7155	0.7183	0.560		
	4	4	4	5	0.80			0.7132	0.7157	0.500		
	5	5	5	5	1.00			0.7076	0.7108	0.640		
56	6	1	2	5	0.40	0.88	0.27	0.6968	0.6985	0.340	0.65	0.18
	7	2	5	5	1.00			0.6815	0.6851	0.720		
	8	3	5	5	1.00			0.7199	0.7240	0.820		
	9	4	5	5	1.00			0.7166	0.7201	0.700		
	10	5	5	5	1.00			0.6987	0.7020	0.660		
100	11	1	5	5	1.00	1.00	0.00	0.7103	0.7138	0.700	0.75	0.04
	12	2	5	5	1.00			0.7098	0.7137	0.780		
	13	3	5	5	1.00			0.6786	0.6826	0.800		
	14	4	5	5	1.00			0.6790	0.6827	0.740		
	15	5	5	5	1.00			0.6856	0.6892	0.720		
180	16	1	1	5	0.20	0.48	0.23	0.6799	0.6804	0.100	0.37	0.18
	17	2	3	5	0.60			0.6842	0.6868	0.520		
	18	3	4	5	0.80			0.6783	0.6811	0.560		
	19	4	2	5	0.40			0.6877	0.6893	0.320		
	20	5	2	5	0.40			0.6974	0.6992	0.360		
320	21	1	2	5	0.40	0.52	0.18	0.6792	0.6808	0.320	0.28	0.07
	22	2	4	5	0.80			0.6630	0.6648	0.360		
	23	3	2	5	0.40			0.6836	0.6847	0.220		
	24	4	2	5	0.40			0.6579	0.6589	0.200		
	25	5	3	5	0.60			0.6509	0.6524	0.300		
										Biomass did not meet 0.85 mg criteria		

Dispersant - *Atherinops* (Topsmelt) 7 Day Range Finder - Ref Tox Daily Counts - 12/16/19

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	5	Not Counted	5	1.00	0.92	0.11
	2	2	5	5	5	5	5	5		5	1.00		
	3	3	5	5	5	5	5	5		4	0.80		
	4	4	5	4	4	4	4	4		4	0.80		
	5	5	5	5	5	5	5	5		5	1.00		
56	6	1	5	3	3	2	2	2		2	0.40	0.88	0.27
	7	2	5	5	5	4	4	4		5	1.00		
	8	3	5	5	5	5	5	5		5	1.00		
	9	4	5	5	5	5	5	5		5	1.00		
	10	5	5	5	5	5	5	5		5	1.00		
100	11	1	5	5	5	5	5	5		5	1.00	1.00	0.00
	12	2	5	5	5	5	5	5		5	1.00		
	13	3	5	5	5	5	5	5		5	1.00		
	14	4	5	5	5	5	5	5		5	1.00		
	15	5	5	5	5	5	5	5		5	1.00		
180	16	1	5	5	3	1	1	1		1	0.20	0.48	0.23
	17	2	5	5	4	4	3	3		3	0.60		
	18	3	5	5	4	4	4	4		4	0.80		
	19	4	5	4	3	3	2	2		2	0.40		
	20	5	5	5	4	3	2	2		2	0.40		
320	21	1	5	4	4	2	2	2		2	0.40	0.52	0.18
	22	2	5	4	4	4	4	4		4	0.80		
	23	3	5	3	2	2	2	2		2	0.40		
	24	4	5	3	3	2	2	2		2	0.40		
	25	5	5	4	4	3	3	3		3	0.60		

Ref Tox

Marine Pollution Studies Laboratory

Data Sheet for Topsmelt Chronic Toxicity Test

Project: Dispersant Topsmelt RF

Sample Type: Water

Balance #: 1

Start Date/Time: 12/16/19

End Date/Time: 12/23/19

Species Lot #: AA121319

Container Number	Number at Start	Number Alive	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of fish	~~Females w/ eggs~~
1	5	5	JV	R1 1	0.7200	0.7229	5	
2		5	JV		0.7185	0.7224	5	
3		4	JV		0.7155	0.7183	4	
4		4	JV		0.7132	0.7157	4	
5		5	JV		0.7076	0.7108	5	
6		2	JV		0.6968	0.6985	2	
7		5	JV		0.6815	0.6851	5	
8		5	JV		0.7199	0.7240	5	
9		5	JV		0.7166	0.7201	5	
10		5	JV		0.6987	0.7020	5	
11		5	JV		0.7103	0.7138	5	
12		5	JV		0.7098	0.7137	5	
13		5	JV		0.6786	0.6826	5	
14		5	JV		0.6790	0.6827	5	
15		5	JV		0.6856	0.6892	5	
16		1	JV		0.6799	0.6804	1	
17		3	JV		0.6842	0.6868	3	
18		4	JV		0.6783	0.6811	4	
19		2	JV		0.6877	0.6893	2	
20		2	JV		0.6974	0.6992	2	
21		2	JV		0.6792	0.6808	2	
22		4	JV		0.6630	0.6648	4	
23		2	JV		0.6836	0.6847	2	
24		2	JV		0.6579	0.6589	2	
25	✓	3	JV	RF 25	0.6509	0.6524	3	
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
Initials	SZ, JV				SZ	JV	JV	

	Tare weight	Total weight	# fish
Baseline 1			
Baseline 2			
Baseline 3			
Baseline 4			
Baseline 5			

Ref Tox

Marine Pollution Studies Laboratory

Topsmelt 7-day Chronic Toxicity Test

Feeding: 40 Artemia nauplii per fish, 2x daily

Project: ~~Dispersant Topsmelt PF~~ **Start Date/Time:** 12/16/19

~~Water Batch #:~~ **End Date/Time:** 12/23/19

Ref Tox

Lot #: AA12319

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
1		5	5	5	5	5	5			
2			5	5	5	5	5			
3			5	5	5	5	5			
4			4	4	4	4	4			
5			5	5	5	5	5			
6			3	3	2	2	2			
7			5	5	4	4	4			
8			5	5	5	5	5			
9			5	5	5	5	5			
10			5	5	5	5	5			
11			5	5	6	5	5			
12			5	5	5	5	5			
13			5	5	6	5	5			
14			5	5	5	5	5			
15			5	5	5	5	5			
16			5	3	1	1	1			
17			5	4	4	~~4~~ 3	3			
18			5	4	4	4	4			
19			4	3	3	~~3~~ 2	2			
20			5	4	3	2	2			
21			4	4	~~3~~ 2	2	2			
22			4	4	4	4	4			
23			3	2	2	2	2			
24			3	3	2	2	2			
25		5	4	4	3	3	3			
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
Initials		SZ JV	JV		JV	SZ	SZ			

SEE FINAL WEIGHT DATA

Ref TOX

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	12-6341-0454	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:33	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	14-7936-4816	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	23 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	15-9720-0646	**Code:**	5F335906	**Project:**	Dispersant
Sample Date:	25 Sep-13 09:45	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	25 Sep-13 09:45	**CAS (PC):**		**Station:**	In House
Sample Age:	2272d 14h	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	180	134.2		27.09%

Dunnett Multiple Comparison Test

Control vs	Conc-ug/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	56	0.2925	2.305	0.290	8	CDF	0.6923	Non-Significant Effect
	100	-0.756	2.305	0.290	8	CDF	0.9561	Non-Significant Effect
	180*	3.848	2.305	0.290	8	CDF	0.0018	Significant Effect
	320*	3.497	2.305	0.290	8	CDF	0.0040	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.92	0.8	>>	Yes	Passes Criteria
PMSD	0.2709	<<	0.25	No	Above Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.44603	0.361507	4	9.109	2.3E-04	Significant Effect
Error	0.793723	0.0396861	20			
Total	2.23975		24			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.9314	0.8877	0.0937	Normal Distribution

7d Survival Rate Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9200	0.7840	1.0000	1.0000	0.8000	1.0000	0.0490	11.91%	0.00%
56		5	0.8800	0.5468	1.0000	1.0000	0.4000	1.0000	0.1200	30.49%	4.35%
100		5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	-8.70%
180		5	0.4800	0.1969	0.7631	0.4000	0.2000	0.8000	0.1020	47.51%	47.83%
320		5	0.5200	0.2979	0.7421	0.4000	0.4000	0.8000	0.0800	34.40%	43.48%

Angular (Corrected) Transformed Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.25	1.088	1.412	1.345	1.107	1.345	0.05833	10.43%	0.00%
56		5	1.213	0.8464	1.58	1.345	0.6847	1.345	0.1321	24.35%	2.95%
100		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	-7.62%
180		5	0.7653	0.464	1.066	0.6847	0.4636	1.107	0.1085	31.70%	38.78%
320		5	0.8095	0.5762	1.043	0.6847	0.6847	1.107	0.08401	23.21%	35.24%

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID: 12-6341-0454 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.6
Analyzed: 10 Apr-20 12:33 **Analysis:** Parametric-Control vs Treatments **Status Level:** 1

7d Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	0.8000	0.8000	1.0000
56		0.4000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000
180		0.2000	0.6000	0.8000	0.4000	0.4000
320		0.4000	0.8000	0.4000	0.4000	0.6000

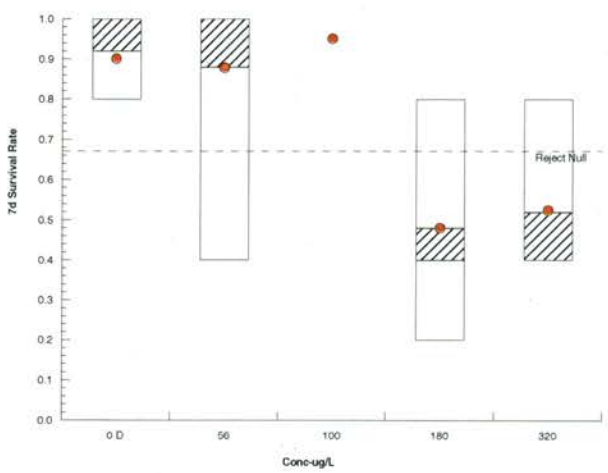
Angular (Corrected) Transformed Detail

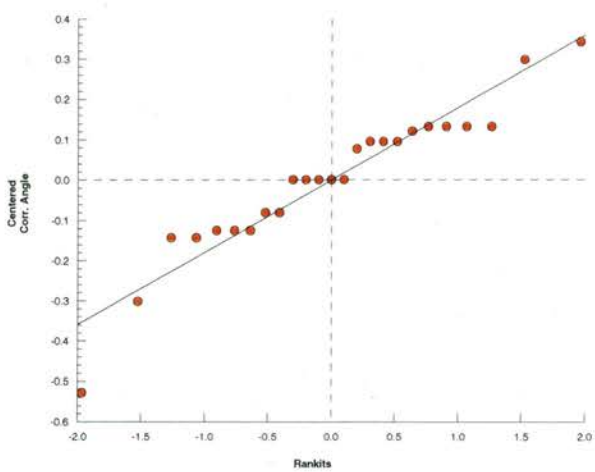
Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.345	1.345	1.107	1.107	1.345
56		0.6847	1.345	1.345	1.345	1.345
100		1.345	1.345	1.345	1.345	1.345
180		0.4636	0.8861	1.107	0.6847	0.6847
320		0.6847	1.107	0.6847	0.6847	0.8861

7d Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	5/5	5/5	4/5	4/5	5/5
56		2/5	5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5	5/5
180		1/5	3/5	4/5	2/5	2/5
320		2/5	4/5	2/5	2/5	3/5

Graphics





CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	05-1772-5085	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:33	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	14-7936-4816	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	23 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	15-9720-0646	**Code:**	5F335906	**Project:**	Dispersant
Sample Date:	25 Sep-13 09:45	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	25 Sep-13 09:45	**CAS (PC):**		**Station:**	In House
Sample Age:	2272d 14h	**Client:**	Internal Lab		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	837543	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.92	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	ug/L	95% LCL	95% UCL
LC5	106.5	n/a	110.6
LC10	113.5	n/a	122.2
LC15	120.9	96.3	136.2
LC20	128.9	104.3	150.7
LC25	137.3	115.4	170.8
LC40	166	137.7	n/a
LC50	>320	n/a	n/a

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-ug/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	D	5	0.9200	0.8000	1.0000	0.1095	11.91%	0.0%	23/25	0.9333	0.0%
56		5	0.8800	0.4000	1.0000	0.2683	30.49%	4.35%	22/25	0.9333	0.0%
100		5	1.0000	1.0000	1.0000	0.0000	0.00%	-8.7%	25/25	0.9333	0.0%
180		5	0.4800	0.2000	0.8000	0.2280	47.51%	47.83%	12/25	0.5	46.43%
320		5	0.5200	0.4000	0.8000	0.1789	34.40%	43.48%	13/25	0.5	46.43%

7d Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	0.8000	0.8000	1.0000
56		0.4000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000
180		0.2000	0.6000	0.8000	0.4000	0.4000
320		0.4000	0.8000	0.4000	0.4000	0.6000

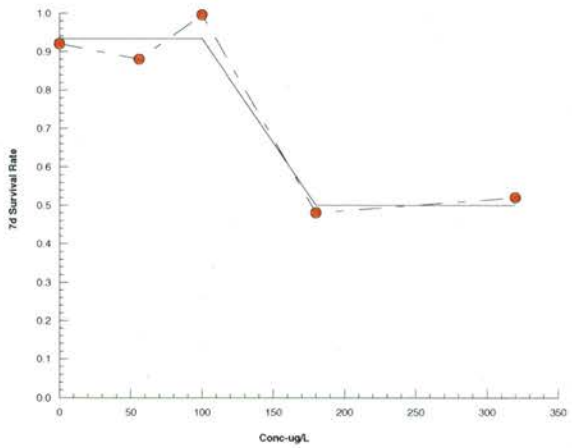
7d Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	5/5	5/5	4/5	4/5	5/5
56		2/5	5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5	5/5
180		1/5	3/5	4/5	2/5	2/5
320		2/5	4/5	2/5	2/5	3/5

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	05-1772-5085	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:33	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	05-9892-1571	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:33	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	14-7936-4816	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	23 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	15-9720-0646	**Code:**	5F335906	**Project:**	Dispersant
Sample Date:	25 Sep-13 09:45	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	25 Sep-13 09:45	**CAS (PC):**		**Station:**	In House
Sample Age:	2272d 14h	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	180	134.2		30.92%

Dunnett Multiple Comparison Test

Control vs	Conc-ug/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	56	-0.4384	2.305	0.0002	8	CDF	0.9111	Non-Significant Effect
	100	-1.656	2.305	0.0002	8	CDF	0.9961	Non-Significant Effect
	180*	2.923	2.305	0.0002	8	CDF	0.0141	Significant Effect
	320*	4.043	2.305	0.0002	8	CDF	0.0011	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.000612	0.85	>>	Yes	Below Criteria
PMSD	0.3092	<<	0.5	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.781E-07	1.945E-07	4	11.54	5.1E-05	Significant Effect
Error	3.371E-07	1.686E-08	20			
Total	1.115E-06		24			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	9.514	13.28	0.0495	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9228	0.8877	0.0592	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.000612	0.00048	0.000744	0.00058	0.0005	0.00078	4.76E-05	17.39%	0.00%
56		5	0.000648	0.000422	0.000874	0.0007	0.00034	0.00082	8.14E-05	28.08%	-5.88%
100		5	0.000748	0.000697	0.0008	0.00074	0.0007	0.0008	1.86E-05	5.54%	-22.22%
180		5	0.000372	0.000145	0.000599	0.00036	0.0001	0.00056	8.19E-05	49.22%	39.22%
320		5	0.00028	0.000196	0.000364	0.0003	0.0002	0.00036	3.03E-05	24.22%	54.25%

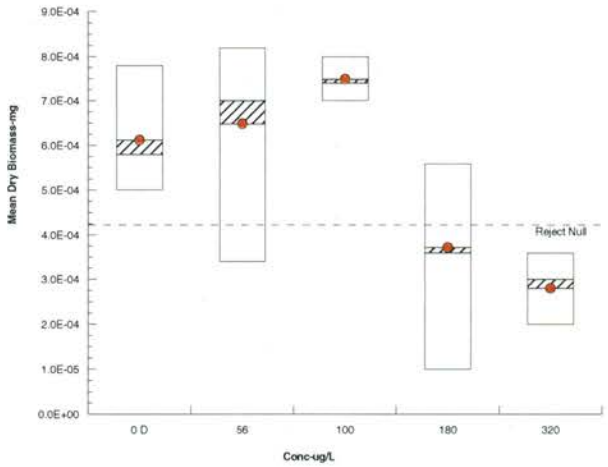
Mean Dry Biomass-mg Detail

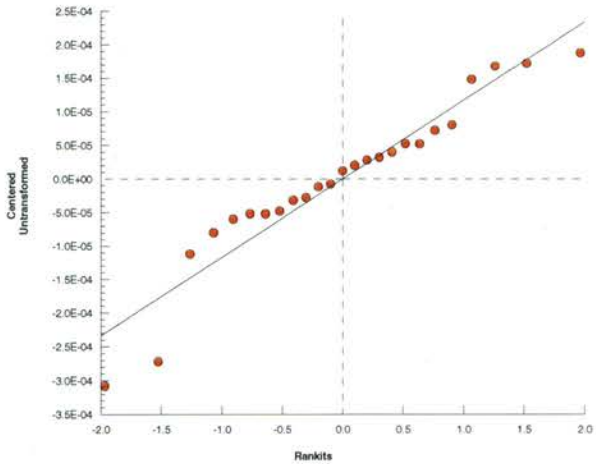
Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.00058	0.00078	0.00056	0.0005	0.00064
56		0.00034	0.00072	0.00082	0.0007	0.00066
100		0.0007	0.00078	0.0008	0.00074	0.00072
180		0.0001	0.00052	0.00056	0.00032	0.00036
320		0.00032	0.00036	0.00022	0.0002	0.0003

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	05-9892-1571	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:33	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

Graphics





Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	03-4757-5834	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:33	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	14-7936-4816	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	16 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	23 Dec-19	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	15-9720-0646	**Code:**	5F335906	**Project:**	Dispersant
Sample Date:	25 Sep-13 09:45	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	25 Sep-13 09:45	**CAS (PC):**		**Station:**	In House
Sample Age:	2272d 14h	**Client:**	Internal Lab		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1469052	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.000612	0.85	>>	Yes	Below Criteria

Point Estimates

Level	ug/L	95% LCL	95% UCL
IC5	106.9	19.81	115.6
IC10	114.2	102.6	133.3
IC15	122	109.8	153.5
IC20	130.3	113.7	179.6
IC25	139.3	118.2	205.7
IC40	169.8	132	278
IC50	227.4	124.1	359.8

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-ug/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	D	5	0.000612	0.0005	0.00078	0.000106	17.39%	0.0%	0.000669	0.0%
56		5	0.000648	0.00034	0.00082	0.000182	28.08%	-5.88%	0.000669	0.0%
100		5	0.000748	0.0007	0.0008	4.15E-05	5.55%	-22.22%	0.000669	0.0%
180		5	0.000372	0.0001	0.00056	0.000183	49.22%	39.22%	0.000372	44.42%
320		5	0.00028	0.0002	0.00036	6.78E-05	24.22%	54.25%	0.00028	58.17%

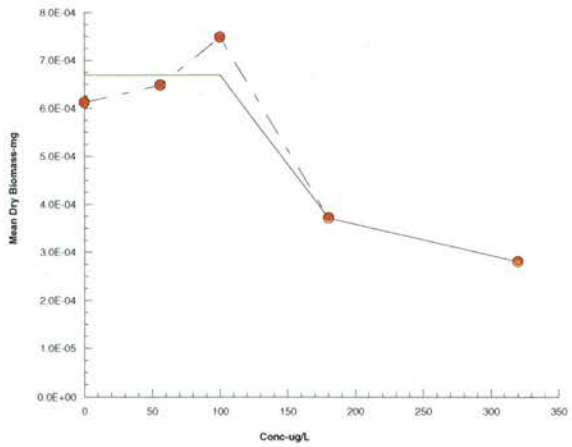
Mean Dry Biomass-mg Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.00058	0.00078	0.00056	0.0005	0.00064
56		0.00034	0.00072	0.00082	0.0007	0.00066
100		0.0007	0.00078	0.0008	0.00074	0.00072
180		0.0001	0.00052	0.00056	0.00032	0.00036
320		0.00032	0.00036	0.00022	0.0002	0.0003

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	03-4757-5834	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:33	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Marine Pollution Studies Laboratory
Water Quality
***A. affinis* Chronic 7-day**

Project: Dispersant Topsmelt RF
Lot # AA B13/19
Toxicant: Water

Start Date/Time: 12/16/19
End Date/Time: 12/23/19
WQ Meter ID: AZ

Sample	Day 0 Date: 12/16/19 Temp: 20.6						Day 1 Date: 12/17/19 Temp: 19.1								
							New				Old				
	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Old pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	7.49	8.91	0.824	7.34	33.8	0.1	9.64	0.824	7.94	33.7	7.81	7.74	0.819	6.34	34.9
5.6	7.52	8.71	0.824	7.18	33.9	0.3	8.60	"	7.09	34.3	7.96	7.66	"	6.27	34.6
10	7.54	8.50	0.824	7.00	33.9	0.3	8.43	"	6.95	34.1	7.96	7.51	"	6.15	34.7
18	7.57	8.38	0.824	6.90	34.0	UR	8.35	"	6.88	34.0	7.94	7.47	"	6.12	35.0
32	7.60	8.37	0.824	~~6.89~~ 6.90	34.0	0.1	8.35	"	6.88	33.8	7.93	7.12	"	5.83	34.8
56	7.62	8.32	0.824	~~6.86~~ 6.85	34.0	0.2	8.30	0.829	6.88	33.4	7.88	6.69	"	5.48	34.7
100	7.62	8.28	0.824	6.82	34.3	0.4	8.23	0.829	6.82	32.9	7.80	5.42	"	4.43	34.6
180	7.62	8.28	0.824	6.82	34.4	0.2	8.20	0.833	6.83	32.0	~~7.75~~	4.65	"	3.81 ★	34.8
Ø	7.49	8.91	0.824	7.34	33.8	0.1	8.59	0.819	7.04	34.8	8.05	7.77	0.819	6.12	34.6
56	7.66	8.28	0.824	6.82	34.2	0.5	8.48	0.824	6.99	34.2	8.04	7.73	0.824	6.37	34.3
100	7.66	~~8.31~~ 8.31	0.824	6.85	34.1	0.4	8.42	"	6.94	34.0	8.05	7.75	"	6.39	34.1
180	7.66	~~8.28~~ 8.31	0.824	6.85	33.8	0.2	8.39	"	6.91	33.6	8.05	7.66	"	6.31	33.8
320	7.66	8.28	0.824	6.86	33.3	0.0	8.39	0.829	6.96	33.2	8.03	8.12	0.829	6.73	33.2
Initials	JV	JV	JV	JV	JV	JV	KF	KF	KF	KF	KF	KF	KF	KF	KF

Cu RT

Quality Assurance	pH 7.00	DO 100%	Salinity (ppt)	Ammonia 10 mg/L
	7.14	101.2	34.9	9.9
	7.18	91.8	35.4	10.4
Initials	JV	JV	JV	JV
	Slope: 98.2	Temp: 18.6		

	DO 100%	Salinity (ppt)
	100.7	34.9
	—	—
	94.7	35.0
Initials	KF	KF
	Temp: 19.8	

	pH 7.00	DO 100%	Salinity (ppt)
	6.95		
	—		
	6.95		
Initials	KF		
	Slope: 96.2	Temp: 19.9	

★ Aeration set up -KF

Marine Pollution Studies Laboratory
Water Quality
***A. affinis* Chronic 7-day**

Project: Dispersant Topsmelt RF
Lot #: AA9213/9
Toxicant: Water

Start Date/Time: 12/16/19
End Date/Time: 12/23/19
WQ Meter ID: A2

Day 2 Date: 12/18/19 Temp: 21.0

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	8.56	0.824	7.05	34.3	7.93	7.76	0.810	6.29	36.5
5.6	8.14	0.824	6.71	34.4	7.97	7.49	0.814	6.10	35.9
10	7.95	0.824	6.56	34.4	7.94	7.43	0.814	6.05	35.9
18	7.88	0.824	6.49	34.3	7.93	7.39	0.814	6.02	36.2
32	7.84	0.824	6.46	34.1	—Ⓐ	7.34	0.819	6.01	35.0
56	7.82	0.824	6.44	33.9	7.93	7.21	0.819	5.90	35.2
100	—	—	—	—	7.87	6.68	0.819	5.47	35.1
180	—	—	—	—	7.76	5.24	0.819	4.29	34.9
	~~8.~~ LM								
Ø	8.48	0.819	6.95	34.6	7.91	7.59	0.819	6.22	35.2
56	8.25	0.819	6.76	34.6	7.91	7.54	0.819	6.18	35.1
100	8.23	0.824	6.78	34.4	7.92	7.54	0.819	6.18	35.0
180	8.17	0.824	6.73	34.1	7.88	7.39	0.824	6.09	34.4
320	8.11	0.829	6.72	33.4	7.94	7.55	0.824	6.22	34.1
Initials	LM	LM	LM	LM	LM	LM	LM	LM	LM

Ⓐ Spilled Sample LM

Cu RT

Quality Assurance	DO 100%	Salinity (ppt)
	100.4	35.2
	97.7	35.1
Initials	~~LM~~ 100.4	~~LM~~
	LM	LM
	Temp: 20.7	

	pH 7.00	DO 100%	Salinity (ppt)
	6.99	100.4	35.2
	—	97.7	35.1
Initials	7.10	100.4	35.4
	LM	LM	LM
	Slope: ~~96.7%~~	Temp: 20.7	

Day 3 Date: 12/19/19 Temp: 19.9

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø 8.38 LM	~~8.56~~	~~7.79~~ 0.824	6.90	34.2	7.97	7.74	0.814	6.30	35.9
5.6	8.19	0.824	6.75	34.1	7.99	7.60	0.814	6.19	35.5
10	8.07	0.824	6.65	34.2	7.99	7.46	0.819	6.11	35.3
18	8.01	0.824	6.60	34.1	7.97	7.34	0.814	5.97	35.5
32	7.91	0.824	6.52	34.0	7.97	7.13	0.814	5.80	35.1
56	7.82	0.824	6.44	33.6	7.94	6.91	0.824	5.69	34.5
100	—	—	—	—	—	—	—	—	—
180	—	—	—	—	—	—	—	—	—
Ø	7.78	0.824	6.41	34.4	7.94	7.43	0.819	6.08	34.9
56	7.82	0.824	6.44	34.7	7.94	7.31	0.819	5.99	35.1
100	7.85	0.824	6.47	34.1	7.92	7.31	0.819	5.99	34.9
180	7.98	0.824	6.53	33.8	7.92	7.31	0.824	6.02	34.4
320	7.94	0.829	6.58	33.4	7.94	7.33	0.824	6.04	33.9
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Cu RT

Quality Assurance	DO 100%	Salinity (ppt)
	100.8	34.9
	97.0	35.5
Initials	JV	JV
	Temp: 20.3	

	pH 7.00	DO 100%	Salinity (ppt)
	7.00		
	7.02		
Initials	JV		
	Slope: 97.2	Temp: 20.5	

Marine Pollution Studies Laboratory
Water Quality
***A.affinis* Chronic 7-day**

Project: Dispersant Topsmelt RF
Lot #: AA121319
Toxicant: Water

Start Date/Time: 12/16/19
End Date/Time: 12/23/19
WQ Meter ID: A2

Day 4

Date: 12/20/19 Temp: 20.9

CW RT

Sample	New Oxygen (0ppt)	New Oxygen Multiplier (switch)	New Oxygen (mg/L)	New Salinity (ppt)	Old pH	Old Oxygen (0ppt)	Old Oxygen Multiplier	Old Oxygen (mg/L)	Old Salinity (ppt)
Ø	8.04	6.62	0.824	34.4	7.91	7.78	0.814	6.33	35.9
5.6	7.87	6.48	0.824	34.0	7.94	7.67	0.814	6.24	35.5
10	7.84	6.46	0.824	34.4	7.95	7.63	0.814	6.21	35.5
18	7.80	6.43	0.824	34.0	7.92	7.57	0.814	6.16	35.8
32	7.79	6.42	0.824	34.3	7.92	7.36	0.819	6.03	35.2
56	7.80	6.43	0.824	34.3	7.92	7.32	0.819	6.00	34.8
100									
180									
Ø	7.71	0.819	6.31	34.6	7.91	7.46	0.819	6.11	35.4
56	7.82	0.824	6.44	34.4	7.92	7.34	0.819	6.01	34.9
100	7.92	0.824	6.53	34.3	7.92	7.32	0.819	6.00	34.8
180	7.88	0.824	6.49	34.3	7.92	7.43	0.824	6.12	34.4
320	7.92	0.824	6.53	33.4	7.94	7.62	0.824	6.28	34.2
							SZ		
Initials	SZ	SZ	SZ	SZ	SZ	SZ		SZ	SZ

Quality Assurance	DO 100%	Salinity (ppt)
	101.0	35.0
	—	—
Initials	99.0	35.7
	SZ	SZ
Temp: 19.1		

	pH 7.00	DO 100%	Salinity (ppt)
	7.02	101.0	35.0
	—	—	—
	6.98	99.0	35.7
Initials	SZ	SZ	
Slope: 98.2	Temp: 19.1		SZ

Day 5

Date: 12/21/19 Temp: 20.7

CW RT

Sample	New Oxygen (0ppt)	New Oxygen Multiplier	New Oxygen (mg/L)	New Salinity (ppt)	Old pH	Old Oxygen (0ppt)	Old Oxygen Multiplier	Old Oxygen (mg/L)	Old Salinity (ppt)
Ø	~~34.3~~ 8.02	0.824	6.61	34.3	8.03	7.60	0.814	6.19	36.3
5.6	7.89	0.824	6.50	34.0	8.05	7.59	0.819	6.22	35.3
10	7.85	0.824	6.47	34.4	8.05	7.59	0.819	6.22	35.4
18	7.82	0.824	6.44	34.4	8.04	7.50	0.814	6.11	35.7
32	7.82	0.824	6.44	34.3	8.00	7.36	0.814	5.99	35.7
56	7.79	0.824	6.42	34.4	8.00	7.20	0.814	5.86	36.0
100									
180									
Ø	7.63	0.824	6.29	34.4	7.95	7.46	0.819	6.11	35.0
56	8.03	0.824	6.62	34.0	7.98	7.36	0.819	6.03	34.5
100	7.94	0.824	6.54	34.0	7.98	7.36	0.819	6.03	34.5
180	7.94	0.824	6.54	33.9	8.00	7.49	0.824	6.17	34.0
320	7.94	0.829	6.58	33.3	8.01	7.65	0.824	6.30	34.2
Initials	SZ	SZ	SZ	SZ	SZ	SZ	SZ	SZ	SZ

Quality Assurance	DO 100%	Salinity (ppt)
	100.0	~~35~~ ppt
	—	—
Initials	102.7	35.4
	SZ	SZ
Temp: 19.8		

	pH 7.00	DO 100%	Salinity (ppt)
	7.00		
	—		
	7.02		
Initials	SZ		
Slope: 98.0	Temp:		

Marine Pollution Studies Laboratory
Water Quality
***A. affinis* Chronic 7-day**

Project: Dispersant Topsmelt RF
Lot #: AA12319
Toxicant: Water

Start Date/Time: 12/16/19
End Date/Time: 12/23/19
WQ Meter ID: A2

Day 6
Date: 12/22/19 Temp:

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø									
5.6									
10									
18									
32									
56									
100									
180									
Ø									
56									
100									
180									
320									
Initials									

Cu RT

Quality Assurance	DO 100%	Salinity (ppt)
Initials		
	Temp:	

	pH 7.00	DO 100%	Salinity (ppt)
Initials			
	Slope:	Temp:	

Day 7
Date: 12/23/19 Temp: 19.7

Sample	Old					
	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt) √J	Ammonia (mg/L NH3)
Ø	8.08	8.25	0.819	6.72	~~37.5~~ 36.2	-0.5 UR
5.6	8.11	7.91	0.819	6.44	~~34.4~~ 36.2	0.5
10	8.11	7.91	0.810	6.41	36.7	-0.8 UR
18	8.08	7.69	0.810	6.23	36.7	-1.8 UR
32	8.08	7.71	0.814	6.28	36.2	-1.5 UR
56	8.03	7.02	0.810	5.69	37.5	-1.9 UR
100						0.2
180						0.3
Ø	8.06	7.29	0.819	5.97	35.2	-1.5 UR
56	8.06	7.39	0.819	6.05	34.7	-1.4 UR
100	8.06	7.53	0.819	6.17	34.9	-1.1 UR
180	8.09	7.60	0.819	6.22	34.6	-1.4 UR
320	8.09	7.61	0.819	6.23	34.7	-1.6 UR
Initials	SZ	SZ	SZ	SZ	SZ	SZ

Cu RT

> LM, Day 2 - NH_3 Standard: 10.4, 9.0 mg
other QA - See Day 2

Quality Assurance	pH 7.00	DO 100%	Salinity (ppt)	Ammonia 10 mg/L
	6.98	99.8	35.0	10.2
	—	—	—	—
	7.02	99.7	35.8	9.1
Initials	SZ	SZ	SZ	SZ
	Slope: 97.6	Temp: 16.3		

Sal. on test high, JJ w/ Refractometer
Test not RN on 12/22/19

Marine Pollution Studies Laboratory
Water Quality Data Sheet

***A. affinis* Daily Log**

Project: Dispersant Topsmelt RF — Start Date/Time: 12/16/19
Sample Type: water — End Date/Time: 12/23/19
WQ Meter ID: A2 — Species Lot #: AA 12 13 19

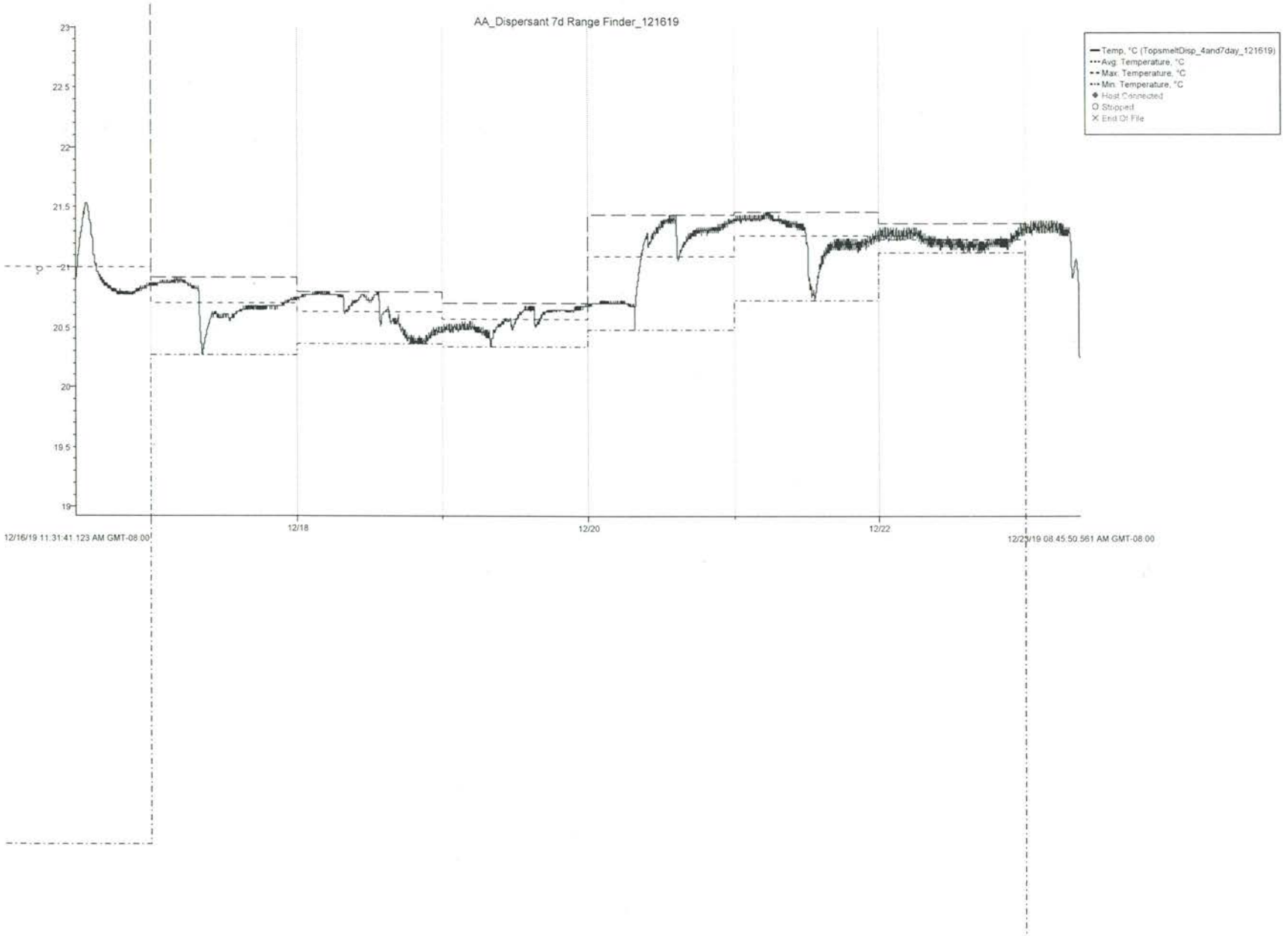
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Start temp logger	✓							
Temperature Test	20.6	19.1	21.0	19.9	20.9	20.7		19.7
Temperature Ref Tox	21.8*	19.9	20.8	19.9	20.9	20.5		20.9
Feed 40 naups/mysid AM		✓	✓	✓	✓	✓		
Renew Test/Ref Tox		✓	✓	✓	✓	✓		
Measure Test WQ	✓	✓	✓	✓	✓	✓		
Feed 40 naups/mysid PM	✓	✓	✓	✓	✓	✓		
Initials	ALL	ALL	LM/KF BP	JV	SZ	SZ		

NOTE: DO should be above 4.0 mg/L. If it is not, aerate the entire test at 1 bubble/second.

* ↓ temp

D1: Aeration set up, sample 180 was <4mg/L - KF

Test was not Maintained/counted on day 6.


AA_Dispersant 7d Range Finder_121619
Temp, °C (TopsmeltDisp_4and7day_121619)
Avg. Temperature, °C
Max. Temperature, °C
Min. Temperature, °C
Host Connected
Stopped
End Of File
23
22.5
22
21.5
21
20.5
20
19.5
19
12/18
12/20
12/22
12/16/19 11:31:41.123 AM GMT-08:00
12/22/19 08:45:50.561 AM GMT-08:00

Marine Pollution Studies Laboratory
Culture Log

Atherinops affinis

Lot # AA1213F

Organism Source: ABS
Collection Date: 12/12/19
Arrival Date/Time at MPSL: 12/13/19
Arrival Temperature at MPSL: 17.5
Arrival Salinity at MPSL: 28
Hatch Date: 12/5/19

Date	12/13	12/14	12/15	12/16					
Temp.	18.5	19.1	18.6	18.5					
Salinity	30	31	32	32					
Water flow	—	—	—	—					
Aeration	Y	Y	Y	Y					
Organism Health	E	E	E	E					
Feeding	naups	naups	naups	naups					
Initials	JV	RP	KF	JV					
Notes	RN 50%	SOME DEAD	RN 50%	RN 50% ↑temp					

Temperature: Measured value (make note if it is adjusted up/down).
Salinity: Measured value
Water flow: yes/no
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 12/12/2019

SPECIES: *Atherinops affinis*

AGE: 7 day

LIFE STAGE: Larvae

HATCH DATE: 12/5/2019

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	18°C	18-21°C
SALINITY/CONDUCTIVITY:	32 ppt	28-32 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	150 mg/l	140-195 mg/l
pH:	7.66	7.61-8.33

Comments:

Facility Supervisor

Dispersant - Atherinops (Topsmelt) 7 Day Definitive - 3/11/19

Concentration	Vial	Replicate	Alive	Start	% Survival	Mean	SD	Tare	Total	Biomass	Mean	SD
0	1	1	5	5	100	100	0.0	0.6780	0.6824	0.880	0.964	0.103
	2	2	5	5	100			0.6784	0.6827	0.860		
	3	3	5	5	100			0.6688	0.6740	1.040		
	4	4	5	5	100			0.6608	0.6663	1.100		
	5	5	5	5	100			0.6728	0.6775	0.940		
5.6	6	1	5	5	100	96	8.9	0.6513	0.6553	0.800	0.896	0.065
	7	2	5	5	100			0.6559	0.6606	0.940		
	8	3	4	5	80			0.7110	0.7153	0.860		
	9	4	5	5	100			0.7124	0.7172	0.960		
	10	5	5	5	100			0.7157	0.7203	0.920		
10	11	1	5	5	100	100	0.0	0.7092	0.7142	1.000	1.020	0.097
	12	2	5	5	100			0.7060	0.7119	1.180		
	13	3	5	5	100			0.6990	0.7036	0.920		
	14	4	5	5	100			0.6984	0.7035	1.020		
	15	5	5	5	100			0.7322	0.7371	0.980		
18	16	1	5	5	100	96	8.9	0.7209	0.7267	1.160	0.960	0.136
	17	2	5	5	100			0.7237	0.7281	0.880		
	18	3	4	5	80			0.7120	0.7162	0.840		
	19	4	5	5	100			0.7108	0.7160	1.040		
	20	5	5	5	100			0.7096	0.7140	0.880		
32	21	1	5	5	100	96	8.9	0.7149	0.7191	0.840	0.916	0.119
	22	2	4	5	80			0.7139	0.7178	0.780		
	23	3	5	5	100			0.7001	0.7045	0.880		
	24	4	5	5	100			0.7159	0.7212	1.060		
	25	5	5	5	100			0.7123	0.7174	1.020		
56	26	1	4	5	80	72	11.0	0.6881	0.6924	0.860	0.840	0.156
	27	2	3	5	60			0.7130	0.7159	0.580		
	28	3	4	5	80			0.7019	0.7067	0.960		
	29	4	3	5	60			0.6833	0.6875	0.840		
	30	5	4	5	80			0.7054	0.7102	0.960		
100	31	1	0	5	0	0	0.0					
	32	2	0	5	0							
	33	3	0	5	0							
	34	4	0	5	0							
	35	5	0	5	0							

Dispersant - *Atherinops* (Topsmelt) 7 Day Definitive - Daily Counts - ~~3/20/20~~ 3/11/20

Concentration	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	5	5	5	1.00	1.00	0.00
	2	2	5	5	5	5	5	5	5	5	1.00		
	3	3	5	5	5	5	5	5	5	5	1.00		
	4	4	5	5	5	5	5	5	5	5	1.00		
	5	5	5	5	5	5	5	5	5	5	1.00		
5.6	6	1	5	5	5	5	5	5	5	5	1.00	0.96	0.09
	7	2	5	5	5	5	5	5	5	5	1.00		
	8	3	5	5	4	4	4	4	4	4	0.80		
	9	4	5	5	5	5	5	5	5	5	1.00		
	10	5	5	5	5	5	5	5	5	5	1.00		
10	11	1	5	5	5	5	5	5	5	5	1.00	1.00	0.00
	12	2	5	5	5	5	5	5	5	5	1.00		
	13	3	5	5	5	5	5	5	5	5	1.00		
	14	4	5	5	5	5	5	5	5	5	1.00		
	15	5	5	5	5	5	5	5	5	5	1.00		
18	16	1	5	5	5	5	5	5	5	5	1.00	0.96	0.09
	17	2	5	5	5	5	5	5	5	5	1.00		
	18	3	5	5	5	5	5	5	4	4	0.80		
	19	4	5	5	5	5	5	5	5	5	1.00		
	20	5	5	5	5	5	5	5	5	5	1.00		
32	21	1	5	5	5	5	5	5	5	5	1.00	0.96	0.09
	22	2	5	5	5	4	4	4	4	4	0.80		
	23	3	5	5	5	5	5	5	5	5	1.00		
	24	4	5	5	5	5	5	5	5	5	1.00		
	25	5	5	5	5	5	5	5	5	5	1.00		
56	26	1	5	5	5	4	4	4	4	4	0.80	0.72	0.11
	27	2	5	5	4	4	4	4	3	3	0.60		
	28	3	5	4	4	4	4	4	4	4	0.80		
	29	4	5	4	3	3	3	3	3	3	0.60		
	30	5	5	4	4	4	4	4	4	4	0.80		
100	31	1	5	0	0	0	0	0	0	0	0.00	0.00	0.00
	32	2	5	0	0	0	0	0	0	0	0.00		
	33	3	5	0	0	0	0	0	0	0	0.00		
	34	4	5	0	0	0	0	0	0	0	0.00		
	35	5	5	0	0	0	0	0	0	0	0.00		

Marine Pollution Studies Laboratory

Data Sheet for Topsmelt Chronic Toxicity Test

Project: Dispersant AADEF

Sample Type: Water

Balance #: 1

Start Date/Time: 3/11/20

End Date/Time: 3/18/20

Species Lot #: AA031020

Container Number	Number at Start	Number Alive	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of fish	Notes
1	5	5	LM	1	0.6780	0.6824	5	
2		5			0.6784	0.6827	5	
3		5			0.6688	0.6740	5	
4		5			0.6608	0.6663	5	
5		5			0.6728	0.6775	5	
6		5			0.6513	0.6553	5	
7		5			0.6559	0.6606	5	
8		4			0.7110	0.7153	4	
9		5			0.7124	0.7172	5	
10		5			0.7157	0.7203	5	
11		5			0.7092	0.7142	5	
12		5			0.7060	0.7119	5	
13		5			0.6990	0.7036	5	
14		5			0.6984	0.7035	5	
15		5			0.7322	0.7371	5	
16		5			0.7209	0.7267	5	
17		5			0.7237	0.7281	5	
18		4			0.7120	0.7162	4	
19		5			0.7108	0.7160	5	
20		5			0.7096	0.7140	5	
21		5			0.7149	0.7191	5	
22		4			0.7139	0.7178	4	
23		5			0.7001	0.7045	5	
24		5			0.7159	0.7212	5	
25		5			0.7123	0.7174	5	
26		4			0.6881	0.6925	4	
27		3			0.7130	0.7159	3	
28		4			0.7019	0.7067	4	
29		3			0.6833	0.6875	3	
30		4			0.7054	0.7102	4	
31		0			0.6872			
32		0			0.6673			
33		0			0.6839			
34		0			0.6607			
35		0		35	0.6567			
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
Initials	JV	LM			LM	JV	JV	

	Tare weight	Total weight	# fish
Baseline 1			
Baseline 2			
Baseline 3			
Baseline 4			
Baseline 5			

Marine Pollution Studies Laboratory

Topsmelt 7-day Chronic Toxicity Test

Feeding: 40 Artemia nauplii per fish, 2x daily

Project: Disp. AA DEF **Start Date/Time:** 3/11/20

~~**Water Batch #:**~~ _____ **End Date/Time:** 3/18/20

Lot #: AA031020

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
1	Ø	5	5	5	5	5	5	5	5	
2			5	5	5	5	5	5	5	
3			5	5	5	5	5	5	5	
4			5	5	5	5	5	5	5	
5			5	5	5	5	5	5	5	
6	5.6		5	5	5	5	5	5	5	
7			5	5	5	5	5	5	5	
8			5	4	4	4	4	4	4	
9			5	5	5	5	5	5	5	
10			5	5	5	5	5	5	5	
11	10		5	5	5	5	5	5	5	
12			5	5	5	5	5	5	5	
13			5	5	5	5	5	5	5	
14			5	5	5	5	5	5	5	
15			5	5	5	5	5	5	5	
16	18		5	5	5	5	5	5	5	
17			5	5	5	5	5	5	5	
18			5	5	5	5	5	4	4	
19			5	5	5	5	5	5	5	
20			5	5	5	5	5	5	5	
21	32		5	5	5	5	5	5	5	
22			5	5	4*	4	4	4	4	*high + dry
23			5	5	5	5	5	5	5	
24			5	5	5	5	5	5	5	
25			5	5	5	5	5	5	5	
26	56		5	5	4	4	4	4	4	
27			5	4	4	4	4	3	3	
28			4	4	4	4	4	4	4	
29			4	3	3	3	3	3	3	
30			4	4	4	4	4	4	4	
31	100		Ø							
32			Ø							
33			Ø							
34			Ø							
35		5	Ø							
36										
37										
38										
39										
40										
Initials	JV	JV	JV	JV	JV	KS	JV	JV	LM	

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	16-5400-0763	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 16:43	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	17-1917-8007	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	11 Mar-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	18 Mar-20	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	16-1857-3475	**Code:**	607978A3	**Project:**	Dispersant
Sample Date:	10 Apr-20 12:46	**Material:**	Corexit	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 12:46	**CAS (PC):**		**Station:**	
Sample Age:	n/a	**Client:**			

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	32	56	42.33		12.41%

Steel Many-One Rank Sum Test

Control vs	Conc-uL/L	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	5.6	25	16	1	8	CDF	0.6353	Non-Significant Effect
	10	27.5	16	1	8	CDF	0.8333	Non-Significant Effect
	18	25	16	1	8	CDF	0.6353	Non-Significant Effect
	32	25	16	1	8	CDF	0.6353	Non-Significant Effect
	56*	15	16	0	8	CDF	0.0191	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria
PMSD	0.1241	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.383594	0.0767187	5	9.455	4.4E-05	Significant Effect
Error	0.194746	0.0081144	24			
Total	0.57834		29			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.7482	0.9031	8.5E-06	Non-Normal Distribution

7d Survival Rate Summary

Conc-uL/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
5.6		5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	4.00%
10		5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
18		5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	4.00%
32		5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	4.00%
56		5	0.7200	0.5840	0.8560	0.8000	0.6000	0.8000	0.0490	15.21%	28.00%
100		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Angular (Corrected) Transformed Summary

Conc-uL/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
5.6		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%
10		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
18		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%
32		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%
56		5	1.019	0.8684	1.169	1.107	0.8861	1.107	0.05415	11.89%	24.27%
100		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.00%	83.24%

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID: 16-5400-0763 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.6
Analyzed: 10 Apr-20 16:43 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

7d Survival Rate Detail

Conc-uL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	1.0000
5.6		1.0000	1.0000	0.8000	1.0000	1.0000
10		1.0000	1.0000	1.0000	1.0000	1.0000
18		1.0000	1.0000	0.8000	1.0000	1.0000
32		1.0000	0.8000	1.0000	1.0000	1.0000
56		0.8000	0.6000	0.8000	0.6000	0.8000
100		0.0000	0.0000	0.0000	0.0000	0.0000

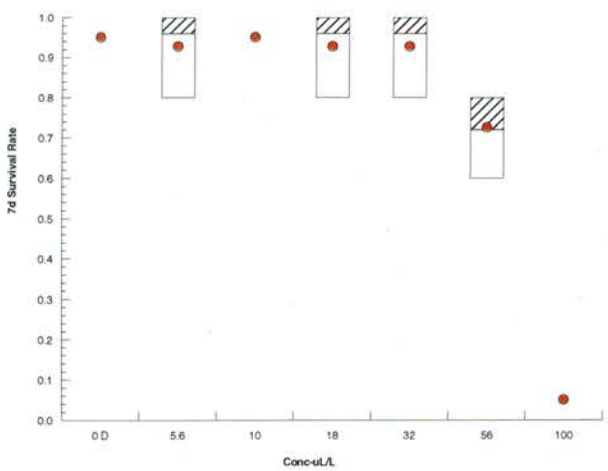
Angular (Corrected) Transformed Detail

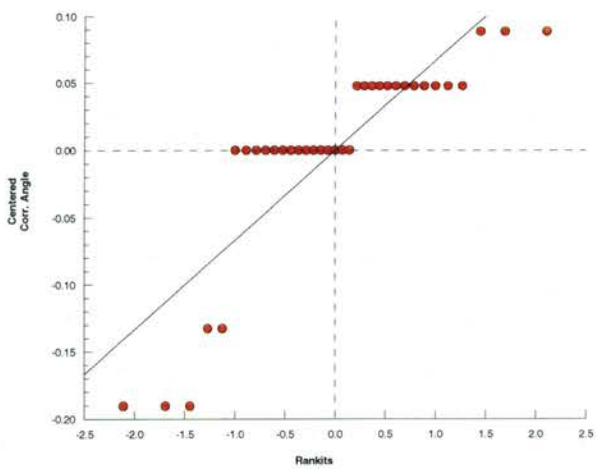
Conc-uL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.345	1.345	1.345	1.345	1.345
5.6		1.345	1.345	1.107	1.345	1.345
10		1.345	1.345	1.345	1.345	1.345
18		1.345	1.345	1.107	1.345	1.345
32		1.345	1.107	1.345	1.345	1.345
56		1.107	0.8861	1.107	0.8861	1.107
100		0.2255	0.2255	0.2255	0.2255	0.2255

7d Survival Rate Binomials

Conc-uL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	5/5	5/5	5/5	5/5	5/5
5.6		5/5	5/5	4/5	5/5	5/5
10		5/5	5/5	5/5	5/5	5/5
18		5/5	5/5	4/5	5/5	5/5
32		5/5	4/5	5/5	5/5	5/5
56		4/5	3/5	4/5	3/5	4/5
100		0/5	0/5	0/5	0/5	0/5

Graphics





CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	19-4493-5245	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 16:43	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	17-1917-8007	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	11 Mar-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	18 Mar-20	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	16-1857-3475	**Code:**	607978A3	**Project:**	Dispersant
Sample Date:	10 Apr-20 12:46	**Material:**	Corexit	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 12:46	**CAS (PC):**		**Station:**	
Sample Age:	n/a	**Client:**			

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0	2.00%	1.794136	0.027508	62.25	54.84	70.66

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-uL/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	D	5	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	25/25	1	0.0%
5.6		5	0.9600	0.8000	1.0000	0.0894	9.32%	4.0%	24/25	0.98	2.0%
10		5	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	25/25	0.98	2.0%
18		5	0.9600	0.8000	1.0000	0.0894	9.32%	4.0%	24/25	0.96	4.0%
32		5	0.9600	0.8000	1.0000	0.0894	9.32%	4.0%	24/25	0.96	4.0%
56		5	0.7200	0.6000	0.8000	0.1095	15.21%	28.0%	18/25	0.72	28.0%
100		5	0.0000	0.0000	0.0000	0.0000		100.0%	0/25	0	100.0%

7d Survival Rate Detail

Conc-uL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	1.0000
5.6		1.0000	1.0000	0.8000	1.0000	1.0000
10		1.0000	1.0000	1.0000	1.0000	1.0000
18		1.0000	1.0000	0.8000	1.0000	1.0000
32		1.0000	0.8000	1.0000	1.0000	1.0000
56		0.8000	0.6000	0.8000	0.6000	0.8000
100		0.0000	0.0000	0.0000	0.0000	0.0000

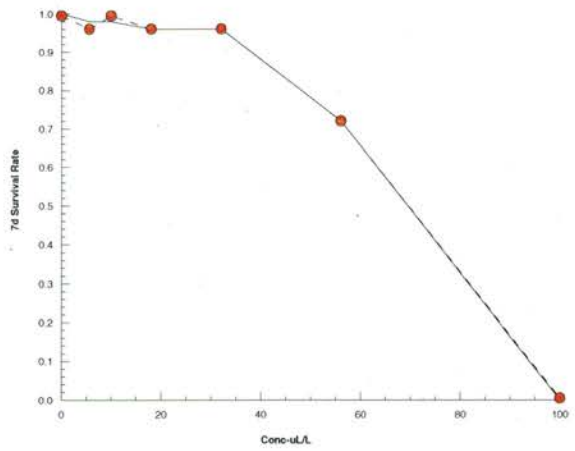
7d Survival Rate Binomials

Conc-uL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	5/5	5/5	5/5	5/5	5/5
5.6		5/5	5/5	4/5	5/5	5/5
10		5/5	5/5	5/5	5/5	5/5
18		5/5	5/5	4/5	5/5	5/5
32		5/5	4/5	5/5	5/5	5/5
56		4/5	3/5	4/5	3/5	4/5
100		0/5	0/5	0/5	0/5	0/5

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	19-4493-5245	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 16:43	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1

Graphics



Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	13-2351-1172	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	16 Apr-20 14:34	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	10-0953-8090	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	11 Mar-20	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	18 Mar-20	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	
Sample ID:	16-0772-2159	**Code:**	5FD3E4AF	**Client:**	
Sample Date:	16 Apr-20 14:23	**Material:**	Corexit	**Project:**	
Receive Date:	16 Apr-20 14:23	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	NA	C > T	NA	NA	56	>56	NA		18.0%

Dunnett Multiple Comparison Test

Control	vs	C-uL/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		5.6	0.92	2.4	0.0002	8	0.4541	CDF	Non-Significant Effect
		10	-0.76	2.4	0.0002	8	0.9683	CDF	Non-Significant Effect
		18	0.054	2.4	0.0002	8	0.8168	CDF	Non-Significant Effect
		32	0.65	2.4	0.0002	8	0.5788	CDF	Non-Significant Effect
		56	1.7	2.4	0.0002	8	0.1692	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	9.782465E-08	1.956493E-08	5	1.4	0.2445	Non-Significant Effect
Error	3.249668E-07	1.354028E-08	24			
Total	4.227914E-07		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3	15	0.7054	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.97	0.9	0.6637	Normal Distribution

Mean Dry Biomass-mg Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.00096	0.00084	0.0011	0.00094	0.00086	0.0011	0.000046	11.0%	0.0%
5.6		5	0.0009	0.00081	0.00098	0.00092	0.0008	0.00096	0.000029	7.3%	7.1%
10		5	0.001	0.0009	0.0011	0.001	0.00092	0.0012	0.000043	9.5%	-5.8%
18		5	0.00096	0.00079	0.0011	0.00088	0.00084	0.0012	0.000061	14.0%	0.42%
32		5	0.00092	0.00077	0.0011	0.00088	0.00078	0.0011	0.000053	13.0%	5.0%
56		5	0.00084	0.00065	0.001	0.00086	0.00058	0.00096	0.00007	19.0%	13.0%

Mean Dry Biomass-mg Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water					
5.6						
10						
18						
32						
56						

Pacific Topsmelt 7-d Survival and Growth Test					Granite Canyon
Analysis ID:	13-2351-1172	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	16 Apr-20 14:34	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Dispersant - *Atherinops* (Topsmelt) 7 Day Definitive - Ref Tox - ~~3/20/20~~ 3/11/20 LM

Concentration (CuCl2)	Beaker	Rep	Alive	Initial	Prop.	Mean	SD	Tare (g)	Total (g)	Biomass (mg)	Mean	SD
0	1	1	5	5	1.00	0.96	0.09	0.6631	0.6681	1.000	0.92	0.08
	2	2	4	5	0.80			0.6541	0.6581	0.800		
	3	3	5	5	1.00			0.7233	0.7281	0.960		
	4	4	5	5	1.00			0.7211	0.7257	0.920		
	5	5	5	5	1.00			0.7192	0.7239	0.940		
56	6	1	5	5	1.00	1.00	0.00	0.7282	0.7329	0.940	0.97	0.08
	7	2	5	5	1.00			0.7152	0.7201	0.980		
	8	3	5	5	1.00			0.7232	0.7277	0.900		
	9	4	5	5	1.00			0.7179	0.7225	0.920		
	10	5	5	5	1.00			0.7034	0.7089	1.100		
100	11	1	4	5	0.80	0.88	0.18	0.7132	0.7185	1.060	0.98	0.05
	12	2	5	5	1.00			0.7143	0.7193	1.000		
	13	3	3	5	0.60			0.7126	0.7173	0.940		
	14	4	5	5	1.00			0.7193	0.7240	0.940		
	15	5	5	5	1.00			0.7164	0.7211	0.940		
180	16	1	4	5	0.80	0.76	0.09	0.7096	0.7140	0.880	0.83	0.21
	17	2	4	5	0.80			0.7273	0.7313	0.800		
	18	3	4	5	0.80			0.6878	0.6936	1.160		
	19	4	3	5	0.60			0.7027	0.7056	0.580		
	20	5	4	5	0.80			0.7014	0.7051	0.740		
320	21	1	1	5	0.20	0.16	0.09	0.6925	0.6936	0.220	0.20	0.04
	22	2	1	5	0.20			0.7094	0.7105	0.220		
	23	3	1	5	0.20			0.7158	0.7165	0.140		
	24	4	0	5	0.00			-	-	-		
	25	5	1	5	0.20			0.6884	0.6894	0.200		

CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	13-6803-5429	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	16 Apr-20 14:35	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	10-0953-8090	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	
Start Date:	11 Mar-20	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	
Ending Date:	18 Mar-20	**Species:**	Atherinops affinis	**Brine:**	
Duration:	7d 0h	**Source:**		**Age:**	

Sample ID:	16-0772-2159	**Code:**	5FD3E4AF	**Client:**	
Sample Date:	16 Apr-20 14:23	**Material:**	Corexit	**Project:**	
Receive Date:	16 Apr-20 14:23	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	501518	200	Yes	Two-Point Interpolation

Point Estimates

Level	uL/L	95% LCL	95% UCL
IC5	32	N/A	N/A
IC10	46	0.43	N/A
IC15	>56	N/A	N/A
IC20	>56	N/A	N/A
IC25	>56	N/A	N/A
IC40	>56	N/A	N/A
IC50	>56	N/A	N/A

Mean Dry Biomass-mg Summary

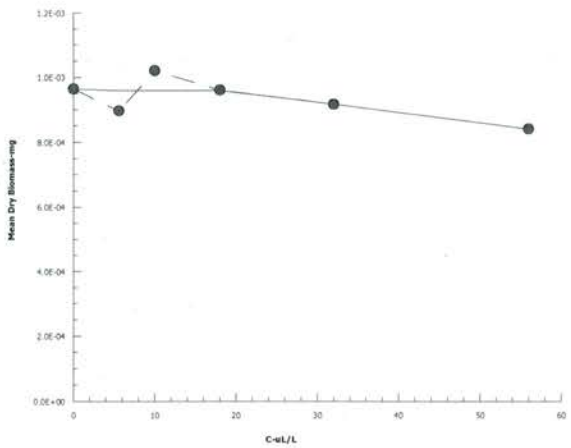
			Calculated Variate						
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	5	0.00096	0.00086	0.0011	0.000046	0.0001	11.0%	0.0%
5.6		5	0.0009	0.0008	0.00096	0.000029	0.000065	7.3%	7.1%
10		5	0.001	0.00092	0.0012	0.000043	0.000097	9.5%	-5.8%
18		5	0.00096	0.00084	0.0012	0.000061	0.00014	14.0%	0.42%
32		5	0.00092	0.00078	0.0011	0.000053	0.00012	13.0%	5.0%
56		5	0.00084	0.00058	0.00096	0.00007	0.00016	19.0%	13.0%

Mean Dry Biomass-mg Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.00088	0.00086	0.001	0.0011	0.00094
5.6		0.0008	0.00094	0.00086	0.00096	0.00092
10		0.001	0.0012	0.00092	0.001	0.00098
18		0.0012	0.00088	0.00084	0.001	0.00088
32		0.00084	0.00078	0.00088	0.0011	0.001
56		0.00086	0.00058	0.00096	0.00084	0.00096

Pacific Topsmelt 7-d Survival and Growth Test					Granite Canyon
Analysis ID:	13-6803-5429	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.4
Analyzed:	16 Apr-20 14:35	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



3/11/20

Dispersant - *Atherinops* (Topsmelt) 7 Day Definitive - Ref Tox Daily Counts ~~3/20/20~~ IM

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Prop Alive	Mean	SD
0	1	1	5	5	5	5	5	5	5	5	1.00	0.96	0.09
	2	2	5	4	4	4	4	4	4	4	0.80		
	3	3	5	5	5	5	5	5	5	5	1.00		
	4	4	5	5	5	5	5	5	5	5	1.00		
	5	5	5	5	5	5	5	5	5	5	1.00		
56	6	1	5	5	5	5	5	5	5	5	1.00	1.00	0.00
	7	2	5	5	5	5	5	5	5	5	1.00		
	8	3	5	5	5	5	5	5	5	5	1.00		
	9	4	5	5	5	5	5	5	5	5	1.00		
	10	5	5	5	5	5	5	5	5	5	1.00		
100	11	1	5	5	5	5	5	4	4	4	0.80	0.88	0.18
	12	2	5	5	5	5	5	5	5	5	1.00		
	13	3	5	5	3	3	3	3	3	3	0.60		
	14	4	5	5	5	5	5	5	5	5	1.00		
	15	5	5	5	5	5	5	5	5	5	1.00		
180	16	1	5	4	4	4	4	4	4	4	0.80	0.76	0.09
	17	2	5	4	4	4	4	4	4	4	0.80		
	18	3	5	5	5	5	5	5	4	4	0.80		
	19	4	5	4	3	3	3	3	3	3	0.60		
	20	5	5	5	5	5	5	4	4	4	0.80		
320	21	1	5	2	1	1	1	1	1	1	0.20	0.16	0.09
	22	2	5	1	1	1	1	1	1	1	0.20		
	23	3	5	3	2	2	2	2	1	1	0.20		
	24	4	5	2	1	1	1	0	0	0	0.00		
	25	5	5	2	2	2	2	1	1	1	0.20		

Marine Pollution Studies Laboratory

Data Sheet for Topsmelt Chronic Toxicity Test

Project: Dispersant AA DEF

Sample Type: Water

Balance #: 1

Start Date/Time: 3/11/20

End Date/Time: 3/18/20

Species Lot #: AA031020

Ref Tox

Container Number	Number at Start	Number Alive	Initials	Pan Number	Tare Weight (g)	Total Weight (g)	Number of fish	Notes
1	5	5	LM	1	0.6631	0.6681	5	
2	1	4	1	1	0.6541	0.6581	4	
3	1	5	1	1	0.7233	0.7281	5	
4	1	5	1	1	0.7211	0.7257	5	
5	1	5	1	1	0.7192	0.7239	5	
6	1	5	1	1	0.7282	0.7329	5	
7	1	5	1	1	0.7152	0.7201	5	
8	1	5	1	1	0.7232	0.7277	5	
9	1	5	1	1	0.7179	0.7225	5	
10	1	5	1	1	0.7034	0.7089	5	
11	1	4	1	1	0.7132	0.7185	4	
12	1	5	1	1	0.7143	0.7193	5	
13	1	3	1	1	0.7126	0.7173	3	
14	1	5	1	1	0.7193	0.7240	5	
15	1	5	1	1	0.7164	0.7211	5	
16	1	4	1	1	0.7096	0.7140	4	
17	1	4	1	1	0.7273	0.7313	4	
18	1	4	1	1	0.6878	0.6936	4	
19	1	3	1	1	0.7027	0.7060	3	
20	1	4	1	1	0.7014	0.7051	4	
21	1	1	1	1	0.6925	0.6936	1	
22	1	1	1	1	0.7094	0.7105	1	
23	1	1	1	1	0.7158	0.7165	1	
24	1	0	1	1	0.6927			
25	1	1	1	25	0.6884	0.6894	1	
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
Initials	JV	LM			LM	JV	JV	

	Tare weight	Total weight	# fish
Baseline 1			
Baseline 2			
Baseline 3			
Baseline 4			
Baseline 5			

Ref Tox

Marine Pollution Studies Laboratory

Topsmelt 7-day Chronic Toxicity Test

Feeding: 40 Artemia nauplii per fish, 2x daily

Project: Disp. AA DEF **Start Date/Time:** 3/11/20

~~**Water Batch #:**~~ _____ **End Date/Time:** 3/18/20

Ref Tox

Lot #: AA031020 Lot# 1672

Cont.#	Station Name	Number at Start	Number Alive							Notes
			Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
1	Ø	5	5	5	5	5	5	5	5	
2			4	4	4	4	4	4	4	
3			5	5	5	5	5	5	5	
4			5	5	5	5	5	5	5	
5			5	5	5	5	5	5	5	
6	56		5	5	5	5	5	5	5	
7			5	5	5	5	5	5	5	
8			5	5	5	5	5	5	5	
9			5	5	5	5	5	5	5	
10			5	5	5	5	5	5	5	
11	100		5	5	5	5	4	4	4	
12			5	5	5	5	5	5	5	
13			5	3	3	3	3	3	3	
14			5	5	5	5	5	5	5	
15			5	5	5	5	5	5	5	
16	180		~~4~~	4	4	4	4	4	4	
17			4	4	4	4	4	4	4	
18			5	5	5	5	5	4	4	
19			4	3	3	3	3	3	3	
20			5	5	5	5	4	4	4	
21	320		2	1	1	1	1	1	1	
22			1	1	1	1	1	1	1	
23			3	2	2	2	2	1	1	
24			2	1	1	1	Ø	—	—	
25		5	2	2	2	2	1	1	1	
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
Initials	JV	JV	JV	JV	JV	KS	JV	JV	JM	

Ref Tox

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	21-4548-4956	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:40	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	03-0584-3861	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	11 Mar-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	18 Mar-20	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	05-5034-8181	**Code:**	20CDA595	**Project:**	Dispersant
Sample Date:	10 Apr-20 12:36	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 12:36	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	180	134.2		15.68%

Steel Many-One Rank Sum Test

Control vs	Conc-ug/L	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	56	30	17	1	8	CDF	0.9275	Non-Significant Effect
	100	24.5	17	2	8	CDF	0.5435	Non-Significant Effect
	180*	17	17	1	8	CDF	0.0463	Significant Effect
	320*	15	17	0	8	CDF	0.0158	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.96	0.8	>>	Yes	Passes Criteria
PMSD	0.1568	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.86847	0.717116	4	47.78	<1.0E-37	Significant Effect
Error	0.300152	0.0150076	20			
Total	3.16862		24			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.7994	0.8877	2.2E-04	Non-Normal Distribution

7d Survival Rate Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	0.00%
56		5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	-4.17%
100		5	0.8800	0.6579	1.0000	1.0000	0.6000	1.0000	0.0800	20.33%	8.33%
180		5	0.7600	0.6489	0.8711	0.8000	0.6000	0.8000	0.0400	11.77%	20.83%
320		5	0.1600	0.0489	0.2711	0.2000	0.0000	0.2000	0.0400	55.90%	83.33%

Angular (Corrected) Transformed Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.00%
56		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	-3.67%
100		5	1.206	0.9496	1.462	1.345	0.8861	1.345	0.09228	17.11%	7.08%
180		5	1.063	0.9402	1.186	1.107	0.8861	1.107	0.04421	9.30%	18.09%
320		5	0.416	0.2838	0.5483	0.4636	0.2255	0.4636	0.04763	25.60%	67.94%

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID: 21-4548-4956 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.9.6
Analyzed: 10 Apr-20 12:40 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

7d Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	0.8000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	1.0000	1.0000
100		0.8000	1.0000	0.6000	1.0000	1.0000
180		0.8000	0.8000	0.8000	0.6000	0.8000
320		0.2000	0.2000	0.2000	0.0000	0.2000

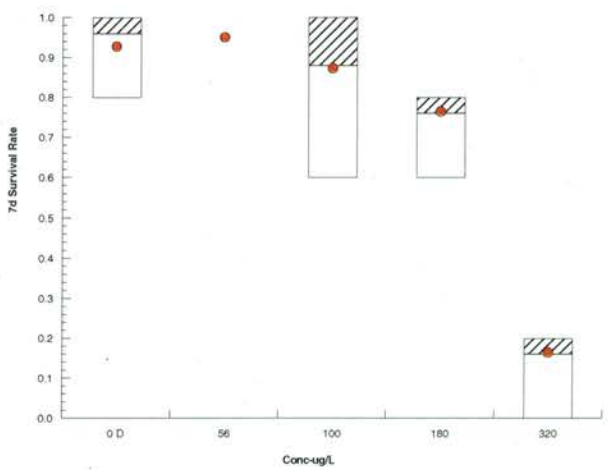
Angular (Corrected) Transformed Detail

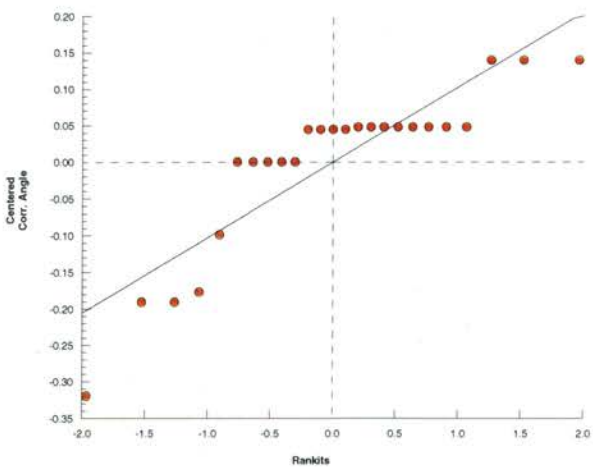
Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.345	1.107	1.345	1.345	1.345
56		1.345	1.345	1.345	1.345	1.345
100		1.107	1.345	0.8861	1.345	1.345
180		1.107	1.107	1.107	0.8861	1.107
320		0.4636	0.4636	0.4636	0.2255	0.4636

7d Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	5/5	4/5	5/5	5/5	5/5
56		5/5	5/5	5/5	5/5	5/5
100		4/5	5/5	3/5	5/5	5/5
180		4/5	4/5	4/5	3/5	4/5
320		1/5	1/5	1/5	0/5	1/5

Graphics





Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	19-8827-7758	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:40	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	03-0584-3861	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	11 Mar-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	18 Mar-20	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	05-5034-8181	**Code:**	20CDA595	**Project:**	Dispersant
Sample Date:	10 Apr-20 12:36	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 12:36	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.04	16.33%	2.363051	0.037932	230.7	193.7	274.7

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.96	0.8	>>	Yes	Passes Criteria

7d Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-ug/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	D	5	0.9600	0.8000	1.0000	0.0894	9.32%	0.0%	24/25	0.98	0.0%
56		5	1.0000	1.0000	1.0000	0.0000	0.00%	-4.17%	25/25	0.98	0.0%
100		5	0.8800	0.6000	1.0000	0.1789	20.33%	8.33%	22/25	0.88	10.2%
180		5	0.7600	0.6000	0.8000	0.0894	11.77%	20.83%	19/25	0.76	22.45%
320		5	0.1600	0.0000	0.2000	0.0894	55.90%	83.33%	4/25	0.16	83.67%

7d Survival Rate Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	0.8000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	1.0000	1.0000
100		0.8000	1.0000	0.6000	1.0000	1.0000
180		0.8000	0.8000	0.8000	0.6000	0.8000
320		0.2000	0.2000	0.2000	0.0000	0.2000

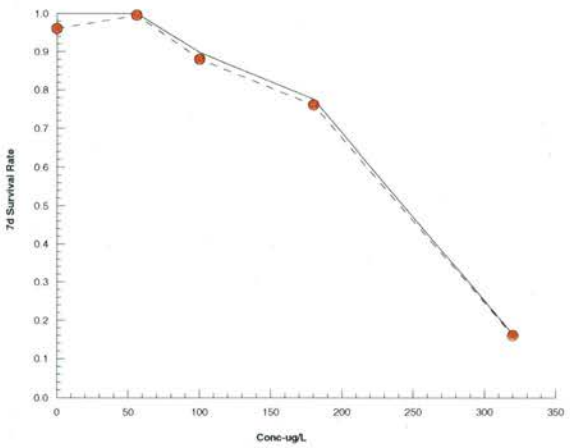
7d Survival Rate Binomials

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	5/5	4/5	5/5	5/5	5/5
56		5/5	5/5	5/5	5/5	5/5
100		4/5	5/5	3/5	5/5	5/5
180		4/5	4/5	4/5	3/5	4/5
320		1/5	1/5	1/5	0/5	1/5

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	19-8827-7758	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:40	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1

Graphics



Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	20-4343-0522	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:41	**Analysis:**	Parametric-Multiple Comparison	**Status Level:**	1
Batch ID:	03-0584-3861	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	11 Mar-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	18 Mar-20	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	05-5034-8181	**Code:**	20CDA595	**Project:**	Dispersant
Sample Date:	10 Apr-20 12:36	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 12:36	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	180	320	240		20.13%

Bonferroni Adj t Test

Control vs	Conc-ug/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	56	-0.6105	2.433	0.0002	8	CDF	1.0000	Non-Significant Effect
	100	-0.7215	2.433	0.0002	8	CDF	1.0000	Non-Significant Effect
	180	1.277	2.433	0.0002	8	CDF	0.4343	Non-Significant Effect
	320*	9.537	2.433	0.0002	7	CDF	<1.0E-37	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.000924	0.85	>>	Yes	Below Criteria
PMSD	0.2013	<<	0.5	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.842E-06	4.605E-07	4	35.46	<1.0E-37	Significant Effect
Error	2.467E-07	1.298E-08	19			
Total	2.089E-06		23			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	12.46	13.28	0.0143	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.8915	0.884	0.0143	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-ug/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.000924	0.000830	0.001018	0.00094	0.0008	0.001	3.37E-05	8.16%	0.00%
56		5	0.000968	0.000869	0.001067	0.00094	0.0009	0.0011	3.56E-05	8.21%	-4.76%
100		5	0.000976	0.000909	0.001043	0.00094	0.00094	0.00106	0.000024	5.50%	-5.63%
180		5	0.000832	0.000567	0.001097	0.0008	0.00058	0.00116	9.56E-05	25.70%	9.96%
320		4	0.000195	0.000135	0.000255	0.00021	0.00014	0.00022	1.89E-05	19.42%	78.90%

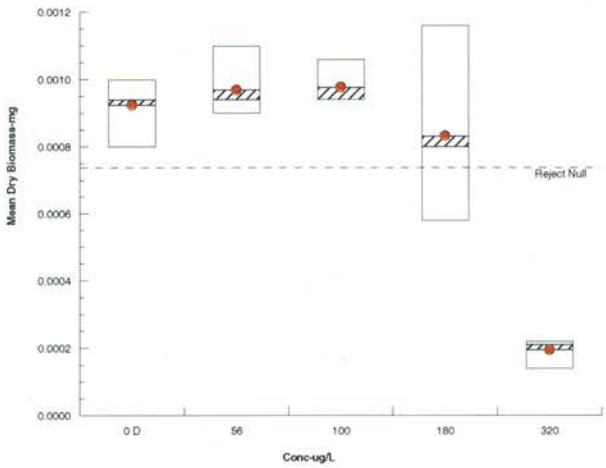
Mean Dry Biomass-mg Detail

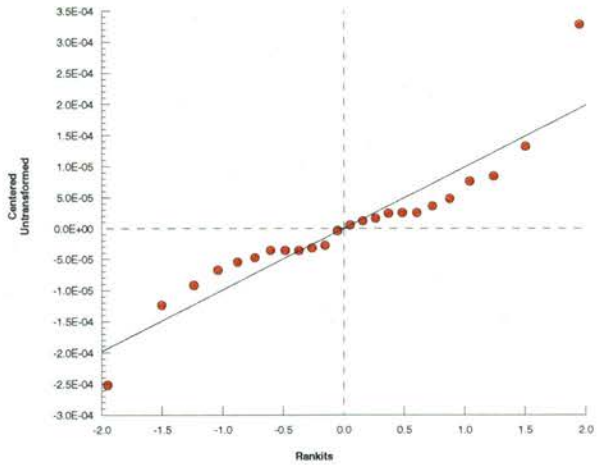
Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.001	0.0008	0.00096	0.00092	0.00094
56		0.00094	0.00098	0.0009	0.00092	0.0011
100		0.00106	0.001	0.00094	0.00094	0.00094
180		0.00088	0.0008	0.00116	0.00058	0.00074
320		0.00022	0.00022	0.00014	0.0002	

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	20-4343-0522	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:41	**Analysis:**	Parametric-Multiple Comparison	**Status Level:**	1

Graphics





CETIS Analytical Report

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	10-2723-7659	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:41	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1
Batch ID:	03-0584-3861	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	11 Mar-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	18 Mar-20	**Species:**	Atherinops affinis	**Brine:**	
Test Length:	7d 0h	**Taxon:**	Actinopterygii	**Source:**	**Age:**
Sample ID:	05-5034-8181	**Code:**	20CDA595	**Project:**	Dispersant
Sample Date:	10 Apr-20 12:36	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 12:36	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1327060	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.000924	0.85	>>	Yes	Below Criteria

Point Estimates

Level	ug/L	95% LCL	95% UCL
IC5	125.5	99.65	217.2
IC10	157.4	104.3	211.5
IC15	183.2	111.7	209.2
IC20	191.3	129.7	216.2
IC25	199.7	149.6	223.5
IC40	227.4	192.7	247.7
IC50	247.9	218.2	266.1

Mean Dry Biomass-mg Summary

			Calculated Variate						Isotonic Variate	
Conc-ug/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**Mean**	**%Effect**
0	D	5	0.000924	0.0008	0.001	7.54E-05	8.16%	0.0%	0.000956	0.0%
56		5	0.000968	0.0009	0.0011	7.95E-05	8.21%	-4.76%	0.000956	0.0%
100		5	0.000976	0.00094	0.00106	5.37E-05	5.50%	-5.63%	0.000956	0.0%
180		5	0.000832	0.00058	0.00116	0.000214	25.70%	9.96%	0.000832	12.97%
320		4	0.000195	0.00014	0.00022	3.79E-05	19.42%	78.9%	0.000195	79.6%

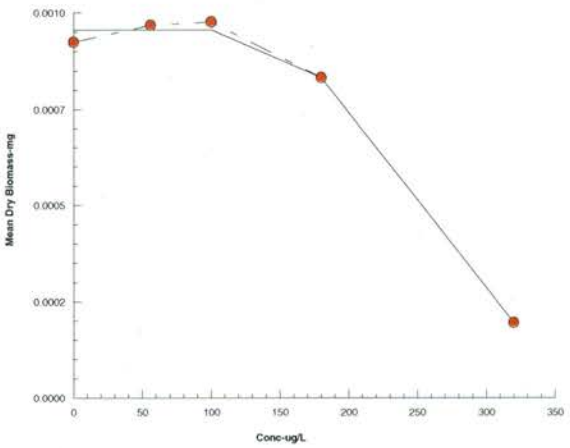
Mean Dry Biomass-mg Detail

Conc-ug/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.001	0.0008	0.00096	0.00092	0.00094
56		0.00094	0.00098	0.0009	0.00092	0.0011
100		0.00106	0.001	0.00094	0.00094	0.00094
180		0.00088	0.0008	0.00116	0.00058	0.00074
320		0.00022	0.00022	0.00014	0.0002	

Pacific Topsmelt 7-d Survival and Growth Test — **Granite Canyon**

Analysis ID:	10-2723-7659	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 12:41	**Analysis:**	Linear Interpolation (ICPIN)	**Status Level:**	1

Graphics



Marine Pollution Studies Laboratory
Water Quality
***A. affinis* Chronic 7-day**

Project: Disp. AA DEF
Lot # AA031020
Toxicant: Water

Start Date/Time: 3/11/20
End Date/Time: 3/18/20
WQ Meter ID: A2

Sample	Day 0 Date: 3/11/20 Temp: 19.2						Day 1 Date: 3/12/20 Temp: 19.4								
							New				Old				
	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity KF (ppt)	Ammonia (mg/L NH3)	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Old pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	7.85	9.00	~~0.824~~	7.37	~~34~~34.5	0.5	8.66	0.824	7.14	34.1	7.99	8.35	0.814	6.80	~~35.7~~
5.6	8.07	8.81	0.819	7.22	34.7		8.65	0.824	7.13	34.2	7.97	8.24	0.814	6.71	35.7
10	8.10	8.69	0.819	7.12	34.7		8.62	0.824	7.10	34.0	7.94	8.20	0.819	6.72	353
18	8.10	8.60	0.819	7.04	34.6		8.66	0.824	7.14	34.1	7.90	7.97	0.819	6.53	35.1
32	8.10	8.52	0.819	6.16	34.7		8.69	0.824	7.16	34.1	7.87	~~7.~~79	0.814	6.34	35.8
56	8.10	KF 8.438	0.819	6.86	34.7		8.90	0.824	7.33	34.0	7.78	7.49	0.814	6.10	36.1
100	8.10	8.35	0.819	6.84	34.6	0.6	—	—	—	—	7.72	6.26	0.814	5.10	36.1
			KF 8.819	7.37 KF											
Ø	7.85	9.00	~~0.824~~	~~34.5~~ KF	34.5	0.5	8.66	0.824	7.14	34.1	7.97	7.10	0.814	5.78	36.1
56	8.10	8.29	0.824	6.83	34.4		8.80	0.824	7.25	33.7	7.97	7.10	0.819	5.81	34.7
100	8.10	8.20	0.824	6.76	34.3		8.77	0.824	7.23	33.7	7.97	7.10	0.819	5.81	34.7
180	8.08	8.14	0.824	6.71	34.0		8.~~8~~2	0.824	7.10	33.4	7.94	7.14	0.824	5.88	34.3
320	8.08	8.14	0.824	6.71	33.5		8.67	0.829	7.19	33.1	7.85	7.20	0.824	5.93	33.9
Initials	KF	KF	KF	KF	KF	KF	JV	JV	JV	JV	JV	JV	JV	JV	JV

Quality Assurance	pH 7.00	DO 100%	Salinity (ppt)	Ammonia 10 mg/L
	6.99	100.4	34.9	9.2
	—	—		10.5
	6.91	93.6	35.5	
Initials	KF	KF	KF	KF
	Slope: 96.0	Temp: 18.7		

DO 100%	Salinity (ppt)
99.7	34.9
92.6	35.3
JV	JV
Temp: 19.9	

Initials

pH 7.00	DO 100%	Salinity (ppt)
7.04		
7.03		
JV		
Slope: 96.6	Temp:	

Initials

Marine Pollution Studies Laboratory
Water Quality
***A. affinis* Chronic 7-day**

Project: Dispersant AA DEF
Lot #: AA031020
Toxicant: Water

Start Date/Time: 3/11/20
End Date/Time: 3/18/20
WQ Meter ID: A2

Day 2 Date: 3/13/20 Temp: 20.0

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	8.61	0.824	7.09	34.4	7.89	8.07	0.814	6.57	35.6
5.6	8.48	0.824	6.99	34.3	7.97	7.93	0.814	6.45	35.5
10	8.48	0.824	6.99	34.2	7.97	7.79	0.819	6.38	34.8
18	8.40	0.824	6.92	34.2	7.94	7.62	0.819	6.24	34.8
32	8.40	0.824	6.92 34.1	~~34.6~~	7.94	7.53	0.819	6.17	35.1
56	8.30	0.824	6.84	34.1	7.92	7.25	0.814	5.90	35.6
100									
Ø	8.61	0.824	7.09	34.4	7.98	7.53	0.814	6.13	36.4
56	8.33	0.824	6.86	33.8	8.01	7.47	0.819	6.12	34.8
100	8.33	0.824	6.86	34.2	8.01	7.47	0.819	6.12	34.9
180	8.26	0.829	6.85	33.4	8.01	7.43	0.824	6.12	34.5
320	8.16	0.829	6.76	33.0	8.01	7.42	0.824	6.11	34.2
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Quality Assurance	DO 100%	Salinity (ppt)
	99.6	34.9
Initials	99.3	35.4
	JV	JV
Temp:	20.5	

	pH 7.00	DO 100%	Salinity (ppt)
	7.04		
Initials	7.01		
	JV		
Slope:	95.6	Temp:	

Day 3 Date: 3/14/20 Temp: 19.7

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	8.61	0.819	7.05	34.7	7.84	8.27	0.810	6.70	36.8
5.6	8.56	0.824	7.05	34.5	7.93	8.25	0.814	6.72	36.0
10	8.54	0.824	7.04	34.5	7.94	8.20	0.819	6.72	35.2
18	8.51	0.819	6.99	34.6	7.92	7.93	0.819	6.49	35.2
32	8.47	0.819	6.94	34.7	7.92	7.81	0.814	6.36	35.6
56	8.46	0.819	6.93	34.7	7.92	7.70	0.810	6.24	36.9
100									
Ø	8.61	0.819	7.05	34.7	7.98	7.89	0.810	6.39	36.7
56	8.50	0.824	7.00	34.2	7.98	7.87	0.819	6.44	35.0
100	8.46	0.824	6.97	34.1	7.98	7.87	0.819	6.44	35.3
180	8.40	0.824	6.92	33.8	7.98	7.87	0.819	6.44	34.8
320	8.33	0.829	6.90	33.3	8.00	~~7.84~~ 7.92	0.824	6.53	34.5
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Quality Assurance	DO 100%	Salinity (ppt)
	100.4	34.9
Initials	96.9	35.3
	JV	JV
Temp:	20.10	

	pH 7.00	DO 100%	Salinity (ppt)
	7.05		
Initials	7.01		
	JV		
Slope:	96.0	Temp:	

Marine Pollution Studies Laboratory
Water Quality
***A.affinis* Chronic 7-day**

Project: Dispersant AA DEF
Lot #: AA031020
Toxicant: Water

Start Date/Time: 3/11/20
End Date/Time: 3/18/20
WQ Meter ID: A2

Day 4
Date: 3/15/20 Temp: 19.4

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	8.89	0.824	7.33	34.0	8.00	8.83	0.814	7.19	36.3
5.6	8.83	0.824	7.28	34.3	8.00	8.81	0.810	7.14	36.6
10	8.72	0.819	7.14	34.5	7.96	8.77	0.814	7.14	35.7
18	8.68	0.819	7.11	34.5	7.93	8.71	0.819	7.13	35.3
32	8.60	0.819	7.04	34.5	7.90	8.69	0.814	7.07	35.5
56	8.59	0.819	7.04	34.5	7.90	8.64	0.814	7.03	36.3
100									
Ø	8.54	0.824	7.04	34.3	7.99	8.70	0.810	7.05	37.0
56	8.33	0.824	6.86	34.2	7.99	8.60	0.819	7.04	35.0
100	8.26	0.824	7.09	34.1	8.02	8.54	0.819	6.99	35.3
180	8.21	0.824	6.77	34.1	8.02	8.49	0.819	6.95	34.6
320	8.09	0.829	6.71	33.4	8.05	8.45	0.824	6.96	34.3
Initials	KS	KS	KS	KS	KS	KS	KS	KS	KS

Quality Assurance	DO 100%	Salinity (ppt)
	100.3	35.0
	92.4	35.3
Initials		
	KS	KS
	Temp: 20.0	

	pH 7.00	DO 100%	Salinity (ppt)
	7.05	100.5	35.0
	6.99	94.6	35.3
Initials			
	KS	KS	KS
	Slope: 95.1	Temp: 19.5	

Day 5
Date: 3/16/20 Temp: 19.4

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	9.01	0.824	7.42	33.9	7.97	8.55	0.814	6.96	36.4
5.6	8.93	0.824	7.36	34.1	7.97	8.41	0.814	6.84	35.9
10	8.87	0.824	7.31	33.9 ~~35.2~~	7.95	8.36	0.819	6.85	35.2
18	8.87	0.824	7.31	34.0	7.95	8.15	0.819	6.67	35.3
32	8.82	0.824	7.27	34.2	7.90	7.96	0.814	6.48	36.2
56	8.82	0.824	7.27	33.9	7.87	7.79	0.814	6.34	36.2
100									
Ø	9.01	0.824	7.42	33.9	7.98	8.01	0.814	6.52	36.4
56	8.78	0.824	7.23	33.6	8.01	8.00	0.819	6.55	34.8
100	8.78	0.824	7.23	33.5	8.01	8.00	0.819	6.55	34.9
180	8.66	0.829	7.18	33.2	7.99	8.00	0.824	6.58	34.5
320	8.66	0.829	7.18	32.7	8.03	8.00	0.824	6.62	34.3
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Quality Assurance	DO 100%	Salinity (ppt)
	99.8	~~34.9~~ 35.1
	92.9	34.8
Initials	JV	JV
	Temp: 18.6	

	pH 7.00	DO 100%	Salinity (ppt)
	7.04		
	7.02		
Initials			
	Slope: 95.4	Temp:	

Marine Pollution Studies Laboratory
Water Quality
***A. affinis* Chronic 7-day**

Project: Dispersant AADEF
Lot #: AA031020
Toxicant: water

Start Date/Time: 3/11/20
End Date/Time: 3/18/20
WQ Meter ID: A2

Day 6
Date: 3/17/20 Temp: 19.8

Sample	New				Old				
	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)
Ø	8.68	0.824	7.15	33.8	7.89	8.10	0.814	6.59	36.2
5.6	8.60	0.824	7.09	33.5	7.95	7.86	0.814	6.40	35.6
10	8.56	0.829	7.10	33.4	7.97	7.63	0.819	6.25	34.9
18	8.50	0.829	7.05	33.3	7.94	7.45	0.819	6.10	35.1
32	8.50	0.829	7.05	33.4	7.90	7.24	0.819	5.93	35.3
56	8.38	0.829	6.95	33.3	7.90	7.08	0.814	5.76	36.2
100									
Ø	8.68	0.824	7.15	33.8	8.01	7.22	0.814	5.88	36.0
56	8.42	0.829	6.98	32.9	8.01	7.29	0.819	5.97	34.8
100	8.42	0.829	6.98	32.9	8.01	7.24	0.819	5.93	35.0
180	8.32	0.829	6.90	32.7	8.01	7.24	0.824	6.60	34.3
320	8.25	0.833	6.87	32.2	8.05	7.34	0.824	6.63	34.2
Initials	JV	JV	JV	JV	JV	JV	JV	JV	JV

Quality Assurance	DO 100%	Salinity (ppt)
	100.0	35.0
Initials	91.8	35.2
	JV	JV
	Temp: 20.0	

	pH 7.00	DO 100%	Salinity (ppt)
	7.03		
Initials	7.01		
	JV		
	Slope: 95.5	Temp:	

Day 7
Date: 3/18/20 Temp: 19.8

Sample	Old					
	pH	Oxygen (0ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)
Ø	7.95	8.99	0.814	7.32	35.9	0.2
5.6	7.95	8.82	0.814	7.18	35.8	0.1
10	7.91	8.57	0.819	7.02	~~35.8~~ 34.8	0.3
18	7.90	8.41	0.819	6.89	34.8	-0.1 UR
32	7.87	8.16	0.819	6.68	34.9	0.0
56	7.86	8.11	0.814	6.60	35.5	-0.2 UR
100						-0.1
Ø	7.98	8.18	0.814	6.66	35.5	1.7
56	7.98	8.25	0.819	6.76	34.5	1.5
100	7.99	8.22	0.819	6.73	35.3	1.5
180	7.99	8.25	0.824	6.80	34.4	1.5
320	8.03	8.29	0.824	6.83	33.8	1.2
Initials	LM	LM	LM	LM	LM	LM

9.6/10.0 3/12/20 JV

Quality Assurance	pH 7.00	DO 100%	Salinity (ppt)	Ammonia 10 mg/L
	7.01	99.8	34.9	10.2
	7.03	99.4	35.5	10.4
Initials	LM	LM	LM	LM
	Slope: 95.5	Temp: 18.1		

Marine Pollution Studies Laboratory
Water Quality Data Sheet

***A. affinis* Daily Log**

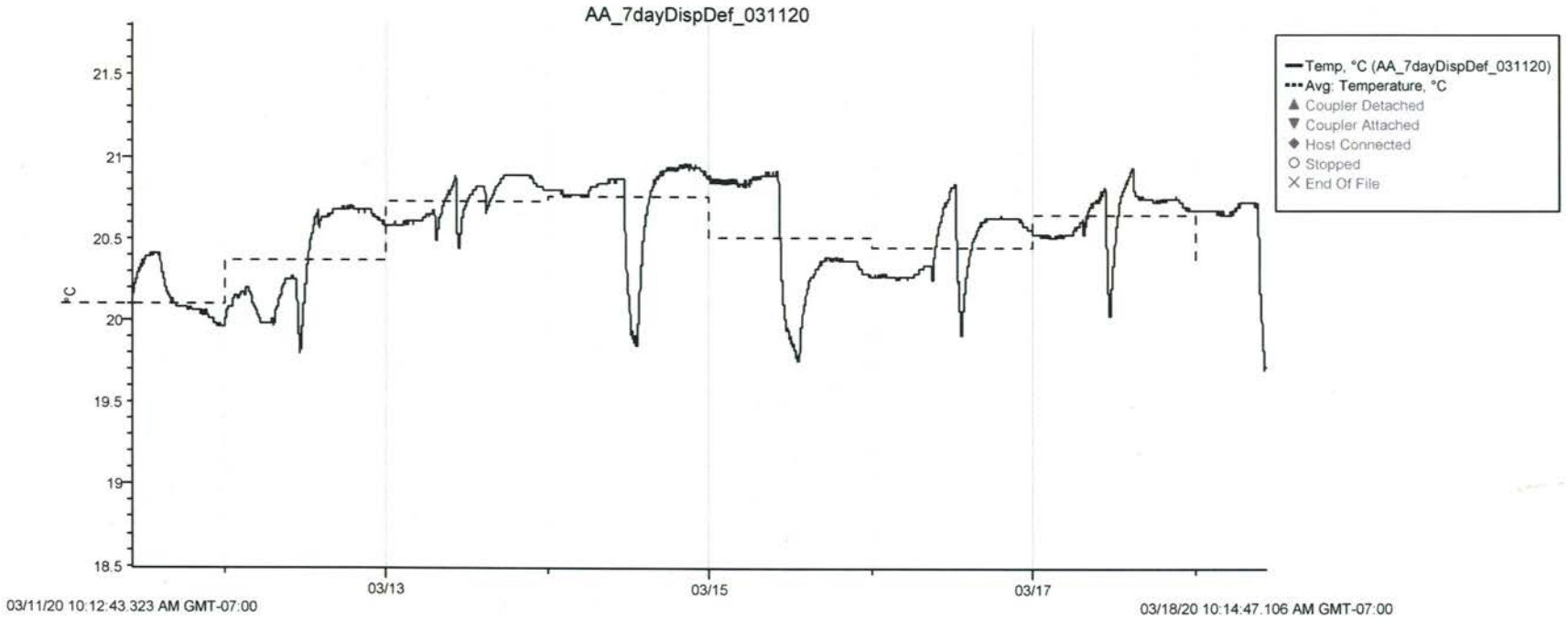
Project: Dispersant AA DEF Start Date/Time: 3/11/20

Sample Type: Water End Date/Time: 3/18/20

WQ Meter ID: A2 Species Lot #: AA031020

	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Start temp logger	✓							
Temperature Test	19.2	19.4	20.0	19.7	19.4	19.4	19.8	19.8
Temperature Ref Tox	19.9	19.5	19.9	19.8	19.6	19.4	20.3	20.2
Feed 40 naups/mysid AM		✓	✓	✓	✓	✓	✓	
Renew Test/Ref Tox		✓	✓	✓	✓	✓	✓	
Measure Test WQ	✓	✓	✓	✓	✓	✓	✓	✓
Feed 40 naups/mysid PM	✓	✓	✓	✓	✓	✓	✓	
Initials	KFJV	JV	JV	JV	KS	JV	JV	LM

NOTE: DO should be above 4.0 mg/L. If it is not, aerate the entire test at 1 bubble/second.


AA_7dayDispDef_031120
Temp, °C (AA_7dayDispDef_031120)
Avg: Temperature, °C
Coupler Detached
Coupler Attached
Host Connected
Stopped
End Of File
°C
21.5
21
20.5
20
19.5
19
18.5
03/13
03/15
03/17
03/11/20 10:12:43.323 AM GMT-07:00
03/18/20 10:14:47.106 AM GMT-07:00

Marine Pollution Studies Laboratory
Culture Log

Atherinops affinis

Lot # AA031020

Organism Source: ABS
Collection Date: 3/9/20
Arrival Date/Time at MPSL: 3/10/20
Arrival Temperature at MPSL: 17.5
Arrival Salinity at MPSL: 30
Hatch Date: 2/27/20

Date	3/10	3/11							
Temp.	19.6	21.7							
Salinity	~~AA 30~~ 30	30							
Water flow	—	—							
Aeration	Y	Y							
Organism Health	E	E							
Feeding	naups	naups							
Initials	JV	JV							
Notes	RN 50% Fed PM -JV	RN 50% ↓temp							

Temperature: Measured value (make note if it is adjusted up/down).
Salinity: Measured value
Water flow: yes/no
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 3/9/2020

SPECIES: *Atherinops affinis*

AGE: 11 day

LIFE STAGE: Larvae

HATCH DATE: 2/27/2020

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	19°C	17-20°C
SALINITY/CONDUCTIVITY:	32 ppt**	30-34 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	185 mg/l	145-210 mg/l
pH:	8.04	7.56-8.17

Comments: ** Acclimated to 30 ppt 3/9/20.

Facility Supervisor

Dispersant - Abalone Development 48 h Range Finder - 11/13/19

Concentraion	Vial	Replicate	Normal	Abnormal	% Normal	Mean	SD
0.0	1	1	52	9	85	84	3.4
	2	2	60	10	86		
	3	3	77	12	87		
	4	4	58	16	78		
	5	5	55	9	86		
1.8	6	1	57	7	89	87	1.2
	7	2	50	8	86		
	8	3	56	9	86		
	9	4	64	9	88		
	10	5	61	9	87		
3.2	11	1	61	18	77	78	4.2
	12	2	52	14	79		
	13	3	64	22	74		
	14	4	41	15	73		
	15	5	52	10	84		
5.6	16	1	46	43	52	47	7.8
	17	2	30	34	47		
	18	3	37	30	55		
	19	4	29	32	48		
	20	5	19	36	35		
10.0	21	1	0	66	0	0	0.0
	22	2	0	68	0		
	23	3	0	77	0		
	24	4	0	90	0		
	25	5	0	86	0		
18.0	26	1	0	91	0	0	0.0
	27	2	0	74	0		
	28	3	0	94	0		
	29	4	0	82	0		
	30	5	0	74	0		
32.0	31	1	0	65	0	0	0.0
	32	2	0	61	0		
	33	3	0	89	0		
	34	4	0	87	0		
	35	5	0	61	0		
56.0	36	1	0	84	0	0	0.0
	37	2	0	65	0		
	38	3	0	67	0		
	39	4	0	99	0		
100.0	40	5	0	88	0		
	41	1	0	55	0	0	0.0
	42	2	0	78	0		
	43	3	0	77	0		
	44	4	0	74	0		
	45	5	0	87	0		

Marine Pollution Studies Laboratory
Data Sheet Abalon Development Test Final Count

Project: Dispersant Abalone 48hr RF
Sample Type: water
Abalone Source: Cultured Abalone

Start Date/Time: 11/13/19
End Date/Time: 11/15/19
Abalone Lot #: HR102519

Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
1	57	9	JV 84.4%
2	60	10	JV
3	77	12	JV
4	58	16	JV
5	55	9	JV
6	57	7	JV
7	50	8	JV
8	56	9	JV
9	64	9	JV
10	61	9	JV
11	61	18	JV
12	57	14	JV
13	64	22	JV
14	41	15	JV
15	52	10	JV
16	46	43	JV
17	30	34	JV
18	37	30	JV
19	39	32	JV
20	19	36	JV
21	0	66	JV
22	0	68	JV
23	0	77	JV
24	0	90	JV
25	0	86	JV
26	0	91	JV
27	0	74	JV
28	0	94	JV
29	0	82	JV
30	0	74	JV
31	0	65	JV
32	0	61	JV
33	0	89	JV
34	0	87	JV
35	0	61	JV
36	0	84	JV
37	0	105	JV
38	0	107	JV
39	0	99	JV
40	0	88	JV
41	0	55	JV
42	0	78	JV
43	0	77	JV
44	0	74	JV
45	0	87	JV
46			
47			
48			
49			
50			

Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
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CETIS Analytical Report

Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID:	04-1704-6251	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:55	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	03-3851-1089	**Test Type:**	Development	**Analyst:**	
Start Date:	13 Nov-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Seawater
Ending Date:	15 Nov-19	**Species:**	Haliotis rufescens	**Brine:**	Frozen Seawater
Duration:	48h	**Source:**	Granite Canyon Lab	**Age:**	
Sample ID:	18-7557-1794	**Code:**	6FCAF452	**Client:**	
Sample Date:	13 Nov-19	**Material:**	Corexit	**Project:**	
Receive Date:	13 Nov-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	1.8	3.2	2.4		6.72%

Dunnett Multiple Comparison Test

Control	vs	C-uL/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		1.8	-1.203	2.23	0.075	8	0.9764	CDF	Non-Significant Effect
		3.2*	2.614	2.23	0.075	8	0.0240	CDF	Significant Effect
		5.6*	12.2	2.23	0.075	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.6225977	0.2075326	3	73.91	<0.0001	Significant Effect
Error	0.04492369	0.002807731	16			
Total	0.6675214		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.323	11.3	0.0969	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9352	0.866	0.1942	Normal Distribution

Proportion Normal Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.8436	0.8017	0.8855	0.8571	0.7838	0.8652	0.01509	4.0%	0.0%
1.8		5	0.8725	0.8576	0.8874	0.8714	0.8615	0.8906	0.005368	1.38%	-3.42%
3.2		5	0.775	0.723	0.827	0.7722	0.7321	0.8387	0.01873	5.41%	8.13%
5.6		5	0.4717	0.3746	0.5689	0.4754	0.3455	0.5522	0.03499	16.6%	44.1%
10		5	0	0	0	0	0	0	0		100.0%
18		5	0	0	0	0	0	0	0		100.0%
32		5	0	0	0	0	0	0	0		100.0%
56		5	0	0	0	0	0	0	0		100.0%
100		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-uL/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.166	1.111	1.221	1.183	1.087	1.195	0.01983	3.8%	0.0%
1.8		5	1.206	1.183	1.229	1.204	1.19	1.234	0.008147	1.51%	-3.46%
3.2		5	1.078	1.014	1.142	1.073	1.027	1.158	0.02299	4.77%	7.51%
5.6		5	0.7566	0.6582	0.8551	0.7608	0.6283	0.8377	0.03547	10.5%	35.1%
10		5	0.05719	0.0523	0.06207	0.05701	0.05273	0.06158	0.001759	6.88%	95.1%
18		5	0.05512	0.05129	0.05895	0.05524	0.05159	0.05816	0.00138	5.6%	95.3%
32		5	0.05937	0.05244	0.06629	0.06206	0.05302	0.06406	0.002494	9.4%	94.9%
56		5	0.05627	0.04992	0.06262	0.05458	0.05027	0.06206	0.002286	9.08%	95.2%
100		5	0.05858	0.05207	0.06509	0.05701	0.05363	0.06747	0.002344	8.95%	95.0%

Red Abalone Larval Development Test **Granite Canyon**

Analysis ID:	04-1704-6251	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:55	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Proportion Normal Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.8525	0.8571	0.8652	0.7838	0.8594
1.8		0.8906	0.8621	0.8615	0.8767	0.8714
3.2		0.7722	0.7879	0.7442	0.7321	0.8387
5.6		0.5169	0.4688	0.5522	0.4754	0.3455
10		0	0	0	0	0
18		0	0	0	0	0
32		0	0	0	0	0
56		0	0	0	0	0
100		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D					
1.8						
3.2						
5.6						
10						
18						
32						
56						
100						

CETIS Analytical Report

Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID:	15-0960-2333	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:55	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	03-3851-1089	**Test Type:**	Development	**Analyst:**	
Start Date:	13 Nov-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Seawater
Ending Date:	15 Nov-19	**Species:**	Haliotis rufescens	**Brine:**	Frozen Seawater
Duration:	48h	**Source:**	Granite Canyon Lab	**Age:**	
Sample ID:	18-7557-1794	**Code:**	6FCAF452	**Client:**	
Sample Date:	13 Nov-19	**Material:**	Corexit	**Project:**	
Receive Date:	13 Nov-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.1564	0.00%	0.7406	0.007771	5.502	5.309	5.703

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.8436	0.8 - NL	Yes	Passes Acceptability Criteria

Proportion Normal Summary

			Calculated Variate(A/B)								
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	5	0.8436	0.7838	0.8652	0.01509	0.03374	4.0%	0.0%	302	358
1.8		5	0.8725	0.8615	0.8906	0.005368	0.012	1.38%	-3.42%	288	330
3.2		5	0.775	0.7321	0.8387	0.01873	0.04189	5.41%	8.13%	270	349
5.6		5	0.4717	0.3455	0.5522	0.03499	0.07824	16.6%	44.1%	161	336
10		5	0	0	0	0	0		100.0%	0	387
18		5	0	0	0	0	0		100.0%	0	415
32		5	0	0	0	0	0		100.0%	0	363
56		5	0	0	0	0	0		100.0%	0	403
100		5	0	0	0	0	0		100.0%	0	371

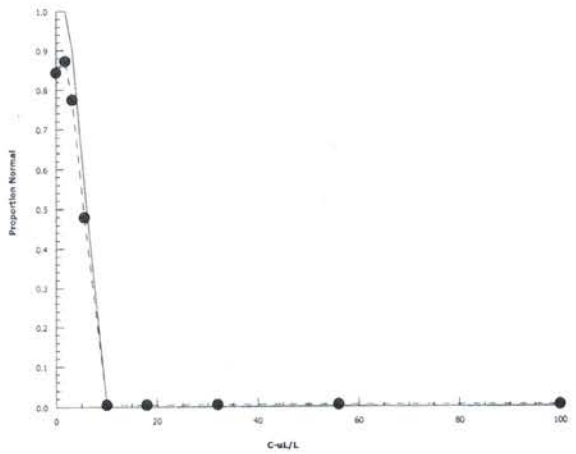
Proportion Normal Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.8525	0.8571	0.8652	0.7838	0.8594
1.8		0.8906	0.8621	0.8615	0.8767	0.8714
3.2		0.7722	0.7879	0.7442	0.7321	0.8387
5.6		0.5169	0.4688	0.5522	0.4754	0.3455
10		0	0	0	0	0
18		0	0	0	0	0
32		0	0	0	0	0
56		0	0	0	0	0
100		0	0	0	0	0

Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID:	15-0960-2333	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:55	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes

Graphics



Dispersant - Abalone Development 48 h Range Finder - Ref Tox - 11/13/19

Zn Conc.	Vial	Replicate	Normal	Abnormal	% Normal	Mean	SD
0	1	1	62	9	87	81	7.0
	2	2	50	17	75		
	3	3	53	16	77		
	4	4	49	15	77		
	5	5	61	7	90		
18	6	1	52	8	87	88	2.8
	7	2	67	13	84		
	8	3	53	5	91		
	9	4	55	8	87		
	10	5	57	7	89		
32	11	1	47	12	80	74	7.6
	12	2	55	12	82		
	13	3	50	29	63		
	14	4	56	17	77		
	15	5	45	19	70		
56	16	1	3	66	4	4	2.6
	17	2	0	63	0		
	18	3	3	70	4		
	19	4	2	68	3		
	20	5	5	65	7		

Ref Tox

Marine Pollution Studies Laboratory
Data Sheet for Abalone Development Test Final Count

Project: Dispersant Abalone
Sample Type: Water
Abalone Source: Cultured Abalone

Start Date/Time: 11/13/19
End Date/Time: 11/15/19
Abalone Lot #: HR102519

Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
1	67	9	JV
2	50	17	JV
3	53	16	JV
4	49	15	JV
5	61	7	JV
6	52	8	JV
7	67	13	JV
8	53	5	JV
9	55	8	JV
10	57	7	JV
11	47	12	JV
12	55	12	JV
13	50	09	JV
14	56	17	JV
15	45	19	JV
16	3	66	JV
17	0	63	JV
18	3	70	JV
19	2	68	JV
20	5	65	JV
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Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
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Ref Tox

CETIS Analytical Report

Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID:	05-5388-3424	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 14:27	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	05-3170-1059	**Test Type:**	Development	**Analyst:**	
Start Date:	13 Nov-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Seawater
Ending Date:	15 Nov-19	**Species:**	Haliotis rufescens	**Brine:**	Frozen Seawater
Test Length:	48h	**Taxon:**	Gastropod	**Source:**	Granite Canyon Lab **Age:**
Sample ID:	19-8689-3011	**Code:**	766D94D3	**Project:**	Dispersant
Sample Date:	10 Apr-20 14:24	**Material:**	Zinc sulfate	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 14:24	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	32	56	42.33		10.71%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
SW Control	18	-1.796	2.227	0.109	8	CDF	0.9948	Non-Significant Effect
	32	1.677	2.227	0.109	8	CDF	0.1292	Non-Significant Effect
	56*	19.3	2.227	0.109	8	CDF	7.0E-07	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.8101	0.8	>>	Yes	Passes Criteria
NOEL	32	<<	56	No	Passes Criteria
PMSD	0.1071	<<	0.2	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.41317	1.13772	3	191.1	<1.0E-37	Significant Effect
Error	0.09527	0.0059544	16			
Total	3.50844		19			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	2.061	11.34	0.5598	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9632	0.866	0.6101	Normal Distribution

Proportion Normal Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	5	0.8101	0.7237	0.8965	0.7681	0.7463	0.8971	0.0311	8.59%	0.00%
18		5	0.8763	0.8411	0.9115	0.8730	0.8375	0.9138	0.0127	3.24%	-8.18%
32		5	0.7441	0.6495	0.8388	0.7671	0.6329	0.8209	0.0341	10.24%	8.14%
56		5	0.0369	0.0048	0.0691	0.0411	0.0000	0.0714	0.0116	70.17%	95.44%

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	5	1.126	1.01	1.241	1.068	1.043	1.244	0.04146	8.24%	0.00%
18		5	1.213	1.159	1.267	1.206	1.156	1.273	0.01945	3.59%	-7.79%
32		5	1.044	0.9363	1.151	1.067	0.9199	1.134	0.03867	8.29%	7.27%
56		5	0.1835	0.08854	0.2785	0.2041	0.06304	0.2705	0.03421	41.68%	83.69%

Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	0.8732	0.7463	0.7681	0.7656	0.8971
18		0.8667	0.8375	0.9138	0.8730	0.8906
32		0.7966	0.8209	0.6329	0.7671	0.7031
56		0.0435	0.0000	0.0411	0.0286	0.0714

Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID:	05-5388-3424	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 14:27	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1

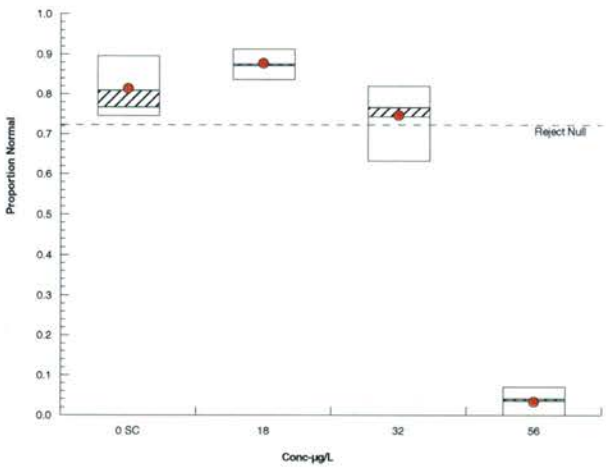
Angular (Corrected) Transformed Detail

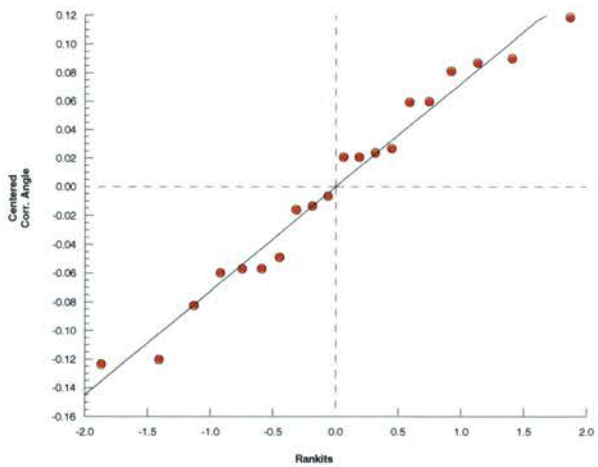
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	1.207	1.043	1.068	1.065	1.244
18		1.197	1.156	1.273	1.206	1.234
32		1.103	1.134	0.9199	1.067	0.9946
56		0.2101	0.06304	0.2041	0.1698	0.2705

Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	62/71	50/67	53/69	49/64	61/68
18		52/60	67/80	53/58	55/63	57/64
32		47/59	55/67	50/79	56/73	45/64
56		3/69	0/63	3/73	2/70	5/70

Graphics





CETIS Analytical Report

Test Code/ID: HR111319 / 12-5882-8359

Red Abalone Larval Development Test

Granite Canyon

Analysis ID:	05-7371-7986	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 14:27	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	05-3170-1059	**Test Type:**	Development	**Analyst:**	
Start Date:	13 Nov-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Seawater
Ending Date:	15 Nov-19	**Species:**	Haliotis rufescens	**Brine:**	Frozen Seawater
Test Length:	48h	**Taxon:**	Gastropod	**Source:**	Granite Canyon Lab **Age:**
Sample ID:	19-8689-3011	**Code:**	766D94D3	**Project:**	Dispersant
Sample Date:	10 Apr-20 14:24	**Material:**	Zinc sulfate	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 14:24	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.1888	4.47%	1.609648	0.005327	40.71	39.72	41.72

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.8101	0.8	>>	Yes	Passes Criteria

Proportion Normal Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	SC	5	0.8101	0.7463	0.8971	0.0696	8.59%	0.0%	275/339	0.8432	0.0%
18		5	0.8763	0.8375	0.9138	0.0284	3.24%	-8.18%	284/325	0.8432	0.0%
32		5	0.7441	0.6329	0.8209	0.0762	10.24%	8.14%	253/342	0.7441	11.75%
56		5	0.0369	0.0000	0.0714	0.0259	70.17%	95.44%	13/345	0.03691	95.62%

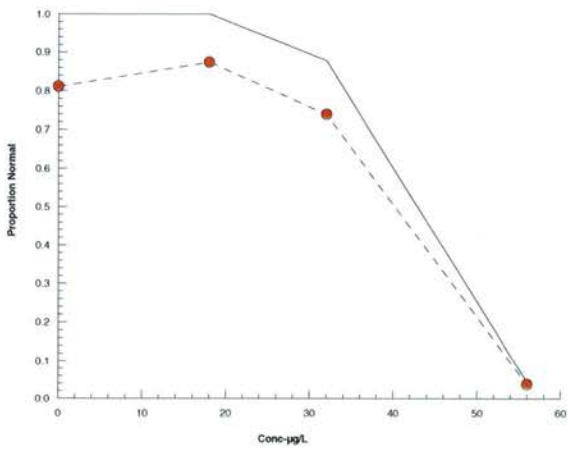
Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	0.8732	0.7463	0.7681	0.7656	0.8971
18		0.8667	0.8375	0.9138	0.8730	0.8906
32		0.7966	0.8209	0.6329	0.7671	0.7031
56		0.0435	0.0000	0.0411	0.0286	0.0714

Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	62/71	50/67	53/69	49/64	61/68
18		52/60	67/80	53/58	55/63	57/64
32		47/59	55/67	50/79	56/73	45/64
56		3/69	0/63	3/73	2/70	5/70

Graphics



Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 11/13/19

End Date/Time: 11/15/19

Project: Dispersant Abalone

Spp./Species Lot #: HR.102519

Sample Type: Water

WQ Meter ID: A2

Date: 11/13/19

~~Water Batch #~~:

Test Temperature: 15.4

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.30	9.66	0.824	7.96	34.4	-0.2 UR	
1.8	7.38	9.65	0.819	7.90	34.6		
3.2	7.40	9.60	0.819	7.86	34.6		
5.6	7.43	9.55	0.819	7.82	34.6		
10	7.45	9.58	0.819	7.85	34.5		
18	7.48	9.58	0.819	7.85	34.5		
32	7.48	9.55	0.819	7.82	34.6		
56	7.51	9.55	0.819	7.82	34.5		
100	7.53	9.60	0.819	7.86	34.5	-0.1	
Ø	7.56	9.68	0.824	7.98	34.2		
18	7.56	9.70	0.824	7.99	34.2		
32	7.56	9.70	0.824	7.99	34.1		
56	7.58	9.73	0.824	8.02	34.1		
Initials	WL	WL	WL	WL	WL	WL	

2h RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
6.99	100.2	35.7	Certified Std.	9.4
—	—	—	35	—
7.12	99.7	35.8		9.7
Initials: WL	WL	WL		WL

pH slope: 98.5 DO temp: 15.9

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 11/13/19

End Date/Time: 11/15/19

Project: Dispersant Abalone

Spp./Species Lot #: HR102519

Sample Type: water

WQ Meter ID: A2

Date: 11/15/19

Test Temperature: 15.7

~~Water Batch #~~:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.23	9.50	0.824	7.83	34.2	UR	
1.8	7.42	9.50	0.824	7.83	34.4		
3.2	7.46	9.52	0.824	7.84	34.5		
5.6	7.48	9.47	0.824	7.80	34.4		
10	7.48	9.27	0.824	7.64	34.3		
18	7.48	9.26	0.824	7.63	34.4		
32	7.51	9.26	0.824	7.63	34.4		
56	7.57	9.17	0.824	7.56	34.4		
100	7.46	8.33	0.819	6.82	34.7	UR	
Ø	7.55	9.30	0.824	7.66	34.2		
18	7.57	9.40	0.824	7.74	34.0		
32	7.57	9.46	0.824	7.80	34.1		
56	7.60	9.55	0.824	7.87	34.1		
Initials	JV	JV	JV	JV	JV	JV	

2m RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
6.98	100.6	34.9	Certified Std.	9.2
			35	
7.04	96.6	35.3		11.0
Initials JV	JV	JV		JV

pH slope: 98.8 DO temp: 14.7

Marine Pollution Studies Laboratory
Abalone Spawning Worksheet
Test Date: 11/13/19
Project: Dispersant Abalone
Source: Cultured Abalone
Spawning preparation: Place male and female abalone in 2 separate buckets with 6L of filtered seawater.

Prepare the following solutions:

12.1g tris dissolved in 50mL distilled water

50mL 1:5 peroxide solution (10mL 30% peroxide/40mL distilled water)

Add 25mL of each solution to the bucket of **females**, aerate thoroughly.

Time: 0723
Temp: 13°

Wait 30 minutes and add 25mL of each solution to the bucket of **males**, aerate thoroughly.

Time: 0753
Temp: 13°

After 2.5 hours, empty bucket and rinse and refill with fresh seawater.

Females: Time: 1000 Temp: 13°

Time of first spawn: 1230

Males: Time: 1040 Temp: 13°

Time of first spawn: 1120

Collect sperm directly from respiratory pore with a turkey baster. Place in flask and keep cold. Replace sperm in the flask with fresh sperm throughout the spawn. Eggs should be fertilized within 1 hour of release.

Siphon eggs from the bottom of the bucket into another clean culture bucket.
Add approximately 200mL (slightly cloudy) sperm solution and rinse thoroughly with fresh seawater.

Time: 1308

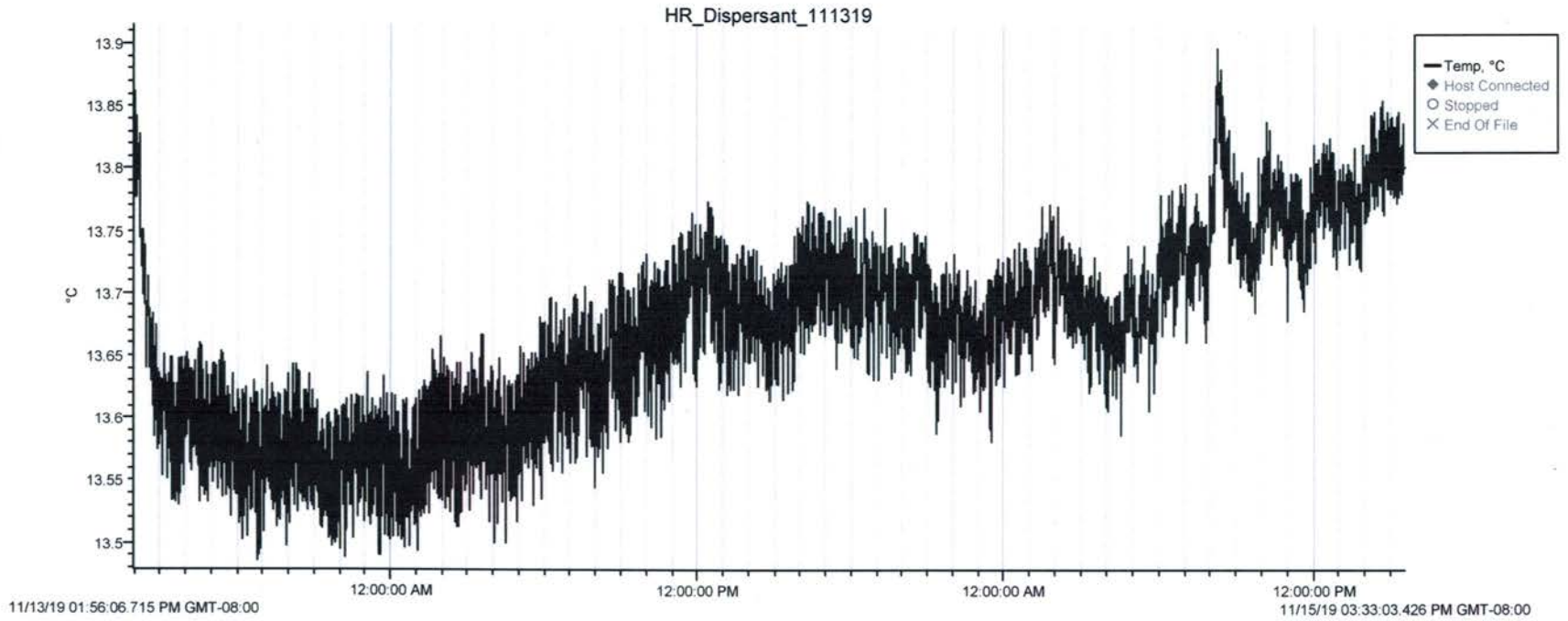
Allow the eggs to settle to the bottom of the bucket and then siphon into a clean 1L culture beaker. Adjust the density to 100 embryos/ 100µl ± 10 embryos.

_____ _____ _____

Inoculate test with ~~100~~ 0.227mL µl embryo dilution within 1 hour of fertilization.

Time: 1357

Initials: JV



The temperature probe was incorrectly located in a different area of the room than the test. The test temperatures taken manually with a spirit thermometer at initiation and termination were within range.

11/20/19
LM

Dispersant - Abalone Development 48 h Definitive - 12/11/19

Concentraion	Vial	Replicate	Normal	Abnormal	% Normal	Mean	SD
0.0	1	1	63	8	89	94	3.2
	2	2	63	4	94		
	3	3	73	3	96		
	4	4	75	5	94		
	5	5	65	2	97		
0.56	6	1	53	2	96	93	3.0
	7	2	84	4	95		
	8	3	60	7	90		
	9	4	61	6	91		
	10	5	72	4	95		
1.0	11	1	71	3	96	95	2.6
	12	2	53	2	96		
	13	3	63	3	95		
	14	4	55	3	95		
	15	5	54	6	90		
1.8	16	1	76	5	94	92	2.6
	17	2	57	4	93		
	18	3	65	5	93		
	19	4	66	6	92		
	20	5	63	9	88		
3.2	21	1	70	6	92	90	3.0
	22	2	69	12	85		
	23	3	81	7	92		
	24	4	69	6	92		
	25	5	74	9	89		
5.6	26	1	68	10	87	90	2.7
	27	2	65	9	88		
	28	3	58	5	92		
	29	4	58	5	92		
	30	5	66	5	93		
10.0	31	1	0	63	0	0	0.0
	32	2	0	64	0		
	33	3	0	90	0		
	34	4	0	98	0		
	35	5	0	77	0		
18.0	36	1	0	45	0	0	0.0
	37	2	0	53	0		
	38	3	0	75	0		
	39	4	0	62	0		
32.0	40	5	0	66	0		
	41	1	0	72	0	0	0.0
	42	2	0	67	0		
	43	3	0	48	0		
	44	4	0	52	0		
	45	5	0	54	0		

Marine Pollution Studies Laboratory
Data Sheet Abalon Development Test Final Count

48hr Def.

Project: Dispersant Abalone
Sample Type: Water
Abalone Source: Cultured Abalone

Start Date/Time: 12/4/19
End Date/Time: 12/13/19
Abalone Lot #: HR102519

Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
1	103	8	JV 93.9%
2	63	4	JV
3	73	3	JV
4	75	5	JV
5	105	2	JV
6	53	2	JV
7	84	4	JV
8	100	7	JV
9	101	6	JV
10	77	4	JV
11	71	3	JV
12	53	2	JV
13	103	3	JV
14	55	3	JV
15	54	6	JV
16	716	5	JV
17	57	4	JV
18	105	5	JV
19	106	6	JV
20	103	9	JV spilled after Counting
21	70	6	JV
22	109	17	JV
23	81	7	JV
24	109	16	JV
25	74	9	JV
26	108	10	JV
27	105	9	JV
28	58	5	JV
29	58	5	JV
30	106	5	JV
31	0	63	JV
32	0	64	JV
33	0	90	JV
34	0	98	JV
35	0	77	JV
36	0	45	JV
37	0	53	JV
38	0	75	JV
39	0	107	JV
40	0	106	JV
41	0	72	JV
42	0	47	JV
43	0	48	JV
44	0	52	JV
45	0	54	JV
46			
47			
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50			

Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
51			
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Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID:	18-7181-3387	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:54	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Proportion Normal Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.8873	0.9403	0.9605	0.9375	0.9701
0.56		0.9636	0.9545	0.8955	0.9104	0.9474
1		0.9595	0.9636	0.9545	0.9483	0.9
1.8		0.9383	0.9344	0.9286	0.9167	0.875
3.2		0.9211	0.8519	0.9205	0.92	0.8916
5.6		0.8718	0.8784	0.9206	0.9206	0.9296
10		0	0	0	0	0
18		0	0	0	0	0
32		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D					
0.56						
1						
1.8						
3.2						
5.6						
10						
18						
32						

Red Abalone Larval Development Test

Granite Canyon

Analysis ID:	19-4824-0521	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:54	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	11-6729-7978	**Test Type:**	Development	**Analyst:**	
Start Date:	11 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Seawater
Ending Date:	13 Dec-19	**Species:**	Haliotis rufescens	**Brine:**	Frozen Seawater
Duration:	48h	**Source:**	Granite Canyon Lab	**Age:**	
Sample ID:	08-9227-1140	**Code:**	352EFA24	**Client:**	
Sample Date:	11 Dec-19	**Material:**	Corexit	**Project:**	
Receive Date:	11 Dec-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.06094	0.00%	0.8483	0.004085	7.052	6.92	7.186

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9392	0.8 - NL	Yes	Passes Acceptability Criteria

Proportion Normal Summary

			Calculated Variate(A/B)								
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	5	0.9392	0.8873	0.9701	0.01433	0.03205	3.41%	0.0%	338	361
0.56		5	0.9343	0.8955	0.9636	0.01326	0.02964	3.17%	0.52%	330	353
1		5	0.9452	0.9	0.9636	0.01158	0.0259	2.74%	-0.64%	296	313
1.8		5	0.9186	0.875	0.9383	0.01149	0.0257	2.8%	2.19%	327	356
3.2		5	0.901	0.8519	0.9211	0.0135	0.03019	3.35%	4.06%	363	403
5.6		5	0.9042	0.8718	0.9296	0.01204	0.02693	2.98%	3.72%	315	349
10		5	0	0	0	0	0		100.0%	0	392
18		5	0	0	0	0	0		100.0%	0	301
32		5	0	0	0	0	0		100.0%	0	293

Proportion Normal Detail

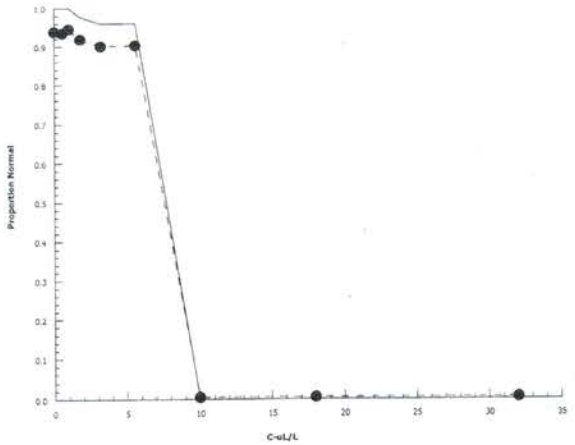
C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.8873	0.9403	0.9605	0.9375	0.9701
0.56		0.9636	0.9545	0.8955	0.9104	0.9474
1		0.9595	0.9636	0.9545	0.9483	0.9
1.8		0.9383	0.9344	0.9286	0.9167	0.875
3.2		0.9211	0.8519	0.9205	0.92	0.8916
5.6		0.8718	0.8784	0.9206	0.9206	0.9296
10		0	0	0	0	0
18		0	0	0	0	0
32		0	0	0	0	0

Red Abalone Larval Development Test

Granite Canyon

Analysis ID:	19-4824-0521	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:54	**Analysis:**	Untrimmed Spearman-Kärber	**Official Results:**	Yes

Graphics



Dispersant - Abalone Development 48 h Definitive - Ref Tox - 12/11/19

Zn Conc.	Vial	Replicate	Normal	Abnormal	% Normal	Mean	SD
0	1	1	64	3	96	93	3.9
	2	2	53	8	87		
	3	3	78	3	96		
	4	4	58	5	92		
	5	5	78	4	95		
18	6	1	0	58	0	19	29.7
	7	2	0	65	0		
	8	3	0	57	0		
	9	4	14	36	28		
	10	5	46	22	68		
32	11	1	66	31	68	86	10.3
	12	2	58	6	91		
	13	3	78	5	94		
	14	4	75	9	89		
	15	5	62	8	89		
56	16	1	0	51	0	0	0.0
	17	2	0	72	0		
	18	3	0	58	0		
	19	4	0	69	0		
	20	5	0	74	0		

Ref Tox

Marine Pollution Studies Laboratory
Data Sheet Abalon Development Test Final Count

Project: Dispersant Abalone RT
Sample Type: Water
Abalone Source: Cultured Abalone

Start Date/Time: 12/11/19
End Date/Time: 12/13/19
Abalone Lot #: HR102519

Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
1	64	5	JV
2	53	8	JV
3	78	3	JV
4	58	5	JV
5	78	4	JV
6	0	58	JV
7	0	65	JV
8	0	57	JV
9	14	30	JV
10	46	22	JV
11	66	31	JV
12	68	6	JV
13	78	5	JV
14	75	9	JV
15	62	8	JV
16	0	51	JV
17	0	72	JV
18	0	58	JV
19	0	69	JV
20	0	74	JV
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Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
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Ref Tox

CETIS Analytical Report

Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID:	21-2028-9467	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 14:33	**Analysis:**	Nonparametric-Control vs Treatments	**Status Level:**	1
Batch ID:	02-4705-9263	**Test Type:**	Development	**Analyst:**	
Start Date:	11 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Seawater
Ending Date:	13 Dec-19	**Species:**	Haliotis rufescens	**Brine:**	Frozen Seawater
Test Length:	48h	**Taxon:**	Gastropod	**Source:**	Granite Canyon Lab **Age:**
Sample ID:	19-7102-8629	**Code:**	757B8295	**Project:**	Dispersant
Sample Date:	10 Apr-20 14:32	**Material:**	Zinc sulfate	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 14:32	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	<18	18	n/a		26.18%

Steel Many-One Rank Sum Test

Control	vs	Control II	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
SW Control		18*	15	18	0	8	CDF	0.0086	Significant Effect
		32	20	18	0	8	CDF	0.1020	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9318	0.8	>>	Yes	Passes Criteria
NOEL	18	<<	56	No	Passes Criteria
PMSD	0.2618	<<	0.2	No	Above Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.82077	1.41039	2	22.25	9.2E-05	Significant Effect
Error	0.760663	0.0633886	12			
Total	3.58143		14			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	9.975	9.21	0.0068	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.8681	0.8328	0.0316	Normal Distribution

Proportion Normal Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	5	0.9318	0.8838	0.9798	0.9512	0.8689	0.9630	0.0173	4.15%	0.00%
18		5	0.1913	0.0000	0.5602	0.0000	0.0000	0.6765	0.1329	155.30%	79.47%
32		5	0.8610	0.7330	0.9890	0.8929	0.6804	0.9398	0.0461	11.97%	7.60%
56		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	SC	5	1.314	1.224	1.403	1.348	1.2	1.377	0.03226	5.49%	0.00%
18		5	0.3435	-0.1633	0.8502	0.06628	0.06206	0.9658	0.1825	118.82%	73.85%
32		5	1.203	1.035	1.372	1.237	0.97	1.323	0.06065	11.27%	8.41%
56		5	0.06262	0.05629	0.06896	0.06023	0.05816	0.07007	0.002281	8.14%	95.23%

Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	0.9552	0.8689	0.9630	0.9206	0.9512
18		0.0000	0.0000	0.0000	0.2800	0.6765
32		0.6804	0.9062	0.9398	0.8929	0.8857
56		0.0000	0.0000	0.0000	0.0000	0.0000

Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID: 21-2028-9467 **Endpoint:** Proportion Normal **CETIS Version:** CETISv1.9.6
Analyzed: 10 Apr-20 14:33 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

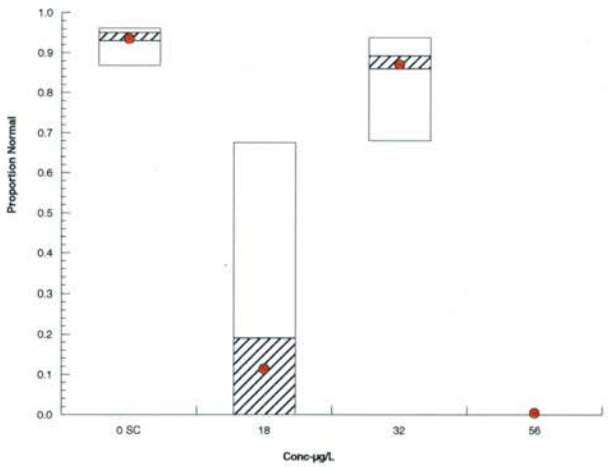
Angular (Corrected) Transformed Detail

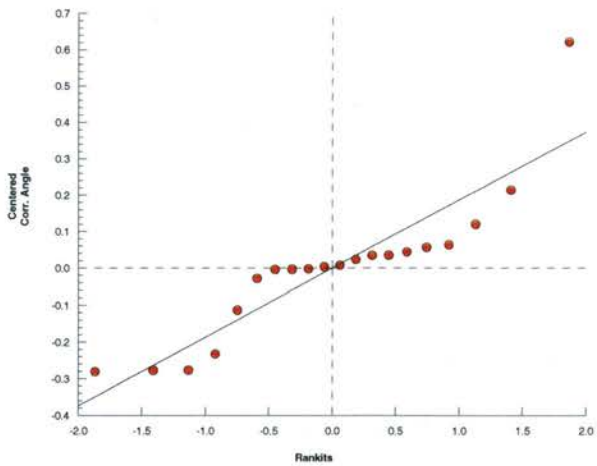
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	1.358	1.2	1.377	1.285	1.348
18		0.0657	0.06206	0.06628	0.5576	0.9658
32		0.97	1.26	1.323	1.237	1.226
56		0.07007	0.05896	0.0657	0.06023	0.05816

Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	64/67	53/61	78/81	58/63	78/82
18		0/58	0/65	0/57	14/50	46/68
32		66/97	58/64	78/83	75/84	62/70
56		0/51	0/72	0/58	0/69	0/74

Graphics





CETIS Analytical Report

Red Abalone Larval Development Test — **Granite Canyon**

Analysis ID:	16-0412-9279	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 14:33	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	02-4705-9263	**Test Type:**	Development	**Analyst:**	
Start Date:	11 Dec-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Seawater
Ending Date:	13 Dec-19	**Species:**	Haliotis rufescens	**Brine:**	Frozen Seawater
Test Length:	48h	**Taxon:**	Gastropod	**Source:**	Granite Canyon Lab **Age:**
Sample ID:	19-7102-8629	**Code:**	757B8295	**Project:**	Dispersant
Sample Date:	10 Apr-20 14:32	**Material:**	Zinc sulfate	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 14:32	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.06497	43.69%	1.532399	0.009527	34.07	32.61	35.6

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9318	0.8	>>	Yes	Passes Criteria

Proportion Normal Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	SC	5	0.9318	0.8689	0.9630	0.0387	4.15%	0.0%	331/354	0.9318	0.0%
18		5	0.1913	0.0000	0.6765	0.2971	155.30%	79.47%	60/298	0.5261	43.53%
32		5	0.8610	0.6804	0.9398	0.1031	11.97%	7.6%	339/398	0.5261	43.53%
56		5	0.0000	0.0000	0.0000	0.0000		100.0%	0/324	0	100.0%

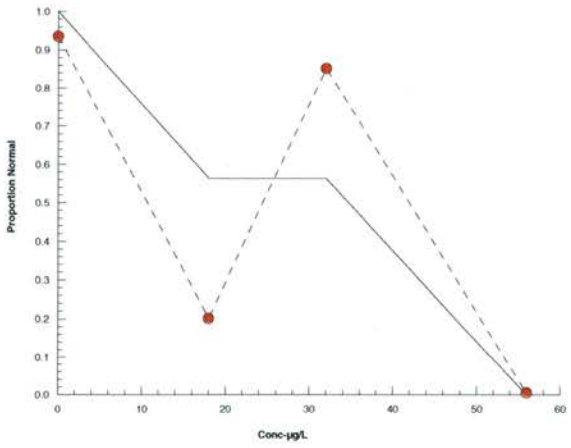
Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	0.9552	0.8689	0.9630	0.9206	0.9512
18		0.0000	0.0000	0.0000	0.2800	0.6765
32		0.6804	0.9062	0.9398	0.8929	0.8857
56		0.0000	0.0000	0.0000	0.0000	0.0000

Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	SC	64/67	53/61	78/81	58/63	78/82
18		0/58	0/65	0/57	14/50	46/68
32		66/97	58/64	78/83	75/84	62/70
56		0/51	0/72	0/58	0/69	0/74

Graphics



Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 12/11/19

End Date/Time: 12/13/19

Project: Dispersant Abalone

Spp./Species Lot #: HR102519

Sample Type: Water

WQ Meter ID: AJ

Date: 12/11/19

Test Temperature: 16.0

~~Water Batch #:~~

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.03	9.58	0.824	7.89	33.6	VR -0.3	
0.56	7.52	9.54		7.86	33.9		
1	7.55	9.62		7.93	33.9		
1.8	7.60	9.57		7.89	34.0		
3.2	7.65	9.64		7.94	34.0		
5.6	7.68	9.72		8.01	34.1		
10	7.68	9.48		7.81	34.4		
18	7.68	9.13	0.819	7.48	34.5		
32	7.68	8.93	0.819	7.31	34.6	0.2	
Ø	7.71	9.43	0.824	7.77	34.4	-0.1	
18	7.73	9.47		7.80	34.3		
32	7.73	9.47		7.80	34.3		
56	7.78	9.49		7.82	34.3		
Initials	KF	KF	KF	KF	KF	KF	

Zn RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.05	101.0	34.9	Certified Std.	10.2
—	—	—	35 ppt	—
7.10	92.8	35.5		9.7
KF	KF	KF		KF

pH slope: 98.5 DO temp: 16.7

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 12/11/19

End Date/Time: 12/13/19

Project: Dispersant Abalone

Spp./Species Lot #: HR102519

Sample Type: Water

WQ Meter ID: A2

Date: 12/13/19

Test Temperature: 15.9

~~Water Batch #:~~

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.37	9.77	0.824	8.05	34.1 ~~33.3~~	~~UR -0.3~~	0.0 -KF
0.5e	7.54	9.69	0.824	7.98	34.2	~~UR -0.2~~	
1	7.62	9.63	|	7.94	34.2	~~0.0~~	
1.8	7.65	9.64	|	7.94	34.2	~~UR -0.2~~	
3.2	7.65	9.63	|	7.94	34.2	~~0.2~~	
5.6	7.68	9.63	|	7.94	34.2	~~UR 0.3~~	
10	7.68	9.55	|	7.87	34.2	~~0.0~~	
18	7.71	9.55	|	7.87	34.2	~~0.0~~	
32	7.73	9.51	⊥	7.84	34.2	~~0.0~~	0.2 -KF
Ø	7.37	9.77	0.824	8.05	34.1	~~UR -0.3~~	0.0 -KF
18	7.73	9.55	|	7.87	34.2	|	
32	7.73	9.62	|	7.93	34.1	|	
56	7.76	9.66	⊥	7.96	34.0	|	
Initials	KF	KF	KF	KF	KF	KF	

To RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
6.99	100.9	34.9	Certified Std.	KF ~~9.0~~
—	—	—	35 ppt	9.7
7.05	101.7	35.4		9.0 / 9.8
KF	KF	KF		KF

pH slope: 97.9 DO temp: 18.0

Marine Pollution Studies Laboratory
Abalone Spawning Worksheet
Test Date: 12/18/19
Project: Dispersant
Source: Cultured Abalone
Spawning preparation: Place male and female abalone in 2 separate buckets with 6L of filtered seawater.

Prepare the following solutions:

12.1g tris dissolved in 50mL distilled water

50mL 1:5 peroxide solution (10mL 30% peroxide/40mL distilled water)

Add 25mL of each solution to the bucket of **females**, aerate thoroughly.

Time: 0725
Temp: 14.2°

Wait 30 minutes and add 25mL of each solution to the bucket of **males**, aerate thoroughly.

Time: 0800
Temp: 14.1°

After 2.5 hours, empty bucket and rinse and refill with fresh seawater.

Females: Time: 1000 Temp: 14.4° Males: Time: 1030 Temp: 14.4°

Time of first spawn: 1100 Time of first spawn: 1059

Collect sperm directly from respiratory pore with a turkey baster. Place in flask and keep cold. Replace sperm in the flask with fresh sperm throughout the spawn. Eggs should be fertilized within 1 hour of release.

Siphon eggs from the bottom of the bucket into another clean culture bucket.
Add approximately 200mL (slightly cloudy) sperm solution and rinse thoroughly with fresh seawater.

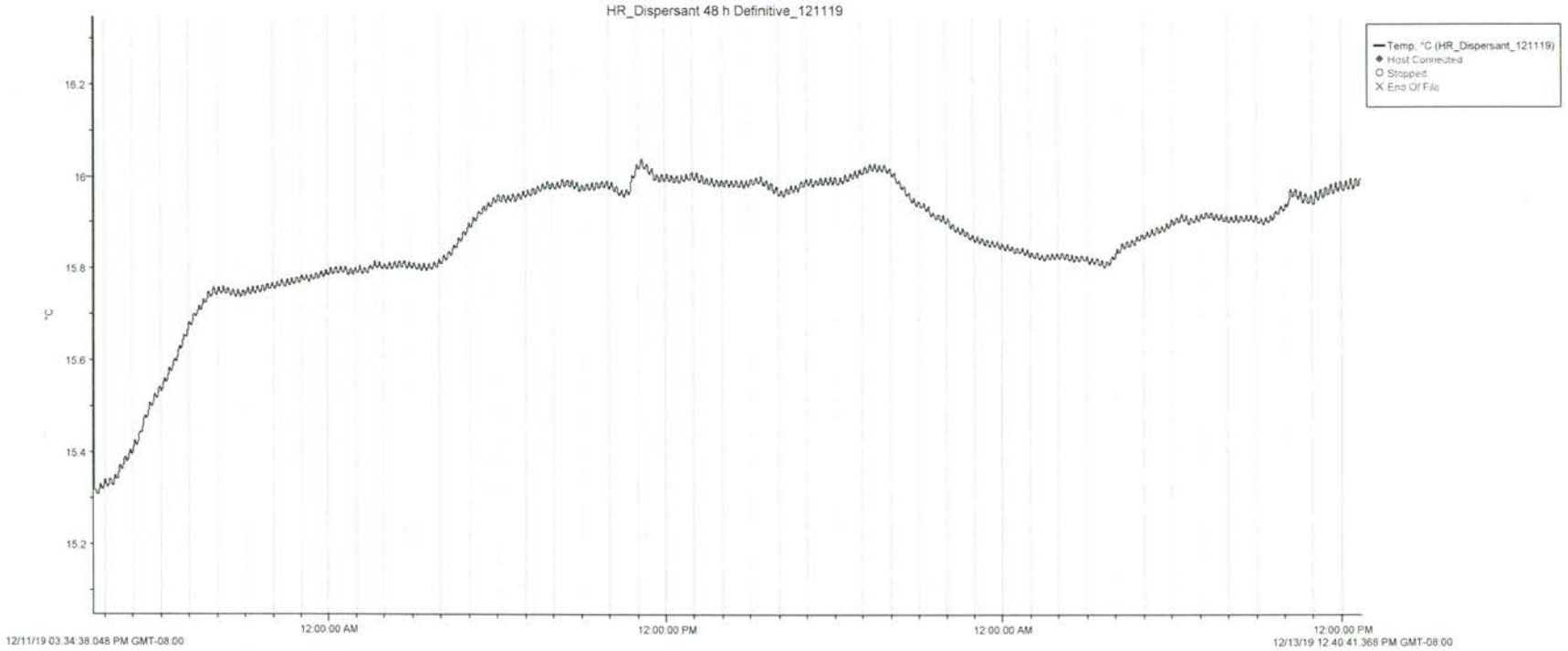
Time: 1136

Allow the eggs to settle to the bottom of the bucket and then siphon into a clean 1L culture beaker. Adjust the density to 100 embryos/ 100µl ± 10 embryos.

107 142 75 81

Inoculate test with 100 µl embryo dilution within 1 hour of fertilization. Time: 1232

Initials: JV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Stopped
End Of File
°C
16.2
16
15.8
15.6
15.4
15.2
12:00:00 AM
12:00:00 PM
12:00:00 AM
12:00:00 PM
12/11/19 03:34:38.048 PM GMT-08:00
12/13/19 12:40:41.368 PM GMT-08:00

Dispersant - Urchin Development 72 h Range Finder - 10/1/19

Concentraion	Vial	Replicate	Normal	Abnormal	% Normal	Mean	SD
0.0	1	1	98	2	98	96	2.2
	2	2	97	5	95		
	3	3	102	4	96		
	4	4	95	8	92		
	5	5	104	3	97		
1.8	6	1	106	3	97	97	1.8
	7	2	100	2	98		
	8	3	101	0	100		
	9	4	109	4	96		
	10	5	117	6	95		
3.2	11	1	100	0	100	95	4.1
	12	2	102	1	99		
	13	3	99	6	94		
	14	4	91	10	90		
	15	5	102	7	94		
5.6	16	1	100	2	98	97	1.9
	17	2	105	2	98		
	18	3	100	7	93		
	19	4	99	3	97		
	20	5	98	4	96		
10.0	21	1	99	7	93	92	1.6
	22	2	95	11	90		
	23	3	94	9	91		
	24	4	100	7	93		
	25	5	95	9	91		
18.0	26	1	100	4	96	87	11.3
	27	2	101	23	81		
	28	3	77	34	69		
	29	4	99	5	95		
	30	5	92	9	91		
32.0	31	1	75	25	75	64	6.5
	32	2	66	34	66		
	33	3	60	43	58		
	34	4	62	38	62		
	35	5	61	39	61		
56.0	36	1	0	100	0	1	0.7
	37	2	1	99	1		
	38	3	1	99	1		
	39	4	2	98	2		
100.0	40	5	1	99	1		
	41	1	0	100	0	0	0.0
	42	2	0	100	0		
	43	3	0	100	0		
	44	4	0	100	0		
	45	5	0	100	0		

Purple Sea Urchin Embryo-Larval Development Test — **Granite Canyon**

Analysis ID:	17-0675-4337	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:46	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Proportion Normal Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.98	0.95	0.96	0.92	0.97
1.8		0.97	0.98	1	0.96	0.9406
3.2		1	0.9892	0.94	0.9	0.9307
5.6		0.98	0.98	0.93	0.97	0.96
10		0.93	0.8911	0.91	0.93	0.91
18		0.96	0.7788	0.6699	0.95	0.91
32		0.75	0.66	0.5743	0.62	0.61
56		0	0.01	0.01	0.02	0.01

Angular (Corrected) Transformed Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D					
1.8						
3.2						
5.6						
10						
18						
32						
56						

CETIS Analytical Report

Purple Sea Urchin Embryo-Larval Development Test — **Granite Canyon**

Analysis ID:	15-3906-5219	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	28 Feb-20 10:46	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	15-6712-5477	**Test Type:**	Development	**Analyst:**	
Start Date:	01 Oct-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	04 Oct-19	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	72h	**Source:**		**Age:**	
Sample ID:	15-8248-6822	**Code:**	5E52D526	**Client:**	
Sample Date:	01 Oct-19	**Material:**	Corexit	**Project:**	
Receive Date:	01 Oct-19	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.044	1.04%	1.509	0.006946	32.26	31.24	33.31

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.956	0.8 - NL	Yes	Passes Acceptability Criteria

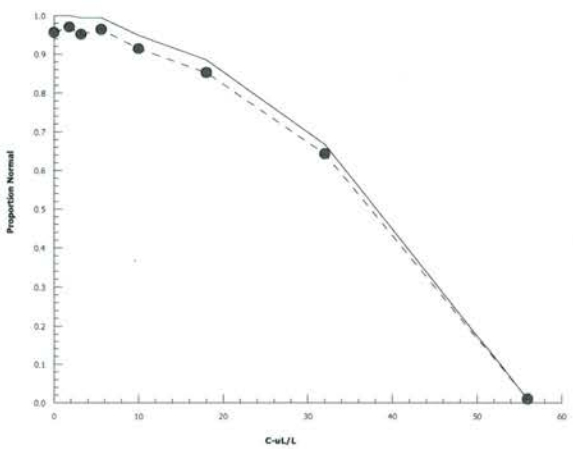
Proportion Normal Summary

			Calculated Variate(A/B)								
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	5	0.956	0.92	0.98	0.0103	0.02302	2.41%	0.0%	478	500
1.8		5	0.9701	0.9406	1	0.009911	0.02216	2.28%	-1.48%	486	501
3.2		5	0.952	0.9	1	0.0187	0.04181	4.39%	0.42%	470	494
5.6		5	0.964	0.93	0.98	0.009274	0.02074	2.15%	-0.84%	482	500
10		5	0.9142	0.8911	0.93	0.007309	0.01634	1.79%	4.37%	458	501
18		5	0.8537	0.6699	0.96	0.05618	0.1256	14.7%	10.7%	432	507
32		5	0.6429	0.5743	0.75	0.03007	0.06723	10.5%	32.8%	322	501
56		5	0.01	0	0.02	0.003162	0.007071	70.7%	99.0%	5	500

Proportion Normal Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.98	0.95	0.96	0.92	0.97
1.8		0.97	0.98	1	0.96	0.9406
3.2		1	0.9892	0.94	0.9	0.9307
5.6		0.98	0.98	0.93	0.97	0.96
10		0.93	0.8911	0.91	0.93	0.91
18		0.96	0.7788	0.6699	0.95	0.91
32		0.75	0.66	0.5743	0.62	0.61
56		0	0.01	0.01	0.02	0.01

Graphics



Dispersant - Urchin Development 72 h Range Finder - Ref Tox - 10/1/19

CuCl2 Conc.	Vial	Replicate	Normal	Abnormal	% Normal	Mean	SD
0	1	1	98	5	95	91	4.2
	2	2	97	6	94		
	3	3	94	15	86		
	4	4	89	14	86		
	5	5	93	9	91		
3.2	6	1	98	6	94	91	6.9
	7	2	90	11	89		
	8	3	94	7	93		
	9	4	104	3	97		
	10	5	81	21	79		
5.6	11	1	82	36	69	82	9.1
	12	2	90	13	87		
	13	3	99	11	90		
	14	4	95	12	89		
	15	5	77	24	76		
10	16	1	63	40	61	75	13.1
	17	2	65	38	63		
	18	3	91	17	84		
	19	4	83	26	76		
	20	5	96	9	91		
18	21	1	5	96	5	8	2.9
	22	2	7	98	7		
	23	3	6	101	6		
	24	4	13	93	12		
	25	5	9	96	9		
32	26	1	0	101	0	0	0.0
	27	2	0	102	0		
	28	3	0	103	0		
	29	4	0	103	0		
	30	5	0	103	0		

Marine Pollution Studies Laboratory
Data Sheet for Sea Urchin Development Test Ref Tox

RF

Project: SR Dispersant ~~Ref to~~ Start Date/Time: 10/1/19
Sample Type: Dispersant End Date/Time: 10/4/19
Reference Toxicant: CuCl2 Sea Urchin Lot #: Wild
Stock Solution #: 1669 Sea Urchin Source: GC

Container Number	Concentration	Normal Larvae	Abnormal Larvae	Notes and Initials
1	0	98	5	SZ
2	|	97	6	SZ
3	|	94	15	SZ
4	|	89	14	SZ
5	|	93	9	SZ
6	3.2	98	6	SZ
7	|	90	11	SZ
8	|	94	7	SZ
9	|	104	3	SZ
10	|	81	21	SZ
11	5.6	82	36	SZ
12	|	90	13	SZ
13	|	99	11	SZ
14	|	95	12	SZ
15	|	77	24	SZ
16	10.0	63	40	SZ
17	|	65	38	SZ
18	|	91	17	SZ
19	|	83	26	SZ
20	|	96	9	SZ
21	18.0	5	96	SZ
22	|	7	98	SZ
23	|	6	101	SZ
24	|	13	93	SZ
25	|	9	96	SZ
26	32.0	0	101	SZ
27	|	0	102	SZ
28	|	0	103	SZ
29	|	0	103	SZ
30	|	0	103	SZ

Purple Sea Urchin Embryo-Larval Development Test

Granite Canyon

Analysis ID:	00-4403-9776	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 15:54	**Analysis:**	Parametric-Control vs Treatments	**Status Level:**	1
Batch ID:	05-5997-2709	**Test Type:**	Development	**Analyst:**	
Start Date:	01 Oct-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	04 Oct-19	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Test Length:	72h	**Taxon:**	Echinoidea	**Source:**	**Age:**
Sample ID:	06-1059-5427	**Code:**	2464F263	**Project:**	Dispersant
Sample Date:	10 Apr-20 15:53	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 15:43	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	5.6	10	7.483		11.88%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water	3.2	-0.1169	2.305	0.160	8	CDF	0.8357	Non-Significant Effect
	5.6	1.712	2.305	0.160	8	CDF	0.1434	Non-Significant Effect
	10*	2.92	2.305	0.160	8	CDF	0.0142	Significant Effect
	18*	14.23	2.305	0.160	8	CDF	4.5E-07	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9063	0.8	>>	Yes	Passes Criteria
PMSD	0.1188	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.47635	0.869088	4	71.83	<1.0E-37	Significant Effect
Error	0.241993	0.0120997	20			
Total	3.71834		24			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	4.784	13.28	0.3102	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9672	0.8877	0.5741	Normal Distribution

Proportion Normal Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.9063	0.8542	0.9584	0.9118	0.8624	0.9515	0.0188	4.63%	0.00%
3.2		5	0.9060	0.8204	0.9917	0.9307	0.7941	0.9720	0.0308	7.61%	0.03%
5.6		5	0.8238	0.7114	0.9362	0.8738	0.6949	0.9000	0.0405	10.99%	9.10%
10		5	0.7522	0.5892	0.9152	0.7615	0.6117	0.9143	0.0587	17.45%	17.00%
18		5	0.0761	0.0396	0.1126	0.0667	0.0495	0.1226	0.0132	38.61%	91.60%
32		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.266	1.175	1.357	1.269	1.191	1.349	0.03281	5.80%	0.00%
3.2		5	1.274	1.132	1.416	1.304	1.1	1.403	0.05113	8.98%	-0.64%
5.6		5	1.147	1.002	1.291	1.208	0.9856	1.249	0.05205	10.15%	9.41%
10		5	1.063	0.8638	1.261	1.061	0.898	1.274	0.07162	15.07%	16.05%
18		5	0.2759	0.2097	0.3421	0.2612	0.2244	0.3578	0.02386	19.34%	78.20%
32		5	0.04943	0.04916	0.0497	0.04929	0.04929	0.04977	9.71E-05	0.44%	96.09%

Purple Sea Urchin Embryo-Larval Development Test — **Granite Canyon**

Analysis ID: 00-4403-9776 **Endpoint:** Proportion Normal **CETIS Version:** CETISv1.9.6
Analyzed: 10 Apr-20 15:54 **Analysis:** Parametric-Control vs Treatments **Status Level:** 1

Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.9515	0.9417	0.8624	0.8641	0.9118
3.2		0.9423	0.8911	0.9307	0.9720	0.7941
5.6		0.6949	0.8738	0.9000	0.8879	0.7624
10		0.6117	0.6311	0.8426	0.7615	0.9143
18		0.0495	0.0667	0.0561	0.1226	0.0857
32		0.0000	0.0000	0.0000	0.0000	0.0000

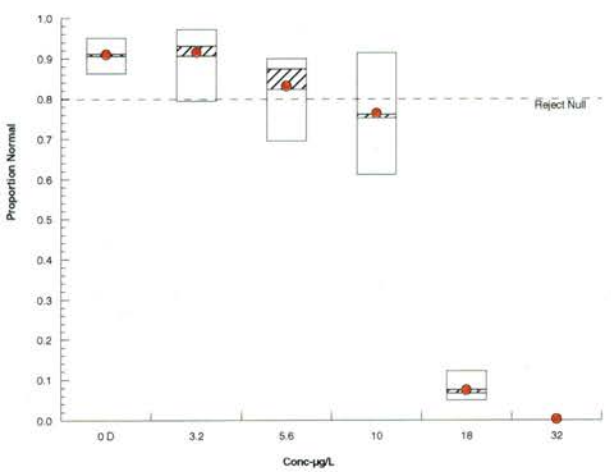
Angular (Corrected) Transformed Detail

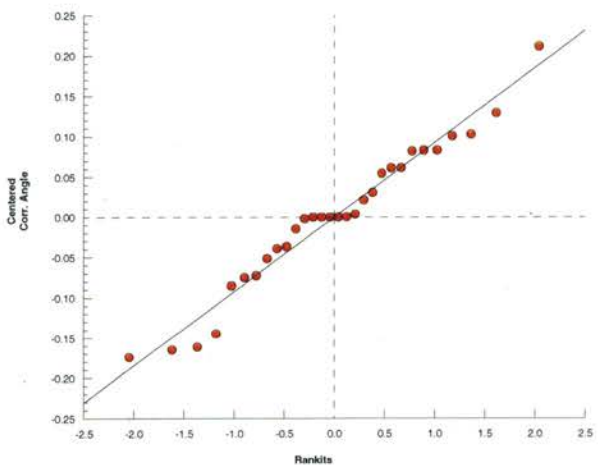
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.349	1.327	1.191	1.193	1.269
3.2		1.328	1.234	1.304	1.403	1.1
5.6		0.9856	1.208	1.249	1.229	1.062
10		0.898	0.918	1.163	1.061	1.274
18		0.2244	0.2612	0.2391	0.3578	0.2971
32		0.04977	0.04953	0.04929	0.04929	0.04929

Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	98/103	97/103	94/109	89/103	93/102
3.2		98/104	90/101	94/101	104/107	81/102
5.6		82/118	90/103	99/110	95/107	77/101
10		63/103	65/103	91/108	83/109	96/105
18		5/101	7/105	6/107	13/106	9/105
32		0/101	0/102	0/103	0/103	0/103

Graphics





Purple Sea Urchin Embryo-Larval Development Test

Granite Canyon

Analysis ID:	01-1126-4329	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 15:54	**Analysis:**	Untrimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	05-5997-2709	**Test Type:**	Development	**Analyst:**	
Start Date:	01 Oct-19	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	04 Oct-19	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Test Length:	72h	**Taxon:**	Echinoidea	**Source:**	**Age:**
Sample ID:	06-1059-5427	**Code:**	2464F263	**Project:**	Dispersant
Sample Date:	10 Apr-20 15:53	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	10 Apr-20 15:43	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.09423	0.00%	1.083209	0.006002	12.11	11.78	12.45

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.9063	0.8	>>	Yes	Passes Criteria

Proportion Normal Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Dev**	**CV%**	**%Effect**	**A/B**	**Mean**	**%Effect**
0	D	5	0.9063	0.8624	0.9515	0.0419	4.63%	0.0%	471/520	0.9063	0.0%
3.2		5	0.9060	0.7941	0.9720	0.0690	7.61%	0.03%	467/515	0.906	0.03%
5.6		5	0.8238	0.6949	0.9000	0.0905	10.99%	9.1%	443/539	0.8238	9.1%
10		5	0.7522	0.6117	0.9143	0.1313	17.45%	17.0%	398/528	0.7522	17.0%
18		5	0.0761	0.0495	0.1226	0.0294	38.61%	91.6%	40/524	0.07612	91.6%
32		5	0.0000	0.0000	0.0000	0.0000		100.0%	0/512	0	100.0%

Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.9515	0.9417	0.8624	0.8641	0.9118
3.2		0.9423	0.8911	0.9307	0.9720	0.7941
5.6		0.6949	0.8738	0.9000	0.8879	0.7624
10		0.6117	0.6311	0.8426	0.7615	0.9143
18		0.0495	0.0667	0.0561	0.1226	0.0857
32		0.0000	0.0000	0.0000	0.0000	0.0000

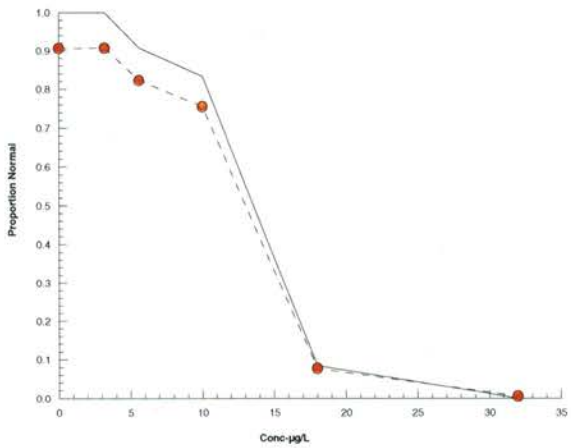
Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	98/103	97/103	94/109	89/103	93/102
3.2		98/104	90/101	94/101	104/107	81/102
5.6		82/118	90/103	99/110	95/107	77/101
10		63/103	65/103	91/108	83/109	96/105
18		5/101	7/105	6/107	13/106	9/105
32		0/101	0/102	0/103	0/103	0/103

Purple Sea Urchin Embryo-Larval Development Test — **Granite Canyon**

Analysis ID:	01-1126-4329	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.6
Analyzed:	10 Apr-20 15:54	**Analysis:**	Untrimmed Spearman-Kärber	**Status Level:**	1

Graphics



Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 10/1/19

End Date/Time: 10/4/19

Project: SP Dispersant RF

Spp./Species Lot #: WILD

Sample Type: water

WQ Meter ID: A2

Date: 10/1/19

Test Temperature: 14.9

Water Batch #: NA

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.40	9.58	0.824	7.89	34.1	UR	
1.8	7.51	9.60	0.824	7.91	34.3		
3.2	7.53	9.53	0.824	7.85	34.3		
5.6	7.53	9.57	0.824	7.88	34.4		
10	7.58	9.58	0.824	7.89	34.4		
18	7.58	9.58	0.824	7.89	34.4		
32	7.61	9.59	0.824	7.90	34.4		
56	7.61	9.60	0.824	7.91	34.4		
100	7.61	9.75	0.824	8.03	34.0	UR	
Ø	7.61	9.66	0.824	7.96	34.1	UR	
3.2	7.64	9.62	0.824	7.93	34.3		
5.6	7.64	9.62	0.824	7.93	34.3		
10	7.66	9.68	0.824	7.98	34.3		
18	7.66	9.84	0.819	8.05	34.6		
32	7.66	9.77	0.819	8.00	34.6		
Initials	JV	JV	JV	JV	JV	JV	

CURT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.01	100.2	35.4	Certified Std.	10.0
			35	
7.09	102.5	35.6		9.5
Initials JV	JV	JV		JV

pH slope: 97.8 DO temp: 16.0

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 10/1/19

End Date/Time: 10/4/19

Project: SP Dispersant RF

Spp./Species Lot #: WILD

Sample Type: Water

WQ Meter ID: A2

Date: 10/4/19

Test Temperature: 14.9

Water Batch #: NA

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.46	9.53	0.819	7.81	35.4	0.0	
1.8	7.51	9.54	0.814	7.77	35.9	0.0	
3.2	7.54	9.55	0.814	7.77	35.9	0.1	
5.6	7.57	9.55	0.814	7.77	35.9	0.1	
10	7.60	9.59	0.814	7.80	35.8	0.4	
18	7.65	9.60	0.814	7.81	35.8	UR	
32	7.68	9.56	0.814	7.78	35.8	0.1	
56	7.68	9.50	0.814	7.73	35.8	0.1	
100	7.70	9.38	0.819	7.68	34.9	UR	
Ø	7.74	9.41	0.819	7.71	35.4	0.0	
32	7.77	9.58	0.819	7.85	35.1		
5.6	7.77	9.67	0.819	7.92	35.2		
10	7.79	9.71	0.819	7.95	35.3		
18	7.79	9.74	0.819	7.98	35.3		
32	7.79	9.73	0.819	7.97	35.2		
Initials	LD	LD	LD	LD	LD	JV	

CURT

Water Quality Precision and Accuracy

pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.00	101.1	35.6	Certified Std.	9.4
7.07	99.9	35.5	35.0	9.8
Initials	LD	LD	LD	JV

pH slope: 98.1 DO temp: 17.4

Marine Pollution Studies Laboratory
Urchin Development Worksheet
Project: DISPERSANT 2019

Date: 10/1/19
Species Lot #: —
Species: SP

Exact times: Urchins injected: 0950
Test initiated (innoculated): 1050
Initials: BP

Sperm dilution factor:

Fix one ml of sperm solution in 10 mL Glacial Acetic Acid and 89 ml seawater.
Count this solution on the hemocytometer.

X = #sperm counted = 96 112 100 mean = 106

DF= (X)(0.2) See Protocol for Derivation

DF= 21.2 one part sperm, 20.2 parts water

Egg dilution factor:

Place one ml of egg dilution on the Sedgewick-Rafter chamber and count three micrometer swaths.

X = # eggs counted = 270 258 251 mean = 265

DF= (X)(4.425) / 1000 (for **OLYMPUS** scope only)

DF= 1.17 one part eggs, 0.17 parts water

Test initiation:

Combine equal amounts of the sperm dilution and egg dilution calculated from above in a separate beaker (X mls). This dilution has 500 embryos/100µL. Add X mls of dilution water to the embryo solution for a final density of 250 embryos/100µL. Wait 10 minutes before checking fertilization. After confirming fertilization, innoculate the test with 100µL embryo dilution.

After 10 minutes count percent fertilization: 98 99 ___

2nd count if not >95%: ___ ___ ___

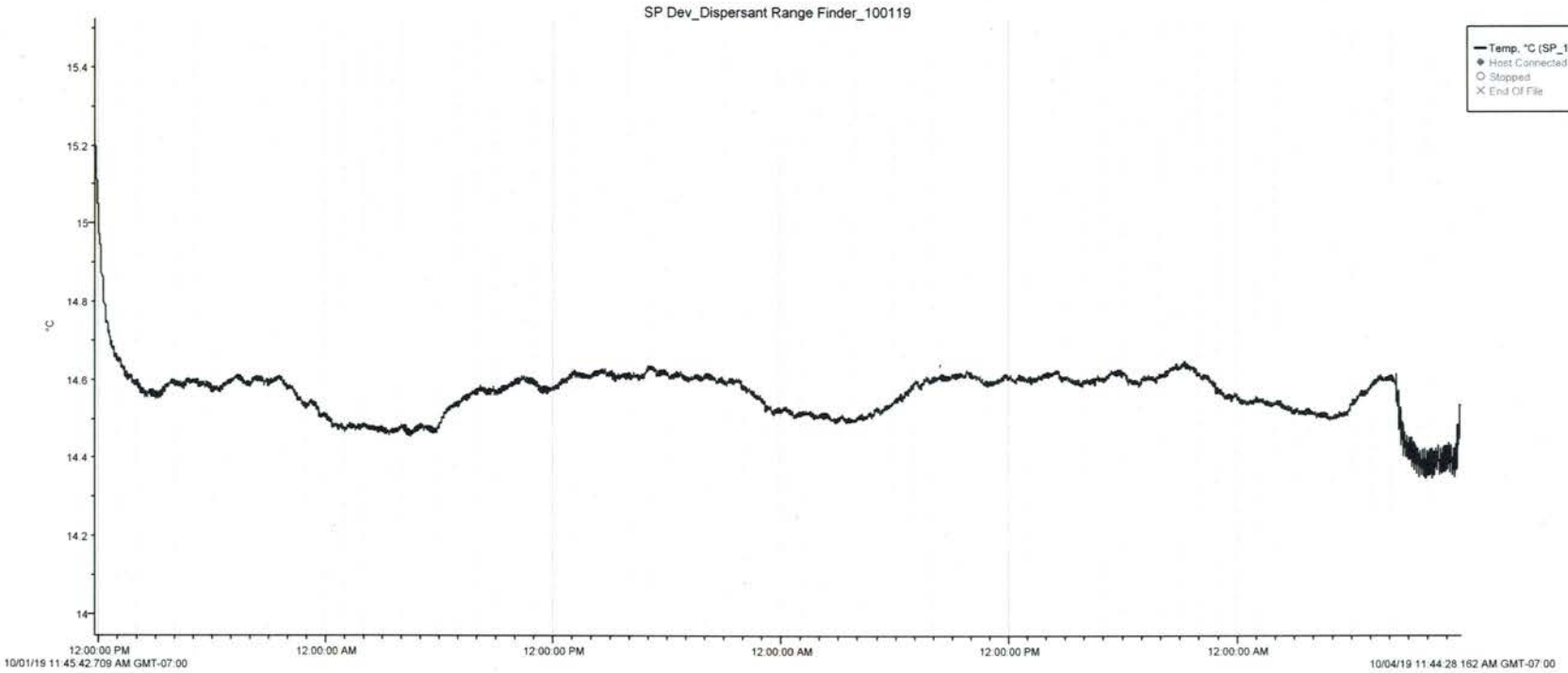
Embryo Density Check:

Count three separate volumes of 100µL of embryo dilution:

228 270 ___

If density is above or below 250 ± 25 embryos/100µL, adjust density and recount.

___ ___ ___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Temp, °C (SP_100119)
Host Connected
Stopped
End Of File
°C
15.4
15.2
15
14.8
14.6
14.4
14.2
14
12:00:00 PM
12:00:00 AM
12:00:00 PM
12:00:00 AM
12:00:00 PM
12:00:00 AM
10/01/19 11:45:42.709 AM GMT-07:00
10/04/19 11:44:28.162 AM GMT-07:00

Dispersant - Urchin Development 72-Hour Definitive - 4/17/20

Concentration	Vial	Replicate	Normal	Abnormal	% Normal	Mean	SD	
0	6	1	99	5	95	95	2.9	
	12	2	90	10	90			
	25	3	99	3	97			
	35	4	96	6	94			
	38	5	100	3	97			
3.2	10	1	102	2	98	96	1.7	
	26	2	94	6	94			
	27	3	112	4	97			
	37	4	97	6	94			
	40	5	96	4	96			
5.6	1	1	98	2	98	97	1.7	
	13	2	112	5	96			
	14	3	101	3	97			
	17	4	114	2	98			
	30	5	96	6	94			
10	7	1	96	4	96	94	1.8	
	9	2	102	9	92			
	21	3	95	5	95			
	24	4	114	5	96			
	39	5	94	7	93			
18	4	1	105	9	92	92	1.8	
	11	2	96	7	93			
	15	3	102	6	94			
	28	4	109	9	92			
	32	5	94	11	90			
32	3	1	40	60	40	34	4.5	
	5	2	36	64	36			
	20	3	31	73	30			
	22	4	29	71	29			
	36	5	37	71	34			
56	8	1	0	100	0	0	0.0	
	16	2	0	100	0			
	18	3	0	100	0			
	23	4	0	100	0			
	29	5	0	100	0			
100	2	1	0	100	0	0	0.0	
	19	2	0	100	0			
	31	3	0	100	0			
	33	4	0	100	0			
	34	5	0	100	0			

Marine Pollution Studies Laboratory
Data Sheet for Urchin Development Test Final Count

Project: Dispersant Definitive
Sample Type: Dispersant
Sea Urchin Source: GC

Start Date/Time: ~~4/17/20~~ 4/17/20
End Date/Time: 4/20/20
Sea Urchin Lot #: NA -wild

Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
1	98	2	
2	0	100	
3	40	60	
4	105	9	
5	36	64	
6	99	5	
7	96	4	
8	0	100	
9	102	2	
10	102	2	
11	96	7	
12	90	10	
13	112	5	
14	101	3	
15	102	6	
16	0	100	
17	114	2	
18	0	100	
19	0	100	
20	31	73	
21	95	5	
22	29	71	
23	0	100	
24	114	5	
25	99	3	
26	94	6	
27	112	4	
28	109	9	
29	0	100	
30	94	6	
31	0	100	
32	34	11	
33	0	100	
34	0	100	
35	94	6	
36	37	71	
37	97	6	
38	105	3	
39	94	7	
40	96	4	
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			

Vial	Normal Larvae	Abnormal Larvae	Notes and Initials
51			
52			
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CETIS Analytical Report

Purple Sea Urchin Embryo-Larval Development Test — **Granite Canyon**

Analysis ID:	14-7902-4302	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	16 Jul-20 12:54	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	14-7175-7014	**Test Type:**	Development	**Analyst:**	
Start Date:	17 Apr-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	20 Apr-20	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	72h	**Source:**		**Age:**	
Sample ID:	17-1527-8211	**Code:**	663D1183	**Client:**	Internal Lab
Sample Date:	17 Apr-20	**Material:**	Corexit	**Project:**	
Receive Date:	17 Apr-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	In House		

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	10	18	13.42		8.44%

Dunnett Multiple Comparison Test

Control	vs	C-uL/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		3.2	0.1373	2.36	0.127	8	0.7896	CDF	Non-Significant Effect
		5.6	0.5923	2.36	0.127	8	0.6060	CDF	Non-Significant Effect
		10	0.8277	2.36	0.127	8	0.4982	CDF	Non-Significant Effect
		18*	2.397	2.36	0.127	8	0.0466	CDF	Significant Effect
		32*	12.72	2.36	0.127	8	<0.0001	CDF	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9256	0.8 - NL	Yes	Passes Acceptability Criteria
PMSD	0.08444	NL - 0.25	No	Passes Acceptability Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.770981	0.3541962	5	48.93	<0.0001	Significant Effect
Error	0.1737214	0.007238392	24			
Total	1.944702		29			

CETIS Analytical Report

Report Date: 16 Jul-20 12:55 (p 1 of 1)
Test Code: CXSP3-041720 | 14-7962-1847

Purple Sea Urchin Embryo-Larval Development Test

Granite Canyon

Analysis ID:	00-5493-7031	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.4
Analyzed:	16 Jul-20 12:55	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	14-7175-7014	**Test Type:**	Development	**Analyst:**	
Start Date:	17 Apr-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	20 Apr-20	**Species:**	Strongylocentrotus purpuratus	**Brine:**	
Duration:	72h	**Source:**		**Age:**	
Sample ID:	17-1527-8211	**Code:**	663D1183	**Client:**	Internal Lab
Sample Date:	17 Apr-20	**Material:**	Corexit	**Project:**	
Receive Date:	17 Apr-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	In House		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0.07436	1.06%	1.432	0.006873	27.06	26.22	27.93

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	0.9256	0.8 - NL	Yes	Passes Acceptability Criteria

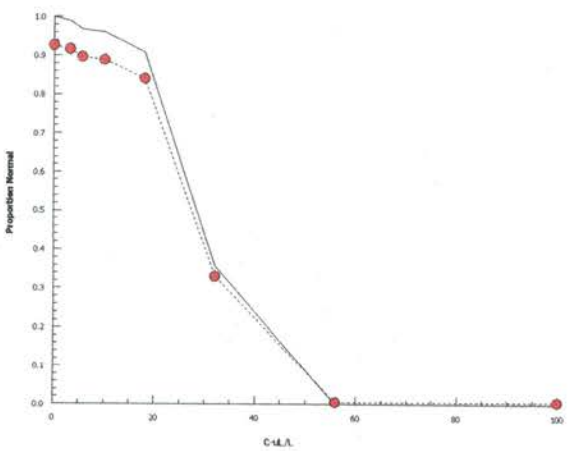
Proportion Normal Summary

			Calculated Variate(A/B)								
C-uL/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	5	0.9256	0.9	0.951	0.009284	0.02076	2.24%	0.0%	473	511
3.2		5	0.9182	0.8362	0.96	0.02186	0.04888	5.32%	0.79%	479	523
5.6		5	0.8999	0.8205	0.98	0.02941	0.06576	7.31%	2.77%	483	539
10		5	0.8933	0.8067	0.96	0.03168	0.07084	7.93%	3.49%	472	531
18		5	0.8434	0.7797	0.9029	0.02219	0.04961	5.88%	8.87%	461	548
32		5	0.3307	0.2885	0.4	0.02163	0.04836	14.6%	64.3%	169	512
56		5	0	0	0	0	0		100.0%	0	500
100		5	0	0	0	0	0		100.0%	0	500

Proportion Normal Detail

C-uL/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.9135	0.9	0.951	0.9216	0.9417
3.2		0.9423	0.94	0.8362	0.9126	0.96
5.6		0.98	0.8205	0.9327	0.8448	0.9216
10		0.96	0.8288	0.95	0.8067	0.9208
18		0.807	0.9029	0.8704	0.7797	0.8571
32		0.4	0.36	0.2885	0.29	0.3148
56		0	0	0	0	0
100		0	0	0	0	0

Graphics



Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 4/17/20

End Date/Time: 4/20/20

Project: SP Dispersant Definitive

Spp./Species Lot #: Wild

Sample Type: Water

WQ Meter ID: A2

Date: 4/20/20

Test Temperature: 13.8

Water Batch #: NA

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)	Notes
Ø	8.00	10.38	0.824	8.55	34.5	~~0.2~~ 0.1	
3.2	8.03	10.36	0.824	8.54	34.5	UR	
5.6	8.03	10.42	0.819	8.53	34.6	0.0	
10	8.03	10.42	0.819	8.53	34.6	UR	
18	8.03	10.42	0.819	8.53	34.7	UR	
32	8.03	10.49	0.819	8.59	34.8	-0.1	
56	8.03	10.44	0.819	8.55	34.8	0.0	
100	8.00	10.44	0.819	8.55	35.4	-0.1	
Ø	8.02	10.44	0.819	8.55	35.0	UR	
3.2	8.02	10.48	0.819	8.58	35.0	|	
5.6	8.02	10.62	0.819	8.70	35.0	|	
10.0	8.02	10.60	0.819	8.73	35.3	|	
18.0	8.04	10.74	0.819	8.80	35.3	|	
32.0	8.04	10.74	0.819	8.80	35.4	|	
Initials	JV	JV	JV	JV	JV	JV	

Cu Cl2 Ref. Tox.

Water Quality Precision and Accuracy

pH 7	DO 100%	Salinity (ppt)		Ammonia (10 mg/L N)
7.01	100.7	34.9	Certified Std.	9.0
			35	
7.02	107.9	35.2		9.8
Initials JV	JV	JV		JV

pH slope: 98.2 DO temp: 15.8

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 4/17/20

End Date/Time: 4/20/20

Project: SP Dispersant Definitive

Spp./Species Lot #: Wild

Sample Type: Water

WQ Meter ID: A2

Date: 4/17/20

Test Temperature: 14.1°C

Water Batch #: NA

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/L NH3)	Notes
Ø	7.65	10.18	0.824	8.39	33.8	0.2	
3.2	7.82	10.26	0.824	8.45	33.9		
5.6	7.85	10.23	0.824	8.43	33.9		
10	7.85	10.23	0.824	8.43	34.4		
18	7.85	10.23	0.824	8.43	34.3		
32	7.85	10.23	0.824	8.43	34.3		
56	7.85	10.17	0.824	8.38	34.3		
100	7.85	10.18	0.824	8.39	34.3	0.5	
Ø	7.65	10.18	0.824	8.39	33.8	0.2	
3.2	7.85	10.30	0.824	8.49	34.2		
5.6	7.85	10.27	0.824	8.46	34.4		
10	7.86	10.31	0.824	8.50	34.3		
18	7.86	10.31	0.824	8.50	34.3		
32	7.86	10.29	0.824	8.48	34.3		
Initials	KF	KF	KF	KF	KF	KF	

CuCl2 Ref. Tox.

Water Quality Precision and Accuracy

pH 7	DO 100%	Salinity (ppt)		Ammonia (10 mg/L N)
7.01	100.2	34.9	Certified Std.	11.0
—	—	—	35‰	—
7.02	100.5	34.3		10.7
KF	KF	KF		KF

pH slope: 98.3 DO temp: 15.6

Marine Pollution Studies Laboratory
Urchin Development Worksheet
Project: Dispersant Definitive DISPERSANT PROJECT Date: 4/17/20
Species Lot #: Wild
Species: SP

Exact times: Urchins injected: 1215
Test initiated (innoculated): 1310
Initials: RF

Sperm dilution factor:

Fix one ml of sperm solution in 10 mL Glacial Acetic Acid and 89 ml seawater. Count this solution on the hemocytometer.

X = #sperm counted = 17 22 ___ mean = 19.5

DF= (X)(0.2) See Protocol for Derivation

DF= 3.9 one part sperm, 2.9 parts water

Egg dilution factor:

Place one ml of egg dilution on the Sedgewick-Rafter chamber and count three micrometer swaths.

X = # eggs counted = 235 221 ___ mean = 228

DF= (X)(4.425) / 1000 (for **OLYMPUS** scope only)

DF= 1 one part eggs, ∅ parts water

Test initiation:

Combine equal amounts of the sperm dilution and egg dilution calculated from above in a separate beaker (X mls). This dilution has 500 embryos/100µL. Add X mls of dilution water to the embryo solution for a final density of 250 embryos/100µL. Wait 10 minutes before checking fertilization. After confirming fertilization, innoculate the test with 100µL embryo dilution.

After 10 minutes count percent fertilization: 99% ___ ___

2nd count if not >95%: ___ ___ ___

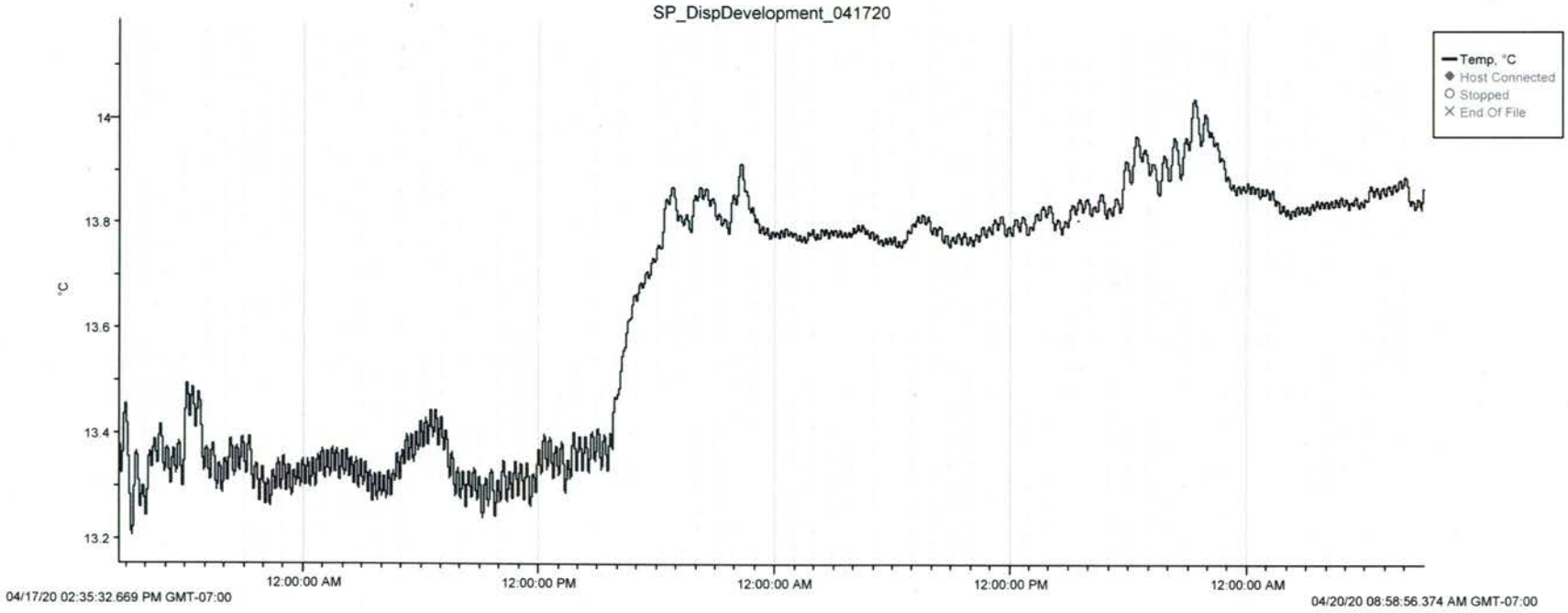
Embryo Density Check:

Count three separate volumes of 100µL of embryo dilution:

280 268 ___

If density is above or below 250 ± 25 embryos/100µL, adjust density and recount.

___ ___ ___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°C
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13.6
13.4
13.2
12:00:00 AM
12:00:00 PM
12:00:00 AM
12:00:00 PM
12:00:00 AM
04/17/20 02:35:32.669 PM GMT-07:00
04/20/20 08:58:56.374 AM GMT-07:00

CEWAF Rangefinder - Mysid - 1/29/20

Conc. (% CEWAF)	Conc. (g/L)	TPH mg/L	Vial	Replicate	Alive	Start	% Survival	Mean	SD
0	0	0	1	1	10	10	100	100	0.0
			2	2	10	10	100		
			3	3	10	10	100		
			4	4	10	10	100		
			5	5	10	10	100		
3.125	0.78	19.9	6	1	2	10	20	30	14.1
			7	2	2	10	20		
			8	3	5	10	50		
			9	4	2	10	20		
			10	5	4	10	40		
6.25	1.56	39.9	11	1	0	10	0	0	0.0
			12	2	0	10	0		
			13	3	0	10	0		
			14	4	0	10	0		
			15	5	0	10	0		
12.5	3.125	79.8	16	1	0	10	0	0	0.0
			17	2	0	10	0		
			18	3	0	10	0		
			19	4	0	10	0		
			20	5	0	10	0		
25	6.25	160	21	1	0	10	0	0	0.0
			22	2	0	10	0		
			23	3	0	10	0		
			24	4	0	10	0		
			25	5	0	10	0		
50	12.5	319	26	1	0	10	0	0	0.0
			27	2	0	10	0		
			28	3	0	10	0		
			29	4	0	10	0		
			30	5	0	10	0		
100% CEWAF =	25 g/L								
100% CEWAF =	638 mg/L TPH								

Marine Pollution Studies Laboratory
Americamysis 4-day Acute Toxicity Test
Feeding: 50 Artemia nauplii per mysid, 2x daily

Project: CEWAF1 Mysids **Start Date/Time:** 1/29/20

~~Water Batch #~~: _____ **End Date/Time:** ~~2/2/20~~ 1/31/20

Lot #: AB012820

Cont.#	Station Name	Number at Start	Number Alive		Notes
			Day 1	Day 2	
1	Ø	10	10	10	
2			10	10	
3			10	10	
4			10	10	
5			10	10	
6	~~6.25~~ 3.125		7	2	
7			9	2	
8			9	5	
9			10	2	
10			10	4	
11	~~12.5~~ 6.25		9	Ø	
12			8	Ø	
13			9	Ø	
14			5	Ø	
15			8	Ø	
16	~~25~~ 12.5		7	Ø	
17			8	Ø	
18			7	Ø	
19			6	Ø	
20			7	Ø	
21	~~50~~ 25	20	Ø	—	
22		10	Ø	—	
23			Ø	—	
24			Ø	—	
25			Ø	—	
26	~~100~~ 50		Ø	—	
27			Ø	—	
28			Ø	—	
29			Ø	—	
30		10	Ø	—	
Initials		LH, KF	JV	JV	

Mysidopsis 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	16-9656-0784	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 16:21	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	03-2794-3624	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	29 Jan-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	31 Jan-20	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	48h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	12-4385-9410	**Code:**	4A23C9D2	**Client:**	
Sample Date:	29 Jan-20	**Material:**	Corexit	**Project:**	
Receive Date:	29 Jan-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	Test Result	PMSD
Angular (Corrected)	NA	C > T	NA	NA	Sample fails 48h survival rate endpoint	7.95%

Dunnett Multiple Comparison Test

Control	vs	C-mg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		19.9*	12.28	1.86	0.127	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.763177	1.763177	1	150.9	<0.0001	Significant Effect
Error	0.09346489	0.01168311	8			
Total	1.856642		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	2.807	13.7	0.1449	Equal Variances
Variances	Levene Equality of Variance	39.45	11.3	0.0002	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8424	0.741	0.0471	Normal Distribution

48h Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1	1	1	1	1	1	0	0.0%	0.0%
19.9		5	0.3	0.1244	0.4756	0.2	0.2	0.5	0.06325	47.1%	70.0%
39.9		5	0	0	0	0	0	0	0		100.0%
79.8		5	0	0	0	0	0	0	0		100.0%
160		5	0	0	0	0	0	0	0		100.0%
319		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
19.9		5	0.5722	0.3824	0.762	0.4636	0.4636	0.7854	0.06836	26.7%	59.5%
39.9		5	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.8%
79.8		5	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.8%
160		5	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.8%
319		5	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0	0.0%	88.8%

48h Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	1	1
19.9		0.2	0.2	0.5	0.2	0.4
39.9		0	0	0	0	0
79.8		0	0	0	0	0
160		0	0	0	0	0
319		0	0	0	0	0

CETIS Analytical Report

Mysidopsis 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	14-7551-5110	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 16:22	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	03-2794-3624	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	29 Jan-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	31 Jan-20	**Species:**	Mysidopsis bahia	**Brine:**	
Duration:	48h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	12-4385-9410	**Code:**	4A23C9D2	**Client:**	
Sample Date:	29 Jan-20	**Material:**	Corexit	**Project:**	
Receive Date:	29 Jan-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	1066488	200	Yes	Two-Point Interpolation

Point Estimates

Level	mg/L	95% LCL	95% UCL
LC5	0.2425	0.1926	0.3112
LC10	0.5438	0.4215	0.7176
LC15	0.9182	0.6932	1.248
LC20	1.383	1.016	1.94
LC25	1.961	1.398	2.842
LC40	4.68	3.017	7.541
LC50	7.769	4.643	13.5

48h Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	5	1	1	1	0	0	0.0%	0.0%	50	50
19.9		5	0.3	0.2	0.5	0.06325	0.1414	47.1%	70.0%	15	50
39.9		5	0	0	0	0	0		100.0%	0	50
79.8		5	0	0	0	0	0		100.0%	0	50
160		5	0	0	0	0	0		100.0%	0	50
319		5	0	0	0	0	0		100.0%	0	50

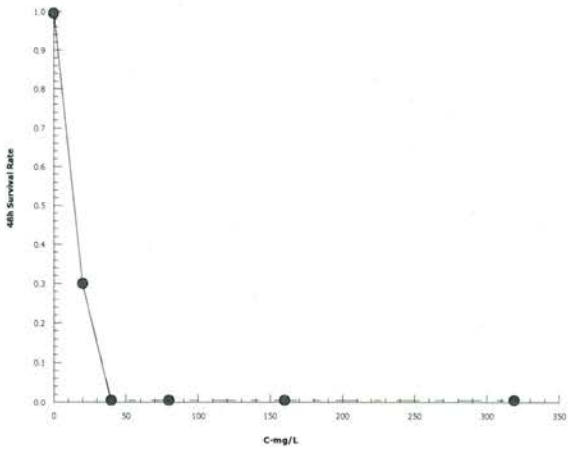
48h Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	1	1
19.9		0.2	0.2	0.5	0.2	0.4
39.9		0	0	0	0	0
79.8		0	0	0	0	0
160		0	0	0	0	0
319		0	0	0	0	0

Mysidopsis 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	14-7551-5110	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 16:22	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CEWAF 1 - *Americamysis* (Mysid) 48 Hour - Ref Tox - 1/29/20

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Prop.	Mean	SD
0	1	1	10	10	10	1.00	1.00	0.00
	2	2	10	10	10	1.00		
	3	3	10	10	10	1.00		
	4	4	10	10	10	1.00		
	5	5	10	10	10	1.00		
32	6	1	10	9	9	0.90	0.94	0.09
	7	2	10	9	8	0.80		
	8	3	10	10	10	1.00		
	9	4	10	10	10	1.00		
	10	5	10	10	10	1.00		
56	11	1	10	10	10	1.00	1.00	0.00
	12	2	10	10	10	1.00		
	13	3	10	10	10	1.00		
	14	4	10	10	10	1.00		
	15	5	10	10	10	1.00		
100	16	1	10	10	10	1.00	1.00	0.00
	17	2	10	10	10	1.00		
	18	3	10	10	10	1.00		
	19	4	10	10	10	1.00		
	20	5	10	10	10	1.00		
180	21	1	10	10	10	1.00	0.98	0.04
	22	2	10	10	10	1.00		
	23	3	10	10	10	1.00		
	24	4	10	10	10	1.00		
	25	5	10	9	9	0.90		
320	26	1	10	9	9	0.90	0.96	0.05
	27	2	10	10	10	1.00		
	28	3	10	10	10	1.00		
	29	4	10	9	9	0.90		
	30	5	10	10	10	1.00		

Ref. Tox. Failed - No dose Response. - LM

Marine Pollution Studies Laboratory
Americamysis 4-day Acute Toxicity Test
Feeding: 50 Artemia nauplii per mysid, 2x daily

RefTox

Project: CEWAF1 Mysids **Start Date/Time:** 1/29/20

~~Water Batch #:~~ _____ **End Date/Time:** ~~2/2/20~~ 1/31/20

Lot #: AB012820

Cont.#	Station Name	Number at Start	Number Alive		Notes
			Day 1	Day 2	
1	Ø	10	10	10	
2			10	10	
3			10	10	
4			10	10	
5			10	10	
6	32		~~10~~ 9	9	
7			9	8	
8			10	10	
9			10	10	
10			10	10	
11	56		10	10	
12			10	10	
13			10	10	
14			10	10	
15			10	10	
16	100		10	10	
17			10	10	
18			10	10	
19			10	10	
20			10	10	
21	180		10	10	
22			10	10	
23			10	10	
24			10	10	
25			9	9	
26	320		9	9	
27			10	10	
28			10	10	
29			9	9	
30		10	10	10	
Initials		LM, KF	JV	JV	

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 1/29/20

End Date/Time: ~~2/2/20~~ 1/31/20

Project: CEWAF 1

Sample Type: water

Date: 1/29/20

~~Water Batch #:~~

Spp./Species Lot #: AB012820

WQ Meter ID: A2

Test Temperature: 25.4

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	8.06	9.66	0.843	8.14	30.1	0.1	
~~6.25~~ 3.125	8.17	9.51	0.843	8.02	30.3		
~~12.5~~ 6.25	8.17	9.18	0.843	7.74	30.3		
~~25~~ 12.5	8.17	9.16	0.843	7.72	30.3		
~~50~~ 25	8.09	8.57	0.843	7.22	30.5		
~~100~~ 50	7.94	7.60	0.838	6.37	31.1	0.6	
Ø	8.06	9.66	0.843	8.14	30.1	0.1	
32	8.10	7.89	0.833	6.57	31.6		
56	8.10	7.80	0.833	6.50	31.3		
100	8.10	7.77	0.833	6.47	31.2		
180	8.10	7.77	0.833	6.47	30.9		
320	8.13	7.70	0.833	6.41	30.6		
Initials	JV	JV	JV	JV	JV	JV	

Cu RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.01	100.9	35.0	Certified Std.	10.4
			35	
7.01	101.2	35.7		10.7
Initials JV	JV	JV		JV

pH slope: 97.7 DO temp: 20.2

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 1/29/20

End Date/Time: 1/31/20

Project: CEWAF1 Mysids

Spp./Species Lot #: AB012820

Sample Type: Water

WQ Meter ID: A2

Date: ~~2/1~~ 1/31/20

Test Temperature: 25.6

~~Water Batch #~~:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.83	6.58	0.833	5.48	31.7	0.5	
~~6.25~~ 3.125	7.83	6.16	0.833	5.13	31.7	1.1	
~~12.5~~ 6.25	7.77	5.50	0.838	4.61	31.2	0.4	
~~25~~ 12.5	7.74	4.98	0.838	4.17	31.4	0.6	
~~50~~ 25	7.61	5.34	0.838	4.47	30.8	0.1	
~~100~~ 50	7.56	4.26	0.838	3.57	30.9	-0.1	
	6.99/6.99	101.0/96.9			34.9/35.2	9.8/9.9	1/30/20 JV
	97.4%	23.0					
Initials	JV	JV	JV	JV	JV	JV	

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.02	100.7	35.0	Certified Std.	9.9
			35	
7.02	92.7	35.8		10.4
Initials	JV	JV	JV		JV

pH slope: 97.5 DO temp: 23.2

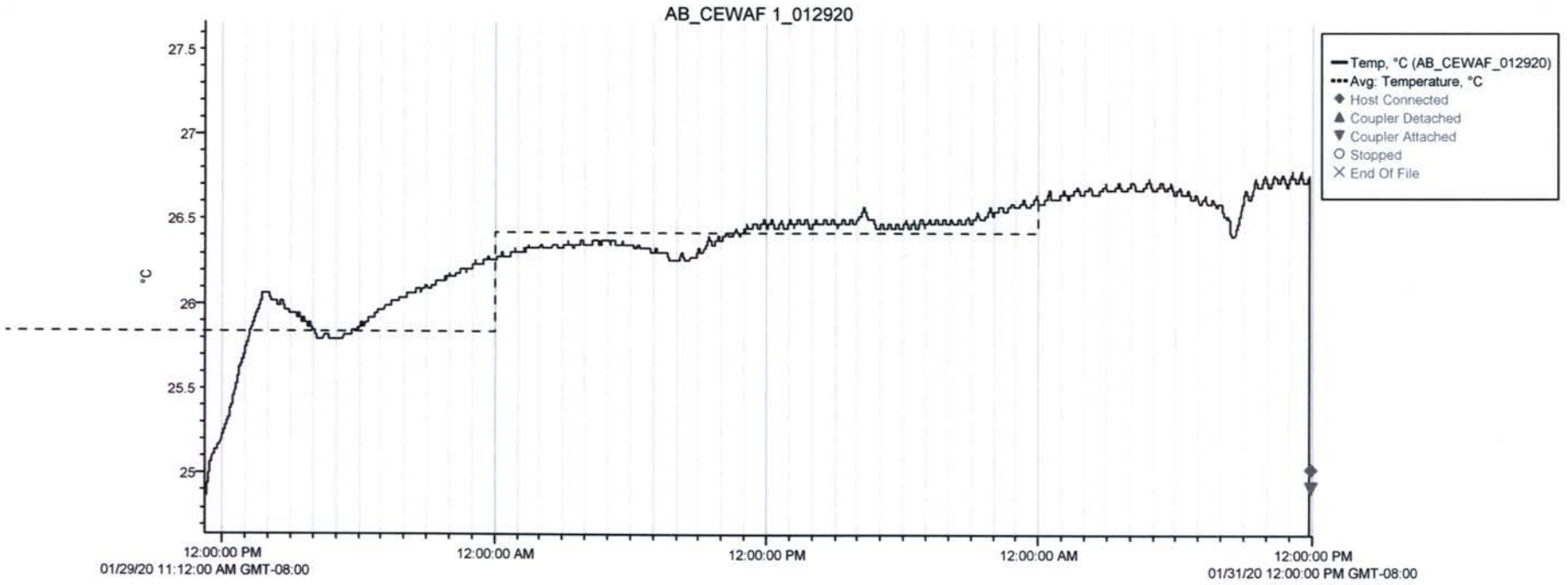
Marine Pollution Studies Laboratory
Americamysis Water Test Daily Log

Start Date/Time: 1/29/20
End Date/Time: ~~2/2/20~~ 1/31/20
Species Lot #: AB012820
WQ Meter ID: A2

Project: CEWAF | Mysids
Sample Type: Water

	Wed	Thu	Fri
Day	0	1	2
Start Temp Logger	✓		
Test Temperature	25.4	25.4	25.6
Ref Tox Temperature	26.0	25.8	25.5
Count Critters	✓	✓	✓
Feed (50 naups/mysid) AM	✓	✓	—
Feed (50 nausp/mysid) PM	✓	✓	—
Initials	ALL	JV LM	JV

↓0.5°C - KF


AB_CEWAF 1_012920
27.5
27
26.5
26
25.5
25
°C
Temp, °C (AB_CEWAF_012920)
Avg: Temperature, °C
Host Connected
Coupler Detached
Coupler Attached
Stopped
End Of File
12:00:00 PM
01/29/20 11:12:00 AM GMT-08:00
12:00:00 AM
12:00:00 PM
12:00:00 AM
12:00:00 PM
01/31/20 12:00:00 PM GMT-08:00

Marine Pollution Studies Laboratory
Culture Log

Organism: A. bahia

Organism Source: ABS

Collection Date: 1/27/20

Arrival Date at MPSL: 1/28/20

Test Start Date: 1/29/20

Arrival Temperature at MPSL: 17.5

Arrival Conductivity/Salinity at MPSL: 28

WQ Meter ID: Refractometer

Species Lot #: AB012820

Date	1/28	1/29							
Temperature	22.3	23.5							
Conductivity/ Salinity	27	30							
Aeration	Y	Y							
Organism Health	E	E							
Initials	JV	JV							
Notes	fed naups RN ~25% *	RN 50% Atemp fed naups							

* forgot to cover

Temperature: Measured value (make note if it is adjusted up/down).
Conductivity: Measured value
~~Water flow: yes/no~~
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

Quality Assurance/Quality Control Criteria:

Organisms acclimated to test conductivity at least 48 hours prior to test: (Yes) No

Organisms held at MPSL no more than 2 weeks: (Yes) No

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 1/27/2020

SPECIES: *Americamysis bahia* (formerly Mysidopsis)

AGE: 3 day

LIFE STAGE: Juvenile

HATCH DATE: 1/24/2020

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	25 °C	23-26 °C
SALINITY/CONDUCTIVITY:	30 ppt	21-33 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	135 mg/l	135-195 mg/l
pH:	8.33	7.87-8.34

Comments:

Facility Supervisor

CEWAF Definitive 2 - Mysid - 6/17/20

Conc. (% CEWAF)	Conc. (g/L)	TPH mg/L	Vial	Replicate	Alive	Start	% Survival	Mean	SD
0	0	0	1	1	10	10	100	92	8.4
			2	2	9	10	90		
			3	3	9	10	90		
			4	4	8	10	80		
			5	5	10	10	100		
0.78	0.195	3.78	6	1	10	10	100	94	8.9
			7	2	9	10	90		
			8	3	10	10	100		
			9	4	8	10	80		
			10	5	10	10	100		
1.56	0.39	7.55	11	1	9	10	90	66	20.7
			12	2	7	10	70		
			13	3	8	10	80		
			14	4	5	10	50		
			15	5	4	10	40		
3.125	0.78	15.1	16	1	3	10	30	38	13.0
			17	2	4	10	40		
			18	3	3	10	30		
			19	4	3	10	30		
			20	5	6	10	60		
6.25	1.56	30.2	21	1	2	10	20	14	5.5
			22	2	1	10	10		
			23	3	2	10	20		
			24	4	1	10	10		
			25	5	1	10	10		
12.5	3.125	60.4	26	1	0	10	0	0	0.0
			27	2	0	10	0		
			28	3	0	10	0		
			29	4	0	10	0		
			30	5	0	10	0		
100% CEWAF =	25 g/L								
100% CEWAF =	483 mg/L TPH								

Marine Pollution Studies Laboratory

Americamysis ~~4~~ 2 (KF) day Acute Toxicity Test

Feeding: 50 Artemia nauplii per mysid, 2x daily

Project: CEWAF 3 AB **Start Date/Time:** 6/17/20

~~Water Batch #:~~ **End Date/Time:** ~~6/21/20~~ 6/19/20 (KF)

Lot #: AB061620

Cont.#	Station Name	Number at Start	Number Alive		Notes
			Day 1	Day 2	
1	∅	10	10	10	
2			10	9	
3			10	9	
4			9	8	
5			10	10	
6	0.78%		10	10	
7			10	9	
8			10	10	
9			9	8	
10			10	10	
11	1.56%		10	9	
12			8	7	
13			9	8	
14			9	5	
15			8	4	
16	3.125%		6	3	
17			7	4	
18			7	3	
19			7	3	
20			10	6	
21	4.25%		6	2	
22			5	1	
23			6	2	
24			3	1	
25			5	1	
26	12.5%		~~0~~	—	
27			1	~~0~~	
28			~~0~~	—	
29			~~0~~	—	
30		10	~~0~~	—	
Initials		JV	KF	KF	

CEWAF 3 - *Americamysis* (Mysid) 48 Hour - Ref Tox - 6/17/20

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Prop.	Mean	SD
0	1	1	10	10	10	1.00	100	0.0
	2	2	10	10	10	1.00		
	3	3	10	10	10	1.00		
	4	4	10	10	10	1.00		
	5	5	10	9	10	1.00		
32	6	1	10	10	10	1.00	98	4.5
	7	2	10	9	9	0.90		
	8	3	10	10	10	1.00		
	9	4	10	10	10	1.00		
	10	5	10	10	10	1.00		
56	11	1	10	10	10	1.00	96	5.5
	12	2	10	8	9	0.90		
	13	3	10	10	10	1.00		
	14	4	10	10	10	1.00		
	15	5	10	9	9	0.90		
100	16	1	10	9	9	0.90	98	4.5
	17	2	10	9	10	1.00		
	18	3	10	10	10	1.00		
	19	4	10	10	10	1.00		
	20	5	10	10	10	1.00		
180	21	1	10	9	9	0.90	96	5.5
	22	2	10	10	10	1.00		
	23	3	10	9	9	0.90		
	24	4	10	10	10	1.00		
	25	5	10	10	10	1.00		
320	26	1	10	10	10	1.00	100	0.0
	27	2	10	10	10	1.00		
	28	3	10	10	10	1.00		
	29	4	10	10	10	1.00		
	30	5	10	10	10	1.00		
560	31	1	10	2	0	0.00	6	5.5
	32	2	10	1	0	0.00		
	33	3	10	4	1	0.10		
	34	4	10	3	1	0.10		
	35	5	10	2	1	0.10		
1000	36	1	10	1	0	0.00	2	4.5
	37	2	10	2	0	0.00		
	38	3	10	1	0	0.00		
	39	4	10	1	1	0.10		
	40	5	10	2	0	0.00		

These last two concentrations were added as an experiment. They ran from 6/18/20 to 6/20/20.

Americamysis 48-h Acute Survival Test — **Granite Canyon**

Analysis ID: 13-7299-5165 **Endpoint:** 48h Survival Rate **CETIS Version:** CETISv1.9.6
Analyzed: 28 Jul-20 8:02 **Analysis:** Nonparametric-Control vs Treatments **Status Level:** 1

48h Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	1.0000
32		1.0000	0.9000	1.0000	1.0000	1.0000
56		1.0000	0.9000	1.0000	1.0000	0.9000
100		0.9000	1.0000	1.0000	1.0000	1.0000
180		0.9000	1.0000	0.9000	1.0000	1.0000
320		1.0000	1.0000	1.0000	1.0000	1.0000
560		0.0000	0.0000	0.1000	0.1000	0.1000
1000		0.0000	0.0000	0.0000	0.1000	0.0000

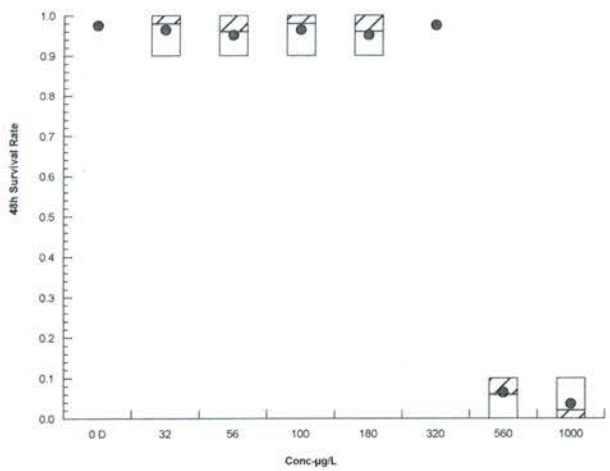
Angular (Corrected) Transformed Detail

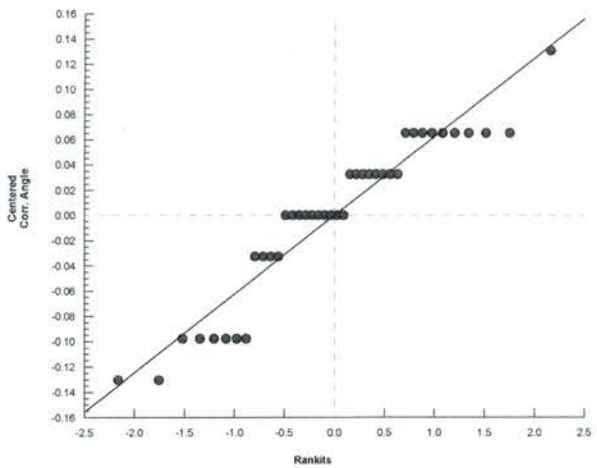
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.412	1.412	1.412	1.412	1.412
32		1.412	1.249	1.412	1.412	1.412
56		1.412	1.249	1.412	1.412	1.249
100		1.249	1.412	1.412	1.412	1.412
180		1.249	1.412	1.249	1.412	1.412
320		1.412	1.412	1.412	1.412	1.412
560		0.1588	0.1588	0.3218	0.3218	0.3218
1000		0.1588	0.1588	0.1588	0.3218	0.1588

48h Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	10/10	10/10	10/10	10/10
32		10/10	9/10	10/10	10/10	10/10
56		10/10	9/10	10/10	10/10	9/10
100		9/10	10/10	10/10	10/10	10/10
180		9/10	10/10	9/10	10/10	10/10
320		10/10	10/10	10/10	10/10	10/10
560		0/10	0/10	1/10	1/10	1/10
1000		0/10	0/10	0/10	1/10	0/10

Graphics





CETIS Analytical Report

Americamysis 48-h Acute Survival Test — **Granite Canyon**

Analysis ID:	06-7361-9834	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	28 Jul-20 8:02	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1
Batch ID:	00-2859-3222	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	17 Jun-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	19 Jun-20	**Species:**	Americamysis bahia	**Brine:**	
Test Length:	48h	**Taxon:**		**Source:**	**Age:**
Sample ID:	03-7067-6452	**Code:**	161812E4	**Project:**	Dispersant - CEWAF
Sample Date:	17 Jun-20	**Material:**	Copper chloride	**Source:**	Reference Toxicant
Receipt Date:	20 Jun-20 15:10	**CAS (PC):**		**Station:**	In House
Sample Age:	n/a	**Client:**	Internal Lab		

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0	2.00%	2.63177	0.01484	428.3	400	458.6

48h Survival Rate Summary

			Calculated Variate(A/B)							Isotonic Variate	
Conc-µg/L	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	A/B	Mean	%Effect
0	D	5	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	50/50	1	0.0%
32		5	0.9800	0.9000	1.0000	0.0447	4.56%	2.0%	49/50	0.98	2.0%
56		5	0.9600	0.9000	1.0000	0.0548	5.71%	4.0%	48/50	0.975	2.5%
100		5	0.9800	0.9000	1.0000	0.0447	4.56%	2.0%	49/50	0.975	2.5%
180		5	0.9600	0.9000	1.0000	0.0548	5.71%	4.0%	48/50	0.975	2.5%
320		5	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	50/50	0.975	2.5%
560		5	0.0600	0.0000	0.1000	0.0548	91.29%	94.0%	3/50	0.06	94.0%
1000		5	0.0200	0.0000	0.1000	0.0447	223.60%	98.0%	1/50	0.02	98.0%

48h Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	1.0000
32		1.0000	0.9000	1.0000	1.0000	1.0000
56		1.0000	0.9000	1.0000	1.0000	0.9000
100		0.9000	1.0000	1.0000	1.0000	1.0000
180		0.9000	1.0000	0.9000	1.0000	1.0000
320		1.0000	1.0000	1.0000	1.0000	1.0000
560		0.0000	0.0000	0.1000	0.1000	0.1000
1000		0.0000	0.0000	0.0000	0.1000	0.0000

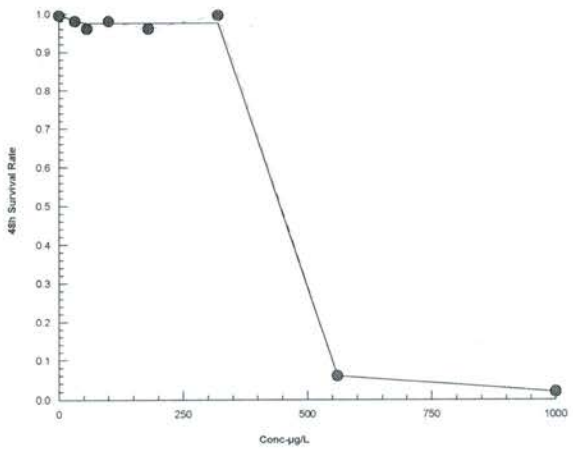
48h Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	10/10	10/10	10/10	10/10	10/10
32		10/10	9/10	10/10	10/10	10/10
56		10/10	9/10	10/10	10/10	9/10
100		9/10	10/10	10/10	10/10	10/10
180		9/10	10/10	9/10	10/10	10/10
320		10/10	10/10	10/10	10/10	10/10
560		0/10	0/10	1/10	1/10	1/10
1000		0/10	0/10	0/10	1/10	0/10

Americamysis 48-h Acute Survival Test — **Granite Canyon**

Analysis ID:	06-7361-9834	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.6
Analyzed:	28 Jul-20 8:02	**Analysis:**	Trimmed Spearman-Kärber	**Status Level:**	1

Graphics



Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 6/17/20

End Date/Time: ~~6/21/20~~ 6/19/20 KF

Project: CEWAF 3 AB

Sample Type: Water

Date: 6/17/20

~~Water Batch #:~~

Spp./Species Lot #: AB0611620

WQ Meter ID: AZ

Test Temperature: 24.9

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.90	7.54	0.833	6.28	31.9	0.5	
0.78%	7.99	7.81	0.838	6.54	31.1		
1.56%	7.99	7.54	0.838	6.32	31.1		
3.125%	7.97	7.86	0.838	6.59	30.9		
6.25%	7.99	7.55	0.838	6.33	31.0		
12.5%	7.96	7.41	0.833	6.17	31.5	-0.5 UR	
Ø	7.90	7.54	0.833	6.28	31.9	0.5	
32	8.01	7.47	0.833	6.22	31.9		
56	8.04	7.28	0.833	6.06	31.7		
100	8.04	7.37	0.833	6.14	31.6		
180	8.04	7.54	0.838	6.32	31.4		
320	8.04	7.43	0.838	6.23	31.0		
560	8.02	7.90	0.843	6.66	29.9		
1000	8.07	7.69	0.852	6.31	28.5		
Initials	ER	ER	ER	ER	ER	KF	

Ctrl RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
6.98	100.0	35.0	Certified Std.	10.0
			35 ppt	—
7.00	100.0	35.0		9.0
Initials ER	ER	ER		KF
pH slope: 97.8	DO temp: 22.4			

6/18/19 7.02 100.2 34.4
JV 7.02 95.3 35.0
98.5 24.1°

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 6/17/20

End Date/Time: ~~6/21/20~~ 6/19/20 (KF)

Project: CEWAF3AB

Spp./Species Lot #: AB061620

Sample Type: Water

WQ Meter ID: A2

Date: ~~6/21/20~~ 6/19/20 (KF)

Test Temperature: 25.1 °C

~~Water~~ Batch #:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	7.74	6.43	0.833	5.36	32.4	0.8	
0.78 %	7.71	6.27	0.838	5.25	31.3	0.7	
1.56 %	7.71	5.84	0.838	4.89	31.3	0.9	
3.125 %	7.68	5.52	0.838	4.63	31.4	0.9	
6.25 %	7.67	5.82	0.833	4.85	31.5	0.8	
12.5 %	7.64	5.46	0.833	4.55	31.5	0.6	
560	7.79	6.72	0.833	5.60	31.5		
1000	7.79	6.69	0.843	5.64	30.0		
Initials	ER	ER	ER	ER	ER	KF	

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
6.99	100.0	36.2	Certified Std.	9.7
				—
6.94	100.0	36.1		9.0
Initials ER	ER	ER		KF

pH slope: 98.0 DO temp: 22.2

JV 6/20/20

7.04 100.0 35.0
7.02 100.2 35.8
98.0 22.1°

Marine Pollution Studies Laboratory
Americamysis Water Test Daily Log

Start Date/Time: 6/17/20
End Date/Time: ~~6/18/20~~ 6/19/20 KF
Species Lot #: ~~A~~ 06/16/20
WQ Meter ID: ~~A2~~

Project: CEWAF 3 AB
Sample Type: Water

	Wed	Thu	Fri
Day	0	1	2
Start Temp Logger	✓		
Test Temperature	24.9	25.0	25.1
Ref Tox Temperature	25.3	25.3	25.1
Count Animals	✓	✓	
Feed (50 naups/mysid) AM		✓	✓
Feed (50 naups/mysid) PM	✓	✓	

Ref. Tox. 31-40 KF

Initials	ALL	KF	

Marine Pollution Studies Laboratory
Culture Log

Organism: A. bahia

Organism Source: ABS

Collection Date: 6/16/20

Arrival Date at MPSL: 6/17/20

Test Start Date: 6/18/20

Arrival Temperature at MPSL: 23.2

Arrival Conductivity/Salinity at MPSL: 28

WQ Meter ID: Refractometer

Species Lot #: AB061720

Date	6/17	6/18	6/19						
Temperature	20.4	19.1	20.9						
Conductivity/ Salinity	27	28	29						
Aeration	Y	Y	Y						
Organism Health	E	E	E						
Initials	JV	KF/LM	LM						
Notes	~~fed~~ Naups RW 5%	fed naups	RW 50% Fed Naups						

Temperature: Measured value (make note if it is adjusted up/down).
Conductivity: Measured value
Water flow: yes/no
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

Quality Assurance/Quality Control Criteria:

Organisms acclimated to test conductivity at least 48 hours prior to test: Yes No

Organisms held at MPSL no more than 2 weeks: Yes No

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 6/16/2020

SPECIES: *Americamysis bahia* (formerly Mysidopsis)

AGE: 2 day

LIFE STAGE: Juvenile

HATCH DATE: 6/14/2020

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	**Current**	**Range**
TEMPERATURE:	25 °C	23-26 °C
SALINITY/CONDUCTIVITY:	30 ppt	21-30 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	140 mg/l	140-190 mg/l
pH:	8.15	7.76-8.28

Comments:

Facility Supervisor

CEWAF Rangefinder - Topsmelt - 1/29/20

Conc. (% CEWAF)	Conc. (g/L)	TPH mg/L	Vial	Replicate	Alive	Start	% Survival	Mean	SD
0	0	0	1	1	5	5	100	92	11.0
			2	2	5	5	100		
			3	3	5	5	100		
			4	4	4	5	80		
			5	5	4	5	80		
3.125	0.78	19.9	6	1	2	5	40	76	21.9
			7	2	4	5	80		
			8	3	4	5	80		
			9	4	5	5	100		
			10	5	4	5	80		
6.25	1.56	39.9	11	1	2	5	40	76	26.1
			12	2	5	5	100		
			13	3	3	5	60		
			14	4	4	5	80		
			15	5	5	5	100		
12.5	3.125	79.8	16	1	1	5	20	56	29.7
			17	2	3	5	60		
			18	3	5	5	100		
			19	4	3	5	60		
			20	5	2	5	40		
25	6.25	160	21	1	0	5	0	0	0.0
			22	2	0	5	0		
			23	3	0	5	0		
			24	4	0	5	0		
			25	5	0	5	0		
50	12.5	319	26	1	0	5	0	0	0.0
			27	2	0	5	0		
			28	3	0	5	0		
			29	4	0	5	0		
			30	5	0	5	0		
100% CEWAF =	25 g/L								
100% CEWAF =	638 mg/L TPH								

Marine Pollution Studies Laboratory
Atherinops 4-day Acute Toxicity Test
Feeding: 40 Artemia nauplii per fish, 2x daily

Project: CEWAF | Topsmelt **Start Date/Time:** 1/29/20

~~Water Batch #:~~ _____ **End Date/Time:** 2/2/20

Fish Lot #: AA012820

Cont.#	Station Name	Number at Start	Number Alive				Notes
			Day 1	Day 2	Day 3	Day 4	
1	Ø	5	5	5	5	5	
2			5	5	5	5	
3			5	5	5	5	
4			4	4	4	4	
5			5	5	5	4	
6	~~6.25~~ 3.25		4	2	2	2	
7			4	4	4	4	
8			5	4	4	4	
9			5	5	5	5	
10			4	4	4	4	
11	~~12.5~~ 6.25		3	2	2	2	
12			5	5	5	5	
13			5	4	4	3	
14			4	4	4	4	
15			5	5	5	5	
16	~~25~~ 12.5		4	4	4	1	
17			4	3	3	3	
18			5	5	5	5	
19			5	3	3	3	
20			4	2	2	2	
21	~~50~~ 25		4	1	1	Ø	
22			1	1	Ø	—	
23			2	Ø	—	—	
24			2	Ø	—	—	
25			4	Ø	—	—	
26	~~100~~ 50		2	Ø	—	—	
27			Ø	—	—	—	
28			2	Ø	—	—	
29			1	Ø	—	—	
30		5	Ø	—	—	—	
Initials		JV	JV	JV	KS	LM	

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	01-9712-3943	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 16:06	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	07-1701-4800	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	29 Jan-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	02 Feb-20	**Species:**	Atherinops affinis	**Brine:**	
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	10-1166-1619	**Code:**	3C4CBB33	**Client:**	
Sample Date:	29 Jan-20	**Material:**	Corexit	**Project:**	
Receive Date:	29 Jan-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	39.9	79.8	56.43		34.6%

Dunnett Multiple Comparison Test

Control	vs	C-mg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		19.9	1.106	2.23	0.362	8	0.2918	CDF	Non-Significant Effect
		39.9	1.085	2.23	0.362	8	0.2994	CDF	Non-Significant Effect
		79.8*	2.443	2.23	0.362	8	0.0334	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.3958715	0.1319572	3	1.999	0.1547	Non-Significant Effect
Error	1.055997	0.06599982	16			
Total	1.451869		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.852	11.3	0.4150	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9386	0.866	0.2256	Normal Distribution

96h Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.92	0.784	1	1	0.8	1	0.04899	11.9%	0.0%
19.9		5	0.76	0.488	1	0.8	0.4	1	0.09798	28.8%	17.4%
39.9		5	0.76	0.4362	1	0.8	0.4	1	0.1166	34.3%	17.4%
79.8		5	0.56	0.1917	0.9283	0.6	0.2	1	0.1327	53.0%	39.1%
160		5	0	0	0	0	0	0	0		100.0%
319		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.25	1.088	1.412	1.345	1.107	1.345	0.05833	10.4%	0.0%
19.9		5	1.07	0.7736	1.367	1.107	0.6847	1.345	0.1069	22.3%	14.4%
39.9		5	1.074	0.7143	1.433	1.107	0.6847	1.345	0.1294	27.0%	14.1%
79.8		5	0.8532	0.4487	1.258	0.8861	0.4636	1.345	0.1457	38.2%	31.7%
160		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.0%
319		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.0%

Pacific Topsmelt 96-h Acute Survival Test **Granite Canyon**

Analysis ID:	01-9712-3943	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 16:06	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

96h Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	0.8	0.8
19.9		0.4	0.8	0.8	1	0.8
39.9		0.4	1	0.6	0.8	1
79.8		0.2	0.6	1	0.6	0.4
160		0	0	0	0	0
319		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-mg/L	Control Type
0	D
19.9	
39.9	
79.8	
160	
319	

CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	11-3005-3793	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 17:03	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	07-1701-4800	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	29 Jan-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	02 Feb-20	**Species:**	Atherinops affinis	**Brine:**	
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	10-1166-1619	**Code:**	3C4CBB33	**Client:**	
Sample Date:	29 Jan-20	**Material:**	Corexit	**Project:**	
Receive Date:	29 Jan-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.08	17.39%	1.924	0.04669	83.9	67.67	104

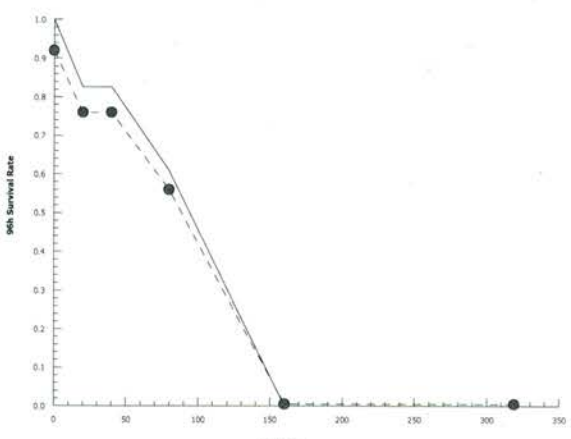
96h Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Dilution Water	5	0.92	0.8	1	0.04899	0.1095	11.9%	0.0%	23	25
19.9		5	0.76	0.4	1	0.09798	0.2191	28.8%	17.4%	19	25
39.9		5	0.76	0.4	1	0.1166	0.2608	34.3%	17.4%	19	25
79.8		5	0.56	0.2	1	0.1327	0.2966	53.0%	39.1%	14	25
160		5	0	0	0	0	0		100.0%	0	25
319		5	0	0	0	0	0		100.0%	0	25

96h Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	0.8	0.8
19.9		0.4	0.8	0.8	1	0.8
39.9		0.4	1	0.6	0.8	1
79.8		0.2	0.6	1	0.6	0.4
160		0	0	0	0	0
319		0	0	0	0	0

Graphics



CEWAF 1 - *Atherinops* (Topsmelt) 4 Day - Ref Tox - 1/29/20

Concentration (CuCl2)	Beaker	Rep	Day 0	Day 1	Day 2	Day 3	Day 4	Prop Alive	Mean	SD
0	1	1	5	5	5	5	4	0.80	0.84	0.09
	2	2	5	5	5	4	4	0.80		
	3	3	5	5	5	5	5	1.00		
	4	4	5	5	4	4	4	0.80		
	5	5	5	5	4	4	4	0.80		
56	6	1	5	5	5	5	5	1.00	0.80	0.20
	7	2	5	5	4	4	4	0.80		
	8	3	5	5	5	5	5	1.00		
	9	4	5	4	3	3	3	0.60		
	10	5	5	4	3	3	3	0.60		
100	11	1	5	5	5	5	5	1.00	0.96	0.09
	12	2	5	5	5	5	5	1.00		
	13	3	5	5	5	5	5	1.00		
	14	4	5	5	4	4	4	0.80		
	15	5	5	5	5	5	5	1.00		
180	16	1	5	5	4	4	4	0.80	0.84	0.17
	17	2	5	5	5	5	5	1.00		
	18	3	5	4	3	3	3	0.60		
	19	4	5	5	5	5	5	1.00		
	20	5	5	5	4	4	4	0.80		
320	21	1	5	5	4	4	4	0.80	0.84	0.09
	22	2	5	5	4	4	4	0.80		
	23	3	5	5	4	4	4	0.80		
	24	4	5	5	5	5	5	1.00		
	25	5	5	4	4	4	4	0.80		

Marine Pollution Studies Laboratory
Atherinops 4-day Reference Toxicant Test
Feeding: 40 Artemia nauplii per fish, 2x daily

Project: CEWAF | Topsmelt **Start Date/Time:** 1/29/20

~~Water Batch #:~~ _____ **End Date/Time:** 2/2/20

Fish Lot #: AA012820

Cont.#	Concentration	Number at Start	Number Alive				Notes
			Day 1	Day 2	Day 3	Day 4	
1	Ø	5	5	5	5	4	
2			5	5	4	4	
3			5	5	5	5	
4			5	4	4	4	
5			5	4	4	4	
6	56		5	5	5	5	
7			5	4	4	4	
8			5	5	5	5	
9			4	3	3	3	
10			4	3	3	3	
11	100		5	5	5	5	
12			5	5	5	5	
13			5	5	5	5	
14			5	4	4	4	
15			5	5	5	5	
16	180		5	4	4	4	
17			5	5	5	5	
18			4	3	3	3	
19			5	5	5	5	
20			5	4	4	4	
21	320		5	4	4	4	
22			5	4	4	4	
23			5	4	4	4	
24			5	5	5	5	
25		5	4	4	4	4	
Initials		JV	JV	JV	KS	LM	

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 1/29/20

End Date/Time: 2/2/20

Project: CEWAFITopsmelt

Spp./Species Lot #: AA012820

Sample Type: Water

WQ Meter ID: A2

Date: ~~2/2/20~~ 1/29/20

Test Temperature: 19.0

~~Water Batch #:~~

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	8.06	9.66	0.843	8.14	30.1	0.1	
~~6.25~~ 3.125	8.17	9.51	0.843	8.02	30.3		
~~12.5~~ 6.25	8.17	9.18	0.843	7.74	30.3		
~~25~~ 12.5	8.17	9.16	0.843	7.72	30.3		
~~50~~ 25	8.09	8.57	0.843	7.22	30.5		
~~100~~ 50	7.94	7.60	0.838	6.37	31.1	0.6	
Ø	8.06	9.66	0.843	8.14	30.1	0.1	
56	8.10	8.92	0.843	7.52	30.4		
100	8.10	9.02	0.843	7.60	30.2		
180	8.10	9.13	0.843	7.70	30.3		
320	8.10	9.13	0.843	7.70	29.6		
Initials	JV	JV	JV	JV	JV	JV	

Cu RT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.01	100.9	36.0	Certified Std.	10.4
			35	
7.01	101.2	35.7		10.7
JV	JV	JV		JV

pH slope: 97.7 DO temp: 17.9

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 1/29/20

End Date/Time: 2/2/20

Project: CEWAF | Topsmelt

Spp./Species Lot #: AA012820

Sample Type: Water

WQ Meter ID: A2

Date: 1/31/20

~~Water Batch #~~:

Test Temperature: 19.8

	Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
	~~0~~	8.07	6.76	0.838	5.66	31.0		
	~~6.25~~ 3.125	8.07	6.85	0.838	5.74	31.0		
New	~~12.5~~ 6.25	8.10	6.93	0.838	5.81	31.0		
	~~25~~ 12.5	8.10	6.98	0.838	5.85	31.0		
	~~50~~ 25	8.03	6.88	0.838	5.76	31.1		
	~~100~~ 50	—	—	—	—	—		
	~~0~~	8.03	7.13	0.829	5.91	33.3		
	~~6.25~~ 3.125	7.95	7.00	0.829	5.80	33.0		
Old	~~12.5~~ 6.25	7.90	6.88	0.824	5.67	34.0		
	~~25~~ 12.5	7.90	6.80	0.829	5.64	33.4		
	~~50~~ 25	7.84	6.39	0.824	5.26	33.5		
	~~100~~ 50	7.69	5.87	0.824	4.84	33.5		
	~~0~~	8.09	7.02	0.829	5.82	33.4		
	~~56~~	8.09	7.08	0.838	5.93	31.3		
New	100	8.09	7.17	0.838	6.01	31.0		
	180	8.09	7.20	0.838	6.03	30.9		
	320	8.09	7.29	0.838	6.11	30.7		
	~~0~~	8.03	7.26	0.843	6.12	30.2		
	~~56~~	8.03	7.19	0.838	6.02	30.9		
Old	100	8.00	7.19	0.838	6.02	30.6		
	180	8.00	7.23	0.838	6.06	30.6		
	320	8.00	7.21	0.843	6.08	329.7		
	Initials	JV	JV	JV	JV	JV		

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.02	100.7	35.0	Certified Std.	
			35	
7.02	92.7	35.8		
Initials: JV	JV	JV		

pH slope: 97.5 DO temp: 20.7

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 1/29/20

End Date/Time: 2/2/20

Project: CEWAF I Topsmelt

Spp./Species Lot #: AA012820

Sample Type: Water

WQ Meter ID: A2

Date: 2/2/20

Test Temperature: 19.1 °C

~~Water Batch #~~:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
Ø	8.02	8.13	0.819	6.66	35.0	0.2	
~~6.25~~ 3.125	8.04	8.50	0.819	6.96	34.6	0.3	
~~12.5~~ 6.25	8.02	8.42	0.819	6.90	34.9	0.3	
~~25~~ 12.5	7.99	8.34	0.819	6.83	34.8	0.4	
~~50~~ 25	7.91	7.87	0.814	6.41	36.1	0.0	
~~100~~ 50	—	—	—	—	—	*0.1	See 1/31/20 renewals
Ø	8.04	8.60	0.833	7.16	31.9	0.1	
56	8.00	8.31	0.838	6.96	31.1	0.5	
100	8.03	8.20	0.838	6.87	31.1	0.1	
180	8.00	8.43	0.838	7.06	30.9	0.7	
390	8.00	8.44	0.843	7.11	30.1	0.1	
Initials	LM	LM	LM	LM	LM	LM	

Water Quality Precision and Accuracy

pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.02	96.1	34.9	Certified Std.	10.1
—	—	—	35.0‰	—
7.01	104.3			9.6
Initials: LM	LM	LM		LM

pH slope: 97.3% DO temp: 18.1°C

*9.9/10.4
1/31/20 JV

Marine Pollution Studies Laboratory

Atherinops Water Test Daily Log

Start Date/Time: 1/29/20

End Date/Time: 2/2/20

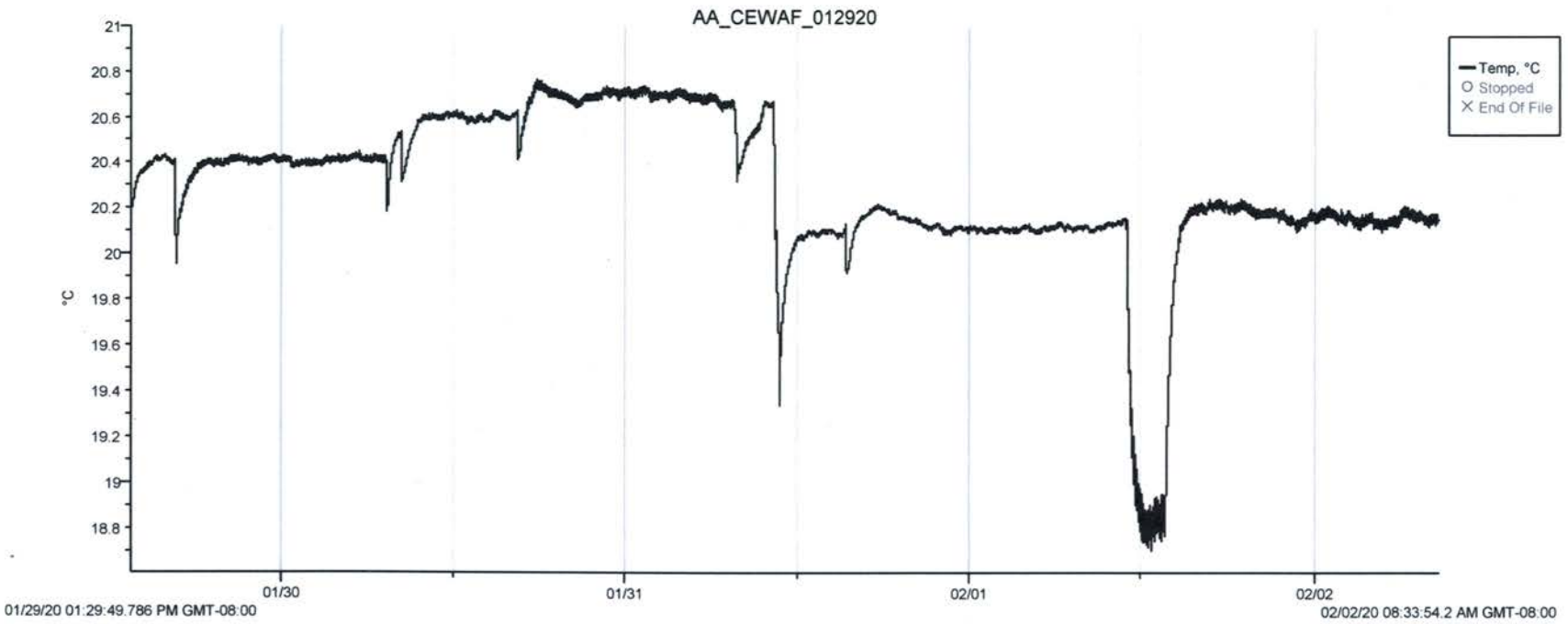
Project: CEWAF | Topsmelt

Species Lot #: AA012820

Sample Type: Water

WQ Meter ID: A2

	Wed	Thu	Fri	Sat	Sun
Day	0	1	2	3	4
Test Temperature	19.0	19.5	19.8	20.6	19.1
Ref Tox Temperature	19.5	20.0	19.9	20.3	19.7
Count critters	—	✓	✓	✓	✓
Feed (40 naups/fish) AM	—	✓	✓	✓	—
Warm renewal water		—			
Renew test			✓		
Measure old/new WQ	✓		✓		✓
Feed (40 naups/fish) PM	✓	✓	✓	✓	—
Initials	ALL	JV	JV	KS	LM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Temp, °C
Stopped
End Of File
°C
21
20.8
20.6
20.4
20.2
20
19.8
19.6
19.4
19.2
19
18.8
01/30
01/31
02/01
02/02
01/29/20 01:29:49.786 PM GMT-08:00
02/02/20 08:33:54.2 AM GMT-08:00

Marine Pollution Studies Laboratory
Culture Log

Organism: ~~ABS~~ A. affinis

Organism Source: ABS

Collection Date: 1|27|20

Arrival Date at MPSL: 1|28|20

Test Start Date: 1|29|20

Arrival Temperature at MPSL: 17.3

Arrival Conductivity/Salinity at MPSL: 29

WQ Meter ID: Refractometer

Species Lot #: AA012820

Date	1|28	1|29							
Temperature	19.2	20.2							
Conductivity/ Salinity	28	28							
Aeration	Y	Y							
Organism Health	E	E*							
Initials	JV	JV							
Notes	fed naups RN ~35%	* lots dead >30 RN 50% fed naups							

Temperature: Measured value (make note if it is adjusted up/down).
Conductivity: Measured value
~~Water flow: yes/no~~
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

Quality Assurance/Quality Control Criteria:

Organisms acclimated to test conductivity at least 48 hours prior to test: (Yes) No

Organisms held at MPSL no more than 2 weeks: (Yes) No

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 1/27/2020

SPECIES: *Atherinops affinis*

AGE: 11 day

LIFE STAGE: Larvae

HATCH DATE: 1/16/2019

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	18°C	18-21°C
SALINITY/CONDUCTIVITY:	32 ppt**	28-32 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	155 mg/l	140-195 mg/l
pH:	8.20	7.45-8.20

Comments: ** Acclimated to 30 ppt 1/27/20.

Facility Supervisor

CEWAF Definitive 2 - Topsmelt - 6/17/20

Conc. (% CEWAF)	Conc. (g/L)	TPH mg/L	Vial	Replicate	Alive	Start	% Survival	Mean	SD
0	0	0	1	1	5	5	100	96	8.9
			2	2	5	5	100		
			3	3	5	5	100		
			4	4	4	5	80		
			5	5	5	5	100		
3.125	0.78	15.2	6	1	4	5	80	88	11.0
			7	2	5	5	100		
			8	3	5	5	100		
			9	4	4	5	80		
			10	5	4	5	80		
6.25	1.56	30.3	11	1	1	5	20	72	33.5
			12	2	5	5	100		
			13	3	5	5	100		
			14	4	4	5	80		
			15	5	3	5	60		
12.5	3.125	61	16	1	3	5	60	56	16.7
			17	2	4	5	80		
			18	3	3	5	60		
			19	4	2	5	40		
			20	5	2	5	40		
25	6.25	121	21	1	0	5	0	8	17.9
			22	2	2	5	40		
			23	3	0	5	0		
			24	4	0	5	0		
			25	5	0	5	0		
50	12.5	243	26	1	0	5	0	0	0.0
			27	2	0	5	0		
			28	3	0	5	0		
			29	4	0	5	0		
			30	5	0	5	0		
100% CEWAF =	25 g/L								
100% CEWAF =	483 mg/L TPH								

Marine Pollution Studies Laboratory
Atherinops 4-day Acute Toxicity Test
Feeding: 40 Artemia nauplii per fish, 2x daily

Project: CEWAF 3 AA **Start Date/Time:** 6/17/20

~~**Water Batch #:**~~ **End Date/Time:** 6/21/20

Fish Lot #: AA061620

Cont.#	Station Name	Number at Start	Number Alive				Notes
			Day 1	Day 2	Day 3	Day 4	
1	0%	5	5	4	4	4-~~5~~ (KF)	USED REF TOX
2			5	4	4	4	CONTROL FOR
3			5	5	5	5	DATA ANALYSIS
4			5	5	5	4	
5			5	5	5	5	
6	3.125%		5	5	5	4	
7			5	5	5	5	
8			5	5	5	5	
9			4	4	4	4	
10			5	4	4	4	
11	6.25%		4	3	2	1	
12			5	5	5	5	
13			5	5	5	5	
14			5	4	4	4	
15			4	4	4	3	
16	12.5%		4	3	3	3	
17			5	5	4	4	
18			4	3	3	3	
19			4	3	2	2	
20			5	4*	3	2	*high t dry
21	25%		5	3	1	~~0~~	
22			5	4	2	2	
23			4	0	—	—	
24			4	2	1	~~0~~	
25			4	2	0	—	
26	50%		1	0	—	—	
27			0	—	—	—	
28			2	0	—	—	
29			1	0	—	—	
30			0	—	—	—	
Initials		BP	JV	JV	JV	KF	

CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	04-7258-6109	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 16:12	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	04-7032-2341	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	17 Jun-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	21 Jun-20	**Species:**	Atherinops affinis	**Brine:**	
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	00-8100-5408	**Code:**	4D40B60	**Client:**	
Sample Date:	17 Jun-20	**Material:**	Corexit	**Project:**	
Receive Date:	17 Jun-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	NA	C > T	NA	NA	30.3	61	42.99		28.2%

Dunnett Multiple Comparison Test

Control	vs	C-mg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		15.2	0.6904	2.3	0.318	8	0.5179	CDF	Non-Significant Effect
		30.3	1.944	2.3	0.318	8	0.0972	CDF	Non-Significant Effect
		61*	3.247	2.3	0.318	8	0.0070	CDF	Significant Effect
		121*	7.105	2.3	0.318	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.003057	0.7507643	4	15.78	<0.0001	Significant Effect
Error	0.9517016	0.04758508	20			
Total	3.954759		24			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.137	13.3	0.1288	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9231	0.888	0.0603	Normal Distribution

96h Survival Rate Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	0.0%
15.2		5	0.88	0.744	1	0.8	0.8	1	0.04899	12.4%	8.33%
30.3		5	0.72	0.3045	1	0.8	0.2	1	0.1497	46.5%	25.0%
61		5	0.56	0.3522	0.7678	0.6	0.4	0.8	0.07483	29.9%	41.7%
121		5	0.08	0	0.3021	0	0	0.4	0.08	224.0%	91.7%
243		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-mg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.0%
15.2		5	1.202	1.04	1.364	1.107	1.107	1.345	0.05833	10.8%	7.34%
30.3		5	1.029	0.5706	1.488	1.107	0.4636	1.345	0.1653	35.9%	20.7%
61		5	0.8497	0.6317	1.068	0.8861	0.6847	1.107	0.07854	20.7%	34.5%
121		5	0.3174	0.06236	0.5723	0.2255	0.2255	0.6847	0.09184	64.7%	75.5%
243		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	82.6%

Pacific Topsmelt 96-h Acute Survival Test **Granite Canyon**

Analysis ID:	04-7258-6109	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 16:12	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

96h Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	0.8	1
15.2		0.8	1	1	0.8	0.8
30.3		0.2	1	1	0.8	0.6
61		0.6	0.8	0.6	0.4	0.4
121		0	0.4	0	0	0
243		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-mg/L	Control Type
0	D
15.2	
30.3	
61	
121	
243	

CETIS Analytical Report

Pacific Topsmelt 96-h Acute Survival Test — **Granite Canyon**

Analysis ID:	03-9755-4193	**Endpoint:**	96h Survival Rate	**CETIS Version:**	CETISv1.8.4
Analyzed:	20 Jul-20 16:13	**Analysis:**	Trimmed Spearman-Kärber	**Official Results:**	Yes
Batch ID:	04-7032-2341	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	17 Jun-20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	
Ending Date:	21 Jun-20	**Species:**	Atherinops affinis	**Brine:**	
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	
Sample ID:	00-8100-5408	**Code:**	4D40B60	**Client:**	
Sample Date:	17 Jun-20	**Material:**	Corexit	**Project:**	
Receive Date:	17 Jun-20	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Trimmed Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	LC50	95% LCL	95% UCL
Control Threshold	0.04	8.33%	1.753	0.04945	56.68	45.14	71.18

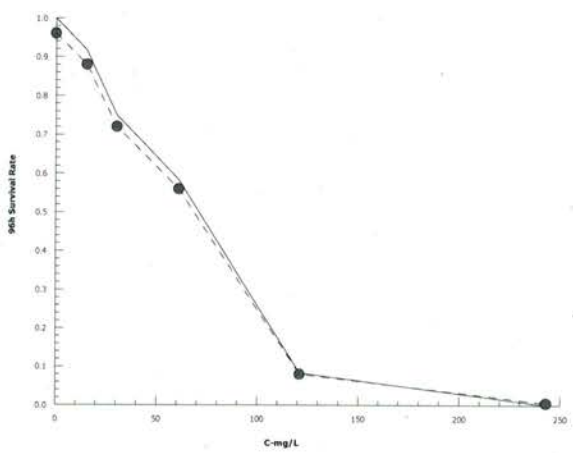
96h Survival Rate Summary

			Calculated Variate(A/B)								
C-mg/L	**Control Type**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	Dilution Water	5	0.96	0.8	1	0.04	0.08944	9.32%	0.0%	24	25
15.2		5	0.88	0.8	1	0.04899	0.1095	12.4%	8.33%	22	25
30.3		5	0.72	0.2	1	0.1497	0.3347	46.5%	25.0%	18	25
61		5	0.56	0.4	0.8	0.07483	0.1673	29.9%	41.7%	14	25
121		5	0.08	0	0.4	0.08	0.1789	224.0%	91.7%	2	25
243		5	0	0	0	0	0		100.0%	0	25

96h Survival Rate Detail

C-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	1	1	0.8	1
15.2		0.8	1	1	0.8	0.8
30.3		0.2	1	1	0.8	0.6
61		0.6	0.8	0.6	0.4	0.4
121		0	0.4	0	0	0
243		0	0	0	0	0

Graphics



Marine Pollution Studies Laboratory
Atherinops 4-day Reference Toxicant Test
Feeding: 40 Artemia nauplii per fish, 2x daily

Project: CEWAF3 AA **Start Date/Time:** 6/17/20

~~Water Batch #:~~ $CuCl_2$ #1672 **End Date/Time:** 6/21/20

Fish Lot #: AA061620

Cont.#	Concentration	Number at Start	Number Alive				Notes
			Day 1	Day 2 *	Day 3	Day 4	
1	0	5	5	5	5	~~4~~ 5	KF
2			5	5	5	~~4~~ 5	KF
3	|	|	5	5	5	5	
4	|	|	5	5	5	~~5~~ 4	KF
5	|	|	5	5	5	5	
6	56	|	5	5	5	5	
7	|	|	5	5	5	5	
8	|	|	5	5	5	5	
9	|	|	5	5	5	5	
10	|	|	5	5	5	5	
11	100	|	5	5	5	4	
12	|	|	5	4	4	3	
13	|	|	5	5	5	5	
14	|	|	5	5	4	4	
15	|	|	5	5	5	5	
16	180	|	5	5	5	5	
17	|	|	5	5	5	5	
18	|	|	5	4	4	2	
19	|	|	5	5	5	5	
20	|	|	5	5	5	5	
21	320	|	5	4	4	3	
22	|	|	5	5	5	5	
23	|	|	5	4	3	3	
24	|	|	5	5	5	5	
25	|	5	5	5	5	5	
Initials		BP	JV	JV	JV	KF	

* Renewed using lot # 1674

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 6/17/20

End Date/Time: 6/21/20

Project: CEWAF 3 AA

Spp./Species Lot #: AA061620

Sample Type: Water

WQ Meter ID: A2

Date: 6/17/20

Test Temperature: 19.4

~~Water Batch #~~:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
0%	7.77	7.83	0.838	6.56	31.0	-0.1	
3.125%	7.97	7.86	0.838	~~6.60~~ * 6.59 (ER)	30.9		
6.25%	7.99	7.55	0.838	6.33	31.0		
12.5%	7.96	7.41	0.838	6.21	31.1		
25%	7.94	6.97	0.833	5.81	31.5		
50%	7.85	5.96	0.833	4.96	31.8	1.4	
Ø	7.99	7.85	0.838	6.58	31.1	-0.1	
56	8.02	7.59	0.838	6.36	30.8		
100	8.02	7.63	0.838	6.39	30.6		
180	8.01	7.83	0.843	6.60	30.4		
320	8.01	7.85	0.843	6.62	30.0		
Initials	ER	ER	ER	ER	ER	KF	

CuRT

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
7.00	100.0	35.0	Certified Std.	10.0
			35 ppt	—
6.94	99.2	36.2		9.0
Initials ER	ER	ER		KF

pH slope: 97.8 DO temp: 21.5

* 6.59 (ER)

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 6/17/20

End Date/Time: 6/21/20

Project: CEWAF 3 AA

Spp./Species Lot #: AA061620

Sample Type: Water

WQ Meter ID: A2

Date: 6/19/20

Test Temperature: 19.5

Water Batch #:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
New 0%	~~*7.17~~ ER	8.13	0.833	6.77	~~34.1~~ 32.3 ER		
3.125%	7.93	8.07	0.833	6.72	32.2		
6.25%	7.97	7.84	0.829	6.50	33.1		
12.5%	7.97	7.86	0.829	6.52	33.1		
25%	7.91	7.24	0.829	6.00	33.0		
50%							Dead KE
Old 0%	7.78	7.74	0.824	6.38	33.9		
3.125%	7.76	7.34	0.829	6.08	32.7		
6.25%	7.76	7.35	0.833	6.12	32.4		
12.5%	7.72	7.03	0.829	5.83	33.0		
25%	7.64	6.30	0.829	5.22	33.4		
50%	7.58	5.93	0.824	4.89	34.4		
Initials	ER	ER	ER	ER	ER		

Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
6.99	101.0	~~*34.8~~ ER	Certified Std.	
6.97	97.6	36.2		
Initials ER	ER	ER		

pH slope: 98.0 DO temp: 22.0 *35.7

*7.94 ER

Marine Pollution Studies Laboratory
Water Quality Data Sheet

Start Date/Time: 6/17/20

End Date/Time: 6/21/20

Project: CEWAF 3 AA

Spp./Species Lot #: AA061620

Sample Type: Water

WQ Meter ID: A2 + HACH (DO + Salinity)

Date: 6/21/20

Test Temperature: 19.5°C

Water Batch #:

Sample	pH	Oxygen (0 ppt)	Oxygen Multiplier	Oxygen (mg/L)	Salinity (ppt)	Ammonia (mg/l NH3)	Notes
0%	7.86	7.65	0.824	6.30	34.0	0.2	
3.125%	7.87	7.62	0.829	6.32	33.1	0.5	
6.25%	7.87	7.36	0.829	6.10	33.0	0.3	
12.5%	7.87	7.25	0.824	5.97	33.7	0.4	
25%	~~7.80~~ 7.77	6.96	0.819	5.70	35.0	0.2	
50%	7.58	5.93	0.824	4.89	34.4	0.3	~~6/20/20 KF~~ KF 6/19/20
Initials	KF	KF	KF	KF	KF	KF	

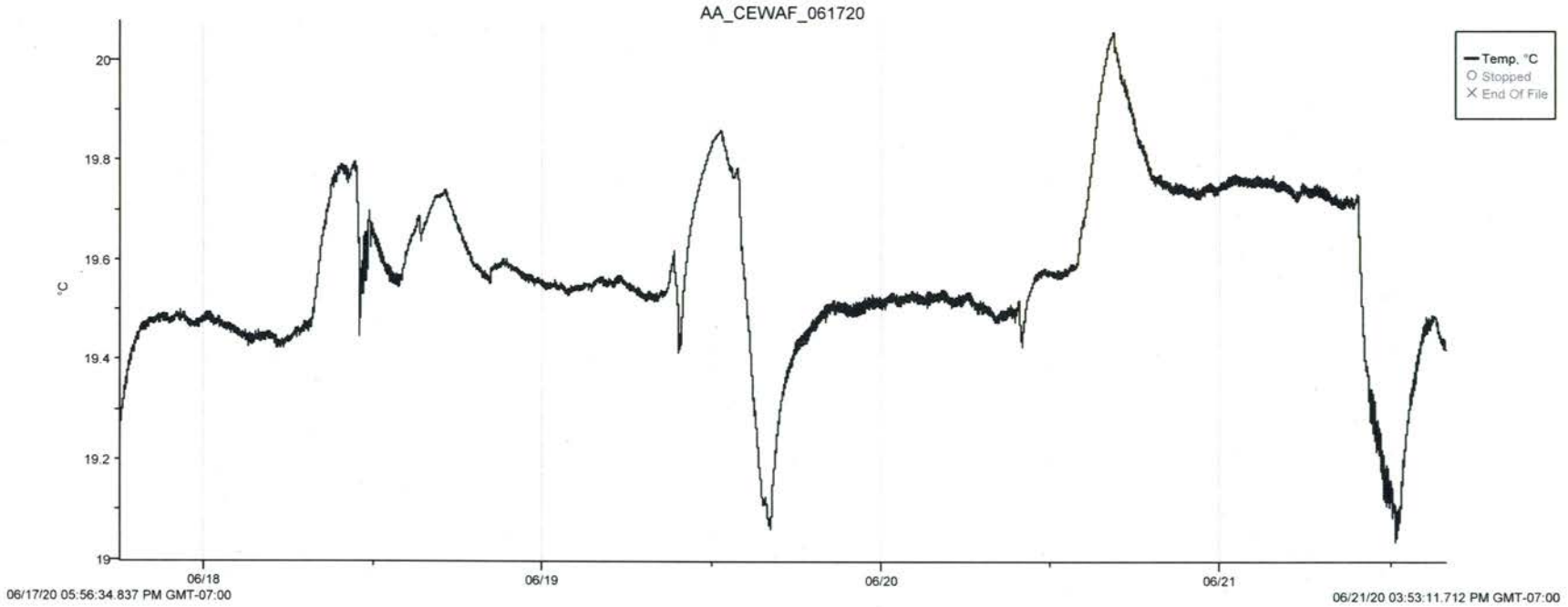
Water Quality Precision and Accuracy				
pH 7	DO 100%	Salinity (ppt)		Ammonia (mg/L N)
6.99	99.9	34.8	Certified Std.	9.0
—	—	—	35‰	—
7.10	99.6	36.2		9.6
KF	KF	KF		KF

pH slope: 98.0 DO temp: 21.1

Marine Pollution Studies Laboratory
Atherinops Water Test Daily Log

Start Date/Time: 6/17/20
End Date/Time: 6/21/20
Project: CEWAF3 AA
Species Lot #: AA061620
Sample Type: Water
WQ Meter ID: A2

	Wed	Thu	Fri	Sat	Sun
Day	0	1	2	3	4
Test Temperature	19.8	20.0	19.5	19.4	19.5
Ref Tox Temperature	19.4	20.3	20.1	20.4	20.5
Count critters	✓	✓	✓	✓	✓
Feed (40 naups/fish) AM	✓	✓	✓	✓	—
Warm renewal water					
Renew test			✓		
Measure old/new WQ	✓				
Feed (40 naups/fish) PM	✓	✓	✓		—
Initials	BP KFER	ALL	LM, ALL	JV	KF


AA_CEWAF_061720
Temp, °C
Stopped
End Of File
°C
20
19.8
19.6
19.4
19.2
19
06/18
06/19
06/20
06/21
06/17/20 05:56:34.837 PM GMT-07:00
06/21/20 03:53:11.712 PM GMT-07:00

Marine Pollution Studies Laboratory
Culture Log

Atherinops affinis

Lot # AA061620

Organism Source: ABS
Collection Date: 6/15/20
Arrival Date/Time at MPSL: 6/16/20
Arrival Temperature at MPSL: 21.8°
Arrival Salinity at MPSL: 31‰
Hatch Date: 6/7/20

Date	6/16	6/17	6/18						
Temp.	21.9	20.6	20.3						
Salinity	30	29	30						
Water flow	—	—	—						
Aeration	Y	Y	Y						
Organism Health	E	E	E						
Feeding	naups	naups	naups						
Initials	JV	JV	KF						
Notes	RN 59%								

Temperature: Measured value (make note if it is adjusted up/down).
Salinity: Measured value
Water flow: yes/no
Aeration: yes/no
Organism Health: Excellent(E)/Good(G)/Poor(P)

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 6/15/2020

SPECIES: *Atherinops affinis*

AGE: 8 day

LIFE STAGE: Larvae

HATCH DATE: 6/7/2020

BEGAN FEEDING: Immediately

FOOD: *Artemia* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	20°C	20-25°C
SALINITY/CONDUCTIVITY:	30 ppt	30-34 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	140 mg/l	140-170 mg/l
pH:	7.57	7.56-8.17

Comments:

Facility Supervisor

State of California -The Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Petroleum Chemistry Laboratory
1995 Nimbus Road
Rancho Cordova, CA 95670
PHONE: (916) 358-2803 FAX (916) 358-2801

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

LABORATORY REPORT

Name:	Bryn Phillips	**Lab Number:**	PET2001005
Agency:	UCD-Marine Pollution Studies Lab.	**Other Number:**	
Address:	34500 Coast Route One	**Date Sampled:**	01/29/2020
City:	Monterey, CA 93940	**Date Received:**	01/30/2020
		Date Completed:	02/12/2020
		Index-PCA Code:	

RE: Oil Dispersant

Sample	Description	Date	Sampler
PET2001005-001	CEWAF 1	01/29/2020	Bryn Phillips

RESULTS OF CHEMICAL ANALYSIS: Total Petroleum Hydrocarbons (TPH)

Enclosed are the analytical results for samples received by our lab. Unless otherwise noted in the narrative, the samples were received, processed, analyzed, and stored in accordance with CDFW-PCL standard operating procedures and/or US environmental agency protocols (when available). Please refer to the attached page listing your samples. Unless otherwise noted in the Quality Assurance Summary, all quality controls processed with your sample met internal acceptance criteria. Sample PET2001005-001 was extracted with dichloromethane using extraction Method 3510, Separatory Funnel Liquid-Liquid Extraction, USEPA-OSW, SW-846 and analyzed on GCMS using Method LUFT GC/MS.

COST OF ANALYSIS:	**(1 sample @ 302.00) $**	**302.00**
POLLUTION ACTION KIT:	**$**	
TOTAL	**$**	**No charge**

Cerasela Gadberry — **Analyst (Cerasela Gadberry)** — 2/14/2020 — **Date**

Martice Vasquez — **Reviewed by (Martice Vasquez, PhD)** — 2/14/2020 — **Date**

Martice Vasquez — **Laboratory Director (Martice Vasquez, PhD)** — 2/14/2020 — **Date**

State of California -The Natural Resources Agency
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PHONE: (916) 358-2803 FAX (916) 358-2801

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

Quality Control

A batch is defined as 20 or fewer samples of similar matrix processed together or processed within 24-continuous hours (for continuous process methods). Quality controls are included with every batch of samples to provide evidence that the reported data is of expected recovery and precision, and that batch processes were free from contamination. Laboratory quality control (QC) includes method blanks, lab control samples, and duplicates. Matrix-specific quality controls include field samples spiked with known compounds of known concentrations. Surrogate compounds may also be added to samples and lab QC prior to processing for organic analysis as an additional measure of sample matrix and recovery efficiency. Lab QC, when used in conjunction with matrix quality controls, can indicate matrix effects that could bias analyte recovery. All quality control samples are processed concurrently with samples within the batch.

Data Flags and Qualifiers Used in this Report

A - chromatograms contains additional pecks not part of petroleum pattern. Result is inclusive of those additional compounds, resulting in a high bias of the TPH value.

NA - Not applicable.

Unless otherwise stated, all criteria for the following quality controls met internal acceptance criteria for analyses performed by PCL. One quality assurance (QA) batch number (BS 03-20) is represented in this narrative.

- Holding time:
  - The sample met holding times.
- Method Blanks (MBLK):
  - Target compounds concentrations greater than the reporting limit were not detected.
  - The result is not blank-corrected.
- Lab Control Samples (LCS):
  - All spiked compounds were within control limits.
- LCSD:
  - Default control limit of <25% RPD was applied.
  - The precision criterion was acceptable for the LCSD.
- Calibration Curve:
  - A Calibration curve consisting of 8 standards was prepared using the source sample (PET2001005-002).
  - The correlation coefficient criterion R≥0.995 was applied.
- Calibration Verification:
  - All continuing calibration verifications met acceptance criteria for all compounds.
- Surrogate recoveries:
  - A surrogate compound was added for the TPH analysis.
  - Results are not surrogate-recovery corrected.
  - Default control limits of 50%-150% were applied. All surrogate compounds were within acceptance limits.

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- The sample required large dilutions such that the recoveries of the surrogate compound could not be calculated.

- Sample Preparation and Analysis Methods.
  - In order to prepare the sample for analysis, the entire content of sample was used.

TPH Results and Quality Assurance Summary

Sample Identification	Laboratory Identification Number	Extraction Date	Analysis Date	QA Batch Number	TPH (C_{10} - C_{32}) mg/L (ppm)	Qualifier Value (Q)	MDL mg/L	RL mg/L	Expected TPH (C_{10} - C_{32}) mg/L (ppm)	% Recovery TPH (C_{10} - C_{32})	RPD %	% Recovery Surrogate
Method Blank	Method Blank	1/31/2020	2/7/2020	BS 03-20	ND		0.043	0.100	ND	NA		88.2
LCS	LCS	1/31/2020	2/7/2020	BS 03-20	0.517		0.043	0.100	0.501	103	6.30	96.5
LCSD	LCSD	1/31/2020	2/7/2020	BS 03-20	0.551		0.043	0.100	0.501	110		91.5
CEWAF 1	PET2001005-001	1/31/2020	2/7/2020	BS 03-20	720	A	4.3	10				NA

A- chromatograms contains additional pecks not part of petroleum pattern. Result is inclusive of those additional compound, resulting in a high bias of the TPH value.

Lab # PET2001005-L

University of California, Davis - Marine Pollution Studies Laboratory
Chain of Custody

34500 Coast Route One
Monterey, CA 93940

Contact: Bryn Phillips
831-624-0947

Final Destination: CDFW Petroleum Chemistry Lab
1995 Nimbus Road
Rancho Cordova, CA 95670

Contact: Martice Vasquez
916-358-0315

Project: Oil Dispersant

Sample Name	Date Sampled	Time Sampled	Analysis	Quantity
-001 CEWAF 1			Total Petroleum Hydrocarbons (TPH)	2 Liters
-002 ANS Oil			Calibration	10 mLs

	Signature and Print Name	Date/Time	Location
Relinquished by:	J P Voorhees / Jennifer P. Voorhees	1/29/20 1500	MPSL
Received by:	Gerardo Gadberry	1/30/20 10:45	PeL
Relinquished by:			
Received by:			
Relinquished by:			
Received by:			

cooler temp 4.5°C

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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

LABORATORY REPORT

Name: Bryn Phillips
Agency: UCD-Marine Pollution Studies Lab.
Address: 34500 Coast Route One
City: Monterey, CA 93940

Lab Number: PET2003001
Other Number:
Date Sampled: 03/04/2020
Date Received: 03/05/2020
Date Completed: 04/02/2020
Index-PCA Code:

RE: Oil Dispersant

Sample	Description	Date	Sampler
PET2003001-001	ANS CEWAF Definitive	03/04/2020	Bryn Phillips
PET2003001-002	Dispersant Only	03/04/2020	Bryn Phillips

RESULTS OF CHEMICAL ANALYSIS: Total Petroleum Hydrocarbons (TPH)

Enclosed are the analytical results for samples received by our lab. Unless otherwise noted in the narrative, the samples were received, processed, analyzed, and stored in accordance with CDFW-PCL standard operating procedures and/or US environmental agency protocols (when available). Please refer to the attached page listing your samples. Unless otherwise noted in the Quality Assurance Summary, all quality controls processed with your sample met internal acceptance criteria. Samples PET2003001-001 and PET2003001-002 ware extracted with dichloromethane using extraction Method 3510, Separatory Funnel Liquid-Liquid Extraction, USEPA-OSW, SW-846 and analyzed on GCMS using Method LUFT GC/MS.

COST OF ANALYSIS:	**(2 sample @ 302.00)**	**$**	**604.00**
POLLUTION ACTION KIT:		**$**	
TOTAL		**$**	**No charge**

Martin Vasquez for
Analyst (Cerasela Gadberry)

04/06/2020
Date

Martin Vasquez
Reviewed by (Martice Vasquez, PhD)

04/06/2020
Date

Martin Vasquez
Laboratory Director (Martice Vasquez, PhD)

04/06/2020
Date

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Quality Control

A batch is defined as 20 or fewer samples of similar matrix processed together or processed within 24-continuous hours (for continuous process methods). Quality controls are included with every batch of samples to provide evidence that the reported data is of expected recovery and precision, and that batch processes were free from contamination. Laboratory quality control (QC) includes method blanks, lab control samples, and duplicates. Matrix-specific quality controls include field samples spiked with known compounds of known concentrations. Surrogate compounds may also be added to samples and lab QC prior to processing for organic analysis as an additional measure of sample matrix and recovery efficiency. Lab QC, when used in conjunction with matrix quality controls, can indicate matrix effects that could bias analyte recovery. All quality control samples are processed concurrently with samples within the batch.

Data Flags and Qualifiers Used in this Report

A - chromatogram contains additional peaks not part of petroleum pattern. Additional peaks quantified as "dispersant".

NA - Not applicable.

Unless otherwise stated, all criteria for the following quality controls met internal acceptance criteria for analyses performed by PCL. One quality assurance (QA) batch number (BS 05-20) is represented in this narrative.

- Holding time:
  - The sample met holding times.
- Method Blanks (MBLK):
  - Target compounds concentrations greater than the reporting limit were not detected.
  - The result is not blank-corrected.
- Lab Control Samples (LCS):
  - All spiked compounds were within control limits.
- LCSD:
  - Default control limit of <25% RPD was applied.
  - The precision criterion was acceptable for the LCSD.
- Calibration Curve:
  - A Calibration curve consisting of 8 standards was prepared using the source sample (PET2001005-002).
  - The correlation coefficient criterion R≥0.995 was applied.
- Calibration Verification:
  - All continuing calibration verifications met acceptance criteria for all compounds.
- Surrogate recoveries:
  - A surrogate compound was added for the TPH analysis.
  - Results are not surrogate-recovery corrected.
  - Default control limits of 50%-150% were applied. All surrogate compounds were within acceptance limits.

- The samples required large dilutions such that the recoveries of the surrogate compound could not be calculated.

- Sample Preparation and Analysis Methods:
  - In order to prepare the samples for analysis, the entire content of 1Liter sample was used for each sample.

- Other comments and observations:
  - TPH result for sample PET2003001-001 is inclusive of the response associated with the "dispersant", resulting in a high bias of the TPH value. This bias in the TPH value is quantified as "dispersant" (81.6 ppm) in the sample itself. The “dispersant” concentration was also quantified in sample PET2003001-002, the dispersant only sample (98.7 ppm).

TPH Results and Quality Assurance Summary

Sample Identification	Laboratory Identification Number	Extraction Date	Analysis Date	QA Batch Number	TPH (C_{10} - C_{32}) mg/L (ppm)	Dispersant mg/L (ppm)	Qualifier Value (Q)	MDL mg/L	RL mg/L	Expected TPH (C_{10} - C_{32}) mg/L (ppm)	% Recovery TPH (C_{10} - C_{32})	RPD %	% Recovery Surrogate
Method Blank	Method Blank	3/6/2020	4/1/2020	BS 05-20	ND	NA		0.043	0.100	ND	NA		116
LCS	LCS	3/6/2020	4/1/2020	BS 05-20	0.512	NA		0.043	0.100	0.501	102	19.7	111
LCSD	LCSD	3/6/2020	4/1/2020	BS 05-20	0.420	NA		0.043	0.100	0.501	83.8		96.2
ANS CEWAF Definitive	PET2003001-001	3/6/2020	4/1/2020	BS 05-20	306	81.6	A	4.3	10				NA
Dispersant Only	PET2003001-002	3/6/2020	4/1/2020	BS 05-20	No TPH Pattern	98.7		4.3	10				NA

A- chromatogram contains additional peaks not part of petroleum pattern. Additional peaks quantified as "dispersant".

PET 2003001

University of California, Davis - Marine Pollution Studies Laboratory
Chain of Custody

34500 Coast Route One
Monterey, CA 93940

Contact: Bryn Phillips
831-624-0947

Final Destination: CDFW Petroleum Chemistry Lab
1995 Nimbus Road
Rancho Cordova, CA 95670

Contact: Martice Vasquez
916-358-0315

Project: Oil Dispersant

Sample Name	Date Sampled	Time Sampled	Analysis	Quantity			
- 001 ANS CEWAF Definitive			Total Petroleum Hydrocarbons (TPH)	2 Liters			
- 002 Dispersant Only			Calibration	1 Liter			

	Signature and Print Name	Date/Time	Location
Relinquished by:	JP Voorhees / JP Voorhees	3/4/20 1500	MAPSL
Received by:			
Relinquished by:			
Received by:	Cerasia Gadberry	3/5/2020	12:10
Relinquished by:			
Received by:			

DocuSign Envelope ID: AFF84EFB-0416-470D-BD9E-49E71C67546C

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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

LABORATORY REPORT

Name: Bryn Phillips
Agency: UCD-Marine Pollution Studies Lab.
Address: 34500 Coast Route One
City: Monterey, CA 93940

Lab Number: PET2006001
Other Number:
Date Sampled: 06/17/2020
Date Received: 06/18/2020
Date Completed: 07/08/2020
Index-PCA Code:

RE: Oil Dispersant

Sample	Description	Date	Sampler
PET2006001-001	ANS CEWAF Definitive	06/17/2020	Bryn Phillips
PET2006001-002	Dispersant Only	06/17/2020	Bryn Phillips

RESULTS OF CHEMICAL ANALYSIS: Total Petroleum Hydrocarbons (TPH)

Enclosed are the analytical results for samples received by our lab. Unless otherwise noted in the narrative, the samples were received, processed, analyzed, and stored in accordance with CDFW-PCL standard operating procedures and/or US environmental agency protocols (when available). Please refer to the attached page listing your samples. Unless otherwise noted in the Quality Assurance Summary, all quality controls processed with your sample met internal acceptance criteria. Samples PET2006001-001 and PET2006001-002 were extracted with dichloromethane using extraction Method 3510, Separatory Funnel Liquid-Liquid Extraction, USEPA-OSW, SW-846 and analyzed on GCMS using Method LUFT GC/MS.

COST OF ANALYSIS:	**(2 sample @ 302.00) $**	**604.00**
POLLUTION ACTION KIT:	**$**	
TOTAL	**$**	**No charge**

DocuSigned by: Cerasela Gadberry 4E0137657EED412... 7/13/2020
Analyst (Cerasela Gadberry) **Date**

DocuSigned by: Martice Vasquez 90015450359B455... 7/13/2020
Reviewed by (Martice Vasquez, PhD) **Date**

DocuSigned by: Martice Vasquez 90015450359B455... 7/13/2020
Laboratory Director (Martice Vasquez, PhD) **Date**

DocuSign Envelope ID: AFF84EFB-0416-470D-BD9E-49E71C67546C

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GAVIN NEWSOM, Governor
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Quality Control

A batch is defined as 20 or fewer samples of similar matrix processed together or processed within 24-continuous hours (for continuous process methods). Quality controls are included with every batch of samples to provide evidence that the reported data is of expected recovery and precision, and that batch processes were free from contamination. Laboratory quality control (QC) includes method blanks, lab control samples, and duplicates. Matrix-specific quality controls include field samples spiked with known compounds of known concentrations. Surrogate compounds may also be added to samples and lab QC prior to processing for organic analysis as an additional measure of sample matrix and recovery efficiency. Lab QC, when used in conjunction with matrix quality controls, can indicate matrix effects that could bias analyte recovery. All quality control samples are processed concurrently with samples within the batch.

Data Flags and Qualifiers Used in this Report

A - chromatogram contains additional peaks not part of petroleum pattern. Additional peaks quantified as "dispersant".

NA - Not applicable.

ND – Not detected.

Unless otherwise stated, all criteria for the following quality controls met internal acceptance criteria for analyses performed by PCL. One quality assurance (QA) batch number (BS 10-20) is represented in this narrative.

- Holding time:
  - The sample met holding times.
- Method Blanks (MB):
  - Target compounds concentrations greater than the reporting limit were not detected.
  - The result is not blank-corrected.
- Lab Control Samples (LCS):
  - All spiked compounds were within control limits. LCS and LCSD were spiked with Jet fuel and reanalyzed and quantitated with Jet fuel standards,
- LCSD:
  - Default control limit of <25% RPD was applied.
  - The precision criterion was acceptable for the LCSD.
- Calibration Curve:
  - A Calibration curve consisting of 8 standards was prepared using the source sample (PET2001005-002).
  - The correlation coefficient criterion R≥0.995 was applied.
- Calibration Verification:
  - All continuing calibration verifications met acceptance criteria for all compounds.
- Surrogate recoveries:
  - A surrogate compound was added for the TPH analysis.

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Petroleum Chemistry Laboratory
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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

- Results are not surrogate-recovery corrected.
- Default control limits of 50%-150% were applied. All surrogate compounds were within acceptance limits.
- The samples required large dilutions such that the recoveries of the surrogate compound could not be calculated.

- Sample Preparation and Analysis Methods:
  - In order to prepare the samples for analysis, the entire content of the 1Liter sample was used for each sample.

- Other comments and observations:
  - TPH result for sample PET2006001-001 is inclusive of the response associated with the "dispersant", resulting in a high bias of the TPH value. This bias in the TPH value is quantified as "dispersant" (415 ppm) in the sample itself. The “dispersant” concentration was also quantified in sample PET2006001-002, the dispersant only (671 ppm).

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TPH Results and Quality Assurance Summary

Sample Identification	Laboratory Identification Number	Extraction Date	Analysis Date	QA Batch Number	TPH (C_{10} - C_{32}) mg/L (ppm)	Dispersant mg/L (ppm)	Qualifier Value (Q)	MDL mg/L	RL mg/L	Expected TPH Jet Fuel mg/L (ppm)	% Recovery TPH Jet Fuel	RPD %	% Recovery Surrogate
Method Blank	Method Blank	6/18/2020	7/1/2020	BS 10-20	ND	NA		0.0564	0.113	ND	NA		91.9
LCS	LCS	6/18/2020	7/3/2020	BS 10-20	0.333	NA		0.0564	0.113	0.535	62.2	18.1	98.3
LCSD	LCSD	6/18/2020	7/3/2020	BS 10-20	0.278	NA		0.0564	0.113	0.535	52.0		93.1
ANS CEWAF Definitive	PET2006001-001	6/18/2020	7/1/2020	BS 10-20	565	415	A	11.3	22.6				NA
Dispersant Only	PET2006001-002	6/18/2020	7/1/2020	BS 10-20	No TPH Pattern	671		11.3	22.6				NA

A- chromatogram contains additional peaks not part of petroleum pattern. Additional peaks quantified as "dispersant".

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PET 2006001

University of California, Davis - Marine Pollution Studies Laboratory
Chain of Custody

34500 Coast Route One
Monterey, CA 93940

Contact: Bryn Phillips
831-624-0947

Final Destination: CDFW Petroleum Chemistry Lab
1995 Nimbus Road
Rancho Cordova, CA 95670

Contact: Martice Vasquez
916-358-0315

Project: Oil Dispersant

Temp 10°C

	Sample Name	Date Sampled	Time Sampled	Analysis	Quantity			
001	ANS CEWAF Definitive 2	6/17/20	800	Total Petroleum Hydrocarbons (TPH)	2 Liters			
002	Dispersant Only	6/17/20	1100	Calibration	1 Liter			

	Signature and Print Name	Date/Time	Location
Relinquished by:	B PHILLIPS 1130	6/17/20	MPSL
Received by:	Cerasela Gadberry	06/18/20 @10:35	PCL
Relinquished by:			
Received by:			
Relinquished by:			
Received by:			