City of Buenaventura
Toxicity and Chemical Evaluation
July 04 Dry Weather Sampling Event
Santa Clara River Estuary

Prepared by
Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, California 92121
(858) 587-7333

INTRODUCTION

Toxicity tests and chemical analyses were conducted on estuarine ambient water samples collected on 20 July 2004 from the Santa Clara River Estuary located in the City of San Buenaventura, CA. This third sampling effort for the project was characterized as a "dry weather" event; the sand berm was closed to tidal flushing and the estuary was full of water. Dr. Howard Bailey, Mr. Chris Stransky, and Mr. John Rudolph of Nautilus Environmental, LLC (Nautilus) along with Mr. Nick Buhbe of AMEC Earth & Environmental (AMEC) coordinated the collection effort, toxicity testing, and chemical testing programs. Ambient water toxicity was evaluated using the freshwater alga *Selenastrum capricornutum*, the water flea *Ceriodaphnia dubia*, and the fathead minnow *Pimephales promelas*. Ambient water toxicity to marine organisms was tested using giant kelp *Macrocystis pyrifera*, the blue mussel *Mytilus galloprovincialis* (formerly *Mytilus edulis*), the opossum shrimp *Americamysis bahia* (formerly *Mysidopsis bahia*), and the Pacific topsmelt *Atherinops affinis*. Bioassays were conducted between 21 and 28 July 2004 at Nautilus located in San Diego, CA. Chemical analyses were performed by Calscience Environmental Laboratories (CEL) located in Garden Grove, CA.

METHODS AND MATERIALS

SAMPLE COLLECTION AND TRANSPORT

Ambient water samples were collected from four of the eleven sampling locations (A-2, B-1, B-3, and C-2). Sites for water collection were selected based on location within the estuary and water depth (i.e. centrally located sites with enough water to provide an adequate sample volume for testing). Sample collection time, global positioning system (GPS) coordinates, water depth, temperature, dissolved oxygen (DO), salinity, and pH were recorded in a field logbook (Appendix G).

All equipment used for water collection was cleaned thoroughly with Alconox soap and rinsed with site water. Collections were performed using a hand pump connected to ½" clear PVC tubing. The end of the tubing was held at mid-depth to collect the water and pumped into 20-L plastic lined buckets; a total of five buckets were collected at each site. Nautilus personnel transported all samples to the laboratory where samples were placed in a 4°C cold room overnight. The following day, each sample was composited and water quality parameters of temperature, DO, conductivity, salinity, pH, total residual chlorine, alkalinity, and hardness were measured and recorded in a logbook. A portion

of each composited sample was then removed for test initiation and the remainder of each sample was held at 4°C until used for testing.

ORGANISM PROCUREMENT AND HANDLING

Freshwater Species

Fathead Minnow

Fish larvae (1 day old) were purchased from Aquatic Biosystems, Inc. of Fort Collins, CO. The organisms were placed in plastic bags containing oxygenated culture water, packed in insulted containers, and transported to Nautilus via overnight delivery service. Upon arrival at Nautilus, temperature, pH, DO, and conductivity were measured and recorded in a logbook. Fish larvae condition was also noted. The larvae were then acclimated to test dilution water and temperature, and observed prior to test initiation for any indications of stress (e.g. abnormal swimming behavior) or significant mortality (>10%). Fish larvae were fed *Artemia* nauplii to satiation during holding.

Water Flea

Cultures of *C. dubia* are maintained for use in testing at Nautilus. One week prior to test initiation, neonate (<24 hours old) water fleas were isolated from brood stock from the previous week and placed in individual holding cups containing clean culture water and food. Neonate selection for continuing culture is based on overall health and reproductive performance of the individuals in the current culture. The number of water fleas isolated was equal to the number of neonates required to initiate testing. Cups were held in a polypropylene holder and the entire holder was placed in a temperature-controlled room maintained at 25°C. Isolated females were transferred to cups containing fresh water and food each day, and on the morning of test initiation. Neonates produced on the day of test initiation were selected for testing if produced by individuals that had at least 3 broods of 8 or more neonates each over the course of the previous week.

Green Alga

A continuous culture of *S. capricornutum* is maintained for use in testing at Nautilus. A new culture is started each week and grown under a cool-white fluorescent light source providing continuous illumination. The culture used to inoculate the effluent and

reference toxicant tests for this study was six days old and in log-phase growth at the time of test initiation.

Marine Species

Blue Mussel

Nautilus personnel collected the blue mussel *Mytilus galloprovincialis* from Mission Bay in San Diego, CA. The mussels were transported from the field to Nautilus in a clean ice chest with blue ice. In the laboratory, the organism receipt date and arrival condition were recorded in a logbook. The mussels then were acclimated to test temperature and salinity, and observed prior to test initiation for any indications of significant mortality (>10%).

Pacific Topsmelt and Opossum Shrimp

Fish (14 days old) and shrimp larvae (7 days old) were purchased from Aquatic Biosystems, Inc. of Fort Collins, CO. The organisms were placed in plastic bags containing oxygenated culture water, packed in insulted containers, and transported to Nautilus via overnight delivery service. Upon arrival at Nautilus, water quality measurements of temperature, pH, DO, and salinity were recorded in a logbook. Organism condition was also noted. The larvae were then acclimated to test salinity and temperature, and observed prior to test initiation for any indications of stress (e.g. abnormal swimming behavior) or significant mortality (>10%). Larvae of both species were fed *Artemia* nauplii to satiation during holding.

Giant Kelp

Giant kelp zoospores are obtained from the reproductive blades (sporophylls) of adult plants. Nautilus personnel collected kelp sporophylls from multiple plants offshore of La Jolla Cove in La Jolla, CA the day prior to test initiation. The blades were transported to Nautilus in a clean cooler with blue ice. Once in the lab, sporophylls were cleaned, rinsed with 0.20-µm filtered seawater, blotted dry, arranged individually in a single layer on paper towels, and allowed to desiccate overnight. Prior to initiation, the blades were rinsed again and placed in a 2-L glass beaker containing 1 L of clean 0.20-µm filtered seawater. The beaker was then placed in a temperature-controlled environmental chamber at 15°C. One hour later, the blades were removed and the resulting solution of

released zoospores allowed to settle. After approximately 30 minutes, the motile zoospores were siphoned from the top layer of seawater into a flask and observed under a compound microscope at 100x to verify their viability. Spore density was determined by direct count of the spore solution with an Improved Nuebauer hemacytometer, and an algal stock solution was prepared to yield an initial cell density of approximately 225,000 cells per ml in each test chamber.

BIOASSAY PROTOCOLS

All freshwater bioassay procedures used for this study followed United States Environmental Protection Agency (US EPA) methods outlined in, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition (EPA/821/R-02/013)," (US EPA 2002a). Marine bioassays conducted using *Americamysis bahia*, followed "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, Third Edition (EPA/821/R-02/014)," (US EPA 2002b). The bivalve embryo development test using *Mytilus galloprovincialis* was conducted according to the American Society for Testing and Materials (ASTM) 1999 protocol "Standard guide for conducting static acute toxicity tests starting with embryos of four species of saltwater bivalve molluscs (E-724-98)". Finally, marine bioassays conducted using *Atherinops affinis* and *Macrocystis pyrifera* followed "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms (EPA 600/R-95/136)," (US EPA 1995).

Freshwater Species

Fathead Minnow 7-Day Survival and Growth

This test estimates chronic toxicity by evaluating survival and growth of larval fathead minnows over time. Larval fish (one day old at test initiation) were exposed to the samples for a period of seven days. A sample concentration of 100 percent was tested along with a negative control. Because samples were estuarine, additional controls of equal salinity to each sample were also tested to ensure that any observed effects were not due to salinity, rather than other toxic constituents. Three of the samples were received at a pH greater than 9.00 and equal salinity of 3.1 parts per thousand (ppt). As a result, a third control of 3.1 ppt and pH greater than 9.00 was added to the test design. The pH of this control was adjusted using 1.0 N sodium hydroxide (NaOH).

Test solutions were prepared using graduated cylinders and pipettes. Measurements of pH, DO, temperature, and conductivity were measured and recorded for each sample and control. Four replicate test chambers were prepared for each sample and control. Replicates consisted of 400-ml plastic cups containing 250 ml of test solution. Test solutions were acclimated to 25°C in a temperature-controlled environmental chamber prior to initiation.

Ten fish larvae were arbitrarily added to each test chamber. A second technician verified counts and condition of all test organisms before and after addition of the larvae to test chambers. A 16:8 hour light:dark illumination cycle was provided for the duration of the test. Test chambers were covered with a clear plexiglass sheet to prevent test solution contamination.

Test solutions were renewed once per day, and organisms were fed three times per day. Temperature, pH, DO, and conductivity were measured daily in both freshly prepared test solution, and test solution collected from the test chambers for each concentration and control. Survival status was recorded for organisms in each test chamber once per day. At test termination, final observations were made and test animals were prepared for weight determination.

Fish weights were determined by placing fish from each test chamber on individual tared aluminum pans and drying them in an oven at 60°C for 24 hours. After drying, fish were weighed on a Mettler 240AE balance to the nearest 0.01 mg.

A concurrent copper (II) chloride ($CuCl_2$) reference toxicant test (positive control) was also conducted as a measure of consistent organism sensitivity, as well as continuing laboratory proficiency with the method.

Water Flea 7-Day Survival and Reproduction

This test estimates chronic toxicity by evaluating survival and reproduction of individual water fleas over time. Water fleas (<24 hours old at test initiation) were exposed to the samples for a period of seven days. A sample concentration of 100 percent was tested along with a negative control. Because samples were estuarine, additional controls of equal salinity to each sample were also tested to ensure observed mortality was not due to salinity rather than other toxic constituents. Three of the samples were received at a pH greater than 9.00 and equal salinity of 3.1 parts per thousand (ppt). As a result, a

third control of 3.1 ppt and pH greater than 9.00 was added to the test design. The pH of this control was adjusted using 1.0 N NaOH.

Test solutions were prepared using graduated cylinders and pipettes. A diet of yeast, cerophyll, trout chow (YCT) and *Selenastrum* suspension was added to each test sample and control prior to distribution to test chambers. Measurements of pH, DO, temperature, and conductivity were measured and recorded for each sample and control. Ten replicate test chambers were prepared for each sample and control. Replicates consisted of 30-ml soufflé cups containing 15 ml of test solution. Test solutions were acclimated to 25°C in a temperature-controlled environmental chamber prior to initiation.

Test solutions were renewed, and organisms were fed once per day. Temperature, pH, DO, and conductivity were measured daily in both freshly prepared test solution, and test solution collected from the test chambers for each sample and control. Survival status and reproductive output were recorded for each organism once per day. At test termination, final observations were made, water quality measurements taken, and test solution and organisms discarded.

A concurrent $CuCl_2$ reference toxicant test (positive control) was also conducted.

96-Hour Algal Growth Inhibition

This test estimates chronic toxicity by measuring algal population response to effluent exposure in terms of changes in cell density over time. Algal cells (six days old and in log-phase growth at test initiation) were exposed to the samples for a period of 96 hours. Prior to test initiation, each sample was inspected under a microscope and found to have native algae present. A portion of each sample was then filtered through a 0.45-µm-nylon membrane filter. Both 100 percent-filtered and 100 percent-unfiltered samples were tested along with a negative control. This was done to ensure sample toxicity was not modified by filtration. Because samples were estuarine, additional controls of equal salinity to the sample were also tested to ensure observed response was not due to salinity alone. Three of the samples were received at a pH greater than 9.00 and equal salinity of 3.1 parts per thousand (ppt). As a result, a third control of 3.1 ppt and pH greater than 9.00 was added to the test design. The pH of this control was adjusted using 1.0 N NaOH.

Test solutions were prepared using graduated cylinders and pipettes. Nutrients to

promote algal growth were added to effluent and dilution water at a ratio of 1 ml/L. Measurements of pH, DO, temperature, and conductivity were measured and recorded for each test concentration and control. Alkalinity and hardness were measured and recorded for each control and sample prior to test initiation. Five replicate test chambers were prepared for each sample and control, one of which was used only as a surrogate for measuring pH and temperature during the exposure period. An additional flask containing filtered sample not inoculated with algae was also tested as a blank to ensure that there was no growth of native algae, or other interference in measuring chlorophyll-a fluorescence at test termination. Test chambers consisted of 125-ml Erlenmeyer flasks containing 50 ml of test solution. Test solutions were acclimated to 25°C in a temperature-controlled environmental chamber prior to inoculation.

Each test chamber was aseptically inoculated with an algal stock solution prepared to yield an initial cell density of approximately 10,000 cells per ml in each test chamber. A cool-white fluorescent light source provided continuous illumination above the test chambers. Each chamber was covered with Parafilm, with a small opening left for gas exchange, to prevent contamination and to minimize evaporation.

Each test chamber was manually swirled three times per day (morning, mid-day, and evening), and rotated to a new location under the light source twice per day (morning and evening) for the duration of the test period. Temperature and pH were measured once per day in the surrogate test chamber for each concentration and control. At test termination, cell density in each test chamber was determined using a Turner Model TD-700 Fluorometer. Chlorophyll-a fluorescence was automatically converted to cell density based on an internal calibration curve that is updated monthly.

A concurrent $CuCl_2$ reference toxicant test (positive control) was also conducted.

Marine Species

48-hour Bivalve Embryo Development

Blue mussel embryos were exposed to ambient site water for a period of 48 hours to evaluate effects on embryo development. Sample concentrations of 25, 50, and 67 percent were tested along with a negative control. Due to the low salinities of the samples, hypersaline brine was added to each sample to raise the salinity to 30 ppt. The volume of hypersaline brine required to adjust the salinity determined the highest

testable concentration of 67 percent for each sample. Traditionally, this test is sensitive to artificial salts and is only conducted using brine. However, because the highest testable concentration is limited by brine and sample salinity, comparability of results among all test species is limited as well. Therefore, in this study, each sample was also tested undiluted by using Forty Fathoms™ sea salt to raise the salinity to 30 ppt. Two additional controls were also tested to ensure any observed adverse effects were not due to the addition of hypersaline brine or artificial salt rather than other toxic constituents. One control was composed of hypersaline brine and deionized water, and the other composed of Forty Fathoms™ sea salt and deionized water.

Test solutions were prepared using graduated cylinders and pipettes. Measurements of pH, DO, temperature, and salinity were measured and recorded for each test concentration and control. Five replicate test chambers were prepared for each test concentration and control. Replicates consisted of 30-ml shell vials containing 10 ml of test solution. Test solutions were acclimated to 15°C in temperature-controlled environmental chambers prior to initiation.

Newly fertilized embryos were added to each test chamber to produce a density of 20 embryos/ml. A 16:8 hour light:dark illumination cycle was provided for the duration of the test. Test chambers were covered with a clear plexiglass sheet to prevent test solution contamination.

Temperature, pH, DO, and salinity were measured daily in surrogate test chambers for each concentration and control. At test termination, larvae in each test chamber were preserved with 1 ml of seawater-buffered Formalin prior to evaluation. The first 100 bivalve embryos in each test chamber were counted under a compound microscope at 100x magnification and classified as normal or abnormal. Normally developed embryos have a distinct D-shape with complete formation of the shell.

A concurrent reference toxicant test (positive control) using $CuCl_2$ was conducted in conjunction with the ambient water tests.

Pacific Topsmelt and Opossum Shrimp 7-Day Survival and Growth

These tests estimate chronic toxicity by evaluating survival and growth of larval Pacific topsmelt or opossum shrimp over time. Organisms were exposed to the samples for a period of seven days. Sample concentrations of 25, 50, 67 (for consistency with species

requiring brine) and 100 percent were tested along with a negative control (30 ppt natural seawater). Due to the low salinities of the samples, Forty Fathoms™ sea salt was added to each sample to raise the salinity to 30 ppt. An additional control, composed of Forty Fathoms™ sea salt and deionized water, was also tested to ensure observed mortality was not due to the addition of artificial salt rather than other toxic constituents. This water was also used to prepare the dilutions of full-strength sample.

Test solutions were prepared using graduated cylinders and pipettes. Measurements of pH, DO, temperature, and salinity were measured and recorded for each test concentration and control. Five (Pacific topsmelt) or eight (opossum shrimp) replicate test chambers were prepared for each test concentration and control. Replicates for the topsmelt test consisted of 1-L plastic cups containing 500 ml of test solution. Replicates for the shrimp test consisted of 400-ml plastic cups containing 250 ml of test solution. Test solutions were acclimated to 20 or 25°C in temperature-controlled environmental chambers prior to initiation, for the topsmelt and shrimp tests respectively.

Five organisms were arbitrarily added to each test chamber for both species. A second technician verified counts and condition of all test organisms before and after addition of the larvae to test chambers. A 16:8 hour light:dark illumination cycle was provided for the duration of the test. Test chambers were covered with a clear plexiglass sheet to prevent test solution contamination and reduce evaporation.

Test solutions were renewed once per day, and organisms were fed two times per day. Temperature, pH, DO, and salinity were measured daily in both freshly prepared test solution, and test solution collected from the test chambers for each concentration and control. Survival status was recorded for organisms in each test chamber once per day. At test termination, final observations were made and test animals were prepared for weight determination.

Dry weights were determined by placing organisms from each test chamber in individual tared aluminum pans and drying them in an oven at 60°C for 24 hours. After drying, pans were weighed on a Mettler 240AE balance to the nearest 0.01 mg.

A concurrent $CuCl_2$ reference toxicant test (positive control) was conducted with both species.

48-Hour Giant Kelp Germination and Growth

This test estimates chronic toxicity by evaluating germination rate and growth of individual zoospores over a 48-hour period. Sample concentrations of 25, 50, and 65 percent were tested along with a negative control. Due to the low salinities of the samples, hypersaline brine was added to each sample to raise the salinity to 32 ppt. The volume of hypersaline brine required to adjust the salinity determined the highest testable concentration of 65 percent for each sample. Traditionally, this test is sensitive to artificial salts and is only conducted using brine. However, because the highest testable concentration is limited by brine and sample salinity, comparability of results among all test species is limited as well. Therefore, in this study, each sample was also tested undiluted by using Forty Fathoms™ sea salt to raise the salinity to 32 ppt rather than hypersaline brine. Two additional controls were also tested to ensure that any observed effects were not due to the addition of hypersaline brine or artificial salt. One control was composed of hypersaline brine and deionized water, and the other composed of Forty Fathoms™ sea salt and deionized water.

Test solutions were prepared using graduated cylinders and pipettes. Measurements of pH, DO, temperature, and salinity were measured and recorded for each test concentration and control. Five replicate test chambers were prepared for each test concentration and control. Replicates consisted of 50-ml glass petri dishes containing 30 ml of test solution. Test solutions were acclimated to 15°C in temperature-controlled environmental chambers prior to initiation.

Approximately 225,000 kelp spores were added to each test chamber. A 16:8 hour light:dark illumination cycle was provided for the duration of the test. At test termination, kelp spore germination was scored under a compound microscope at 400x magnification. Ten germinated kelp spores were then arbitrarily selected and measured to the nearest µm. Test solutions from each replicate were pooled by concentration, and water quality parameters of pH, DO, and salinity were measured and recorded. All test solutions were discarded.

A concurrent $CuCl_2$ reference toxicant test (positive control) was conducted concurrent to the ambient water tests.

STATISTICAL ANALYSES

Analysis of ambient water and reference toxicant data was conducted using CETIS™ Comprehensive Environmental Toxicity Information System and Database Software, Version 1.024. Statisitcal differences from the control and No Observed Effect Concentrations (NOEC) were determined for each test using Dunnett's, Wilcoxon Rank Sum, Steel's Many-One Rank, or Fisher's Exact Multiple Comparisons Tests. Median Lethal Concentration (LC_{50}) or Median Effect Concentration (EC_{50}) values were determined for marine and freshwater reference toxicant bioassays using Maximum Likelihood Probit, Trimmed Spearman-Karber, or Linear Interpolation Analysis. The choice of statistical method used was dependent upon specific assumptions met by the data.

CHEMICAL ANALYSES

Analysis of total organic carbon (TOC), total dissolved carbon (DOC), total suspended solids (TSS), cyanide, copper, nickel, zinc, and selenium was performed by CEL (Appendix F).

RESULTS AND DISCUSSION

Detailed data summaries are contained in Appendix A. Bioassay water quality data, including total ammonia are located in Appendix B. Statistical analyses and raw data can be found in Appendix C, and reference toxicant data are located in Appendix D. Analytical chemistry data reports, field collection data logs, and chain-of-custody information can be found in Appendices E, F, and G, respectively.

FRESHWATER SPECIES

Performing toxicity tests with freshwater organisms on estuary samples was complicated by the fact that the salinity was slightly higher than freshwater and could pose variable levels of stress on the test organisms. Additionally, three of the samples exhibited a pH above 9.00. Consequently, the samples were tested with concurrent salinity and pH controls. To separate salinity and pH effects from other constituents present in the sample, statistical comparisons were made between each full-strength sample and the appropriate salinity or pH control.

Fathead Minnow 7-Day Survival and Growth

Survival of fathead minnow larvae was 90 percent or greater in all samples. Growth results were similar to those for survival; no adverse effects were observed. In fact, average dry weights of larvae exposed to the samples exceeded those of their corresponding salinity controls (Figure 5). The mean dry weight of fish exposed to the samples ranged from 0.41 to 0.53, whereas the weights of the fish in the salinity controls ranged from 0.36 to 0.38.

Water Flea 96-Hour Survival

Due to unforeseen health problems with the *Ceriodaphnia* culture, 7-day results for survival and reproduction were poor in all controls and treatments (see QA/QC section for a detailed explanation). Therefore, results reported are for 96-hour survival. Mean survival was 100 percent for site B-1, which was the site with the lowest salinity. Remaining sites exhibited lower survival with mean values of 30, 40, and 50 percent for sites A-2, B-3, and C-2, respectively (Figure 6). However, none of these data were statistically reduced compared to the appropriate pH or salinity controls. This suggests that the reduced survival observed in samples A-2, B-3, and C-2 can likely be attributed to elevated salinity or pH, rather than the presence of toxic compounds.

96-Hour Algal Growth Inhibition

The results of the *Selenastrum* (green algae) tests are were slightly affected by salinity based on the differences between the lab control (0 ppt) and the samples and salinity controls (1.1 to 3.1 ppt). The mean cell density of both lab controls exceeded 2.0×10^6 cells/ml, whereas the salinity and pH controls exhibited growth in the range of only 0.9 to 1.8×10^6 cells/ml. Algae exposed to filtered ambient water samples ranged from 1.4 to 2.0×10^6 cells/ml. Samples from sites A-2, B-3, and C-2 had greater increases in mean cell density than the corresponding salinity or pH controls, whereas sample from site B-1 did not. On the other hand, unfiltered samples from all four sites tested concurrently exhibited low growth, with means ranging from 0.20 to 0.33×10^6 cells/ml, nearly an order of magnitude lower than the filtered samples. Thus, it is likely that native algal species and/or particulate debris in the samples sequestered the added nutrients and prevented the *Selenastrum* from reaching their optimum cell density.

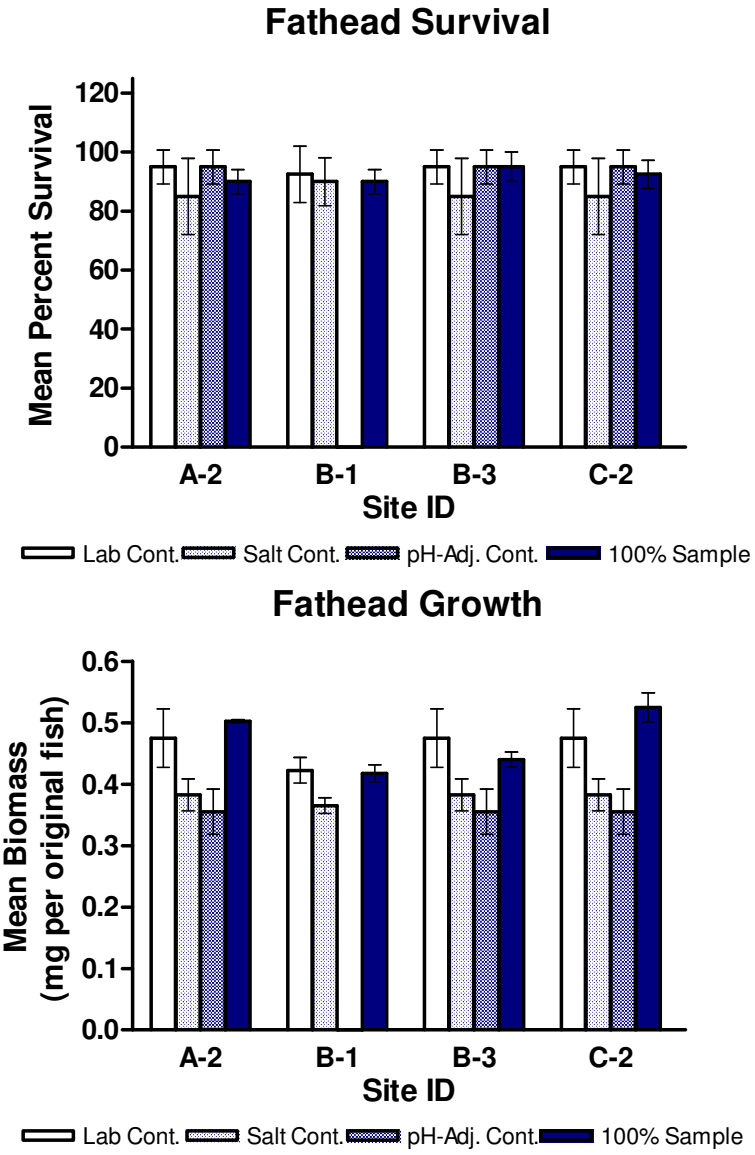


Figure 5. Summary of toxicity test results for fathead minnow 7-day survival and growth. Mean (±1SD) values in 100 percent sample are displayed. No statistically significant decreases were observed compared to concurrent salinity controls (t-test, $p \leq 0.05$, n=4).

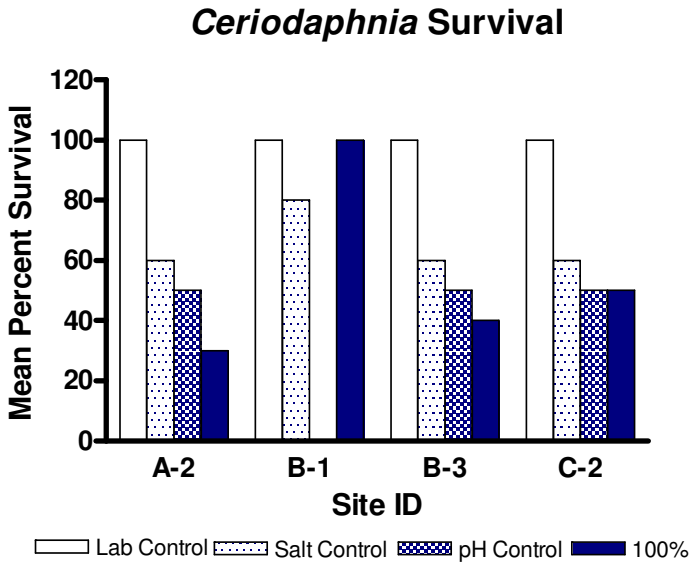


Figure 6. Summary of toxicity test results for water flea 96-hour survival. Mean (±1SD) values in 100 percent sample are displayed (Fisher's Exact, $p \leq 0.05$, n=10).

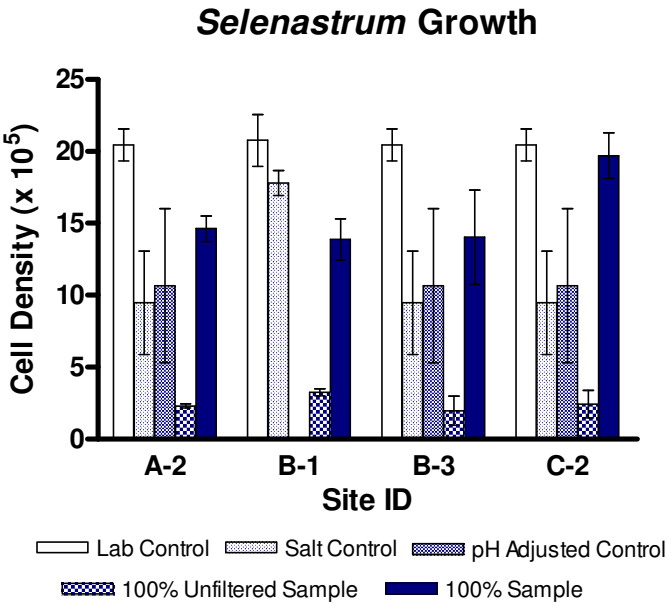


Figure 7. Summary of toxicity test results for algal growth inhibition. Mean (±1SD) values in 100 percent sample are displayed. All unfiltered samples showed a significant decrease relative to the salinity control (t-test, $p \leq 0.05$, n=4).

MARINE SPECIES

Marine toxicity test species included the blue mussel, Pacific topsmelt, opossum shrimp, and giant kelp. Due to the necessity of increasing the salinity of the samples with hypersaline brine in tests with the blue mussel and giant kelp, modest dilutions of the samples occurred. Consequently, the highest brined concentration tested with the bivalve embryo was 67 percent and 65 percent for giant kelp. The samples were also tested up to full strength with the addition of artificial sea salts. All of the salinity adjustments for the Pacific topsmelt and opossum shrimp were performed with artificial salts.

Bivalve Embryo Development

No adverse effects were observed with bivalve larvae, even in full-strength sample (Figure 8). Mean normal development for the embryos exposed to undiluted samples ranged from 84 to 89 percent.

Pacific Topsmelt 7-Day Survival and Growth

Neither survival nor growth of topsmelt larvae was adversely affected by exposure to the samples. Mean survival ranged between 92 and 96 percent and mean biomass ranged from 1.2 to 1.6 mg among all samples tested (Figure 9). Notably, biomass was greater in all four full strength samples than in any of the corresponding salt controls.

Opossum Shrimp 7-Day Survival and Growth

Survival of mysids averaged between 95 and 100 percent across sites, indicating that exposure to the samples did not cause mortality. In addition, no adverse effects were observed for growth, with the mean biomass ranging from 0.26 to 0.49 mg (Figure 10) compared with 0.28 to 0.30 mg in the controls.

48-Hour Giant Kelp Germination and Growth

No adverse effects on the germination of giant kelp spores were observed. Percent germination averaged between 78 and 90 percent in the highest (i.e. full-strength) concentrations of all the samples tested. Growth was also normal, between 11.3 and 16.6 µm, and averaged higher than the controls in three out of the four samples (Figure 11).

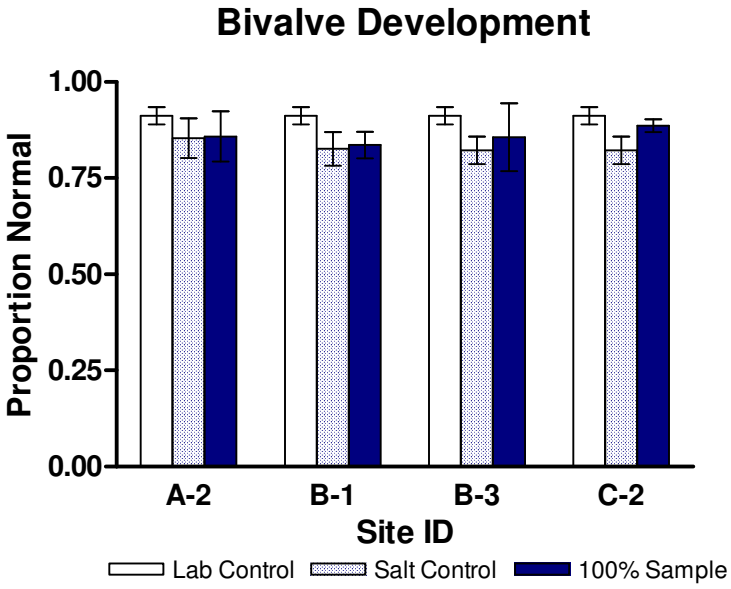


Figure 8. Summary of toxicity test results for bivalve 48-hour embryo development using *Mytilus galloprovincialis*. Mean (±1SD) values in the highest testable concentration are displayed. No statistically significant decreases were observed compared to concurrent brine or salt controls (t-test, $p \leq 0.05$, n=5).

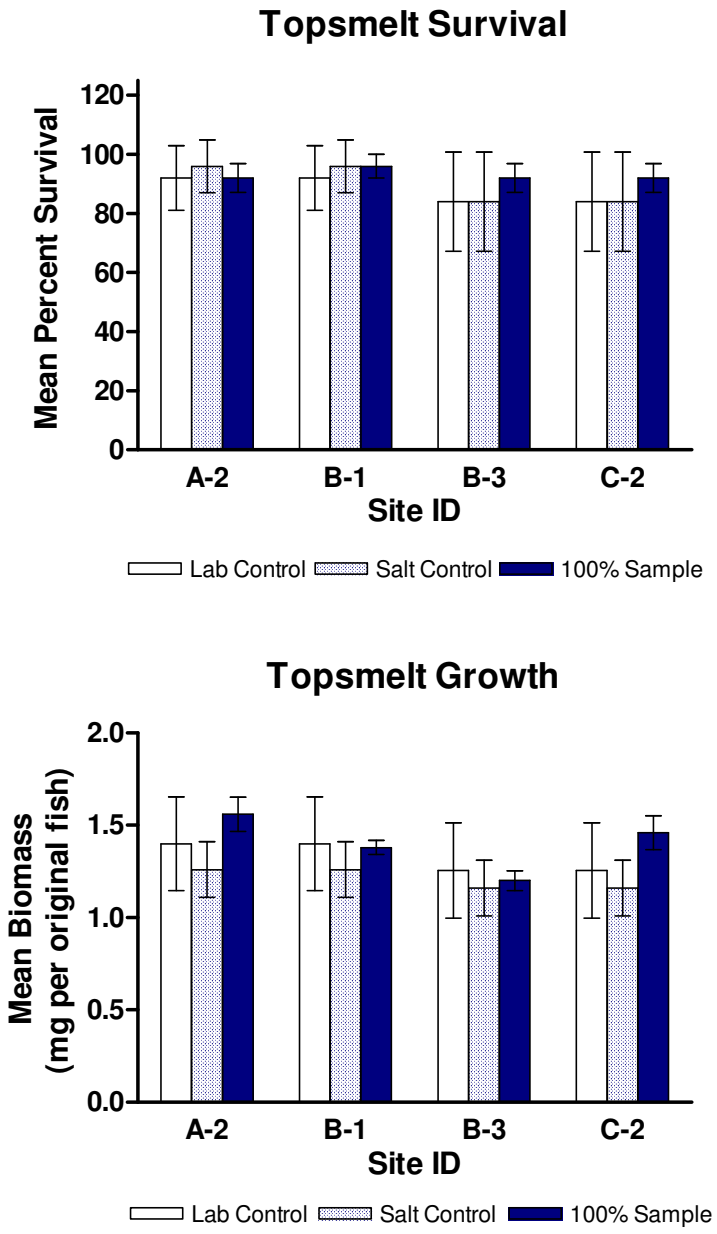


Figure 9. Summary of toxicity test results for Pacific topsmelt 7-day survival and growth. Mean (±1SD) values in 100 percent sample are displayed. (t-test, $p \leq 0.05$, n=5).

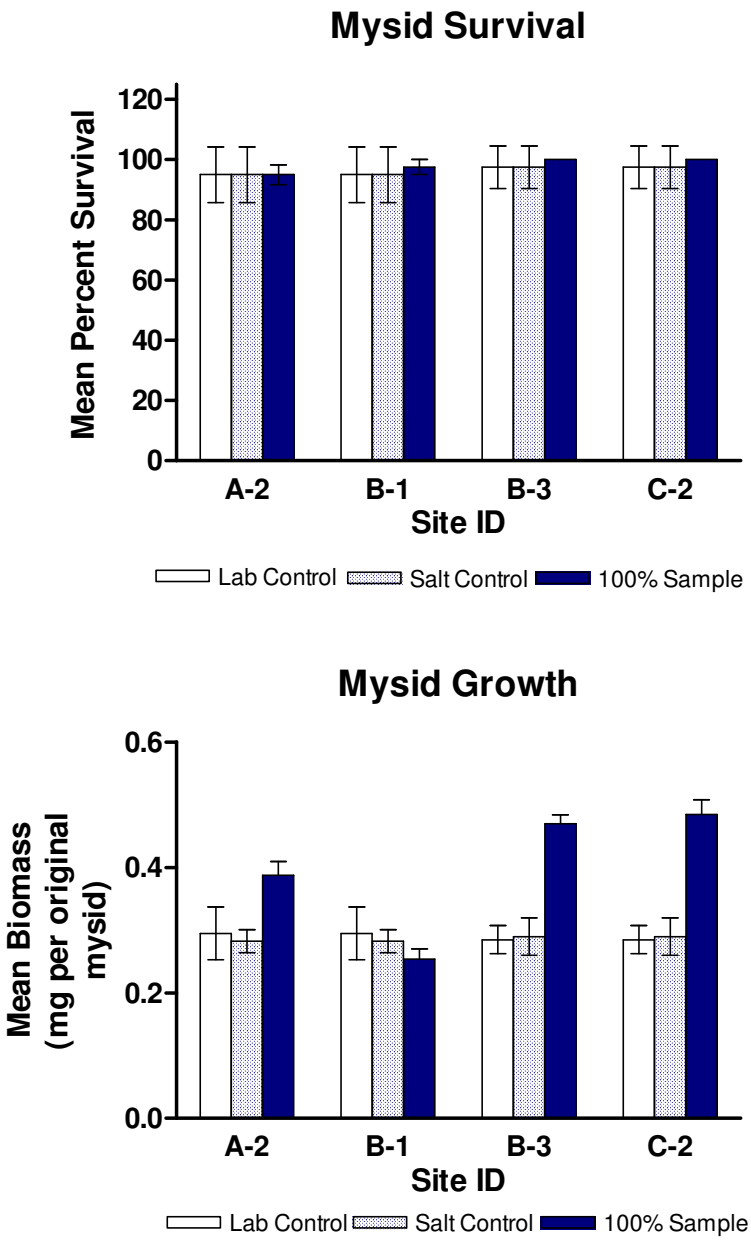


Figure 10. Summary of toxicity test results for mysid 7-day survival and growth. Mean (±1SD) values in 100 percent sample are displayed. No statistically significant decreases were observed compared to concurrent salt controls (t-test, $p \leq 0.05$, n=8).

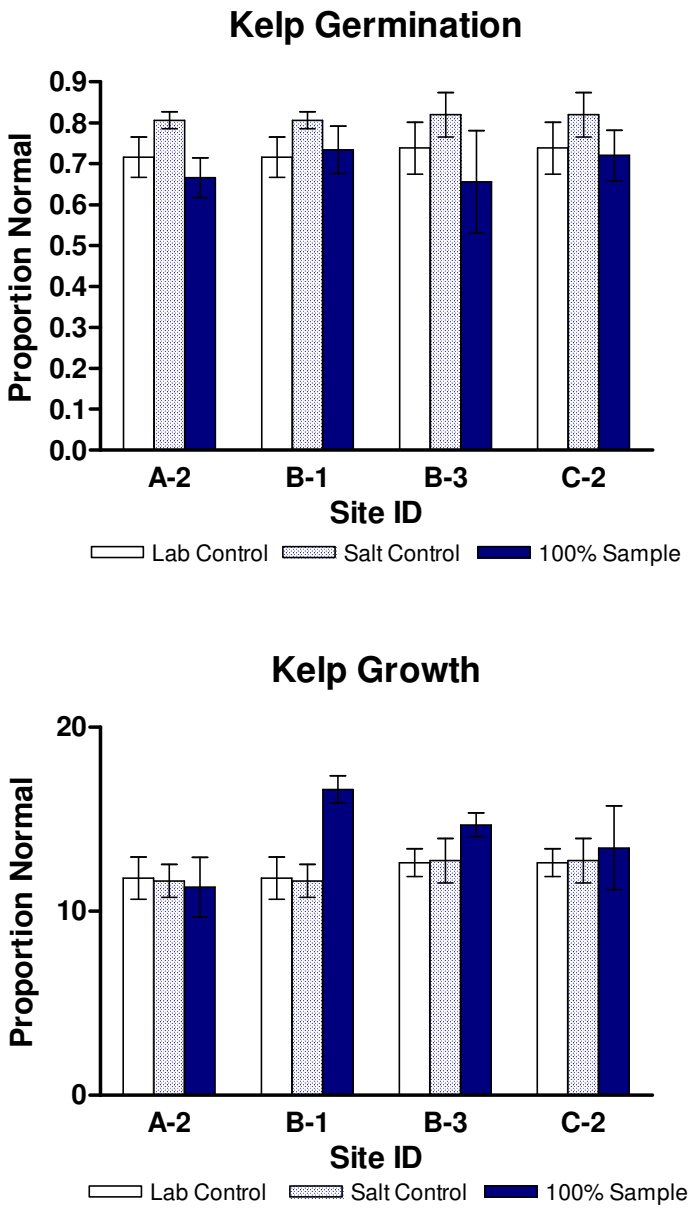


Figure 11. Summary of toxicity test results for kelp spore germination and growth. Mean (±1SD) values for each site are displayed. No statistically significant decreases were observed compared to concurrent brine or artificial salt controls (t-test, $p \leq 0.05$, n=5).

AMBIENT WATER TRACE METAL AND ANALYTICAL CHEMISTRY RESULTS

Copper concentrations in these samples were low, ranging between 3.4 and 3.7 µg/L as total copper. At these concentrations, copper would not be expected to result in any adverse effects based on values reported in "Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California," (US EPA 2000). Moreover, concentrations of nickel, selenium, and zinc were relatively low, and all below their respective water quality guidelines. These data suggest that these contaminants were unlikely to be associated with toxicity (Tables 1 and 2). Measurements for cyanide, total organic carbon (TOC), dissolved organic carbon (DOC), and total suspended solids (TSS) are included in Table 3.

Table 1. Summary of Total and Dissolved Trace Metal Concentrations Measured in Santa Clara River Estuary Samples Collected 20 July 2004.

Sample	Form	Concentration (µg/L)			
		Copper	Nickel	Selenium	Zinc
A-2	Dissolved	3.44	8.03	2.95*	1.43
	Total	3.45	8.27	2.21	2.26
B-1	Dissolved	3.27	6.31	1.26	17.5*
	Total	3.47	6.66	1.74	17.2
B-3	Dissolved	3.35	7.85	2.03	2.17
	Total	3.67	8.11	2.23	3.65
C-2	Dissolved	3.03	8.38	3.41*	ND
	Total	3.41	8.85	2.91	1.53

*In these cases the dissolved portion exceeds the total. However, the difference is <20% and falls within the RPD confidence limits for chemical analysis.

Table 2. EPA Water Quality Criteria for the Protection of Aquatic Life [a]

Sample	Concentration (µg/L)			
	Copper	Nickel	Selenium	Zinc
EPA Marine Acute CMC	4.8	74	290	90
EPA Marine Chronic CCC	3.1	8.2	71	81
EPA Freshwater Acute CMC [b]	13	470	13-186 [c]	120
EPA Freshwater Chronic CCC [b]	9.0	52	5 total	120

[a] Values expressed as a dissolved fraction excluding the EPA freshwater CCC value for selenium
[b] Values are hardness dependant and based in this table on a hardness of 100mg/L $CaCO_3$
[c] Freshwater CMC depends on ratio of selenite to selenate, CMC - Criterion Maximum Concentration
CCC - Criterion Continuous Concentration

Table 3. Summary of Analytical Chemistry Measured in Santa Clara River Estuary Samples Collected 20 July 2004.

Sample	Cyanide (mg/L)	TOC (mg/L)	DOC (mg/L)	TSS (mg/L)
A-2	< 0.050	2.3	2.7	28
B-1	< 0.050	5.8	7.3	< 1.0
B-3	< 0.050	2.5	2.8	28
C-2	< 0.050	2.4	2.8	38

Note: DOC levels detected were slightly higher than TOC levels possibly due to the presence of DOC in the filters used during sample preparation at the chemistry lab.

QA/QC

FRESHWATER SPECIES

Laboratory controls met acceptability criteria for all three freshwater species tested. Mean percent survival for the fathead minnow lab controls ranged from 93 to 95 percent (>80 percent criterion); mean dry biomass ranged from 0.42 to 0.47 mg (> 0.25 mg criterion). No mortality was observed in the lab controls for the water flea test, which has a minimum criterion of 90 percent for acute toxicity tests. Finally, the lab controls for the green alga test had mean final densities ranging from 20.4 to 20.8 x 10^5 cells/ml, and variability among control replicates ranged from 5.44 to 8.71 percent. Acceptability criteria for this test are a minimum mean final density of 10 x 10^5 cells/ml and less than 20 percent variability among control replicates.

Reference toxicant tests conducted using the fathead minnow and green alga met test acceptability criteria, and fell within two standard deviations of laboratory control chart means. The reference toxicant test for the water flea met the test acceptability criterion for survival, but the LC_{50} was well above two standard deviations of the historical mean (Appendix C). It is possible that the reduced survival and reproduction observed in the *Ceriodaphnia* culture were caused by an infection from a contaminated food source. When the animals were used for acute and chronic reference toxicant testing, the following observations were made: 1) Mortality was high and reproduction was low in the controls, low, and high concentrations but the animals exposed to the middle concentrations of copper had good survival and reproduction. This suggests that low concentrations of copper inhibited the growth of the infection agent. 2) The acute test showed no effect up to 25 µg/L, almost twice as high as the mean LC_{50} for the last 20 tests. Decreases in sensitivity to copper have been previously observed when acute tests wee initiated with food. It is possible that this acute reference toxicant test was initiated with food, since the estimated LC_{50} (50 µg/L) was nearly the same as that for the chronic test (67 µg/L).

MARINE SPECIES

Laboratory controls met acceptability criteria for all four marine species tested, and fell within two standard deviations of laboratory control chart means. The bivalve development test resulted in lab controls with mean normal development of 91 percent. Currently, no criterion is specified for mussels in the ASTM 1999 protocol. However, the

minimum acceptability criterion for oysters, which is an alternate species for this test, is 70 percent. Therefore, this was used as a guideline for acceptability in the mussel test. Topsmelt mean control survival ranged from 84 to 92 percent and mean dry biomass ranged from 1.1 to 1.4 mg. Both endpoints exceed the minimum requirements of 80 percent survival and 0.85 mg biomass. Mean percent survival for the mysid controls ranged from 95 to 98 percent, which also has a minimum requirement of 80 percent. The mean dry biomass for both mysid controls equaled 0.29 mg (> 0.2 mg criterion). Finally, the kelp test controls exhibited 72 to 74 mean percent germination and 12 to 13 µm mean spore length, exceeding the criteria of 70 percent and 10 µm, respectively.

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APPENDIX A
TEST RESULT SUMMARIES

FRESHWATER

P. PROMELAS

Appendix Table A-1. Larval Fish 7-Day Survival and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Pimephales promelas*

Sample	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control #1	A	10	100	95 +/- 5.8	0.52	0.47 +/- 0.05
	B	9	90		0.51	
	C	10	100		0.45	
	D	9	90		0.42	
Lab Control #2	A	9	90	93 +/- 9.6	0.44	0.42 +/- 0.02
	B	10	100		0.41	
	C	10	100		0.44	
	D	8	80		0.40	
Salinity Control #1 (3.1 ppt) A-2, B-3, C-2	A	10	100	85 +/- 13	0.41	0.38 +/- 0.03
	B	8	80		0.36	
	C	7	70		0.36	
	D	9	90		0.40	
Salinity Control #2 (1.1 ppt) B-1	A	9	90	90 +/- 8.2	0.38	0.36 +/- 0.02
	B	8	80		0.36	
	C	9	90		0.35	
	D	10	100		0.37	
pH-adjusted Control A-2, B-3, C-2	A	9	90	95 +/- 5.8	0.38	0.36 +/- 0.04
	B	9	90		0.39	
	C	10	100		0.31	
	D	10	100		0.34	
A-2	A	9	90	90 +/- 8.2	0.50	0.50 +/- 0.01
	B	9	90		0.50	
	C	10	100		0.50	
	D	8	80		0.51	
B-1	A	9	90	90 +/- 8.2	0.45	0.41 +/- 0.03
	B	10	100		0.43	
	C	8	80		0.39	
	D	9	90		0.40	
B-3	A	10	100	95 +/- 10	0.42	0.44 +/- 0.02
	B	8	80		0.42	
	C	10	100		0.47	
	D	10	100		0.45	
C-2	A	8	80	93 +/- 9.6	0.50	0.53 +/- 0.05
	B	9	90		0.53	
	C	10	100		0.48	
	D	10	100		0.59	

[a] Mean results are presented +/- 1 standard deviation.

C. DUBIA

Appendix A-2. Water Flea Acute Survival Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: 21 July 2004
Test Species: *Ceriodaphnia dubia*

Sample	Replicate	Percent Survival at 48 Hours	Mean Percent Survival at 48 Hours[a]	Percent Survival at 96 Hours	Mean Percent Survival at 96 Hours[a]
Lab Control #1	1	100	100	100	100
	2	100		100	
	3	100		100	
	4	100		100	
	5	100		100	
	6	100		100	
	7	100		100	
	8	100		100	
	9	100		100	
	10	100		100	
Lab Control #2	1	100	100	100	100
	2	100		100	
	3	100		100	
	4	100		100	
	5	100		100	
	6	100		100	
	7	100		100	
	8	100		100	
	9	100		100	
	10	100		100	
Salinity Control #1 (3.1 ppt) A-2, B-3, C-2	1	0	60 +/- 52	0	60 +/- 52
	2	100		100	
	3	100		100	
	4	0		0	
	5	100		100	
	6	100		100	
	7	100		100	
	8	0		0	
	9	100		100	
	10	0		0	
Salinity Control #2 (1.1 ppt) B-1	1	0	80 +/- 42	0	80 +/- 42
	2	100		100	
	3	100		100	
	4	100		100	
	5	100		100	
	6	0		0	
	7	100		100	
	8	100		100	
	9	100		100	
	10	100		100	
pH Adjusted Salt Control	1	0	50 +/- 53	0	50 +/- 53
	2	100		100	
	3	100		100	
	4	0		0	
	5	0		0	
	6	100		100	
	7	100		100	
	8	0		0	
	9	0		0	
	10	100		100	

[a] Mean results are presented +/- 1 standard deviation.

Appendix A-2 (con'd.). Water Flea Acute Survival Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: 21 July 2004
Test Species: *Ceriodaphnia dubia*

Sample	Replicate	Percent Survival at 48 Hours	Mean Percent Survival at 48 Hours[a]	Percent Survival at 96 Hours	Mean Percent Survival at 96 Hours[a]
A-2	1	0	30 +/- 48	0	30 +/- 48
	2	100		100	
	3	100		100	
	4	0		0	
	5	0		0	
	6	100		100	
	7	0		0	
	8	0		0	
	9	0		0	
	10	0		0	
B-1	1	100	100	100	100
	2	100		100	
	3	100		100	
	4	100		100	
	5	100		100	
	6	100		100	
	7	100		100	
	8	100		100	
	9	100		100	
	10	100		100	
B-3	1	0	50 +/- 53	0	40 +/- 52
	2	100		100	
	3	100		100	
	4	100		100	
	5	100		0	
	6	0		0	
	7	100		100	
	8	0		0	
	9	0		0	
	10	0		0	
C-2	1	0	50 +/- 53	0	50 +/- 53
	2	100		100	
	3	100		100	
	4	0		0	
	5	100		100	
	6	100		100	
	7	0		0	
	8	0		0	
	9	100		100	
	10	0		0	

[a] Mean results are presented +/- 1 standard deviation.

Appendix A-2 (con'd.). Water Flea 7-Day Survival and Reproduction Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Ceriodaphnia dubia*

Sample	Replicate	Percent Survival at 7 Days	Mean Percent Survival at 7 Days[a]	Number of Neonates Produced	Mean Number of Neonates Produced[a]
Lab Control #2	1	0	30 +/- 48	2	12 +/- 6.3
	2	0		22	
	3	100		12	
	4	0		15	
	5	100		14	
	6	0		7	
	7	0		20	
	8	0		5	
	9	0		11	
	10	100		15	
Salinity Control #2 (1.1 ppt)	1	0	70 +/- 48	0	14 +/- 8.1
	2	100		26	
	3	100		15	
	4	100		15	
	5	100		16	
	6	0		0	
	7	0		17	
	8	100		15	
	9	100		15	
	10	100		20	
B-1	1	100	70 +/- 48	28	25 +/- 11
	2	100		32	
	3	0		20	
	4	100		30	
	5	100		35	
	6	100		33	
	7	100		34	
	8	0		0	
	9	0		12	
	10	100		25	

[a] Mean results are presented +/- 1 standard deviation.

S. CAPRICORNUTUM

Appendix Table A-3. 96-Hour Algal Growth Inhibition Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: 21 July 2004
Test Species: *Selenastrum capricornutum*

Sample	Replicate	Initial Density (10^5 cells/ml)	Final Density (10^5 cells/ml)	Mean Final Density (10^5 cells/ml)[a]	Percent Growth	Mean Percent Growth
Lab Control #1	A	0.100	21.4	20.4 +/- 1.11	21300	20350
	B	0.100	18.9		18800	
	C	0.100	21.0		20900	
	D	0.100	20.5		20400	
Lab Control #2	A	0.100	20.7	20.8 +/- 1.81	20600	20675
	B	0.100	18.7		18600	
	C	0.100	23.1		23000	
	D	0.100	20.6		20500	
Salinity Control #1 (3.1 ppt) A-2, B-3, C-2	A	0.100	13.7	9.84 +/- 3.62	13600	9370
	B	0.100	11.2		11100	
	C	0.100	6.03		5930	
	D	0.100	6.95		6850	
Salinity Control #2 (1.1 ppt) B-1	A	0.100	17.2	17.8 +/- 0.883	17100	17700
	B	0.100	16.9		16800	
	C	0.100	18.7		18600	
	D	0.100	18.4		18300	
pH-adjusted Control A-2, B-3, C-2	A	0.100	7.7	10.6 +/- 5.32	7560	10548
	B	0.100	15.5		15400	
	C	0.100	4.6		4530	
	D	0.100	14.8		14700	
A-2 Filtered	A	0.100	14.1	14.6 +/- 0.902	14000	14525
	B	0.100	14.0		13900	
	C	0.100	15.9		15800	
	D	0.100	14.5		14400	
B-1 Filtered	A	0.100	13.6	13.9 +/- 1.42	13500	13775
	B	0.100	12.6		12500	
	C	0.100	15.9		15800	
	D	0.100	13.4		13300	
B-3 Filtered	A	0.100	9.7	14.0 +/- 3.28	9550	13913
	B	0.100	13.7		13600	
	C	0.100	15.2		15100	
	D	0.100	17.5		17400	
C-2 Filtered	A	0.100	18.3	19.7 +/- 1.61	18200	19600
	B	0.100	18.8		18700	
	C	0.100	19.8		19700	
	D	0.100	21.9		21800	
Blank A-2	A	0.100	0.200	NA	100	NA
Blank B-1	A	0.100	0.100	NA	0	NA
Blank B-3	A	0.100	0.040	NA	-60	NA
Blank C-2	A	0.100	0.240	NA	140	NA

[a] Mean results are presented +/- 1 standard deviation.

Appendix Table A-3 (con'd). 96-Hour Algal Growth Inhibition Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: 21 July 2004
Test Species: *Selenastrum capricornutum*

Sample	Replicate	Initial Density (10^5 cells/ml)	Final Density (10^5 cells/ml)	Mean Final Density (10^5 cells/ml)[a]	Percent Growth	Mean Percent Growth
A-2 Unfiltered	A	0.100	2.20	2.28 +/- 0.152	2100	2183
	B	0.100	2.27		2170	
	C	0.100	2.50		2400	
	D	0.100	2.16		2060	
B-1 Unfiltered	A	0.100	3.57	3.27 +/- 0.209	3470	3165
	B	0.100	3.14		3040	
	C	0.100	3.12		3020	
	D	0.100	3.23		3130	
B-3 Unfiltered	A	0.100	2.04	1.97 +/- 1.05	1940	1873
	B	0.100	1.25		1150	
	C	0.100	1.17		1070	
	D	0.100	3.43		3330	
C-2 Unfiltered	A	0.100	2.33	2.46 +/- 0.943	2230	2355
	B	0.100	1.93		1830	
	C	0.100	3.82		3720	
	D	0.100	1.74		1640	

[a] Mean results are presented +/- 1 standard deviation.

MARINE

A. AFFINIS

Appendix Table A-4. Site A-2 Marine Larval Fish 7-Day Survival and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Atherinops affinis*

Concentration	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control	A	5	100	92 +/- 11	1.5	1.4 +/- 0.24
	B	5	100		1.3	
	C	5	100		1.6	
	D	4	80		1.0	
	E	4	80		1.6	
Salt Control	A	5	100	96 +/- 8.9	1.1	1.3 +/- 0.16
	B	4	80		1.1	
	C	5	100		1.4	
	D	5	100		1.4	
	E	5	100		1.3	
25%	A	5	100	92 +/- 11	1.4	1.5 +/- 0.13
	B	4	80		1.4	
	C	4	80		1.5	
	D	5	100		1.6	
	E	5	100		1.6	
50%	A	4	80	96 +/- 8.9	1.4	1.5 +/- 0.16
	B	5	100		1.6	
	C	5	100		1.6	
	D	5	100		1.4	
	E	5	100		1.7	
67%	A	5	100	100	1.4	1.5 +/- 0.09
	B	5	100		1.5	
	C	5	100		1.5	
	D	5	100		1.5	
	E	5	100		1.6	
100%	A	4	80	92 +/- 11	1.6	1.6 +/- 0.20
	B	5	100		1.8	
	C	5	100		1.7	
	D	4	80		1.4	
	E	5	100		1.3	

[a] Mean results are presented +/- 1 standard deviation.

Appendix Table A-4 (Con'd). Site B-1 Marine Larval Fish 7-Day Survival and Growth Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: 21 July 2004
Test Species: *Atherinops affinis*

Concentration	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control	A	5	100	92 +/- 11	1.5	1.4 +/- 0.24
	B	5	100		1.3	
	C	5	100		1.6	
	D	4	80		1.0	
	E	4	80		1.6	
Salt Control	A	5	100	96 +/- 8.9	1.1	1.3 +/- 0.16
	B	4	80		1.1	
	C	5	100		1.4	
	D	5	100		1.4	
	E	5	100		1.3	
25%	A	5	100	100	1.5	1.4 +/- 0.12
	B	5	100		1.4	
	C	5	100		1.3	
	D	5	100		1.4	
	E	5	100		1.5	
50%	A	4	80	92 +/- 11	1.3	1.4 +/- 0.24
	B	4	80		1.3	
	C	5	100		1.4	
	D	5	100		1.1	
	E	5	100		1.7	
67%	A	5	100	100	1.3	1.3 +/- 0.09
	B	5	100		1.3	
	C	5	100		1.4	
	D	5	100		1.2	
	E	5	100		1.5	
100%	A	5	100	96 +/- 8.9	1.4	1.4 +/- 0.10
	B	5	100		1.4	
	C	5	100		1.3	
	D	4	80		1.3	
	E	5	100		1.5	

[a] Mean results are presented +/- 1 standard deviation.

Appendix Table A-4 (Con'd). Site B-3 Marine Larval Fish 7-Day Survival and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Atherinops affinis*

Concentration	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control	A	5	100	84 +/- 17	1.6	1.2 +/- 0.24
	B	5	100		1.3	
	C	4	80		1.2	
	D	4	80		1.3	
	E	3	60		0.88	
Salt Control	A	5	100	84 +/- 17	1.2	1.2 +/- 0.16
	B	4	80		1.1	
	C	4	80		1.1	
	D	3	60		1.0	
	E	5	100		1.4	
25%	A	5	100	96 +/- 8.9	1.1	1.2 +/- 0.15
	B	5	100		1.4	
	C	4	80		1.2	
	D	5	100		1.1	
	E	5	100		1.4	
50%	A	5	100	96 +/- 8.9	1.4	1.3 +/- 0.19
	B	5	100		1.5	
	C	5	100		1.4	
	D	5	100		1.1	
	E	4	80		1.1	
67%	A	5	100	96 +/- 8.9	1.2	1.3 +/- 0.25
	B	5	100		1.3	
	C	5	100		1.6	
	D	4	80		1.0	
	E	5	100		1.6	
100%	A	4	80	92 +/- 11	1.2	1.2 +/- 0.11
	B	5	100		1.3	
	C	5	100		1.2	
	D	5	100		1.0	
	E	4	80		1.3	

[a] Mean results are presented +/- 1 standard deviation.

Appendix Table A-4 (Con'd). Site C-2 Marine Larval Fish 7-Day Survival and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Atherinops affinis*

Concentration	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control	A	5	100	84 +/- 17	1.6	1.2 +/- 0.24
	B	5	100		1.3	
	C	4	80		1.2	
	D	4	80		1.3	
	E	3	60		0.88	
Salt Control	A	5	100	84 +/- 17	1.2	1.2 +/- 0.16
	B	4	80		1.1	
	C	4	80		1.1	
	D	3	60		1.0	
	E	5	100		1.4	
25%	A	5	100	96 +/- 8.9	1.1	1.2 +/- 0.15
	B	5	100		1.2	
	C	4	80		1.3	
	D	5	100		1.5	
	E	5	100		1.2	
50%	A	4	80	92 +/- 11	1.2	1.2 +/- 0.08
	B	4	80		1.1	
	C	5	100		1.2	
	D	5	100		1.2	
	E	5	100		1.3	
67%	A	5	100	96 +/- 8.9	1.4	1.3 +/- 0.21
	B	5	100		1.2	
	C	5	100		1.1	
	D	4	80		1.1	
	E	5	100		1.6	
100%	A	5	100	92 +/- 11	1.7	1.5 +/- 0.22
	B	4	80		1.5	
	C	4	80		1.2	
	D	5	100		1.3	
	E	5	100		1.6	

[a] Mean results are presented +/- 1 standard deviation.

A. BAHIA

Appendix Table A-5. Site A-2 Opossum Shrimp 7-Day Survival and Growth Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: 21 July 2004
Test Species: *Americamysis bahia*

Concentration	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control	A	4	80	95 +/- 9.3	0.30	0.29 +/- 0.04
	B	5	100		0.36	
	C	5	100		0.22	
	D	5	100		0.29	
	E	4	80		0.30	
	F	5	100		0.33	
	G	5	100		0.26	
	H	5	100		0.30	
Salt Control	A	5	100	95 +/- 9.3	0.30	0.28 +/- 0.02
	B	5	100		0.31	
	C	5	100		0.27	
	D	4	80		0.28	
	E	5	100		0.27	
	F	4	80		0.27	
	G	5	100		0.26	
	H	5	100		0.30	
25%	A	5	100	100	0.37	0.34 +/- 0.04
	B	5	100		0.36	
	C	5	100		0.39	
	D	5	100		0.33	
	E	5	100		0.36	
	F	5	100		0.27	
	G	5	100		0.33	
	H	5	100		0.32	
50%	A	5	100	98 +/- 7.1	0.40	0.37 +/- 0.17
	B	5	100		0.42	
	C	5	100		0.38	
	D	5	100		0.39	
	E	5	100		0.27	
	F	5	100		0.44	
	G	5	100		0.62	
	H	4	80		0.01	
67%	A	5	100	98 +/- 7.1	0.44	0.38 +/- 0.07
	B	4	80		0.26	
	C	5	100		0.48	
	D	5	100		0.34	
	E	5	100		0.41	
	F	5	100		0.42	
	G	5	100		0.39	
	H	5	100		0.31	
100%	A	5	100	95 +/- 9.3	0.38	0.39 +/- 0.06
	B	4	80		0.33	
	C	5	100		0.50	
	D	4	80		0.35	
	E	5	100		0.37	
	F	5	100		0.46	
	G	5	100		0.39	
	H	5	100		0.32	

[a] Mean results are presented +/- 1 standard deviation.

Appendix Table A-5 (Con'd). Site B-1 Opossum Shrimp 7-Day Survival and Growth Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: 21 July 2004
Test Species: *Americamysis bahia*

Concentration	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control	A	4	80	95 +/- 9.3	0.30	0.29 +/- 0.04
	B	5	100		0.36	
	C	5	100		0.22	
	D	5	100		0.29	
	E	4	80		0.30	
	F	5	100		0.33	
	G	5	100		0.26	
	H	5	100		0.30	
Salt Control	A	5	100	95 +/- 9.3	0.30	0.28 +/- 0.02
	B	5	100		0.31	
	C	5	100		0.27	
	D	4	80		0.28	
	E	5	100		0.27	
	F	4	80		0.27	
	G	5	100		0.26	
	H	5	100		0.30	
25%	A	5	100	95 +/- 9.3	0.35	0.30 +/- 0.06
	B	5	100		0.39	
	C	5	100		0.29	
	D	4	80		0.20	
	E	5	100		0.29	
	F	5	100		0.28	
	G	5	100		0.30	
	H	4	80		0.28	
50%	A	5	100	98 +/- 7.1	0.33	0.26 +/- 0.04
	B	5	100		0.26	
	C	5	100		0.22	
	D	4	80		0.21	
	E	5	100		0.23	
	F	5	100		0.30	
	G	5	100		0.28	
	H	5	100		0.23	
67%	A	4	80	98 +/- 7.1	0.16	0.25 +/- 0.04
	B	5	100		0.25	
	C	5	100		0.25	
	D	5	100		0.28	
	E	5	100		0.26	
	F	5	100		0.25	
	G	5	100		0.28	
	H	5	100		0.25	
100%	A	5	100	98 +/- 7.1	0.24	0.26 +/- 0.05
	B	4	80		0.22	
	C	5	100		0.21	
	D	5	100		0.21	
	E	5	100		0.28	
	F	5	100		0.23	
	G	5	100		0.31	
	H	5	100		0.33	

[a] Mean results are presented +/- 1 standard deviation.

Appendix Table A-5 (Con'd). Site B-3 Opossum Shrimp 7-Day Survival and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Americamysis bahia*

Concentration	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control	A	5	100	98 +/- 71	0.30	0.29 +/- 0.02
	B	5	100		0.29	
	C	5	100		0.32	
	D	5	100		0.25	
	E	4	80		0.29	
	F	5	100		0.26	
	G	5	100		0.29	
	H	5	100		0.28	
Salt Control	A	5	100	98 +/- 7.1	0.30	0.29 +/- 0.03
	B	5	100		0.30	
	C	5	100		0.31	
	D	5	100		0.27	
	E	5	100		0.26	
	F	5	100		0.32	
	G	4	80		0.24	
	H	5	100		0.32	
25%	A	*	*	100	*	0.41 +/- 0.05
	B	5	100		0.32	
	C	5	100		0.41	
	D	5	100		0.39	
	E	5	100		0.43	
	F	5	100		0.46	
	G	5	100		0.48	
	H	5	100		0.41	
50%	A	5	100	100	0.48	0.46 +/- 0.04
	B	5	100		0.43	
	C	5	100		0.49	
	D	5	100		0.46	
	E	5	100		0.39	
	F	5	100		0.42	
	G	5	100		0.51	
	H	5	100		0.47	
67%	A	5	100	100	0.47	0.44 +/- 0.02
	B	5	100		0.44	
	C	5	100		0.45	
	D	5	100		0.44	
	E	5	100		0.44	
	F	5	100		0.40	
	G	5	100		0.44	
	H	5	100		0.43	
100%	A	5	100	100	0.46	0.47 +/- 0.04
	B	5	100		0.49	
	C	5	100		0.51	
	D	5	100		0.46	
	E	5	100		0.48	
	F	5	100		0.52	
	G	5	100		0.39	
	H	5	100		0.45	

[a] Mean results are presented +/- 1 standard deviation.

* Replicate spilled during test period.

Appendix Table A-5 (Con'd). Site C-2 Opossum Shrimp 7-Day Survival and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Americamysis bahia*

Concentration	Replicate	No. Alive	Percent Survival	Mean Percent Survival[a]	Retained Biomass (mg)	Mean Retained Biomass (mg)[a]
Lab Control	A	5	100	98 +/- 71	0.30	0.29 +/- 0.02
	B	5	100		0.29	
	C	5	100		0.32	
	D	5	100		0.25	
	E	4	80		0.29	
	F	5	100		0.26	
	G	5	100		0.29	
	H	5	100		0.28	
Salt Control	A	5	100	98 +/- 7.1	0.30	0.29 +/- 0.03
	B	5	100		0.30	
	C	5	100		0.31	
	D	5	100		0.27	
	E	5	100		0.26	
	F	5	100		0.32	
	G	4	80		0.24	
	H	5	100		0.32	
25%	A	5	100	100	0.45	0.41 +/- 0.02
	B	5	100		0.39	
	C	5	100		0.38	
	D	5	100		0.39	
	E	5	100		0.43	
	F	5	100		0.41	
	G	5	100		0.41	
	H	5	100		0.40	
50%	A	5	100	100	0.49	0.48 +/- 0.03
	B	5	100		0.46	
	C	5	100		0.51	
	D	5	100		0.46	
	E	5	100		0.53	
	F	5	100		0.44	
	G	5	100		0.44	
	H	5	100		0.50	
67%	A	5	100	100	0.42	0.47 +/- 0.03
	B	5	100		0.48	
	C	5	100		0.45	
	D	5	100		0.47	
	E	5	100		0.45	
	F	5	100		0.53	
	G	5	100		0.48	
	H	5	100		0.45	
100%	A	5	100	100	0.50	0.49 +/- 0.07
	B	5	100		0.55	
	C	5	100		0.47	
	D	5	100		0.41	
	E	5	100		0.49	
	F	5	100		0.39	
	G	5	100		0.59	
	H	5	100		0.48	

[a] Mean results are presented +/- 1 standard deviation.

M. GALLOPROVINCIALIS

Appendix Table A-6. Site A-2 48-Hour Bivalve Embryo Development Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Mytilus galloprovincialis*

Concentration[a]	Replicate	Percent Normal Development	Mean Percent Normal Development[b]
Lab Control	A	92	91 +/- 2.3
	B	92	
	C	90	
	D	94	
	E	88	
Brine Control	A	83	85 +/- 4.0
	B	88	
	C	84	
	D	90	
	E	80	
Salt Control	A	93	85 +/- 5.2
	B	87	
	C	79	
	D	85	
	E	83	
25%	A	94	91 +/- 3.9
	B	96	
	C	88	
	D	88	
	E	88	
50%	A	89	92 +/- 2.0
	B	94	
	C	92	
	D	92	
	E	94	
65%	A	88	90 +/- 2.9
	B	89	
	C	88	
	D	93	
	E	94	
100%	A	93	86 +/- 6.5
	B	80	
	C	79	
	D	92	
	E	85	

[a] The 100% test concentration was achieved by the addition of artificial sea salts. All other test concentrations were achieved by the addition of hypersaline brine. NOEC and LOEC statisitcal comparisons were made between the salt control and 100% sample, and between the brine control and remaining test concentrations.

[b] Mean results are presented +/- 1 standard deviation.

Appendix Table A-6 (Con'd). Site B-1 48-Hour Bivalve Embryo Development Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Mytilus galloprovincialis*

Concentration[a]	Replicate	Percent Normal Development	Mean Percent Normal Development[b]
Lab Control	A	92	91 +/- 2.3
	B	92	
	C	90	
	D	94	
	E	88	
Brine Control	A	83	85 +/- 4.0
	B	88	
	C	84	
	D	90	
	E	80	
Salt Control	A	84	83 +/- 4.4
	B	85	
	C	86	
	D	75	
	E	83	
25%	A	88	89 +/- 4.0
	B	95	
	C	84	
	D	88	
	E	90	
50%	A	90	87 +/- 4.6
	B	80	
	C	90	
	D	86	
	E	91	
65%	A	86	86 +/- 4.6
	B	92	
	C	88	
	D	83	
	E	80	
100%	A	87	84 +/- 3.4
	B	79	
	C	81	
	D	86	
	E	85	

[a] The 100% test concentration was achieved by the addition of artificial sea salts. All other test concentrations were achieved by the addition of hypersaline brine. NOEC and LOEC statisitcal comparisons were made between the salt control and 100% sample, and between the brine control and remaining test concentrations.

[b] Mean results are presented +/- 1 standard deviation.

Appendix Table A-6 (Con'd). Site B-3 48-Hour Bivalve Embryo Development Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Mytilus galloprovincialis*

Concentration[a]	Replicate	Percent Normal Development	Mean Percent Normal Development[b]
Lab Control	A	92	91 +/- 2.3
	B	92	
	C	90	
	D	94	
	E	88	
Brine Control	A	83	85 +/- 4.0
	B	88	
	C	84	
	D	90	
	E	80	
Salt Control	A	82	82 +/- 3.6
	B	77	
	C	83	
	D	87	
	E	82	
25.0%	A	89	90 +/- 5.6
	B	93	
	C	88	
	D	82	
	E	97	
50%	A	89	90 +/- 3.4
	B	90	
	C	86	
	D	92	
	E	95	
65%	A	84	87 +/- 2.0
	B	88	
	C	89	
	D	88	
	E	86	
100%	A	75	86 +/- 8.8
	B	92	
	C	91	
	D	77	
	E	93	

Appendix Table A-6 (Con'd). Site C-2 48-Hour Bivalve Embryo Development Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Mytilus galloprovincialis*

Concentration[a]	Replicate	Percent Normal Development	Mean Percent Normal Development[b]
Lab Control	A	92	91 +/- 2.3
	B	92	
	C	90	
	D	94	
	E	88	
Brine Control	A	83	85 +/- 4.0
	B	88	
	C	84	
	D	90	
	E	80	
Salt Control	A	82	82 +/- 3.6
	B	82	
	C	77	
	D	87	
	E	83	
25.0%	A	97	89 +/- 5.9
	B	92	
	C	81	
	D	88	
	E	89	
50%	A	88	88 +/- 1.7
	B	91	
	C	87	
	D	87	
	E	89	
65%	A	92	90 +/- 5.1
	B	90	
	C	85	
	D	85	
	E	97	
100%	A	89	89 +/- 1.7
	B	90	
	C	88	
	D	86	
	E	90	

M. PYRIFERA

Appendix Table A-8. Site A-2 48-Hour Kelp Spore Germination and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Macrocystis pyrifera*

Concentration	Replicate	Percent Germinated	Mean Percent Germinated[a]	Spore Length (μm)	Mean Spore Length (μm)[a]
Lab Control #1	A	69	72 +/- 4.9	12	12 +/- 1.1
	B	69		12	
	C	68		13	
	D	80		10	
	E	72		12	
Brine Control #1	A	78	73 +/- 5.6	11	13 +/- 1.2
	B	*		*	
	C	77		13	
	D	67		14	
	E	69		14	
Salt Control #1	A	78	81 +/- 2.1	12	12 +/- 0.89
	B	82		11	
	C	83		12	
	D	81		13	
	E	79		11	
25%	A	79	69 +/- 7.2	11	10 +/- 1.3
	B	73		12	
	C	62		8.3	
	D	66		10	
	E	63		10	
50%	A	74	65 +/- 7.6	11	12 +/- 1.2
	B	73		11	
	C	59		13	
	D	60		14	
	E	60		12	
65%	A	81	75 +/- 4.8	14	13 +/- 0.84
	B	74		13	
	C	72		12	
	D	78		14	
	E	69		14	
100%	A	63	67 +/- 4.8	13	11 +/- 1.6
	B	66		12	
	C	75		8.8	
	D	65		13	
	E	64		11	

[a] Mean results are presented +/- 1 standard deviation.

* Replicate excluded from analysis due to possible test chamber contamination.

Appendix Table A-8 (Con'd). Site B-1 48-Hour Kelp Spore Germination and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Macrocystis pyrifera*

Concentration	Replicate	Percent Germinated	Mean Percent Germinated[a]	Spore Length (μm)	Mean Spore Length (μm)[a]
Lab Control #1	A	69	72 +/- 4.9	12	12 +/- 1.1
	B	69		12	
	C	68		13	
	D	80		10	
	E	72		12	
Brine Control #1	A	78	73 +/- 5.6	11	13 +/- 1.2
	B	*		*	
	C	77		13	
	D	67		14	
	E	69		14	
Salt Control #1	A	78	81 +/- 2.1	12	12 +/- 0.89
	B	82		11	
	C	83		12	
	D	81		13	
	E	79		11	
25%	A	57	62 +/- 4.1	14	14 +/- 0.73
	B	60		14	
	C	61		13	
	D	63		14	
	E	68		13	
50%	A	72	68 +/- 10	17	17 +/- 1.9
	B	68		17	
	C	56		20	
	D	83		15	
	E	63		18	
65%	A	59	67 +/- 5.3	16	17 +/- 0.86
	B	73		17	
	C	66		18	
	D	68		18	
	E	70		17	
100%	A	73	73 +/- 5.8	16	17 +/- 0.73
	B	81		17	
	C	74		16	
	D	65		17	
	E	75		18	

[a] Mean results are presented +/- 1 standard deviation.

* Replicate excluded from analysis due to possible test chamber contamination.

Appendix Table A-8 (Con'd). Site B-3 48-Hour Kelp Spore Germination and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Macrocystis pyrifera*

Concentration	Replicate	Percent Germinated	Mean Percent Germinated[a]	Spore Length (µm)	Mean Spore Length (µm)[a]
Lab Control #2	A	73	74 +/- 6.3	13.0	13 +/- 0.76
	B	74		13.3	
	C	77		12.3	
	D	81		11.5	
	E	64		13.3	
Brine Control #2	A	69	72 +/- 6.2	12	14 +/- 1.2
	B	75		15	
	C	65		14	
	D	79		13	
	E	*		*	
Salt Control #2	A	84	82 +/- 5.4	11	13 +/- 1.2
	B	79		15	
	C	74		13	
	D	86		12	
	E	87		13	
25%	A	75	72 +/- 2.7	13	13 +/- 1.7
	B	68		12	
	C	74		12	
	D	71		15	
	E	72		16	
50%	A	71	67 +/- 5.8	13	13 +/- 0.74
	B	66		13	
	C	61		13	
	D	75		15	
	E	63		13	
65%	A	61	66 +/- 8.1	16	14 +/- 1.2
	B	64		14	
	C	66		13	
	D	79		13	
	E	58		15	
100%	A	75	66 +/- 13	15	15 +/- 0.65
	B	65		15	
	C	79		16	
	D	47		14	
	E	62		15	

[a] Mean results are presented +/- 1 standard deviation.

* Replicate excluded from analysis due to possible test chamber contamination.

Appendix Table A-8 (Con'd). Site C-2 48-Hour Kelp Spore Germination and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: 21 July 2004

Test Species: *Macrocystis pyrifera*

Concentration	Replicate	Percent Germinated	Mean Percent Germinated[a]	Spore Length (μm)	Mean Spore Length (μm)[a]
Lab Control #2	A	73	74 +/- 6.3	13.0	13 +/- 0.76
	B	74		13.3	
	C	77		12.3	
	D	81		11.5	
	E	64		13.3	
Brine Control #2	A	69	72 +/- 6.2	12	14 +/- 1.2
	B	75		15	
	C	65		14	
	D	79		13	
	E	*		*	
Salt Control #2	A	84	82 +/- 5.4	11	13 +/- 1.2
	B	79		15	
	C	74		13	
	D	86		12	
	E	87		13	
25%	A	63	71 +/- 5.1	12	11 +/- 1.1
	B	70		12	
	C	76		11	
	D	75		9.3	
	E	71		11	
50%	A	75	71 +/- 6.1	13	13 +/- 2.1
	B	60		9.8	
	C	72		13	
	D	73		12	
	E	74		16	
65%	A	74	70 +/- 5.4	9.5	12 +/- 1.6
	B	65		11	
	C	77		14	
	D	65		12	
	E	71		13	
100%	A	67	72 +/- 6.2	11	13 +/- 2.3
	B	78		16	
	C	64		13	
	D	74		12	
	E	77		16	

[a] Mean results are presented +/- 1 standard deviation.

* Replicate excluded from analysis due to possible test chamber contamination.

APPENDIX B
STATISTICAL ANALYSIS SUMMARIES
& RAW BENCH DATASHEETS

FRESHWATER

P. PROMELAS

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test A-2 — AMEC Bioassay SD

Test:	06-7756-1654	Test Type:	Growth-Survival (7d)	Duration:	6 Days 23 Hours
Start Date:	21 Jul-04 04:00 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Pimephales promelas
End Date:	28 Jul-04 03:00 PM	Dil Water:	Diluted Mineral Water (8:2)	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:00 PM	Brine:	Not Applicable		

Sample:	02-6088-6219	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 02:50 PM	Code:	0407-047	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	25 Hours (19.3 °C)	Station:	A-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
08-8786-8038	7d Proportion Survived	100	>100	N/A	0.20711	Equal Variance t
13-4590-8037		100	>100	N/A	0.09401	Equal Variance t
17-0062-1291		100	>100	N/A	0.09401	Equal Variance t
04-2289-6644	Mean Dry Weight-mg	100	>100	N/A	0.10107	Equal Variance t
11-2848-8668		100	>100	N/A	0.07060	Equal Variance t
15-6000-6236		100	>100	N/A	0.12482	Unequal Variance t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
08-8786-8038	7d Proportion Survived	Control Response	0.85	0.8		Passes acceptability criteria
13-4590-8037			0.95	0.8		Passes acceptability criteria
17-0062-1291			0.95	0.8		Passes acceptability criteria

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.95000	0.90000	1.00000	0.02887	0.05774	6.08%
0	pH-adjusted C	4	0.95000	0.90000	1.00000	0.02887	0.05774	6.08%
0	Salt Control	4	0.85000	0.70000	1.00000	0.06455	0.12910	15.19%
100		4	0.90000	0.80000	1.00000	0.04082	0.08165	9.07%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.47350	0.41800	0.52000	0.02493	0.04987	10.53%
0	pH-adjusted C	4	0.35525	0.31300	0.39000	0.01823	0.03646	10.26%
0	Salt Control	4	0.38425	0.35900	0.41300	0.01363	0.02727	7.10%
100		4	0.50000	0.49500	0.50700	0.00300	0.00600	1.20%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1.00000	0.90000	1.00000	0.90000
0	pH-adjusted C	0.90000	0.90000	1.00000	1.00000
0	Salt Control	1.00000	0.80000	0.70000	0.90000
100		0.90000	0.90000	1.00000	0.80000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	0.52000	0.51100	0.44500	0.41800
0	pH-adjusted C	0.38100	0.39000	0.31300	0.33700
0	Salt Control	0.41300	0.36300	0.35900	0.40200
100		0.49500	0.49500	0.50300	0.50700

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	06-6107-5783	06-6107-5783	19 Aug-04 1:00 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	9.40%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.95	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.75393	47.46723	0.65584	Equal Variances
Distribution	Shapiro-Wilk W	0.95631	0.74935	0.74224	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.01161802	0.0116180	1	0.95	0.36665	Non-Significant Effect
Error	0.07314242	0.0121904	6			
Total	0.08476043	0.0238084	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		100	0.9762408	1.94318	0.18332	0.1517075	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.95000	0.90000	1.00000	0.05773	1.33053	1.24905	1.41202	0.09409
100		4	0.90000	0.80000	1.00000	0.08165	1.25431	1.10715	1.41202	0.12461

Approved By: 8/26

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	06-6107-5783	06-6107-5783	19 Aug-04 1:00 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	20.71%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.85	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.12911	47.46723	0.55074	Equal Variances
Distribution	Shapiro-Wilk W	0.96937	0.74935	0.87603	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00831335	0.0083134	1	0.34	0.57988	Non-Significant Effect
Error	0.1457636	0.0242939	6			
Total	0.15407693	0.0326073	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-0.5849776	1.94318	0.71006	0.2141643	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	0.85000	0.70000	1.00000	0.12910	1.18984	0.99116	1.41202	0.18182
100		4	0.90000	0.80000	1.00000	0.08165	1.25431	1.10715	1.41202	0.12461

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	06-6107-5783	06-6107-5783	19 Aug-04 1:00 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	9.40%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.95	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.75393	47.46723	0.65584	Equal Variances
Distribution	Shapiro-Wilk W	0.95631	0.74935	0.74224	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.01161802	0.0116180	1	0.95	0.36665	Non-Significant Effect
Error	0.07314242	0.0121904	6			
Total	0.08476043	0.0238084	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		100	0.9762408	1.94318	0.18332	0.1517075	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	0.95000	0.90000	1.00000	0.05773	1.33053	1.24905	1.41202	0.09409
100		4	0.90000	0.80000	1.00000	0.08165	1.25431	1.10715	1.41202	0.12461

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	06-6107-5783	06-6107-5783	19 Aug-04 1:01 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Unequal Variance t	C > T	Untransformed		100	>100	1.00	N/A	12.48%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	69.07761	47.46723	0.00576	Unequal Variances
Distribution	Shapiro-Wilk W	0.95800	0.74935	0.76014	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00140451	0.0014045	1	1.11	0.33197	Non-Significant Effect
Error	0.00756897	0.0012615	6			
Total	0.00897349	0.0026660	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		100	-1.055164	2.353363	0.81559	0.05910399	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.47350	0.41800	0.52000	0.04987				
100		4	0.50000	0.49500	0.50700	0.00600				

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	06-6107-5783	06-6107-5783	19 Aug-04 1:01 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	7.06%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	20.65350	47.46723	0.03323	Equal Variances
Distribution	Shapiro-Wilk W	0.96720	0.74935	0.85517	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.02679614	0.0267961	1	68.74	0.00017	Significant Effect
Error	0.00233876	0.0003898	6			
Total	0.0291349	0.0271859	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-8.291227	1.94318	0.99992	0.02712785	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	0.38425	0.35900	0.41300	0.02727				
100		4	0.50000	0.49500	0.50700	0.00600				

CETIS Report

Report Date: 19 Aug-04 1:01 PM
Analysis: 04-2289-6644

Fathead Minnow 7-d Larval Survival and Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	06-6107-5783	06-6107-5783	19 Aug-04 1:01 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	10.11%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	36.92997	47.46723	0.01442	Equal Variances
Distribution	Shapiro-Wilk W	0.97074	0.74935	0.88871	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0419053	0.0419053	1	61.37	0.00023	Significant Effect
Error	0.00409676	0.0006828	6			
Total	0.04600206	0.0425881	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		100	-7.834116	1.94318	0.99989	0.03590398	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	0.35525	0.31300	0.39000	0.03646				
100		4	0.50000	0.49500	0.50700	0.00600				

Approved By: 8/23/

Freshwater Chronic Bioassay **Larval Fish Survival & Weights**

Test Species: *P. promelas*

Client Name: City of Buenaventura **Test Date:** 07/21/2004

Sample ID: A-2 **Test No.:** 0407-047

Conc. (___%___)	Rep.	Test Day 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g) RS
Lab	a	10	10	10	10	10	10	10	10	100	0.04924	0.05444
Control #1	b	10	10	9	9	9	9	9	9	90	0.03662	0.04173
	c	10	10	10	10	10	10	10	10	100	0.04416	0.04861
	d	10	10	9	9	9	9	9	9	90	0.03823	0.04241
Salt	a	10	10	10	10	10	10	10	10	100	0.04000	0.04413
Control #1	b	10	10	10	10	9	9	8	8	80	0.04285	0.04648
(3.1 ppt)	c	10	10	10	8	7	7	7	7	70	0.03690	0.04049
	d	10	10	9	9	9	9	9	9	90	0.03498	0.03900
100%	a	10	10	9	9	9	9	9	9	90	0.03847	0.04342
	b	10	10	9	9	9	9	9	9	90	0.04029	0.04524
	c	10	10	10	10	10	10	10	10	100	0.03778	0.04281
	d	10	8	8	8	8	8	8	8	80	0.03326	0.03833
	a											
	b											
	c											
	d											
pH-adjusted salt control	a	10	9	9	9	9	9	9	9	90	0.05015	0.05396
	b	10	9	9	9	9	9	9	9	90	0.04563	0.04953
	c	10	10	10	10	10	10	10	10	100	0.04472	0.04785
	d	10	10	10	10	10	10	10	10	100	0.04522	0.04859
	a											
	b											
	c											
	d											
	a											
	b											
	c											
	d											
Tech Initials		SH	RS	RS	SH	AH	RS	AH	SH			

data entry ME
QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
-	0900	0800	0830	0900	0840	0815
-	1215	1400	1030	1300	1320	1150
1630	1445	1605	1400	1945	1600	1545

Weight Data:
Date/Time in: 7-28-04/1600
Date/Time out: 8-2-04/1218
Oven Temp (°C): 63
Tech Initials: RS

Comments:

QC Check: AH 8/10/04
Final Review: 8/23/04

Freshwater Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *P. promelas*

Sample ID: A-2 | **Start Date/Time:** 07/21/2004 1600

Test No: 0407-047 | **End Date/Time:** 07/28/2004 1500

Concentration	Lab Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.09	8.24	8.28	8.25	8.25	8.22	8.21	
DO (mg/L)	7.9	7.7	7.9	7.8	8.3	7.8	8.0	
Cond. (µmhos/cm)	224	209	207	208	209	210	210	
Temp (°C)	24.7	25.7	24.7	24.8	24.7	24.7	24.1	
Final								
pH		7.53	7.82	7.68	7.71	7.71	7.73	7.75
DO (mg/L)		6.1	6.5	6.0	6.2	6.4	6.3	6.2
Temp (°C)		25.0	24.7	24.7	25.2	24.7	25.1	25.2

Concentration	Salt Control #1 (3.1ppt)							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.75	7.80	7.76	7.81	7.87	7.80	8.12	
DO (mg/L)	7.9	8.2	8.9	8.3	8.7	7.9	8.0	
Cond. (µmhos/cm)	5750	5510	5530	5530	5520	5530	5610	
Temp (°C)	24.4	25.9	26.0	25.2	24.7	24.7	24.2	
Final								
pH		7.74	7.68	7.72	7.69	7.71	7.74	7.76
DO (mg/L)		6.1	6.2	6.2	6.4	6.6	6.5	6.3
Temp (°C)		25.4	24.7	24.7	25.3	24.7	25.1	25.2

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH (A)	9.70	9.64	9.60	9.65	9.49	9.38	9.29	
DO (mg/L)	8.4	8.7	8.9	8.5	9.0	8.6	8.6	
Cond. (µmhos/cm)	5770	5600	5610	5640	5640	5610	5640	
Temp (°C)	24.5	25.6	24.7	24.2	25.1	24.9	24.2	
Final								
pH		8.91	8.77	8.76	8.79	8.77	8.77	8.79
DO (mg/L)		6.3	6.3	6.0	6.0	6.4	6.3	6.3
Temp (°C)		25.7	24.6	24.6	25.3	24.9	25.1	25.9

		0	1	2	3	4	5	6	7
Analysts:	**Initial:**	ME	AH	SH	SH	RG	RG/RS	SH	
	Final:		AH	MC	SH	RG	RS	ME	SH

Comments: (A) pH > 9 was not adjusted prior to test initiation. An additional control of pH > 9 was initiated concurrently

Animal Source/Date Received: ABS / 7-21-04 | **Animal Age at Initiation:** <48 Hours

QC Check: AH 8-10-04 | **Final Review:** 8/20/04

Freshwater Chronic Bioassay — Water Quality Measurements

Client: City of Buenaventura — Test Species: P. promelas

Sample ID: pH adjusted Salt Control — Test Date: 7-21-04

Test No: 0407-047⇒050 — Start/End Times: 1600 ~~7-22-04~~ ME 1500

Concentration	pH adjusted Salt Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	9.64	9.63	9.65	966	9.63	9.65	9.66	
DO (mg/L)	8.0	8.3	8.9	8.4	8.8	7.9	8.2	
Cond. (µmhos-cm)	5820	5590	5580	5520	5580	5570	5590	
Temp (°C)	25.7	24.7	24.1	24.6	24.4	24.6	24.1	
Final								
pH		8.62	8.57	8.13	8.24	8.23	8.46	8.32
DO (mg/L)		5.9	6.7	6.0	6.2	6.44	6.3	6.4
Temp (°C)		25.9	24.7	24.8	24.9	25.0	25.0	24.9

Concentration								
Day	0	1	2	3	4	5	6	7
Initial								
pH								
DO (mg/L)								
Cond. (µmhos-cm)								
Temp (°C)								
Final								
pH								
DO (mg/L)								
Temp (°C)								

Concentration								
Day	0	1	2	3	4	5	6	7
Initial								
pH								
DO (mg/L)								
Cond. (µmhos-cm)								
Temp (°C)								
Final								
pH								
DO (mg/L)								
Temp (°C)								

		0	1	2	3	4	5	6	7
Analysts:	Initial:	SH	AH	SH	MC	AH	RG	SH	
	Final:		AH	ME	SH	RG	RS	AH	SH

Comments: samples A-2, B-3 and C-2 had pH >9. Control w/ pH >9 prepared and tested concurrently

Animal Source/Date Received: ABS 7-21-04 — Animal Age at Initiation: 48hrs

QC Check: AH 8-10-04 — Final Review: [illegible] 8/23/04

CETIS Report

Report Date: 23 Aug-04 10:59 AM
Link: 10-3959-9886/0407-048

Fathead Minnow 7-d Larval Survival and Growth Test — AMEC Bioassay SD

Test:	06-7756-1654	**Test Type:**	Growth-Survival (7d)	**Duration:**	6 Days 23 Hours
Start Date:	21 Jul-04 04:00 PM	**Protocol:**	EPA/821/R-02-013 (2002)	**Species:**	Pimephales promelas
End Date:	28 Jul-04 03:00 PM	**Dil Water:**	Diluted Mineral Water (8:2)	**Source:**	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:00 PM	**Brine:**	Not Applicable		

Sample:	12-8859-0827	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 01:40 PM	**Code:**	0407-048	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	26 Hours (18.4 °C)	**Station:**	B-1		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
05-6077-1382	7d Proportion Survived	100	>100	N/A	0.13547	Equal Variance t
16-0351-4149		100	>100	N/A	0.13636	Equal Variance t
01-4539-9265	Mean Dry Weight-mg	100	>100	N/A	0.08278	Equal Variance t
14-5156-5174		100	>100	N/A	0.07565	Equal Variance t

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0		4						
0	Lab Control	4	0.92500	0.80000	1.00000	0.04787	0.09574	10.35%
0	Salt Control	4	0.90000	0.80000	1.00000	0.04082	0.08165	9.07%
100		4	0.90000	0.80000	1.00000	0.04082	0.08165	9.07%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0		4						
0	Lab Control	4	0.42125	0.40000	0.43900	0.00940	0.01880	4.46%
0	Salt Control	4	0.36425	0.34500	0.38300	0.00776	0.01552	4.26%
100		4	0.41375	0.38800	0.44500	0.01344	0.02687	6.50%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0					
0	Lab Control	0.90000	1.00000	1.00000	0.80000
0	Salt Control	0.90000	0.80000	0.90000	1.00000
100		0.90000	1.00000	0.80000	0.90000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0					
0	Lab Control	0.43500	0.41100	0.43900	0.40000
0	Salt Control	0.38300	0.36400	0.34500	0.36500
100		0.44500	0.42700	0.38800	0.39500

Approved By: 8/23/04

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	10-3959-9886	10-3959-9886	19 Aug-04 1:10 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	13.55%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.925	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.39075	47.46723	0.79283	Equal Variances
Distribution	Shapiro-Wilk W	0.92602	0.74935	0.44859	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00331992	0.0033199	1	0.18	0.68709	Non-Significant Effect
Error	0.1113685	0.0185614	6			
Total	0.11468842	0.0218813	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		100	0.4229198	1.94318	0.34355	0.1871991	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.92500	0.80000	1.00000	0.09574	1.29506	1.10715	1.41202	0.14695
100		4	0.90000	0.80000	1.00000	0.08165	1.25431	1.10715	1.41202	0.12461

Approved By: 8/23/04

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	10-3959-9886	10-3959-9886	19 Aug-04 1:10 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	13.64%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.9	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.00000	47.46723	1.00000	Equal Variances
Distribution	Shapiro-Wilk W	0.84732	0.74935	0.09347	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0	0	1	0.00	1.00000	Non-Significant Effect
Error	0.09316617	0.0155277	6			
Total	0.09316617	0.0155277	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	0	1.94318	0.50000	0.1712189	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	0.90000	0.80000	1.00000	0.08165	1.25431	1.10715	1.41202	0.12461
100		4	0.90000	0.80000	1.00000	0.08165	1.25431	1.10715	1.41202	0.12461

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-1	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	10-3959-9886	10-3959-9886	19 Aug-04 1:10 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	7.57%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.04265	47.46723	0.57238	Equal Variances
Distribution	Shapiro-Wilk W	0.89744	0.74935	0.26046	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0001125	0.0001125	1	0.21	0.66353	Non-Significant Effect
Error	0.00322750	0.0005379	6			
Total	0.00334000	0.0006504	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		100	0.4573179	1.94318	0.33177	0.03186807	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.42125	0.40000	0.43900	0.01880				
100		4	0.41375	0.38800	0.44500	0.02687				

Approved By: 8/23/04

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	10-3959-9886	10-3959-9886	19 Aug-04 1:10 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	8.28%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.99791	47.46723	0.39129	Equal Variances
Distribution	Shapiro-Wilk W	0.94133	0.74935	0.58682	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00490055	0.0049006	1	10.18	0.01884	Significant Effect
Error	0 00288950	0.0004816	6			
Total	0.00779006	0.0053821	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-3.18997	1.94318	0.99058	0.03015324	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	0.36425	0.34500	0.38300	0.01552				
100		4	0.41375	0.38800	0.44500	0.02687				

Freshwater Chronic Bioassay **Larval Fish Survival & Weights**

Test Species: *P. promelas*

Client Name: City of Buenaventura **Test Date:** 07/21/2004

Sample ID: B-1 **Test No.:** 0407-048

Conc. (___%___)	Rep.	Test Day 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g) RB
Lab	a	10	9	9	9	9	9	9	9	90	0.04014	0.04449
Control #2	b	10	10	10	10	10	10	10	10	100	0.03645	0.04056
	c	10	10	10	10	10	10	10	10	100	0.04063	0.04502
	d	10	8	8	8	8	8	8	8	80	0.03463	0.03863
Salt	a	10	9	9	9	9	9	9	9	90	0.04065	0.04448
Control #2	b	10	10	9	9	9	9	8	8	80	0.03856	0.04250
(1.1 ppt)	c	10	10	10	10	10	9	9	9	90	0.03981	0.04326
	d	10	10	10	10	10	10	10	10	100	0.04008	0.04373
100%	a	10	10	10	10	10	10	10	9	90	0.03796	0.04241
	b	10	10	10	10	10	10	10	10	100	0.03937	0.04364
	c	10	10	9	9	8	8	8	8	80	0.03948	0.04336
	d	10	10	10	10	10	9	9	9	90	0.04177	0.04572
	a											
	b											
	c											
	d											
~~pH adjusted~~ SH ~~Salt Control~~	a	~~10~~										
	b	~~10~~										
	c	~~10~~										
	d	~~10~~										
	a											
	b											
	c											
	d											
	a											
	b											
	c											
	d											
Tech Initials		SH	RB	RB	SH	AH	RS	AH	SH			

docks entry MC
QC = AH

Feeding Times (day):

0	1	2	3	4	5	6
-	0900	0800	0830	0900	0840	0815
-	1215	1400	1030	1300	1320	1150
1630	1645	1605	1400	1945	1600	1545

Weight Data:
Date/Time in: 7-28-04/1600
Date/Time out: 1218/8-2-04
Oven Temp (°C): 63
Tech Initials: RB

Comments:

QC Check: AH 8-10-04
Final Review: AH 8/23/04

Freshwater Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *P. promelas*

Sample ID: B-1 | **Start Date/Time:** 07/21/2004 1600

Test No: 0407-048 | **End Date/Time:** 07/28/2004 1500

Concentration	Lab Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.24	8.24	8.28	8.26	8.25	8.22	8.24	
DO (mg/L)	7.5	7.7	7.9	8.0	8.3	7.8	8.0	
Cond. (µmhos/cm)	235	209	209	206	209	210	216	
Temp (°C)	24.8	25.7	25.0	24.9	24.7	24.7	24.5	
Final								
pH		8.20	8.02	7.84	7.79	8.00	7.81	7.88
DO (mg/L)		6.2	6.6	6.1	6.2	6.6	6.5	6.4
Temp (°C)		25.5	24.7	24.7	25.3	24.9	25.2	25.2

Concentration	Salt Control #2 (1.1ppt)							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.56	7.65	7.52	7.57	7.59	7.60	8.16	
DO (mg/L)	7.9	8.1	8.7	8.7	8.8	8.8	8.0	
Cond. (µmhos/cm)	2446	2350	2370	2370	2370	2360	2070	
Temp (°C)	24.8	25.9	26.0	25.6	24.9	24.9	24.5	
Final								
pH		7.75	7.82	7.72	7.80	7.79	7.82	7.91
DO (mg/L)		6.0	6.6	6.3	6.3	6.6	6.4	6.3
Temp (°C)		25.7	24.6	24.7	25.2	24.9	25.3	25.2

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.93	7.96	7.95	8.06	8.10	7.99	8.01	
DO (mg/L)	8.1	8.7	8.7	8.7	8.7	8.3	8.5	
Cond. (µmhos/cm)	2700	2600	2620	2630	2640	2640	2620	
Temp (°C)	24.5	25.8	26.0	25.5	25.1	24.9	24.3	
Final								
pH		8.26	8.07	8.20	8.19	8.17	8.17	8.24
DO (mg/L)		6.3	5.4	6.3	6.2	6.6	6.4	6.4
Temp (°C)		25.7	24.5	24.5	25.3	25.0	25.3	25.2

		0	1	2	3	4	5	6	7
Analysts:	**Initial:**	MC	AH	SH	MC	RG	RG RS	SH	
	Final:		AH	MC	SH	RG	RS	MC	SH

Comments:

Animal Source/Date Received: ABS / 7-21-04 **Animal Age at Initiation:** <48 Hours

QC Check: AH 8-10-04 **Final Review:** 8/23/04

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-3 — AMEC Bioassay SD

Test:	06-7756-1654	Test Type:	Growth-Survival (7d)	Duration:	6 Days 23 Hours
Start Date:	21 Jul-04 04:00 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Pimephales promelas
End Date:	28 Jul-04 03:00 PM	Dil Water:	Diluted Mineral Water (8:2)	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:00 PM	Brine:	Not Applicable		

Sample:	05-0738-0761	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 10:40 AM	Code:	0407-049	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	29 Hours (18.2 °C)	Station:	B-3		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
05-2921-9144	7d Proportion Survived	100	>100	N/A	0.22509	Equal Variance t
08-8872-6172		100	>100	N/A	0.11098	Mann-Whitney U
12-6690-0856		100	>100	N/A	0.11098	Mann-Whitney U
05-9448-8801	Mean Dry Weight-mg	100	>100	N/A	0.11376	Equal Variance t
07-7359-3925		100	>100	N/A	0.11972	Equal Variance t
13-9753-4711		100	>100	N/A	0.09222	Equal Variance t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
05-2921-9144	7d Proportion Survived	Control Response	0.85	0.8		Passes acceptability criteria
08-8872-6172			0.95	0.8		Passes acceptability criteria
12-6690-0856			0.95	0.8		Passes acceptability criteria

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.95000	0.90000	1.00000	0.02887	0.05774	6.08%
0	pH-adjusted C	4	0.95000	0.90000	1.00000	0.02887	0.05774	6.08%
0	Salt Control	4	0.85000	0.70000	1.00000	0.06455	0.12910	15.19%
100		4	0.95000	0.80000	1.00000	0.05000	0.10000	10.53%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.47350	0.41800	0.52000	0.02493	0.04987	10.53%
0	pH-adjusted C	4	0.35525	0.31300	0.39000	0.01823	0.03646	10.26%
0	Salt Control	4	0.38425	0.35900	0.41300	0.01363	0.02727	7.10%
100		4	0.43900	0.41500	0.46700	0.01211	0.02422	5.52%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1.00000	0.90000	1.00000	0.90000
0	pH-adjusted C	0.90000	0.90000	1.00000	1.00000
0	Salt Control	1.00000	0.80000	0.70000	0.90000
100		1.00000	0.80000	1.00000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	0.52000	0.51100	0.44500	0.41800
0	pH-adjusted C	0.38100	0.39000	0.31300	0.33700
0	Salt Control	0.41300	0.36300	0.35900	0.40200
100		0.42300	0.41500	0.46700	0.45100

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	01-1159-0453	01-1159-0453	19 Aug-04 1:17 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Mann-Whitney U	C > T	Angular (Corrected)		100	>100	1.00	N/A	11.10%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.95	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.62462	47.46723	0.44904	Equal Variances
Distribution	Shapiro-Wilk W	0.73912	0.74935	0.00773	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.5510E-05	5.551E-05	1	0.00	0.95501	Non-Significant Effect
Error	0.09626742	0.0160446	6			
Total	0.09632293	0.0161001	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		100	7		0.55714	2	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.95000	0.90000	1.00000	0.05773	1.33053	1.24905	1.41202	0.09409
100		4	0.95000	0.80000	1.00000	0.10000	1.33580	1.10715	1.41202	0.15243

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	01-1159-0453	01-1159-0453	19 Aug-04 1:18 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	22.51%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.85	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.42280	47.46723	0.77894	Equal Variances
Distribution	Shapiro-Wilk W	0.89354	0.74935	0.24117	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.04260716	0.0426072	1	1.51	0.26462	Non-Significant Effect
Error	0.1688886	0.0281481	6			
Total	0.21149576	0.0707553	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-1.230316	1.94318	0.86769	0.2305274	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	0.85000	0.70000	1.00000	0.12910	1.18984	0.99116	1.41202	0.18182
100		4	0.95000	0.80000	1.00000	0.10000	1.33580	1.10715	1.41202	0.15243

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	01-1159-0453	01-1159-0453	19 Aug-04 1:17 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Mann-Whitney U	C > T	Angular (Corrected)		100	>100	1.00	N/A	11.10%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.95	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.62462	47.46723	0.44904	Equal Variances
Distribution	Shapiro-Wilk W	0.73912	0.74935	0.00773	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.5510E-05	5.551E-05	1	0.00	0.95501	Non-Significant Effect
Error	0.09626742	0.0160446	6			
Total	0.09632293	0.0161001	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
pH-adjusted Co		100	7		0.55714	2	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	0.95000	0.90000	1.00000	0.05773	1.33053	1.24905	1.41202	0.09409
100		4	0.95000	0.80000	1.00000	0.10000	1.33580	1.10715	1.41202	0.15243

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	01-1159-0453	01-1159-0453	19 Aug-04 1:18 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	9.22%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.26747	47.46723	0.85016	Equal Variances
Distribution	Shapiro-Wilk W	0.82854	0.74935	0.06250	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00599512	0.0059951	1	9.01	0.02394	Significant Effect
Error	0.00399075	0.0006651	6			
Total	0.00998587	0.0066602	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-3.002251	1.94318	0.98803	0.03543643	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	0.38425	0.35900	0.41300	0.02727				
100		4	0.43900	0.41500	0.46700	0.02422				

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	01-1159-0453	01-1159-0453	19 Aug-04 1:18 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	11.38%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	4.23918	47.46723	0.26632	Equal Variances
Distribution	Shapiro-Wilk W	0.94296	0.74935	0.60301	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00238049	0.0023805	1	1.55	0.25970	Non-Significant Effect
Error	0.00922097	0.0015368	6			
Total	0.01160146	0.0039173	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		100	1.244574	1.94318	0.12985	0.0538655	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.47350	0.41800	0.52000	0.04987				
100		4	0.43900	0.41500	0.46700	0.02422				

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	01-1159-0453	01-1159-0453	19 Aug-04 1:18 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	11.97%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.26633	47.46723	0.51904	Equal Variances
Distribution	Shapiro-Wilk W	0.90912	0.74935	0.32684	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.01402821	0.0140282	1	14.64	0.00870	Significant Effect
Error	0.00574875	0.0009581	6			
Total	0.01977696	0.0149863	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		100	-3.826397	1.94318	0.99565	0.04253135	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	0.35525	0.31300	0.39000	0.03646				
100		4	0.43900	0.41500	0.46700	0.02422				

Freshwater Chronic Bioassay **Larval Fish Survival & Weights**

Test Species: *P. promelas*

Client Name: City of Buenaventura **Test Date:** 07/21/2004

Sample ID: B-3 **Test No.:** 0407-049

Conc. (___%___)	Rep.	Test Day 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g)
Lab	a	10	10	10	10	10	10	10	10	100	0.04924	0.05444
Control #1	b	10	10	9	9	9	9	9	9	90	0.03662	0.04173
	c	10	10	10	10	10	10	10	10	100	0.04416	0.04861
	d	10	10	9	9	9	9	9	9	90	0.03823	0.04241
Salt	a	10	10	10	10	10	10	10	10	100	0.04000	0.04413
Control #1	b	10	10	10	10	9	9	8	8	80	0.04285	0.04648
(3.1 ppt)	c	10	10	10	8	7	7	7	7	70	0.03690	0.04049
	d	10	10	9	9	9	9	9	9	90	0.03498	0.03900
100%	a	10	10	10	10	10	10	10	10	100	0.03662	0.04085
	b	10	10	10	10	9	9	8	8	80	0.03989	0.04404
	c	10	10	10	10	10	10	10	10	100	0.02832	0.03299
	d	10	10	10	10	10	10	10	10	100	0.04133	0.04584
	a											
	b											
	c											
	d											
alt-acdy. salt control	a	10	9	9	9	9	9	9	9	90	0.05015	0.05396
	b	10	9	9	9	9	9	9	9	90	0.04563	0.04953
	c	10	10	10	10	10	10	10	10	100	0.04472	0.04785
	d	10	10	10	10	10	10	10	10	100	0.04522	0.04859
	a											
	b											
	c											
	d											
	a											
	b											
	c											
	d											
Tech Initials		SH	RS	RS	SH	AH	RS	AH	SH			

data entry QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
-	0900	0800	0830	0900	0840	0915
-	1215	1400	1630	1300	1320	1150
1630	1645	1605	1400	1945	1600	1545

Weight Data:

Date/Time in: 7-28-04/1600

Date/Time out: 8-2-04/1218

Oven Temp (°C): 63

Tech Initials: RS

Comments: _____

QC Check: AH 8-10-04

Final Review: 8/23/04

AMEC Earth & Environmental Bioassay Laboratory. 5550 Morehouse Dr., Ste. B. San Diego, CA 92121.

Freshwater Chronic Bioassay **Water Quality Measurements**

Client: City of Buenaventura **Test Species:** *P. promelas*

Sample ID: B-3 **Start Date/Time:** 07/21/2004 1600

Test No: 0407-049 **End Date/Time:** 07/28/2004 1500

Concentration	Lab Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.09	8.24	8.28	8.25	8.25	8.22	8.21	
DO (mg/L)	7.9	7.7	7.9	8.0	8.3	7.8	8.0	
Cond. (µmhos/cm)	224	209	207	209	209	210	210	
Temp (°C)	24.7	25.7	24.7	24.5	24.7	24.7	24.1	
Final								
pH		7.53	7.82	7.68	7.71	7.71	7.73	7.75
DO (mg/L)		6.1	6.9	6.0	6.2	6.4	6.3	6.2
Temp (°C)		25.0	24.7	24.7	25.2	24.7	25.1	25.2

Concentration	Salt Control #1 (3.1ppt)							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.75	7.80	7.76	7.78	7.87	7.80	8.12	
DO (mg/L)	7.9	8.2	8.9	8.6	8.7	7.9	8.0	
Cond. (µmhos/cm)	5950	5510	5530	5510	5520	5530	5610	
Temp (°C)	24.4	25.9	26.0	25.2	24.7	24.7	24.2	
Final								
pH		7.74	7.68	7.72	7.69	7.71	7.74	7.76
DO (mg/L)		6.1	6.2	6.2	6.4	6.6	6.5	6.3
Temp (°C)		25.4	24.7	24.7	25.3	24.7	25.1	25.3

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH Ⓐ	9.45	9.35	9.22	9.10	8.41	9.33	9.19	
DO (mg/L)	8.3	8.9	8.6	8.5	8.6	8.5	8.4	
Cond. (µmhos/cm)	5380	5280	5280	5290	5290	5290	5310	
Temp (°C)	25.0	25.7	25.8	25.5	25.1	25.3	24.1	
Final								
pH		8.89	8.78	8.54	8.60	8.43	8.56	8.52
DO (mg/L)		7.0	5.8	5.9	6.1	6.4	6.4	6.2
Temp (°C)		25.5	24.6	24.8	25.3	24.9	25.2	25.2

		0	1	2	3	4	5	6	7
Analysts:	**Initial:**	ME	AH	SH	MC	RG	ABS RG	SH	
	Final:		AH	MC	SH	RG	RS	ME	SH

Comments: Ⓐ sample pH >9, not adjusted prior to test initiation, an additional control of pH >9 initiated concurrently

Animal Source/Date Received: ABS / 7-21-04 **Animal Age at Initiation:** <48 Hours

QC Check: AH 8-10-04 **Final Review:** 8/23/04

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test C-2 — AMEC Bioassay SD

Test:	06-7756-1654	Test Type:	Growth-Survival (7d)	Duration:	6 Days 23 Hours
Start Date:	21 Jul-04 04:00 PM	Protocol	EPA/821/R-02-013 (2002)	Species:	Pimephales promelas
End Date:	28 Jul-04 03:00 PM	Dil Water:	Diluted Mineral Water (8:2)	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:00 PM	Brine:	Not Applicable		

Sample:	18-0547-1978	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 09:35 AM	Code:	0407-050	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	30 Hours (18.5 °C)	Station:	C-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
02-2977-3762	7d Proportion Survived	100	>100	N/A	0.22135	Equal Variance t
03-0376-8162		100	>100	N/A	0.10749	Equal Variance t
09-6942-2930		100	>100	N/A	0.10749	Equal Variance t
06-2639-9704	Mean Dry Weight-mg	100	>100	N/A	0.14498	Equal Variance t
08-3891-4208		100	>100	N/A	0.14412	Equal Variance t
14-6623-8901		100	>100	N/A	0.16936	Equal Variance t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
02-2977-3762	7d Proportion Survived	Control Response	0.85	0.8		Passes acceptability criteria
03-0376-8162			0.95	0.8		Passes acceptability criteria
09-6942-2930			0.95	0.8		Passes acceptability criteria

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.95000	0.90000	1.00000	0.02887	0.05774	6.08%
0	pH-adjusted C	4	0.95000	0.90000	1.00000	0.02887	0.05774	6.08%
0	Salt Control	4	0.85000	0.70000	1.00000	0.06455	0.12910	15.19%
100		4	0.92500	0.80000	1.00000	0.04787	0.09574	10.35%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.47350	0.41800	0.52000	0.02493	0.04987	10.53%
0	pH-adjusted C	4	0.35525	0.31300	0.39000	0.01823	0.03646	10.26%
0	Salt Control	4	0.38425	0.35900	0.41300	0.01363	0.02727	7.10%
100		4	0.52625	0.47700	0.59300	0.02502	0.05005	9.51%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1.00000	0.90000	1.00000	0.90000
0	pH-adjusted C	0.90000	0.90000	1.00000	1.00000
0	Salt Control	1.00000	0.80000	0.70000	0.90000
100		0.80000	0.90000	1.00000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	0.52000	0.51100	0.44500	0.41800
0	pH-adjusted C	0.38100	0.39000	0.31300	0.33700
0	Salt Control	0.41300	0.36300	0.35900	0.40200
100		0.50200	0.53300	0.47700	0.59300

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	15-1010-3293	15-1010-3293	19 Aug-04 1:24 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	22.14%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.85	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.53091	47.46723	0.73488	Equal Variances
Distribution	Shapiro-Wilk W	0.93653	0.74935	0.54076	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.02214034	0.0221403	1	0.81	0.40275	Non-Significant Effect
Error	0.1639659	0.0273277	6			
Total	0.18610627	0.049468	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-0.9001005	1.94318	0.79863	0.227143	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	0.85000	0.70000	1.00000	0.12910	1.18984	0.99116	1.41202	0.18182
100		4	0.92500	0.80000	1.00000	0.09574	1.29506	1.10715	1.41202	0.14695

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	15-1010-3293	15-1010-3293	19 Aug-04 1:24 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	10.75%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.95	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.43927	47.46723	0.48316	Equal Variances
Distribution	Shapiro-Wilk W	0.87586	0.74935	0.16904	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00251685	0.0025168	1	0.17	0.69841	Non-Significant Effect
Error	0.09134475	0.0152241	6			
Total	0.0938616	0.017741	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		100	0.4065952	1.94318	0.34921	0.1695369	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.95000	0.90000	1.00000	0.05773	1.33053	1.24905	1.41202	0.09409
100		4	0.92500	0.80000	1.00000	0.09574	1.29506	1.10715	1.41202	0.14695

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	15-1010-3293	15-1010-3293	19 Aug-04 1:25 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	14.50%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.00721	47.46723	0.99542	Equal Variances
Distribution	Shapiro-Wilk W	0.92228	0.74935	0.41886	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00556513	0.0055651	1	2.23	0.18599	Non-Significant Effect
Error	0.01497575	0.002496	6			
Total	0.02054088	0.0080611	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		100	-1.493203	1.94318	0.90700	0.06864625	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.47350	0.41800	0.52000	0.04987				
100		4	0.52625	0.47700	0.59300	0.05005				

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	15-1010-3293	15-1010-3293	19 Aug-04 1:25 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	14.41%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.36872	47.46723	0.34515	Equal Variances
Distribution	Shapiro-Wilk W	0.94922	0.74935	0.66712	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.04032795	0.040328	1	24.83	0.00249	Significant Effect
Error	0.00974554	0.0016243	6			
Total	0.05007349	0.0419522	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-4.982826	1.94318	0.99875	0.0553765	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	0.38425	0.35900	0.41300	0.02727				
100		4	0.52625	0.47700	0.59300	0.05005				

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	15-1010-3293	15-1010-3293	19 Aug-04 1:24 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	10.75%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.95	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.43927	47.46723	0.48316	Equal Variances
Distribution	Shapiro-Wilk W	0.87586	0.74935	0.16904	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00251685	0.0025168	1	0.17	0.69841	Non-Significant Effect
Error	0.09134475	0.0152241	6			
Total	0.0938616	0.017741	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		100	0.4065952	1.94318	0.34921	0.1695369	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	0.95000	0.90000	1.00000	0.05773	1.33053	1.24905	1.41202	0.09409
100		4	0.92500	0.80000	1.00000	0.09574	1.29506	1.10715	1.41202	0.14695

Approved By: [signature] 8/20/04

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	15-1010-3293	15-1010-3293	19 Aug-04 1:25 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	16.94%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.88400	47.46723	0.61593	Equal Variances
Distribution	Shapiro-Wilk W	0.95264	0.74935	0.70310	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.05848214	0.0584821	1	30.50	0.00148	Significant Effect
Error	0.01150354	0.0019173	6			
Total	0.06998568	0.0603994	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		100	-5.522955	1.94318	0.99926	0.06016421	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	0.35525	0.31300	0.39000	0.03646				
100		4	0.52625	0.47700	0.59300	0.05005				

Freshwater Chronic Bioassay

Larval Fish Survival & Weights

Test Species: *P. promelas*

Client Name: City of Buenaventura **Test Date:** 07/21/2004

Sample ID: C-2 **Test No.:** 0407-050

Conc. (___%___)	Rep.	Test Day 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g)
Lab	a	10	9/10	10	10	10	10	10	10	100	0.04924	0.05444
Control #1	b	10	10	9	9	9	9	9	9	90	0.03662	0.04173
	c	10	9/9/10	10	10	10	10	10	10	100	0.04416	0.04861
	d	10	9/8/10	9	9	9	9	9	9	90	0.03823	0.04241
Salt	a	10	9/8/10	10	10	10	10	10	10	100	0.04000	0.04413
Control #1	b	10	10	10	10	10	9	9	8	80	0.04285	0.04648
(3.1 ppt)	c	10	10	10	8	7	7	7	7	70	0.03690	0.04049
	d	10	10	9	9	9	9	9	9	90	0.03498	0.03900
100%	a	10	10	9	9	8	8	8	8	80	0.03684	0.04186
	b	10	10	10	9	9	9	9	9	90	0.03875	0.04408
	c	10	10	10	10	10	10	10	10	100	0.03749	0.04226
	d	10	10	10	10	10	10	10	10	100	0.04101	0.04694
	a											
	b											
	c											
	d											
pH adjusted	a	10	9	9	9	9	9	9	9	90	0.05015	0.05396
Salt Control	b	10	9	9	9	9	9	9	9	90	0.04563	0.04953
	c	10	10	10	10	10	10	10	10	100	0.04472	0.04785
	d	10	10	10	10	10	10	10	10	100	0.04522	0.04859
	a											
	b											
	c											
	d											
	a											
	b											
	c											
	d											
Tech Initials		SH	RB	RB	SH	AH	RB	AH	SH			

data entry QC=AH llc

Feeding Times (day):

0	1	2	3	4	5	6
-	0900	0800	0830	0900	0840	0815
-	1215	1400	1030	1300	1320	1150
1630	1645	1605	1400	1945	1600	1545

Weight Data:

Date/Time in: 7-28-04/1600

Date/Time out: 8-2-04/1218

Oven Temp (°C): 63

Tech Initials: RB

Comments:

QC Check: AH 8-10-04

Final Review: ~~8/23/04~~

Freshwater Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *P. promelas*

Sample ID: C-2 | **Start Date/Time:** 07/21/2004 1600

Test No: 0407-050 | **End Date/Time:** 07/28/2004 1500

Concentration	Lab Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.09	8.24	8.28	8.25	8.25	8.22	8.21	
DO (mg/L)	7.9	7.7	7.9	8.0	8.3	7.8	8.0	
Cond. (µmhos/cm)	224	209	207	209	209	210	210	
Temp (°C)	24.7	25.8	24.7	24.5	24.7	24.7	24.1	
Final								
pH		7.53	7.62	7.68	7.71	7.71	7.73	7.75
DO (mg/L)		6.1	6.5	6.0	6.2	6.4	6.3	6.2
Temp (°C)		25.0	24.7	24.7	25.2	24.7	25.1	25.2

Concentration	Salt Control #1 (3.1ppt)							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.75	7.80	7.76	7.78	7.87	7.80	8.12	
DO (mg/L)	7.9	8.2	8.9	8.6	8.7	7.9	8.0	
Cond. (µmhos/cm)	5750	5510	5530	5510	5520	5530	5610	
Temp (°C)	24.4	25.9	26.0	25.2	24.7	24.7	24.3	
Final								
pH		7.74	7.68	7.72	7.69	7.77	7.74	7.76
DO (mg/L)		6.1	6.2	6.2	6.4	6.6	6.5	6.3
Temp (°C)		25.4	24.7	24.7	25.3	24.7	25.1	25.2

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH (A)	9.14	9.03	9.01	8.89	8.91	8.85	8.67	
DO (mg/L)	8.9	8.5	8.4	8.5	8.6	8.7	8.6	
Cond. (µmhos/cm)	5540	5320	5330	5330	5330	5390	5410	
Temp (°C)	25.0	25.8	24.6	25.4	25.2	25.3	24.9	
Final								
pH		8.61	8.47	8.27	8.29	8.29	8.32	8.27
DO (mg/L)		6.3	6.1	5.7	5.6	6.2	6.0	5.7
Temp (°C)		25.5	24.5	25.0	25.1	24.9	25.3	25.2

Analysts:		0	1	2	3	4	5	6	7
	Initial:	ME	AH	SH	MC	RG	RS RG	SH	
	Final:		AH	ME	SH	RG	RS	ME	SH

Comments: (A) sample pH > 9 not adjusted prior to test initiation, an additional control of pH > 9 was initiated concurrently.

Animal Source/Date Received: ABS / 7-21-04 | **Animal Age at Initiation:** <48 Hours

QC Check: AH 8-10-04 | **Final Review:** 8/23/04

C. DUBIA

CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test A-2 **AMEC Bioassay SD**

Test:	14-5599-8866	**Test Type:**	Survival (96h)	**Duration:**	7 Days 21 Hours
Start Date:	21 Jul-04 04:00 PM	**Protocol:**	EPA/821/R-02-013 (2002)	**Species:**	Ceriodaphnia dubia
End Date:	29 Jul-04 01:10 PM	**Dil Water:**	Diluted Mineral Water (8:2)	**Source:**	In-House Culture
Setup Date:	21 Jul-04 04:00 PM	**Brine:**			

Sample:	18-2313-8804	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 02:50 PM	**Code:**	0407-051	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	25 Hours (19.3 °C)	**Station:**	A-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
07-1852-9551	96h Proportion Survived	<100	100	N/A	N/A	Fisher's Exact
13-8766-1765		100	>100	N/A	N/A	Fisher's Exact
15-5022-2154		100	>100	N/A	N/A	Fisher's Exact

96h Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
0	pH-adjusted C	10	0.50000	0.00000	1.00000	0.16667	0.52705	105.41
0	Salt Control	10	0.60000	0.00000	1.00000	0.16330	0.51640	86.07%
100		10	0.30000	0.00000	1.00000	0.15275	0.48305	161.02

96h Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Control	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
0	pH-adjusted C	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000
0	Salt Control	0.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	0.00000	1.00000	0.00000
100		0.00000	1.00000	1.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000	0.00000

CETIS Report

Report Date: 23 Sep-04 10:31 AM
Analysis: 07-1852-9551

Ceriodaphnia 7-d Survival and Reproduction Test A-2 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	00-3815-4461	00-3815-4461	22 Sep-04 12:16 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	<100	100		N/A	

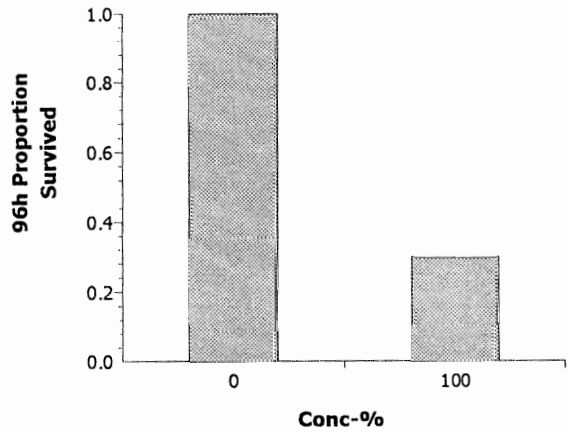
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
Lab Control		100	0.00155	0.05000	Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Lab Control	10	0	10
100		3	7	10

96h Proportion Survived



CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test A-2 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	00-3815-4461	00-3815-4461	22 Sep-04 12:16 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

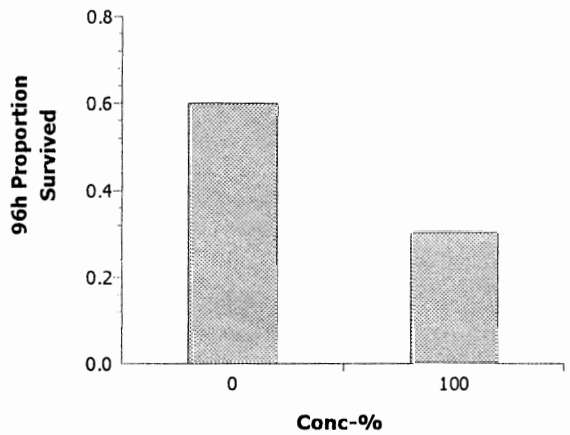
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
Salt Control		100	0.18492	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Salt Control	6	4	10
100		3	7	10

96h Proportion Survived



CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test A-2 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	00-3815-4461	00-3815-4461	22 Sep-04 12:16 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

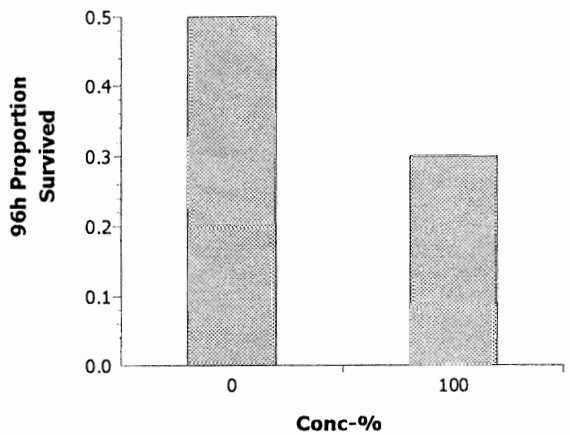
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
pH-adjusted Co		100	0.32496	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	pH-adjusted Co	5	5	10
100		3	7	10

96h Proportion Survived



 Approved By:

Freshwater Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *C. dubia*

Sample ID: A-2 | **Start Date/Time:** 07/21/2004 1600

Test No: 0407-051 | **End Date/Time:** 07/29/2004 (AH) 1310

Concentration	Lab Control #1								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	8.09	8.24	8.28	8.25	8.25	8.22	8.21	(A)	
DO (mg/L)	7.9	7.7	7.9	8.0	8.3	7.8	8.0		
Cond. (µmhos/cm)	224	209	207	209	209	210	210		
Temp (°C)	24.7	25.7	24.7	24.5	24.7	24.7	24.6		
Final							8.10		
pH		7.75	8.05	8.01	8.02	8.29	8.10	~~8.09~~ 8.11 RR	8.16
DO (mg/L)		8.2	8.9	7.9	7.9	7.9	9.0	8.8	7.6
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Concentration	Salt Control #1 (3.1ppt)								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	7.75	7.80	7.76	7.78	7.87	7.87	8.12	(A)	
DO (mg/L)	7.9	8.2	8.9	8.6	8.7	8.4	8.0		
Cond. (µmhos/cm)	5750	5510	5530	5510	5520	5531	5610		
Temp (°C)	24.4	25.9	26.0	25.2	24.7	24.6	24.2		
Final									
pH		7.97	8.11	8.03	7.99	8.02	8.05	8.01	7.99
DO (mg/L)		8.3	8.8	7.8	7.9	7.9	8.9	8.6	7.7
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Concentration	100%								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	9.70	9.64	9.60	9.44	9.49	9.38	9.29	(A)	
DO (mg/L)	~~9.48~~ 9.4	8.7	8.9	8.6	9.0	8.6	8.6		
Cond. (µmhos/cm)	5770	5600	5610	5510	5640	5610	5640		
Temp (°C)	24.5	25.6	24.7	25.3	25.1	24.9	24.2		
Final							8.33		
pH		8.34	8.40	8.45	8.32	8.23	~~8.13~~ 8.14 MC	8.33	8.27
DO (mg/L)		8.1	9.0	7.9	7.9	7.9	8.0	8.0	7.8
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

		0	1	2	3	4	5	6	7
Analysts:	**Initial:**	MC	AH	SH	MC	RG	RG	SH	
	Final:		RG	SD	MC	RG	[illegible]	MC	[illegible]

Comments: Test not ended within 2 hours of initiation time.
(A) no renewal done on day 7, out of sample.

Animal Source/Date Received: Internal / NA | **Animal Age at Initiation:** <24 Hours

QC Check: AH 8-17-04 | **Final Review:** AH 10/17/04

Freshwater Chronic Bioassay **Daphnid Survival and Reproduction Datasheet**

Client/Sample ID:	City of Buenaventura / A-2	**Start Date:**	07/21/2004	**End Date:**	29 07/28/2004 AH
Test No:	0407-051	**Start Time:**	1600	**End Time:**	1310

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
LC #1	1	0	0	0	7	9	8	0	0	24	
	2	0	0	6	0	6	11	0	D-9	23 2/d	
	3	0	0	0	0	7	9	0	0	16	
	4	0	0	0	3	6	0	9	D-6	18 3/d	
	5	0	0	0	3	10	6	0	D-0	19/d	
	6	0	0	0	4	0	3/D	–	–	7/d	
	7	0	0	0	4	0	4/D	–	–	8/d	
	8	0	0	0	0	2	4	0	0	6	0 SH
	9	0	0	5	0	9	8	0	9	~~31~~ 32	
	10	0	0	0	0	6	2	0	D-9	12/d	
Analyst		RG	SD	ME	RG	RB	SH	RB	RB		

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
SC #1 (3.1ppt)	1	0/D	–	–	–	–	–	–	–	0/d	
	2	0	0	0	0	0	0	0	0	0	0 SH
	3	0	0	0	1	0	0	0	D-0	0/d	
	4	0	–	–	–	–	–	–	–	0/d	
	5	0	0	0	0	D-0	–	–	–	0/d	
	6	0	0	0	0	D-4	–	–	–	4/d	
	7	0	0	0	4	0	2	D-0	–	6/d	
	8	0/D	–	–	–	–	–	–	–	0/d	
	9	0	0	6	3	8	5	D-0	–	16/d	
	10	0/D	–	–	–	–	–	–	–	0/d	

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
100%	1	0/D	–	–	–	–	–	–	–	0/d	
	2	0	0	0	0	0	0	0	D-0		0 SH
	3	0	0	0	0	0	0	0	0		
	4	0	0/d	–	–	–	–	–	–		
	5	0/D	–	–	–	–	–	–	–		
	6	0	0	0	0	0	0	0	0		
	7	0	0/d	–	–	–	–	–	–		
	8	0/D	–	–	–	–	–	–	–		
	9	0/D	–	–	–	–	–	–	–		
	10	0/D	–	–	–	–	–	–	–		

Time Fed (day): (0) 1600 (1) 1430 (2) 1100 (3) 1110 (4) 1237 (5) 1306 (6) 1115 (7) 1547 (8) 1310

Comments: Total Neonates counted are from first 3 broods only.

QC Check: AH 8-17-04 **Final Review:** AH 10/7/04

Freshwater Chronic Bioassay

Brood Selection Datasheet

Client/Sample ID: City of Buenaventura / A-2

Test Number: 0407-051

Test Species: *C. dubia*

Start Date: 07/21/2004

Start Time: ~~07/28/2004~~ 1600

Test Rep #	Brood Board #	Cup #
1	36	3
2		4
3		11
4		26
5		23
6		25
7		27
8		30
9		32
10		33

Verified by: AH

Comments:

QC Check: AH 8-17-04

Final Review: AH 10/17/04

CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test B-1 **AMEC Bioassay SD**

Test:	14-5599-8866	**Test Type:**	Survival (96h)	**Duration:**	7 Days 21 Hours
Start Date:	21 Jul-04 04:00 PM	**Protocol:**	EPA/821/R-02-013 (2002)	**Species:**	Ceriodaphnia dubia
End Date:	29 Jul-04 01:10 PM	**Dil Water:**	Diluted Mineral Water (8:2)	**Source:**	In-House Culture
Setup Date:	21 Jul-04 04:00 PM	**Brine:**			

Sample:	07-9699-9968	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 01:40 PM	**Code:**	0407-052	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	26 Hours (18.4 °C)	**Station:**	B-1		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
07-8834-6325	96h Proportion Survived	100	>100	N/A	N/A	Fisher's Exact
08-5329-8270		100	>100	N/A	N/A	Fisher's Exact
13-0898-2306		100	>100	N/A	N/A	Fisher's Exact

96h Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
0	pH-adjusted C	10	0.50000	0.00000	1.00000	0.16667	0.52705	105.41
0	Salt Control	10	0.80000	0.00000	1.00000	0.13333	0.42164	52.70%
100		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%

96h Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Control	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
0	pH-adjusted C	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000
0	Salt Control	0.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test B-1 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	09-9167-6551	09-9167-6551	22 Sep-04 12:14 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

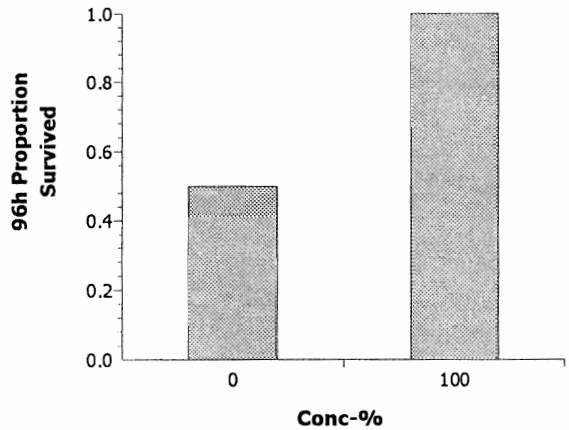
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
pH-adjusted Co		100	1.00000	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	pH-adjusted Co	5	5	10
100		10	0	10

96h Proportion Survived



CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test B-1 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	09-9167-6551	09-9167-6551	22 Sep-04 12:14 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

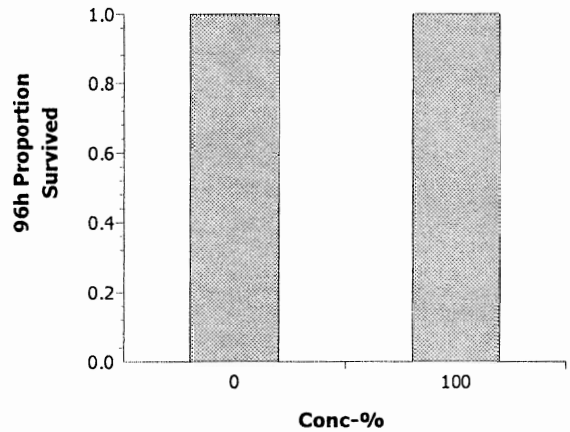
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
Lab Control		100	1.00000	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Lab Control	10	0	10
100		10	0	10

96h Proportion Survived



 Approved By:

CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test B-1 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	09-9167-6551	09-9167-6551	22 Sep-04 12:14 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

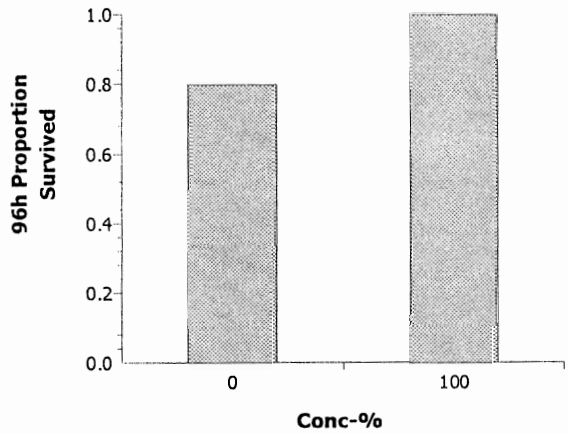
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
Salt Control		100	1.00000	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Salt Control	8	2	10
100		10	0	10

96h Proportion Survived



 Approved By:

Freshwater Chronic Bioassay | Water Quality Measurements

Client: City of Buenaventura Test Species: C. dubia

Sample ID: PH adjusted Salt Control Test Date: 7-21-04

Test No: 0407-051→054 Start/End Times: 1600 / 1310

Concentration	pH adjusted Salt Control								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	9.53	9.63	9.65	9.66	9.63	9.66	9.66	(A)	
DO (mg/L)	8.9	8.3	8.9	8.4	8.8	8.4	8.2		
Cond. (µmhos-cm)	5760	5590	5580	5520	5580	5582	5590		
Temp (°C)	24.4	24.7	24.1	24.6	24.4	24.6	24.1		
Final									
pH		8.30	8.33	8.37	8.41	8.42	8.31	8.43	8.31
DO (mg/L)		8.2	9.2	~~8.8~~	7.9	7.7	9.2	8.8	8.4
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1
				~~7.8~~					

Concentration								
Day	0	1	2	3	4	5	6	7
Initial								
pH								
DO (mg/L)								
Cond. (µmhos-cm)								
Temp (°C)								
Final								
pH								
DO (mg/L)								
Temp (°C)		~~25.6~~						

Concentration								
Day	0	1	2	3	4	5	6	7
Initial								
pH								
DO (mg/L)								
Cond. (µmhos-cm)								
Temp (°C)								
Final								
pH								
DO (mg/L)								
Temp (°C)		~~25.6~~						

Analysts:		0	1	2	3	4	5	6	7
	Initial:	ME	AH	SH	MC	AH	RS	SH	
	Final:		RG	SD	MC	RG	RS	MC	RS

Comments: pH adjusted to ~9.6 to match site A-2 with highest pH. w/NaOH. Test not ended within 2 hours of initiation time

Animal Source/Date Received: Internal N/A Animal Age at Initiation: ~24hrs

QC Check: AH 8-17-04 (A) no renewal on day 7, out of sample. Final Review: AH 10/17/04

Freshwater Chronic Bioassay | Daphnid Survival and Reproduction Datasheet

Client/Sample ID: City of Escondido | Start Date: 7-21-04 | End Date: 7-29-04
Test No: | Start Time: 1600 | End Time: 1310

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
Plastic Salt Control	1	0/d	—	—	—	—	—	—	—	0/d	
	2	0	0	0	0	0	0/D	—	—	0/d	
	3	0	0	0	0	0	0/D	—	—		
	4	0	0/d	-	-	-	-	-	-		
	5	0	0/d	—	—	-	-	—	-		
	6	0	0	0	0	0/D	-	—	-		
	7	0	0	0	0	0	0	0	D-0		
	8	0/d	—	—	-	-	/	/	-		
	9	0/d	-	-	-	-	-	-	-		
	10	2	0	0	0	0	0	0	D-0		OSH
Analyst		MC	RG	SD	MC	RG	MS	SH	MS	MS	

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
	1										
	2										
	3										
	4										
	5										
	6										
	7										
	8										
	9										
	10										

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
	1										
	2										
	3										
	4										
	5										
	6										
	7										
	8										
	9										
	10										

Time Fed (day): (0) 1600 (1) 1430 (2) 1100 (3) 1115 (4) 1330 (5) 1300 (6) 1115 (7) 1547 (8) 1310

Comments:

QC Check: AH 8-17-04 | Final Review: AH 10/7/04

Freshwater Chronic Bioassay **Water Quality Measurements**

Client: City of Buenaventura **Test Species:** *C. dubia*

Sample ID: B-1 **Start Date/Time:** 07/21/2004 1600

Test No: 0407-052 **End Date/Time:** 07/29/2004 1310 AH

Concentration	Lab Control #2								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	8.24	8.24	8.28	8.26	8.25	8.22	8.24	(A)	
DO (mg/L)	7.5	7.7	7.9	8.0	8.3	7.8	8.0		
Cond. (µmhos/cm)	238	209	209	206	209	210	216		
Temp (°C)	24.8	25.1	25.0	24.9	24.7	24.7	24.5		
Final									
pH		7.97	8.03	8.04	8.05	8.08	8.13	8.13	8.14
DO (mg/L)		8.2	8.5	7.8	7.7	7.6	9.0	8.8	7.8
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Concentration	Salt Control #2 (1.1ppt)								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	7.56	7.65	7.52	7.57	7.59	7.60	8.16	(A)	
DO (mg/L)	7.9	8.1	8.7	8.7	8.3	8.8	8.0		
Cond. (µmhos/cm)	2440	2350	2370	2370	2370	2360	2070		
Temp (°C)	24.8	25.9	26.0	25.6	24.9	24.9	24.5		
Final									
pH		8.02	8.15	8.10	7.99	8.20	8.08	8.01	8.07
DO (mg/L)		8.3	9.0	7.9	7.7	7.7	8.9	8.8	8.3
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Concentration	100%								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	7.93	7.96	7.95	8.06	8.10	7.99	8.01	(A)	
DO (mg/L)	8.1	8.7	8.7	8.7	8.7	8.3	8.5		
Cond. (µmhos/cm)	2700	2600	2620	2630	2660	2640	2620		
Temp (°C)	24.5	25.8	26.0	25.5	25.4	24.9	24.9		
Final									
pH		8.38	8.44	8.48	8.59	8.36	8.49	8.39	8.41
DO (mg/L)		8.1	8.9	7.9	7.9	7.6	9.0	8.6	8.0
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

		0	1	2	3	4	5	6	7
Analysts:	**Initial:**	MC	AH	SH	MC	RG	RG	SH	
	Final:		RG	SD	MC	RG	DB	MC	PB

Comments: Time at test end not within 2 hours of initiation.
(A) no renewal done on day 7, out of sample.

Animal Source/Date Received: Internal / NA **Animal Age at Initiation:** <24 Hours

QC Check: AH 8-17-04 **Final Review:** AH 10/17/04

Freshwater Chronic Bioassay | **Daphnid Survival and Reproduction Datasheet**

29

Client/Sample ID: City of Buenaventura / B-1 **Start Date:** 07/21/2004 **End Date:** 07/28/2004
Test No: 0407-052 **Start Time:** 1600 **End Time:** 1310 AH

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
LC #2	1	0	0	0	2	D-0	—	—	—	2/d	
	2	0	0	4	0	6	12/D	0 D-8	—	22/d	
	3	0	0	0	4	8	0	0	0	12	
	4	0	0	0	6	0	3	D-6	—	15/d	
	5	0	0	0	2	6	6	0	D-0	14/d	OSH
	6	0	0	0	5	0	2/D	—	—	7/d	
	7	0	0	0	6	7	0	D-7	—	20/d	
	8	0	0	2	3	D-0	—	—	—	5/d	
	9	0	0	0	3	0	8	D-0	—	11/d	
	10	0	0	0	0	5	4	0	6	15	
Analyst	MC	RG	SD	MC	RG	RS	SH	RS	RS		

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
SC #2 (1.1ppt)	1	0/D	—	—	—	—	—	—	—	0/d	
	2	0	0	7	0	9/0	10	0	10	26	
	3	0	0	0	0	8	0	6	D-1	15/d	
	4	0	0	0	0	5	10	0	D-0	15/d	
	5	0	0	4	0	9	3	0	D-0	16/d	OSH
	6	0/D	—	—	—	—	—	—	—	0/d	
	7	0	0	0	6	11	0/D	—	—	17/d	
	8	0	0	3	0	5	7	10	7	32 15	
	9	0	0	0	2	6	7	0	D-13	28/d	15/d
	10	0	0	0	4	8	0	8	D-8	20/d	20/d

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
100%	1	0	0	6	0	6	5	0	11	28	
	2	0	0	0	6	9	0	12	5	32	
	3	0	0	0	7	10	3	D-4	—	20/d	
	4	0	0	0	7	8	0	15	0	30	
	5	0	0	5	0	9	10	11	D-0	35/d	
	6	0	0	0	8	8	0	10	7	33	10 SH
	7	0	0	2	5	12	0	15	0	34	
	8	0	0	0	0	D-0	—	—	—	0/d	
	9	0	0	0	0	12	0/D	—	—	12/d	
	10	0	0	0	3	7	0	5	10	25	

Time Fed (day): (0) 1600 (1) 1430 (2) 1100 (3) 1115 (4) 1245 (5) 1300 (6) 1115 (7) 1548 (8) 1510

Comments: Total Neonates counted are from the first 3 broods only.

QC Check: AH 8/17/04 **Final Review:** AH 10/17/04

Freshwater Chronic Bioassay

Brood Selection Datasheet

Client/Sample ID: City of Buenaventura / B-1

Test Number: 0407-052

Test Species: *C. dubia*

Start Date: 07/21/2004

Start Time: ~~07/28/2004~~ 1600

Test Rep #	Brood Board #	Cup #
1	36	3
2		4
3		11
4		20
5		23
6		25
7		27
8		36
9		32
10		33

Verified by: AH

Comments:

QC Check: AH 8-17-04

Final Review: AH 10/17/04

CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test B-3 **AMEC Bioassay SD**

Test:	14-5599-8866	**Test Type:**	Survival (96h)	**Duration:**	7 Days 21 Hours
Start Date:	21 Jul-04 04:00 PM	**Protocol:**	EPA/821/R-02-013 (2002)	**Species:**	Ceriodaphnia dubia
End Date:	29 Jul-04 01:10 PM	**Dil Water:**	Diluted Mineral Water (8:2)	**Source:**	In-House Culture
Setup Date:	21 Jul-04 04:00 PM	**Brine:**			

Sample:	19-1973-1584	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 10:40 AM	**Code:**	0407-053	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	29 Hours (18.2 °C)	**Station:**	B-3		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
01-0466-3846	96h Proportion Survived	100	>100	N/A	N/A	Fisher's Exact
08-3665-7121		<100	100	N/A	N/A	Fisher's Exact
15-4630-2471		100	>100	N/A	N/A	Fisher's Exact

96h Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
0	pH-adjusted C	10	0.50000	0.00000	1.00000	0.16667	0.52705	105.41
0	Salt Control	10	0.60000	0.00000	1.00000	0.16330	0.51640	86.07%
100		10	0.40000	0.00000	1.00000	0.16330	0.51640	129.10

96h Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Control	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
0	pH-adjusted C	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000
0	Salt Control	0.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	0.00000	1.00000	0.00000
100		0.00000	1.00000	1.00000	1.00000	0.00000	0.00000	1.00000	0.00000	0.00000	0.00000

Approved By:

CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test B-3 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	17-5454-3182	17-5454-3182	22 Sep-04 12:12 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

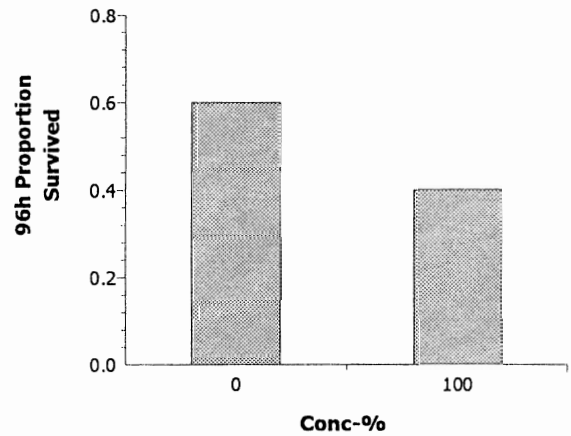
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
Salt Control		100	0.32814	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Salt Control	6	4	10
100		4	6	10

96h Proportion Survived



CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test B-3 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	17-5454-3182	17-5454-3182	22 Sep-04 12:12 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	<100	100		N/A	

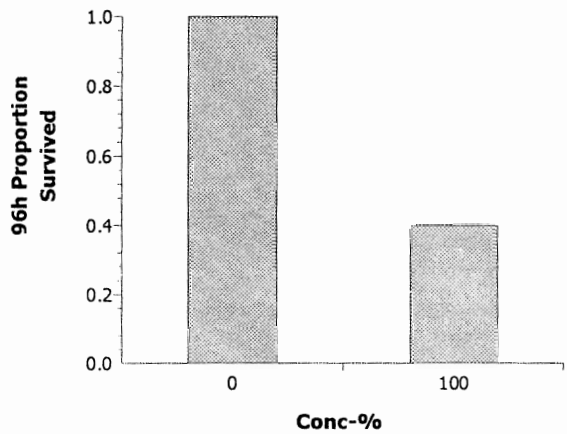
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
Lab Control		100	0.00542	0.05000	Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Lab Control	10	0	10
100		4	6	10

96h Proportion Survived



CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test B-3 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	17-5454-3182	17-5454-3182	22 Sep-04 12:12 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

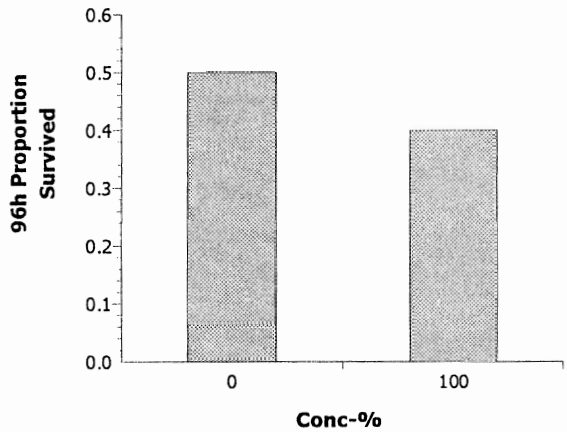
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
pH-adjusted Co		100	0.50000	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	pH-adjusted Co	5	5	10
100		4	6	10

96h Proportion Survived



 Approved By

Freshwater Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *C. dubia*

Sample ID: B-3 | **Start Date/Time:** 07/21/2004 1600

Test No: 0407-053 | **End Date/Time:** 07/29/2004 1310 AH

Concentration	Lab Control #1								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	8.09	8.24	8.28	8.25	8.25	8.22	8.21	(A)	
DO (mg/L)	7.9	7.7	7.9	8.0	8.3	7.8	8.0		
Cond. (µmhos/cm)	224	209	207	209	209	210	210		
Temp (°C)	24.7	25.7	24.7	24.5	24.7	24.7	24.1		
Final					8.02 RG				
pH		7.75	8.05	8.01	~~8.56~~	8.29	8.16	8.10	8.16
DO (mg/L)		8.2	8.9	7.9	7.9	7.8	9.0	8.8	7.6
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Concentration	Salt Control #1 (3.1ppt)								
Day	0	1	2	3	4	5	6	7	8
Initial						7.87			
pH	7.75	7.80	7.76	7.78	7.87	~~7.82~~	8.12	(A)	
DO (mg/L)	7.9	8.2	8.9	8.6	8.7	8.4	8.0		
Cond. (µmhos/cm)	5750	5510	5530	5510	5520	5531	5610		
Temp (°C)	24.4	25.9	26.0	25.2	24.7	24.6	24.2		
Final									
pH		7.97	8.11	8.03	7.99	8.02	8.05	8.02	7.99
DO (mg/L)		8.3	8.8	7.8	7.9	7.7	8.9	8.8	7.7
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Concentration	100%								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	9.45	9.35	9.22	9.10	9.21	9.33	9.19	(A)	
DO (mg/L)	~~9.5/8.4~~	8.9	8.6	8.5	8.6	8.5	8.4		
Cond. (µmhos/cm)	5380	5280	5280	5290	5290	5290	5310		
Temp (°C)	25.6	25.7	25.8	25.5	25.1	25.3	24.1		
Final									
pH		8.35	8.45	8.44	8.56	8.37	8.43	8.39	8.37
DO (mg/L)		8.2	9.1	8.0	8.2	7.8	9.0	8.8	8.1
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

		0	1	2	3	4	5	6	7
Analysts:	**Initial:**	ME	AH	SH	MC	RG	RG	SH	
	Final:		RG	SD	MC	RG	PS	ME	PS

Comments: Test not ended within 2 hours of initiation time.
(A) no renewal done on day 7, out of sample.

Animal Source/Date Received: Internal / NA | **Animal Age at Initiation:** <24 Hours

QC Check: AH 8-17-04 | **Final Review:** AH 10/17/04

Freshwater Chronic Bioassay **Daphnid Survival and Reproduction Datasheet**

Client/Sample ID: City of Buenaventura / B-3 **Start Date:** 07/21/2004 **End Date:** ~~07/28~~ 29/2004
Test No: 0407-053 **Start Time:** 1600 **End Time:** AH 1310

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
LC #1	1	0	0	0	37	9	8	0	0	24	
	2	0	0	6	9 0	6	11	0	D-9	23/d	
	3	0	0	0	4 0	7	9	0	0	16	
	4	0	0	0	6 3	6	0	9	D-6	18/d	
	5	0	0	0	7 3	10	6	0	D-0	19/d	
	6	0	0	0	5 4	0	3/D	–	–	7/d	
	7	0	0	0	6 4	0	4/D	–	–	8/d	
	8	0	0	0	3 4 0	2	4	0	0	6	0 SH
	9	0	0	5	0	9	8	0	9	22	
	10	0	0	0	0	6	2	0	D-4	12/d	
Analyst		MC	RG	SD	MC	RG	RB	SH	RB	RB	

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
SC #1 (3.1ppt)	1	0/0	–	–	–	–	–	–	–	0/d	
	2	0	0	0	0	0	0	0	0	0	0 SH
	3	0	0	0	1	0	0	0	D-0	1/d	
	4	0/0	–	–	–	–	–	–	–	0/d	
	5	0	0	0	0	0/D	–	–	–	0/d	
	6	0	0	0	0	4/D	–	–	–	4/d	
	7	0	0	0	4	0	2	~~RB D~~	–	6/d	
	8	0/0	–	–	–	–	–	–	–	0/d	
	9	0	0	0	3	8	5	~~RB~~ D-0	–	16/d	
	10	0/0	–	–	–	–	–	–	–	0/d	

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
100%	1	0/0	–	–	–	–	–	–	–	0/d	
	2	0	0	4	2	0	0	D-0	–	6/d	
	3	0	0	0	4	8	0	0	D-0	12/d	0 SH
	4	0	0	0	0	4	0/D	–	–	4/d	
	5	0	0	0	0/d	–	–	–	–	0/d	
	6	0	0/0	–	–	–	–	–	–	0/d	
	7	0	0	0	2	7	0	0	D-0	9/d	
	8	0/0	–	–	–	–	–	–	–	0/d	
	9	0/0	–	–	–	–	–	–	–		
	10	0	0/0	–	–	–	–	–	–	↓	

Time Fed (day): (0) 1600 (1) 1430 (2) 1100 (3) 1115 (4) 1245 (5) 1306 (6) 1115 (7) 1548 (8) 1310

Comments: Total Neonates counted are from first 3 broods only.

QC Check: AH 8-17-04 **Final Review:** AH 10/17/04

Freshwater Chronic Bioassay

Brood Selection Datasheet

Client/Sample ID: City of Buenaventura / B-3

Test Number: 0407-053

Test Species: *C. dubia*

Start Date: 07/21/2004

Start Time: ~~07/28/2004~~ 1600

Test Rep #	Brood Board #	Cup #
1	36	3
2	↓	4
3	↓	11
4	↓	20
5	↓	23
6	↓	25
7	↓	27
8	↓	36
9	↓	32
10	↓	33

Verified by: AH

Comments:

QC Check: AH 8·17·04

Final Review: AH 10/17/04

CETIS Report

Report Date: 23 Sep-04 10:35 AM
Link: 12-7262-4031/0407-054

Ceriodaphnia 7-d Survival and Reproduction Test C-2 **AMEC Bioassay SD**

Test:	14-5599-8866	**Test Type:**	Survival (96h)	**Duration:**	7 Days 21 Hours
Start Date:	21 Jul-04 04:00 PM	**Protocol:**	EPA/821/R-02-013 (2002)	**Species:**	Ceriodaphnia dubia
End Date:	29 Jul-04 01:10 PM	**Dil Water:**	Diluted Mineral Water (8:2)	**Source:**	In-House Culture
Setup Date:	21 Jul-04 04:00 PM	**Brine:**			

Sample:	14-3932-3197	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 09:35 AM	**Code:**	0407-054	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	30 Hours (18.5 °C)	**Station:**	C-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
04-5472-3169	96h Proportion Survived	100	>100	N/A	N/A	Fisher's Exact
06-5697-8688		100	>100	N/A	N/A	Fisher's Exact
10-0807-3141		<100	100	N/A	N/A	Fisher's Exact

96h Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
0	pH-adjusted C	10	0.50000	0.00000	1.00000	0.16667	0.52705	105.41
0	Salt Control	10	0.60000	0.00000	1.00000	0.16330	0.51640	86.07%
100		10	0.50000	0.00000	1.00000	0.16667	0.52705	105.41

96h Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Control	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
0	pH-adjusted C	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000
0	Salt Control	0.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	0.00000	1.00000	0.00000
100		0.00000	1.00000	1.00000	0.00000	1.00000	1.00000	0.00000	0.00000	1.00000	0.00000

CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test C-2 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	12-7262-4031	12-7262-4031	22 Sep-04 12:07 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

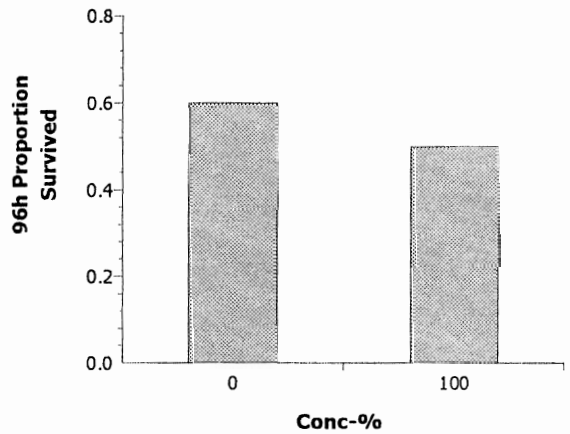
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
Salt Control		100	0.50000	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Salt Control	6	4	10
100		5	5	10

96h Proportion Survived



 Approved By:

CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test C-2 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	12-7262-4031	12-7262-4031	22 Sep-04 12:07 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	>100	1.00	N/A	

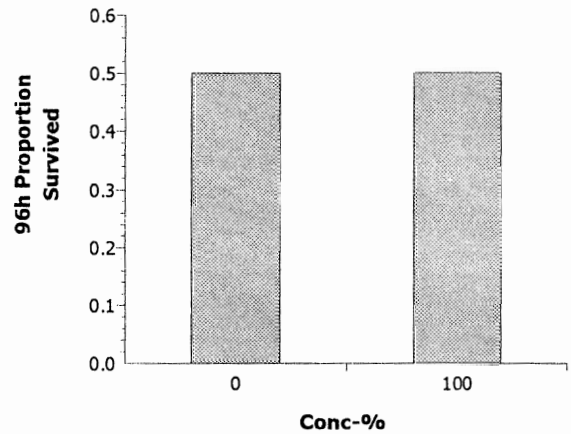
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
pH-adjusted Co		100	0.67186	0.05000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	pH-adjusted Co	5	5	10
100		5	5	10

96h Proportion Survived



CETIS Report

Ceriodaphnia 7-d Survival and Reproduction Test C-2 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	12-7262-4031	12-7262-4031	22 Sep-04 12:07 PM	CETISv1.024

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	<100	100		N/A	

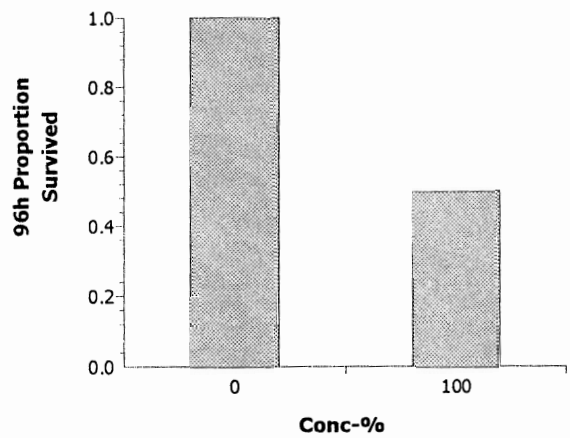
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	Decision(0.05)
Lab Control		100	0.01625	0.05000	Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Lab Control	10	0	10
100		5	5	10

96h Proportion Survived



 Approved By:

Freshwater Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *C. dubia*

Sample ID: C-2 | **Start Date/Time:** 07/21/2004 1600

Test No: 0407-054 | **End Date/Time:** 07/~~28~~29/2004 1310 AH

Concentration	Lab Control #1								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	8.09	8.24	8.28	8.25	8.25	8.22	8.21	(A)	
DO (mg/L)	7.9	7.7	7.9	8.0	8.3	7.9	8.0		
Cond. (µmhos/cm)	224	209	207	209	209	209	210		
Temp (°C)	24.7	25.8	24.7	24.5	24.7	24.7	24.1		
Final									
pH		7.75	8.05	8.01	8.02	8.29	8.10	8.10	8.1L
DO (mg/L)		8.2	8.9	7.9	7.9	7.6	9.0	8.8	7.6
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Concentration	Salt Control #1 (3.1ppt)								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	7.75	7.80	7.76	7.78	7.87	7.87	8.12	(A)	
DO (mg/L)	7.9	8.2	8.9	8.6	8.7	8.4	8.0		
Cond. (µmhos/cm)	5750	5510	5530	5510	5520	5531	5610		
Temp (°C)	24.4	25.9	26.0	25.2	24.7	24.6	24.9		
Final									
pH		7.97	8.11	8.03	7.99	8.02	8.05	8.01	7.99
DO (mg/L)		8.3	8.8	7.8	7.9	7.8	8.9	8.6	7.7
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Concentration	100%								
Day	0	1	2	3	4	5	6	7	8
Initial									
pH	9.14	9.03	9.01	8.89	8.91	8.85	8.67	(A)	
DO (mg/L)	8.9	8.5	8.4	8.5	8.6	8.7	8.6		
Cond. (µmhos/cm)	5540	5320	5330	5330	5330	5390	5410		
Temp (°C)	25.0	25.8	24.6	25.4	25.2	25.3	24.3		
Final									
pH		8.26	8.35	8.37	8.48	8.35	8.33	8.30	8.18
DO (mg/L)		7.9	9.0	7.7	7.9	7.9	8.8	8.8	8.1
Temp (°C)		25.6	25.0	25.4	25.4	24.7	24.9	25.0	24.1

Analysts:		0	1	2	3	4	5	6	7
	Initial:	MC	AH	SH	MC	RG	RG	SH	
	Final:		RG	SD	MC	RG	PS	MC	PS

Comments: Test not ended within 2 hours of initiation time.
(A) No renewal done on day 7, out of sample.

Animal Source/Date Received: Internal / NA | **Animal Age at Initiation:** <24 Hours

QC Check: AH 8-17-04 | **Final Review:** AH 10/17/04

Freshwater Chronic Bioassay **Daphnid Survival and Reproduction Datasheet**

Client/Sample ID:	City of Buenaventura / C-2	**Start Date:**	07/21/2004	**End Date:**	29 07/28/2004 AH
Test No:	0407-054	**Start Time:**	1600	**End Time:**	1310

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
LC #1	1	0	0	0	7	8 9	8	0	0	17	
	2	0	0	6	0	6	11	0	D-9	32/d AH	23/d
	3	0	0	0	0	7	9	0	0	16	
	4	0	0	0	3	6	0	9	D-6	24/d	16/d
	5	0	0	0	3	10	SH 3/D 6	10	D-7 0	19/d	
	6	0	0	0	4	0	3/D	–	–	7/d	
	7	0	0	0	4	0	4/D	–	–	8/d	
	8	0	0	0	0	2	SH 4	0	0	6	0 SH
	9	0	0	5	0	9	8	0	9	AH 34 32	
	10	0	0	0	0	6	2	0	D-4	12/d	
Analyst		MC	RG	SD	MC	RG	RB	SH	RB	RB	

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
SC #1 (3.1ppt)	1	0/0	–	–	–	–	–	–	–	0/d	
	2	0	0	0	0	0	0	0	0	0	0 SH
	3	0	0	0	1	0	0	0	D-0	1/d	
	4	0/0	–	–	–	–	–	–	–	0/d	
	5	0	0	0	0	0/0	–	–	–	0/d	
	6	0	0	0	0	4/D	–	–	–	4/d	
	7	0	0	0	4	0	2	D-0 2 RB	–	6/d	
	8	0/0	–	–	–	–	–	–	–	0/d	
	9	0	0	0	3	8	5	D-0 5 RB	–	16/d	
	10	0/0	–	–	–	–	–	–	–	0/d	

Conc.	Rep	Daily Reproduction/ Survival 1	2	3	4	5	6	7	8	Total	QC
100%	1	0/0	–	–	–	–	–	–	–	0/d	
	2	0	0	0	0	5	5	D-0	–	10/d	
	3	0	0	0	0	3	2/D	–	–	5/d	
	4	0	0/d	–	–	–	–	–	–	0/d	
	5	0	0	0	0	7	4	0	0	11	
	6	0	0	6	2	6	1	0	5	AH 9	0 SH
	7	0	0/d	–	–	–	–	–	–	0/d	
	8	0/d	–	–	–	–	–	–	–	0/d	
	9	0	0	0	0	0	1	0	0	1	
	10	0/d	–	–	–	–	–	–	–	0/d	

Time Fed (day): (0) 1600 (1) 1430 (2) 1100 (3) 1115 (4) 1330 (5) 1213 (6) 1115 (7) 1548 (8) 1310

Comments: Total Neonates counted are from the first 3 broods only.

QC Check: AH 8-17-04 **Final Review:** AH 10/17/04

Freshwater Chronic Bioassay **Brood Selection Datasheet**

Client/Sample ID: City of Buenaventura / C-2 **Start Date:** 07/21/2004

Test Number: 0407-054 **Start Time:** ~~07/28/2004~~ 1600

Test Species: *C. dubia*

Test Rep #	Brood Board #	Cup #
1	36	3
2	↓	4
3	↓	11
4	↓	20
5	↓	23
6	↓	25
7	↓	27
8	↓	36
9	↓	32
10	↓	33

Verified by: AH

Comments:

QC Check: AH 8-17-04 **Final Review:** AH 10/17/04

S. CAPRICORNUTUM

CETIS Report

Report Date: 23 Aug-04 3:43 PM
Link: 07-5136-7464/0407-055

Selenastrum Growth Test A-2 — AMEC Bioassay SD

Test:	17-4198-9895	Test Type:	Cell Growth	Duration:	4 Days 1 Hours
Start Date:	21 Jul-04 04:40 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Selenastrum capricornutum
End Date:	25 Jul-04 05:40 PM	Dil Water:	Nutrient Enriched Water	Source:	In-House Culture
Setup Date:	21 Jul-04 04:40 PM	Brine:	Frozen Seawater		
Comment:	Salt Control #1 = 3.1 ppt				

Sample:	03-0936-6046	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 02:50 PM	Code:	0407-055	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	26 Hours (19.3 °C)	Station:	A-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
01-8697-3595	Cell Density	100	>100	N/A	0.38250	Equal Variance t
04-9747-8215		100	>100	N/A	0.49391	Equal Variance t
03-5566-8128		<101	101	N/A	0.59000	Unequal Variance t
06-4077-5686		<101	101	N/A	0.44990	Unequal Variance t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
01-8697-3595	Cell Density	Control CV	0.3820		0.2	Fails acceptability criteria
03-5566-8128			0.5012		0.2	Fails acceptability criteria
04-9747-8215			0.5012		0.2	Fails acceptability criteria
06-4077-5686			0.3820		0.2	Fails acceptability criteria
01-8697-3595	Cell Density	Control Response	947750	1E+06		Fails acceptability criteria
03-5566-8128			1E+06	1E+06		Passes acceptability criteria
04-9747-8215			1E+06	1E+06		Passes acceptability criteria
06-4077-5686			947750	1E+06		Fails acceptability criteria
01-8697-3595	Cell Density	MSDp	0.3825	0.091	0.29	Fails acceptability criteria
03-5566-8128			0.59	0.091	0.29	Fails acceptability criteria
04-9747-8215			0.4939	0.091	0.29	Fails acceptability criteria
06-4077-5686			0.4499	0.091	0.29	Fails acceptability criteria

Cell Density Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	2043250.0	1885000.0	2139000.0	55594.3	111188.	5.44%
0	pH-adjusted C	4	1061750.0	463000.0	1551000.0	266076.	532153.	50.12%
0	Salt Control	4	947750.0	603000.0	1373000.0	181025.	362050.	38.20%
100		4	1462750.0	1398000.0	1594000.0	45083.9	90167.8	6.16%
~~101~~ 100% unfiltered		4	228250.0	216000.0	250000.0	7597.97	15195.9	6.66%

Cell Density Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	2139000.0	1885000.0	2096000.0	2053000.0
0	pH-adjusted C	766000.0	1551000.0	463000.0	1467000.0
0	Salt Control	1373000.0	1120000.0	603000.0	695000.0
100		1410000.0	1398000.0	1594000.0	1449000.0
~~101~~ 100% unfiltered		220000.0	227000.0	250000.0	216000.0

Approved By: 8/25

CETIS Report

Selenastrum Growth Test A-2	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	07-5136-7464	07-5136-7464	23 Aug-04 3:43 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	38.25%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.3820		0.2	Fails acceptability criteria
Control Response	947750	1E+06		Fails acceptability criteria
MSDp	0.3825	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	16.12262	47.46723	0.04707	Equal Variances
Distribution	Shapiro-Wilk W	0.97106	0.74935	0.89159	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.3045E+11	5.305E+11	1	7.62	0.03283	Significant Effect
Error	4.1763E+11	6.961E+10	6			
Total	9.4808E+11	6.001E+11	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-2.760579	1.94318	0.98359	362510.1	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	947750.0	603000.0	1373000.0	362050.0				
100		4	1462750.0	1398000.0	1594000.0	90167.6				

CETIS Report

Selenastrum Growth Test A-2 AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	07-5136-7464	07-5136-7464	23 Aug-04 3:43 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	49.39%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.5012		0.2	Fails acceptability criteria
Control Response	1E+06	1E+06		Passes acceptability criteria
MSDp	0.4939	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	34.83135	47.46723	0.01570	Equal Variances
Distribution	Shapiro-Wilk W	0.96134	0.74935	0.79544	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	3.2160E+11	3.216E+11	1	2.21	0.18785	Non-Significant Effect
Error	8.7395E+11	1.457E+11	6			
Total	1.1956E+12	4.673E+11	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		100	-1.485904	1.94318	0.90607	524404.8	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	1061750.	463000.	1551000.	532153.				
100		4	1462750.	1398000.	1594000.	90167.6				

CETIS Report

Selenastrum Growth Test A-2	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	07-5136-7464	07-5136-7464	23 Aug-04 3:43 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Unequal Variance t	C > T	Untransformed		<101	101		N/A	44.99%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.3820		0.2	Fails acceptability criteria
Control Response	947750	1E+06		Fails acceptability criteria
MSDp	0.4499	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	567.65470	47.46723	0.00025	Unequal Variances
Distribution	Shapiro-Wilk W	0.93466	0.74935	0.52349	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.0354E+12	1.035E+12	1	15.77	0.00736	Significant Effect
Error	3.9394E+11	6.566E+10	6			
Total	1.4293E+12	1.101E+12	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		101	3.971082	2.353363	0.01427	426393.8	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	947750.	603000.	1373000.	362050.				
~~101~~ 100% unfiltered		4	228250.	216000.	250000.	15195.9				

CETIS Report

Selenastrum Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	07-5136-7464	07-5136-7464	23 Aug-04 3:43 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Unequal Variance t	C > T	Untransformed		<101	101		N/A	59.00%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.5012		0.2	Fails acceptability criteria
Control Response	1E+06	1E+06		Passes acceptability criteria
MSDp	0.59	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1226.36300	47.46723	0.00008	Unequal Variances
Distribution	Shapiro-Wilk W	0.92444	0.74935	0.43583	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.3894E+12	1.389E+12	1	9.80	0.02029	Significant Effect
Error	8.5026E+11	1.417E+11	6			
Total	2.2397E+12	1.531E+12	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		101	3.131277	2.353363	0.02601	626430.8	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	1061750.	463000.	1551000.	532153.				
~~101~~ 100% unfiltered		4	228250.	216000.	250000.	15195.9				

CETIS Worksheet

Report Date: 21 Jul-04 10:43 AM
Link: 07-5136-7464/0407-055

Selenastrum Growth Test — AMEC Bioassay SD

Start Date:	21 Jul-04	**Species:**	Selenastrum capricornutum	**Sample Code:**	0407-055
End Date:	25 Jul-04	**Protocol:**	EPA/821/R-02-013 (2002)	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	A-2

Conc-%	Code	Rep	Pos	Cell Density	Absorbance	Biomass	Chlorophyll a	Notes
0	LC	1	6					
0	LC	2	7					
0	LC	3	1					
0	LC	4	2					
0	SC	1	4					
0	SC	2	10					
0	SC	3	12					
0	SC	4	9					
100		1	8					
100		2	11					
100		3	5					
100		4	3					

QC=AH Data entry QC=AH

Analyst: AH Reviewed By: AH 8-10-04

Fluorometric & Microscopic Determination of Cell Density
Turner Fluorometer Model TD-700

Test Species: *S. capricornutum*

Client: City of Buenaventura

Test Date: 7-21-04

Sample ID: A-2, B-1; B-3, C-2

Start/End Times: 16:40 / 17:40

Test No: 0407-055 → 058

Analyst: AH

Random Number	Dilution	Cell Density (fluorometric) (cells/ml *10⁴)	Cell Density (microscopic) (cells/ml *10⁴)
Blank	NA		
Cal Check 1 (NEW, Solid, Effluent Blanks)	0.00, 2.18 →	2I:	
1		21.39	
2		18.85	
3		14.10	
4		13.73	
5		13.98	
6		20.96	
7		20.53	
8		15.94	
9		11.20	
10		6.03	
11		14.49	
12		6.95	
Cal Check 2 (NEW, Solid, Effluent Blanks)		0.00, 2.18	
13		9.65	
14		13.65	
15		15.15	
16		17.46	
17		18.28	
18		18.83	
19		19.81	
20		21.94	
21		13.58	
22		12.60	
23		20.72	
24		18.69	
Cal Check 3 (NEW, Solid, Effluent Blanks)			

#1 corr A 7.66
B 15.51
C 4.63
D 14.67

#2 filtered blank 0.20
3-1 " 0.10
3-3 " 0.04
C-2 " 0.24

Comments: _____

QC Check: AH 8/10/04

Final Review: 8/25/04

Fluorometric & Microscopic Determination of Cell Density
Turner Fluorometer Model TD-700

Test Species: S. capricornutum

Client: City of Buenaventura Test Date: 7-21-04

Sample ID: A-2, B-1, B-3, C-2 Start/End Times: 16:40 / 17:40

Test No: 0407-055 → 058 Analyst: AH

Random Number	Dilution	Cell Density (fluorometric) (cells/ml *10^5)	Cell Density (microscopic) (cells/ml *10^4)
Blank	NA		
Cal Check 1 (NEW, Solid, Effluent Blanks)	0.	0.00, 2.18	
25		17.17	
26		16.88	
27		15.90	
28		18.66	
29		23.11	
30		18.40	
31		13.40	
32		20.62	
A-2 unfilt A		2.20 *	
A-2 unfilt B		2.27	
A-2 unfilt C		2.50	
A-2 unfilt D		2.16	
Cal Check 2 (NEW, Solid, Effluent Blanks)		0.00, 2.18	
B-1 unfilt A		3.57	
B-1 unfilt B		3.14	
B-1 unfilt C		3.12	
B-1 unfilt D		3.23	
B-3 unfilt A		2.04	
B-3 " B		1.25	
B-3 " C		1.17	
B-3 " D		3.43	
C-2 " A		2.33	
C-2 " B		1.93	
C-2 " C		3.82	
C-2 " D		1.74	
Cal Check 3 (NEW, Solid, Effluent Blanks)			

Comments: * unfiltered samples. A lot of algae stuck to bottom of flask even after shakin

QC Check: AH 8/10/04 Final Review: 8/25/04

Freshwater Chronic Bioassay **Algal Growth Inhibition Worksheet**

Client : City of Buenaventura **Test Species:** *S. capricornutum*

Sample ID: A-2, B-1, B-3, C-2 **Test Date:** 07/21/2004

Test No: 0407-055, 056, 057, 058 **Analyst:** AH

Source/Date Stock Culture Started: Internal / 7-15-04

Stock Cell Density Measurements: 32.32
32.19
32.26
32.10
32.18

Mean: 32.21

(mean no. * 100,000)/(500,000) = x (dilution factor): 6.44 / 1.00 pt sele + 5.44 pt NEW

Prepare inoculum according to the dilution factor. This yields a solution with the desired cell density of 500,000 cells/ml.

Example: (35 * 100,000)/(500,000) = 7 (e.g. 25 ml Sele stock + 150 ml NEW)

Inoculate 1 ml into 3 initial count flasks containing 50 ml of NEW, stir and count on the hemacytometer. Flasks should contain a final density of 10,000 cells/ml ± 10%.

Inoculum Cell Density Confirmation Counts: 1
2
1

Mean: 1.3

Test Initiation Time: 16:40

Test Termination Time: 17:40

Comments: _____

QC Check: AH 8-10-04 Final Review: 8/25/04

Freshwater Chronic Bioassay

Water Quality Measurements
Algal Growth Inhibition

Test Species: *S. capricornutum*

Client : City of Buenaventura

Test Date: 07/21/2004

Sample ID: A-2, B-1, B-3, C-2

Start/End Times: ~~07/25/2004~~ 16:40 / 17:40

Test No: 0407-055, 056, 057, 058

Analyst: AH

	Initial Readings				Final Readings	
Concentration (____%____)	D.O. (mg/L)	Conductivity (umhos-cm)	Alkalinity (mg/L)	Hardness (mg/L)	D.O. (mg/L)	Conductivity (umhos-cm)
Lab Control	7.4	110	16	36	9.2	255
Salt Control #1 (3.1 ppt)	7.3	5710	–	–	9.0	5440
Salt Control #2 (1.1 ppt)	6.8	2430	–	–	9.1	2310
A-2	7.4	5790	171	917	9.3	5510
B-1	7.7	2750	184	540	9.1	2650
B-3	7.5	5520	183	813	9.2	5290
C-2	7.2	5570	147	882	9.0	5330
pH adj SC	7.4	6230	–	–	8.9	6060

		0 Hour	24 Hour	48 Hour	72 Hour	96 Hour
pH/Temperature (°C):	Lab control	7.46 / 25.0	7.09 / 25.5	7.13 / 25.3	7.31 / 25.6	9.15 / 25.2
pH/Temperature (°C):	Salt Cont. #1	7.68 / 25.0	~~8.~~ 7.26 / 25.6	7.46 / 25.7	8.31 / 25.6	8.85 / 25.2
pH/Temperature (°C):	Salt Cont. #2	7.63 / 25.0	7.30 / 25.8	7.56 / 25.8	8.32 / 25.5	9.06 / 25.2
pH/Temperature (°C):	A-2	9.59 / 25.0	8.50 / 25.8	8.46 / 25.6	8.78 / 25.8	9.00 / 25.2
pH/Temperature (°C):	B-1	8.10 / 25.0	8.43 / 25.8	8.52 / 25.5	8.85 / 25.7	9.22 / 25.2
pH/Temperature (°C):	B-3	9.38 / 25.0	8.45 / 25.8	8.49 / 25.3	8.83 / 25.4	9.06 / 25.2
pH/Temperature (°C):	C-2	9.06 / 25.0	8.31 / 26.1	8.44 / 25.8	8.81 / 25.4	9.13 / 25.2
pH/Temp	pH adj SC.	9.62 / 25.0	7.59 / 25.8	8.00 / 25.8	8.18 / 25.4	8.97 / 26.2

Comments: samples A-2, B-3, and C-2 had pH's >9 and were not adjusted prior to test initiation. An additional control of pH>9 was tested concurren

QC Check: AH 8-10-04

Final Review: ~~AH~~ 8/25/04

CETIS Report

Selenastrum Growth Test B-1 — AMEC Bioassay SD

Test:	13-7888-5444	Test Type:	Cell Growth	Duration:	4 Days 1 Hours
Start Date:	21 Jul-04 04:40 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Selenastrum capricornutum
End Date:	25 Jul-04 05:40 PM	Dil Water:	Nutrient Enriched Water	Source:	In-House Culture
Setup Date:	21 Jul-04 12:00 AM	Brine:	Frozen Seawater		
Comment:	Salt Control #2 = 1.1 ppt				

Sample:	04-7882-9801	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 01:40 PM	Code:	0407-056	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	10 Hours (18.4 °C)	Station:	B-1		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
08-3889-5930	Cell Density	<100	100	N/A	0.09134	Equal Variance t
10-5680-9280		<101	101	N/A	0.04961	Equal Variance t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
08-3889-5930	Cell Density	Control CV	0.0497		0.2	Passes acceptability criteria
10-5680-9280			0.0497		0.2	Passes acceptability criteria
08-3889-5930	Cell Density	Control Response	2E+06	1E+06		Passes acceptability criteria
10-5680-9280			2E+06	1E+06		Passes acceptability criteria
08-3889-5930	Cell Density	MSDp	0.0913	0.091	0.29	Passes acceptability criteria
10-5680-9280			0.0496	0.091	0.29	Fails acceptability criteria

Cell Density Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0		~~4~~						
0	Lab Control	4	2078500.0	1869000.0	2311000.0	90489.8	180979.	8.71%
0	Salt Control	4	1777750.0	1688000.0	1866000.0	44167.0	88334.1	4.97%
100		4	1387000.0	1260000.0	1590000.0	70938.9	141877.	10.23%
~~101~~ 100% unfiltered		4	326500.0	312000.0	357000.0	10444.2	20888.5	6.40%

Cell Density Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0					
0	Lab Control	2072000.0	1869000.0	2311000.0	2062000.0
0	Salt Control	1717000.0	1688000.0	1866000.0	1840000.0
100		1358000.0	1260000.0	1590000.0	1340000.0
~~101~~ 100% unfiltered		357000.0	314000.0	312000.0	323000.0

Approved By: 8/26/04

CETIS Report

Selenastrum Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	15-6595-9011	15-6595-9011	23 Aug-04 3:33 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		<100	100		N/A	9.13%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.0497		0.2	Passes acceptability criteria
Control Response	2E+06	1E+06		Passes acceptability criteria
MSDp	0.0913	0.091	0.29	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.57972	47.46723	0.45693	Equal Variances
Distribution	Shapiro-Wilk W	0.92549	0.74935	0.44429	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	3 0537E+11	3.054E+11	1	21.87	0.00341	Significant Effect
Error	8.3797E+10	1.397E+10	6			
Total	3.8917E+11	3.193E+11	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	4.676016	1.94318	0.00171	162381.3	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	1777750.0	1688000.0	1866000.0	88334.1				
100		4	1387000.0	1260000.0	1590000.0	141877.				

Approved By: 8/25/04

CETIS Report

Selenastrum Growth Test B-1	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	15-6595-9011	15-6595-9011	23 Aug-04 3:33 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		<101	101		N/A	4.96%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.0497		0.2	Passes acceptability criteria
Control Response	2E+06	1E+06		Passes acceptability criteria
MSDp	0.0496	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	17.88293	47.46723	0.04071	Equal Variances
Distribution	Shapiro-Wilk W	0.97186	0.74935	0.89879	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	4.2123E+12	4.212E+12	1	1022.48	0.00000	Significant Effect
Error	2.4718E+10	4.12E+09	6			
Total	4.237E+12	4.216E+12	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		101	31.97631	1.94318	0.00000	88191.55	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	1777750.0	1688000.0	1866000.0	88334.1				
~~101~~ 100% unfiltered		4	326500.0	312000.0	357000.0	20888.5				

CETIS Worksheet

Report Date: 21 Jul-04 10:49 AM
Link: 15-6595-9011

Selenastrum Growth Test					AMEC Bioassay SD
Start Date:	21 Jul-04	**Species:**	Selenastrum capricornutum	**Sample Code:**	0407-056
End Date:	25 Jul-04	**Protocol:**	EPA/821/R-02-013 (2002)	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	B-1

Conc-%	Code	Rep	Pos	Cell Density	Absorbance	Biomass	Chlorophyll a	Notes
0	LC	1	24					
0	LC	2	32					
0	LC	3	23					
0	LC	4	29					
0	SC	1	30					
0	SC	2	26					
0	SC	3	28					
0	SC	4	25					
100		1	22					
100		2	27					
100		3	21					
100		4	31					

QC=AH data entry QC=AH

CETIS Report

Report Date: 23 Aug-04 3:46 PM
Link: 13-9674-1566/0407-057

Selenastrum Growth Test B-3 — AMEC Bioassay SD

Test:	17-4198-9895	Test Type:	Cell Growth	Duration:	4 Days 1 Hours
Start Date:	21 Jul-04 04:40 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Selenastrum capricornutum
End Date:	25 Jul-04 05:40 PM	Dil Water:	Nutrient Enriched Water	Source:	In-House Culture
Setup Date:	21 Jul-04 04:40 PM	Brine:	Frozen Seawater		
Comment:	Salt Control #1 = 3.1 ppt				

Sample:	07-7207-8087	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 10:40 AM	Code:	0407-057	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	30 Hours (18.2 °C)	Station:	B-3		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
03-4334-3103	Cell Density	100	>100	N/A	0.57219	Equal Variance t
04-3087-3172		100	>100	N/A	0.50104	Equal Variance t
08-9088-1776		<101	101	N/A	0.49632	Equal Variance t
13-0004-6989		<101	101	N/A	0.38639	Equal Variance t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
03-4334-3103	Cell Density	Control CV	0.5012		0.2	Fails acceptability criteria
04-3087-3172			0.3820		0.2	Fails acceptability criteria
08-9088-1776			0.5012		0.2	Fails acceptability criteria
13-0004-6989			0.3820		0.2	Fails acceptability criteria
03-4334-3103	Cell Density	Control Response	1E+06	1E+06		Passes acceptability criteria
04-3087-3172			947750	1E+06		Fails acceptability criteria
08-9088-1776			1E+06	1E+06		Passes acceptability criteria
13-0004-6989			947750	1E+06		Fails acceptability criteria
03-4334-3103	Cell Density	MSDp	0.5722	0.091	0.29	Fails acceptability criteria
04-3087-3172			0.5010	0.091	0.29	Fails acceptability criteria
08-9088-1776			0.4963	0.091	0.29	Fails acceptability criteria
13-0004-6989			0.3864	0.091	0.29	Fails acceptability criteria

Cell Density Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	2043250.0	1885000.0	2139000.0	55594.3	111188.	5.44%
0	pH-adjusted C	4	1061750.0	463000.0	1551000.0	266076.	532153.	50.12%
0	Salt Control	4	947750.0	603000.0	1373000.0	181025.	362050.	38.20%
100		4	1397750.0	965000.0	1746000.0	164157.	328314.	23.49%
~~101~~ 100% unfiltered		4	197250.0	117000.0	343000.0	52399.7	104799.	53.13%

Cell Density Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	2139000.0	1885000.0	2096000.0	2053000.0
0	pH-adjusted C	766000.0	1551000.0	463000.0	1467000.0
0	Salt Control	1373000.0	1120000.0	603000.0	695000.0
100		965000.0	1365000.0	1515000.0	1746000.0
~~101~~ 100% unfiltered		204000.0	125000.0	117000.0	343000.0

Approved By: 8/25/04

CETIS Report

Selenastrum Growth Test B-3 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	13-9674-1566	13-9674-1566	23 Aug-04 3:46 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	57.22%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.5012		0.2	Fails acceptability criteria
Control Response	1E+06	1E+06		Passes acceptability criteria
MSDp	0.5722	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.62721	47.46723	0.44859	Equal Variances
Distribution	Shapiro-Wilk W	0.92971	0.74935	0.47952	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.2579E+11	2.258E+11	1	1.16	0.32381	Non-Significant Effect
Error	1.1729E+12	1.955E+11	6			
Total	1.3987E+12	4.213E+11	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		100	-1.074715	1.94318	0.83810	607518.1	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	1061750.0	463000.0	1551000.0	532153.				
100		4	1397750.0	965000.0	1746000.0	328314.				

Approved By: 8/25/04

CETIS Report

Selenastrum Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	13-9674-1566	13-9674-1566	23 Aug-04 3:46 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	50.10%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.3820		0.2	Fails acceptability criteria
Control Response	947750	1E+06		Fails acceptability criteria
MSDp	0.5010	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.21607	47.46723	0.87605	Equal Variances
Distribution	Shapiro-Wilk W	0.94064	0.74935	0.58005	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	4.05E+11	4.05E+11	1	3.39	0.11515	Non-Significant Effect
Error	7.1661E+11	1.194E+11	6			
Total	1.1216E+12	5.244E+11	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-1.841453	1.94318	0.94243	474859.3	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	947750.0	603000.0	137300	362050.				
100		4	1397750.0	965000.0	174600	328314.				

CETIS Report

Selenastrum Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	13-9674-1566	13-9674-1566	23 Aug-04 3:46 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		<101	101		N/A	49.63%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.5012		0.2	Fails acceptability criteria
Control Response	1E+06	1E+06		Passes acceptability criteria
MSDp	0.4963	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	25.78437	47.46723	0.02422	Equal Variances
Distribution	Shapiro-Wilk W	0.96760	0.74935	0.85912	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.4947E+12	1.495E+12	1	10.16	0.01889	Significant Effect
Error	8.8251E+11	1.471E+11	6			
Total	2.3772E+12	1.642E+12	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		101	3.187832	1.94318	0.00944	526966.1	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	1061750.0	463000.0	1551000.0	532153.				
~~101~~ 100% unfiltered		4	197250.0	117000.0	343000.0	104799.				

Approved By: 8/29/04

CETIS Report

Selenastrum Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	13-9674-1566	13-9674-1566	23 Aug-04 3:46 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		<101	101		N/A	38.64%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.3820		0.2	Fails acceptability criteria
Control Response	947750	1E+06		Fails acceptability criteria
MSDp	0.3864	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	11.93498	47.46723	0.07127	Equal Variances
Distribution	Shapiro-Wilk W	0.97402	0.74935	0.91716	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.1265E+12	1.127E+12	1	15.86	0.00726	Significant Effect
Error	4.2619E+11	7.103E+10	6			
Total	1.5527E+12	1.198E+12	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		101	3.982345	1.94318	0.00363	366205.5	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	947750.0	603000.0	1373000.0	362050.				
~~101~~ 100% unfiltered		4	197250.0	117000.0	343000.0	104799.				

Approved By: [signature] 8/24/04

CETIS Worksheet

Report Date: 21 Jul-04 10:45 AM
Link: 13-9674-1566

Selenastrum Growth Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Selenastrum capricornutum	**Sample Code:**	0407-057
End Date:	25 Jul-04	**Protocol:**	EPA/821/R-02-013 (2002)	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	B-3

Conc-%	Code	Rep	Pos	Cell Density	Absorbance	Biomass	Chlorophyll a	Notes
100		1	16					
100		2	14					
100		3	15					
100		4	13					

QC-AH data entry QC-AH

CETIS Report

Report Date: 23 Aug-04 4:09 PM
Link: 11-4020-2553/0407-058

Selenastrum Growth Test C-2 — **AMEC Bioassay SD**

Test:	17-4198-9895	**Test Type:**	Cell Growth	**Duration:**	4 Days 1 Hours
Start Date:	21 Jul-04 04:40 PM	**Protocol:**	EPA/821/R-02-013 (2002)	**Species:**	Selenastrum capricornutum
End Date:	25 Jul-04 05:40 PM	**Dil Water:**	Nutrient Enriched Water	**Source:**	In-House Culture
Setup Date:	21 Jul-04 04:40 PM	**Brine:**	Frozen Seawater		
Comment:	Salt Control #1 = 3.1 ppt				

Sample:	05-7998-4298	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 09:35 AM	**Code:**	0407-058	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	31 Hours (18.5 °C)	**Station:**	C-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
03-4732-9431	Cell Density	<101	101	N/A	0.49455	Equal Variance t
03-5600-7815		100	>100	N/A	0.50883	Equal Variance t
08-2822-9665		<101	101	N/A	0.38353	Equal Variance t
13-0612-3396		100	>100	N/A	0.40631	Equal Variance t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
03-4732-9431	Cell Density	Control CV	0.5012		0.2	Fails acceptability criteria
03-5600-7815			0.5012		0.2	Fails acceptability criteria
08-2822-9665			0.3820		0.2	Fails acceptability criteria
13-0612-3396			0.3820		0.2	Fails acceptability criteria
03-4732-9431	Cell Density	Control Response	1E+06	1E+06		Passes acceptability criteria
03-5600-7815			1E+06	1E+06		Passes acceptability criteria
08-2822-9665			947750	1E+06		Fails acceptability criteria
13-0612-3396			947750	1E+06		Fails acceptability criteria
03-4732-9431	Cell Density	MSDp	0.4945	0.091	0.29	Fails acceptability criteria
03-5600-7815			0.5088	0.091	0.29	Fails acceptability criteria
08-2822-9665			0.3835	0.091	0.29	Fails acceptability criteria
13-0612-3396			0.4063	0.091	0.29	Fails acceptability criteria

Cell Density Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	2043250.0	1885000.0	2139000.0	55594.3	111188.	5.44%
0	pH-adjusted C	4	1061750.0	463000.0	1551000.0	266076.	532153.	50.12%
0	Salt Control	4	947750.0	603000.0	1373000.0	181025.	362050.	38.20%
100		4	1971500.0	1828000.0	2194000.0	80633.4	161266.	8.18%
~~101~~ 100% unfiltered		4	245500.0	174000.0	382000.0	47131.9	94263.8	38.40%

Cell Density Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	2139000.0	1885000.0	2096000.0	2053000.0
0	pH-adjusted C	766000.0	1551000.0	463000.0	1467000.0
0	Salt Control	1373000.0	1120000.0	603000.0	695000.0
100		1828000.0	1883000.0	1981000.0	2194000.0
~~101~~ 100% unfiltered		233000.0	193000.0	382000.0	174000.0

Approved By: 8/29/04

CETIS Report

Selenastrum Growth Test C-2	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	11-4020-2553	11-4020-2553	23 Aug-04 4:07 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		<101	101		N/A	49.45%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.5012		0.2	Fails acceptability criteria
Control Response	1E+06	1E+06		Passes acceptability criteria
MSDp	0.4945	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	31.87016	47.46723	0.01785	Equal Variances
Distribution	Shapiro-Wilk W	0.96335	0.74935	0.81637	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.3325E+12	1.333E+12	1	9.12	0.02338	Significant Effect
Error	8.7622E+11	1.460E+11	6			
Total	2.2087E+12	1.479E+12	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		101	3.020698	1.94318	0.01169	525084.3	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	1061750.0	463000.0	1551000.0	532153.				
~~101~~ 100% unfiltered		4	245500.0	174000.0	382000.0	94263.8				

CETIS Report

Selenastrum Growth Test C-2	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	11-4020-2553	11-4020-2553	23 Aug-04 4:07 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	50.88%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.5012		0.2	Fails acceptability criteria
Control Response	1E+06	1E+06		Passes acceptability criteria
MSDp	0.5088	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	10.88890	47.46723	0.08070	Equal Variances
Distribution	Shapiro-Wilk W	0.97203	0.74935	0.90023	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.6553E+12	1.655E+12	1	10.71	0.01699	Significant Effect
Error	9.2758E+11	1.546E+11	6			
Total	2.5829E+12	1.81E+12	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
pH-adjusted Co		100	-3.272172	1.94318	0.99151	540255.3	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	pH-adjusted C	4	1061750.0	463000.0	1551000.0	532153.				
100		4	1971500.0	1828000.0	2194000.0	161266.				

CETIS Report

Selenastrum Growth Test C-2					AMEC Bioassay SD
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Cell Density	Comparison	11-4020-2553	11-4020-2553	23 Aug-04 4:08 PM	CETISv1.024

Method	**Alt H**	**Data Transform**	**Z**	**NOEL**	**LOEL**	**Toxic Units**	**ChV**	**MSDp**
Equal Variance t	C > T	Untransformed		<101	101		N/A	38.35%

Test Acceptability

Attribute	**Statistic**	**Lower Limit**	**Upper Limit**	**Decision**
Control CV	0.3820		0.2	Fails acceptability criteria
Control Response	947750	1E+06		Fails acceptability criteria
MSDp	0.3835	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	**Test**	**Statistic**	**Critical**	**P Level**	**Decision(0.01)**
Variances	Variance Ratio	14.75195	47.46723	0.05326	Equal Variances
Distribution	Shapiro-Wilk W	0.97234	0.74935	0.90297	Normal Distribution

ANOVA Table

Source	**Sum of Squares**	**Mean Square**	**DF**	**F Statistic**	**P Level**	**Decision(0.05)**
Between	9.8631E+11	9.863E+11	1	14.09	0.00946	Significant Effect
Error	4.199E+11	6.998E+10	6			
Total	1.4062E+12	1.056E+12	7			

Group Comparisons

Control	**vs**	**Conc-%**	**Statistic**	**Critical**	**P Level**	**MSD**	**Decision(0.05)**
Salt Control		101	3.754132	1.94318	0.00473	363492.4	Significant Effect

Data Summary			**Original Data**				**Transformed Data**			
Conc-%	**Control Type**	**Count**	**Mean**	**Minimum**	**Maximum**	**SD**	**Mean**	**Minimum**	**Maximum**	**SD**
0	Salt Control	4	947750.0	603000.0	1373000.0	362050.				
~~101~~ 100% unfiltered		4	245500.0	174000.0	382000.0	94263.8				

CETIS Report

Selenastrum Growth Test C-2	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	11-4020-2553	11-4020-2553	23 Aug-04 4:08 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	40.63%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.3820		0.2	Fails acceptability criteria
Control Response	947750	1E+06		Fails acceptability criteria
MSDp	0.4063	0.091	0.29	Fails acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	5.04022	47.46723	0.21700	Equal Variances
Distribution	Shapiro-Wilk W	0.97228	0.74935	0.90247	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.0961E+12	2.096E+12	1	26.69	0.00208	Significant Effect
Error	4.7126E+11	7.854E+10	6			
Total	2.5674E+12	2.175E+12	7			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-5.165977	1.94318	0.99896	385083.1	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	947750.0	603000.0	1373000.0	362050.				
100		4	1971500.0	1828000.0	2194000.0	161266.				

Approved By: [signature] 12/16

CETIS Worksheet

Report Date: 21 Jul-04 10:46 AM
Link: 11-4020-2553

Selenastrum Growth Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Selenastrum capricornutum	**Sample Code:**	0407-058
End Date:	25 Jul-04	**Protocol:**	EPA/821/R-02-013 (2002)	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	C-2

Conc-%	Code	Rep	Pos	Cell Density	Absorbance	Biomass	Chlorophyll a	Notes
100		1	18					
100		2	17					
100		3	19					
100		4	20					

QC=AH data entry QC=AH

MARINE

A. AFFINIS

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test A-2 **AMEC Bioassay SD**

Test:	11-9894-1671	**Test Type:**	Growth-Survival (7d)	**Duration:**	6 Days 23 Hours
Start Date:	21 Jul-04 02:30 PM	**Protocol:**	EPA/8~~21/R-02-012 (2002)~~ AM 1995	**Species:**	Atherinops affinis
End Date:	28 Jul-04 02:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 02:30 PM	**Brine:**			

Sample:	13-3511-5267	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 02:50 PM	**Code:**	0407-031	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	24 Hours (19.3 °C)	**Station:**	A-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
08-1166-3340	7d Proportion Survived	100	>100	N/A	0.10369	Steel's Many-One Rank
12-1992-6421	Mean Dry Weight-mg	100	>100	N/A	0.17089	Dunnett's Multiple Comparison

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
0	Salt Control	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
25		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
50		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
67		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.40880	1.04600	1.61800	0.10862	0.24289	17.24%
0	Salt Control	5	1.28280	1.11200	1.44000	0.07036	0.15732	12.26%
25		5	1.49200	1.35200	1.64000	0.05678	0.12697	8.51%
50		5	1.53120	1.35400	1.72800	0.07192	0.16083	10.50%
67		5	1.49840	1.35600	1.59800	0.04027	0.09004	6.01%
100		5	1.55720	1.31800	1.82200	0.08798	0.19674	12.63%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.00000	1.00000	1.00000	0.80000	0.80000
0	Salt Control	1.00000	0.80000	1.00000	1.00000	1.00000
25		1.00000	0.80000	0.80000	1.00000	1.00000
50		0.80000	1.00000	1.00000	1.00000	1.00000
67		1.00000	1.00000	1.00000	1.00000	1.00000
100		0.80000	1.00000	1.00000	0.80000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.49800	1.28200	1.61800	1.04600	1.60000
0	Salt Control	1 11200	1.11800	1.44000	1.40400	1.34000
25		1.37200	1.35200	1.51400	1.58200	1.64000
50		1.35400	1.60400	1.59400	1.37600	1.72800
67		1.35600	1.48000	1.53200	1.52600	1.59800
100		1.57200	1.82200	1.65200	1.42200	1.31800

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test A-2 AMEC NW Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	15-1869-6060	15-1869-6060	18 Aug-04 12:27 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		100	>100	1.00	N/A	10.37%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	1.51429	4.43069	0.23592	Equal Variances
Distribution	Shapiro-Wilk W	0.80172	0.88746	0.00014	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.03175642	0.0079391	4	0.70	0.60101	Non-Significant Effect
Error	0.2268316	0.0113416	20			
Total	0.25858802	0.0192807	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	25	17	>0.05	2	Non-Significant Effect
		50	27.5	17	>0.05	2	Non-Significant Effect
		67	30	17	>0.05	1	Non-Significant Effect
		100	25	17	>0.05	2	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
25		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043
50		5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
67		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
100		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test A-2 AMEC NW Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	15-1869-6060	15-1869-6060	18 Aug-04 12:28 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		100	>100	1.00	N/A	17.09%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.26695	13.27671	0.68679	Equal Variances
Distribution	Shapiro-Wilk W	0.94084	0.88746	0.16397	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.2382839	0.059571	4	2.62	0.06544	Non-Significant Effect
Error	0.4542017	0.0227101	20			
Total	0.69248562	0.0822811	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-2.194938	2.3	>0.05	0.2192135	Non-Significant Effect
		50	-2.606227	2.3	>0.05	0.2192135	Non-Significant Effect
		67	-2.262087	2.3	>0.05	0.2192135	Non-Significant Effect
		100	-2.879021	2.3	>0.05	0.2192135	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	1.28280	1.11200	1.44000	0.15732				
25		5	1.49200	1.35200	1.64000	0.12697				
50		5	1.53120	1.35400	1.72800	0.16083				
67		5	1.49840	1.35600	1.59800	0.09004				
100		5	1.55720	1.31800	1.82200	0.19674				

CETIS Report

Report Date: 18 Aug-04 12:29 PM
Analysis: 16-6272-1125

Pacific Topsmelt 7-d Survival and Growth Test A-2 AMEC ~~NW~~ SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Linear Interpolation	15-1869-6060	15-1869-6060	18 Aug-04 12:28 PM	CETISv1.024

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7090378	200	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-%	95% LCL	95% UCL
10	>100	N/A	N/A
20	>100	N/A	N/A
25	>100	N/A	N/A
50	>100	N/A	N/A

Data Summary

			Calculated Variate				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Salt Control	5	1.28280	1.11200	1.44000	0.03211	0.15732
25		5	1.49200	1.35200	1.64000	0.02592	0.12697
50		5	1.53120	1.35400	1.72800	0.03283	0.16083
67		5	1.49840	1.35600	1.59800	0.01838	0.09004
100		5	1.55720	1.31800	1.82200	0.04016	0.19674

Approved By: [signature] 8/20/04

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: *A. affinis*

Sample ID: A-2

Start Date/Time: 07/21/2004 / 1430

Test No: 0407-031

End Date/Time: 07/28/2004 / 1230

Concentration	Lab Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.06	7.97	7.98	8.01	8.06	7.98	7.91	
DO (mg/L)	7.8	7.6	7.8	7.9	7.9	7.3	8.4	
Salinity (ppt)	30.3	29.8	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	20.9	20.7	20.8	20.0	20.1	20.7	20.7	
Final								
pH		7.70	7.62	7.74	7.69	8.06	8.09	8.05
DO (mg/L)		6.3	6.4	6.2	6.2	5.7	6.1	5.8
Temp (°C)		20.9	20.6	20.7	20.7	20.9	20.8	20.7

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.75	8.56	8.63	8.66	8.61	8.53	8.58	
DO (mg/L)	7.5	6.0	6.4	6.5	6.6	6.6	5.5	
Salinity (ppt)	30.8	29.9	30.1	30.0	30.1	30.4	30.2	
Temp (°C)	20.6	20.6	20.1	20.0	20.2	20.4	20.7	
Final								
pH		8.51	8.38	8.38	8.44	8.32	8.37	8.35
DO (mg/L)		6.0	5.9	5.3	5.4	5.6	5.8	5.9
Temp (°C)		20.8	20.7	20.7	20.6	20.9	20.8	20.7

Concentration	Salt Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.15	8.29	8.33	8.37	8.25	8.38	
DO (mg/L)	7.0	6.7	7.2	7.2	7.1	6.5	5.7	
Salinity (ppt)	30.3	29.9	30.2	30.2	30.2	30.5	30.1	
Temp (°C)	20.9	20.6	20.8	20.0	20.1	20.1	20.6	
Final								
pH		8.14	7.94	8.02	8.01	8.07	8.09	8.07
DO (mg/L)		6.9	5.7	6.1	6.2	5.7	6.1	6.0
Temp (°C)		20.8	20.6	20.7	20.7	20.7	20.8	20.7

Concentration	67%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.83	8.65	8.70	8.75	8.76	8.55	8.57	
DO (mg/L)	7.7	5.9	6.2	6.5	6.7	5.2	5.1	
Salinity (ppt)	30.6	29.9	30.1	30.0	30.1	30.3	30.3	
Temp (°C)	20.3	20.5	20.3	20.0	20.3	20.2	20.7	
Final								
pH		8.62	8.46	8.45	8.49	8.41	8.44	8.44
DO (mg/L)		5.8	6.0	5.3	5.2	5.4	5.6	5.7
Temp (°C)		20.9	20.7	20.7	20.7	20.9	20.8	20.7

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.62	8.37	8.46	8.50	8.49	8.41	8.45	
DO (mg/L)	7.4	6.5	6.6	6.8	7.0	6.1	5.7	
Salinity (ppt)	30.1	29.9	30.0	30.0	30.0	30.3	30.1	
Temp (°C)	20.4	20.4	20.1	20.0	20.1	20.4	20.5	
Final								
pH		8.34	8.19	8.21	8.26	8.23	8.22	8.24
DO (mg/L)		6.1	6.0	5.6	5.4	5.7	5.8	5.8
Temp (°C)		20.8	20.6	20.7	20.6	20.8	20.7	20.7

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.94	8.60	8.82	8.81	8.79	8.66	8.59	
DO (mg/L)	8.1	5.2	6.0	6.4	6.6	6.1	5.2	
Salinity (ppt)	30.4	30.0	30.2	30.1	30.2	30.1	30.2	
Temp (°C)	19.6	20.6	20.3	20.0	20.3	20.4	20.6	
Final								
pH		8.69	8.58	8.57	8.60	8.49	8.52	8.51
DO (mg/L)		5.6	5.8	5.1	5.2	5.4	5.6	5.7
Temp (°C)		20.8	20.7	20.8	20.7	20.9	20.8	20.7

Analysts:		0	1	2	3	4	5	6	7
	Initial:	MC	RG	MC	SH	RG	RS/RG	RG	
	Final:		AH	MC	SH	RG	RS	SH	SH

Animal Source/Date Received: ABS / 7-17-04

Animal Age at Initiation: 14 days

Comments:

QC Check: AH 8-10-04

Final Review: AH 8/20/04

Marine Chronic Bioassay | **Larval Fish Survival & Weights**

Client Name: City of Buenaventura | **Test Species:** *A. affinis*

Sample ID: A-2 | **Start Date/Time:** 07/21/2004 / 1430

Test No.: 0407-031 | **End Date/Time:** 07/28/2004 / 1230

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g)
Lab Control	a	5	5	6	5	5	5	5	5	100	0.04136	0.04885
#1	b	5	5	5	5	5	5	5	5	100	0.04746	0.05381
	c	5	5	5	5	5	5	5	5	100	0.03476	0.04285
	d	5	5	5	5	5	5	SH 4	4	80	0.02874	0.03397
	e	5	4	4	4	4	4	4	4	80	0.03142	0.03942
Salt Control	a	5	5	5	5	5	5	5	5	100	0.03122	0.03678
#1	b	5	5	4	4	4	4	4	4	80	0.02915	0.03474
	c	5	5	5	5	5	5	5	5	100	0.03249	0.03969
	d	5	5	5	5	5	5	5	5	100	0.03716	0.04418
	e	5	5	5	5	5	5	5	5	100	0.03792	0.04462
25	a	5	5	5	5	5	5	5	5	100	0.05049	0.05735
	b	5	MS 4	4	4	4	4	4	4	80	0.04590	0.05266
	c	5	5	5	5	5	5	5	4	80	0.04426	0.05183
	d	5	5	5	5	5	5	5	5	100	0.05031	0.05822
	e	5	5	5	5	5	5	5	5	100	0.04532	0.05352
50	a	5	4	4	4	4	4	4	4	80	0.04156	0.04833
	b	5	5	5	5	5	5	5	5	100	0.04050	0.04852
	c	5	5	5	5	5	5	5	5	100	0.04118	0.04915
	d	5	5	5	5	5	5	5	5	100	0.04165	0.04853
	e	5	5	5	5	5	5	5	5	100	0.04645	0.05509
67	a	5	5	5	5	5	5	5	5	100	0.04428	0.05106
	b	5	5	5	5	5	5	5	5	100	0.04220	0.04960
	c	5	5	5	5	5	5	5	5	100	0.04182	0.04948
	d	5	5	5	5	5	5	5	5	100	0.03538	0.04301
	e	5	5	5	5	5	5	5	5	100	0.04050	0.04849
100	a	5	5	4	4	4	4	4	4	80	0.04590	0.05374
	b	5	5	5	5	5	5	5	5	100	0.04485	0.05396
	c	5	5	5	5	5	5	5	5	100	0.05073	0.05899
	d	5	5	5	5	5	4	4	4	80	0.04855	0.05566
	e	5	5	5	5	5	5	5	5	100	0.03912	0.04571
	a											
	b											
	c											
	d											
	e											
Tech Initials		SH	MC	SH	SH	RG	RG	SH	SH			

data entry QC = AH

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	0810
1630	1645	1605	1400	1945	1600	1845

Weight Data:

Date/Time in: 7.28.04 1330

Date/Time out: 7.30.04 1430

Oven Temp (°C): 64

Tech Initials: SO

Comments: _____

QC Check: AH 8-10-04

Final Review: ~~8/04~~ 8/20/04

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test B-1 AMEC Bioassay SD

Test:	11-9894-1671	Test Type:	Growth-Survival (7d)	Duration:	6 Days 23 Hours
Start Date:	21 Jul-04 02:30 PM	Protocol:	EPA/~~821/R-02-012 (2002)~~ 1995	Species:	Atherinops affinis
End Date:	28 Jul-04 02:00 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 02:30 PM	Brine:			

Sample:	09-2601-7028	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 01:40 PM	Code:	0407-032	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	25 Hours (18.4 °C)	Station:	B-1		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
14-7555-0366	7d Proportion Survived	100	>100	N/A	0.08423	Steel's Many-One Rank
00-4884-7347	Mean Dry Weight-mg	100	>100	N/A	0.17082	Dunnett's Multiple Comparison

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
0	Salt Control	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
25		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
67		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.40880	1.04600	1.61800	0.10862	0.24289	17.24%
0	Salt Control	5	1.28280	1.11200	1.44000	0.07036	0.15732	12.26%
25		5	1.41920	1.25200	1.54600	0.05347	0.11957	8.43%
50		5	1.35480	1.06000	1.71200	0.10631	0.23772	17.55%
67		5	1.33720	1.22400	1.45000	0.04129	0.09233	6.90%
100		5	1.37240	1.28000	1.52400	0.04331	0.09683	7.06%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.00000	1.00000	1.00000	0.80000	0.80000
0	Salt Control	1.00000	0.80000	1.00000	1.00000	1.00000
25		1.00000	1.00000	1.00000	1.00000	1.00000
50		0.80000	0.80000	1.00000	1.00000	1.00000
67		1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	1.00000	0.80000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.49800	1.28200	1.61800	1.04600	1.60000
0	Salt Control	1.11200	1.11800	1.44000	1.40400	1.34000
25		1.54600	1.38000	1.25200	1.39400	1.52400
50		1.30200	1.28400	1.41600	1.06000	1.71200
67		1.31000	1.29000	1.41200	1.22400	1.45000
100		1.40000	1.35600	1.30200	1.28000	1.52400

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test B-1 AMEC ~~NW~~ SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	05-6415-1320	05-6415-1320	18 Aug-04 12:56 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		100	>100	1.00	N/A	8.42%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	1.72000	4.43069	0.18510	Equal Variances
Distribution	Shapiro-Wilk W	0.78117	0.88746	0.00005	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.03175642	0.0079391	4	1.00	0.43068	Non-Significant Effect
Error	0.1587821	0.0079391	20			
Total	0.19053853	0.0158782	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	30	17	>0.05	1	Non-Significant Effect
		50	25	17	>0.05	2	Non-Significant Effect
		67	30	17	>0.05	1	Non-Significant Effect
		100	27.5	17	>0.05	2	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
25		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
50		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043
67		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
100		5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test B-1 AMEC ~~NW~~ SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	05-6415-1320	05-6415-1320	18 Aug-04 12:56 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		100	>100	1.00	N/A	17.08%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	4.81998	13.27671	0.30627	Equal Variances
Distribution	Shapiro-Wilk W	0.97490	0.88746	0.76279	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.04969673	0.0124242	4	0.55	0.70292	Non-Significant Effect
Error	0.4538454	0.0226923	20			
Total	0.50354214	0.0351165	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-1.431679	2.3	>0.05	0.2191275	Non-Significant Effect
		50	-0.7557261	2.3	>0.05	0.2191275	Non-Significant Effect
		67	-0.5709908	2.3	>0.05	0.2191275	Non-Significant Effect
		100	-0.9404598	2.3	>0.05	0.2191275	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	1.28280	1.11200	1.44000	0.15732				
25		5	1.41920	1.25200	1.54600	0.11957				
50		5	1.35480	1.06000	1.71200	0.23772				
67		5	1.33720	1.22400	1.45000	0.09233				
100		5	1.37240	1.28000	1.52400	0.09683				

CETIS Report

Report Date: 18 Aug-04 12:57 PM
Analysis: 11-9472-0539

Pacific Topsmelt 7-d Survival and Growth Test B-1 AMEC ~~NW~~ SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Linear Interpolation	05-6415-1320	05-6415-1320	18 Aug-04 12:56 PM	CETISv1.024

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	453527	200	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-%	95% LCL	95% UCL
10	>100	N/A	N/A
20	>100	N/A	N/A
25	>100	N/A	N/A
50	>100	N/A	N/A

Data Summary

			Calculated Variate				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Salt Control	5	1.28280	1.11200	1.44000	0.03211	0.15732
25		5	1.41920	1.25200	1.54600	0.02441	0.11957
50		5	1.35480	1.06000	1.71200	0.04852	0.23772
67		5	1.33720	1.22400	1.45000	0.01885	0.09233
100		5	1.37240	1.28000	1.52400	0.01977	0.09683

Approved By: [signature] 8/20

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: *A. affinis*

Sample ID: B-1

Start Date/Time: 07/21/2004 / 1430

Test No: 0407-032

End Date/Time: 07/28/2004 / 1230

Concentration	Lab Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.00	7.97	7.98	8.01	8.06	7.98	7.91	
DO (mg/L)	7.8	7.6	7.8	7.9	7.9	7.3	8.4	
Salinity (ppt)	30.3	29.8	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	20.9	20.7	20.0	20.0	20.1	20.7	20.7	
Final								
pH		7.70	7.62	7.74	7.69	8.06	8.09	8.05
DO (mg/L)		6.3	6.4	6.2	6.2	5.7	6.1	5.8
Temp (°C)		20.9	20.6	20.7	20.7	20.9	20.8	20.7

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.25	8.09	8.14	8.14	8.22	8.25	8.25	
DO (mg/L)	7.2	6.3	6.6	6.6	6.3	6.1	6.2	
Salinity (ppt)	30.8	30.0	30.1	30.0	30.1	30.6	30.7	
Temp (°C)	20.2	20.4	20.2	20.0	20.3	20.4	20.5	
Final								
pH		8.18	8.08	8.09	8.10	8.17	8.18	8.15
DO (mg/L)		5.9	6.1	5.7	5.6	5.7	5.7	5.8
Temp (°C)		20.8	20.7	20.7	20.6	20.7	20.8	20.6

Concentration	Salt Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.15	8.29	8.33	8.37	8.25	8.36	
DO (mg/L)	7.0	6.7	7.2	7.2	7.1	6.5	5.7	
Salinity (ppt)	30.3	29.9	30.2	30.2	30.2	30.5	30.1	
Temp (°C)	20.9	20.6	20.8	20.0	20.1	20.1	20.1	
Final								
pH		8.14	7.94	8.02	8.01	8.07	8.09	8.07
DO (mg/L)		6.9	5.7	6.1	6.2	5.7	6.1	6.0
Temp (°C)		20.8	20.6	20.7	20.7	20.7	20.8	20.7

Concentration	67%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.20	8.04	8.13	8.14	8.24	8.25	8.22	
DO (mg/L)	7.2	6.2	6.5	6.6	6.4	6.1	5.9	
Salinity (ppt)	30.5	30.1	30.1	30.1	30.2	30.7	30.7	
Temp (°C)	19.7	20.5	20.1	20.0	20.3	20.4	20.5	
Final								
pH		8.18	8.10	8.14	8.17	8.18	8.19	8.17
DO (mg/L)		6.0	6.1	5.7	5.7	5.8	5.8	5.8
Temp (°C)		20.7	20.7	20.7	20.7	20.7	20.8	20.6

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.32	8.12	8.14	8.15	8.20	8.25	8.33	
DO (mg/L)	7.1	6.5	6.4	6.6	6.4	6.2	5.8	
Salinity (ppt)	30.0	29.9	29.9	30.0	30.1	30.5	30.4	
Temp (°C)	20.8	20.2	20.2	20.0	20.2	20.1	20.1	
Final								
pH		8.16	8.03	8.06	8.07	8.14	8.11	8.09
DO (mg/L)		6.2	6.2	5.6	5.5	5.6	5.7	5.8
Temp (°C)		20.8	20.7	20.7	20.6	20.9	20.8	20.6

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.12	8.06	8.13	8.14	8.20	8.25	8.14	
DO (mg/L)	7.5	5.9	6.6	6.5	6.6	6.2	5.9	
Salinity (ppt)	30.2	30.2	30.2	30.1	30.2	30.6	30.9	
Temp (°C)	19.3	20.5	20.5	20.0	20.3	20.5	20.6	
Final								
pH		8.16	8.12	8.16	8.19	8.20	8.19	8.19
DO (mg/L)		6.0	5.9	5.8	5.8	5.8	5.8	5.7
Temp (°C)		20.7	20.7	20.6	20.7	20.8	20.8	20.6

Analysts:	0	1	2	3	4	5	6	7
Initial:	MC	RG	MC	SH	RG	~~RG~~ RG	RG	
Final:		AH	MC	SH	RG	RS	SH	SH

Animal Source/Date Received: ABS / 7/17/04

Animal Age at Initiation: 14 days

Comments:

QC Check: AH 8-10-04

Final Review: 8/20/04

AMEC Earth & Environmental Bioassay Laboratory. 5550 Morehouse Dr., Ste. B. San Diego, CA 92121.

Marine Chronic Bioassay | **Larval Fish Survival & Weights**

Client Name: City of Buenaventura | **Test Species:** *A. affinis*

Sample ID: B-1 | **Start Date/Time:** 07/21/2004 / 1430

Test No.: 0407-032 | **End Date/Time:** 07/28/2004 / 1230

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g)
Lab Control	a	5	5	5	5	5	5	5	5	100	0.04136	0.04885
#1	b	5	5	5	5	5	5	5	5	100	0.04740	0.05381
	c	5	5	5	5	5	5	5	5	100	0.03476	0.04285
	d	5	5	5	5	5	5	4	4	80	0.02874	0.03397
	e	5	4	4	4	4	1	4	4	80	0.03142	0.03942
Salt Control	a	5	5	5	5	5	5	5	5	100	0.03122	0.03678
#1	b	5	5	4	4	4	4	4	4	80	0.02915	0.03474
	c	5	5	5	5	5	5	5	5	100	0.03249	0.03969
	d	5	5	5	5	5	5	5	5	100	0.03716	0.04418
	e	5	5	5	5	5	5	5	5	100	0.03792	0.04462
25	a	5	5	5	5	5	5	5	5	100	0.03932	0.04705
	b	5	5	5	5	5	5	5	5	100	0.03650	0.04340
	c	5	5	5	5	5	5	5	5	100	0.03821	0.04447
	d	5	5	5	5	5	5	5	5	100	0.04647	0.05344
	e	5	5	5	5	5	5	5	5	100	0.04079	0.04841
50	a	5	5	5	5	5	5	5	4	80	0.04139	0.04790
	b	5	4	4	4	4	4	4	4	80	0.03498	0.04140
	c	5	5	5	5	5	5	5	5	100	0.04021	0.04729
	d	5	5	5	5	5	5	5	5	100	0.03486	0.04016
	e	5	5	5	5	5	5	5	5	100	0.04079	0.04935
67	a	5	5	5	5	5	5	5	5	100	0.04762	0.05417
	b	5	5	5	5	5	5	5	5	100	0.04792	0.05437
	c	5	5	5	5	5	5	5	5	100	0.04781	0.05487
	d	5	5	5	5	5	5	5	5	100	0.03668	0.04280
	e	5	5	5	5	5	5	5	5	100	0.03885	0.04610
100	a	5	5	5	5	5	5	5	5	100	0.04168	0.04868
	b	5	5	5	5	5	5	5	5	100	0.04251	0.04929
	c	5	5	5	5	5	5	5	5	100	0.04173	0.04824
	d	5	5	4	4	4	4	4	4	80	0.04060	0.04700
	e	5	5	5	5	5	5	5	5	100	0.03956	~~0.04118~~ SD 0.04712
	a											
	b											
	c											
	d											
	e											
Tech Initials		SH	MC	SH	SH	RG	RG	SH	SH			

data entry ec
QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	815
1630	1645	1605	1400	1945	1600	1745

Weight Data:
Date/Time In: 7-28-04 / 1330
Date/Time out: 7-30-04 / 1430
Oven Temp (°C): 60
Tech Initials: SD

Comments: _____

QC Check: AH 8-10-04
Final Review: [illegible] 8/20/04

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test B-3 — AMEC Bioassay SD

Test:	11-9894-1671	**Test Type:**	Growth-Survival (7d)	**Duration:**	6 Days 23 Hours
Start Date:	21 Jul-04 02:30 PM	**Protocol:**	EPA/~~821/R-02-012 (2002)~~ AH 1995	**Species:**	Atherinops affinis
End Date:	28 Jul-04 02:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 02:30 PM	**Brine:**			

Sample:	06-4069-9812	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 10:40 AM	**Code:**	0407-033	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	28 Hours (18.2 °C)	**Station:**	B-3		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
06-1191-8481	7d Proportion Survived	100	>100	N/A	0.19476	Steel's Many-One Rank
16-3500-0241	Mean Dry Weight-mg	100	>100	N/A	0.22005	Dunnett's Multiple Comparison

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.84000	0.60000	1.00000	0.07483	0.16733	19.92%
0	Salt Control	5	0.84000	0.60000	1.00000	0.07483	0.16733	19.92%
25		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
50		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
67		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.24520	0.88200	1.55200	0.10682	0.23886	19.18%
0	Salt Control	5	1.16040	1.00200	1.41200	0.06946	0.15533	13.39%
25		5	1.24600	1.10400	1.41000	0.06514	0.14566	11.69%
50		5	1.30440	1.08800	1.52600	0.08424	0.18836	14.44%
67		5	1.34120	1.02400	1.61400	0.10980	0.24551	18.31%
100		5	1.20920	1.03200	1.31800	0.05092	0.11386	9.42%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.00000	1.00000	0.80000	0.80000	0.60000
0	Salt Control	1.00000	0.80000	0.80000	0.60000	1.00000
25		1.00000	1.00000	0.80000	1.00000	1.00000
50		1.00000	1.00000	1.00000	1.00000	0.80000
67		1.00000	1.00000	1.00000	0.80000	1.00000
100		0.80000	1.00000	1.00000	1.00000	0.80000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.55200	1.27000	1.23800	1.28400	0.88200
0	Salt Control	1.17000	1.07200	1.14600	1.00200	1.41200
25		1.10400	1.39600	1.17600	1.14400	1.41000
50		1.41400	1.52600	1.36400	1.08800	1.13000
67		1.20400	1.30800	1.55600	1.02400	1.61400
100		1.19000	1.30000	1.20600	1.03200	1.31800

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test B-3 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	13-2732-6785	13-2732-6785	18 Aug-04 1:13 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		100	>100	1.00	N/A	19.48%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.25717	13.27671	0.68858	Equal Variances
Distribution	Shapiro-Wilk W	0.85585	0.88746	0.00199	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.07359371	0.0183984	4	1.04	0.41077	Non-Significant Effect
Error	0.3534118	0.0176706	20			
Total	0.42700551	0.0360690	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	33	17	>0.05	2	Non-Significant Effect
		50	33	17	>0.05	2	Non-Significant Effect
		67	33	17	>0.05	2	Non-Significant Effect
		100	31	17	>0.05	2	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.84000	0.60000	1.00000	0.16733	1.15819	0.88608	1.34528	0.19317
25		5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
50		5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
67		5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
100		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	13-2732-6785	13-2732-6785	18 Aug-04 1:13 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		100	>100	1.00	N/A	22.00%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.44139	13.27671	0.65516	Equal Variances
Distribution	Shapiro-Wilk W	0.97034	0.88746	0.65213	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.1048022	0.0262006	4	0.85	0.51013	Non-Significant Effect
Error	0.6162474	0.0308124	20			
Total	0.72104959	0.0570129	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-0.7710477	2.3	>0.05	0.2553409	Non-Significant Effect
		50	-1.297086	2.3	>0.05	0.2553409	Non-Significant Effect
		67	-1.628567	2.3	>0.05	0.2553409	Non-Significant Effect
		100	-0.4395698	2.3	>0.05	0.2553409	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	1.16040	1.00200	1.41200	0.15533				
25		5	1.24600	1.10400	1.41000	0.14566				
50		5	1.30440	1.08800	1.52600	0.18836				
67		5	1.34120	1.02400	1.61400	0.24551				
100		5	1.20920	1.03200	1.31800	0.11386				

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: *A. affinis*

Sample ID: B-3

Start Date/Time: 07/21/2004 / 1430

Test No: 0407-033

End Date/Time: 07/28/2004 / 1230

Concentration	Lab Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.00	7.97	7.98	8.01	8.06	7.95	7.91	
DO (mg/L)	7.8	7.6	7.8	7.9	7.9	7.3	8.4	
Salinity (ppt)	30.1	29.8	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	20.5	20.7	20.0	20.0	20.1	20.7	20.7	
Final								
pH		7.78	7.61	7.76	7.69	7.81	8.09	8.08
DO (mg/L)		6.2	6.0	6.0	6.2	6.0	6.1	5.8
Temp (°C)		20.7	20.7	20.7	20.7	20.7	20.8	20.7

Concentration	Salt Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.15	8.29	8.33	8.37	8.25	8.38	
DO (mg/L)	7.0	6.7	7.2	7.2	7.1	6.5	5.7	
Salinity (ppt)	30.3	29.9	30.2	30.2	30.2	30.5	30.1	
Temp (°C)	20.9	20.6	20.8	20.8	20.1	20.1	20.6	
Final								
pH		8.20	8.00	8.06	8.01	81.92	8.09	8.08
DO (mg/L)		5.8	5.7	6.2	6.2	6.0	6.1	5.9
Temp (°C)		20.7	20.7	20.7	20.7	20.7	20.8	20.7

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.56	8.43	8.41	8.46	8.44	8.44	8.50	
DO (mg/L)	7.3	6.6	6.3	6.5	6.6	6.1	6.0	
Salinity (ppt)	30.0	29.9	29.9	30.0	30.1	30.4	30.3	
Temp (°C)	20.8	20.4	20.3	20.8	20.1	20.1	20.4	
Final								
pH		8.34	8.14	8.19	8.22	8.21	8.21	8.24
DO (mg/L)		5.7	5.8	6.0	6.1	5.6	5.6	5.7
Temp (°C)		20.7	20.7	20.7	20.6	20.8	20.7	20.8

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.68	8.49	8.56	8.56	8.57	8.55	8.52	
DO (mg/L)	7.5	6.4	6.3	6.5	6.6	6.1	6.2	
Salinity (ppt)	30.7	29.9	30.0	30.0	30.1	30.5	30.3	
Temp (°C)	20.6	20.6	20.1	20.0	20.2	20.1	20.4	
Final								
pH		8.46	8.34	8.35	8.40	8.36	8.41	8.41
DO (mg/L)		5.7	5.6	5.7	5.7	5.6	5.6	5.7
Temp (°C)		20.7	20.7	20.7	20.6	20.8	20.7	20.7

Concentration	67%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.74	8.59	8.64	8.67	8.61	8.60	8.56	
DO (mg/L)	7.9	5.9	6.4	6.5	6.5	6.1	6.4	
Salinity (ppt)	30.5	30.0	30.1	30.0	30.2	30.6	30.5	
Temp (°C)	20.3	20.5	20.1	20.0	20.2	20.1	20.2	
Final								
pH		8.56	8.41	8.42	8.44	8.38	8.42	8.44
DO (mg/L)		5.2	5.4	5.2	5.1	5.4	5.5	5.6
Temp (°C)		20.8	20.7	20.7	20.7	20.8	20.8	20.7

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.83	8.67	8.74	8.77	8.74	8.67	8.65	
DO (mg/L)	8.4	5.7	6.2	6.3	6.4	6.2	7.1	
Salinity (ppt)	30.2	30.1	30.2	30.1	30.2	30.7	30.7	
Temp (°C)	19.2	20.5	20.8	20.0	20.2	20.1	20.1	
Final								
pH		8.62	8.52	8.54	8.55	8.48	8.49	8.51
DO (mg/L)		5.4	5.6	5.2	5.1	5.2	5.5	5.4
Temp (°C)		20.8	20.7	20.7	20.7	20.8	20.8	20.8

Analysts:	0	1	2	3	4	5	6	7
Initial:	MC	RG	ME	SH	RG	RG	RG	
Final:		AH	ME	SH	RG	RG	SH	SH

Animal Source/Date Received: ABS / 7/17/04

Animal Age at Initiation: 14 days

Comments:

QC Check: AH 8-10-04

Final Review: 8/20/04

Marine Chronic Bioassay **Larval Fish Survival & Weights**

Client Name: City of Buenaventura **Test Species:** *A. affinis*

Sample ID: B-3 **Start Date/Time:** 07/21/2004 / 1430

Test No.: 0407-033 **End Date/Time:** 07/28/2004 / 1230

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g)	
Lab Control	a	5	5	5	5	5	5	5	5	100	0.03494	0.04270	
#2	b	5	5	5	5	5	5	5	5	100	0.03484	0.04119	
	c	5	5	5	5	5	4	4	4	80	0.03953	0.04572	
	d	5	4	4	4	4	4	4	4	80	0.04001	0.04643	
	e	5	5	5	5	5	4	3	3	60	0.03534	0.03975	
Salt Control	a	5	5	5	5	5	5	5	5	100	0.04103	0.04688	
#2	b	5	5	5	4	4	4	4	4	80	0.03748	0.04284	
	c	5	4	4	4	4	4	4	4	80	0.03796	0.04369	
	d	5	5	4	4	4	3	3	3	60	0.03457	0.03958	
	e	5	5	5	5	5	MY 5	5	5	100	0.03731	0.04437	SD
25	a	5	5	5	5	5	5	5	5	100	0.04555	~~0.05755~~	0.05107
	b	5	5	5	5	5	5	5	5	100	0.03573	~~0.05266~~	0.04271
	c	5	5	5	4	4	4	4	4	80	0.02736	~~0.5183~~	0.05783
	d	5	5	5	5	5	5	5	5	100	0.03839	~~0.05822~~	0.03321
	e	5	5	5	5	5	5	5	5	100	0.03715	~~0.05352~~	0.04411
50	a	5	5	5	SH 5	5	5	5	5	100	0.04531	~~0.04833~~	0.04421
	b	5	5	5	5	5	5	5	5	100	0.04058	~~0.04852~~	0.05238
	c	5	5	5	5	5	5	5	5	100	0.04029	0.04711	0.04821
	d	5	5	5	5	5	5	5	5	100	0.04054	0.04598	
	e	5	5	4	4	4	4	4	4	80	0.03958	0.04523	
67	a	5	5	5	5	5	5	5	5	100	0.04052	0.04654	
	b	5	5	5	5	5	5	5	5	100	0.03917	0.04571	
	c	5	5	5	5	5	5	5	5	100	0.04014	0.04792	
	d	5	5	5	5	5	5	5	4	80	0.04281	0.04793	
	e	5	5	5	5	5	5	5	5	100	0.04172	0.04979	
100	a	5	4	4	4	4	4	4	4	80	0.03913	0.04508	
	b	5	5	5	5	5	5	5	5	100	0.03653	0.04303	
	c	5	5	5	5	5	5	5	5	100	0.03571	0.04174	
	d	5	5	5	5	5	5	5	5	100	0.03298	0.03814	
	e	5	5	5	5	5	5	4	4	80	0.03177	0.03830	
	a												
	b												
	c												
	d												
	e												
Tech Initials		SH	MC	SH	SH	RG	RG	SH	SH	data entry QC=AH	LLC		

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	0815
1430	1045	1605	1400	1945	1600	1545

Weight Data:

Date/Time in: 7-28-04 1330

Date/Time out: 7-30-04 1430

Oven Temp (°C): 60

Tech Initials: SD

Comments:

QC Check: AH 8-10-04

Final Review: [illegible] 8/20/04

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test C-2 — AMEC Bioassay SD

Test:	11-9894-1671	Test Type:	Growth-Survival (7d)	Duration:	6 Days 23 Hours
Start Date:	21 Jul-04 02:30 PM	Protocol:	EPA/~~821/R-02-013 (2002)~~ AH 1995	Species:	Atherinops affinis
End Date:	28 Jul-04 02:00 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 02:30 PM	Brine:			

Sample:	16-8186-3116	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 09:35 AM	Code:	0407-034	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	29 Hours (18.5 °C)	Station:	C-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
13-4805-4181	7d Proportion Survived	100	>100	N/A	0.20159	Dunnett's Multiple Comparison
17-7579-1683	Mean Dry Weight-mg	100	>100	N/A	0.21275	Dunnett's Multiple Comparison

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.84000	0.60000	1.00000	0.07483	0.16733	19.92%
0	Salt Control	5	0.84000	0.60000	1.00000	0.07483	0.16733	19.92%
25		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
50		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
67		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.24520	0.88200	1.55200	0.10682	0.23886	19.18%
0	Salt Control	5	1.16040	1.00200	1.41200	0.06946	0.15533	13.39%
25		5	1.23840	1.08400	1.46400	0.06574	0.14701	11.87%
50		5	1.19800	1.11600	1.31400	0.03367	0.07530	6.29%
67		5	1.26880	1.06200	1.58600	0.09247	0.20677	16.30%
100		5	1.45320	1.17800	1.72200	0.09985	0.22327	15.36%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.00000	1.00000	0.80000	0.80000	0.60000
0	Salt Control	1.00000	0.80000	0.80000	0.60000	1.00000
25		1.00000	1.00000	0.80000	1.00000	1.00000
50		0.80000	0.80000	1.00000	1.00000	1.00000
67		1.00000	1.00000	1.00000	0.80000	1.00000
100		1.00000	0.80000	0.80000	1.00000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.55200	1.27000	1.23800	1.28400	0.88200
0	Salt Control	1.17000	1.07200	1.14600	1.00200	1.41200
25		1.08400	1.15800	1.29400	1.46400	1.19200
50		1.19800	1.11600	1.15000	1.21200	1.31400
67		1.35400	1.19600	1.14600	1.06200	1.58600
100		1.72200	1.49800	1.17800	1.27800	1.59000

CETIS Report

Report Date: 18 Aug-04 1:40 PM
Analysis: 13-4805-4181

Pacific Topsmelt 7-d Survival and Growth Test C-2 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	17-3531-6143	17-3531-6143	18 Aug-04 1:39 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		100	>100	1.00	N/A	20.16%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.91381	13.27671	0.75161	Equal Variances
Distribution	Shapiro-Wilk W	0.88850	0.88746	0.01055	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.06484551	0.0162114	4	0.86	0.50348	Non-Significant Effect
Error	0.376095	0.0188048	20			
Total	0.44094048	0.0350161	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-1.608092	2.3	>0.05	0.1994764	Non-Significant Effect
		50	-1.058946	2.3	>0.05	0.1994764	Non-Significant Effect
		67	-1.608092	2.3	>0.05	0.1994764	Non-Significant Effect
		100	-1.058946	2.3	>0.05	0.1994764	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.84000	0.60000	1.00000	0.16733	1.15819	0.88608	1.34528	0.19317
25		5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
50		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043
67		5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
100		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043

Approved By: 8/20/04

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test C-2 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	17-3531-6143	17-3531-6143	18 Aug-04 1:40 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		100	>100	1.00	N/A	21.27%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	4.16772	13.27671	0.38378	Equal Variances
Distribution	Shapiro-Wilk W	0.96587	0.88746	0.54640	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.2578187	0.0644547	4	2.24	0.10129	Non-Significant Effect
Error	0.5760557	0.0288028	20			
Total	0.83387443	0.0932575	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-0.7266861	2.3	>0.05	0.2468738	Non-Significant Effect
		50	-0.3502983	2.3	>0.05	0.2468738	Non-Significant Effect
		67	-1.009908	2.3	>0.05	0.2468738	Non-Significant Effect
		100	-2.727871	2.3	>0.05	0.2468738	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	1.16040	1.00200	1.41200	0.15533				
25		5	1.23840	1.08400	1.46400	0.14701				
50		5	1.19800	1.11600	1.31400	0.07530				
67		5	1.26880	1.06200	1.58600	0.20677				
100		5	1.45320	1.17800	1.72200	0.22327				

Marine Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *A. affinis*

Sample ID: C-2 | **Start Date/Time:** 07/21/2004 / 1430

Test No: 0407-034 | **End Date/Time:** 07/28/2004 / 1230

Concentration	Lab Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.00	7.97	7.98	8.01	8.06	7.98	7.91	
DO (mg/L)	7.8	7.6	7.8	7.9	7.9	7.3	8.4	
Salinity (ppt)	30.1	29.8	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	20.5	20.7	20.0	20.0	20.1	20.7	20.7	
Final								
pH		7.78	7.61	7.76	7.72	7.81	8.09	8.08
DO (mg/L)		6.2	6.0	6.0	6.1	6.0	6.1	5.8
Temp (°C)		20.7	20.7	20.7	20.8	20.7	20.8	20.7

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial						8.44		
pH	8.56	8.31	8.41	8.48	8.44	8.25	8.34	
DO (mg/L)	7.4	6.1	6.3	6.5	6.5	6.2	5.9	
Salinity (ppt)	30.7	29.9	30.1	30.0	30.1	30.6	30.2	
Temp (°C)	20.4	20.3	20.3	20.0	20.2	20.2	20.2	
Final						8.25		
pH		8.34	8.36	8.22	8.27	~~8.36~~	8.19	8.21
DO (mg/L)		5.5	5.4	5.4	5.5	5.7	5.6	5.7
Temp (°C)		20.7	20.7	20.7	20.6	20.8	20.8	20.7

Concentration	Salt Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.15	8.29	8.33	8.37	8.25	8.38	
DO (mg/L)	7.6	6.7	7.2	7.2	7.1	6.5	5.7	
Salinity (ppt)	30.3	29.9	30.2	30.2	30.2	30.5	30.1	
Temp (°C)	20.9	20.6	20.8	20.0	20.1	20.1	20.6	
Final								
pH		8.20	8.00	8.06	8.00	7.92	8.09	8.08
DO (mg/L)		5.8	5.7	6.2	6.0	6.0	6.1	5.9
Temp (°C)		20.7	20.7	20.7	20.7	20.7	20.8	20.7

Concentration	67%							
Day	0	1	2	3	4	5	6	7
Initial						8.45		
pH	8.59	8.35	8.46	8.51	8.50	8.50	8.39	
DO (mg/L)	7.7	5.5	6.1	6.3	6.4	6.0	5.9	
Salinity (ppt)	30.5	30.1	30.2	30.1	30.2	30.7	30.3	
Temp (°C)	20.1	20.4	20.7	20.0	20.3	20.2	20.7	
Final						8.24		
pH		8.40	8.27	8.25	8.29	~~8.38~~	8.21	8.21
DO (mg/L)		5.5	5.2	5.0	5.1	5.7	5.6	5.7
Temp (°C)		20.7	20.9	20.8	20.6	20.7	20.8	20.7

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.50	8.29	8.31	8.41	8.37	8.32	8.37	
DO (mg/L)	7.2	6.3	6.4	6.5	6.6	6.1	5.9	
Salinity (ppt)	30.7	29.9	30.0	30.0	30.1	30.5	30.2	
Temp (°C)	20.7	20.2	20.2	20.0	20.2	20.1	20.2	
Final						8.21		
pH		8.27	8.12	8.12	8.14	~~8.28~~	8.18	8.20
DO (mg/L)		5.8	5.6	5.3	5.3	5.6	5.7	5.8
Temp (°C)		20.8	20.9	20.7	20.6	20.7	20.6	20.7

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.65	8.47	8.53	8.56	8.55	8.59	8.54	
DO (mg/L)	8.3	5.3	6.1	6.3	6.6	6.2	6.1	
Salinity (ppt)	30.2	30.3	30.3	30.1	30.2	30.7	30.4	
Temp (°C)	19.4	20.5	20.3	20.0	20.3	20.3	20.2	
Final						8.26		
pH		8.45	8.31	8.29	8.29	~~8.40~~	8.22	8.24
DO (mg/L)		5.4	5.1	4.6	4.9	4.8	5.3	5.5
Temp (°C)		20.8	20.9	20.7	20.4	20.9	20.8	20.7

Analysts:	0	1	2	3	4	5	6	7
Initial:	MC	RG	MC	SH	RG	RG ~~RS~~	RG	
Final:		AH	MC	SH	RG	RS	SH	SH

Animal Source/Date Received: ABS / 7/17/04

Animal Age at Initiation: 14 days

Comments:

QC Check: AH 8-10-04

Final Review: 8/20/04

Marine Chronic Bioassay **Larval Fish Survival & Weights**

Client Name: City of Buenaventura **Test Species:** ***A. affinis***

Sample ID: C-2 **Start Date/Time:** 07/21/2004 / 1480

Test No.: 0407-034 **End Date/Time:** 07/28/2004 / 1230

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g)
Lab Control	a	5	5	5	5	5	5	5	5	100	0.03494	0.04270
#2	b	5	5	5	5	5	5	5	5	100	0.03484	0.04119
	c	5	5	5	5	5	4	4	4	80	0.03953	0.04572
	d	5	4	4	4	4	4	4	4	80	0.04001	0.04643
	e	5	5	5	5	5	4	3	3	60	0.03534	0.03975
Salt Control	a	5	5	5	5	5	5	5	5	100	0.04103	0.04688
#2	b	5	5	5	4	4	4	4	4	80	0.03748	0.04284
	c	5	4	4	4	4	4	4	4	80	0.03796	0.04369
	d	5	5	4	4	4	3	3	3	60	0.03457	0.03958
	e	5	5	5	5	5	5	5	5	100	0.03731	0.04437
25	a	5	5	5	5	5	5	5	5	100	0.03843	0.04385
	b	5	5	5	5	5	5	5	5	100	0.03436	0.04015
	c	5	5	5	5	5	5	4	4	80	0.03489	0.04136
	d	5	5	5	5	5	5	5	5	100	0.03795	0.04527
	e	5	5	5	5	5	5	5	5	100	0.03472	0.04068
50	a	5	4	4	4	4	4	4	4	80	0.04087	0.04686
	b	5	4	4	4	4	4	4	4	80	0.04154	0.04712
	c	5	5	5	5	5	5	5	5	100	0.03616	0.04191
	d	5	5	5	5	5	5	5	5	100	0.04006	0.04612
	e	5	5	5	5	5	5	5	5	100	0.03496	0.04153
67	a	5	5	5	5	5	5	5	5	100	0.04933	0.05610
	b	5	5	5	5	5	5	5	5	100	0.04664	0.05262
	c	5	5	5	5	5	5	5	5	100	0.03935	~~0.04166~~ 0.04508
	d	5	5	4	4	4	4	4	4	80	0.04089	0.04620
	e	5	5	5	5	5	5	5	5	100	0.03839	0.04632
100	a	5	5	5	5	5	5	5	5	100	0.03868	0.04729
	b	5	5	4	4	4	4	4	4	80	0.04159	0.04908
	c	5	5	5	4	4	4	4	4	80	0.03577	0.04166
	d	5	5	5	5	5	5	5	5	100	0.04456	0.05095
	e	5	5	5	5	5	5	5	5	100	0.03570	0.04365
	a											
	b											
	c											
	d											
	e											
Tech Initials		SH	LLE	SH	SH	RG	RG	SH	SH			

data entry LLE
QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
-	0900	0800	0830	0900	0840	0815
1630	1645	1605	1400	1945	1600	1515

Weight Data:
Date/Time in: 7-28-04 / 1330
Date/Time out: 8-1-04 / 1100
Oven Temp (°C): 65
Tech Initials: SD

Comments:

QC Check: AH 8-10-04
Final Review: [illegible] 8/20/04

A. BAHIA

CETIS Report

Chronic Mysid Survival and Growth Test A-2 — AMEC Bioassay SD

Test:	10-4928-7581	Test Type:	Growth-Survival (7d)	Duration:	6 Days 22 Hours
Start Date:	21 Jul-04 04:~~15~~ 20 PM	Protocol:	EPA/821/R-02-014 (2002)	Species:	Americamysis bahia
End Date:	28 Jul-04 03:~~00~~ 05 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:~~15~~ 20 PM	Brine:	Not Applicable		

Sample:	03-0997-3942	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 02:50 PM	Code:	0407-035	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	25 Hours (19.3 °C)	Station:	A-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
07-1107-2556	7d Proportion Survived	100	>100	N/A	0.06394	Steel's Many-One Rank
03-4631-7063	Mean Dry Weight-mg	100	>100	N/A	0.36076	Steel's Many-One Rank

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.95000	0.80000	1.00000	0.03273	0.09258	9.75%
0	Salt Control	8	0.95000	0.80000	1.00000	0.03273	0.09258	9.75%
25		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%
67		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%
100		8	0.95000	0.80000	1.00000	0.03273	0.09258	9.75%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.29400	0.21800	0.35800	0.01469	0.04154	14.13%
0	Salt Control	8	0.28225	0.25800	0.31200	0.00659	0.01865	6.61%
25		8	0.34100	0.27000	0.39400	0.01326	0.03749	10.99%
50		8	0.36625	0.01000	0.62000	0.06137	0.17358	47.39%
67		8	0.38125	0.25800	0.47600	0.02603	0.07363	19.31%
100		8	0.38725	0.31800	0.50200	0.02257	0.06383	16.48%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.80000	1.00000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000
0	Salt Control	1.00000	1.00000	1.00000	0.80000	1.00000	0.80000	1.00000	1.00000
25		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
50		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.80000
67		1.00000	0.80000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	0.80000	1.00000	0.80000	1.00000	1.00000	1.00000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.29800	0.35800	0.21800	0.28600	0.30000	0.32800	0.26400	0.30000
0	Salt Control	0.29600	0.31200	0.27200	0.28200	0.26800	0.27000	0.25800	0.30000
25		0.36600	0.35800	0.39400	0.33400	0.36000	0.27000	0.32600	0.32000
50		0.39800	0.42200	0.38400	0.39200	0.26800	0.43600	0.62000	0.01000
67		0.44400	0.25800	0.47600	0.33600	0.41200	0.42200	0.39200	0.31000
100		0.38000	0.33000	0.50200	0.34800	0.36800	0.46000	0.39200	0.31800

CETIS Report

Chronic Mysid Survival and Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	19-1830-8935	19-1830-8935	18 Aug-04 2:16 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		100	>100	1.00	N/A	6.39%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	0.64474	3.90824	0.63427	Equal Variances
Distribution	Shapiro-Wilk W	0.64663	0.91882	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.01984776	0.0049619	4	0.64	0.63427	Non-Significant Effect
Error	0.2693625	0.0076961	35			
Total	0.28921027	0.0126580	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	76	47	>0.05	2	Non-Significant Effect
		50	72	47	>0.05	2	Non-Significant Effect
		67	72	47	>0.05	2	Non-Significant Effect
		100	68	47	>0.05	2	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.95000	0.80000	1.00000	0.09258	1.28575	1.10715	1.34528	0.11023
25		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
50		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
67		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
100		8	0.95000	0.80000	1.00000	0.09258	1.28575	1.10715	1.34528	0.11023

CETIS Report

Chronic Mysid Survival and Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	19-1830-8935	19-1830-8935	18 Aug-04 2:17 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Untransformed		100	>100	1.00	N/A	36.08%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	31.66066	13.27671	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.85658	0.91882	0.00011	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.05829154	0.0145729	4	1.76	0.15888	Non-Significant Effect
Error	0.2896622	0.0082761	35			
Total	0.34795378	0.0228489	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	95	47	>0.05	0	Non-Significant Effect
		50	85.5	47	>0.05	1	Non-Significant Effect
		67	92	47	>0.05	0	Non-Significant Effect
		100	100	47	>0.05	0	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.28225	0.25800	0.31200	0.01865				
25		8	0.34100	0.27000	0.39400	0.03749				
50		8	0.36625	0.01000	0.62000	0.17358				
67		8	0.38125	0.25800	0.47600	0.07363				
100		8	0.38725	0.31800	0.50200	0.06383				

Marine Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *A. bahia*

Sample ID: A-2 | **Start Date/Time:** 07/21/2004 - 1600

Test No: 0407-035 | **End Date/Time:** 07/28/2004 1500

Concentration	Lab Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.00	7.97	7.98	8.01	8.06	7.98	7.91	
DO (mg/L)	7.8	7.6	7.8	7.9	7.9	7.3	8.4	
Salinity (ppt)	30.3	29.8	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	~~30.9~~ 24.4	24.7	25.0	25.1	25.1	25.2	25.7	
Final								
pH		7.87	7.70	7.62	7.69	7.78	7.71	7.71
DO (mg/L)		5.5	5.4	4.7	4.9	5.3	5.0	5.1
Temp (°C)		25.2	25.4	25.3	25.2	25.4	25.5	25.6

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial							RG	
pH	8.75	8.58	8.63	8.66	8.61	8.53	~~8.25~~	8.56
DO (mg/L)	7.5	6.0	6.4	6.5	6.6	6.6	~~6.0~~	5.5
Salinity (ppt)	30.8	29.9	30.1	30.0	30.1	30.4	~~30.7~~	30.2
Temp (°C)	25.8	24.6	25.0	25.2	25.1	25.2	~~20.5~~	25.5
Final								
pH		8.46	8.26	8.29	8.27	8.31	8.33	8.28
DO (mg/L)		4.7	4.5	5.0	4.9	5.3	5.1	5.0
Temp (°C)		25.4	25.4	25.2	25.2	25.3	25.2	25.4

Concentration	Salt Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.15	8.29	8.33	8.37	8.25	8.38	
DO (mg/L)	7.0	6.7	7.2	7.2	7.1	6.5	5.7	
Salinity (ppt)	30.3	29.9	30.2	30.2	30.2	30.5	30.1	
Temp (°C)	~~30.9~~ 25.1	24.7	25.0	25.3	25.2	25.1	25.6	
Final								
pH		8.11	7.97	7.95	7.94	7.90	7.97	7.91
DO (mg/L)		5.0	4.9	5.2	4.9	5.4	5.2	5.1
Temp (°C)		25.6	25.4	25.1	25.2	25.4	25.5	25.6

Concentration	67%							
Day	0	1	2	3	4	5	6	7
Initial							RG	
pH	8.93	8.65	8.70	8.75	8.76	8.55	~~8.22~~	8.57
DO (mg/L)	7.7	5.9	6.2	6.5	6.7	5.2	5.1	
Salinity (ppt)	30.6	29.9	30.1	30.0	30.1	30.3	30.3	
Temp (°C)	25.9	24.5	25.0	25.2	25.0	25.2	25.6	
Final								
pH		8.55	8.39	8.38	8.40	8.39	8.41	8.36
DO (mg/L)		4.7	5.0	4.8	4.9	4.7	5.0	5.1
Temp (°C)		25.4	25.6	25.2	25.1	25.5	25.3	25.6

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial							RG	
pH	8.62	8.37	8.46	8.50	8.49	8.41	~~8.33~~	8.45
DO (mg/L)	7.4	6.5	6.6	6.8	7.0	6.1	~~5.8~~	5.7
Salinity (ppt)	30.1	29.9	30.0	30.0	30.0	30.3	~~30.4~~	30.1
Temp (°C)	25.8	24.6	25.0	25.1	25.1	25.1	~~22.4~~	25.5
Final								
pH		8.31	8.17	8.15	8.21	8.21	8.19	8.19
DO (mg/L)		4.0	4.5	5.3	4.7	5.4	5.4	5.6
Temp (°C)		25.5	25.5	25.1	25.2	25.3	25.2	25.5

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.84	8.80	8.82	8.81	8.79	8.66	8.59	
DO (mg/L)	8.1	5.2	6.6	6.4	6.6	6.1	5.2	
Salinity (ppt)	30.4	30.0	30.2	30.1	30.2	30.1	30.2	
Temp (°C)	25.9	24.6	25.0	25.2	25.0	25.3	25.6	
Final								
pH		8.45	8.53	8.56	8.51	8.46	8.51	8.49
DO (mg/L)		4.9	5.0	4.4	4.5	4.7	4.6	4.7
Temp (°C)		25.6	25.7	25.8	25.3	25.5	25.2	25.6

Analysts:	0	1	2	3	4	5	6	7
Initial:	MC	RG	ME	SH	RG	RG ~~RS~~	RG	
Final:		AH	ME	SH	RG	RS	RG	SH

Animal Source/Date Received: ABS/7-21-04

Animal Age at Initiation: 7 days old

Comments:

QC Check: AH 8-10-04

Final Review: 8/26/04

Marine Chronic Bioassay **Larval Mysid Survival & Weights**

Client Name: City of Buenaventura **Test Species:** *A. bahia*

Sample ID: A-2 **Start Date/Time:** 07/21/2004 ~1600

Test No.: 0407-035 **End Date/Time:** 07/28/2004 1500

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
Lab Control	a	5	5	5	5	5	4	4	4	80	0.04290	0.04439
#1	b	5	5	5	5	5	5	5	5	100	0.03323	0.03502
	c	5	5	5	5	5	5	5	5	100	0.03705	0.03814
	d	5	5	5	5	5	5	5	5	100	0.03590	0.03733
	e	5	5	5	5	5	4	4	4	80	0.03420	0.03570
	f	5	5	5	5	4	5	5	5	100	0.03671	0.03852
	g	5	5	5	5	5	5	5	5	100	0.03290	~~0.03488~~ 0.03422
	h	5	5	5	5	4	5	5	5	100	0.03305	0.03455
Salt Control	a	5	5	5	5	5	5	5	5	100	0.03642	0.03790
#1	b	5	5	5	5	5	5	5	5	100	0.02547	0.02703
	c	5	5	5	5	5	5	5	5	100	0.03585	0.03721
	d	5	5	5	5	5	4	4	4	80	0.03548	0.03689
	e	5	5	5	5	5	5	5	5	100	0.03448	0.03582
	f	5	5	5	5	5	5	4	4	80	0.03397	0.03532
	g	5	5	5	5	5	5	5	5	100	0.04006	0.04135
	h	5	5	5	5	5	5	5	5	100	0.03298	0.03448
25	a	5	5	5	5	5	5	5	5	100	0.05011	0.05194
	b	5	5	5	5	5	5	5	5	100	0.03498	0.03677
	c	5	5	5	5	5	5	5	5	100	0.03703	~~0.03880~~ 0.03910
	d	5	5	5	5	5	5	5	5	100	0.03370	0.03537
	e	5	5	5	5	5	5	5	5	100	0.03270	0.03450
	f	5	5	5	5	5	5	5	5	100	0.03780	0.03915
	g	5	5	5	5	5	5	5	5	100	0.03867	0.04030
	h	5	5	5	5	5	5	5	5	100	0.03709	0.03869
50	a	5	5	5	5	5	5	5	5	100	0.03801	0.04000
	b	5	5	5	5	5	5	5	5	100	0.03792	0.04003
	c	5	5	5	5	5	5	5	5	100	0.04054	0.04246
	d	5	5	5	5	5	5	5	5	100	0.04220	0.04416
	e	5	5	5	5	5	5	5	5	100	0.03735	0.03909
	f	5	5	5	5	5	5	5	5	100	0.03635	0.03853
	g	5	5	5	5	5	5	5	5	100	0.03362	0.03572
	h	5	5	4	4	4	4	4	4	80	0.03490	0.03495
Tech Initials		SD	RR	MC/RS	SH	AH	RG	RG	MC		YR	

data entry QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0820	0830	0900	0840	0845
1630	1645	1605	1400	1945	1600	1545

Weight Data:

Date/Time in: 7/28/04 1530

Date/Time out: 7-30-04 / 1415

Oven Temp (°C): 64

Tech Initials: SD

Comments: 0

QC Check: AH 8-10-04

Final Review: ~~AH 8/20/04~~

Marine Chronic Bioassay **Larval Mysid Survival & Weights**

Client Name: City of Buenaventura **Test Species:** *A. bahia*

Sample ID: A-2 **Start Date/Time:** 07/21/2004 1600

Test No.: 0407-035 **End Date/Time:** 07/28/2004 1530

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
67	a	5	5	~~4~~ 5	~~4~~ 5	5	5	5	5	100	0.04264	0.04486
	b	5	5	5	~~4~~ 5	4	4	4	4	80	0.04773	0.04992
	c	5	5	5	5	5	5	~~4~~ 5	5	100	0.03704	0.03942
	d	5	5	~~4~~ 5	~~4~~ 5	5	5	5	5	100	0.04151	0.04319
	e	5	5	5	5	5	5	5	5	100	0.04031	0.04237
	f	5	5	5	5	5	5	5	5	100	0.03966	0.04177
	g	5	5	5	5	5	5	5	5	100	0.04843	0.05039
	h	5	5	5	5	5	5	5	5	100	0.04409	0.04641
100	a	5	5	5	5	5	5	5	5	100	0.04835	0.05025
	b	5	5	4	4	4	4	4	4	80	0.03880	0.04045
	c	5	5	5	5	5	5	5	5	100	0.03147	0.03398
	d	5	5	4	4	4	4	4	4	80	0.03820	0.03994
	e	5	5	5	5	5	5	5	5	100	0.04601	0.04785
	f	5	5	5	5	5	5	5	5	100	0.04036	0.04246
	g	5	5	5	5	5	5	5	5	100	0.04429	0.04625
	h	5	5	5	5	5	5	5	5	100	0.03930	0.04089
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
Tech Initials		SD	RS	RS	SH	AH	RG	RG	MC			

data entry QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	0815
1630	1645	1605	1400	1945	1600	1545

Weight Data:
Date/Time in: 7/28/04 1530
Date/Time out: 7.30-04 1415
Oven Temp (°C): 60
Tech Initials: SD

Comments: _____

QC Check: AH 8-10-04
Final Review: ~~8/04~~ 8/20/04

CETIS Report

Chronic Mysid Survival and Growth Test B-1 — AMEC Bioassay SD

Test:	10-4928-7581	Test Type:	Growth-Survival (7d)	Duration:	6 Days 22 Hours
Start Date:	21 Jul-04 04:~~15~~ PM	Protocol:	EPA/821/R-02-014 (2002)	Species:	Americamysis bahia
End Date:	28 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:~~15~~ PM	Brine:	Not Applicable		

Sample:	00-5042-2330	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 01:40 PM	Code:	0407-036	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	27 Hours (18.4 °C)	Station:	B-1		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
11-8539-1561	7d Proportion Survived	100	>100	N/A	0.07032	Steel's Many-One Rank
19-4990-6605	Mean Dry Weight-mg	100	>100	N/A	0.16603	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method
11-0542-1642	7d Proportion Survived	10	>100	N/A	N/A	Linear Interpolation
		20	>100	N/A	N/A	
		25	>100	N/A	N/A	
		50	>100	N/A	N/A	
05-1053-2167	Mean Dry Weight-mg	10	46.91288	37.64388	N/A	Linear Interpolation
		20	>100	N/A	N/A	
		25	>100	N/A	N/A	
		50	>100	N/A	N/A	

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.95000	0.80000	1.00000	0.03273	0.09258	9.75%
0	Salt Control	8	0.95000	0.80000	1.00000	0.03273	0.09258	9.75%
25		8	0.95000	0.80000	1.00000	0.03273	0.09258	9.75%
50		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%
67		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%
100		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.29400	0.21800	0.35800	0.01469	0.04154	14.13%
0	Salt Control	8	0.28225	0.25800	0.31200	0.00659	0.01865	6.61%
25		8	0.29625	0.20000	0.38800	0.01949	0.05513	18.61%
50		8	0.25625	0.20600	0.32600	0.01499	0.04239	16.54%
67		8	0.24925	0.16200	0.28400	0.01333	0.03770	15.13%
100		8	0.25600	0.21400	0.33400	0.01643	0.04646	18.15%

CETIS Report

7d Proportion Survived Detail B-1

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.80000	1.00000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000
0	Salt Control	1.00000	1.00000	1.00000	0.80000	1.00000	0.80000	1.00000	1.00000
25		1.00000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000	0.80000
50		1.00000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000	1.00000
67		0.80000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	0.80000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.29800	0.35800	0.21800	0.28600	0.30000	0.32800	0.26400	0.30000
0	Salt Control	0.29600	0.31200	0.27200	0.28200	0.26800	0.27000	0.25800	0.30000
25		0.35000	0.38800	0.29000	0.20000	0.28800	0.28000	0.29600	0.27800
50		0.32600	0.25600	0.22200	0.20600	0.22600	0.29800	0.28400	0.23200
67		0.16200	0.25200	0.25200	0.28000	0.26200	0.25200	0.28400	0.25000
100		0.23600	0.22400	0.21400	0.21400	0.28200	0.23400	0.31000	0.33400

CETIS Report

Chronic Mysid Survival and Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	15-9798-8746	15-9798-8746	18 Aug-04 2:33 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		100	>100	1.00	N/A	7.03%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.18248	13.27671	0.88097	Equal Variances
Distribution	Shapiro-Wilk W	0.58195	0.91882	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00850618	0.0021265	4	0.23	0.91772	Non-Significant Effect
Error	0.3189819	0.0091138	35			
Total	0.32748810	0.0112403	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	68	47	>0.05	2	Non-Significant Effect
		50	72	47	>0.05	2	Non-Significant Effect
		67	72	47	>0.05	2	Non-Significant Effect
		100	72	47	>0.05	2	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.95000	0.80000	1.00000	0.09258	1.28575	1.10715	1.34528	0.11023
25		8	0.95000	0.80000	1.00000	0.09258	1.28575	1.10715	1.34528	0.11023
50		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
67		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
100		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419

CETIS Report

Report Date: 18 Aug-04 2:57 PM
Analysis: 11-0542-1642

Chronic Mysid Survival and Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Linear Interpolation	15-9798-8746	15-9798-8746	18 Aug-04 2:54 PM	CETISv1.024

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7055475	200	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-%	95% LCL	95% UCL
10	>100	N/A	N/A
20	>100	N/A	N/A
25	>100	N/A	N/A
50	>100	N/A	N/A

Data Summary

			Calculated Variate(A/B)						
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	8	0.95000	0.80000	1.00000	0.01890	0.09258	38	40
25		8	0.95000	0.80000	1.00000	0.01890	0.09258	38	40
50		8	0.97500	0.80000	1.00000	0.01443	0.07071	39	40
67		8	0.97500	0.80000	1.00000	0.01443	0.07071	39	40
100		8	0.97500	0.80000	1.00000	0.01443	0.07071	39	40

Approved By: [signature]

CETIS Report

Chronic Mysid Survival and Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	15-9798-8746	15-9798-8746	18 Aug-04 2:35 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		100	>100	1.00	N/A	16.60%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	6.90704	13.27671	0.14088	Equal Variances
Distribution	Shapiro-Wilk W	0.97710	0.91882	0.67475	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.013078	0.0032695	4	1.87	0.13854	Non-Significant Effect
Error	0.0613541	0.001753	35			
Total	0.07443211	0.0050225	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-0.668757	2.238571	>0.05	0.04686286	Non-Significant Effect
		50	1.241984	2.238571	>0.05	0.04686286	Non-Significant Effect
		67	1.576365	2.238571	>0.05	0.04686286	Non-Significant Effect
		100	1.253929	2.238571	>0.05	0.04686286	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.28225	0.25800	0.31200	0.01865				
25		8	0.29625	0.20000	0.38800	0.05513				
50		8	0.25625	0.20600	0.32600	0.04239				
67		8	0.24925	0.16200	0.28400	0.03770				
100		8	0.25600	0.21400	0.33400	0.04646				

CETIS Report

Report Date: 18 Aug-04 2:57 PM
Analysis: 05-1053-2167

Chronic Mysid Survival and Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Linear Interpolation	15-9798-8746	15-9798-8746	18 Aug-04 2:35 PM	CETISv1.024

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	5334240	200	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-%	95% LCL	95% UCL
10	46.91288	37.64388	N/A
20	>100	N/A	N/A
25	>100	N/A	N/A
50	>100	N/A	N/A

Data Summary

			Calculated Variate				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Salt Control	8	0.28225	0.25800	0.31200	0.00381	0.01865
25		8	0.29625	0.20000	0.38800	0.01125	0.05513
50		8	0.25625	0.20600	0.32600	0.00865	0.04239
67		8	0.24925	0.16200	0.28400	0.00770	0.03770
100		8	0.25600	0.21400	0.33400	0.00948	0.04646

Approved By: 8/20/04

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: *A. bahia*

Sample ID: B-1

Start Date/Time: 07/21/2004 - 1600

Test No: 0407-036

End Date/Time: 07/28/2004 1500

Concentration	Lab Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.00	7.97	7.98	8.01	8.06	7.98	7.91	
DO (mg/L)	7.8	4.6	7.8	7.9	7.9	7.3	8.4	
Salinity (ppt)	30.3	29.8	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	24.4	24.7	25.0	25.1	25.1	25.2	25.7	
Final								
pH		7.87	7.70	7.62	7.69	7.73	7.71	7.71
DO (mg/L)		5.5	5.4	5.2	4.9	5.3	5.0	5.1
Temp (°C)		25.2	25.4	25.2	25.2	25.4	25.5	25.6

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.25	8.09	8.14	8.14	8.22	8.25	8.25	
DO (mg/L)	7.2	6.3	6.6	6.6	6.3	6.1	6.0	
Salinity (ppt)	30.8	30.0	30.1	30.0	30.1	30.6	30.7	
Temp (°C)	25.8	24.4	25.0	25.1	25.2	25.3	25.5	
Final								
pH		8.17	8.10	8.11	8.12	8.15	8.10	8.11
DO (mg/L)		4.9	4.8	5.3	5.2	5.5	5.2	5.2
Temp (°C)		25.5	25.8	25.0	25.2	25.6	25.1	25.3

Concentration	Salt Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.15	8.29	8.33	8.37	8.25	8.38	
DO (mg/L)	7.0	6.7	7.2	7.2	7.1	6.5	5.7	
Salinity (ppt)	30.3	29.9	30.2	30.2	30.2	30.5	30.1	
Temp (°C)	24.4	24.7	25.0	25.3	25.2	25.1	25.6	
Final								
pH		8.11	7.97	7.95	7.94	7.90	7.97	7.91
DO (mg/L)		5.0	4.9	5.2	4.9	5.4	5.2	5.1
Temp (°C)		25.6	25.4	25.1	25.2	25.4	25.5	25.6

Concentration	67%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.20	8.04	8.13	8.14	8.24	8.25	8.22	
DO (mg/L)	7.2	6.2	6.5	6.6	6.4	6.1	5.9	
Salinity (ppt)	30.5	30.1	30.1	30.1	30.2	30.7	30.7	
Temp (°C)	25.9	24.6	25.0	25.2	25.2	25.3	25.5	
Final								
pH		8.18	8.12	8.15	8.14	8.14	8.16	8.14
DO (mg/L)		5.2	5.1	5.4	5.4	5.6	5.3	5.4
Temp (°C)		25.4	25.7	25.4	25.2	25.2	25.2	25.1

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.32	8.12	8.14	8.15	8.20	8.25	8.33	
DO (mg/L)	7.1	6.5	6.4	6.6	6.4	6.2	5.8	
Salinity (ppt)	30.0	29.9	29.9	30.0	30.1	30.5	30.4	
Temp (°C)	25.8	24.4	25.0	25.1	25.1	25.3	25.4	
Final								
pH		8.17	8.04	8.07	8.06	8.13	8.02	8.04
DO (mg/L)		4.9	4.8	5.2	5.1	5.4	5.2	5.2
Temp (°C)		25.3	25.6	25.2	25.1	25.5	25.1	25.4

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.12	8.06	8.13	8.14	8.20	8.25	8.14	
DO (mg/L)	7.5	5.9	6.6	6.5	6.6	6.2	5.9	
Salinity (ppt)	30.2	30.2	30.2	30.1	30.2	30.6	30.9	
Temp (°C)	25.9	24.5	25.6	25.3	25.2	25.3	25.6	
Final								
pH		8.20	8.18	8.18	8.19	8.17	8.15	8.16
DO (mg/L)		5.4	5.6	5.1	5.2	5.4	5.4	5.4
Temp (°C)		25.3	25.3	25.6	25.3	25.2	25.2	25.1

Analysts:	0	1	2	3	4	5	6	7
Initial:	MC	RG	MC	SH	RG	RG	RG	
Final:		AH	MC	SH	RG	RS	RG	SH

Animal Source/Date Received: ABS / 7-21-04

Animal Age at Initiation: 7 days

Comments:

QC Check: AH 8-10-04

Final Review: 8/20/04

Marine Chronic Bioassay **Larval Mysid Survival & Weights**

Client Name: City of Buenaventura **Test Species:** *A. bahia*

Sample ID: B-1 **Start Date/Time:** 07/21/2004 1600

Test No.: 0407-036 **End Date/Time:** 07/28/2004 1500

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
Lab Control	a	5	5	5	5	5	4	4	4	80	0.04290	0.04439
#1	b	5	5	5	5	5	5	5	5	100	0.03323	0.03502
	c	5	5	5	5	5	5	5	5	100	0.03705	0.03814
	d	5	5	5	5	5	RMS	5	5	100	0.03590	0.03733
	e	5	5	5	5	5	RMS4	4	4	80	0.03420	0.03570
	f	5	5	5	5	4	5	5	5	100	0.03671	0.03835
	g	5	5	5	5	5	5	5	5	100	0.03290	0.03422
	h	5	5	5	5	4	5	5	5	100	0.03305	0.03455
Salt Control	a	5	5	5	5	5	5	5	5	100	0.03642	0.03790
#1	b	5	5	5	5	5	5	5	5	100	0.02547	0.02703
	c	5	5	5	5	5	5	5	5	100	0.03585	0.03721
	d	5	5	5	5	5	4	4	4	80	0.03548	0.03689
	e	5	5	5	5	5	5	RMS5	5	100	0.03448	0.03582
	f	5	5	5	5	5	5	RMS4	4	80	0.03397	0.03532
	g	5	5	5	5	5	5	5	5	100	0.04006	0.04135
	h	5	5	5	5	5	5	5	5	100	0.03298	0.03448
25	a	5	5	5	5	5	5	5	5	100	0.04777	0.04952
	b	5	5	5	5	5	5	5	5	100	0.04642	0.04836
	c	5	5	5	5	5	5	5	5	100	0.04136	0.04281
	d	5	5	4	SH 4	4	4	4	4	80	0.03560	0.03600
	e	5	5	5	5	5	5	5	5	100	0.03443	0.03587
	f	5	5	5	5	5	5	5	5	100	0.04588	0.04728
	g	5	5	5	5	5	5	5	5	100	0.04209	0.04357
	h	5	5	4	4	4	4	4	4	80	0.04305	0.04444
50	a	5	5	5	5	5	5	5	5	100	0.05012	0.05175
	b	5	5	5	5	5	5	5	5	100	0.03866	0.03994
	c	5	5	5	5	5	5	5	5	100	0.03776	0.03947
	d	5	5	5	5	5	5	4	4	80	0.03633	0.03736
	e	5	5	5	5	5	5	5	5	100	0.03476	0.03589
	f	5	5	5	5	5	5	5	5	100	0.03932	0.04081
	g	5	5	5	5	5	5	5	5	100	0.03475	0.03617
	h	5	5	5	5	5	5	5	5	100	0.03604	0.03720
Tech Initials		SD	RS	ue	SH	AH	RG	RG	me		me	

data entry
QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
–	0900	0800	0830	0900	0840	0845
1630	1645	1605	1400	1445	1600	1545

Weight Data:
Date/Time in: 7/28/04 1530
Date/Time out: 7/30 04 1100
Oven Temp (°C): 64
Tech Initials: SD

Comments:

QC Check: AH 8-10-04
Final Review: 8/20/04

Marine Chronic Bioassay **Larval Mysid Survival & Weights**

Client Name: City of Buenaventura **Test Species:** *A. bahia*

Sample ID: B-1 **Start Date/Time:** 07/21/2004 1600

Test No.: 0407-036 **End Date/Time:** 07/28/2004 1500

Conc. (67%)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
67	a	5	5	4	4	4	4	4	4	80	0.04078	0.04159
	b	5	5	5	5	5	5	5	5	100	0.03970	0.04096
	c	5	5	5	5	5	5	5	5	100	0.03072	0.03198
	d	5	5	5	5	5	5	5	5	100	0.03395	0.03535
	e	5	5	5	5	5	5	5	5	100	0.03294	0.03425
	f	5	5	5	5	5	5	5	5	100	0.03397	0.03523
	g	5	5	5	5	5	5	5	5	100	0.04017	0.04159
	h	5	5	5	5	5	5	5	5	100	0.03356	0.03481
100	a	5	5	5	5	5	5	5	5	100	0.04686	0.04804
	b	5	5	4	4	4	4	4	4	80	0.03979	0.04091
	c	5	5	5	5	5	5	5	5	100	0.03833	0.03940
	d	5	5	5	5	5	5	5	5	100	0.03859	0.03966
	e	5	5	5	5	5	5	5	5	100	0.03511	0.03652
	f	5	5	5	5	5	5	5	5	100	0.04353	0.04470
	g	5	5	5	5	5	5	5	5	100	0.03850	0.04005
	h	5	5	5	5	5	5	5	5	100	0.04043	0.04210
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
Tech Initials		SD	RS	MC	SH	AH	RG	RG	MC			

data entry ME
QC = AH

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	0845
1630	1645	1605	1400	1945	1600	1545

Weight Data:
Date/Time in: 7/28/04 1530
Date/Time out: 7.30.04 1100
Oven Temp (°C): 60
Tech Initials: SD

Comments:

QC Check: AH 8-10-04
Final Review: [illegible] 8/20/04

CETIS Report

Report Date: 19 Aug-04 8:44 AM
Link: 09-6754-4780/0407-037

Chronic Mysid Survival and Growth Test B-3

AMEC Bioassay SD

Test:	10-4928-7581	Test Type:	Growth-Survival (7d)	Duration:	6 Days 22 Hours
Start Date:	21 Jul-04 04:~~15~~ PM	Protocol:	EPA/821/R-02-014 (2002)	Species:	Americamysis bahia
End Date:	28 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:~~15~~ PM	Brine:	Not Applicable		

Sample:	05-1945-9466	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 10:40 AM	Code:	0407-037	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	30 Hours (18.2 °C)	Station:	B-3		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
11-3646-5502	7d Proportion Survived	100	>100	N/A	0.02421	Bonferroni Adj Wilcoxon Rank Sum
13-7114-1536	Mean Dry Weight-mg	100	>100	N/A	0.15168	Bonferroni Adj t

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%
0	Salt Control	8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%
25		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
67		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.28600	0.25200	0.32200	0.00819	0.02318	8.10%
0	Salt Control	8	0.28950	0.24000	0.32200	0.01010	0.02856	9.87%
25		8	0.41343	0.31600	0.48400	0.02048	0.05418	13.11%
50		8	0.45500	0.39000	0.50800	0.01386	0.03919	8.61%
67		8	0.43925	0.40400	0.47400	0.00684	0.01936	4.41%
100		8	0.47175	0.39400	0.51600	0.01401	0.03962	8.40%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	1.00000	1.00000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000
0	Salt Control	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.80000	1.00000
25		*	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
50		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
67		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1 00000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.30400	0.28600	0.32200	0.25200	0.29000	0.25600	0.29400	0.28400
0	Salt Control	0.29600	0.30200	0.30600	0.27000	0.26400	0.32200	0.24000	0.31600
25		*	0.31600	0.40600	0.39200	0.42800	0.46200	0.48400	0.40600
50		0.47800	0.42600	0.48600	0.45800	0.39000	0.42200	0.50800	0.47200
67		0.47400	0.43800	0.45000	0.43800	0.43800	0.40400	0.44000	0.43200
100		0.46400	0.49400	0.51200	0.46200	0.48400	0.51600	0.39400	0.44800

*replicate spilled during test.

Approved By: 8/20/04

CETIS Report

Chronic Mysid Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	09-6754-4780	09-6754-4780	18 Aug-04 3:30 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj Wilcoxon Rank Sum	C > T	Angular (Corrected)		100	>100	1.00	N/A	2.42%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	0.96520	3.92733	0.43918	Equal Variances
Distribution	Shapiro-Wilk W	0.34950	0.91742	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00563444	0.0014086	4	0.97	0.43918	Non-Significant Effect
Error	0.04961941	0.0014594	34			
Total	0.05525385	0.0028680	38			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	59.5		0.61057	1	Non-Significant Effect
		50	72		0.63955	1	Non-Significant Effect
		67	72		0.63955	1	Non-Significant Effect
		100	72		0.63955	1	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
25		7	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
50		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
67		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
100		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019

CETIS Report

Chronic Mysid Survival and Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	09-6754-4780	09-6754-4780	18 Aug-04 3:30 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Untransformed		100	>100	1.00	N/A	15.17%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	6.77565	13.27671	0.14823	Equal Variances
Distribution	Shapiro-Wilk W	0.97245	0.91742	0.53284	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.1692312	0.0423078	4	30.16	0.00000	Significant Effect
Error	0.04768679	0.0014026	34			
Total	0.21691795	0.0437103	38			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-6.393829	2.345056	1.00000	0.04545319	Non-Significant Effect
		50	-8.838287	2.345056	1.00000	0.04391196	Non-Significant Effect
		67	-7.997179	2.345056	1.00000	0.04391196	Non-Significant Effect
		100	-9.732784	2.345056	1.00000	0.04391196	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.28950	0.24000	0.32200	0.02856				
25		7	0.41343	0.31600	0.48400	0.05418				
50		8	0.45500	0.39000	0.50800	0.03919				
67		8	0.43925	0.40400	0.47400	0.01936				
100		8	0.47175	0.39400	0.51600	0.03962				

Marine Chronic Bioassay | **Water Quality Measurements**

Client: City of Buenaventura | **Test Species:** *A. bahia*

Sample ID: B-3 | **Start Date/Time:** 07/21/2004 1600

Test No: 0407-037 | **End Date/Time:** 07/28/2004 1500

Concentration	Lab Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.00	7.97	7.98	8.01	8.06	7.98	7.91	
DO (mg/L)	7.8	7.6	7.8	7.9	7.9	7.3	8.4	
Salinity (ppt)	30.1	29.8	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	24.4	24.7	25.0	25.1	25.1	25.2	25.7	
Final								
pH		7.78	7.71	7.72	7.71	8.12	7.99	8.06
DO (mg/L)		5.1	5.4	5.2	5.1	5.0	5.0	5.0
Temp (°C)		25.8	25.5	25.6	25.4	24.5	24.9	25.1

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.68	8.49	8.56	8.56	8.57	8.55	8.52	
DO (mg/L)	7.5	6.4	6.3	6.5	6.6	6.1	6.2	
Salinity (ppt)	30.7	29.9	30.0	30.0	30.1	30.5	30.3	
Temp (°C)	24.4	24.6	25.0	25.2	25.2	25.3	25.4	
Final								
pH		8.40	8.26	8.23	8.27	8.30	8.33	8.31
DO (mg/L)		5.1	4.9	5.0	5.2	5.5	5.6	5.1
Temp (°C)		25.4	25.8	25.5	25.5	25.4	25.2	25.2

Concentration	Salt Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.15	8.29	8.33	8.37	8.25	8.38	
DO (mg/L)	7.0	6.7	7.2	7.2	7.1	6.5	5.7	
Salinity (ppt)	30.3	29.9	30.2	30.2	30.2	30.5	30.1	
Temp (°C)	24.4	24.7	25.0	25.3	25.2	25.1	25.6	
Final								
pH		8.10	8.00	7.98	7.95	8.19	8.20	8.14
DO (mg/L)		5.3	5.6	5.2	5.1	4.7	5.1	5.0
Temp (°C)		25.7	25.5	25.5	25.2	24.5	24.9	25.1

Concentration	67%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.74	8.59	8.64	8.67	8.61	8.60	8.56	
DO (mg/L)	7.9	5.9	6.4	6.5	6.5	6.1	6.4	
Salinity (ppt)	30.5	30.0	30.1	30.0	30.2	30.6	30.5	
Temp (°C)	24.8	24.4	25.0	25.2	25.2	25.3	25.3	
Final								
pH		8.47	8.35	8.38	8.31	8.39	8.41	8.36
DO (mg/L)		4.7	5.0	5.0	5.1	5.1	5.1	5.1
Temp (°C)		25.0	24.9	25.5	25.4	25.4	25.2	25.2

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.56	8.43	8.41	8.46	8.49	8.44	8.50	
DO (mg/L)	7.3	6.6	6.3	6.5	6.6	6.1	6.0	
Salinity (ppt)	30.0	29.9	29.9	30.0	30.1	30.4	30.3	
Temp (°C)	24.6	24.7	~~25.3~~ 25.0 mc	25.2	25.1	25.2	25.5	
Final								
pH		8.30	8.19	8.14	8.17	8.24	8.30	8.26
DO (mg/L)		5.0	5.2	5.1	5.2	5.2	5.1	5.1
Temp (°C)		25.5	25.8	25.6	25.5	25.4	25.1	25.2

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.83	8.67	8.74	8.77	8.74	8.69	8.65	
DO (mg/L)	8.4	5.7	6.2	6.3	6.4	6.2	7.1	
Salinity (ppt)	30.2	30.1	30.2	30.1	30.2	30.7	30.7	
Temp (°C)	24.7	24.4	25.0	25.2	25.3	25.3	25.3	
Final								
pH		8.60	8.47	8.47	8.51	8.45	8.40	8.42
DO (mg/L)		5.0	5.1	5.3	5.2	5.4	5.1	5.1
Temp (°C)		24.9	25.4	25.7	25.4	25.4	25.3	25.3

Analysts:	0	1	2	3	4	5	6	7
Initial:	MC	RG	MC	SH	RG	RG RS	RG	
Final:		AH	MC	SH	RG	RS	RG	SH

Animal Source/Date Received: ABS / 7-21-04

Animal Age at Initiation: 7 days old

Comments:

QC Check: AH 8-10-04

Final Review: 8/20/04

Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: City of Buenaventura **Test Species:** *A. bahia*

Sample ID: B-3 **Start Date/Time:** 07/21/2004 1600

Test No.: 0407-037 **End Date/Time:** 07/28/2004 1500

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
Lab Control	a	5	5	5	5	5	5	5	5	100	0.04044	~~0.04199~~ 0.04191
#2	b	5	5	5	5	5	5	5	5	100	0.03828	0.03971
	c	5	5	5	5	5	5	5	5	100	0.04595	0.04756
	d	5	5	5	5	5	5	5	5	100	0.04208	0.04334
	e	5	5	5	5	4	4	4	4	80	0.04015	0.04160
	f	5	5	5	5	5	5	5	5	100	0.03545	0.03673
	g	5	5	5	5	5	5	5	5	100	0.03645	0.03792
	h	5	5	5	5	5	5	5	5	100	0.03615	0.03757
Salt Control	a	5	5	5	5	5	5	5	5	100	0.03794	0.03942
#2	b	5	5	5	5	5	5	5	5	100	0.03948	0.04099
	c	5	5	5	5	5	5	5	5	100	0.03940	0.04093
	d	5	5	5	5	5	5	5	5	100	0.04087	0.04222
	e	5	5	5	5	5	5	5	5	100	0.03750	0.03882
	f	5	5	5	5	5	5	5	5	100	0.03716	0.03877
	g	5	5	5	5	4	4	4	4	80	0.03318	0.03438
	h	5	5	5	5	5	5	5	5	100	0.03301	0.03459
25	a	Ⓐ ~~5~~	—	—	—	—	—	—	—	—	—	—
	b	5	5	5	5	5	5	5	5	100	0.03439	0.03597
	c	5	5	5	5	5	5	5	5	100	0.04910	0.05113
	d	5	5	5	5	5	5	5	5	100	0.03926	0.04122
	e	5	5	5	5	5	5	5	5	100	0.03876	~~0.0408~~ 0.0409
	f	5	5	5	5	5	5	5	5	100	0.03930	0.04161
	g	5	5	5	5	5	5	5	5	100	0.03848	0.04090
	h	5	5	5	5	5	5	5	5	100	0.03706	0.03909
50	a	5	5	5	5	5	5	5	5	100	0.02790	0.03029
	b	5	5	5	5	5	5	5	5	100	0.03340	0.03553
	c	5	5	5	5	5	5	5	5	100	0.04020	0.04263
	d	5	5	5	5	5	5	5	5	100	0.02983	0.03212
	e	5	5	5	5	5	5	5	5	100	0.03864	0.04069
	f	5	5	5	5	5	5	5	5	100	0.03644	0.03865
	g	5	5	5	5	5	5	5	5	100	0.03687	0.03941
	h	5	5	5	5	5	5	5	5	100	0.04035	~~0.0426~~ 0.042
Tech Initials		SD	RS	me	SH	AH	RG	RG	uc		uc	SD

Data entry QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	815
1630	1645	1605	1400	1945	1600	1545

Weight Data:

Date/Time in: 7/28/04 1530

Date/Time out: 7.28.04 1100

Oven Temp (°C): 64

Tech Initials: SD

Comments: Ⓐ spilled cup.

QC Check: AH 8-10-04

Final Review: [signature] 8/20/04

Marine Chronic Bioassay **Larval Mysid Survival & Weights**

Client Name: City of Buenaventura **Test Species:** *A. bahia*

Sample ID: B-3 **Start Date/Time:** 07/21/2004 1600

Test No.: 0407-037 **End Date/Time:** 07/28/2004 1500

Conc. (67%)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
67	a	5	5	5	5	5	5	5	4 5	100	0.04767	0.05004
	b	5	5	5	5	5	5	5	5 5	100	0.04697	0.04916
	c	5	5	5	5	5	5	5	5 5	100	0.03544	0.03769
	d	5	5	5	5	5	5	5	5 5	100	0.03748	0.03962
	e	5	5	5	5	5	5	5	5 5	100	0.03605	0.03814
	f	5	5	5	5	5	5	5	5 5	100	0.04813	0.05015
	g	5	5	5	5	5	5	5	5 5	100	0.03635	0.03855
	h	5	5	5	5	5	5	5	5 5	100	0.04528	0.04744
100	a	5	5	5	5	5	5	5	5 5	100	0.04070	0.04302
	b	5	5	5	5	5	5	5	4 5	100	0.03196	0.03443
	c	5	5	5	5	5	5	5	5 5	100	0.04129	0.04385
	d	5	5	5	5	5	5	5	5 5	100	0.03538	0.03769
	e	5	5	5	5	5	5	5	5 5	100	0.04259	0.04501
	f	5	5	5	5	5	5	5	5 5	100	0.04838	0.05096
	g	5	5	5	5	5	5	5	5 5	100	0.04854	0.05051
	h	5	5	5	5	5	5	5	5 5	100	0.04055	0.04279
	a								PM			
	b											
	c											
	d											
	e											
	f											
	g											
	h											
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
Tech Initials		SD	RB	ME	SH	AH	PG	RG	RG ME		ME	

Data entry QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
–	0900	0820	0830	0900	0840	0815
1630	1645	1605	1400	1945	1600	1545

Weight Data:

Date/Time in: 7/28/04 1530

Date/Time out: 7.30.04 1430

Oven Temp (°C): 60

Tech Initials: SD

Comments: _____

QC Check: AH 8-10-04

Final Review: 8/20/04

CETIS Report

Chronic Mysid Survival and Growth Test C-2 — AMEC Bioassay SD

Test:	10-4928-7581	Test Type:	Growth-Survival (7d)	Duration:	6 Days 22 Hours
Start Date:	21 Jul-04 04:15 PM	Protocol:	EPA/821/R-02-014 (2002)	Species:	Americamysis bahia
End Date:	28 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:15 PM	Brine:	Not Applicable		

Sample:	03-9694-7306	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 09:35 AM	Code:	0407-038	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	31 Hours (18.5 °C)	Station:	C-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
07-0450-5931	7d Proportion Survived	100	>100	N/A	0.02269	Steel's Many-One Rank
03-2333-8357	Mean Dry Weight-mg	100	>100	N/A	0.15317	Dunnett's Multiple Comparison

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%
0	Salt Control	8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%
25		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
67		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%

Mean Dry Weight-mg Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.28600	0.25200	0.32200	0.00819	0.02318	8.10%
0	Salt Control	8	0.28950	0.24000	0.32200	0.01010	0.02856	9.87%
25		8	0.40525	0.37600	0.45000	0.00849	0.02402	5.93%
50		8	0.47925	0.44000	0.53200	0.01194	0.03377	7.05%
67		8	0.46675	0.42000	0.53000	0.01141	0.03227	6.91%
100		8	0.48575	0.39200	0.59000	0.02311	0.06537	13.46%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	1.00000	1.00000	1.00000	1.00000	0.80000	1.00000	1.00000	1.00000
0	Salt Control	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.80000	1.00000
25		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
50		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
67		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

Mean Dry Weight-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.30400	0.28600	0.32200	0.25200	0.29000	0.25600	0.29400	0.28400
0	Salt Control	0.29600	0.30200	0.30600	0.27000	0.26400	0.32200	0.24000	0.31600
25		0.45000	0.38600	0.37600	0.38600	0.42600	0.40600	0.40800	0.40400
50		0.48600	0.46000	0.51400	0.46200	0.53200	0.44000	0.44200	0.49800
67		0.42000	0.48200	0.45400	0.47000	0.45200	0.53000	0.47800	0.44800
100		0.50000	0.55000	0.47400	0.41000	0.49000	0.39200	0.59000	0.48000

CETIS Report

Chronic Mysid Survival and Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	17-0073-0026	17-0073-0026	18 Aug-04 3:52 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		100	>100	1.00	N/A	2.27%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	1.00000	3.90824	0.42065	Equal Variances
Distribution	Shapiro-Wilk W	0.34587	0.91882	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00567079	0.0014177	4	1.00	0.42065	Non-Significant Effect
Error	0.04961941	0.0014177	35			
Total	0.05529020	0.0028354	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	72	47	>0.05	1	Non-Significant Effect
		50	72	47	>0.05	1	Non-Significant Effect
		67	72	47	>0.05	1	Non-Significant Effect
		100	72	47	>0.05	1	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
25		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
50		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
67		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
100		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019

CETIS Report

Chronic Mysid Survival and Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	17-0073-0026	17-0073-0026	18 Aug-04 3:52 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		100	>100	1.00	N/A	15.32%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	9.16035	13.27671	0.05721	Equal Variances
Distribution	Shapiro-Wilk W	0.98226	0.91882	0.84047	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.217012	0.054253	4	34.56	0.00000	Significant Effect
Error	0.05493601	0.0015696	35			
Total	0.27194798	0.0558226	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-5.843278	2.238571	>0.05	0.04434406	Non-Significant Effect
		50	-9.578926	2.238571	>0.05	0.04434406	Non-Significant Effect
		67	-8.947903	2.238571	>0.05	0.04434406	Non-Significant Effect
		100	-9.907062	2.238571	>0.05	0.04434406	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.28950	0.24000	0.32200	0.02856				
25		8	0.40525	0.37600	0.45000	0.02402				
50		8	0.47925	0.44000	0.53200	0.03377				
67		8	0.46675	0.42000	0.53000	0.03227				
100		8	0.48575	0.39200	0.59000	0.06537				

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: *A. bahia*

Sample ID: C-2

Start Date/Time: 07/21/2004 1615

Test No: 0407-038

End Date/Time: 07/28/2004 1500

Concentration	Lab Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.00	7.97	7.98	8.01	8.06	7.98	7.91	
DO (mg/L)	7.8	7.6	7.8	7.9	7.9	7.3	6.4	
Salinity (ppt)	30.1	29.8	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	24.4	24.7	25.0	25.1	25.1	25.2	25.7	
Final								
pH		7.78	7.71	7.72	7.71	8.12	7.99	8.06
DO (mg/L)		5.1	5.4	5.2	5.1	5.0	5.0	5.0
Temp (°C)		25.8	25.5	25.6	25.4	24.5	24.9	25.1

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.56	8.31	8.41	8.48	8.44	8.25	8.34	
DO (mg/L)	7.4	6.1	6.3	6.5	6.5	6.2	5.9	
Salinity (ppt)	30.7	29.9	30.1	30.0	30.7	30.6	30.2	
Temp (°C)	24.9	24.7	25.0	25.2	25.2	25.4	25.2	
Final								
pH		8.33	8.17	8.17	8.20	8.22	8.21	8.21
DO (mg/L)		4.1	5.0	4.9	4.9	4.7	4.6	4.7
Temp (°C)		24.9	25.7	25.5	25.4	24.9	25.4	25.2

Concentration	Salt Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.15	8.29	8.33	8.37	8.25	8.38	
DO (mg/L)	7.0	6.7	7.2	7.2	7.1	6.5	5.7	
Salinity (ppt)	30.3	29.9	30.2	30.2	30.2	30.5	30.1	
Temp (°C)	24.4	24.7	25.0	25.3	25.2	25.1	25.1	
Final								
pH		8.10	8.00	7.98	7.95	8.19	8.20	8.14
DO (mg/L)		5.3	5.6	5.2	5.1	4.7	5.1	5.0
Temp (°C)		25.7	25.5	25.8	25.2	24.5	24.9	25.1

Concentration	67%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.59	8.35	8.46	8.51	8.50	8.50	8.38	
DO (mg/L)	7.7	5.5	6.1	6.3	6.4	6.0	5.9	
Salinity (ppt)	30.5	30.1	30.2	30.1	30.2	30.7	30.3	
Temp (°C)	24.9	24.7	25.0	25.2	25.3	25.4	25.2	
Final								
pH		8.37	8.22	8.23	8.25	8.36	8.30	8.27
DO (mg/L)		4.6	5.0	4.9	4.9	4.6	4.4	4.6
Temp (°C)		24.9	25.6	25.6	25.5	24.9	25.1	25.2

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.50	8.29	8.31	8.41	8.37	8.32	8.37	
DO (mg/L)	7.2	6.3	6.4	6.5	6.6	6.1	5.9	
Salinity (ppt)	30.7	29.9	30.0	30.0	30.1	30.5	30.2	
Temp (°C)	25.0	24.4	25.0	25.2	25.2	25.3	25.4	
Final								
pH		8.24	8.01	8.03	8.19	8.22	8.20	8.21
DO (mg/L)		4.3	4.7	4.7	5.3	4.7	4.7	4.9
Temp (°C)		24.8	25.7	25.2	25.5	24.6	25.1	25.2

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.65	8.47	8.53	8.56	8.55	8.54	8.54	
DO (mg/L)	8.3	5.3	6.1	6.3	6.4	6.2	6.1	
Salinity (ppt)	30.2	30.3	30.3	30.1	30.2	30.7	30.4	
Temp (°C)	24.8	24.8	25.0	25.3	25.2	25.4	25.3	
Final								
pH		8.44	8.30	8.33	8.36	8.28	8.29	8.29
DO (mg/L)		5.1	5.0	5.3	5.3	4.7	4.6	4.6
Temp (°C)		24.8	25.6	25.6	25.5	24.7	25.2	25.2

Analysts:	0	1	2	3	4	5	6	7
Initial:	MC	RG	MC	SH	RG	RG XRS	RG	
Final:		AH	MC	SH	RG	RS	RG	SH

Animal Source/Date Received: ABS/ 7-21-04

Animal Age at Initiation: 7 days old

Comments:

QC Check: AH 8-10-04

Final Review: 8/20/04

AMEC Earth & Environmental Bioassay Laboratory. 5550 Morehouse Dr., Ste. B. San Diego, CA 92121.

Marine Chronic Bioassay **Larval Mysid Survival & Weights**

Client Name: City of Buenaventura **Test Species:** *A. bahia*

Sample ID: C-2 **Start Date/Time:** 07/21/2004 1615

Test No.: 0407-038 **End Date/Time:** 07/28/2004 1500

Conc. (___%___)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
Lab Control	a	5	5	5	5	5	5	5	5	100	0.04044	0.04196
#2	b	5	5	5	5	5	5	5	5	100	0.03828	0.03971
	c	5	5	5	5	5	5	5	5	100	0.04595	0.04756
	d	5	5	5	5	5	5	5	5	100	0.04208	0.04334
	e	5	5	5	5	4	4	4	4	80	0.04015	0.04160
	f	5	5	5	5	5	5	5	5	100	0.03545	0.03673
	g	5	5	5	5	5	5	5	5	100	0.03645	0.03792
	h	5	5	5	5	5	5	5	5	100	0.03615	0.03757
Salt Control	a	5	5	5	5	5	5	5	5	100	0.03794	0.03942
#2	b	5	5	5	5	5	5	5	5	100	0.03948	0.04099
	c	5	5	5	5	5	5	5	5	100	0.03940	0.04093
	d	5	5	5	5	5	5	5	5	100	0.04087	0.04222
	e	5	5	5	5	5	5	5	5	100	0.03750	0.03882
	f	5	5	5	5	5	5	5	5	100	0.03716	0.03877
	g	5	5	5	5	4	4	4	4	80	0.03318	0.03438
	h	5	5	5	5	5	5	5	5	100	0.03301	0.03459
25	a	5	5	5	5	5	5	5	5	100	0.04469	0.04694
	b	5	5	5	5	5	5	5	5	100	0.03782	0.03975
	c	5	5	5	5	5	5	5	5	100	0.03712	0.03900
	d	5	5	5	5	5	5	5	5	100	0.03234	0.03427
	e	5	5	5	5	5	5	5	5	100	0.03857	0.04070
	f	5	5	5	5	5	5	5	5	100	0.03910	0.04113
	g	5	5	5	5	5	5	5	5	100	0.03476	0.03680
	h	5	5	5	5	5	5	5	5	100	0.03291	0.03493
50	a	5	5	5	5	5	5	5	5	100	0.03795	0.04038
	b	5	5	5	5	5	5	5	5	100	0.03798	0.04028
	c	5	5	5	5	5	5	5	5	100	0.03462	0.03719
	d	5	5	5	5	5	5	5	5	100	0.03550	0.03781
	e	5	5	5	5	5	5	5	5	100	0.03547	0.03813
	f	5	5	5	5	5	5	5	5	100	0.03455	0.03675
	g	5	5	5	5	5	5	5	5	100	0.03732	0.03953
	h	5	5	5	5	5	5	5	5	100	0.03333	0.03582
Tech Initials		SD	RR	MC	SH	AH	RG	RG	MC		HR	

data entry QC=AH

Feeding Times (day):

0	1	2	3	4	5	6
–	0900	0820	0830	0900	0840	0815
1630	1645	1605	1400	1945	1600	1545

Weight Data:

Date/Time in: 7/28/04 1530

Date/Time out: 7-30-04 1430

Oven Temp (°C): 60

Tech Initials: SD

Comments: _____

QC Check: AH 8-10-04

Final Review: 8/20/04

Marine Chronic Bioassay **Larval Mysid Survival & Weights**

Client Name: City of Buenaventura **Test Species:** *A. bahia*

Sample ID: C-2 **Start Date/Time:** 07/21/2004 1615

Test No.: 0407-038 **End Date/Time:** 07/28/2004 1500

Conc. (67%)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid SD (g)	
67	a	5	5	5	5	5	5	5	5	100	0.03979	~~0.04781~~	0.0418
	b	5	5	5	5	5	5	5	5	100	0.04240	0.04481	
	c	5	5	5	5	5	5	5	5	100	0.04126	0.04353	
	d	5	5	5	5	5	5	5	5	100	0.03950	0.04185	
	e	5	5	5	5	5	5	5	5	100	0.03800	0.04026	
	f	5	5	5	5	5	5	5	5	100	0.04244	0.04509	
	g	5	5	5	5	5	5	5	5	100	0.04327	0.04566	
	h	5	5	5	5	5	5	5	5	100	0.04246	0.04470	
100	a	5	5	5	5	5	5	5	5	100	0.04380	0.04630	
	b	5	5	5	5	5	5	5	5	100	0.03976	0.04251	
	c	5	5	5	5	5	5	5	5	100	0.04245	0.04482	
	d	5	5	5	5	5	5	5	5	100	0.04903	0.05108	
	e	5	5	5	5	5	5	5	5	100	0.04343	0.04588	
	f	5	5	5	5	5	5	5	5	100	0.04202	~~0.04~~ SD	0.0439
	g	5	5	5	5	5	5	5	5	100	0.04661	0.04956	
	h	5	5	5	5	5	5	5	5	100	0.03413	0.03653	
	a												
	b												
	c												
	d												
	e												
	f												
	g												
	h												
	a												
	b												
	c												
	d												
	e												
	f												
	g												
	h												
Tech Initials		SD	RB	MC	SH	AH	RG	RG	MC				

data entry QC=AH TR

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	0815
1630	1645	1605	1400	1945	1600	1545

Weight Data:
Date/Time in: 7/28/04 1530
Date/Time out: 7.30.04 1430
Oven Temp (°C): 60
Tech Initials: SD

Comments:

QC Check: AH 8-10-04
Final Review: [illegible] 8/20/04

M. GALLOPROVINCIALIS

CETIS Report

Bivalve Larval Survival and Development Test A-2 — AMEC Bioassay SD

Test:	08-2544-2401	**Test Type:**	Development	**Duration:**	48 Hours
Start Date:	21 Jul-04 04:30 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
End Date:	23 Jul-04 04:15 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	21 Jul-04 04:30 PM	**Brine:**	Frozen Seawater		

Sample:	04-7641-4711	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 02:50 PM	**Code:**	0407-043	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	26 Hours (19.3 °C)	**Station:**	A-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
08-6399-4827	Proportion Normal	100	>100	N/A	0.09297	Equal Variance t
15-1354-4639		65	>65	N/A	0.07073	Dunnett's Multiple Comparison

Proportion Normal Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.85000	0.80000	0.90000	0.01789	0.04000	4.71%
0	Lab Control	5	0.91200	0.88000	0.94000	0.01020	0.02280	2.50%
0	Salt Control	5	0.85400	0.79000	0.93000	0.02315	0.05177	6.06%
25		5	0.90800	0.88000	0.96000	0.01744	0.03899	4.29%
50		5	0.92200	0.89000	0.94000	0.00917	0.02049	2.22%
~~65~~ 67		5	0.90400	0.88000	0.94000	0.01288	0.02881	3.19%
100		5	0.85800	0.79000	0.93000	0.02922	0.06535	7.62%

Proportion Normal Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.83000	0.88000	0.84000	0.90000	0.80000
0	Lab Control	0.92000	0.92000	0.90000	0.94000	0.88000
0	Salt Control	0.93000	0.87000	0.79000	0.85000	0.83000
25		0.94000	0.96000	0.88000	0.88000	0.88000
50		0.89000	0.94000	0.92000	0.92000	0.94000
~~65~~ 67		0.88000	0.89000	0.88000	0.93000	0.94000
100		0.93000	0.80000	0.79000	0.92000	0.85000

CETIS Report

Bivalve Larval Survival and Development Test A-Z	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	03-9390-9780	03-9390-9780	19 Aug-04 11:54 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		65	>65	1.54	N/A	7.07%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.58622	11.34487	0.66252	Equal Variances
Distribution	Shapiro-Wilk W	0.92000	0.86826	0.09927	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.03749486	0.0124983	3	4.00	0.02650	Significant Effect
Error	0.04994309	0.0031214	16			
Total	0.08743795	0.0156197	19			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	-2.635307	2.23	>0.05	0.07879753	Non-Significant Effect
		50	-3.221336	2.23	>0.05	0.07879753	Non-Significant Effect
		~~65~~ 67	-2.348176	2.23	>0.05	0.07879753	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	5	0.85000	0.80000	0.90000	0.04000	1.17567	1.10715	1.24905	0.05690
25		5	0.90800	0.88000	0.96000	0.03899	1.26879	1.21705	1.36944	0.07269
50		5	0.92200	0.89000	0.94000	0.02049	1.28949	1.23273	1.32333	0.03732
AH ~~65~~ 67		5	0.90400	0.88000	0.94000	0.02881	1.25864	1.21705	1.32333	0.05071

Approved By: 8/19

CETIS Report

Report Date: 19 Aug-04 11:55 AM
Analysis: 08-6399-4827

Bivalve Larval Survival and Development Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	03-9390-9780	03-9390-9780	19 Aug-04 11:54 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	9.30%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.57343	23.15450	0.67129	Equal Variances
Distribution	Shapiro-Wilk W	0.89516	0.78055	0.18927	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00018877	0.0001888	1	0.02	0.87969	Non-Significant Effect
Error	0.06184193	0.0077302	8			
Total	0.06203070	0.0079190	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-0.1562677	1.859548	0.56015	0.1034032	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.85400	0.79000	0.93000	0.05177	1.18373	1.09476	1.30303	0.07751
100		5	0.85800	0.79000	0.93000	0.06535	1.19242	1.09476	1.30303	0.09723

Approved By: 8/20/04

CETIS Worksheet

Report Date: 19 Jul-04 12:56 PM
Link: 03-9390-9780/0407-043

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	0407-043
End Date:	23 Jul-04	**Protocol:**	ASTM ~~(1993) 1998~~ AH 1999	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	A-2

Conc-%	Code	Rep	Pos	# Counted	# Normal		Notes
			41	100	92	RG	
			42	79	60	SD	
			43	100	79		
			44	100	94		
			45	100	80		
			46	100	92		
			47	100	88	RG	
			48	100	96	RG	
			49	100	93	SD	
			50	100	94	RG	
			51	100	88	SD	
			52	100	86	RG	
			53	100	42	SD	
			54	100	90	RG	
			55	100	92	RG	
			56	100	71	SD	
			57	100	94	RG	
			58	100	72	SD	
			59	100	85		
			60	100	93	RG	
			61	100	85	SD	
			62	100	89		
			63	100	79		
			64	100	88	RG	
			65	100	56	SD	
			66	100	83		
			67	100	92	RG	
			68	100	93	SD	
			69	100	94	RG	
			70	100	88	RG	
			71	100	92	RG	
			72	100	88	SD	
			73	100	94	RG	
			74	100	87	SD	
			75	100	89	RG	

- Sites A-2 and B-3 and C-2 will share LC1 and SC1 and BC1

data entry QC = AH

Analyst: RG/SD Reviewed By: AH 8-10-04

CETIS Worksheet

Report Date: 19 Jul-04 12:56 PM
Link: 03-9390-9780/0407-043

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	0407-043
End Date:	23 Jul-04	**Protocol:**	ASTM ~~(1993)~~ AH 1999	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	A-2

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
0	B	1	42			
0	B	2	56			
0	B	3	58			
0	B	4	65			
0	B	5	53			
0	LC	1	67			
0	LC	2	55			
0	LC	3	54			
0	LC	4	73			
0	LC	5	64			
0	SC	1	49			
0	SC	2	74			
0	SC	3	43			
0	SC	4	59			
0	SC	5	66			
25		1	50			
25		2	48			
25		3	47			
25		4	70			
25		5	52			
50		1	75			
50		2	69			
50		3	41			
50		4	71			
50		5	57			
65		1	51			
65		2	62			
65		3	72			
65		4	68			
65		5	44			
100		1	60			
100		2	45			
100		3	63			
100		4	46			
100		5	61			

67/65 AH

Sites QC = ~~AH~~
-- A-2 and B-3 will share LC1 and SC1.
A-2 and C-2 and BC1.

100% sample salted, not brined

Analyst: AH/JR Reviewed By: AH 8-10-04

Bivalve Development Bioassay Worksheet

Client: City of Buenaventura
Test No.: 0407-043-D046, 040721mgrt
Test Species: M. galloprovincialis

Start Date/Time: 7/21/04 1630
End Date/Time: 7/23/04 1615
Date Received: 7/20/04

Sample Type: Ambient Water

Test Chamber Type and Sample Volume: Shell Vials, 10ml

Spawn Initiation Time: 1110

	Male	Female
Number of Spawners:	4	1

Spawn Condition: Fair

Fertilization Time: 1330

Egg Stock Density Calculation:

Eggs Counted (x):		
	6	8
	7	17
	15	13
	16	6
	11	17
Mean	11	12.2

Overall Mean: 11.6

Mean: 11.6 X 42 = 487.2 eggs/ml

Initial Stock - 487 eggs/ml = Stock Dilution Factor 1.22
Inoculum Stock - ~~200~~ ~~487~~ 400 eggs/ml

1ess/0.22 water
100ess/22water

Percent Division Upon Inoculation: 90

Time of Inoculation: 1630

Comments:

Reviewed/ Date: AH 8.10.04

AMEC Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121
(858) 458-9044

Marine Chronic Bioassay **Water Quality Measurements** Raw Datasheet

Client: City of Buenaventura
Sample ID: A-2, B-1
Test No.: 0407-043,044

Test Species: M. galloprovincialis
Start/End Dates: 7-21-04 / 7-23-04
Start/End Times: 1630 | 1615

	Concentration %	Temperature (°C)			Salinity (ppt)			Dissolved Oxygen (mg/L)			pH (pH units)		
		0	24	48	0	24	48	0	24	48	0	24	48
	Lab Control 1	15.0	14.5	14.4	30	30.1	30.6	8.2	8.0	8.7	7.99	7.96	7.89
#1	Brine Control 1	15.0	14.4	14.3	30	31.2	31.3	7.7	7.8	8.6	8.00	7.96	7.92
	Salt Control 1	15.0	14.4	14.4	30	30.2	31.4	7.4	7.5	8.5	8.41	8.29	8.19
	A-2 25%	15.0	14.2	14.4	30	30.6	30.6	8.4	7.9	8.7	8.46	8.25	8.14
	A-2 50%	15.0	14.3	14.3	30	31.2	30.3	8.6	7.9	8.5	8.65	8.44	8.30
	A-2 67%	15.0	14.3	14.4	30	31.8	31.9	8.7	7.8	8.5	8.73	8.52	8.39
	A-2 100%	15.0	14.2	14.6	30	30.3	30.4	7.7	7.6	8.4	8.90	8.77	8.66
#2	Brine Cont. 2	15.0	15.9	16.1	30	30.8	30.5	7.6	7.6	8.3	8.01	7.94	7.90
	B-1 25%	15.0	15.9	15.8	30	30.1	30.1	8.0	7.8	8.5	7.92	8.02	8.04
	B-1 50%	15.0	15.7	15.8	30	31.1	31.1	8.0	7.8	8.5	7.86	8.06	8.10
	B-1 67%	15.0	15.7	15.6	31	31.6	31.5	7.9	7.8	8.5	7.83	8.08	8.15
	B-1 100%	15.0	15.5	15.5	30	30.3	30.2	7.6	7.6	8.4	8.14	8.25	8.29

Technician Initials:	0	24	48
	JR	AH	ML

Animal Source/Date Received: Mission Bay Collected 7/20

Comments:
0 hrs: A-2, B-3, C2 share LC1, SC1, B1 ~~B1~~ JR B-1 has BC2, LC2, SC2
24 hrs:
48 hrs:

QC Check: AH 8-10-04 Final Review: [signature] 8/20/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

Marine Chronic Bioassay **Water Quality Measurements** Raw Datasheet

Client: City of Buenaventura
Sample ID: B-3, C-2
Test No.: 0407-045, 046

Test Species: M. galloprovincialis
Start/End Dates: 7-21-04 / 7-23-04
Start/End Times: ~~A~~ 1630 / 1615
me

	Concentration %	Temperature (°C)			Salinity (ppt)			Dissolved Oxygen (mg/L)			pH (pH units)		
		0	24	48	0	24	48	0	24	48	0	24	48
	Lab Control 2	15.0	16.2	16.0	30	29.9	29.5	8.1	7.7	8.3	8.02	7.92	7.85
#1	Brine Control	15.0	14.4	~~14.3~~	30	31.2	31.3	7.7	7.8	8.6	8.00	7.96	7.92
	Salt Control 2	15.0	16.1	16.1	30	31.4	31.2	7.3	7.3	8.1	8.42	8.30	8.22
	B-3 25%	15.0	14.6	14.7	30	30.5	30.3	8.3	7.9	8.4	8.37	8.26	8.17
	B-3 50%	15.0	14.7	14.8	30	31.1	31.0	8.4	7.9	8.4	8.53	8.39	8.29
	B-3 67%	15.0	14.7	14.8	31	31.0	31.2	8.5	7.8	8.4	8.61	8.47	8.37
	B-3 100%	15.0	14.7	14.9	30	30.0	30.2	8.0	7.5	8.4	8.82	8.72	8.63
#1	Brine Cont. 1	15.0	14.4	14.3	30	31.2	31.3	7.7	7.8	8.6	8.00	7.96	7.92
	C-2 25%	15.0	14.6	15.1	30	30.1	30.0	8.1	7.7	8.5	8.21	8.14	8.07
	C-2 50%	15.0	14.7	15.0	31	30.9	30.9	8.2	7.7	8.5	8.33	8.22	8.16
	C-2 67%	15.0	14.9	15.1	31	31.5	31.5	8.1	7.5	8.4	8.37	8.27	8.22
	C-2 100%	15.0	15.0	15.1	30	30.5	30.5	7.9	7.5	8.3	8.62	8.54	8.45

Technician Initials:	0	24	48
	JR	AH	me

Animal Source/Date Received: Mission Bay Collected 7/20

Comments:
0 hrs: A-2, B-3, C-2 share LC1, BC1, SC1 B-1 has LC2, BC2, SC2
24 hrs:
48 hrs:

QC Check: AH 8-10-04 Final Review: 8/20/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

Brine Dilution Worksheet

Client: City of Buenaventura **Analyst:** JR/AH

Sample ID: A-2, B-3, C-2 **Test Date:** 07/21/2004

Test No: 0407-043,45,46 **Test Type:** (Bivalve)/Kelp

Salinity of Effluent	3.0
Salinity of Brine	89
Target Salinity	30
Test Dilution Volume	250

Salinity Adjustment Factor: $\frac{\text{TS - SE}}{\text{SB - TS}}$

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.46

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
6.25	15.6	0.46	7.2	250
12.5	31.3	0.46	14.3	250
25	62.5	0.46	28.6	250
50	125.0	0.46	57.2	250
67	167.5	0.46	76.7	250
	DI Volume			
Brine Control	151	0.51	76.7	250

Brine Control Salinity Adjustment Factor 260.7

Brine Control Calculation: $\frac{\text{TS - 0}}{\text{SB - TS}}$

AMEC Earth and Environmental, Inc.
San Diego Bioassay Laboratory
5550 Morehouse Drive. Suite B
San Diego, CA 92121

Brine Dilution Worksheet

Client: City of Buenaventura **Analyst:** JR/AH

Sample ID: B-1 **Test Date:** 07/21/2004

Test No: 0407-044 **Test Type:** Bivalve/Kelp

Salinity of Effluent	1.1
Salinity of Brine	89
Target Salinity	30
Test Dilution Volume	250

Salinity Adjustment Factor: $\frac{\text{TS - SE}}{\text{SB - TS}}$

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = **0.49**

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
6.25	15.6	0.49	7.7	250
12.5	31.3	0.49	15.3	250
25	62.5	0.49	30.6	250
50	125.0	0.49	61.2	250
67	168	0.49	82.2	250
	DI Volume			
Brine Control	162	0.51	82.2	250

Brine Control Salinity Adjustment Factor 279.2

Brine Control Calculation: $\frac{\text{TS - 0}}{\text{SB - TS}}$

AMEC Earth and Environmental, Inc.
San Diego Bioassay Laboratory
5550 Morehouse Drive. Suite B
San Diego, CA 92121

CETIS Report

Bivalve Larval Survival and Development Test B-1 — AMEC Bioassay SD

Test:	08-2544-2401	**Test Type:**	Development	**Duration:**	48 Hours
Start Date:	21 Jul-04 04:30 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
End Date:	23 Jul-04 04:15 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	21 Jul-04 04:30 PM	**Brine:**	Frozen Seawater		

Sample:	05-5463-2478	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 01:40 PM	**Code:**	0407-044	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	27 Hours (18.4 °C)	**Station:**	B-1		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
09-2290-4581	Proportion Normal	100	>100	N/A	0.05752	Equal Variance t
20-0943-9801		65	>65	N/A	0.08296	Dunnett's Multiple Comparison

Proportion Normal Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.85000	0.80000	0.90000	0.01789	0.04000	4.71%
0	Lab Control	5	0.91200	0.88000	0.94000	0.01020	0.02280	2.50%
0	Salt Control	5	0.82600	0.75000	0.86000	0.01965	0.04393	5.32%
25		5	0.89000	0.84000	0.95000	0.01789	0.04000	4.49%
50		5	0.87400	0.80000	0.91000	0.02040	0.04561	5.22%
AH ~~65~~ 67		5	0.85800	0.80000	0.92000	0.02059	0.04604	5.37%
100		5	0.83600	0.79000	0.87000	0.01536	0.03435	4.11%

Proportion Normal Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.83000	0.88000	0.84000	0.90000	0.80000
0	Lab Control	0.90000	0.92000	0.88000	0.92000	0.94000
0	Salt Control	0.84000	0.85000	0.86000	0.75000	0.83000
25		0.88000	0.95000	0.84000	0.88000	0.90000
50		0.90000	0.80000	0.90000	0.86000	0.91000
~~65~~ 67		0.86000	0.92000	0.88000	0.83000	0.80000
100		0.87000	0.79000	0.81000	0.86000	0.85000

CETIS Report

Bivalve Larval Survival and Development Test B-1	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	02-0286-0226	02-0286-0226	19 Aug-04 11:44 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		65	>65	1.54	N/A	8.30%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	0.15082	11.34487	0.98511	Equal Variances
Distribution	Shapiro-Wilk W	0.97546	0.86826	0.83755	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.01116565	0.0037219	3	0.88	0.47003	Non-Significant Effect
Error	0.06731781	0.0042074	16			
Total	0.07848346	0.0079292	19			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	-1.508305	2.23	>0.05	0.09148289	Non-Significant Effect
		50	-0.879038	2.23	>0.05	0.09148289	Non-Significant Effect
		~~65~~67	-0.3072069	2.23	>0.05	0.09148289	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	5	0.85000	0.80000	0.90000	0.04000	1.17567	1 10715	1.24905	0.05690
25		5	0.89000	0.84000	0.95000	0.04000	1.23754	1.15928	1.34528	0.06838
50		5	0.87400	0.80000	0.91000	0.04561	1.21173	1.10715	1.26610	0.06572
AH ~~65~~67		5	0.85800	0.80000	0.92000	0.04604	1.18827	1.10715	1.28404	0.06780

Approved By: 8/20

CETIS Report

Report Date: 19 Aug-04 11:44 AM
Analysis: 09-2290-4581

Bivalve Larval Survival and Development Test B-1	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	02-0286-0226	02-0286-0226	19 Aug-04 11:44 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	5.75%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.45906	23.15450	0.72323	Equal Variances
Distribution	Shapiro-Wilk W	0.86428	0.78055	0.08870	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00041192	0.0004119	1	0.16	0.70075	Non-Significant Effect
Error	0.02076072	0.0025951	8			
Total	0.02117264	0.0030070	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-0.3984087	1.859548	0.64962	0.05991197	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.82600	0.75000	0.86000	0.04393	1.14254	1.04720	1.18730	0.05549
100		5	0.83600	0.79000	0.87000	0.03435	1.15537	1.09476	1.20193	0.04594

CETIS Worksheet

Report Date: 19 Jul-04 1:11 PM
Link: 02-0286-0226/0407-044

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Start Date:	21 Jul-04	Species:	Mytilis galloprovincialis	Sample Code:	0407-044
End Date:	23 Jul-04	Protocol:	ASTM (~~1993~~) ~~1994~~ AH 1999	Sample Source:	City of Buenaventura
Sampled:	20 Jul-04	Material:	Estuarine Monitoring Sample	Sample Station:	B-1

Conc-%	Code	Rep	Pos	# Counted	# Normal		Notes
			76	100	90	RG	
			77	100	91	RG	
			78	100	87	SD	
			79	100	88	RG	
			80	100	80	RG	
			81	100	88	RG	
			82	100	79	SD	
			83		88		
			84		83		
			85	100	65	SD	
			86	100	86	RG	
			87	100	~~38~~ 34	SD	
			88	100	81		
			89	100	92		
			90	100	~~38~~ 32		
			91	100	89		
			92	100	84	RG	
			93	100	86	SD	
			94	100	90	RG	
			95	100	95	RG	
			96	100	83	SD	
			97	100	86		
			98	100	41		
			99	100	90	RG	
			100	100	49	SD	

data entry QC = AH

-sites [redacted] [redacted] B-1 will ~~share~~ have LC1 ~~LC2~~ and SC2 and ~~SC2~~ BC1

	#counted	#normal
LC2 A	100	75
LC2 B		
LC2 C		
LC2 D		
LC2 E		
SC2 A	100	84
SC2 B		85
SC2 C		86
SC2 D		75
SC2 E		83

LC2 embryos look very small, possible cup contamination, all sites will share LC1

LC1 A	100	90
LC1 B		92
LC1 C		88
LC1 D		92
LC1 E		94

Analyst: RG/SD Reviewed By: AH 8-10-04

CETIS Worksheet

Report Date: 19 Jul-04 1:10 PM
Link: 02-0286-0226/0407-044

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	0407-044
End Date:	23 Jul-04	**Protocol:**	ASTM ~~(1993) 1994~~ AH 1999	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	B-1

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
0	B	1	87			
0	B	2	98			
0	B	3	85			
0	B	4	100			
0	B	5	90			
25		1	79			
25		2	95			
25		3	92			
25		4	81			
25		5	76			
50		1	99			
50		2	80			
50		3	94			
50		4	86			
50		5	77			
65		1	97			
65		2	89			
65		3	83			
65		4	84			
65		5	91			
100		1	78			
100		2	82			
100		3	88			
100		4	93			
100		5	96			

67% AH

QC = AH

- Sites [redacted] [redacted] B-1 will ~~share~~ have LC2 and SC2 and BC2

100% salted, not brined

Analyst: AH Reviewed By: AH 8-10-04

CETIS Report

Bivalve Larval Survival and Development Test B-3 — AMEC Bioassay SD

Test:	08-2544-2401	**Test Type:**	Development	**Duration:**	48 Hours
Start Date:	21 Jul-04 04:30 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
End Date:	23 Jul-04 04:15 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	21 Jul-04 04:30 PM	**Brine:**	Frozen Seawater		

Sample:	14-3889-1352	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 10:40 AM	**Code:**	0407-045	**Project:**	
Received:	20 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	30 Hours (18.2 °C)	**Station:**	B-3		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
03-1080-2927	Proportion Normal	100	>100	N/A	0.11138	Equal Variance t
08-8801-9129		65	>65	N/A	0.08450	Dunnett's Multiple Comparison

Proportion Normal Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.85000	0.80000	0.90000	0.01789	0.04000	4.71%
0	Lab Control	5	0.91200	0.88000	0.94000	0.01020	0.02280	2.50%
0	Salt Control	5	0.82200	0.77000	0.87000	0.01594	0.03564	4.34%
25		5	0.89800	0.82000	0.97000	0.02518	0.05630	6.27%
50		5	0.90400	0.86000	0.95000	0.01503	0.03362	3.72%
AH ~~65~~ 67		5	0.87000	0.84000	0.89000	0.00894	0.02000	2.30%
100		5	0.85600	0.75000	0.93000	0.03945	0.08820	10.30%

Proportion Normal Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.83000	0.88000	0.84000	0.90000	0.80000
0	Lab Control	0.92000	0.94000	0.88000	0.90000	0.92000
0	Salt Control	0.82000	0.77000	0.83000	0.87000	0.82000
25		0.89000	0.93000	0.88000	0.82000	0.97000
50		0.89000	0.90000	0.86000	0.92000	0.95000
~~65~~ 67		0.84000	0.88000	0.89000	0.88000	0.86000
100		0.75000	0.92000	0.91000	0.77000	0.93000

CETIS Report

Bivalve Larval Survival and Development Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	04-3454-4273	04-3454-4273	19 Aug-04 11:42 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		65	>65	1.54	N/A	8.45%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	4.79824	11.34487	0.18718	Equal Variances
Distribution	Shapiro-Wilk W	0.98355	0.86826	0.95768	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.02557489	0.008525	3	1.96	0.16107	Non-Significant Effect
Error	0.06967379	0.0043546	16			
Total	0.09524868	0.0128796	19			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	-1.935254	2.23	>0.05	0.09306997	Non-Significant Effect
		50	-2.012979	2.23	>0.05	0.09306997	Non-Significant Effect
		~~65~~ 67	-0.6473308	2.23	>0.05	0.09306997	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	5	0.85000	0.80000	0.90000	0.04000	1.17567	1.10715	1.24905	0.05690
25		5	0.89800	0.82000	0.97000	0.05630	1.25644	1.13265	1.39671	0.09910
50		5	0.90400	0.86000	0.95000	0.03362	1.25968	1.18730	1.34528	0.05916
~~65~~ 67		5	0.87000	0.84000	0.89000	0.02000	1.20268	1.15928	1.23273	0.02931

CETIS Report

Bivalve Larval Survival and Development Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	04-3454-4273	04-3454-4273	19 Aug-04 11:42 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	11.14%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	7.09169	23.15450	0.08409	Equal Variances
Distribution	Shapiro-Wilk W	0.92410	0.78055	0.37178	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00825634	0.0082563	1	0.93	0.36209	Non-Significant Effect
Error	0.07070667	0.0088383	8			
Total	0.07896302	0.0170947	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-0.9665151	1.859548	0.81895	0.1105663	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.82200	0.77000	0.87000	0.03564	1.13673	1.07062	1.20193	0.04674
100		5	0.85600	0.75000	0.93000	0.08820	1.19420	1.04720	1.30303	0.12447

CETIS Worksheet

Report Date: 19 Jul-04 1:13 PM
Link: 04-3454-4273/0407-045

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	0407-045
End Date:	23 Jul-04	**Protocol:**	ASTM ~~(1993):D44~~ D8 1999	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	B-3

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
			101	100	90	
			102	100	82	SD
			103	100	88	SD
			104	100	95	RG
			105	100	80	SD
			106	100	57	L
			107	100	92	
			108	100	88	RG
			109	100	77	SD
			110	100	~~57~~ 58	L
			111	100	89	L
			112	100	90	RG
			113	100	75	SD
			114	100	86	RG
			115	100	89	RG
			116	100	93	RG
			117	100	88	
			118	100	92	
			119	100	77	SD
			120	100	86	SD
			121	100	92	RG
			122	100	89	RG
			123	100	93	RG
			124	100	87	SD
			125	100	91	RG
			126	100	97	RG
			127	100	83	SD
			128	100	94	
			129			100/82 SD
			130	100	88	L
			131	100	84	
			132	100	92	RG
			133			100/63 SD
			134	100	76	L
			135	~~100~~ SD	~~76~~	100 82 AH

- Sites B-3 and C-2 will share LC1 and SC1. and A-2 and BC1

data entry QC = AH

rep	# counted	# normal
BC1A	100	83
BC1B	100	88
BC1C	100	84
BC1D	100	90
BC1E	100	80

Analyst: SD; RG Reviewed By: AH 8-12-04

CETIS Worksheet

Report Date: 19 Jul-04 1:13 PM
Link: 04-3454-4273/0407-045

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	0407-045
End Date:	23 Jul-04	**Protocol:**	ASTM ~~(1993)~~ ~~1994~~ AH 1999	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	B-3

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
0	B	1	133			
0	B	2	129			
0	B	3	110			
0	B	4	134			
0	B	5	106			
0	LC	1	118			
0	LC	2	128			
0	LC	3	117			
0	LC	4	101			
0	LC	5	107			
0	SC	1	105			
0	SC	2	119			
0	SC	3	127			
0	SC	4	124			
0	SC	5	102			
25		1	122			
25		2	123			
25		3	108			
25		4	135			
25		5	126			
50		1	115			
50		2	112			
50		3	114			
50		4	132			
50		5	104			
65		1	131			
65		2	103			
65		3	111			
65		4	130			
65		5	120			
100		1	113			
100		2	121			
100		3	125			
100		4	109			
100		5	116			

- Sites B-3, ~~C-2~~ A-2 C-2 will share LC1 and SC1 and BC1 QC=AH

100% sample salted, not brined.

CETIS Report

Bivalve Larval Survival and Development Test C-2 — AMEC Bioassay SD

Test:	08-2544-2401	Test Type:	Development	Duration:	48 Hours
Start Date:	21 Jul-04 04:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
End Date:	23 Jul-04 04:15 PM	Dil Water:	Laboratory Seawater	Source:	Field Collected
Setup Date:	21 Jul-04 04:30 PM	Brine:	Frozen Seawater		

Sample:	12-1088-3277	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 09:35 AM	Code:	0407-046	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	31 Hours (18.5 °C)	Station:	C-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
18-2157-6921	Proportion Normal	100	>100	N/A	0.04275	Equal Variance t
00-6482-4201		65	>65	N/A	0.09771	Dunnett's Multiple Comparison

Proportion Normal Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.85000	0.80000	0.90000	0.01789	0.04000	4.71%
0	Lab Control	5	0.91200	0.88000	0.94000	0.01020	0.02280	2.50%
0	Salt Control	5	0.82200	0.77000	0.87000	0.01594	0.03564	4.34%
25		5	0.89400	0.81000	0.97000	0.02619	0.05857	6.55%
50		5	0.88400	0.87000	0.91000	0.00748	0.01673	1.89%
~~65~~ 67		5	0.89800	0.85000	0.97000	0.02267	0.05070	5.65%
100		5	0.88600	0.86000	0.90000	0.00748	0.01673	1.89%

Proportion Normal Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.90000	0.88000	0.80000	0.83000	0.84000
0	Lab Control	0.90000	0.92000	0.88000	0.92000	0.94000
0	Salt Control	0.82000	0.82000	0.77000	0.87000	0.83000
25		0.97000	0.92000	0.81000	0.88000	0.89000
50		0.88000	0.91000	0.87000	0.87000	0.89000
~~65~~ 67		0.92000	0.90000	0.85000	0.85000	0.97000
100		0.89000	0.90000	0.88000	0.86000	0.90000

CETIS Report

Bivalve Larval Survival and Development Test C-Z — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	13-0592-7343	13-0592-7343	19 Aug-04 10:08 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		65	>65	1.54	N/A	9.77%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	5.94360	11.34487	0.11439	Equal Variances
Distribution	Shapiro-Wilk W	0.95308	0.86826	0.40556	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.01984455	0.0066148	3	1.16	0.35559	Non-Significant Effect
Error	0.09122786	0.0057017	16			
Total	0.11107241	0.0123166	19			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	-1.557782	2.23	>0.05	0.1064973	Non-Significant Effect
		50	-1.011042	2.23	>0.05	0.1064973	Non-Significant Effect
		~~65~~ 67	-1.665345	2.23	>0.05	0.1064973	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	5	0.85000	0.80000	0.90000	0.04000	1.17567	1.10715	1.24905	0.05690
25		5	0.89400	0.81000	0.97000	0.05857	1.25006	1.11977	1.39671	0.10128
50		5	0.88400	0.87000	0.91000	0.01673	1.22395	1.20193	1.26610	0.02679
~~65~~ 67		5	0.89800	0.85000	0.97000	0.05069	1.25520	1.17310	1.39671	0.09271

CETIS Report

Report Date: 19 Aug-04 11:33 AM
Analysis: 18-2157-6921

Bivalve Larval Survival and Development Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	13-0592-7343	13-0592-7343	19 Aug-04 10:08 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	4.27%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.26061	23.15450	0.27881	Equal Variances
Distribution	Shapiro-Wilk W	0.95701	0.78055	0.72355	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.02038743	0.0203874	1	14.28	0.00539	Significant Effect
Error	0.0114181	0.0014273	8			
Total	0.03180554	0.0218147	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-3.779456	1.859548	0.99730	0.04443134	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.82200	0.77000	0.87000	0.03564	1.13673	1.07062	1.20193	0.04674
100		5	0.88600	0.86000	0.90000	0.01673	1.22704	1.18730	1.24905	0.02588

Approved By: 8/19/04

CETIS Worksheet

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	0407-046
End Date:	23 Jul-04	**Protocol:**	ASTM ~~(1993)~~ AH 1999	**Sample Source:**	City of Buenaventura
Sampled:	ok 20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	C-2

Conc-%	Code	Rep	Pos	# Counted	# Normal		reread	Notes	
			136	113	95	RB	100	86	MC
			137	114	102	RB	100	88	
			138	109	85	RB		85	
			139	112	81	RB		81	
			140	104	86	RB		89	
			141	102	89	RB		89	
			142	109	95	RB		92	
			143	100	88	RB		90	
			144	106	80	RB		83	
			145	104	77	RB		88	
			146	100	86	RB		89	
			147	100	84	RG			
			148	100	92	RG			
			149	100	90	RG			
			150	100	91	RG			
			151	100	87	RG			
			152	100	97	RG			
			153	100	90	RG			
			154	100	90	RG			
			155	100	97	RG			
			156		80	SD			
			157		83				
			158		85				
			159		88				
			160		87				

sites B-3 and C-2 will share LC1 and SC1 and A-2 and BC1

data entry QC = AH

rep	# counted	# normal
LC1 A	100	90
LC1 B		92
LC1 C		88
LC1 D		92
LC1 E		94
SC1 A		82
SC1 B		82
SC1 C		77
SC1 D		87
SC1 E		83

Analyst: SD, RG, RS Reviewed By: AH 8-12-04

CETIS Worksheet

Report Date: 19 Jul-04 1:15 PM
Link: 13-0592-7343/0407-046

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	0407-046
End Date:	23 Jul-04	**Protocol:**	ASTM (~~1993~~) ~~1994~~ AH 1999	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	C-2

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
0	B	1	149			
0	B	2	145			
0	B	3	156			
0	B	4	144			
0	B	5	147			
25		1	155			
25		2	142			
25		3	139			
25		4	159			
25		5	141			
50		1	137			
50		2	150			
50		3	160			
50		4	151			
50		5	140			
65		1	148			
65		2	154			
65		3	138			
65		4	158			
65		5	152			
100		1	146			
100		2	153			
100		3	157			
100		4	136			
100		5	143			

BC1

All 67%

QC=AH

Sites B-3 and C-2 will share LC1 and SC1 and A-2 and BC1

100% sample saltrd, not brined

M. PYRIFERA

CETIS Report

Macrocystis Germination and Germ Tube Growth Test A-2 — **AMEC Bioassay SD**

Test:	05-5898-6693	**Test Type:**	Growth-Germination	**Duration:**	44 Hours
Start Date:	21 Jul-04 02:00 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Macrocystis pyrifera
End Date:	23 Jul-04 10:00 AM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	21 Jul-04 02:00 PM	**Brine:**	Frozen Seawater		

Comment: 100% concentration obtained by using Forty Fathoms artificial salt.

Sample:	00-8993-8061	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 02:50 PM	**Code:**	0407-039	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	23 Hours (19.3 °C)	**Station:**	A-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
08-1106-7081	Mean Length	100	>100	N/A	0.13235	Equal Variance t
10-0873-2247		65	>65	N/A	0.13850	Bonferroni Adj t
02-8313-5876	Proportion Germinated	<100	100	N/A	0.04964	Equal Variance t
09-1601-6914		65	>65	N/A	0.14317	Bonferroni Adj t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
02-8313-5876	Proportion Germinated	Control Response	0.806	0.7		Passes acceptability criteria
09-1601-6914			0.7275	0.7		Passes acceptability criteria
08-1106-7081	Mean Length		11.65	10		Passes acceptability criteria
10-0873-2247			12.938	10		Passes acceptability criteria
02-8313-5876	Proportion Germinated	MSDp	0.0496		0.2	Passes acceptability criteria
09-1601-6914			0.1432		0.2	Passes acceptability criteria
08-1106-7081	Mean Length		0.1323		0.2	Passes acceptability criteria
10-0873-2247			0.1385		0.2	Passes acceptability criteria

Mean Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	12.9375	11.2500	14.0000	0.59839	1.19678	9.25%
0	Lab Control	5	11.8000	10.0000	13.0000	0.50867	1.13743	9.64%
0	Salt Control	5	11.6500	10.7500	12.7500	0.40000	0.89443	7.68%
25		5	10.2500	8.25000	11.7500	0.57009	1.27475	12.44%
50		5	12.0000	10.7500	13.5000	0.54199	1.21192	10.10%
65		5	13.3500	12.0000	14.2500	0.37583	0.84039	6.30%
100		5	11.3000	8.75000	12.7500	0.72629	1.62404	14.37%

Proportion Germinated Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.72750	0.67000	0.78000	0.02780	0.05560	7.64%
0	Lab Control	5	0.71600	0.68000	0.80000	0.02205	0.04930	6.88%
0	Salt Control	5	0.80600	0.78000	0.83000	0.00927	0.02074	2.57%
25		5	0.68600	0.62000	0.79000	0.03234	0.07232	10.54%
50		5	0.65200	0.59000	0.74000	0.03397	0.07596	11.65%
65		5	0.74800	0.69000	0.81000	0.02131	0.04764	6.37%
100		5	0.66600	0.63000	0.75000	0.02159	0.04827	7.25%

CETIS Report

Mean Length Detail A-2

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	11.2500	*	13.0000	14.0000	13.5000
0	Lab Control	12.2500	11.5000	13.0000	10.0000	12.2500
0	Salt Control	11.7500	10.7500	12.2500	12.7500	10.7500
25		10.7500	11.7500	8.25000	10.2500	10.2500
50		10.7500	11.0000	13.0000	13.5000	11.7500
65		13.5000	13.2500	12.0000	13.7500	14.2500
100		12.7500	11.7500	8.75000	12.5000	10.7500

Proportion Germinated Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.78000	*	0.77000	0.67000	0.69000
0	Lab Control	0.69000	0.69000	0.68000	0.80000	0.72000
0	Salt Control	0.78000	0.82000	0.83000	0.81000	0.79000
25		0.79000	0.73000	0.62000	0.66000	0.63000
50		0.74000	0.73000	0.59000	0.60000	0.60000
65		0.81000	0.74000	0.72000	0.78000	0.69000
100		0.63000	0.66000	0.75000	0.65000	0.64000

*replicate excluded from analysis due to possible cup contamination.

CETIS Report

Report Date: 23 Aug-04 3:02 PM
Analysis: 02-8313-5876

Macrocystis Germination and Germ Tube Growth Test A-2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	02-0826-0660	02-0826-0660	23 Aug-04 3:02 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		<100	100		N/A	4.96%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.806	0.7		Passes acceptability criteria
MSDp	0.0496		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	4.03222	23.15450	0.20555	Equal Variances
Distribution	Shapiro-Wilk W	0.85826	0.78055	0.07628	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.06370729	0.0637073	1	36.92	0.00030	Significant Effect
Error	0.01380394	0.0017255	8			
Total	0.07751123	0.0654328	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	6.076284	1.859548	0.00015	0.04885329	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.80600	0.78000	0.83000	0.02074	1.11512	1.08259	1.14581	0.02619
100		5	0.66600	0.63000	0.75000	0.04827	0.95548	0.91691	1.04720	0.05259

CETIS Report

Macrocystis Germination and Germ Tube Growth Test A-2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	02-0826-0660	02-0826-0660	23 Aug-04 3:02 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	13.23%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	11.65	10		Passes acceptability criteria
MSDp	0.1323		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.29688	23.15450	0.27455	Equal Variances
Distribution	Shapiro-Wilk W	0.92671	0.78055	0.39405	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.30625	0.30625	1	0.18	0.68406	Non-Significant Effect
Error	13.75	1.71875	8			
Total	14.0562500	2.0250000	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	0.4221159	1.859548	0.34203	1.541856	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	11.6500	10.7500	12.7500	0.89443				
100		5	11.3000	8.75000	12.7500	1.62404				

 Approved By: 8/25/04

CETIS Report

Macrocystis Germination and Germ Tube Growth Test A-2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	02-0826-0660	02-0826-0660	23 Aug-04 3:02 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Angular (Corrected)		65	>65	1.54	N/A	14.32%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.7275	0.7		Passes acceptability criteria
MSDp	0.1432		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	0.69799	11.34487	0.87368	Equal Variances
Distribution	Shapiro-Wilk W	0.86894	0.86288	0.01293	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.03195995	0.0106533	3	2.11	0.14184	Non-Significant Effect
Error	0.07573615	0.0050491	15			
Total	0.1076961	0.0157024	18			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	0.9421287	2.342925	0.18053	0.1116788	Non-Significant Effect
		50	1.708894	2.342925	0.05404	0.1116788	Non-Significant Effect
		65	-0.4872575	2.342925	0.68344	0.1116788	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	4	0.72750	0.67000	0.78000	0.05560	1.02309	0.95886	1.08259	0.06260
25		5	0.68600	0.62000	0.79000	0.07232	0.97818	0.90658	1.09476	0.07985
50		5	0.65200	0.59000	0.74000	0.07596	0.94163	0.87589	1.03573	0.08093
65		5	0.74800	0.69000	0.81000	0.04764	1.04632	0.98030	1.11977	0.05540

CETIS Report

Macrocystis Germination and Germ Tube Growth Test A-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	02-0826-0660	02-0826-0660	23 Aug-04 3:02 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Untransformed		65	>65	1.54	N/A	13.85%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	12.938	10		Passes acceptability criteria
MSDp	0.1385		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	0.68888	11.34487	0.87582	Equal Variances
Distribution	Shapiro-Wilk W	0.94577	0.86288	0.32803	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	27.77944	9.259813	3	7.12	0.00337	Significant Effect
Error	19.49688	1.299792	15			
Total	47.2763157	10.559605	18			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	3.514029	2.342925	0.00157	1.791849	Significant Effect
		50	1.225824	2.342925	0.11958	1.791849	Non-Significant Effect
		65	-0.5393626	2.342925	0.70122	1.791849	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	4	12.9375	11.2500	14.0000	1.19678				
25		5	10.2500	8.25000	11.7500	1.27475				
50		5	12.0000	10.7500	13.5000	1.21192				
65		5	13.3500	12.0000	14.2500	0.84039				

Macrocystis Germination and Germ Tube Growth Test

AMEC Bioassay Laboratory - San Diego

Start Date: 21-Jul-04
End Date: 23-Jul-04
Sampled: 20-Jul-04

Species: *Macrocystis pyrifera*
Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Test ID: 0407-039
Sample Source: City of Buenaventura
Sample Station: A-2

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
36	100	81	6	6	7	5	6	6	4	4	5	5	2.5	13.5
b 37	100	70	5	6	4	5	4	4	5	5	5	5	2.5	12
38	100	62	3	3	5	3	4	2	3	3	4	3	2.5	8.25
b 39	100	65	6	5	5	3	7	4	4	6	4	4	2.5	12
40	100	66	7	3	5	4	4	5	5	6	5	3	2.5	11.75
41	100	69	3	4	3	5	5	6	6	4	4	6	2.5	11.5
42	100	60	3	4	4	4	6	6	4	4	5	7	2.5	11.75
43	100	59	5	4	4	5	5	5	6	6	5	7	2.5	13
b 44	100	64	6	6	7	5	4	5	5	6	5	5	2.5	13.5
45	100	60	6	4	6	6	4	6	5	7	5	5	2.5	13.5
46	100	72	5	4	4	4	4	5	6	6	6	5	2.5	12.25
47	100	78	6	3	6	5	4	4	4	5	4	6	2.5	11.75
48	100	63	4	4	5	6	5	4	5	6	6	6	2.5	12.75
49	100	69	5	7	7	7	6	6	5	5	4	5	2.5	14.25
50	100	79	5	3	4	4	4	4	5	4	5	5	2.5	10.75
51	100	73	4	4	5	4	5	4	5	5	4	4	2.5	11
52	100	65	5	4	4	7	8	5	3	4	5	5	2.5	12.5
53	100	63	5	3	2	4	3	6	4	4	4	6	2.5	10.25
54	100	82	5	3	4	4	5	5	5	4	3	5	2.5	10.75
55	100	74	5	5	5	4	4	3	4	4	5	4	2.5	10.75
56	100	68	6	3	4	6	6	5	4	6	6	6	2.5	13
b 57	100	71	7	4	6	5	5	5	5	6	4	7	2.5	13.5
58	100	73	5	5	4	4	4	4	3	6	6	6	2.5	11.75
59	100	78	8	6	5	4	7	3	5	6	6	5	2.5	13.75
60	100	80	3	4	4	3	5	3	4	3	5	6	2.5	10
b 61	100	68	5	3	5	5	3	6	4	4	6	6	2.5	11.75
62	100	72	5	6	6	6	3	4	3	4	5	6	2.5	12
63	100	69	4	6	4	5	3	5	6	7	4	5	2.5	12.25
64	100	83	4	4	4	4	5	5	7	5	6	5	2.5	12.25
65	100	74	5	4	5	6	4	5	7	6	6	5	2.5	13.25
66	100	81	3	5	6	4	5	5	6	5	6	6	2.5	12.75
67	100	79	4	4	5	4	4	5	5	4	4	4	2.5	10.75
68	100	64	5	4	4	3	5	5	4	4	5	4	2.5	10.75
69	100	75	3	3	4	3	3	3	4	4	5	3	2.5	8.75
70	100	66	5	3	3	5	5	3	4	4	3	6	2.5	10.25

data entry QC

QC Check: AH 7-29-04

Final Review: 8/20/04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 21-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 0407-039

End Date: 23-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 | **Sample Station:** A-2

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
36	100	81	6	6	7	5	6	6	4	4	5	5	2.5	13.5
37	100	78	4	5	4	4	5	4	5	5	5	4	2.5	11.25
38	100	62	3	3	5	3	4	2	3	3	4	3	2.5	8.25
39			*replicate excluded due to possible contamination. 0% germinated.											
40	100	66	7	3	5	4	4	5	5	6	5	3	2.5	11.75
41	100	69	3	4	3	5	5	6	6	4	4	6	2.5	11.5
42	100	60	3	4	4	4	6	6	4	4	5	7	2.5	11.75
43	100	59	5	4	4	5	5	5	6	6	5	7	2.5	13
44	100	77	5	7	4	3	6	5	4	4	7	7	2.5	13
45	100	60	6	4	6	6	4	6	5	7	5	5	2.5	13.5
46	100	72	5	4	4	4	4	5	6	6	6	5	2.5	12.25
47	100	78	6	3	6	5	4	4	4	5	4	6	2.5	11.75
48	100	63	4	4	5	6	5	4	5	6	6	6	2.5	12.75
49	100	69	5	7	7	7	6	6	5	5	4	5	2.5	14.25
50	100	79	5	3	4	4	4	4	5	4	5	5	2.5	10.75
51	100	73	4	4	5	4	5	4	5	5	4	4	2.5	11
52	100	65	5	4	4	7	8	5	3	4	5	5	2.5	12.5
53	100	63	5	3	2	4	3	6	4	4	4	6	2.5	10.25
54	100	82	5	3	4	4	5	5	5	4	3	5	2.5	10.75
55	100	74	5	5	5	4	4	3	4	4	5	4	2.5	10.75
56	100	68	6	3	4	6	6	5	4	6	6	6	2.5	13
57	100	67	6	7	5	4	4	7	6	6	5	6	2.5	14
58	100	73	5	5	4	4	4	4	3	6	6	6	2.5	11.75
59	100	78	8	6	5	4	7	3	5	6	6	5	2.5	13.75
60	100	80	3	4	4	3	5	3	4	3	5	6	2.5	10
61	100	69	5	5	7	6	4	5	6	6	5	5	2.5	13.5
62	100	72	5	6	6	6	3	4	3	4	5	6	2.5	12
63	100	69	4	6	4	5	3	5	6	7	4	5	2.5	12.25
64	100	83	4	4	4	4	5	5	7	5	6	5	2.5	12.25
65	100	74	5	4	5	6	4	5	7	6	6	5	2.5	13.25
66	100	81	3	5	6	4	5	5	6	5	6	6	2.5	12.75
67	100	79	4	4	5	4	4	5	5	4	4	4	2.5	10.75
68	100	64	5	4	4	3	5	5	4	4	5	4	2.5	10.75
69	100	75	3	3	4	3	3	3	4	4	5	3	2.5	8.75
70	100	66	5	3	3	5	5	3	4	4	3	6	2.5	10.25

Note: A-2 brine control did not pass the percent germination criterion. Therefore, the brine control from site B-3 was substituted as BC#1.

QC Check: _____ **Final Review:** _____

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 21-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 0407-039

End Date: 23-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 | **Sample Station:** A-2

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
36	100	81	6	6	7	5	6	6	4	4	5	5	2.5	
37	100	70	5	6	4	5	4	4	5	5	5	5		
38	100	62	3	3	5	3	4	2	3	3	4	3		
39	100	65	6	5	5	3	7	4	4	6	4	4		
40	100	66	7	3	5	4	4	5	5	6	5	3		
41	100	69	3	4	3	5	5	6	6	4	4	6		
42	100	60	3	4	4	4	6	6	4	4	5	4		
43	100	59	5	4	4	5	5	5	6	6	5	7		
44	100	64	6	6	7	5	4	5	5	6	5	5		
45	100	60	6	4	6	6	4	6	5	7	5	5		
46	100	72	5	4	4	4	4	5	6	6	6	5		
47	100	78	6	3	6	5	4	4	4	5	4	6		
48	100	63	4	4	5	6	5	4	5	6	6	6		
49	100	69	5	7	7	7	6	6	5	5	4	5		
50	100	79	5	3	4	4	4	4	5	4	5	5		
51	100	73	4	4	5	4	3	4	5	5	4	4		
52	100	65	5	4	4	7	8	5	3	4	5	5		
53	100	63	5	3	2	4	3	6	4	4	4	6		
54	100	82	5	3	4	4	5	5	5	4	3	5		
55	100	74	5	5	5	4	4	3	4	4	5	4		
56	100	68	6	3	4	6	6	5	4	6	6	6		
57	100	71	7	4	6	5	5	5	5	6	4	7		
58	100	73	5	5	4	4	4	4	3	6	6	6		
59	100	78	8	6	5	4	7	3	5	6	6	5		
60	100	80	3	4	4	3	5	3	4	3	5	6		
61	100	68	5	3	5	5	3	6	4	4	6	6		
62	100	72	5	6	6	6	3	4	3	4	5	6		
63	100	69	4	6	4	5	3	5	6	7	4	5		
64	100	83	4	4	4	4	5	5	7	5	6	5		
65	100	74	5	4	5	6	4	5	7	6	6	5		
66	100	81	3	5	6	4	5	5	6	5	6	6		
67	100	79	4	4	5	4	4	5	5	4	4	4		
68	100	MC ~~74~~ 64	5	4	4	3	5	5	4	4	5	4		
69	100	75	3	3	4	3	3	3	4	4	5	3		
70	100	66	5	3	3	5	5	3	4	4	3	6		

Analyst: LL **QC Check:** AH 7-29-04 **Final Review:** AH 8/20/04

CETIS Worksheet

Report Date: 19 Jul-04 1:48 PM
Link: 02-0826-0660

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Macrocystis pyrifera	**Sample Code:**	0407-039
End Date:	23 Jul-04	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	A-2

Conc-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	B	1	61					
0	B	2	57					
0	B	3	44					
0	B	4	39					
0	B	5	37					
0	LC	1	63	100	69	12.25	1	
0	LC	2	41		69	11.5		
0	LC	3	56		68	13 ~~10.75~~ AH		
0	LC	4	60		80	10		
0	LC	5	46		72	12.25		
0	SC	1	47		78	11.75		
0	SC	2	54		82	10.75		
0	SC	3	64		83	12.25		
0	SC	4	66		81	12.75		
0	SC	5	50		79	10.75		
25		1	67					
25		2	58					
25		3	38					
25		4	70					
25		5	53					
50		1	55					
50		2	51					
50		3	43					
50		4	45					
50		5	42					
65		1	36					
65		2	65					
65		3	62					
65		4	59					
65		5	49					
100		1	48					
100		2	40					
100		3	69					
100		4	52					
100		5	68					

- Sites A-2 and B-1 share lab control + salt control

QC-RG ~~Brine control for A-2, B-3, C-2 (RG)~~

A-2 share BC w/ B-3

Analyst: AH Reviewed By: AH 8-12-04

Kelp Spore Germination Bioassay Worksheet

Client: City of Buenaventura

Test No.: 0407-039→042

Tech. Initials: RG

Start/End Dates: 7-21-04 / 7-23-04

Start/End Times: 1400 / 10:00

Test Species: *Macrocystis pyrifera*

Date Collected: 7-20-04

Kelp Collector: AH, JR

Collection Location: La Jolla Cove

Conditions (weather, etc.): Sunny, Surgy, 2-4' Vis.

Dilution Water Source (Client I: C. of Buenaventura): Scripps Pier

Dilution Water Source (Client II: _____): _____

Dilution Water Source (Client III: _____): _____

Dilution Water Source (Reference Toxicant): _____

Time of Initial Rinsing and Dessication: 7-20-04 12:00 (keep kelp from each collecting bag separated)

Time of Rinsing and Transfer to Release Beakers: 1315 (keep kelp from each collecting bag separated)

Conditions of Zoospore Density and Motility (beaker 1): high Density, good motility

Time of Blade Removal From Release Beaker 1/Beaker 2 (if needed): —

Density Counts (target = 90): 112 115 99 108 102 Mean: 107.2

Mean 107.2 * 10,000 = 1,072,000 spores per ml (Density of Spore Release)

Calculate the volume of spore stock to add to each test container:

(225,000 spores/container)/(density of spore release) = _____ ml stock/container

In cases of a spore release = 900,000 spores/ml, the volume is 0.25 ml.

If density > 900,000 spores/ml, calculate a dilution factor, x, and create a new spore stock of 900,000 cells/ml and add 0.25 ml:

Density of spore release 1,072,000 * $\frac{0.25 \text{ ml}}{1 \text{ container}}$ = $\frac{268,000 \text{ spores}}{225,000 \text{ spores}}$ = 1.19 (x)

Example: 980,000 * 0.25 / 225,000 = 1.09 (100 ml stock + 9 ml sw)

In cases of a spore release from 450,000 to 899,000 spores/ml, the volume added should not exceed 0.5 ml. (This volume exceeds the EPA and MBP required volume of no greater than 1% of the total test solution volume. However, it may sometimes be necessary to exceed the required limit of 0.3 ml in order to achieve the desired spore density).

If the density of spore release is < 450,000 spores/ml, check the density of the spores in the second release beaker.

Time of Inoculation: 1400 Amount inoculated: .25 ml 24-hour germination check: 65%

Comments: _____

QC Check: AH 8-12-04 Final Review: AH 8/20/04

AMEC Earth & Environmental
Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr. Suite B
San Diego, CA 92121

Raw Datasheet
Water Quality Measurements
Marine Chronic Bioassay

Client : City of Buenaventura **Test Species:** *Macrocystis pyrifera*

Sample ID: A-2 **Start/End Dates:** 7-21-04 / 7-23-04

Test No: 0407-039 **Start/End Times:** 1400 / ~~1401~~ 10:00

Analyst: RS **Test Type:** Kelp Spore Germination and Growth

	Concentration (/)	Initial Readings D.O. (mg/L)	Initial Readings pH (pH units)	Initial Readings Salinity (ppt)	Final Readings D.O. (mg/L)	Final Readings pH (pH units)	Final Readings Salinity (ppt)
	Lab Control	8.1	8.02	32.0	7.2	7.99	31.7 ~~30.7~~ AH
(A)	Brine Control	7.6	7.99	32.4	7.7	8.01	33.1
	Salt Control	6.7	8.63	32.0	7.6	8.04	32.4
	25	8.8	8.48	31.9	7.6	8.12	31.7
	50	8.9	8.65	32.2	7.6	8.19	32.1
	65	8.9	8.72	32.4	7.5	8.24	32.6
	100	8.3	8.93	32.0	7.3	8.37	31.5

Comments: 100% sample salted, not brined

QC Check: ~~AH 8-12-04~~ (A) Brine Control shared w/ B-3/~~C-2~~ AH **Final Review:** ~~AH~~ 8/20/04

(A)

Brine Dilution Worksheet

Client: City of Buenaventura **Analyst:** RG

Sample ID: A-2, B-3, C-2 **Test Date:** 07/21/2004

Test No: 0407-039,041,042 **Test Type:** Kelp

Salinity of Effluent	3.0
Salinity of Brine	89
Target Salinity	32
Test Dilution Volume	250

Salinity Adjustment Factor: $\frac{\text{TS - SE}}{\text{SB - TS}}$

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.51

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
6.25	15.6	0.51	7.9	250
12.5	31.3	0.51	15.9	250
25	62.5	0.51	31.8	250
50	125.0	0.51	63.6	250
65	164	0.51	83.0	250
	DI Volume			
Brine Control	148	0.56	83.0	250

Brine Control Salinity Adjustment Factor 285.2

Brine Control Calculation: $\frac{\text{TS - 0}}{\text{SB - TS}}$

AMEC Earth and Environmental, Inc.
San Diego Bioassay Laboratory
5550 Morehouse Drive. Suite B
San Diego, CA 92121

CETIS Report

Macrocystis Germination and Germ Tube Growth Test B-1 — **AMEC Bioassay SD**

Test:	05-5898-6693	**Test Type:**	Growth-Germination	**Duration:**	44 Hours
Start Date:	21 Jul-04 02:00 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Macrocystis pyrifera
End Date:	23 Jul-04 10:00 AM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	21 Jul-04 02:00 PM	**Brine:**	Frozen Seawater		
Comment:	100% concentration obtained by using Forty Fathoms artificial salt.				

Sample:	09-5840-1227	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 01:40 PM	**Code:**	0407-040	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	24 Hours (18.4 °C)	**Station:**	B-1		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
09-7937-6089	Mean Length	100	>100	N/A	0.08234	Equal Variance t
02-0116-8857		65	>65	N/A	0.15547	Bonferroni Adj t
13-9177-3350	Proportion Germinated	<100	100	N/A	0.06003	Equal Variance t
11-3039-8818		65	>65	N/A	0.14928	Bonferroni Adj t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
11-3039-8818	Proportion Germinated	Control Response	0.7275	0.7		Passes acceptability criteria
13-9177-3350			0.806	0.7		Passes acceptability criteria
02-0116-8857	Mean Length		12.938	10		Passes acceptability criteria
09-7937-6089			11.65	10		Passes acceptability criteria
11-3039-8818	Proportion Germinated	MSDp	0.1493		0.2	Passes acceptability criteria
13-9177-3350			0.0600		0.2	Passes acceptability criteria
02-0116-8857	Mean Length		0.1555		0.2	Passes acceptability criteria
09-7937-6089			0.0823		0.2	Passes acceptability criteria

Mean Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	12.9375	11.2500	14.0000	0.59839	1.19678	9.25%
0	Lab Control	5	11.8000	10.0000	13.0000	0.50867	1.13743	9.64%
0	Salt Control	5	11.6500	10.7500	12.7500	0.40000	0.89443	7.68%
25		5	13.5220	12.7400	14.3000	0.32770	0.73275	5.42%
50		5	17.2520	14.5000	19.7600	0.87021	1.94585	11.28%
65		5	17.0500	16.1200	18.2000	0.38580	0.86267	5.06%
100		5	16.6240	15.8600	17.7500	0.32571	0.72831	4.38%

Proportion Germinated Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.72750	0.67000	0.78000	0.02780	0.05560	7.64%
0	Lab Control	5	0.71600	0.68000	0.80000	0.02205	0.04930	6.88%
0	Salt Control	5	0.80600	0.78000	0.83000	0.00927	0.02074	2.57%
25		5	0.61800	0.57000	0.68000	0.01828	0.04087	6.61%
50		5	0.68400	0.56000	0.83000	0.04523	0.10114	14.79%
65		5	0.67200	0.59000	0.73000	0.02354	0.05263	7.83%
100		5	0.73400	0.65000	0.81000	0.02581	0.05771	7.86%

CETIS Report

Mean Length Detail B-1

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	11.2500	*	13.0000	14.0000	13.5000
0	Lab Control	12.2500	11.5000	13.0000	10.0000	12.2500
0	Salt Control	11.7500	10.7500	12.2500	12.7500	10.7500
25		14.3000	14.0400	12.7500	13.7800	12.7400
50		17.1600	16.6400	19.7600	14.5000	18.2000
65		16.1200	16.5000	17.6800	18.2000	16.7500
100		15.8600	16.7500	16.1200	16.6400	17.7500

Proportion Germinated Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.78000	*	0.77000	0.67000	0.69000
0	Lab Control	0.69000	0.69000	0.68000	0.80000	0.72000
0	Salt Control	0.78000	0.82000	0.83000	0.81000	0.79000
25		0.57000	0.60000	0.61000	0.63000	0.68000
50		0.72000	0.68000	0.56000	0.83000	0.63000
65		0.59000	0.73000	0.66000	0.68000	0.70000
100		0.72000	0.81000	0.74000	0.65000	0.75000

* replicate excluded from analysis due to possible cup contamination.

CETIS Report

Report Date: 23 Aug-04 2:47 PM
Analysis: 13-9177-3350

Macrocystis Germination and Germ Tube Growth Test B-1	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	15-3143-6103	15-3143-6103	23 Aug-04 2:45 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		<100	100		N/A	6.00%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.806	0.7		Passes acceptability criteria
MSDp	0.0600		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	6.26219	23.15450	0.10332	Equal Variances
Distribution	Shapiro-Wilk W	0.94982	0.78055	0.63606	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.01780362	0.0178036	1	7.15	0.02819	Significant Effect
Error	0.01992097	0.0024901	8			
Total	0.03772459	0.0202937	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	2.673892	1.859548	0.01410	0.05868778	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.80600	0.78000	0.83000	0.02074	1.11512	1.08259	1.14581	0.02619
100		5	0.73400	0.65000	0.81000	0.05771	1.03073	0.93774	1.11977	0.06553

CETIS Report

Macrocystis Germination and Germ Tube Growth Test B-1 **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	15-3143-6103	15-3143-6103	23 Aug-04 2:46 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Angular (Corrected)		65	>65	1.54	N/A	14.93%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.7275	0.7		Passes acceptability criteria
MSDp	0.1493		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	3.92696	11.34487	0.26946	Equal Variances
Distribution	Shapiro-Wilk W	0.97361	0.86288	0.81885	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.03246723	0.0108224	3	1.98	0.16067	Non-Significant Effect
Error	0.08208375	0.0054723	15			
Total	0.11455098	0.0162947	18			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control I		25	2.381918	2.342925	0.01545	0.1162646	Significant Effect
		50	0.9046537	2.342925	0.18997	0.1162646	Non-Significant Effect
		65	1.234136	2.342925	0.11807	0.1162646	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control I	4	0.72750	0.67000	0.78000	0.05560	1.02309	0.95886	1.08259	0.06260
25		5	0.61800	0.57000	0.68000	0.04087	0.90489	0.85563	0.96953	0.04236
50		5	0.68400	0.56000	0.83000	0.10114	0.97820	0.84554	1.14581	0.11264
65		5	0.67200	0.59000	0.73000	0.05263	0.96185	0.87589	1.02440	0.05569

CETIS Report

Macrocystis Germination and Germ Tube Growth Test B-1 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	15-3143-6103	15-3143-6103	23 Aug-04 2:45 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	8.23%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	11.65	10		Passes acceptability criteria
MSDp	0.0823		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.50821	23.15450	0.70023	Equal Variances
Distribution	Shapiro-Wilk W	0.90405	0.78055	0.23395	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	61.85169	61.85169	1	92.98	0.00001	Significant Effect
Error	5.32172	0.665215	8			
Total	67.1734080	62.516903	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-9.642614	1.859548	0.99999	0.9592203	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	11.6500	10.7500	12.7500	0.89443				
100		5	16.6240	15.8600	17.7500	0.72831				

Approved By: 8/25/04

CETIS Report

Report Date: 23 Aug-04 2:47 PM
Analysis: 02-0116-8857

Macrocystis Germination and Germ Tube Growth Test B-1 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	15-3143-6103	15-3143-6103	23 Aug-04 2:46 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Untransformed		65	>65	1.54	N/A	15.55%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	12.938	10		Passes acceptability criteria
MSDp	0.1555		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	4.19249	11.34487	0.24141	Equal Variances
Distribution	Shapiro-Wilk W	0.97301	0.86288	0.80767	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	72.49455	24.16485	3	14.75	0.00010	Significant Effect
Error	24.56664	1.637776	15			
Total	97.0611916	25.802626	18			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	-0.6808493	2.342925	0.74683	2.011369	Non-Significant Effect
		50	-5.025705	2.342925	0.99992	2.011369	Non-Significant Effect
		65	-4.790407	2.342925	0.99988	2.011369	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control t	4	12.9375	11.2500	14.0000	1.19678				
25		5	13.5220	12.7400	14.3000	0.73275				
50		5	17.2520	14.5000	19.7600	1.94585				
65		5	17.0500	16.1200	18.2000	0.86267				

Approved By 8/25/10

Macrocystis Germination and Germ Tube Growth Test

AMEC Bioassay Laboratory - San Diego

Start Date: 21-Jul-04 **Species:** *Macrocystis pyrifera* **Test ID:** 0407-040

End Date: 23-Jul-04 **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 **Sample Station:** B-1

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
71	100	68	8	5	4	7	10	7	7	6	4	6	2.6	16.64
72	100	63	9	5	7	8	7	4	10	10	5	5	2.6	18.2
73	100	68	5	6	7	5	10	8	7	6	8	8	2.6	18.2
74	100	60	3	3	5	9	5	7	7	5	4	6	2.6	14.04
75	100	57	5	8	4	7	10	5	4	8	8	6	2.6	16.9
76	100	65	9	8	4	5	5	8	5	6	7	7	2.6	16.64
77	100	51	6	10	5	5	6	5	8	5	8	7	2.6	16.9
78	100	57	6	5	4	5	10	6	6	4	4	5	2.6	14.3
79	100	66	7	6	8	5	10	6	7	5	7	7	2.6	17.68
80	100	56	10	10	6	7	5	9	10	6	5	8	2.6	19.76
81	100	72	3	7	6	7	7	6	7	4	5	9	2.6	15.86
82	100	47	8	5	2	5	4	5	6	3	3	5	2.6	11.96
83	100	49	9	5	6	3	8	6	4	10	8	6	2.6	16.9
84	100	59	8	8	7	4	7	3	8	3	6	8	2.6	16.12
85	100	63	3	7	6	6	3	3	4	5	8	8	2.6	13.78
86	100	68	5	6	5	5	5	6	3	6	4	4	2.6	12.74
87	100	83	5	7	5	6	6	6	5	7	6	5	2.5	14.5
88	100	72	6	9	5	11	4	9	4	3	8	7	2.6	17.16
89	100	74	4	10	7	8	7	6	8	4	4	4	2.6	16.12
90	100	75	7	7	7	7	6	9	6	6	9	7	2.5	17.75
91	100	73	8	6	8	7	7	5	6	7	6	6	2.5	16.5
92	100	68	4	7	4	4	4	6	5	6	4	6	2.5	12.5
93	100	61	5	4	4	7	6	5	4	4	5	7	2.5	12.75
94	100	70	7	7	8	6	8	6	5	7	7	6	2.5	16.75
95	100	81	6	9	7	5	6	6	7	8	6	7	2.5	16.75

data entry QC

QC Check: AH 7-29-04

Final Review: 8/20/04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 21-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 0407-040

End Date: 23-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 | **Sample Station:** B-1

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
71	100	68	8	5	4	7	10	7	7	6	4	6	2.6	
72	100	63	9	5	7	8	7	4	10	10	5	5		
73	100	68	5	6	7	5	10	8	7	6	8	8		
74	100	60	3	3	5	9	5	7	7	5	4	6		
75	100	57	5	8	4	7	10	5	4	8	8	6		
76	100	65	9	8	4	5	5	8	5	6	7	7		
77	100	51	6	10	5	5	6	5	8	5	8	7		
78	100	57	6	5	4	5	10	6	6	4	4	5		
79	100	66	7	6	8	5	10	6	7	5	7	7		
80	100	56	10	10	6	7	5	9	10	6	5	8		
81	100	72	3	7	6	7	7	6	7	4	5	9		
82	100	47	8	5	2	5	4	5	4	3	3	5		
83	100	49	9	5	6	3	8	6	4	10	8	6		
84	100	59	8	8	7	4	7	3	8	3	6	8		
85	100	63	3	7	6	6	3	3	4	5	8	8		
86	100	69	5	6	5	5	5	6	3	6	4	4		
~~87~~ ~~89~~	100	74	4	10	7	8	7	6	8	4	4	4		
SD 88	100	72	6	9	5	11	4	9	4	3	8	7	↓	
~~89~~ 87	100	83	5	7	5	6	6	6	5	7	6	5	2.5	
90	100	75	7	7	7	7	6	9	6	6	9	7		
91	100	73	8	6	8	7	7	5	6	7	6	6		
92	100	68	4	7	4	4	4	6	5	6	4	6		
93	100	61	5	4	4	7	6	5	4	4	5	7		
94	100	70	7	7	8	6	8	6	5	7	7	6		
95	100	81	6	9	7	5	6	6	7	8	6	7	↓	

QC Check: AH 7-29-04 **Final Review:** 8/20/04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 21-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 0407-040

End Date: 23-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 | **Sample Station:** B-1

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
71	100	68	8	5	4	7	10	7	7	6	4	6	2.6	16.64
72	100	63	9	5	7	8	7	4	10	10	5	5	2.6	18.2
73	100	68	5	6	7	5	10	8	7	6	8	8	2.6	18.2
74	100	60	3	3	5	9	5	7	7	5	4	6	2.6	14.04
75	100	78	4	5	4	4	5	4	5	5	5	4	2.5	11.25
76	100	65	9	8	4	5	5	8	5	6	7	7	2.6	16.64
77			*replicate excluded due to possible contamination. 0% germinated.											
78	100	57	6	5	4	5	10	6	6	4	4	5	2.6	14.3
79	100	66	7	6	8	5	10	6	7	5	7	7	2.6	17.68
80	100	56	10	10	6	7	5	9	10	6	5	8	2.6	19.76
81	100	72	3	7	6	7	7	6	7	4	5	9	2.6	15.86
82	100	77	5	7	4	3	6	5	4	4	7	7	2.5	13
83	100	67	6	7	5	4	4	7	6	6	5	6	2.5	14
84	100	59	8	8	7	4	7	3	8	3	6	8	2.6	16.12
85	100	63	3	7	6	6	3	3	4	5	8	8	2.6	13.78
86	100	68	5	6	5	5	5	6	3	6	4	4	2.6	12.74
87	100	83	5	7	5	6	6	6	5	7	6	5	2.5	14.5
88	100	72	6	9	5	11	4	9	4	3	8	7	2.6	17.16
89	100	74	4	10	7	8	7	6	8	4	4	4	2.6	16.12
90	100	75	7	7	7	7	6	9	6	6	9	7	2.5	17.75
91	100	73	8	6	8	7	7	5	6	7	6	6	2.5	16.5
92	100	69	5	5	7	6	4	5	6	6	5	5	2.5	13.5
93	100	61	5	4	4	7	6	5	4	4	5	7	2.5	12.75
94	100	70	7	7	8	6	8	6	5	7	7	6	2.5	16.75
95	100	81	6	9	7	5	6	6	7	8	6	7	2.5	16.75

Note: B-1 brine control did not pass the percent germination criterion. Therefore, the brine control from site B-3 was substituted as BC #1.

QC Check: _____ **Final Review:** _____

CETIS Worksheet

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Macrocystis pyrifera	**Sample Code:**	0407-040
End Date:	23 Jul-04	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	B-1

Conc-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	B	1	83					
0	B	2	82					
0	B	3	77					
0	B	4	92					
0	B	5	75					
25		1	78					
25		2	74					
25		3	93					
25		4	85					
25		5	86					
50		1	88					
50		2	71					
50		3	80					
50		4	87					
50		5	72					
65		1	84					
65		2	91					
65		3	79					
65		4	73					
65		5	94					
100		1	81					
100		2	95					
100		3	89					
100		4	76					
100		5	90					

Sites A-2 and B1 will share Lab control + Salt control

QC-RG

B-1 will share Brine control w/ B-3

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr. Suite B
San Diego, CA 92121

Raw Datasheet
Water Quality Measurements
Marine Chronic Bioassay

Client: City of Buenaventura
Test Species: *Macrocystis pyrifera*

Sample ID: B-1
Start/End Dates: 7-21-04 / 7-23-04

Test No: 0407-040
Start/End Times: 1400 / ~~1401~~ AH 10:00

Analyst: RB, RG
Test Type: Kelp Spore Germination and Growth

		Initial Readings			Final Readings		
	Concentration (/)	D.O. (mg/L)	pH (pH units)	Salinity (ppt)	D.O. (mg/L)	pH (pH units)	Salinity (ppt)
	Lab Control	8.1	8.02	32.0	7.2	7.99	31.7
(B)	Brine Control	7.3	8.02	32.8	7.7	8.01	33.1
	Salt Control	6.7	8.63	32.0	7.6	8.09	32.4
	25	8.6	8.01	32.3	7.2	8.31	32.6
	50	8.3	7.82	32.7	7.5	8.22	33.8
	65	8.0	7.77	32.8	7.4	8.27	33.9
	100	7.7	8.13	32.0	7.5	8.41	33.0

Comments: 100% sample salted, not brined.

QC Check: AH 8-12-04
Final Review: ~~AH~~ 8/24/04

Brine Dilution Worksheet

Client: City of Buenaventura **Analyst:** RG

Sample ID: B-1 **Test Date:** 07/21/2004

Test No: 0407-040 **Test Type:** Kelp

Salinity of Effluent	1.1
Salinity of Brine	89
Target Salinity	32
Test Dilution Volume	250

Salinity Adjustment Factor: $\frac{\text{TS - SE}}{\text{SB - TS}}$

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.54

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
6.25	15.6	0.54	8.5	250
12.5	31.3	0.54	16.9	250
25	62.5	0.54	33.9	250
50	125.0	0.54	67.8	250
65	162	0.54	87.9	250
	DI Volume			
Brine Control	157	0.56	87.9	250

Brine Control Salinity Adjustment Factor 302.8

Brine Control Calculation: $\frac{\text{TS - 0}}{\text{SB - TS}}$

AMEC Earth and Environmental, Inc.
San Diego Bioassay Laboratory
5550 Morehouse Drive. Suite B
San Diego, CA 92121

CETIS Report

Macrocystis Germination and Germ Tube Growth Test B-3 **AMEC Bioassay SD**

Test:	05-5898-6693	**Test Type:**	Growth-Germination	**Duration:**	44 Hours
Start Date:	21 Jul-04 02:00 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Macrocystis pyrifera
End Date:	23 Jul-04 10:00 AM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	21 Jul-04 02:00 PM	**Brine:**	Frozen Seawater		
Comment:	100% concentration obtained by using Forty Fathoms artificial salt.				

Sample:	18-8453-7373	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 10:40 AM	**Code:**	0407-041	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	27 Hours (18.2 °C)	**Station:**	B-3		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
07-8298-6963	Mean Length	65	>65	N/A	0.14780	Bonferroni Adj t
14-2391-9872	Proportion Germinated	65	>65	N/A	0.13453	Bonferroni Adj t

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
14-2391-9872	Proportion Germinated	Control Response	0.72	0.7		Passes acceptability criteria
07-8298-6963	Mean Length		13.5	10		Passes acceptability criteria
14-2391-9872	Proportion Germinated	MSDp	0.1345		0.2	Passes acceptability criteria
07-8298-6963	Mean Length		0.1478		0.2	Passes acceptability criteria

Mean Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control 2	5	13.5000	12.0000	14.7500	0.58630	1.17260	8.69%
0	Lab Control 2	5	12.6500	11.5000	13.2500	0.34095	0.76240	6.03%
0	Salt Control 2	5	12.7500	11.2500	14.5000	0.54199	1.21192	9.51%
25		5	13.3000	11.7500	15.7500	0.78022	1.74463	13.12%
50		5	13.3000	12.5000	14.5000	0.32977	0.73739	5.54%
65		5	14.1500	13.0000	16.0000	0.53385	1.19373	8.44%
100		5	14.7000	14.0000	15.7500	0.28940	0.64711	4.40%

Proportion Germinated Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control 2	5	0.72000	0.65000	0.79000	0.03109	0.06218	8.64%
0	Lab Control 2	5	0.73800	0.64000	0.81000	0.02818	0.06301	8.54%
0	Salt Control 2	5	0.82000	0.74000	0.87000	0.02429	0.05431	6.62%
25		5	0.72000	0.68000	0.75000	0.01225	0.02739	3.80%
50		5	0.67200	0.61000	0.75000	0.02577	0.05762	8.57%
65		5	0.65600	0.58000	0.79000	0.03614	0.08081	12.32%
100		5	0.65600	0.47000	0.79000	0.05600	0.12522	19.09%

CETIS Report

Mean Length Detail B-3

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control 2	12.0000	14.7500	14.0000	13.2500	*
0	Lab Control 2	13.0000	13.2500	12.2500	11.5000	13.2500
0	Salt Control 2	11.2500	14.5000	13.2500	12.2500	12.5000
25		12.5000	11.7500	12.0000	14.5000	15.7500
50		12.5000	13.2500	13.0000	14.5000	13.2500
65		16.0000	14.0000	13.2500	13.0000	14.5000
100		14.7500	14.5000	15.7500	14.0000	14.5000

Proportion Germinated Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control 2	0.69000	0.75000	0.65000	0.79000	*
0	Lab Control 2	0.73000	0.74000	0.77000	0.81000	0.64000
0	Salt Control 2	0.84000	0.79000	0.74000	0.86000	0.87000
25		0.75000	0.68000	0.74000	0.71000	0.72000
50		0.71000	0.66000	0.61000	0.75000	0.63000
65		0.61000	0.64000	0.66000	0.79000	0.58000
100		0.75000	0.65000	0.79000	0.47000	0.62000

*replicate excluded from analysis due to possible cup contamination 0% germinated.

CETIS Report

Macrocystis Germination and Germ Tube Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	12-5631-8141	12-5631-8141	07 Sep-04 1:47 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Angular (Corrected)		65	>65	1.54	N/A	13.45%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	3.55231	11.34487	0.31404	Equal Variances
Distribution	Shapiro-Wilk W	0.94561	0.86288	0.32610	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.01760455	0.0058682	3	1.35	0.29499	Non-Significant Effect
Error	0.06506439	0.0043376	15			
Total	0.08266893	0.0102058	18			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control 2		25	0.03271826	2.342925	0.48717	0.103512	Non-Significant Effect
		50	1.196021	2.342925	0.12513	0.103512	Non-Significant Effect
		65	1.551047	2.342925	0.07086	0.103512	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control 2	4	0.72000	0.65000	0.79000	0.06218	1.01500	0.93774	1.09476	0.06969
25		5	0.72000	0.68000	0.75000	0.02739	1.01355	0.96953	1.04720	0.03038
50		5	0.67200	0.61000	0.75000	0.05762	0.96216	0.89631	1.04720	0.06206
65		5	0.65600	0.58000	0.79000	0.08081	0.94647	0.86574	1.09476	0.08859

CETIS Report

Report Date: 07 Sep-04 1:49 PM
Analysis: 07-8298-6963

Macrocystis Germination and Germ Tube Growth Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	12-5631-8141	12-5631-8141	07 Sep-04 1:48 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Untransformed		65	>65	1.54	N/A	14.78%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.49037	11.34487	0.47703	Equal Variances
Distribution	Shapiro-Wilk W	0.94561	0.86288	0.32602	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.430263	0.8100877	3	0.50	0.68618	Non-Significant Effect
Error	24.175	1.611667	15			
Total	26.6052623	2.4217544	18			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control 2		25	0.2348476	2.342925	0.40875	1.995272	Non-Significant Effect
		50	0.2348476	2.342925	0.00000	1.995272	Significant Effect
		65	-0.7632547	2.342925	0.77143	1.995272	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control 2	4	13.5000	12.0000	14.7500	1.17260				
25		5	13.3000	11.7500	15.7500	1.74463				
50		5	13.3000	12.5000	14.5000	0.73739				
65		5	14.1500	13.0000	16.0000	1.19373				

Approved By:

CETIS Report

Macrocystis Germination and Germ Tube Growth Test B-3	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	12-5631-8141	12-5631-8141	29 Jul-04 12:32 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		<100	100		N/A	12.69%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.8200	0.7		Passes acceptability criteria
MSDp	0.1269		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.64711	23.15450	0.23798	Equal Variances
Distribution	Shapiro-Wilk W	0.97827	0.78055	0.95043	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.08785958	0.0878596	1	7.85	0.02316	Significant Effect
Error	0.08957801	0.0111973	8			
Total	0.17743759	0.0990568	9			

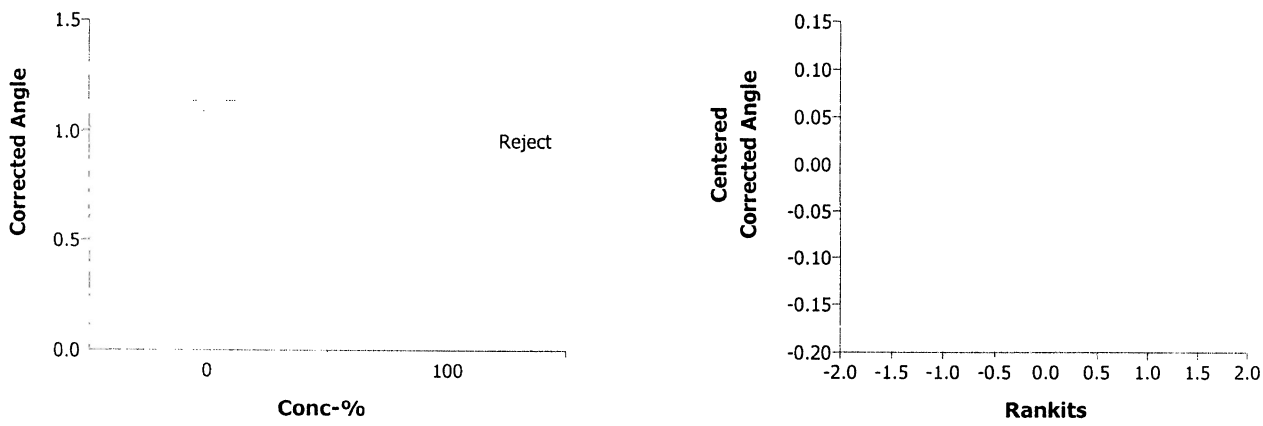
Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control 2		100	2.801166	1.859548	0.01158	0.1244495	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control 2	5	0.82000	0.74000	0.87000	0.05431	1.13580	1.03573	1.20193	0.06942
100		5	0.65600	0.47000	0.79000	0.12522	0.94833	0.75538	1.09476	0.13257

Proportion Germinated



CETIS Report

Macrocystis Germination and Germ Tube Growth Test B-3	AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	12-5631-8141	12-5631-8141	19 Aug-04 12:06 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	8.96%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	12.75	10		Passes acceptability criteria
MSDp	0.0896		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.50746	23.15450	0.25164	Equal Variances
Distribution	Shapiro-Wilk W	0.95979	0.78055	0.75761	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	9.50625	9.50625	1	10.07	0.01312	Significant Effect
Error	7.55	0.94375	8			
Total	17 0562506	10.450000	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control 2		100	-3.173775	1.859548	0.99344	1.142525	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control 2	5	12.7500	11.2500	14.5000	1.21192				
100		5	14.7000	14.0000	15.7500	0.64711				

CETIS Worksheet

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Macrocystis pyrifera	**Sample Code:**	0407-041
End Date:	23 Jul-04	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	B-3

Conc-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	B	1	104					
0	B	2	130					
0	B	3	127					
0	B	4	110					
0	B	5	114					
0	LC	1	106	73	100	13	1	
0	LC	2	124	74		13.25		
0	LC	3	121	77		12.25		
0	LC	4	122	81		11.5		
0	LC	5	119	64		13.25		
0	SC	1	103	84		11.25		
0	SC	2	101	79		14.5		
0	SC	3	99	74		13.25		
0	SC	4	102	86		12.25		
0	SC	5	116	87		12.5		
25		1	112					
25		2	96					
25		3	118					
25		4	123					
25		5	128					
50		1	105					
50		2	126					
50		3	108					
50		4	129					
50		5	113					
65		1	100					
65		2	97					
65		3	107					
65		4	109					
65		5	120					
100		1	125					
100		2	117					
100		3	115					
100		4	98					
100		5	111					

Sites B-3 and C-2 will share LC and SC

~~Brine control from this test is for B-1 only~~ (RG)

QC RG

B-3 will share BC with A-2 and B-1

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr. Suite B
San Diego, CA 92121

Raw Datasheet
Water Quality Measurements
Marine Chronic Bioassay

Client: City of Buenaventura
Test Species: *Macrocystis pyrifera*
Sample ID: B-3
Start/End Dates: 7-21-04 / 7-23-04
Test No: 0407-041
Start/End Times: 1400 / ~~1404~~ AH 10:00
Analyst: RB, RG
Test Type: Kelp Spore Germination and Growth

	Concentration (%)	Initial Readings D.O. (mg/L)	Initial Readings pH (pH units)	Initial Readings Salinity (ppt)	Final Readings D.O. (mg/L)	Final Readings pH (pH units)	Final Readings Salinity (ppt)
	lab Control	8.1	8.02	32.0	7.7	8.06	31.3
(A)	Brine Control	7.6	7.99	32.4	7.6	8.03	33.1
	Salt Control	6.7	8.63	32.0	7.5	8.05	32.0
	25	8.9	8.39	32.4	7.5	8.12	33.2
	50	9.0	8.56	32.4	7.4	8.20	33.1
	65	9.0	8.63	32.4	7.5	8.25	33.2
	100	8.5	8.82	31.9	7.3	8.35	33.0

Comments: 100% sample salted, not brined

QC Check: AH 8-12-04
Final Review: AH 8/20/04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 21-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 0407-041

End Date: 23-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 | **Sample Station:** B-3

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
96	100	68	5	4	5	5	5	6	4	5	4	4	2.5	11.75
97	100	64	7	4	6	6	5	7	5	5	6	5	2.5	14
98	100	47	6	6	6	6	5	5	6	5	6	5	2.5	14
99	100	74	6	6	4	5	6	5	5	4	7	5	2.5	13.25
100	100	61	8	7	5	7	7	7	6	5	6	6	2.5	16
101	100	79	7	7	4	5	6	4	8	4	7	6	2.5	14.5
102	100	86	4	5	6	6	6	6	3	4	4	5	2.5	12.25
103	100	84	5	4	5	4	5	5	6	5	3	3	2.5	11.25
104	100	78	4	5	4	4	5	4	5	5	5	4	2.5	11.25
105	100	71	4	5	6	5	6	5	5	5	4	5	2.5	12.5
106	100	73	5	5	5	8	4	5	5	6	4	5	2.5	13
107	100	66	4	6	4	7	4	9	5	6	4	4	2.5	13.25
108	100	61	5	5	4	7	4	5	6	5	5	6	2.5	13
109	100	79	6	4	3	6	5 4	5	6	6	5	7	2.5	13
110			*replicate excluded due to possible contamination. 0% germinated.											#DIV/0!
111	100	62	5	6	7	7	6	5	6	7	4	5	2.5	14.5
112	100	75	5	5	5	5	5	5	6	5	6	3	2.5	12.5
113	100	63	5	4	5	6	4	4	6	10	5	4	2.5	13.25
114	100	77	5	7	4	3	6	5	4	4	7	7	2.5	13
115	100	79	9	7	6	6	4	5	6	6	8	6	2.5	15.75
116	100	87	6	4	5	4	4	6	5	5	5	6	2.5	12.5
117	100	65	7	4	6	6	6	6	7	5	5	6	2.5	14.5
118	100	74	5	6	6	4	3	5	5	6	4	4	2.5	12
119	100	64	6	6	5	4	6	6	5	5	5	5	2.5	13.25
120	100	58	5	8	6	5	5	7	6	6	6	4	2.5	14.5
121	100	77	3	4	4	4	7	4	5	6	7	5	2.5	12.25
122	100	81	6	5	6	5	4	3	4	4	5	4	2.5	11.5
123	100	71	6	5	6	7	5	6	6	6	4	7	2.5	14.5
124	100	74	5	6	6	6	6	6	4	4	5	5	2.5	13.25
125	100	75	7	7	6	5	5	7	5	5	5	7	2.5	14.75
126	100	66	4	6	5	5	4	7	4	6	6	6	2.5	13.25
127	100	67	6	7	5	4	4	7	6	6	5	6	2.5	14
128	100	72	7	8	8	5	5	5	6	7	6	6	2.5	15.75
129	100	75	6	4	6	7	5	6	6	5	6	7	2.5	14.5
130	100	69	5	5	7	6	4	5	6	6	5	5	2.5	13.5

data entry qc

QC Check: AH 7-29-04

Final Review: 8/20/04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 21-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 0407-041

End Date: 23-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 | **Sample Station:** B-3

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
96	100	68	5	4	5	5	5	6	4	5	4	4	2.5	
97	100	64	7	4	6	6	5	7	5	5	6	5		
98	100	~~SH 78~~ 47	~~4~~ 6	~~5~~ 6	~~4~~ 6	~~4~~ 6	~~5~~ 5	~~4~~ 5	~~5~~ 6	~~5~~ 5	~~5~~ 6	~~4~~ 5		
99	100	74	6	6	4	5	6	5	5	4	7	5		
100	100	61	8	7	5	7	7	7	6	5	6	6		
101	100	79	7	7	4	5	6	4	8	4	7	6		
102	100	86	4	5	6	6	6	6	3	4	4	5		
103	100	84	5	4	5	4	5	5	6	5	3	3		
104	100	78	4	5	4	4	5	4	5	5	5	4		
105	100	71	4	5	6	5	6	5	5	5	4	5		
106	100	73	5	5	5	8	4	5	5	6	4	5		
107	100	66	4	6	4	7	4	9	5	6	4	4		
108	100	61	5	5	4	7	4	5	6	5	5	6		
109	100	79	6	4	3	6	5	5	6	6	5	7		
110	100	0	Spores present but none germinated.											
111	100	62	5	6	7	7	6	5	6	7	4	5		
112	100	75	5	5	5	5	5	5	6	5	6	3		
113	100	63	5	4	5	6	4	4	6	6	5	4		
114	100	77	5	7	4	3	6	5	4	4	7	7		
115	100	79	9	7	6	6	4	5	6	6	8	6		
116	100	87	6	4	5	4	4	6	5	5	5	6		
117	100	65	7	4	6	6	6	6	7	5	5	6		
118	100	74	5	6	6	4	3	5	5	6	4	4		
119	100	64	6	6	5	4	6	6	5	5	5	5		
120	100	58	5	8	6	5	5	7	6	6	6	4		
121	100	77	3	4	4	4	7	4	5	6	7	5		
122	100	81	6	5	6	5	4	3	4	4	5	4		
123	100	71	6	5	6	7	5	6	6	6	4	7		
124	100	74	5	6	6	6	6	6	4	4	5	5		
125	100	75	7	7	6	5	5	7	5	5	5	7		
126	100	66	4	6	5	5	4	7	4	6	6	6		
127	100	67	6	7	5	4	4	7	6	6	5	6		
128	100	72	7	8	8	5	5	5	6	7	6	6		
129	100	75	6	4	6	7	5	6	6	5	6	7		
130	100	69	5	5	7	6	4	5	6	6	5	5		

QC Check: AH 7-29-04 **Final Review:** 8/20/04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 21-Jul-04 **Species:** *Macrocystis pyrifera* **Test ID:** 0407-041

End Date: 23-Jul-04 **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 **Sample Station:** B-3

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
96	100	68	5	4	5	5	5	6	4	5	4	4	2.5	11.75
97	100	64	7	4	6	6	5	7	5	5	6	5	2.5	14
98	100	47	6	6	6	6	5	5	6	5	6	5	2.5	14
99	100	74	6	6	4	5	6	5	5	4	7	5	2.5	13.25
100	100	61	8	7	5	7	7	7	6	5	6	6	2.5	16
101	100	79	7	7	4	5	6	4	8	4	7	6	2.5	14.5
102	100	86	4	5	6	6	6	6	3	4	4	5	2.5	12.25
103	100	84	5	4	5	4	5	5	6	5	3	3	2.5	11.25
104	100	69	5	5	5	4	4	4	5	5	6	5	2.5	12
105	100	71	4	5	6	5	6	5	5	5	4	5	2.5	12.5
106	100	73	5	5	5	8	4	5	5	6	4	5	2.5	13
107	100	66	4	6	4	7	4	9	5	6	4	4	2.5	13.25
108	100	61	5	5	4	7	4	5	6	5	5	6	2.5	13
109	100	79	6	4	3	6	5	5	6	6	5	7	2.5	13.25
110	100	79	7	3	7	6	5	4	5	5	4	7	2.5	13.25
111	100	62	5	6	7	7	6	5	6	7	4	5	2.5	14.5
112	100	75	5	5	5	5	5	5	6	5	6	3	2.5	12.5
113	100	63	5	4	5	6	4	4	6	10	5	4	2.5	13.25
114			*replicate excluded due to possible contamination. 0% germinated.											
115	100	79	9	7	6	6	4	5	6	6	8	6	2.5	15.75
116	100	87	6	4	5	4	4	6	5	5	5	6	2.5	12.5
117	100	65	7	4	6	6	6	6	7	5	5	6	2.5	14.5
118	100	74	5	6	6	4	3	5	5	6	4	4	2.5	12
119	100	64	6	6	5	4	6	6	5	5	5	5	2.5	13.25
120	100	58	5	8	6	5	5	7	6	6	6	4	2.5	14.5
121	100	77	3	4	4	4	7	4	5	6	7	5	2.5	12.25
122	100	81	6	5	6	5	4	3	4	4	5	4	2.5	11.5
123	100	71	6	5	6	7	5	6	6	6	4	7	2.5	14.5
124	100	74	5	6	6	6	6	6	4	4	5	5	2.5	13.25
125	100	75	7	7	6	5	5	7	5	5	5	7	2.5	14.75
126	100	66	4	6	5	5	4	7	4	6	6	6	2.5	13.25
127	100	65	6	5	7	6	4	4	6	6	6	6	2.5	14
128	100	72	7	8	8	5	5	5	6	7	6	6	2.5	15.75
129	100	75	6	4	6	7	5	6	6	5	6	7	2.5	14.5
130	100	75	8	5	6	6	6	6	8	4	5	5	2.5	14.75

Note: Site B-3 sharing LC#2, BC#2, and SC#2 with site C-2.

QC Check: _____ **Final Review:** _____

CETIS Report

Report Date: 23 Aug-04 2:03 PM
Link: 16-4604-8990/0407-042

Macrocystis Germination and Germ Tube Growth Test C-2 — **AMEC Bioassay SD**

Test:	05-5898-6693	**Test Type:**	Growth-Germination	**Duration:**	44 Hours
Start Date:	21 Jul-04 02:00 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Macrocystis pyrifera
End Date:	23 Jul-04 10:00 AM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	21 Jul-04 02:00 PM	**Brine:**	Frozen Seawater		

Comment: 100% concentration obtained by using Forty Fathoms artificial salt.

Sample:	02-3789-2942	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sampled:	20 Jul-04 09:35 AM	**Code:**	0407-042	**Project:**	
Received:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Hold Time:	28 Hours (18.5 °C)	**Station:**	C-2		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
13-4206-1229	Mean Length	100	>100	N/A	0.16804	Equal Variance t
14-0009-1221		65	>65	N/A	0.18469	Bonferroni Adj t
00-2683-8555	Proportion Germinated	<100	100	N/A	0.08061	Equal Variance t
11-7345-7450		65	>65	N/A	0.12722	Bonferroni Adj t
17-5253-3107		65	>65	N/A	0.12722	Bonferroni Adj t

Mean Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control 2	5	13.5000	12.0000	14.7500	0.58630	1.17260	8.69%
0	Lab Control 2	5	12.6500	11.5000	13.2500	0.34095	0.76240	6.03%
0	Salt Control 2	5	12.7500	11.2500	14.5000	0.54199	1.21192	9.51%
25		5	10.9500	9.25000	12.2500	0.49624	1.10962	10.13%
50		5	12.5000	9.75000	15.5000	0.95197	2.12867	17.03%
65		5	11.9000	9.50000	13.5000	0.72715	1.62596	13.66%
100		5	13.4500	11.2500	16.2500	1.01673	2.27349	16.90%

Proportion Germinated Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control 2	5	0.72000	0.65000	0.79000	0.03109	0.06218	8.64%
0	Lab Control 2	5	0.73800	0.64000	0.81000	0.02818	0.06301	8.54%
0	Salt Control 2	5	0.82000	0.74000	0.87000	0.02429	0.05431	6.62%
25		5	0.71000	0.63000	0.76000	0.02302	0.05148	7.25%
50		5	0.70800	0.60000	0.75000	0.02746	0.06140	8.67%
65		5	0.70400	0.65000	0.77000	0.02400	0.05367	7.62%
100		5	0.72000	0.64000	0.78000	0.02775	0.06205	8.62%

CETIS Report

Mean Length Detail C-2

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control 2	13.2500	14.0000	14.7500	12.0000	*
0	Lab Control 2	13.0000	13.2500	12.2500	11.5000	13.2500
0	Salt Control 2	11.2500	14.5000	13.2500	12.2500	12.5000
25		12.2500	11.5000	10.7500	9.25000	11.0000
50		12.5000	9.75000	13.2500	11.5000	15.5000
65		9.50000	11.2500	13.5000	12.0000	13.2500
100		11.2500	15.5000	12.5000	11.7500	16.2500

Proportion Germinated Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control 2	0.79000	0.65000	0.75000	0.69000	*
0	Lab Control 2	0.73000	0.74000	0.77000	0.81000	0.64000
0	Salt Control 2	0.84000	0.79000	0.74000	0.86000	0.87000
25		0.63000	0.70000	0.76000	0.75000	0.71000
50		0.75000	0.60000	0.72000	0.73000	0.74000
65		0.74000	0.65000	0.77000	0.65000	0.71000
100		0.67000	0.78000	0.64000	0.74000	0.77000

* Replicate excluded from analysis due to possible cup contamination, 0% germinated.

Approved By: 8/25/04

CETIS Report

Macrocystis Germination and Germ Tube Growth Test C - 2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	16-4604-8990	16-4604-8990	29 Jul-04 3:11 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Angular (Corrected)		65	>65	1.54	N/A	12.72%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.72	0.7		Passes acceptability criteria
MSDp	0.1272		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	0.18496	11.34487	0.97998	Equal Variances
Distribution	Shapiro-Wilk W	0.94008	0.86288	0.26175	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.00077823	0.0002594	3	0.07	0.97678	Non-Significant Effect
Error	0.05840406	0.0038936	15			
Total	0.0591823	0.0041530	18			

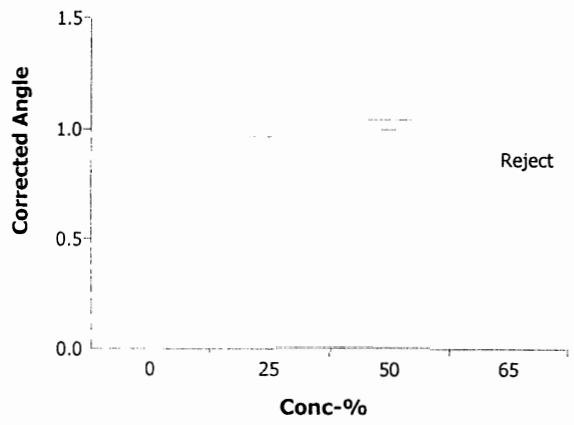
Group Comparisons

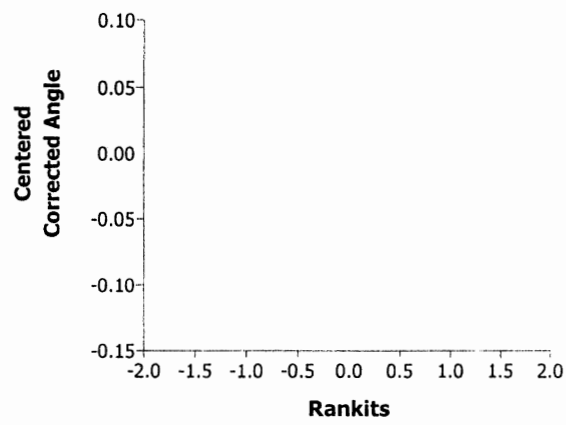
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control 2		25	0.2809151	2.342925	0.39131	0.09807096	Non-Significant Effect
		50	0.3268529	2.342925	0.37415	0.09807096	Non-Significant Effect
		65	0.435034	2.342925	0.33487	0.09807096	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control 2	4	0.72000	0.65000	0.79000	0.06218	1.01500	0.93774	1.09476	0.06969
25		5	0.71000	0.63000	0.76000	0.05148	1.00324	0.91691	1.05882	0.05617
50		5	0.70800	0.60000	0.75000	0.06140	1.00132	0.88608	1.04720	0.06566
65		5	0.70400	0.65000	0.77000	0.05367	0.99679	0.93774	1.07062	0.05909

Proportion Germinated





CETIS Report

Report Date: 29 Jul-04 3:05 PM
Analysis: 00-2683-8555

Macrocystis Germination and Germ Tube Growth Test C - 2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	16-4604-8990	16-4604-8990	29 Jul-04 3:04 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		<100	100		N/A	8.06%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.8200	0.7		Passes acceptability criteria
MSDp	0.0806		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.01798	23.15450	0.98663	Equal Variances
Distribution	Shapiro-Wilk W	0.86888	0.78055	0.09946	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.03647134	0.0364713	1	7.64	0.02455	Significant Effect
Error	0.03821159	0.0047764	8			
Total	0.07468292	0.0412478	9			

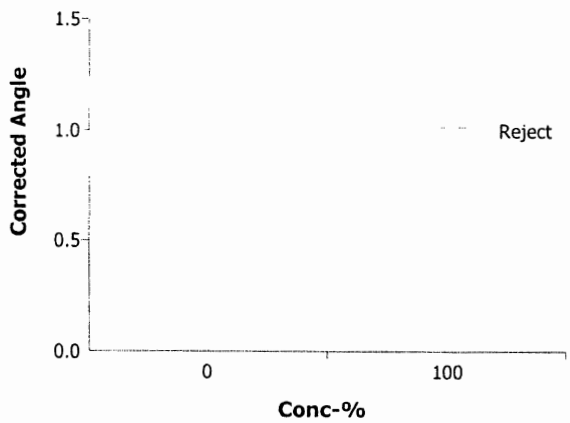
Group Comparisons

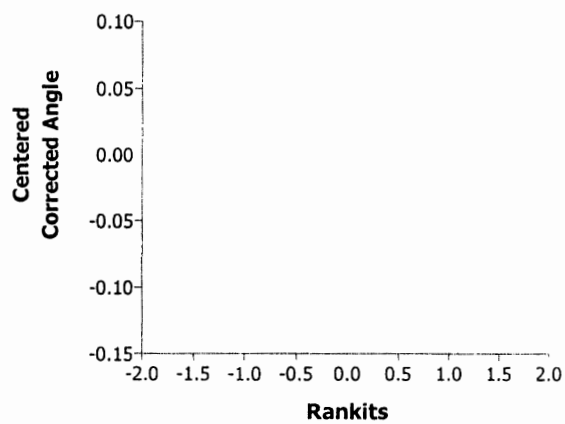
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control 2		100	2.76327	1.859548	0.01228	0.08128117	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control 2	5	0.82000	0.74000	0.87000	0.05431	1.13580	1.03573	1.20193	0.06942
100		5	0.72000	0.64000	0.78000	0.06205	1.01502	0.92730	1.08259	0.06880

Proportion Germinated





Approved By: 8/20/04

CETIS Report

Report Date: 19 Aug-04 12:07 PM
Analysis: 13-4206-1229

Macrocystis Germination and Germ Tube Growth Test C-2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	16-4604-8990	16-4604-8990	19 Aug-04 12:07 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	16.80%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	12.75	10		Passes acceptability criteria
MSDp	0.1680		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.51915	23.15450	0.25045	Equal Variances
Distribution	Shapiro-Wilk W	0.93669	0.78055	0.48905	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.225	1.225	1	0.37	0.56033	Non-Significant Effect
Error	26.55	3.31875	8			
Total	27.7749993	4.5437499	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control 2		100	-0.6075482	1.859548	0.71983	2.142519	Non-Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control 2	5	12.7500	11.2500	14.5000	1.21192				
100		5	13.4500	11.2500	16.2500	2.27349				

Approved By: 8/24/04

CETIS Report

Macrocystis Germination and Germ Tube Growth Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	16-4604-8990	16-4604-8990	19 Aug-04 12:07 PM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Untransformed		65	>65	1.54	N/A	18.47%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	13.5	10		Passes acceptability criteria
MSDp	0.1847		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.90821	11.34487	0.59168	Equal Variances
Distribution	Shapiro-Wilk W	0.98009	0.86288	0.92355	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	15.41447	5.138158	3	2.04	0.15124	Non-Significant Effect
Error	37.75	2.516667	15			
Total	53.1644735	7.6548245	18			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control	2	25	2.396189	2.342925	0.01502	2.493316	Significant Effect
		50	0.9396819	2.342925	0.18113	2.493316	Non-Significant Effect
		65	1.503491	2.342925	0.07674	2.493316	Non-Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control 2	4	13.5000	12.0000	14.7500	1.17260				
25		5	10.9500	9.25000	12.2500	1.10962				
50		5	12.5000	9.75000	15.5000	2.12867				
65		5	11.9000	9.50000	13.5000	1.62596				

Approved By: 8/20/04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 21-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 0407-042

End Date: 23-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 | **Sample Station:** C-2

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
131	100	60	3	3	3	4	4	3	3	4	6	6	2.5	9.75
132	100	65	5	6	3	4	7	6	3	6	3	5	2.5	12
133	100	73	5	4	5	6	3	3	4	4	5	7	2.5	11.5
134	100	74	6	5	4	4	3	4	6	5	4	6	2.5	11.75
135	100	67	4	5	4	5	5	4	5	5	4	4	2.5	11.25
136	100	71	4	6	4	5	5	3	6	5	3	3	2.5	11
137	100	72	6	5	5	6	6	3	8	5	5	4	2.5	13.25
138	100	69	5	5	5	4	4	4	5	5	6	5	2.5	12
139	100	75	3	3	6	2	3	3	4	4	4	5	2.5	9.25
140	100	74	4	4	3	3	4	4	3	3	5	5	2.5	9.5
141	100	79	7	3	7	6	5	4	5	5	4	7	2.5	13.25
142	100	76	7	5	5	4	3	3	3	3	4	6	2.5	10.75
143	100	64	5	4	4	5	5	4	6	6	5	6	2.5	12.5
144	100	78	7	7	6	5	6	6	6	6	7	6	2.5	15.5
145	100	77	6	7	6	6	8	5	6	7	7	7	2.5	16.25
146	100	70	3	4	4	5	4	6	6	5	4	5	2.5	11.5
147	Excluded due to possible contamination. Ø germinated.													
148	100	65	3	5	4	4	4	7	5	4	5	4	2.5	11.25
149	100	71	6	6	7	6	5	5	5	4	5	4	2.5	13.25
150	100	77	8	6	5	5	6	7	4	3	5	5	2.5	13.5
151	100	63	6	4	4	4	5	6	4	7	4	5	2.5	12.25
152	100	74	6	7	7	7	5	6	6	7	6	5	2.5	15.5
153	100	65	6	5	7	6	4	4	6	6	6	6	2.5	14
154	100	75	4	3	6	5	6	7	5	5	5	4	2.5	12.5
155	100	75	8	5	6	6	6	6	8	4	5	5	2.5	14.75

data entry QC

QC Check: AH 7-29-04 **Final Review:** [illegible] 8/5/04

Macrocystis Germination and Germ Tube Growth Test

AMEC Bioassay Laboratory - San Diego

Start Date: 21-Jul-04 **Species:** *Macrocystis pyrifera* **Test ID:** 0407-042

End Date: 23-Jul-04 **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 **Sample Station:** C-2

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
131	100	60	3	3	3	4	4	3	3	4	6	6	2.5	
132	100	65	5	6	3	4	7	6	3	6	3	5		
133	100	73	5	4	5	6	3	3	4	4	5	7		
134	100	74	6	5	4	4	3	4	6	5	4	6		
135	100	67	4	5	4	5	5	4	5	5	4	4		
136	100	71	4	6	4	5	5	3	6	5	3	3		
137	100	72	6	5	5	6	6	3	8	5	5	4		
138	100	69	5	5	5	4	4	4	5	5	6	5		
139	100	75	3	3	6	2	3	3	4	4	4	5		
140	100	74	4	4	3	3	4	4	3	3	5	5		
141	100	79	7	3	7	6	5	4	5	5	4	7		
142	100	76	7	5	5	4	3	3	3	3	4	6		
143	100	64	5	4	4	5	5	4	6	6	5	6		
144	100													
145	100													
146	100													
147	100													
148	100													
149	100													
150	100													
151	100													
152	100													
153	100													
154	100													
155	100													
156	100													

Analyst: MC **QC Check:** 7-29-04 **Final Review:** 8/20/04

Macrocystis Germination and Germ Tube Growth Test

AMEC Bioassay Laboratory - San Diego

Start Date: 21-Jul-04 **Species:** *Macrocystis pyrifera* **Test ID:** 0407-042

End Date: 23-Jul-04 **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) **Sample Source:** City of Buenaventura

Sampled: 20-Jul-04 **Sample Station:** C-2

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
131	100													
132	100													
133	100													
134	100													
135	100													
136	100													
137	100													
138	100													
139	100													
140	100													
141	100													
142	100													
143	100													
144	100	78	7	7	6	5	6	6	6	6	7	6	2.5	
145	100	77	6	7	6	6	8	5	6	7	7	7		
146	100	70	3	4	4	5	4	6	6	5	4	5		
147	100	0	Spores present but none germinated											
148	100	65	3	5	4	4	4	7	5	4	5	4		
149	100	71	6	6	7	6	5	5	5	4	5	4		
150	100	77	8	6	5	5	6	7	4	3	5	5		
151	100	63	6	4	4	4	5	6	4	7	4	5		
152	100	74	6	7	7	7	5	6	6	7	6	5		
153	100	65	6	5	7	6	4	4	6	6	6	6		
154	100	75	4	3	6	5	6	7	5	5	5	4		
155	100	75	8	5	6	6	6	6	8	4	5	5		
~~156~~	~~100~~													

QC Check: AH 7-29-04 **Final Review:** 8/20/04

CETIS Worksheet

Report Date: 19 Jul-04 1:56 PM
Link: 16-4604-8990

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Macrocystis pyrifera	**Sample Code:**	0407-042
End Date:	23 Jul-04	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	City of Buenaventura
Sampled:	20 Jul-04	**Material:**	Estuarine Monitoring Sample	**Sample Station:**	C-2

Conc-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	B	1	141					
0	B	2	153					
0	B	3	155					
0	B	4	138					
0	B	5	147					
25		1	151					
25		2	146					
25		3	142					
25		4	139					
25		5	136					
50		1	154					
50		2	131					
50		3	137					
50		4	133					
50		5	152					
65		1	140					
65		2	148					
65		3	150					
65		4	132					
65		5	149					
100		1	135					
100		2	144					
100		3	143					
100		4	134					
100		5	145					

Sites B-3 and C-2 will share LC and SC

Q-C. RG

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr. Suite B
San Diego, CA 92121

Raw Datasheet
Water Quality Measurements
Marine Chronic Bioassay

Client: City of Buenaventura
Test Species: *Macrocystis pyrifera*
Sample ID: C-2
Start/End Dates: 7-21-04, 7-23-04
Test No: 0407-042
Start/End Times: 14:00 ~~14:01~~ 18:00
Analyst: RG
Test Type: Kelp Spore Germination and Growth

		Initial Readings			Final Readings		
	Concentration (%)	D.O. (mg/L)	pH (pH units)	Salinity (ppt)	D.O. (mg/L)	pH (pH units)	Salinity (ppt)
	Lab Control	8.1	8.02	32.0	7.7	8.06	31.3
(A)	Brine Control	7.6	7.99	32.4	7.6	8.03	33.1
	Salt Control	6.7	8.63	32.0	7.5	8.05	32.0
	25	8.8	8.24	32.1	7.6	8.11	32.5
	50	8.8	8.34	32.4	7.5	8.16	33.5
	65	8.6	8.39	32.5	7.5	8.21	32.2
	100	8.0	8.63	32.6	7.5	8.32	33.1

Comments: 100% sample salted, not brined.

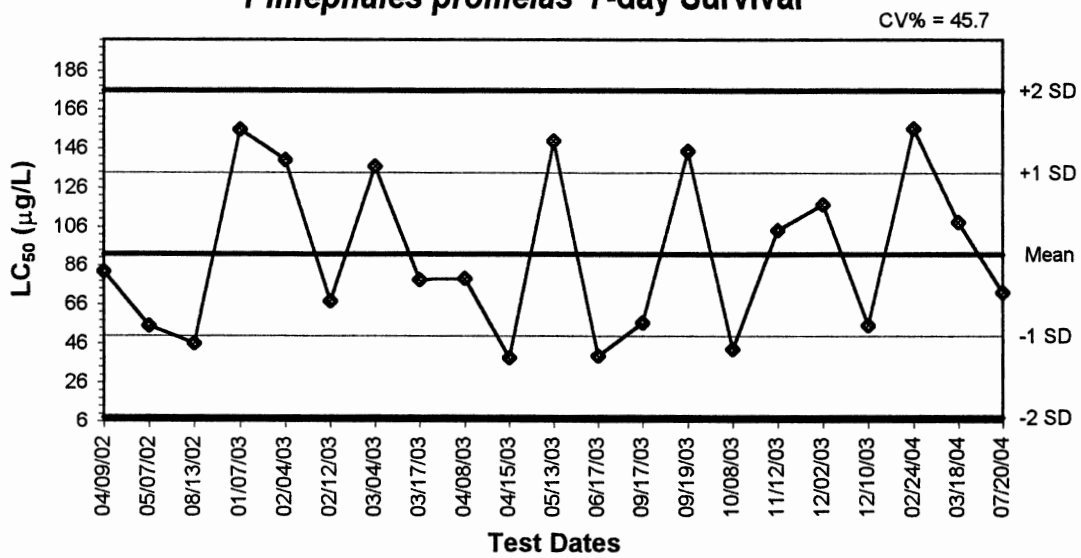
QC Check: ~~AH~~ 8-12-04
Final Review: ~~AH~~ 8/20/04

APPENDIX C
REFERENCE TOXICANT DATA

FRESHWATER

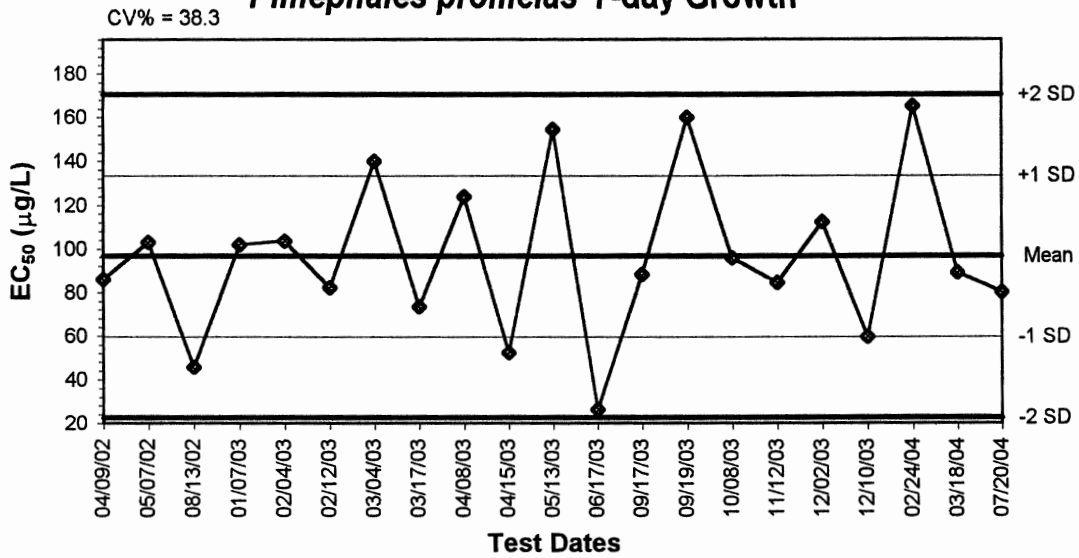
P. PROMELAS

Copper (II) Chloride Reference Toxicant Control Chart - *Pimephales promelas* 7-day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/09/02	82.7708	91.8034	49.8738	7.9443	133.7329	175.6624
05/07/02	55.1305	91.8034	49.8738	7.9443	133.7329	175.6624
08/13/02	45.8862	91.8034	49.8738	7.9443	133.7329	175.6624
01/07/03	155.4388	91.8034	49.8738	7.9443	133.7329	175.6624
02/04/03	140.0516	91.8034	49.8738	7.9443	133.7329	175.6624
02/12/03	67.5523	91.8034	49.8738	7.9443	133.7329	175.6624
03/04/03	136.7841	91.8034	49.8738	7.9443	133.7329	175.6624
03/17/03	78.6469	91.8034	49.8738	7.9443	133.7329	175.6624
04/08/03	79.2207	91.8034	49.8738	7.9443	133.7329	175.6624
04/15/03	38.5448	91.8034	49.8738	7.9443	133.7329	175.6624
05/13/03	149.7478	91.8034	49.8738	7.9443	133.7329	175.6624
06/17/03	39.5091	91.8034	49.8738	7.9443	133.7329	175.6624
09/17/03	56.5391	91.8034	49.8738	7.9443	133.7329	175.6624
09/19/03	144.6815	91.8034	49.8738	7.9443	133.7329	175.6624
10/08/03	43.1912	91.8034	49.8738	7.9443	133.7329	175.6624
11/12/03	104.2762	91.8034	49.8738	7.9443	133.7329	175.6624
12/02/03	117.5399	91.8034	49.8738	7.9443	133.7329	175.6624
12/10/03	55.3737	91.8034	49.8738	7.9443	133.7329	175.6624
02/24/04	156.3174	91.8034	49.8738	7.9443	133.7329	175.6624
03/18/04	108.5512	91.8034	49.8738	7.9443	133.7329	175.6624
07/20/04	72.1174	91.8034	49.8738	7.9443	133.7329	175.6624

Copper (II) Chloride Reference Toxicant Control Chart - *Pimephales promelas* 7-day Growth



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/09/02	85.9635	96.6165	59.6169	22.6174	133.6160	170.6155
05/07/02	103.1250	96.6165	59.6169	22.6174	133.6160	170.6155
08/13/02	45.6522	96.6165	59.6169	22.6174	133.6160	170.6155
01/07/03	101.9048	96.6165	59.6169	22.6174	133.6160	170.6155
02/04/03	103.5616	96.6165	59.6169	22.6174	133.6160	170.6155
02/12/03	82.1105	96.6165	59.6169	22.6174	133.6160	170.6155
03/04/03	140.0281	96.6165	59.6169	22.6174	133.6160	170.6155
03/17/03	73.5889	96.6165	59.6169	22.6174	133.6160	170.6155
04/08/03	123.7772	96.6165	59.6169	22.6174	133.6160	170.6155
04/15/03	52.4483	96.6165	59.6169	22.6174	133.6160	170.6155
05/13/03	154.7297	96.6165	59.6169	22.6174	133.6160	170.6155
06/17/03	26.3845	96.6165	59.6169	22.6174	133.6160	170.6155
09/17/03	88.2769	96.6165	59.6169	22.6174	133.6160	170.6155
09/19/03	160.1437	96.6165	59.6169	22.6174	133.6160	170.6155
10/08/03	95.8075	96.6165	59.6169	22.6174	133.6160	170.6155
11/12/03	84.6014	96.6165	59.6169	22.6174	133.6160	170.6155
12/02/03	112.3664	96.6165	59.6169	22.6174	133.6160	170.6155
12/10/03	59.6613	96.6165	59.6169	22.6174	133.6160	170.6155
02/24/04	165.4302	96.6165	59.6169	22.6174	133.6160	170.6155
03/18/04	89.3120	96.6165	59.6169	22.6174	133.6160	170.6155
07/20/04	80.0723	96.6165	59.6169	22.6174	133.6160	170.6155

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test — **AMEC Bioassay SD**

Test:	14-2511-6226	**Test Type:**	Growth-Survival (7d)	**Duration:**	7 Days 0 Hours
Start Date:	20 Jul-04 03:30 PM	**Protocol:**	EPA/821/R-02-013 (2002)	**Species:**	Pimephales promelas
End Date:	27 Jul-04 04:00 PM	**Dil Water:**	Diluted Mineral Water (8:2)	**Source:**	Aquatic Biosystems. CO
Setup Date:	20 Jul-04 03:30 PM	**Brine:**			

Sample:	04-8196-7046	**Material:**	Copper chloride	**Client:**	Internal
Sampled:	20 Jul-04	**Code:**	040720pprt	**Project:**	
Received:	20 Jul-04	**Source:**	Reference Toxicant		
Hold Time:	16 Hours	**Station:**			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
07-7781-8423	7d Proportion Survived	15	30	21.21320	0.14160	Dunnett's Multiple Comparison
12-7368-1059	Mean Dry Weight-mg	<15	15	N/A	0.15395	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
05-8061-6470	7d Proportion Survived	25	29.53777	17.53883	41.29267	Linear Regression
		50	72.11743	53.34880	97.06013	
03-9398-3747	Mean Dry Weight-mg	10	5.610576	3.74925	9.87148	Linear Interpolation
		20	11.22115	7.49850	22.35451	
		25	14.02644	9.37313	50.25549	
		50	80.07227	66.12440	91.81736	

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Lower Limit	Upper Limit	Decision
05-8061-6470	7d Proportion Survived	Control Response	0.975	0.8		Passes acceptability criteria
07-7781-8423			0.975	0.8		Passes acceptability criteria

7d Proportion Survived Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.97500	0.90000	1.00000	0.02500	0.05000	5.13%
15		4	0.87500	0.70000	1.00000	0.06292	0.12583	14.38%
30		4	0.65000	0.50000	0.80000	0.06455	0.12910	19.86%
60		4	0.65000	0.50000	0.80000	0.08660	0.17321	26.65%
120		4	0.30000	0.20000	0.40000	0.04082	0.08165	27.22%
240		4	0.17500	0.10000	0.30000	0.04787	0.09574	54.71%

Mean Dry Weight-mg Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.48625	0.48000	0.49300	0.00269	0.00538	1.11%
15		4	0.35625	0.29700	0.40100	0.02367	0.04734	13.29%
30		4	0.34150	0.28300	0.41700	0.03354	0.06708	19.64%
60		4	0.30100	0.24900	0.33700	0.01918	0.03837	12.75%
120		4	0.12800	0.06700	0.17500	0.02430	0.04860	37.97%
240		4	0.04075	0.01200	0.08500	0.01561	0.03121	76.60%

CETIS Report

7d Proportion Survived Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1.00000	1.00000	1.00000	0.90000
15		0.70000	1.00000	0.90000	0.90000
30		0.50000	0.60000	0.70000	0.80000
60		0.50000	0.80000	0.80000	0.50000
120		0.30000	0.40000	0.30000	0.20000
240		0.10000	0.20000	0.30000	0.10000

Mean Dry Weight-mg Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	0.48000	0.48700	0.49300	0.48500
15		0.34000	0.29700	0.38700	0.40100
30		0.28300	0.28700	0.37900	0.41700
60		0.24900	0.32100	0.33700	0.29700
120		0.15800	0.17500	0.11200	0.06700
240		0.03000	0.03600	0.08500	0.01200

CETIS Report

Report Date: 18 Aug-04 9:42 AM
Analysis: 07-7781-8423

Fathead Minnow 7-d Larval Survival and Growth Test — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	08-2514-0200	08-2514-0200	18 Aug-04 9:33 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		15	30	6.67	21.21320	14.16%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.975	0.8		Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.76568	15.08628	0.73606	Equal Variances
Distribution	Shapiro-Wilk W	0.94037	0.88421	0.17319	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.655433	0.5310866	5	27.89	0.00000	Significant Effect
Error	0.3427483	0.0190416	18			
Total	2.99818125	0.5501281	23			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		15	1.495856	2.41	>0.05	0.2351546	Non-Significant Effect
		30	4.394881	2.41	<=0.05	0.2351546	Significant Effect
		60	4.355647	2.41	<=0.05	0.2351546	Significant Effect
		120	8.14108	2.41	<=0.05	0.2351546	Significant Effect
		240	9.731808	2.41	<=0.05	0.2351546	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.97500	0.90000	1.00000	0.05000	1.37127	1.24905	1.41202	0.08149
15		4	0.87500	0.70000	1.00000	0.12583	1.22532	0.99116	1.41202	0.17399
30		4	0.65000	0.50000	0.80000	0.12910	0.94245	0.78540	1.10715	0.13825
60		4	0.65000	0.50000	0.80000	0.17321	0.94627	0.78540	1.10715	0.18576
120		4	0.30000	0.20000	0.40000	0.08165	0.57691	0.46365	0.68472	0.09031
240		4	0.17500	0.10000	0.30000	0.09574	0.42170	0.32175	0.57964	0.12475

CETIS Report

Report Date: 18 Aug-04 9:42 AM
Analysis: 05-8061-6470

Fathead Minnow 7-d Larval Survival and Growth Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Linear Regression	08-2514-0200	08-2514-0200	18 Aug-04 9:35 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.025	Yes	Yes	No	No

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.02516	0.02458	-0.02302	0.07334	1.024	0.38136	Not Significant
Slope	1 73989	0.26989	1.21091	2.26887	6.447	0.00757	Significant
Intercept	1.76722	0.50490	0.77761	2.75682	3.500	0.03948	Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
3	-56.36774	1.01571	0.57475	0.09244	16.36427	28.86930	0.56714	Non-Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	0.60403	2.95825	0.69814	Equal Variances
Distribution	Shapiro-Wilk W	0.88058	0.90456	0.01723	Non-normal Distribution

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.975	0.8		Passes acceptability criteria

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	29.53777	17.53883	41.29267
50	72.11743	53.34880	97.06013

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	4	0.97500	0.90000	1.00000	0.01021	0.05000	39	40
15		4	0.87500	0.70000	1.00000	0.02569	0.12583	35	40
30		4	0.65000	0.50000	0.80000	0.02635	0.12910	26	40
60		4	0.65000	0.50000	0.80000	0.03536	0.17321	26	40
120		4	0.30000	0.20000	0.40000	0.01667	0.08165	12	40
240		4	0.17500	0.10000	0.30000	0.01954	0.09574	7	40

Approved By: [signature] 9/2

CETIS Report

Fathead Minnow 7-d Larval Survival and Growth Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	08-2514-0200	08-2514-0200	18 Aug-04 9:34 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		<15	15		N/A	15.39%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	10.50709	15.08628	0.06208	Equal Variances
Distribution	Shapiro-Wilk W	0.94796	0.88421	0.25179	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.5312243	0.1062449	5	55.06	0.00000	Significant Effect
Error	0.03473327	0.0019296	18			
Total	0.56595758	0.1081745	23			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		15	4.185254	2.41	<=0.05	0.07485807	Significant Effect
		30	4.660117	2.41	<=0.05	0.07485807	Significant Effect
		60	5.963985	2.41	<=0.05	0.07485807	Significant Effect
		120	11.53359	2.41	<=0.05	0.07485807	Significant Effect
		240	14.34254	2.41	<=0.05	0.07485807	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	0.48625	0.48000	0.49300	0.00538				
15		4	0.35625	0.29700	0.40100	0.04734				
30		4	0.34150	0.28300	0.41700	0.06708				
60		4	0.30100	0.24900	0.33700	0.03837				
120		4	0.12800	0.06700	0.17500	0.04860				
240		4	0.04075	0.01200	0.08500	0.03121				

CETIS Report

Report Date: 18 Aug-04 9:42 AM
Analysis: 03-9398-3747

Fathead Minnow 7-d Larval Survival and Growth Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Linear Interpolation	08-2514-0200	08-2514-0200	18 Aug-04 9:35 AM	CETISv1.024

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7747400	200	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
10	5.610576	3.74925	9.87148
20	11.22115	7.49850	22.35451
25	14.02644	9.37313	50.25549
50	80.07227	66.12440	91.81736

Data Summary — Calculated Variate

Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	4	0.48625	0.48000	0.49300	0.00110	0.00538
15		4	0.35625	0.29700	0.40100	0.00966	0.04734
30		4	0.34150	0.28300	0.41700	0.01369	0.06708
60		4	0.30100	0.24900	0.33700	0.00783	0.03837
120		4	0.12800	0.06700	0.17500	0.00992	0.04860
240		4	0.04075	0.01200	0.08500	0.00637	0.03121

Approved By: [signature] 8/20/04

Freshwater Chronic Bioassay | **Water Quality Measurements**

Client: Internal Ref tox $CuCl_2$ | **Test Species:** P. promelas

Sample ID: $CuCl_2$ - Ref tox. | **Test Date:** 7/20/04

Test No: 040720PPRT | **Start/End Times:** 1530, 1600

Concentration	Lab Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.21	8.25	8.24	8.28	8.27	8.25	8.27	
DO (mg/L)	7.8	7.9	8.6	7.8	8.0	8.1	7.9	
Cond. (µmhos-cm)	214	218	212	208	207	205	212	
Temp (°C)	25.0	25.4	24.9	24.9	24.7	25.1	25.2	
Final								
pH		7.84	7.87	7.88	7.72	7.94	7.52	7.58
DO (mg/L)		7.9	7.6	6.2	6.4	7.9	7.0	5.9
Temp (°C)		25.4	25.0	25.2	24.6	25.1	24.6	24.5

Concentration	15 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.18	8.22	8.21	8.28	8.27	8.25	8.24	
DO (mg/L)	7.8	7.9	8.6	7.8	8.0	8.1	7.9	
Cond. (µmhos-cm)	214	218	215	209	206	207	212	
Temp (°C)	25.1	25.3	24.8	25.3	25.1	25.1	25.1	
Final								
pH		7.96	7.96	7.86	7.71	7.95	7.59	7.65
DO (mg/L)		8.6	7.6	6.7	6.4	7.9	7.2	6.5
Temp (°C)		25.5	25.0	25.3	24.7	25.1	24.8	24.5

Concentration	30 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.18	8.23	8.20	8.28	8.26	8.25	8.24	
DO (mg/L)	7.8	7.8	8.6	7.7	8.0	8.0	7.9	
Cond. (µmhos-cm)	213	217	212	204	206	207	213	
Temp (°C)	24.9	25.3	24.9	25.3	25.1	25.1	25.1	
Final								
pH		8.05	7.87	7.88	7.76	8.01	7.61	7.69
DO (mg/L)		8.9	7.6	6.9	6.5	7.9	7.4	6.7
Temp (°C)		25.2	25.2	25.3	24.7	25.1	24.8	24.5

Concentration	60 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.18	8.21	8.20	8.29	8.27	8.26	8.26	
DO (mg/L)	7.8	7.8	8.6	7.7	7.9	7.9	7.8	
Cond. (µmhos-cm)	213	216	211	205	206	207	211	
Temp (°C)	24.7	25.2	24.9	25.6	25.5	25.1	25.2	
Final								
pH		8.03	7.85	7.91	7.84	8.01	7.68	7.72
DO (mg/L)		9.2	7.7	7.2	6.9	8.0	7.5	6.8
Temp (°C)		25.0	25.3	25.2	24.6	25.1	24.8	24.4

Concentration	120 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.18	8.23	8.17	8.28	8.27	8.25	8.24	
DO (mg/L)	7.8	7.9	8.6	7.7	8.0	8.1	7.7	
Cond. (µmhos-cm)	211	215	212	204	206	205	210	
Temp (°C)	24.6	25.3	24.9	25.7	25.6	25.1	25.2	
Final								
pH		8.05	7.87	7.94	7.74	7.99	7.74	7.72
DO (mg/L)		9.1	7.7	7.3	6.8	7.9	7.5	6.7
Temp (°C)		25.2	25.3	25.2	24.5	25.2	24.7	24.4

Concentration	240 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.17	8.20	8.18	8.25	8.26	8.25	8.26	
DO (mg/L)	7.8	7.9	8.6	7.6	7.9	7.9	7.7	
Cond. (µmhos-cm)	209	212	208	203	205	206	209	
Temp (°C)	24.6	25.0	24.9	25.8	25.9	25.1	25.3	
Final								
pH		8.03	7.87	8.00	7.91	7.99	7.91	7.73
DO (mg/L)		9.1	7.8	7.6	7.4	7.2	7.5	6.9
Temp (°C)		25.3	25.3	25.1	24.5	25.2	24.6	24.4

Analysts:	0	1	2	3	4	5	6	7
Initial:	SH	MC	RR	SH	MC	RH	RG	
Final:		MC	RR	MC	SH	RH	RG	AH

Animal Source/Date Received: ABS / 7-20-04

Animal Age at Initiation: < 2 days

Comments:

QC Check: JC 8-10-04

Final Review: 8/20/04

Freshwater Chronic Bioassay

Larval Fish Survival & Weights

Test Species: P. promelas

Client Name: CuCl2 Ref Tox

Test Date: 7-20-04

Sample ID: CuCl2 Ref Tox

Test No.: 040720PPRT

Conc. (ug/L)	Rep.	Test Day 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g) RS	pan + fish (g)
LC	a	10	10	10	10	10	10	10	10	100	0.01685	0.02165
	b	10	10	10	10	10	10	10	10	100	0.01750	0.02237
	c	10	10	10	10	10	10	10	10	100	0.01778	0.02271
	d	10	10	10	10	9	9	9	9	90	0.01774	0.02259
15	a	10	10	8	8	7	7	7	7	70	0.01690	0.02030
	b	10	10	9/10	10	10	10	10	10	100	0.01927	RS 0.02224
	c	10	10	10	10	9	9	9	9	90	0.01709	0.02096
	d	10	10	9	9	9	9	9	9	90	0.01691	0.02092
30	a	10	10	7	6	5	5	5	5	50	0.01620	0.01903
	b	10	10	9	7	6	6	6	6	60	0.01557	0.01544
	c	10	9	8	8	7	7	7	7	70	0.01582	0.01961
	d	10	10	10	9	8	8	8	8	80	0.01677	0.02094
60	a	10	7	7	5	5	5	5	5	50	0.01604	0.01853
	b	10	9	9	8	8	8	8	4 8 8	80	0.01749	0.02070
	c	10	10	9	8	8	8	8	8	80	0.01696	0.02033
	d	10	9	5	5	5	5	5	5	50	0.01734	0.02031
120	a	10	7	6	6	5	5	3	3	30	0.01709	0.01866
	b	10	8	6	5	4	4	4	4	40	0.01669	0.01844
	c	10	10	5	3	3	3	3	3	30	0.01575	0.01687
	d	10	9	5	4	3	2	2	2	20	0.01563	0.01630
240	a	10	7	3	3	1	1	1	1	10	0.01895	0.01925
	b	10	7	5	5	4	4	3	2	20	0.01856	0.01892
	c	10	6	5	5	3	3	3	3	30	0.01700	0.01785
	d	10	7	4	2	1	1	1	1	10	0.01780	0.01792
	a											
	b											
	c											
	d											
Tech Initials		SH	RS	RS	RS	SH	AH	RS	RG	data entry QC=AH		

Feeding Times (day):

	0	1	2	3	4	5	6
SD	~~1600~~	0800	0900	0800	0830	0900	0815
	~~1425~~	1423	1215	1400	1030	1300	1200
1620	~~1030~~	1430	1645	1605	1400	1945	1345

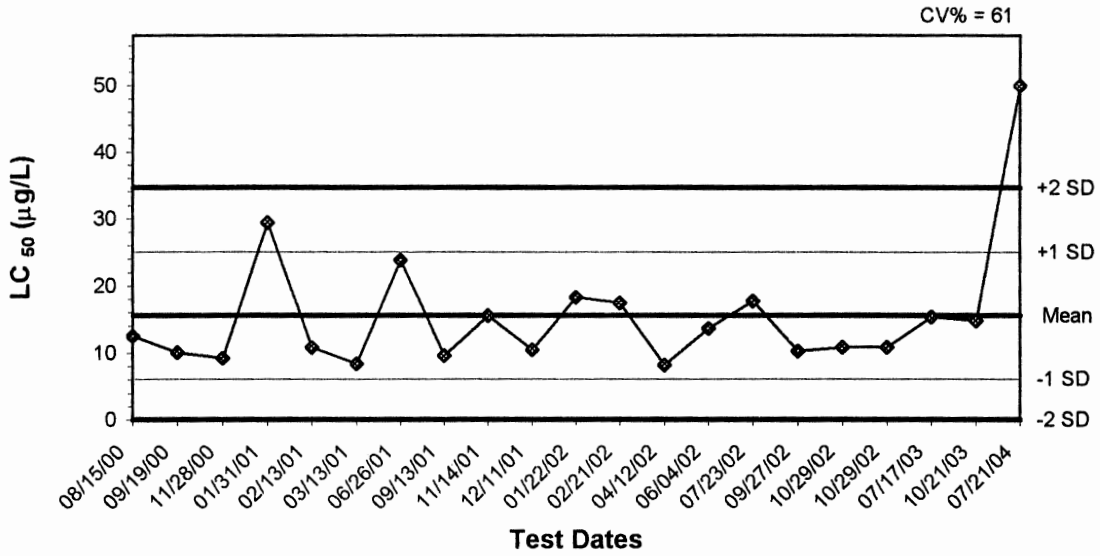
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Date/Time in: ~~7-26-04/1615~~ 7-27-04 1600
Date/Time out: ~~7-27-04/1001~~ 7-30-04/1115
Oven Temp (°C): 64
Tech Initials: RS

Comments:

QC Check: RC 8-10-04
Final Review: ~~8/2/04~~

C. DUBIA

Copper (II) Chloride Reference Toxicant Control Chart - *Ceriodaphnia dubia* 96-hour Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
08/15/00	12.5782	15.5913	6.0883	0.0000	25.0942	34.5971
09/19/00	10.1246	15.5913	6.0883	0.0000	25.0942	34.5971
11/28/00	9.2044	15.5913	6.0883	0.0000	25.0942	34.5971
01/31/01	29.3825	15.5913	6.0883	0.0000	25.0942	34.5971
02/13/01	10.8819	15.5913	6.0883	0.0000	25.0942	34.5971
03/13/01	8.3448	15.5913	6.0883	0.0000	25.0942	34.5971
06/26/01	23.8124	15.5913	6.0883	0.0000	25.0942	34.5971
09/13/01	9.5998	15.5913	6.0883	0.0000	25.0942	34.5971
11/14/01	15.5218	15.5913	6.0883	0.0000	25.0942	34.5971
12/11/01	10.4533	15.5913	6.0883	0.0000	25.0942	34.5971
01/22/02	18.3323	15.5913	6.0883	0.0000	25.0942	34.5971
02/21/02	17.4677	15.5913	6.0883	0.0000	25.0942	34.5971
04/12/02	8.1846	15.5913	6.0883	0.0000	25.0942	34.5971
06/04/02	13.7044	15.5913	6.0883	0.0000	25.0942	34.5971
07/23/02	17.6777	15.5913	6.0883	0.0000	25.0942	34.5971
09/27/02	10.2488	15.5913	6.0883	0.0000	25.0942	34.5971
10/29/02	10.8673	15.5913	6.0883	0.0000	25.0942	34.5971
10/29/02	10.8673	15.5913	6.0883	0.0000	25.0942	34.5971
07/17/03	15.3347	15.5913	6.0883	0.0000	25.0942	34.5971
10/21/03	14.8281	15.5913	6.0883	0.0000	25.0942	34.5971
07/21/04	50.0000	15.5913	6.0883	0.0000	25.0942	34.5971

CETIS Analysis Detail

Report Date: 18 Oct-04 12:42 PM
Analysis: 07-2672-4742/040721cdra

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Trimmed Spearman-Karber	18-0720-0531	18-0720-0531	18 Oct-04 12:41 PM	CETISv1.025

Spearman-Karber Options

Threshold Option	Lower Threshold	Trim Level	Mu	Sigma
Control Threshold	0	50.00%	1.69897	0

Point Estimates

EC50/LC50	95% LCL	95% UCL
50.00000	50.00000	50.00000

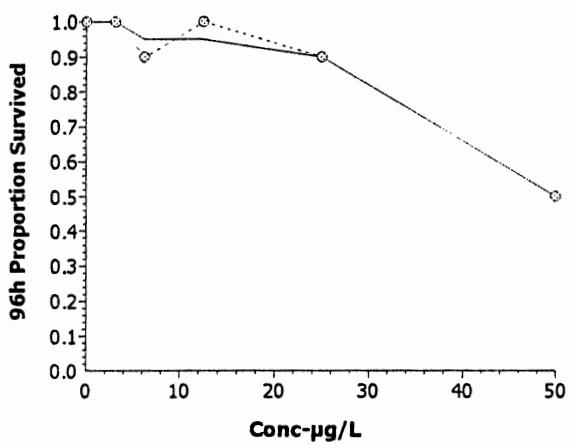
Test Acceptability

Attribute	Statistic	Acceptable Range	Decision
Control Response	1	0.9 - N/A	Passes acceptability criteria

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	4	1.00000	1.00000	1.00000	0.00000	0.00000	20	20
3.125		4	1.00000	1.00000	1.00000	0.00000	0.00000	20	20
6.25		4	0.90000	0.80000	1.00000	0.02357	0.11547	18	20
12.5		4	1.00000	1.00000	1.00000	0.00000	0.00000	20	20
25		4	0.90000	0.80000	1.00000	0.02357	0.11547	18	20
50		4	0.50000	0.00000	1.00000	0.09718	0.47610	10	20

Graphics



CETIS Test Summary

Report Date: 18 Oct-04 12:42 PM
Link: 18-0720-0531/040721cdra

Ceriodaphnia 96-h Acute Survival Test — **Nautilus Environmental (CA)**

Test No:	02-7695-5994	**Test Type:**	Survival (96h)	**Duration:**	94h
Start Date:	21 Jul-04 03:30 PM	**Protocol:**	EPA/821/R-02-012 (2002)	**Species:**	Ceriodaphnia dubia
Ending Date:	25 Jul-04 01:45 PM	**Dil Water:**	Diluted Mineral Water (8:2)	**Source:**	In-House Culture
Setup Date:	21 Jul-04 03:30 PM	**Brine:**	Not Applicable		

Sample No:	11-7930-1907	**Material:**	Copper chloride	**Client:**	Internal
Sample Date:	21 Jul-04	**Code:**	040721cdra	**Project:**	
Receive Date:	21 Jul-04	**Source:**	Reference Toxicant		
Sample Age:	16h	**Station:**			

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
07-2672-4742	96h Proportion Survived	50	50.00000	50.00000	50.00000	Trimmed Spearman-Karber

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision
07-2672-4742	96h Proportion Survived	Control Response	1	0.9 - N/A	Passes acceptability criteria

96h Proportion Survived Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
3.125		4	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
6.25		4	0.90000	0.80000	1.00000	0.05774	0.11547	12.83%
12.5		4	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		4	0.90000	0.80000	1.00000	0.05774	0.11547	12.83%
50		4	0.50000	0.00000	1.00000	0.23805	0.47610	95.22%

96h Proportion Survived Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	1.00000	1.00000	1.00000	1.00000
3.125		1.00000	1.00000	1.00000	1.00000
6.25		0.80000	0.80000	1.00000	1.00000
12.5		1.00000	1.00000	1.00000	1.00000
25		1.00000	1.00000	0.80000	0.80000
50		0.00000	0.20000	0.80000	1.00000

Freshwater 96-hr Acute with Renewal

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Internal
Sample ID: CuCl2
Contact: –
Test #: 040721CDRA

Start Date & Time: 7/20/04 1530 (21 hrs)
End Date & Time: 7/25/04 1345
Test Organism: C. dubia
Test Protocol: EPA '02 Acute 2002

Concentration % v/v	Rep	Number of Live Organisms					D.O. (mg/L)						pH (pH units)						Conductivity (µmhos-cm)				Test Temperature (°C)						% Surv.
									Init.	Fin.					Init.	Fin.				Init.	Fin.					Init.	Fin.			
		0	24	48	72	96	0	24	48	48	72	96	0	24	48	48	72	96	0	48	48	96	0	24	48	48	72	96	
Cont.	A	5	5	5	5	5	7.6	8.0	7.8	A	6.3	6.2	8.05	8.24	8.27	A	7.67	7.70	228	204	A	217	24.6	25.3	25.2	A	24.1	25.4	100
	B	5	5	5	5	5																							100
	C	5	5	5	5	5																							100
	D	5	5	5	5	5																							100
3.125	A	5	5	5	5	5	7.6	7.8	7.8	A	6.7	6.2	8.05	8.16	8.28	A	7.69	7.74	218	205	A	219	24.7	25.2	25.3	A	24.2	25.4	100
	B	5	5	5	5	5																							100
	C	5	5	5	5	5																							100
	D	5	5	5	5	5																							100
6.25	A	5	5	4	4	4	7.6	7.8	7.8	A	6.4	6.1	8.12	8.19	8.29	A	7.69	7.74	218	205	A	219	24.6	24.9	25.3	A	24.2	25.4	80
	B	5	4	4	4	4																							80
	C	5	5	5	5	5																							100
	D	5	5	5	5	5																							100
Technician Initials		MC	SH	SO	ML	IG																							

Animal Source: Internal
Date Received: N/A

Comments:
0 hrs:
24 hrs.
48 hrs. (A) cdgs not taken, cups accidentally dumped
72 hrs.
96 hrs.

QA Check: AH 8/17/04
Final Review: AH 10/19/04

AMEC Earth and Environmental
5550 Morehouse Dr., Suite B
San Diego, CA 92121
(858) 458-9044

Freshwater 96-hr Acute with Renewal

96 Hour Toxicity Test Data Sheet - AMEC Bioassay Laboratory

Client: Internal
Sample ID: CuCl2
Contact:
Test #: 040721CDRA

Start Date & Time: 7/21/04 1530
End Date & Time: 7/25/04 1345
Test Organism: C. dubia
Test Protocol: EPA-821-R-02-012 2002 Acute

Concentration mg/L	Rep	Number of Live Organisms					D.O. (mg/L)						pH (pH units)						Conductivity (µmhos-cm)				Test Temperature (°C)						% Surv.
									Init.	Fin.					Init.	Fin.				Init.	Fin.					Init.	Fin.			
		0	24	48	72	96	0	24	48	48	72	96	0	24	48	48	72	96	0	48	48	96	0	24	48	48	72	96	
12.5	A	5	5	5	5	5	7.5	7.9	7.7	A	6.2	6.1	8.16	8.13	8.29	A	7.69	7.74	218	205	A	219	24.7	25.6	25.6	A	24.4	25.4	100
	B	5	5	5	5	5																							100
	C	5	5	5	5	5																							100
	D	5	5	5	5	5																							100
25	A	5	5	5	5	5	7.5	7.1	7.7	A	6.2	6.1	8.16	8.11	8.28	A	7.69	7.74	217	204	A	215	24.6	25.1	25.7	A	24.5	25.4	100
	B	5	5	5	5	5																							100
	C	5	4	4	4	4																							80
	D	5	5	5	4	4																							80
50	A	5	1	1	0	0	7.6	7.9	7.8	A	6.2	6.1	8.18	8.08	8.28	A	7.68	7.71	217	203	A	217	24.4	24.9	25.4	A	24.6	25.4	0
	B	5	2	2	1	1																							20
	C	5	4	4	4	4																							80
	D	5	5	5	5	5																							100
Technician Initials		MR	SH	SD	me	PH																							

Animal Source: Internal
Date Received: N/A

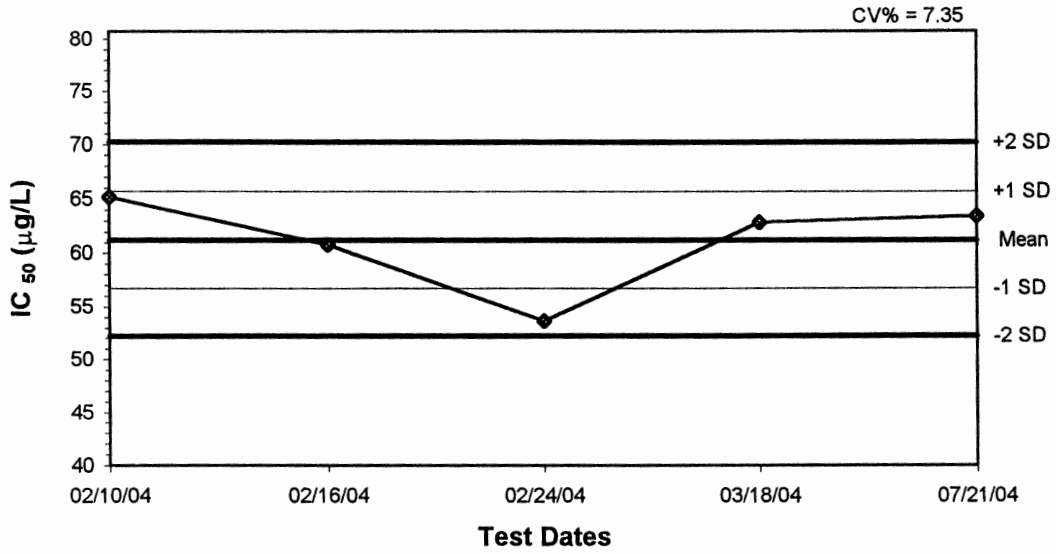
Comments:
0 hrs:
24 hrs.
48 hrs. A cups dumped accidentally before rdgs taken
72 hrs.
96 hrs.

QA Check: [signature] 8/10/04
Final Review: AH 10/19/04

AMEC Earth and Environmental
5550 Morehouse Dr., Suite B
San Diego, CA 92121
(858) 458-9044

S. CAPRICORNUTUM

Copper (II) Chloride Reference Toxicant Control Chart - *Selenastrum capricornutum* 96-hour Growth-Cell Density



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
02/10/04	65.1499	61.1979	56.6993	52.2008	65.6964	70.1949
02/16/04	60.8128	61.1979	56.6993	52.2008	65.6964	70.1949
02/24/04	53.6442	61.1979	56.6993	52.2008	65.6964	70.1949
03/18/04	62.8955	61.1979	56.6993	52.2008	65.6964	70.1949
07/21/04	63.4870	61.1979	56.6993	52.2008	65.6964	70.1949

CETIS Report

Report Date: 23 Aug-04 11:42 AM
Link: 11-5976-2294/040721scrt

Selenastrum Growth Test — AMEC Bioassay SD

Test:	11-3769-7805	Test Type:	Cell Growth	Duration:	4 Days 1 Hours
Start Date:	21 Jul-04 04:40 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Selenastrum capricornutum
End Date:	25 Jul-04 05:40 PM	Dil Water:	Nutrient Enriched Water	Source:	In-House Culture
Setup Date:	21 Jul-04 04:40 PM	Brine:	Not Applicable		

Sample:	06-3491-8014	Material:	Copper chloride	Client:	Internal
Sampled:	21 Jul-04 04:40 PM	Code:	040721scrt	Project:	
Received:	21 Jul-04 04:40 PM	Source:	Reference Toxicant		
Hold Time:	N/A	Station:			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
02-5173-5804	Cell Density	<9.4	9.4	N/A	0.12874	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
11-4134-4405	Cell Density	10	37.62901	N/A	43.26496	Linear Interpolation
		20	44.09351	35.66358	49.40028	
		25	47.32576	38.93421	52.60694	
		50	63.487	56.68685	70.55373	

Cell Density Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	2384250.0	2255000.0	2500000.0	57530.2	115060.	4.83%
9.4		4	2122250.0	2014000.0	2189000.0	37712.4	75424.9	3.55%
18.8		4	2134500.0	2045000.0	2247000.0	52028.0	104056.	4.87%
37.5		4	2195000.0	1814000.0	2606000.0	173092.	346184.	15.77%
75		4	767500.0	574000.0	963000.0	106135.	212271.	27.66%
150		4	10750.0	9000.00	12000.0	629.152	1258.30	11.71%

Cell Density Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	2500000.0	2322000.0	2460000.0	2255000.0
9.4		2014000.0	2189000.0	2139000.0	2147000.0
18.8		2047000.0	2045000.0	2247000.0	2199000.0
37.5		1814000.0	2030000.0	2330000.0	2606000.0
75		574000.0	939000.0	963000.0	594000.0
150		9000.00	11000.0	11000.0	12000.0

Approved By 8/23/

CETIS Report

Report Date: 18 Aug-04 9:07 AM
Analysis: 02-5173-5804

Selenastrum Growth Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	11-5976-2294	11-5976-2294	18 Aug-04 9:06 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Untransformed		<9.4	9.4		N/A	12.87%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control CV	0.0483		0.2	Passes acceptability criteria
Control Response	2E+06	1E+06		Passes acceptability criteria
MSDp	0.1287	0.091	0.29	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	31.94121	15.08628	0.00001	Unequal Variances
Distribution	Shapiro-Wilk W	0.97371	0.88421	0.74752	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.8985E+13	3.797E+12	5	117.03	0.00000	Significant Effect
Error	5.8398E+11	3.244E+10	18			
Total	1.9569E+13	3.829E+12	23			

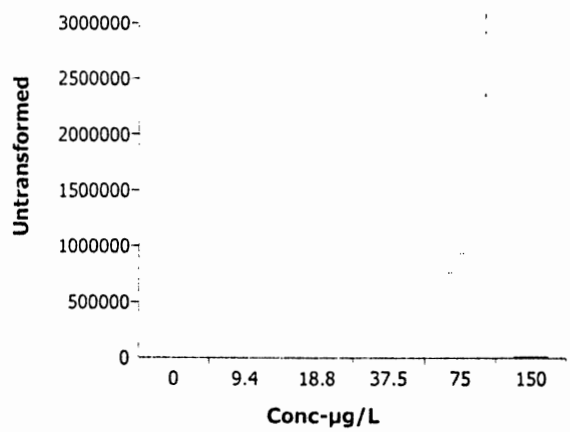
Group Comparisons

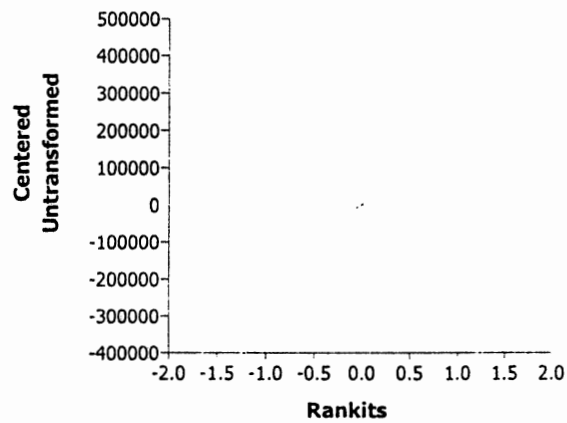
Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		9.4	10	10	<=0.05	0	Significant Effect
		18.8	10	10	<=0.05	0	Significant Effect
		37.5	16	10	>0.05	0	Non-Significant Effect
		75	10	10	<=0.05	0	Significant Effect
		150	10	10	<=0.05	1	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	4	2384250	2255000	2500000	115060.				
9.4		4	2122250	2014000	2189000	75423.6				
18.8		4	2134500	2045000	2247000	104055.				
37.5		4	2195000	1814000	2606000	346185.				
75		4	767500.	574000.	963000.	212271.				
150		4	10750.0	9000.00	12000.0	1258.30				

Cell Density





Approved By: 8/20/04

Fluorometric & Microscopic Determination of Cell Density
Turner Fluorometer Model TD-700

Test Species: S. capricornutum

Client : Internal

Test Date: 7-21-04

Sample ID: CuCl2

Start/End Times: 16:40 / 17:40

Test No: 040721 SCRT

Analyst: AH

Random Number	Dilution	Cell Density (fluorometric) (cells/ml *10^5)	Cell Density (microscopic) (cells/ml *10^4)
Blank	NA		
Cal Check 1 (NEW, Solid, Effluent Blanks)	~~0.00,~~ ?	0,00,2.18	
33		23.22	
34		20.14	
35		18.14	
36		21.47	
37		0.09	
38		21.99	
39		9.63	
40		20.45	
41		26.06	
42		23.30	
43		5.74	
44		21.89	
Cal Check 2 (NEW, Solid, Effluent Blanks)		0,00,2.18	
45		20.30	
46		20.47	
47		9.39	
48		0.12	
49		21.39	
50		25.00	
51		22.47	
52		0.11	
53		24.60	
54		5.94	
55		0.11	
56		22.55	
Cal Check 3 (NEW, Solid, Effluent Blanks)			

data entry QC=AH

Comments:

QC Check: AH 8-2-04

Final Review: [illegible] 8/26/04

CETIS Worksheet

Report Date: 21 Jul-04 10:52 AM
Link: 11-5976-2294

Selenastrum Growth Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Selenastrum capricornutum	**Sample Code:**	040721scrt
End Date:	25 Jul-04	**Protocol:**	EPA/821/R-02-013 (2002)	**Sample Source:**	Reference Toxicant
Sampled:	21 Jul-04	**Material:**	Copper chloride	**Sample Station:**	

Conc-µg/L	Code	Rep	Pos	Cell Density	Absorbance	Biomass	Chlorophyll a	Notes
0	LC	1	50					
0	LC	2	33					
0	LC	3	53					
0	LC	4	56					
9.4		1	34					
9.4		2	44					
9.4		3	49					
9.4		4	36					
18.8		1	46					
18.8		2	40					
18.8		3	51					
18.8		4	38					
37.5		1	35					
37.5		2	45					
37.5		3	42					
37.5		4	41					
75		1	43					
75		2	47					
75		3	39					
75		4	54					
150		1	37					
150		2	55					
150		3	52					
150		4	48					

QC = Ant

Freshwater Chronic Bioassay **Algal Growth Inhibition Worksheet**

Client : City of Buenaventura **Test Species:** *S. capricornutum*

Sample ID: A-2, B-1, B-3, C-2 **Test Date:** 07/21/2004

Test No: 0407-055, 056, 057, 058 **Analyst:** AH

Source/Date Stock Culture Started: Internal / 7-15-04

Stock Cell Density Measurements: 32.32
32.19
32.26
32.10
32.18

Mean: 32.21

(mean no. * 100,000)/(500,000) = x (dilution factor): 6.44 − 1.00 pt sele / 5.44 pt NEW

Prepare inoculum according to the dilution factor. This yields a solution with the desired cell density of 500,000 cells/ml.

Example: (35 * 100,000)/(500,000) = 7 (e.g. 25 ml Sele stock + 150 ml NEW)

Inoculate 1 ml into 3 initial count flasks containing 50 ml of NEW, stir and count on the hemacytometer. Flasks should contain a final density of 10,000 cells/ml ± 10%.

Inoculum Cell Density Confirmation Counts: 1
2
1

Mean: 1.3

Test Initiation Time: 16:40

Test Termination Time: 17:40

Comments:

QC Check: AH 8-12-04 Final Review: [illegible] 8/20/04

Freshwater Chronic Bioassay

Water Quality Measurements
Algal Growth Inhibition

Test Species: *S.capricornutum*

Client : Internal

Test Date: 07/21/2004

Sample ID: $CuCl_2$

Start/End Times: 16:40 / 17:40

Test No: 040721scrt

Analyst: AH

	Initial Readings				Final Readings	
Concentration (____µg/l____)	D.O. (mg/L)	Conductivity (umhos-cm)	Alkalinity (mg/L)	Hardness (mg/L)	D.O. (mg/L)	Conductivity (umhos-cm)
Lab Control	7.4	110	16	36	9.6	125
9.4	6.6	97	7	9	9.0	97
18.8	6.8	97	—	—	8.9	103
37.5	6.5	97	13	9	8.7	101
75	6.7	96	—	—	8.4	101
150	6.8	96	—	—	8.1	99

		0 Hour	24 Hour	48 Hour	72 Hour	96 Hour
pH/Temperature (°C):	Lab Control	7.46/25.0	7.21/26.3*	7.52/26.0	9.22/25.9	9.08/24.8
pH/Temperature (°C):	9.4	7.29/25.0	7.15/26.6	7.39/25.7	8.78/26.6	8.75/24.8
pH/Temperature (°C):	18.8	7.50/25.0	7.11/27.0	7.32/25.7	7.81/26.2	8.11/24.8
pH/Temperature (°C):	37.5	7.41/25.0	7.09/26.9	7.30/25.5	7.87/26.1	8.59/24.8
pH/Temperature (°C):	75	7.32/25.0	7.08/26.9	7.42/25.3	7.51/26.0	7.91/24.8
pH/Temperature (°C):	150	7.28/25.0	7.07/26.9	7.24/25.3	7.18/26.2	7.30/24.8
pH/Temperature (°C):		/	/	/	/	/

Comments: *Turned up fan speed at 24 hrs b/c temp > 26.0°C

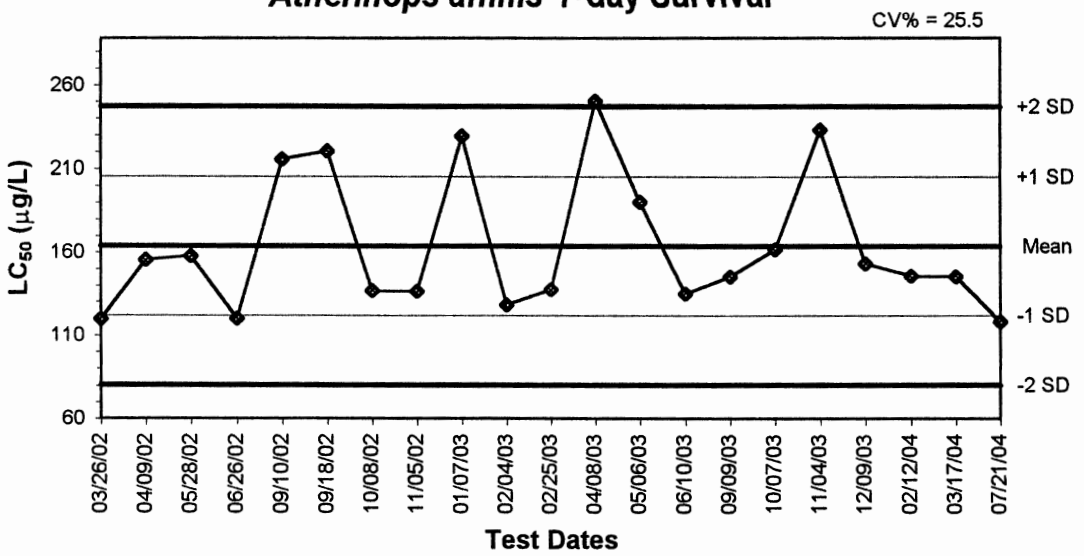
QC Check: AH 8-12-04

Final Review: 8/25/04

MARINE

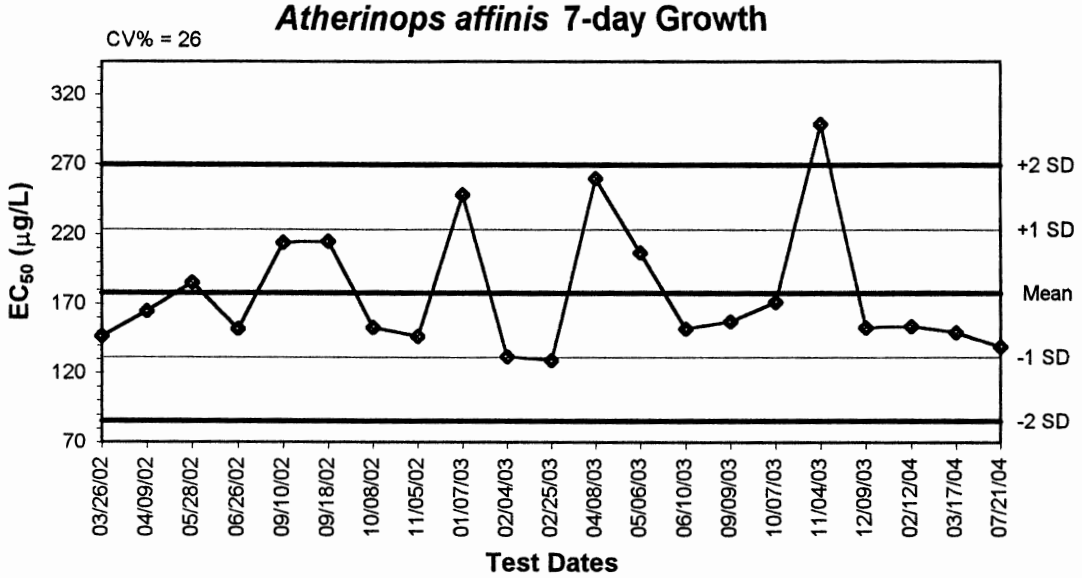
A. AFFINIS

Copper (II) Chloride Reference Toxicant Control Chart - *Atherinops affinis* 7-day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/26/02	119.6742	163.6928	122.0258	80.3587	205.3598	247.0268
04/09/02	155.7269	163.6928	122.0258	80.3587	205.3598	247.0268
05/28/02	157.6964	163.6928	122.0258	80.3587	205.3598	247.0268
06/26/02	120.1115	163.6928	122.0258	80.3587	205.3598	247.0268
09/10/02	215.6806	163.6928	122.0258	80.3587	205.3598	247.0268
09/18/02	220.6823	163.6928	122.0258	80.3587	205.3598	247.0268
10/08/02	136.8843	163.6928	122.0258	80.3587	205.3598	247.0268
11/05/02	136.6628	163.6928	122.0258	80.3587	205.3598	247.0268
01/07/03	229.3396	163.6928	122.0258	80.3587	205.3598	247.0268
02/04/03	128.1337	163.6928	122.0258	80.3587	205.3598	247.0268
02/25/03	137.4615	163.6928	122.0258	80.3587	205.3598	247.0268
04/08/03	250.5491	163.6928	122.0258	80.3587	205.3598	247.0268
05/06/03	190.5418	163.6928	122.0258	80.3587	205.3598	247.0268
06/10/03	134.8645	163.6928	122.0258	80.3587	205.3598	247.0268
09/09/03	145.6062	163.6928	122.0258	80.3587	205.3598	247.0268
10/07/03	161.8443	163.6928	122.0258	80.3587	205.3598	247.0268
11/04/03	233.4041	163.6928	122.0258	80.3587	205.3598	247.0268
12/09/03	153.2281	163.6928	122.0258	80.3587	205.3598	247.0268
02/12/04	145.7969	163.6928	122.0258	80.3587	205.3598	247.0268
03/17/04	145.5798	163.6928	122.0258	80.3587	205.3598	247.0268
07/21/04	118.0799	163.6928	122.0258	80.3587	205.3598	247.0268

Copper (II) Chloride Reference Toxicant Control Chart - *Atherinops affinis* 7-day Growth



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/26/02	146.4188	177.5590	131.4703	85.3816	223.6477	269.7364
04/09/02	164.6897	177.5590	131.4703	85.3816	223.6477	269.7364
05/28/02	185.3288	177.5590	131.4703	85.3816	223.6477	269.7364
06/26/02	152.2438	177.5590	131.4703	85.3816	223.6477	269.7364
09/10/02	214.0064	177.5590	131.4703	85.3816	223.6477	269.7364
09/18/02	215.0769	177.5590	131.4703	85.3816	223.6477	269.7364
10/08/02	152.7364	177.5590	131.4703	85.3816	223.6477	269.7364
11/05/02	146.7005	177.5590	131.4703	85.3816	223.6477	269.7364
01/07/03	248.4452	177.5590	131.4703	85.3816	223.6477	269.7364
02/04/03	131.7939	177.5590	131.4703	85.3816	223.6477	269.7364
02/25/03	129.1648	177.5590	131.4703	85.3816	223.6477	269.7364
04/08/03	260.1567	177.5590	131.4703	85.3816	223.6477	269.7364
05/06/03	206.8016	177.5590	131.4703	85.3816	223.6477	269.7364
06/10/03	152.1667	177.5590	131.4703	85.3816	223.6477	269.7364
09/09/03	157.5385	177.5590	131.4703	85.3816	223.6477	269.7364
10/07/03	171.5624	177.5590	131.4703	85.3816	223.6477	269.7364
11/04/03	298.7089	177.5590	131.4703	85.3816	223.6477	269.7364
12/09/03	153.0860	177.5590	131.4703	85.3816	223.6477	269.7364
02/12/04	153.8089	177.5590	131.4703	85.3816	223.6477	269.7364
03/17/04	149.1393	177.5590	131.4703	85.3816	223.6477	269.7364
07/21/04	139.1653	177.5590	131.4703	85.3816	223.6477	269.7364

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test — AMEC NW Bioassay

Test:	11-9894-1671	Test Type:	Growth-Survival (7d)	Duration:	6 Days 23 Hours
Start Date:	21 Jul-04 02:30 PM	Protocol:	EPA/821/R-02-012 (2002)	Species:	Atherinops affinis
End Date:	28 Jul-04 02:00 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 02:30 PM	Brine:			

Sample:	08-7990-1298	Material:	Copper chloride	Client:	Internal
Sampled:	21 Jul-04	Code:	040721aart	Project:	
Received:	21 Jul-04	Source:	Reference Toxicant		
Hold Time:	14 Hours	Station:			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
04-1077-0847	7d Proportion Survived	50	100	70.71068	0.16502	Dunnett's Multiple Comparison
14-3680-6435	Mean Dry Weight-mg	100	200	141.42140	0.19197	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
08-1811-3849	7d Proportion Survived	25	103.088	N/A	N/A	Linear Regression
		50	109.5876	N/A	N/A	
17-4645-6128	Mean Dry Weight-mg	10	78.07397	N/A	117.51190	Linear Interpolation
		20	102.6644	43.79772	121.15560	
		25	108.7479	66.25540	126.08340	
		50	139.1653	119.28740	150.72230	

7d Proportion Survived Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
25		5	0.76000	0.60000	1.00000	0.07483	0.16733	22.02%
50		5	0.88000	0.80000	1.00000	0.04899	0.10954	12.45%
100		5	0.72000	0.60000	1.00000	0.08000	0.17889	24.85%
200		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
400		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Mean Dry Weight-mg Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.15440	0.94400	1.57600	0.11011	0.24621	21.33%
25		5	1.10560	0.90400	1.24000	0.06430	0.14377	13.00%
50		5	1.23240	0.99600	1.36200	0.06509	0.14556	11.81%
100		5	0.95680	0.74200	1.16600	0.07718	0.17258	18.04%
200		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
400		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

CETIS Report

7d Proportion Survived Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.00000	0.80000	1.00000	0.80000	1.00000
25		1.00000	0.80000	0.60000	0.60000	0.80000
50		0.80000	1.00000	0.80000	0.80000	1.00000
100		0.60000	1.00000	0.60000	0.80000	0.60000
200		0.00000	0.00000	0.00000	0.00000	0.00000
400		0.00000	0.00000	0.00000	0.00000	0.00000

Mean Dry Weight-mg Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.02400	0.94400	1.57600	1.12400	1.10400
25		1.23400	1.02200	1.24000	0.90400	1.12800
50		0.99600	1.22600	1.23600	1.36200	1.34200
100		0.74200	0.89600	0.88200	1.16600	1.09800
200		0.00000	0.00000	0.00000	0.00000	0.00000
400		0.00000	0.00000	0.00000	0.00000	0.00000

CETIS Report

Report Date: 18 Aug-04 10:22 AM
Analysis: 04-1077-0847 SD
AMEC ~~NW~~ Bioassay

Pacific Topsmelt 7-d Survival and Growth Test

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	19-1876-8605	19-1876-8605	18 Aug-04 10:20 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		50	100	2.00	70.71068	16.50%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	2.69729	3.89507	0.04520	Equal Variances
Distribution	Shapiro-Wilk W	0.92078	0.89981	0.03498	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.693336	1.138667	5	60.81	0.00000	Significant Effect
Error	0.4494154	0.0187256	24			
Total	6.14275137	1.1573929	29			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		25	2.12236	2.36	>0.05	0.2042492	Non-Significant Effect
		50	0.5503049	2.36	>0.05	0.2042492	Non-Significant Effect
		100	2.633235	2.36	<=0.05	0.2042492	Significant Effect
		200	11.83778	2.36	<=0.05	0.2042492	Significant Effect
		400	11.83778	2.36	<=0.05	0.2042492	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043
25		5	0.76000	0.60000	1.00000	0.16733	1.06635	0.88608	1.34528	0.19113
50		5	0.88000	0.80000	1.00000	0.10954	1.20240	1.10715	1.34528	0.13043
100		5	0.72000	0.60000	1.00000	0.17889	1.02213	0.88608	1.34528	0.20444
200		5	0.00000	0.00000	0.00000	0.00000	0.22551	0.22551	0.22551	0.00003
400		5	0.00000	0.00000	0.00000	0.00000	0.22551	0.22551	0.22551	0.00003

CETIS Report

Report Date: 18 Aug-04 10:22 AM
Analysis: 08-1811-3849

Pacific Topsmelt 7-d Survival and Growth Test — AMEC ~~NW~~ SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Linear Regression	19-1876-8605	19-1876-8605	18 Aug-04 10:20 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.08	Yes	Yes	No	No

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.14667	0.04085	0.06660	0.22673	3.590	0.03701	Significant
Slope	25.40111	16316.80000	-31955.52000	32006.32000	0.002	0.99886	Not Significant
Intercept	-46.81221	32633.59000	-64008.65000	63915.03000	-0.001	0.99895	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
25	-34.23513	-1.84292	0.03937	1585172.0	11.44874	35.17247	0.97813	Non-Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	1.65434	2.74006	0.19407	Equal Variances
Distribution	Shapiro-Wilk W	0.46062	0.91820	0.00000	Non-normal Distribution

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	103 088	N/A	N/A
50	109.5876	N/A	N/A

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.92000	0.80000	1.00000	0.02236	0.10954	23	25
25		5	0.76000	0.60000	1.00000	0.03416	0.16733	19	25
50		5	0.88000	0.80000	1.00000	0.02236	0.10954	22	25
100		5	0.72000	0.60000	1.00000	0.03651	0.17889	18	25
200		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	25
400		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	25

Approved By: 8/20/04

CETIS Report

Pacific Topsmelt 7-d Survival and Growth Test — AMEC NW Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	19-1876-8605	19-1876-8605	18 Aug-04 10:21 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Untransformed		100	200	1.00	141.42140	19.20%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	4.40023	3.89507	0.00552	Unequal Variances
Distribution	Shapiro-Wilk W	0.90626	0.89981	0.01466	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	8.450183	1.690037	5	76.67	0.00000	Significant Effect
Error	0.5290462	0.0220436	24			
Total	8.97922915	1.7120802	29			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		25	28	16	>0.05	0	Non-Significant Effect
		50	32	16	>0.05	0	Non-Significant Effect
		100	21	16	>0.05	0	Non-Significant Effect
		200	15	16	<=0.05	1	Significant Effect
		400	15	16	<=0.05	1	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	1.15440	0.94400	1.57600	0.24621				
25		5	1.10560	0.90400	1.24000	0.14377				
50		5	1.23240	0.99600	1.36200	0.14556				
100		5	0.95680	0.74200	1.16600	0.17258				
200		5	0.00000	0.00000	0.00000	0.00000				
400		5	0.00000	0.00000	0.00000	0.00000				

CETIS Report

Report Date: 18 Aug-04 10:22 AM
Analysis: 17-4645-6128

Pacific Topsmelt 7-d Survival and Growth Test — AMEC ~~NW~~ SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Linear Interpolation	19-1876-8605	19-1876-8605	18 Aug-04 10:21 AM	CETISv1.024

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7607235	200	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
10	78.07397	N/A	117.51190
20	102 6644	43.79772	121.15560
25	108.7479	66.25540	126.08340
50	139.1653	119.28740	150.72230

Data Summary

			Calculated Variate				
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	5	1.15440	0.94400	1.57600	0.05026	0.24621
25		5	1.10560	0.90400	1.24000	0.02935	0.14377
50		5	1.23240	0.99600	1.36200	0.02971	0.14556
100		5	0.95680	0.74200	1.16600	0.03523	0.17258
200		5	0.00000	0.00000	0.00000	0.00000	0.00000
400		5	0.00000	0.00000	0.00000	0.00000	0.00000

Approved By: [signature] 8/20/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

Raw Datasheet
Water Quality Measurements
Marine Chronic Bioassay

Client: Internal **Test Species:** A. affinis

Sample ID: $CuCl_2$ **Test Date:** 7·21·04

Test No: 040721aart **Start/End Times:** 1430, 1400

Concentration	LC							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.92	7.97	7.97	7.95	7.90	7.98	7.91	
DO (mg/L)	6.5	7.3	8.0	7.8	7.9	7.3	8.4	
Salinity (ppt)	30.9	30.0	30.1	30.0	30.1	30.2	29.6	
Temp (°C)	20.8	21.0	20.2	20.4	20.4	20.1	20.7	
Final								
pH		7.73	7.70	7.76	7.72	7.86	7.83	7.81
DO (mg/L)		5.9	6.2	6.4	6.1	6.4	6.3	6.1
Temp (°C)		20.8	20.9	20.8	20.6	20.8	20.7	20.7

Concentration	100 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.86	8.00	7.96	7.95	7.93	7.94	7.91	
DO (mg/L)	6.5	7.8	7.9	7.8	7.9	7.3	8.1	
Salinity (ppt)	30.7	29.5	29.9	30.0	30.0	30.0	29.5	
Temp (°C)	20.8	20.1	20.5	20.3	20.5	20.2	20.2	
Final								
pH		7.79	7.77	7.80	7.79	7.81	7.83	7.82
DO (mg/L)		6.2	6.5	6.6	6.9	6.6	6.6	6.0
Temp (°C)		20.8	20.9	20.8	20.6	20.8	20.7	20.7

Concentration	25 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.86	7.99	7.95	7.95	7.91	7.97	7.91	
DO (mg/L)	6.5	7.5	7.8	7.8	7.9	7.3	8.2	
Salinity (ppt)	30.8	29.8	30.0	30.0	30.1	30.1	29.6	
Temp (°C)	20.8	21.0	20.8	20.5	20.4	20.2	20.2	
Final								
pH		7.72	7.70	7.76	7.74	7.86	7.83	7.82
DO (mg/L)		5.7	6.2	6.3	6.2	6.6	6.4	6.1
Temp (°C)		20.7	20.9	20.9	20.6	20.8	20.7	20.7

Concentration	200 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.87	8.00	7.96					
DO (mg/L)	6.6	7.8	7.9					
Salinity (ppt)	30.2	29.1	29.8					
Temp (°C)	20.3	20.0	20.3					
Final								
pH		7.74	7.81	7.82				
DO (mg/L)		6.6	7.0	6.3				
Temp (°C)		20.8	20.9	20.8				

AH Dupe

Concentration	50 µg/L							
Day	0	1	2	3	4	5	6	7
Initial			SH					
pH	7.86	8.00	7.95	7.95	7.92	7.92	7.91	
DO (mg/L)	6.5	7.8	7.9	7.8	7.9	7.3	7.1	
Salinity (ppt)	30.7	29.6	30.2	30.1	30.0	30.1	29.6	
Temp (°C)	20.8	20.7	20.4	20.5	20.4	20.2	20.2	
Final								SH
pH		7.79	7.76	7.76	7.77	7.81	7.82	7.82
DO (mg/L)		6.2	6.6	6.4	6.3	6.6	6.4	6.0
Temp (°C)		20.8	20.9	20.8	20.5	20.8	20.7	20.7

Concentration	400 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.83	8.00						
DO (mg/L)	6.7	7.8						
Salinity (ppt)	29.7	28.7						
Temp (°C)	20.9	20.1						
Final								
pH		7.76						
DO (mg/L)		6.1						
Temp (°C)		20.8						

All Dead

Analysts:	0	1	2	3	4	5	6	7
Initial:	NC	AH	SH	SH	RG	RG	RG	
Final:		AH	NC	SH	RG	RS	SH	SH

Animal Source/Date Received: ABS 7·17·04

Animal Age at Initiation: 14 days

Comments: QC: AH 8-10-04 final review: [illegible] 8/12/04

Marine Chronic Bioassay

Larval Fish Survival & Weights

Test Species: A. affinis

Client Name: Internal

Test Date: 7-21-04

Sample ID: CuCl2

Test No.: 040721aart

Conc. (ug/L)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + fish (g)
LC	a	5	5	5	5	5	5	5	5	100	0.01673	0.02185
	b	5	5	5	5	5	5	4	4	80	0.01564	0.02036
	c	5	5	5	5	5	5	5	5	100	0.01580	0.02368
	d	5	5	4	4	4	4	4	4	80	0.01659	0.02221
	e	5	5	5	5	5	5	5	5	100	0.01758	0.02310
25	a	5	5	5	5	5	5	5	5	100	0.01515	0.02132
	b	5	5	4	4	4	4	4	4	80	0.01510	0.02021
	c	5	5	4	3	3	3	3	3	60	0.01492	0.02112
	d	5	3	3	3	3	3	3	3	60	0.01524	0.01976
	e	5	4	4	4	4	4	4	4	80	0.01546	0.02110
50	a	5	4	4	4	4	4	4	4	80	0.01473	0.01971
	b	5	5	5	5	5	5	5	5	100	0.01572	0.02185
	c	5	5	4	4	4	4	4	4	80	0.01484	0.02102
	d	5	4	4	4	4	4	4	4	80	0.01518	0.02199
	e	5	5	5	5	5	5	5	5	100	0.01585	0.02256
100	a	5	4	4	4	4	4	3	3	60	0.01423	0.01794
	b	5	5	5	5	5	5	5	5	100	0.01542	0.01990
	c	5	3	3	3	3	3	3	3	60	0.01496	0.01937
	d	5	4	4	4	4	4	4	4	80	0.01593	0.02176
	e	5	4	3	3	3	3	3	3	60	0.01495	0.02044
200	a	5	0	–	–	–	–	–	–	0		
	b	5	0	–	–	–	–	–	–	0		
	c	5	1	1	0	–	–	–	–	0		
	d	5	0	–	–	–	–	–	–	0		
	e	5	0	–	–	–	–	–	–	0		
400	a	5	0	–	–	–	–	–	–	0		
	b	5	0	–	–	–	–	–	–	0		
	c	5	0	–	–	–	–	–	–	0		
	d	5	0	–	–	–	–	–	–	0		
	e	5	0	–	–	–	–	–	–	0		
	a											
	b											
	c											
	d											
	e											
Tech Initials		SH	AH	SH	SH	AH	RG	SH	SH			

data entry JR
QC=AH

Feeding Times (day):

0	1	2	3	4	5	6	
–	0900	0800	0900	0900	0840	~~1450~~	810
1630	1645	1605	~~1945~~ 0830 1400	1945	1600	~~1450~~	154C

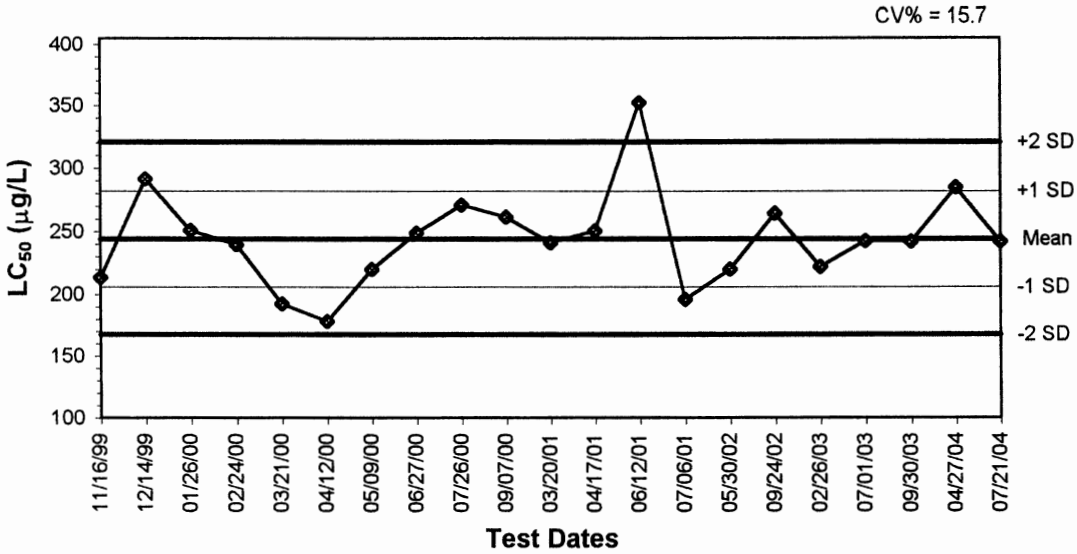
Weight Data:
Date/Time in: 7.26.04 1400
Date/Time out: 7.30.04 1100
Oven Temp (°C): 60
Tech Initials: SD

Comments:

QC Check: AH 8/12/04
Final Review: ~~SH~~ SH 8/20/04

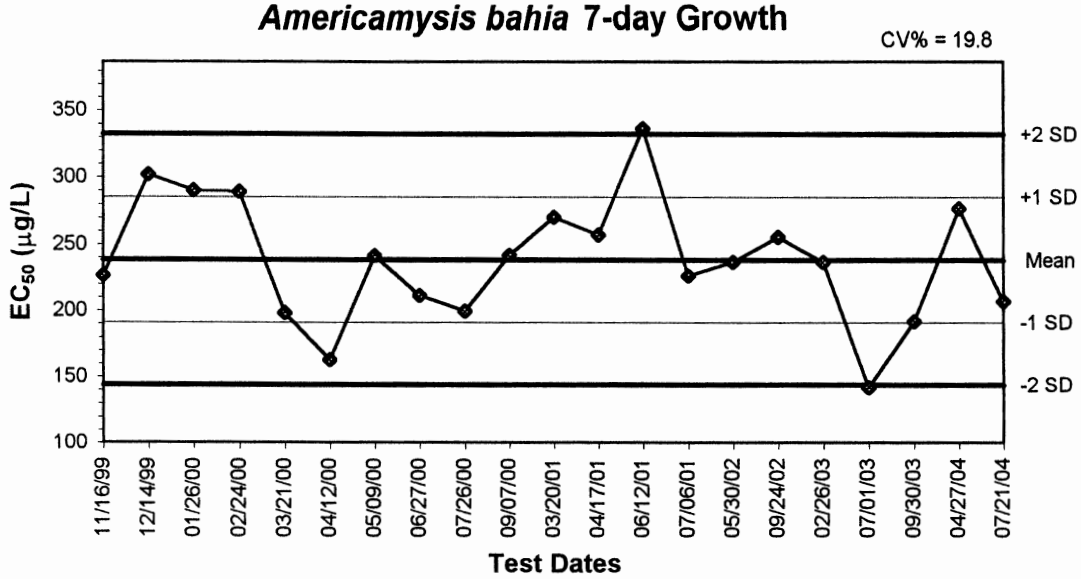
A. BAHIA

Copper (II) Chloride Reference Toxicant Control Chart - *Americamysis bahia* 7-day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/16/99	213.4836	244.0347	205.7966	167.5584	282.2729	320.5110
12/14/99	291.6667	244.0347	205.7966	167.5584	282.2729	320.5110
01/26/00	250.8225	244.0347	205.7966	167.5584	282.2729	320.5110
02/24/00	239.3480	244.0347	205.7966	167.5584	282.2729	320.5110
03/21/00	192.2609	244.0347	205.7966	167.5584	282.2729	320.5110
04/12/00	178.0284	244.0347	205.7966	167.5584	282.2729	320.5110
05/09/00	219.8663	244.0347	205.7966	167.5584	282.2729	320.5110
06/27/00	248.8758	244.0347	205.7966	167.5584	282.2729	320.5110
07/26/00	271.1359	244.0347	205.7966	167.5584	282.2729	320.5110
09/07/00	261.6690	244.0347	205.7966	167.5584	282.2729	320.5110
03/20/01	241.0452	244.0347	205.7966	167.5584	282.2729	320.5110
04/17/01	250.3929	244.0347	205.7966	167.5584	282.2729	320.5110
06/12/01	352.2854	244.0347	205.7966	167.5584	282.2729	320.5110
07/06/01	196.0457	244.0347	205.7966	167.5584	282.2729	320.5110
05/30/02	219.6604	244.0347	205.7966	167.5584	282.2729	320.5110
09/24/02	264.5316	244.0347	205.7966	167.5584	282.2729	320.5110
02/26/03	222.0363	244.0347	205.7966	167.5584	282.2729	320.5110
07/01/03	242.4652	244.0347	205.7966	167.5584	282.2729	320.5110
09/30/03	241.8166	244.0347	205.7966	167.5584	282.2729	320.5110
04/27/04	285.2941	244.0347	205.7966	167.5584	282.2729	320.5110
07/21/04	241.9988	244.0347	205.7966	167.5584	282.2729	320.5110

Copper (II) Chloride Reference Toxicant Control Chart - *Americamysis bahia* 7-day Growth



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/16/99	226.5416	238.1844	191.0675	143.9506	285.3014	332.4183
12/14/99	302.1623	238.1844	191.0675	143.9506	285.3014	332.4183
01/26/00	290.4538	238.1844	191.0675	143.9506	285.3014	332.4183
02/24/00	289.3590	238.1844	191.0675	143.9506	285.3014	332.4183
03/21/00	198.2542	238.1844	191.0675	143.9506	285.3014	332.4183
04/12/00	162.8546	238.1844	191.0675	143.9506	285.3014	332.4183
05/09/00	241.5893	238.1844	191.0675	143.9506	285.3014	332.4183
06/27/00	211.2319	238.1844	191.0675	143.9506	285.3014	332.4183
07/26/00	199.3708	238.1844	191.0675	143.9506	285.3014	332.4183
09/07/00	241.9449	238.1844	191.0675	143.9506	285.3014	332.4183
03/20/01	270.4733	238.1844	191.0675	143.9506	285.3014	332.4183
04/17/01	256.9593	238.1844	191.0675	143.9506	285.3014	332.4183
06/12/01	336.3583	238.1844	191.0675	143.9506	285.3014	332.4183
07/06/01	226.4535	238.1844	191.0675	143.9506	285.3014	332.4183
05/30/02	236.9212	238.1844	191.0675	143.9506	285.3014	332.4183
09/24/02	255.7012	238.1844	191.0675	143.9506	285.3014	332.4183
02/26/03	237.0166	238.1844	191.0675	143.9506	285.3014	332.4183
07/01/03	142.0844	238.1844	191.0675	143.9506	285.3014	332.4183
09/30/03	192.1008	238.1844	191.0675	143.9506	285.3014	332.4183
04/27/04	276.8337	238.1844	191.0675	143.9506	285.3014	332.4183
07/21/04	207.2086	238.1844	191.0675	143.9506	285.3014	332.4183

CETIS Report

Report Date: 18 Aug-04 10:05 AM
Link: 02-9063-5042/040721myrt

Chronic Mysid Survival and Growth Test — AMEC NW Bioassay SD

Test:	10-4928-7581	Test Type:	Growth-Survival (7d)	Duration:	6 Days 22 Hours
Start Date:	21 Jul-04 04:15 PM	Protocol:	EPA/821/R-02-014 (2002)	Species:	Americamysis bahia
End Date:	28 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO
Setup Date:	21 Jul-04 04:15 PM	Brine:	Not Applicable		

Sample:	18-3168-7833	Material:	Copper chloride	Client:	Internal
Sampled:	21 Jul-04	Code:	040721myrt	Project:	
Received:	21 Jul-04	Source:	Reference Toxicant		
Hold Time:	16 Hours	Station:			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
03-6908-1828	7d Proportion Survived	200	400	282.84270	0.06373	Steel's Many-One Rank
20-8659-2559	Mean Dry Weight-mg	<25	25	N/A	0.10831	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
15-2505-0324	7d Proportion Survived	25	202.0274	N/A	N/A	Linear Regression
		50	219.7444	N/A	N/A	
05-4210-8804	Mean Dry Weight-mg	10	101.9837	18.25370	114.04330	Linear Interpolation
		20	127.6892	111.61590	141.29820	
		25	140.542	125.16390	153.77760	
		50	207.2085	185.17540	237.07120	

7d Proportion Survived Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
200		8	0.77500	0.40000	1.00000	0.07962	0.22520	29.06%
400		8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Mean Dry Weight-mg Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	8	0.31425	0.26200	0.34400	0.00920	0.02602	8.28%
25		8	0.27550	0.23400	0.31400	0.01010	0.02858	10.37%
50		8	0.29925	0.25400	0.33000	0.01058	0.02993	10.00%
100		8	0.28525	0.24000	0.32400	0.01013	0.02864	10.04%
200		8	0.16300	0.11200	0.23400	0.01589	0.04494	27.57%
400		8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

CETIS Report

7d Proportion Survived Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
25		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
50		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
200		0.40000	1.00000	0.80000	1.00000	0.60000	0.80000	1.00000	0.60000
400		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Mean Dry Weight-mg Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.34400	0.32800	0.29200	0.33400	0.31600	0.32000	0.26200	0.31800
25		0.27800	0.28000	0.24600	0.25400	0.31400	0.29400	0.30400	0.23400
50		0.31600	0.33000	0.30600	0.29800	0.30800	0.25400	0.32800	0.25400
100		0.24000	0.27600	0.32400	0.29800	0.27400	0.25600	0.31000	0.30400
200		0.11200	0.19200	0.20800	0.16200	0.12400	0.11800	0.23400	0.15400
400		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

CETIS Report

Chronic Mysid Survival and Growth Test — AMEC ~~NW~~ SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	02-9063-5042	02-9063-5042	18 Aug-04 10:03 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		200	400	0.50	282.84270	6.37%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	16.19895	3.48823	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.52369	0.92871	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	8.032095	1.606419	5	152.13	0.00000	Significant Effect
Error	0.4434968	0.0105595	42			
Total	8.47559175	1.6169784	47			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		25	68	46	>0.05	1	Non-Significant Effect
		50	68	46	>0.05	1	Non-Significant Effect
		100	68	46	>0.05	1	Non-Significant Effect
		200	48	46	>0.05	3	Non-Significant Effect
		400	36	46	<=0.05	2	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
25		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
50		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
100		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
200		8	0.77500	0.40000	1.00000	0.22520	1.08838	0.68472	1.34528	0.25171
400		8	0.00000	0.00000	0.00000	0.00000	0.22551	0.22551	0.22551	0.00003

CETIS Report

Report Date: 18 Aug-04 10:05 AM
Analysis: 15-2505-0324

Chronic Mysid Survival and Growth Test — AMEC SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Linear Regression	02-9063-5042	02-9063-5042	18 Aug-04 10:03 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0	Yes	Yes	No	No

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Slope	18.47529	74.90832	-128.34500	165.29560	0.247	0.82110	Not Significant
Intercept	-38.26762	172.36860	-376.11000	299.57480	-0.222	0.83856	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
15	-13.42492	-2.07129	0.05413	63.15236	10.17929	53.38354	1.00000	Non-Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	6.15143	2.49362	0.00037	Unequal Variances
Distribution	Shapiro-Wilk W	0.61779	0.93992	0.00000	Non-normal Distribution

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	202.0274	N/A	N/A
50	219.7444	N/A	N/A

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	8	1.00000	1.00000	1.00000	0.00000	0.00000	40	40
25		8	1.00000	1.00000	1.00000	0.00000	0.00000	40	40
50		8	1.00000	1.00000	1.00000	0.00000	0.00000	40	40
100		8	1.00000	1.00000	1.00000	0.00000	0.00000	40	40
200		8	0.77500	0.40000	1.00000	0.04597	0.22520	31	40
400		8	0.00000	0.00000	0.00000	0.00000	0.00000	0	40

Approved By: 8/2

CETIS Report

Chronic Mysid Survival and Growth Test — AMEC ~~RW~~ SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Comparison	02-9063-5042	02-9063-5042	18 Aug-04 10:04 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Untransformed		<25	25		N/A	10.83%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	3.63540	3.48823	0.00802	Unequal Variances
Distribution	Shapiro-Wilk W	0.95309	0.92871	0.08922	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.5928068	0.1185614	5	136.02	0.00000	Significant Effect
Error	0.03660847	0.0008716	42			
Total	0.62941529	0.119433	47			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		25	44	46	<=0.05	0	Significant Effect
		50	56	46	>0.05	3	Non-Significant Effect
		100	49	46	>0.05	0	Non-Significant Effect
		200	36	46	<=0.05	0	Significant Effect
		400	36	46	<=0.05	1	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	8	0.31425	0.26200	0.34400	0.02602				
25		8	0.27550	0.23400	0.31400	0.02858				
50		8	0.29925	0.25400	0.33000	0.02993				
100		8	0.28525	0.24000	0.32400	0.02864				
200		8	0.16300	0.11200	0.23400	0.04494				
400		8	0.00000	0.00000	0.00000	0.00000				

CETIS Report

Report Date: 18 Aug-04 10:05 AM
Analysis: 05-4210-8804

Chronic Mysid Survival and Growth Test — AMEC SD Bioassay

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Weight-mg	Linear Interpolation	02-9063-5042	02-9063-5042	18 Aug-04 10:04 AM	CETISv1.024

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	140176	200	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
10	101.9837	18.25370	114.04330
20	127.6892	111.61590	141.29820
25	140.542	125.16390	153.77760
50	207.2085	185.17540	237.07120

Data Summary

			Calculated Variate				
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	8	0.31425	0.26200	0.34400	0.00531	0.02602
25		8	0.27550	0.23400	0.31400	0.00583	0.02858
50		8	0.29925	0.25400	0.33000	0.00611	0.02993
100		8	0.28525	0.24000	0.32400	0.00585	0.02864
200		8	0.16300	0.11200	0.23400	0.00917	0.04494
400		8	0.00000	0.00000	0.00000	0.00000	0.00000

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

Water Quality Measurements
Marine Chronic Bioassay

Client: Internal - $CuCl_2$

Test Species: A. bahia

Sample ID: $CuCl_2$ Ref Tox

Test Date: 7-21-04

Test No: 040721MYRT

Start/End Times: 1615 / 1500

Concentration	LC							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.96	7.97	7.95	7.95	7.89	7.80	7.87	
DO (mg/L)	8.2	7.4	7.3	7.5	7.5	7.7	7.2	
Salinity (ppt)	30.2	30.0	29.7	29.8	30.6	30.4	29.6	
Temp (°C)	25.2	25.3	25.0	25.1	24.7	24.7	24.2	
Final								
pH		7.73	7.69	7.72	7.79	7.84	7.90	7.85
DO (mg/L)		5.0	5.4	5.7	6.0	5.7	5.1	5.5
Temp (°C)		24.9	24.3	24.8	24.6	24.7	25.1	25.2

Concentration	100 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.94	7.96	7.95	7.95	7.89	7.92	7.85	
DO (mg/L)	8.2	7.6	7.3	7.5	7.6	7.7	7.2	
Salinity (ppt)	29.9	29.8	29.6	29.8	31.0	30.4	29.5	
Temp (°C)	25.2	25.3	25.0	25.2	24.2	24.8	24.3	
Final								
pH		7.88	7.82	7.81	7.80	7.80	7.87	7.83
DO (mg/L)		5.8	5.9	5.8	6.0	5.8	5.2	5.5
Temp (°C)		25.1	25.0	25.3	25.1	24.7	25.2	25.2

Concentration	25 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.96	7.97	7.96	7.95	7.90	7.90	7.84	
DO (mg/L)	8.1	7.5	7.6	7.6	7.7	7.7	7.1	
Salinity (ppt)	30.2	30.0	29.8	29.9	30.8	30.5	29.8	
Temp (°C)	25.2	25.3	25.0	25.1	24.6	24.7	24.1	
Final								
pH		7.76	7.71	7.73	7.75	7.80	7.89	7.84
DO (mg/L)		5.3	5.5	5.6	5.7	5.7	5.1	5.7
Temp (°C)		24.9	24.5	25.1	25.1	24.5	25.1	25.2

Concentration	200 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.90	7.94	7.95	7.95	7.88	7.92	7.85	
DO (mg/L)	8.2	7.6	7.3	7.4	7.6	7.7	6.9	
Salinity (ppt)	29.6	29.5	29.3	29.6	31.0	30.3	29.4	
Temp (°C)	25.2	25.3	25.0	25.3	24.2	24.9	24.3	
Final								
pH		7.88	7.82	7.81	7.79	7.90	7.87	7.86
DO (mg/L)		5.8	6.0	5.9	5.9	5.7	5.2	5.5
Temp (°C)		25.5	24.9	25.4	25.2	24.7	25.2	25.2

Concentration	50 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.97	7.97	7.95	7.95	7.89	7.91	7.85	
DO (mg/L)	8.0	7.5	7.6	7.5	7.5	7.7	7.2	
Salinity (ppt)	30.1	30.0	29.7	29.9	30.9	30.5	29.7	
Temp (°C)	25.2	25.3	25.0	25.1	24.7	24.7	24.2	
Final								
pH		7.86	7.78	7.76	7.79	7.83	7.87	7.86
DO (mg/L)		5.7	5.8	5.7	5.8	5.6	5.2	5.4
Temp (°C)		25.0	24.5	25.2	25.1	24.7	25.1	25.2

Concentration	400 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.91	7.94	7.95	7.95	7.89			
DO (mg/L)	8.1	7.6	7.4	7.4	7.6			
Salinity (ppt)	29.4	29.3	28.9	29.3	30.9			
Temp (°C)	25.1	25.3	25.0	25.1	24.0			
Final								
pH		7.86	7.81	7.84	7.91	7.93		
DO (mg/L)		8.1	6.1	6.2	6.0	5.8		
Temp (°C)		25.5	24.9	25.4	25.3	24.7		

Analysts:		0	1	2	3	4	5	6	7
	Initial:	RG	MC	MC	SH	AH	RG	RG	
	Final:		AH	MC	SH	RG	RS	RG	SH

Animal Source/Date Received: ABI 7-21-04

Animal Age at Initiation: 7 days

Comments:

Final review: 8/20/04 QC=RC 8-20-04

AMEC Earth and Environmental

Raw Datasheet

Test Species: ~~T. bahia~~ A. bahia

Client Name: Internal CuCl2

Test Date: 7-21-04

Sample ID: CuCl2 Ref tox

Test No.: 040721MYRT

Conc. (ug/L)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
LC	a	~~4~~ 5	5	~~4~~ 5	5	5	5	5	5	100	0.01683	0.01855
	b	~~4~~ 5	5	5	5	5	5	5	5		0.01742	0.01906
	c	5	5	5	5	5	5	5	5		0.01775	0.01921
	d	5	5	5	5	5	5	5	5		0.01846	0.02013
	e	5	5	5	5	5	5	5	5		0.01810	0.01968
	f	5	5	5	5	5	5	5	5		0.01863	0.02023
	g	5	5	5	5	5	5	5	5		0.01733	~~0.01831~~ 0.018
	h	5	5	5	5	5	5	5	5		0.01677	0.01826
25	a	5	5	5	5	5	5	5	5		0.01718	0.01857
	b	5	5	5	5	5	5	5	5		0.01687	0.01827
	c	5	5	5	5	5	5	5	5		0.01765	0.01888
	d	5	5	5	5	5	5	5	5		0.01799	0.01926
	e	5	5	5	5	5	5	5	5		0.01883	0.02040
	f	5	5	5	5	5	5	5	5		0.01758	0.01905
	g	5	5	5	5	5	5	5	5		0.01760	0.01912
	h	5	5	5	5	5	5	5	5		0.01910	0.02027
50	a	5	5	5	5	5	5	5	5		0.01677	0.01835
	b	5	5	5	5	5	5	5	5		0.01578	0.01743
	c	5	5	5	5	5	5	5	5		0.01665	0.01818
	d	5	5	5	5	5	5	5	5		0.01565	0.01714
	e	5	5	5	5	5	5	5	5		0.01743	~~0.01897~~ 0.018
	f	5	5	5	5	5	5	5	5		0.01593	0.01720
	g	5	5	5	5	5	5	5	5		0.01800	0.01964
	h	5	5	5	5	5	5	5	5		0.01714	0.01841
100	a	5	5	5	5	5	5	5	5		0.01740	0.01860
	b	5	5	5	5	5	5	5	5		0.01824	0.01962
	c	5	5	5	5	5	5	5	5		0.01817	0.01979
	d	5	5	5	5	5	5	5	5		0.01874	0.02023
	e	5	5	5	5	5	5	5	5		0.01038	0.02175
	f	5	5	5	5	5	5	5	5		0.01873	0.02001
	g	5	5	5	5	5	5	5	5		0.01769	0.01924
	h	5	5	5	5	5	5	5	5		0.01985	0.02137
Tech Initials		SH	KB	MC	SH	AH	RG	RG	SH			

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	0845
1630	1645	16005	1400	1945	1600	1545

data entry TR
QC=AH

Weight Data:

Date/Time in: 7-20-04/1500

Date/Time out: 7-30-04/1100

Oven Temp (°C): 64

Tech Initials: SD

Comments: _____

QC Check: JL 8-10-04

Final Review: _____

AMEC Earth and Environmental

Raw Datasheet

Test Species: M. bahia

Client Name: External - CuCl2

Test Date: 7-21-04

Sample ID: CuCl2 Ref Tox

Test No.: 040721MYRT

Conc. (ug/L)	Rep.	Survival on Test Day: 0	1	2	3	4	5	6	7	Percent Survival	pan wt. (g)	pan + mysid (g)
200	a	5	5	2	2	2	2	2	2	40	0.01538	0.01594
	b	5	5	5	5	5	5	5	5	100	0.01776	0.01872
	c	5	5	4	4	4	4	4	4	80	0.01681	0.01785
	d	5	5	5	5	5	5	5	5	100	0.01677	0.01758
	e	5	5	4	4	4	4	4	SH 3	60	0.01951	0.02013
	f	5	5	5	4	4	4	4	4	80	0.01708	0.01767
	g	5	5	5	5	5	5	5	5	100	0.01588	0.01705
	h	5	5	3	3	3	3	3	3	60	0.01970	0.02047
400	a	5	3	1	1	0	-	-	-	0		
	b	5	5	3	0	-	-	-	-	0		
	c	5	5	0	-	-	-	-	-	0		
	d	5	5	3	2	0	-	-	-	0		
	e	5	5	4	1	1	0	-	-	0		
	f	5	5	2	0	-	-	-	-	0		
	g	5	5 RR 4	0	-	-	-	-	-	0		
	h	5	5 RR 4	3	0	-	-	-	-	0		
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
Tech Initials		SD	RR	MC	SH	AH	RG	RG	SH		YR	

Feeding Times (day):

0	1	2	3	4	5	6
—	0900	0800	0830	0900	0840	0815
1630	1645	1605	1400	1945	1600	1545

Weight Data:

Date/Time in: 7-28-04/1500

Date/Time out: 7-30-04/1100

Oven Temp (°C): 60°

Tech Initials: SD

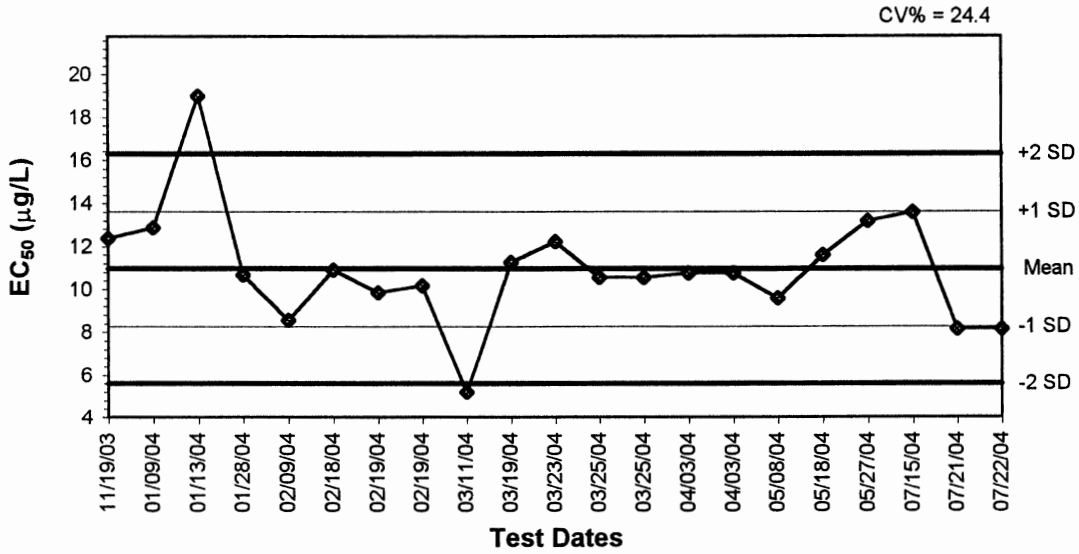
Comments: _____

QC Check: JC 8-10-04

Final Review: _____

M. GALLOPROVINCIALIS

Copper (II) Chloride Reference Toxicant Control Chart - *Mytilus galloprovincialis* 48-hour Proportion Normal



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/19/03	12.3871	10.9546	8.2828	5.6109	13.6264	16.2983
01/09/04	12.8695	10.9546	8.2828	5.6109	13.6264	16.2983
01/13/04	18.9772	10.9546	8.2828	5.6109	13.6264	16.2983
01/28/04	10.6652	10.9546	8.2828	5.6109	13.6264	16.2983
02/09/04	8.5635	10.9546	8.2828	5.6109	13.6264	16.2983
02/18/04	10.9125	10.9546	8.2828	5.6109	13.6264	16.2983
02/19/04	9.8502	10.9546	8.2828	5.6109	13.6264	16.2983
02/19/04	10.1785	10.9546	8.2828	5.6109	13.6264	16.2983
03/11/04	5.2015	10.9546	8.2828	5.6109	13.6264	16.2983
03/19/04	11.2668	10.9546	8.2828	5.6109	13.6264	16.2983
03/23/04	12.2223	10.9546	8.2828	5.6109	13.6264	16.2983
03/25/04	10.5523	10.9546	8.2828	5.6109	13.6264	16.2983
03/25/04	10.5526	10.9546	8.2828	5.6109	13.6264	16.2983
04/03/04	10.7501	10.9546	8.2828	5.6109	13.6264	16.2983
04/03/04	10.7501	10.9546	8.2828	5.6109	13.6264	16.2983
05/08/04	9.5887	10.9546	8.2828	5.6109	13.6264	16.2983
05/18/04	11.6112	10.9546	8.2828	5.6109	13.6264	16.2983
05/27/04	13.1982	10.9546	8.2828	5.6109	13.6264	16.2983
07/15/04	13.6066	10.9546	8.2828	5.6109	13.6264	16.2983
07/21/04	8.1711	10.9546	8.2828	5.6109	13.6264	16.2983
07/22/04	8.1716	10.9546	8.2828	5.6109	13.6264	16.2983

CETIS Report

Report Date: 23 Aug-04 11:36 AM
Link: 09-2239-2847/040721mgrt

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Test:	08-1505-6904	Test Type:	Development	Duration:	48 Hours
Start Date:	21 Jul-04 04:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
End Date:	23 Jul-04 04:15 PM	Dil Water:	Laboratory Seawater	Source:	Carlsbad Aquafarms
Setup Date:	21 Jul-04 04:30 PM	Brine:	Not Applicable		

Sample:	03-5774-7642	Material:	Copper chloride	Client:	Internal
Sampled:	21 Jul-04 04:30 PM	Code:	040721mgrt	Project:	
Received:	21 Jul-04 04:30 PM	Source:	Reference Toxicant		
Hold Time:	N/A	Station:			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
19-1123-3877	Proportion Normal	5	10	7.07107	0.16829	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
03-8913-8180	Proportion Normal	25	7.326438	N/A	N/A	Linear Regression
		50	8.171054	N/A	N/A	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.83200	0.77000	0.93000	0.02691	0.06017	7.23%
2.5		5	0.83000	0.79000	0.86000	0.01183	0.02646	3.19%
5		5	0.83000	0.66000	0.91000	0.04593	0.10271	12.38%
10		5	0.08800	0.00000	0.29000	0.05435	0.12153	138.10
20		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
40		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.83000	0.93000	0.80000	0.83000	0.77000
2.5		0.79000	0.86000	0.82000	0.84000	0.84000
5		0.81000	0.87000	0.66000	0.91000	0.90000
10		0.00000	0.29000	0.04000	0.11000	0.00000
20		0.00000	0.00000	0.00000	0.00000	0.00000
40		0.00000	0.00000	0.00000	0.00000	0.00000

Approved By: 8/24

CETIS Report

Report Date: 19 Aug-04 11:21 AM
Analysis: 19-1123-3877

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	09-2239-2847	09-2239-2847	19 Aug-04 11:21 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		5	10	20.00	7.07107	16.83%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	7.59174	3.89507	0.00021	Unequal Variances
Distribution	Shapiro-Wilk W	0.89840	0.89981	0.00920	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	7.718348	1.54367	5	123.03	0.00000	Significant Effect
Error	0.3011282	0.0125470	24			
Total	8.01947579	1.5562166	29			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		2.5	30	16	>0.05	2	Non-Significant Effect
		5	29	16	>0.05	1	Non-Significant Effect
		10	15	16	<=0.05	2	Significant Effect
		20	15	16	<=0.05	2	Significant Effect
		40	15	16	<=0.05	2	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.83200	0.77000	0.93000	0.06017	1.15448	1.07062	1.30303	0.08873
2.5		5	0.83000	0.79000	0.86000	0.02646	1.14665	1.09476	1.18730	0.03486
5		5	0.83000	0.66000	0.91000	0.10271	1.15702	0.94826	1.26610	0.12976
10		5	0.08800	0.00000	0.29000	0.12153	0.24163	0.05002	0.56868	0.21869
20		5	0.00000	0.00000	0.00000	0.00000	0.05002	0.05002	0.05002	0.00001
40		5	0.00000	0.00000	0.00000	0.00000	0.14137	0.11204	0.19013	0.03910

Approved By: 8/20

CETIS Report

Report Date: 19 Aug-04 11:21 AM
Analysis: 03-8913-8180

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	09-2239-2847	09-2239-2847	19 Aug-04 11:21 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.168	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.16900	0.02535	0.11656	0.22144	6.667	0.00688	Significant
Slope	14.23418	44.08332	-76.95911	105.42750	0.323	0.76797	Not Significant
Intercept	-7.98553	44.08014	-99.17226	83.20119	-0.181	0.86779	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
9	-71.93989	-0.56101	0.07025	41.04505	105.52190	35.17247	0.00000	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	12.54905	2.74006	0.00002	Unequal Variances
Distribution	Shapiro-Wilk W	0.63268	0.91820	0.00000	Non-normal Distribution

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	7.326438	N/A	N/A
50	8.171054	N/A	N/A

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.83200	0.77000	0.93000	0.01228	0.06017	416	500
2.5		5	0.83000	0.79000	0.86000	0.00540	0.02646	415	500
5		5	0.83000	0.66000	0.91000	0.02097	0.10271	415	500
10		5	0.08800	0.00000	0.29000	0.02481	0.12153	44	500
20		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	500
40		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	74

Approved By: 8/20

CETIS Worksheet

Report Date: 19 Jul-04 2:44 PM
Link: 09-2239-2847

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	040721mgrt
End Date:	23 Jul-04	**Protocol:**	ASTM (1993)	**Sample Source:**	Reference Toxicant
Sampled:	21 Jul-04	**Material:**	Copper chloride	**Sample Station:**	

Conc-µg/L	Code	Rep	Pos	# Counted	# Normal	Notes
0	LC	1	311	100	83	
0	LC	2	301	100	93	
0	LC	3	329	100	80	
0	LC	4	315	100	83	
0	LC	5	309	100	77	
2.5		1	317	100	79	
2.5		2	321	100	86	
2.5		3	319	100	82	
2.5		4	314	100	84	
2.5		5	302	100	84	
5		1	325	100	81	
5		2	320	100	87	
5		3	322	100	66	
5		4	312	100	91	
5		5	306	100	90	
10		1	328	100	0	
10		2	318	100	29	
10		3	303	100	4	
10		4	326	100	11	
10		5	327	100	0	
20		1	308	100	0	
20		2	330	100	0	
20		3	307	100	0	
20		4	324	100	0	
20		5	304	100	0	
40		1	310	7	0	
40		2	305	19	0	
40		3	316	20	0	
40		4	323	20	0	
40		5	313	8	0	

QC: AH

Analyst: AH Reviewed By: AH 8-12-04

CETIS Worksheet

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	21 Jul-04	**Species:**	Mytilis gallo ovincialis	**Sample Code:**	040721mgrt
End Date:	23 Jul-04	**Protocol:**	ASTM (199.	**Sample Source:**	Reference Toxicant
Sampled:	21 Jul-04	**Material:**	Copper chlor e	**Sample Station:**	

Conc-µg/L	Code	Rep	Pos	# Counted	# Normal		Re-read		Notes
			301	89	84	R2	100	93	SIJ
			302	123	100	R2		84	
			303	104	12 ~~92~~ R8	R8		4	
			304	105	0	R2		0	
			305	19	0	R8	19	0	
			306	104	78	R2	100	90	RG
			307	104	0	R2	100	0	
			308	105	0	R8	100	0	
			309	116	92	R8	100	77	
			310	0	0	R8	7	0	
			311	106	91	R8	100	83	
			312	100	84	R2	100	91	
			313	4	0	R8	8	0	
			314	109	80	R2	100	84	
			315	101	64	R2	100	83	
			316	32	0	R2	20	0	
			317	100	59	R8	100	79	
			318	112	0	R8	100	29	
			319	106	53	R8	100	82	
			320	93	61	R8	100	87	
			321	105	78	R8	100	96	
			322	103	27	R2	100	66	
			323	28	0	R2	20	0	
			324	104	0	R8	100	0	
			325	94	84	R8	100	81	
			326	98	0	R2	100	11	
			327	111	0	R8	100	0	
			328	78	0	R8	100	0	
			329	125	65	R2	100	80	
			330	102	0	R8	100	0	

data entry QC = AH

Bivalve Development Bioassay Worksheet

Client: City of Buenaventura
Test No.: 040721 mgrt, 0407-043 → 046
Test Species: M. galloprovincialis

Start Date/Time: 7/21/04 16:30
End Date/Time: 7/23/04 16:15
Date Received: 7/20/04

Sample Type: Ambient Water

Test Chamber Type and Sample Volume: Shell Vials, 10ml

Spawn Initiation Time: 1110

	Male	Female
Number of Spawners:	4	1

Spawn Condition: Fair

Fertilization Time: 1330

Egg Stock Density Calculation:

Eggs Counted (x):		
	6	8
	7	17
	15	13
	16	6
	11	17
Mean	11	12.2

Overall Mean: 11.6

Mean: 11.6 X 42 = 487.2 eggs/ml

Initial Stock - 487 eggs/ml = Stock Dilution Factor 1.22
Inoculum Stock - ~~200~~ ~~487~~ 400 eggs/ml

1 ml ~ 500 / 0.22 water
100 ml ~ 50000 / 22 water

Percent Division Upon Inoculation: 90

Time of Inoculation: 1630

Comments:

Reviewed/ Date: AH 8-12-04

AMEC Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121
(858) 458-9044

Marine Chronic Bioassay **Water Quality Measurements** Raw Datasheet

Client: Internal
Sample ID: CuCl2
Test No.: 040721 mgRT

Test Species: M. galloprovincialis
Start/End Dates: 7-21-04 / 7-23-04
Start/End Times: 1630/1615

Concentration mg/L	Temperature (°C)			Salinity (ppt)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	15.0	14.9	14.3	34	34.6	34.7	8.1	8.0	8.2	8.02	7.99	7.93
2.5	15.0	14.2	14.2	34	34.6	34.6	8.1	8.2	8.3	8.02	7.99	7.93
5	15.0	14.2	14.2	34	34.6	34.6	8.0	8.2	8.3	8.02	7.98	7.94
10	15.0	14.3	14.2	34	34.6	34.6	8.1	8.2	8.3	8.01	7.98	7.94
20	15.0	14.4	14.2	34	34.5	34.6	8.1	8.2	8.4	8.01	7.98	7.94
40	15.0	14.7	14.6	33	34.7	34.7	8.0	8.1	8.3	8.00	7.98	7.94

Technician Initials:	0	24	48
	JR	AH	ME

Animal Source/Date Received: Mission Bay Collected 7/20

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AH 8-12-04 Final Review: [illegible] 8/20/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

CETIS Report

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Test:	10-0748-9302	Test Type:	Development	Duration:	46 Hours
Start Date:	22 Jul-04 05:00 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
End Date:	24 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	Field Collected
Setup Date:	22 Jul-04 05:00 PM	Brine:	Not Applicable		

Sample:	06-7117-4213	Material:	Copper chloride	Client:	Internal
Sampled:	22 Jul-04 05:00 PM	Code:	040722mgrt	Project:	
Received:	22 Jul-04 05:00 PM	Source:	Reference Toxicant		
Hold Time:	N/A	Station:			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
14-6839-7916	Proportion Normal	2.5	5	3.53553	0.06057	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
12-5495-9475	Proportion Normal	25	6.746125	5.88542	7.36043	Linear Regression
		50	8.170764	7.52133	8.66711	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.90600	0.87000	0.93000	0.01122	0.02510	2.77%
2.5		5	0.83400	0.75000	0.89000	0.02619	0.05857	7.02%
5		5	0.82800	0.78000	0.86000	0.01530	0.03421	4.13%
10		5	0.21000	0.14000	0.31000	0.03536	0.07906	37.65%
20		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
40		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.92000	0.87000	0.89000	0.93000	0.92000
2.5		0.80000	0.89000	0.88000	0.85000	0.75000
5		0.78000	0.81000	0.86000	0.86000	0.83000
10		0.14000	0.17000	0.28000	0.15000	0.31000
20		0.00000	0.00000	0.00000	0.00000	0.00000
40		0.00000	0.00000	0.00000	0.00000	0.00000

Approved By: 8/23

CETIS Report

Report Date: 19 Aug-04 11:26 AM
Analysis: 14-6839-7916

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	10-6041-7464	10-6041-7464	19 Aug-04 11:25 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		2.5	5	40.00	3.53553	6.06%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	32.12762	15.08628	0.00001	Unequal Variances
Distribution	Shapiro-Wilk W	0.98513	0.89981	0.94662	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	7.794126	1.558825	5	482.17	0.00000	Significant Effect
Error	0.07759104	0.003233	24			
Total	7.87171707	1.5620581	29			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		2.5	17.5	16	>0.05	2	Non-Significant Effect
		5	15	16	<=0.05	2	Significant Effect
		10	15	16	<=0.05	1	Significant Effect
		20	15	16	<=0.05	2	Significant Effect
		40	15	16	<=0.05	2	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.90600	0.87000	0.93000	0.02510	1.26116	1.20193	1.30303	0.04218
2.5		5	0.83400	0.75000	0.89000	0.05857	1.15545	1.04720	1.23273	0.07767
5		5	0.82800	0.78000	0.86000	0.03420	1.14455	1.08259	1.18730	0.04503
10		5	0.21000	0.14000	0.31000	0.07906	0.47086	0.38350	0.59050	0.09608
20		5	0.00000	0.00000	0.00000	0.00000	0.05074	0.05002	0.05363	0.00161
40		5	0.00000	0.00000	0.00000	0.00000	0.09593	0.07077	0.11204	0.01801

Approved By: 8/20/04

CETIS Report

Report Date: 19 Aug-04 11:26 AM
Analysis: 12-5495-9475

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	10-6041-7464	10-6041-7464	19 Aug-04 11:26 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.094	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.13143	0.01367	0.10316	0.15970	9.618	0.00239	Significant
Slope	8.10604	0.97868	6.08149	10.13060	8.283	0.00369	Significant
Intercept	-2.39484	0.96156	-4.38399	-0.40570	-2.491	0.08844	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
8	-398.41990	-0.29544	0.12336	0.06238	39.20660	35.17247	0.03887	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	8.03815	2.74006	0.00032	Unequal Variances
Distribution	Shapiro-Wilk W	0.77519	0.91820	0.00004	Non-normal Distribution

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	6.746125	5.88542	7.36043
50	8.170764	7.52133	8.66711

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.90600	0.87000	0.93000	0.00512	0.02510	453	500
2.5		5	0.83400	0.75000	0.89000	0.01195	0.05857	417	500
5		5	0.82800	0.78000	0.86000	0.00698	0.03420	414	500
10		5	0.21000	0.14000	0.31000	0.01614	0.07906	105	500
20		5	0.00000	0.00000	0 00000	0.00000	0.00000	0	487
40		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	150

Approved By: 8/20/04

CETIS Worksheet

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	22 Jul-04	**Species:**	Mytilis galloprovincialis
End Date:	24 Jul-04	**Protocol:**	ASTM ~~(1993)~~ 1999
Sampled:	22 Jul-04	**Material:**	Copper chloride
Sample Code:	040722mgrt		
Sample Source:	Reference Toxicant		
Sample Station:			

Conc-µg/L	Code	Rep	Pos	# Counted	# Normal	Counted	Norm	Notes
0	LC	1	14	~~106 176 27 12~~		100	87	
0	LC	2	4	~~73 0 12~~		100	87	
0	LC	3	17	~~103 0 12~~		100	89	
0	LC	4	12	~~95 74 12~~		100	93	
0	LC	5	21	~~107 85 12~~		100	92	
2.5		1	5	~~109 24 12~~		100	80	
2.5		2	11	~~75 0 12~~		100	89	
2.5		3	27	100	88			
2.5		4	18	100	85			
2.5		5	28	100	75			
5		1	29	100	78			
5		2	23	100	81			
5		3	30	100	86			
5		4	24	100	86			
5		5	25	100	83			
10		1	16	100	14			
10		2	3	100	17			
10		3	6	100	28			
10		4	1	100	15			
10		5	26	100	31			
20		1	7	100	0			
20		2	2	100	0			
20		3	19	87	0			
20		4	22	100	0			
20		5	20	100	0			
40		1	13	50	0			
40		2	15	20	0			
40		3	8	35	0			
40		4	9	25	0			
40		5	10	20	0			

 Analyst: AH Reviewed By: AH 8-12-04

CETIS Worksheet

Report Date: 22 Jul-04 11:07 AM
Link: 10-6041-7464/040722mgrt

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Start Date:	22 Jul-04	Species:	Mytilis galloprovincialis	Sample Code:	040722mgrt
End Date:	24 Jul-04	Protocol:	ASTM ~~(1993)~~ 1999	Sample Source:	Reference Toxicant
Sampled:	22 Jul-04	Material:	Copper chloride	Sample Station:	

Conc-µg/L	Code	Rep	Pos	# Counted	# Normal		Re-read		Notes
			1	176	27	RB	100	15	LC
			2	73	0	RB	100	0	
			3	103	0	RB	100	17	
			4	95	74	RB	100	87	
			5	107	85	RB	100	80	
			6	109	27	RB	100	24	RG
			7	75	0	RB	100	0	
			8	56	0	RB	35	0	
			9	47	0	RB	25	0	
			10	28	0	RB	20	0	
			11	76	71	RB	100	89	
			12	120	109	RB	100	93	
			13	39	0	RB	50	0	
			14	96	83	RB	100	92	
			15	17	0	RB	20	0	
			16	105	21	RB	100	14	
			17	100	89	LC			
			18	100	85				
			19	87	0				
			20	100	0				
			21	100	92				
			22	100	0				
			23	100	81				
			24	100	86				
			25	100	83				
			26	100	31				
			27	100	88				
			28	100 MC	75				
			29	100	78				
			30	100	86				

data entry QC=AH

Analyst: RS, MC Reviewed By: AH 8-12

Bivalve Development Bioassay Worksheet

Client: City of Ventura
Test No.: 0407-061 > 065, 040722mgrt
Test Species: M. galloprovincialis
Tech Initials: JR

Start Date/Time: 7/22/04 17:00
End Date/Time: 7/24/04 15:00
Date Received: 7/22/04

Sample Type: WER

Test Chamber Type and Sample Volume: 30ml Shell Vials ; 10ml

Spawn Initiation Time: 1145

	Male	Female
Number of Spawners:		

Spawn Condition: Fair to Poor

Fertilization Time: 1530

Egg Stock Density Calculation:

Eggs Counted (x):		
	7	11
	13	18
	10	13
	6	12
	5	12
Mean	8.2	13.2

Overall Mean: 10.7

Mean: 10.7 X 42 = 449.7 eggs/ml

Initial Stock - 449.7 eggs/ml / Inoculum Stock - 400 eggs/ml = Stock Dilution Factor 1.12

Percent Division Upon Inoculation: 30

Time of Inoculation: 1700

Comments:

Reviewed/ Date: 7/24/04

AMEC Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121
(858) 458-9044

Marine Chronic Bioassay

Water Quality Measurements

Raw Datasheet

Client: Internal
Sample ID: CuCl2
Test No.: 040722mgrt

Test Species: M. galloprovincialis
Start/End Dates: 7.22.04 7.24.04
Start/End Times: 1700 1500

Concentration ug/L	Temperature (°C)			Salinity (ppt)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
LC	(A)	14.6	14.8	(A)	34.5	34.3	(A)	8.8	9.1	(A)	7.93	7.98
2.5	↓	14.4	15.0	↓	34.4 → 33.9 MC	34.3	↓	8.8	9.2	↓	7.97	7.96
5		14.3	14.7		34.5	34.5		8.8	9.3		7.97	7.97
10		14.4	14.6		34.5	34.5		8.8	9.3		7.97	7.97
20		14.4	14.7		34.4	34.6		8.9	9.3		7.97	7.97
40		14.4	14.6		34.5	34.6		8.9	9.3		7.97	7.97

Technician Initials:	0	24	48
	(A)	we	SH

Animal Source/Date Received: Mission Bay 7.22.04

Comments:
0 hrs: (A) rdep not taken
24 hrs:
48 hrs:

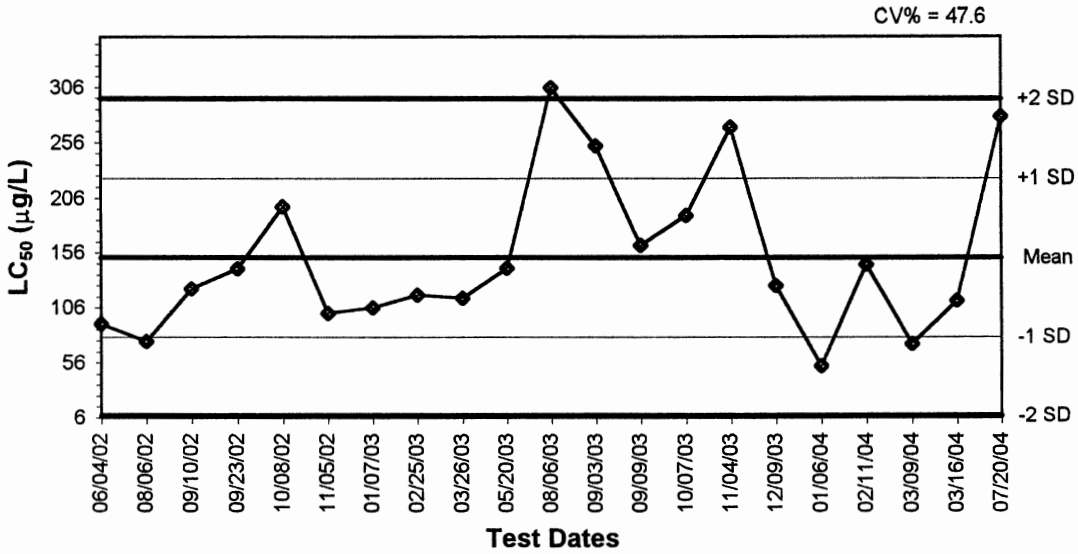
QC Check: AH 8-12-04

Final Review: [illegible] 8/20/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

M. PYRIFERA

Copper (II) Chloride Reference Toxicant Control Chart - *Macrocystis pyrifera* 48-hour Proportion Germinated



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
06/04/02	91.6174	151.6023	79.5147	7.4271	223.6899	295.7776
08/06/02	75.4805	151.6023	79.5147	7.4271	223.6899	295.7776
09/10/02	123.3843	151.6023	79.5147	7.4271	223.6899	295.7776
09/23/02	141.3703	151.6023	79.5147	7.4271	223.6899	295.7776
10/08/02	198.6329	151.6023	79.5147	7.4271	223.6899	295.7776
11/05/02	101.1197	151.6023	79.5147	7.4271	223.6899	295.7776
01/07/03	106.2387	151.6023	79.5147	7.4271	223.6899	295.7776
02/25/03	117.3051	151.6023	79.5147	7.4271	223.6899	295.7776
03/26/03	114.8662	151.6023	79.5147	7.4271	223.6899	295.7776
05/20/03	141.9516	151.6023	79.5147	7.4271	223.6899	295.7776
08/06/03	305.9332	151.6023	79.5147	7.4271	223.6899	295.7776
09/03/03	252.7375	151.6023	79.5147	7.4271	223.6899	295.7776
09/09/03	163.1480	151.6023	79.5147	7.4271	223.6899	295.7776
10/07/03	190.3937	151.6023	79.5147	7.4271	223.6899	295.7776
11/04/03	269.9014	151.6023	79.5147	7.4271	223.6899	295.7776
12/09/03	125.8502	151.6023	79.5147	7.4271	223.6899	295.7776
01/06/04	53.0995	151.6023	79.5147	7.4271	223.6899	295.7776
02/11/04	145.1928	151.6023	79.5147	7.4271	223.6899	295.7776
03/09/04	73.3866	151.6023	79.5147	7.4271	223.6899	295.7776
03/16/04	112.1983	151.6023	79.5147	7.4271	223.6899	295.7776
07/20/04	279.8409	151.6023	79.5147	7.4271	223.6899	295.7776

CETIS Report

Macrocystis Germination and Germ Tube Growth Test

AMEC Bioassay SD

Test:	13-5040-1536	Test Type:	Growth-Germination	Duration:	46 Hours
Start Date:	20 Jul-04 02:45 PM	Protocol:	EPA/600/R-95/136 (1995)	Species:	Macrocystis pyrifera
End Date:	22 Jul-04 01:00 PM	Dil Water:	Laboratory Seawater	Source:	Field Collected
Setup Date:	20 Jul-04 02:45 PM	Brine:	Not Applicable		

Sample:	01-5910-8762	Material:	Copper chloride	Client:	Internal
Sampled:	20 Jul-04 02:45 PM	Code:	040720mprt	Project:	
Received:	20 Jul-04 02:45 PM	Source:	Reference Toxicant		
Hold Time:	N/A	Station:			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
08-2764-6956	Mean Length	100	180	134.16410	0.12742	Dunnett's Multiple Comparison
09-4011-0140	Proportion Germinated	180	320	240.00000	0.16352	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
13-3196-6978	Mean Length	10	107.1864	10.72678	135.09720	Linear Interpolation
		20	142.8475	101.57630	166.40960	
		25	160.678	120.50850	189.66100	
		50	272.4359	240.32620	289.45070	
04-1965-4293	Proportion Germinated	25	236.8586	201.71510	256.82120	Linear Regression
		50	279.8408	258.65920	292.80050	

Mean Length Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	13.1500	11.7500	14.2500	0.45139	1.00933	7.68%
18		5	13.0000	11.5000	14.7500	0.59687	1.33463	10.27%
32		5	12.8500	11.5000	13.7500	0.39211	0.87678	6.82%
56		5	12.6000	10.5000	13.5000	0.53385	1.19373	9.47%
100		5	12.1000	10.0000	13.2500	0.61543	1.37614	11.37%
180		5	9.15000	7.00000	10.0000	0.54544	1.21963	13.33%
320		5	5.25000	4.75000	5.50000	0.13693	0.30619	5.83%

Proportion Germinated Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.71200	0.64000	0.82000	0.03056	0.06834	9.60%
18		5	0.66200	0.54000	0.73000	0.03262	0.07294	11.02%
32		5	0.68600	0.53000	0.76000	0.04032	0.09017	13.14%
56		5	0.66200	0.56000	0.73000	0.03367	0.07530	11.37%
100		5	0.71600	0.63000	0.79000	0.02839	0.06348	8.87%
180		5	0.66200	0.54000	0.76000	0.04030	0.09011	13.61%
320		5	0.20200	0.13000	0.26000	0.02289	0.05119	25.34%

CETIS Report

Mean Length Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	12.5000	13.7500	14.2500	11.7500	13.5000
18		14.7500	11.5000	12.2500	12.5000	14.0000
32		11.5000	13.5000	12.7500	12.7500	13.7500
56		13.0000	10.5000	13.0000	13.0000	13.5000
100		12.5000	13.2500	13.2500	10.0000	11.5000
180		9.75000	10.0000	9.50000	7.00000	9.50000
320		5.25000	5.50000	5.50000	5.25000	4.75000

Proportion Germinated Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.68000	0.64000	0.82000	0.73000	0.69000
18		0.54000	0.66000	0.68000	0.73000	0.70000
32		0.73000	0.53000	0.70000	0.71000	0.76000
56		0.73000	0.56000	0.68000	0.61000	0.73000
100		0.68000	0.76000	0.79000	0.72000	0.63000
180		0.54000	0.74000	0.65000	0.76000	0.62000
320		0.26000	0.20000	0.18000	0.13000	0.24000

CETIS Report

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	16-4174-1254	16-4174-1254	18 Aug-04 11:33 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		100	180	1.00	134.16410	12.74%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	13.15	10		Passes acceptability criteria
MSDp	0.1274		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	7.22292	16.81190	0.30072	Equal Variances
Distribution	Shapiro-Wilk W	0.92207	0.91004	0.02247	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	260.6357	43.43929	6	35.91	0.00000	Significant Effect
Error	33.875	1.209821	28			
Total	294.510712	44.649107	34			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		18	0.2156257	2.408571	>0.05	1.675522	Non-Significant Effect
		32	0.4312515	2.408571	>0.05	1.675522	Non-Significant Effect
		56	0.7906277	2.408571	>0.05	1.675522	Non-Significant Effect
		100	1.50938	2.408571	>0.05	1.675522	Non-Significant Effect
		180	5.75002	2.408571	<=0.05	1.675522	Significant Effect
		320	11.35629	2.408571	<=0.05	1.675522	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	13.1500	11.7500	14.2500	1.00933				
18		5	13.0000	11.5000	14.7500	1.33463				
32		5	12.8500	11.5000	13.7500	0.87678				
56		5	12.6000	10.5000	13.5000	1.19373				
100		5	12.1000	10.0000	13.2500	1.37614				
180		5	9.15000	7.00000	10.0000	1.21963				
320		5	5.25000	4.75000	5.50000	0.30619				

CETIS Report

Macrocystis Germination and Germ Tube Growth Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	16-4174-1254	16-4174-1254	18 Aug-04 11:31 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		180	320	0.56	240.00000	16.35%

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.7120	0.7		Passes acceptability criteria
MSDp	0.1635		0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	0.89001	16.81190	0.98944	Equal Variances
Distribution	Shapiro-Wilk W	0.96146	0.91004	0.31368	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.142202	0.190367	6	29.22	0.00000	Significant Effect
Error	0.1824212	0.0065150	28			
Total	1.32462335	0.1968821	34			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		18	1.078875	2.408571	>0.05	0.1229556	Non-Significant Effect
		32	0.5573204	2.408571	>0.05	0.1229556	Non-Significant Effect
		56	1.073454	2.408571	>0.05	0.1229556	Non-Significant Effect
		100	-0.0746665	2.408571	>0.05	0.1229556	Non-Significant Effect
		180	1.05722	2.408571	>0.05	0.1229556	Non-Significant Effect
		320	10.64254	2.408571	<=0.05	0.1229556	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.71200	0.64000	0.82000	0.06834	1.00683	0.92730	1.13265	0.07836
18		5	0.66200	0.54000	0.73000	0.07294	0.95176	0.82544	1.02440	0.07601
32		5	0.68600	0.53000	0.76000	0.09017	0.97838	0.81542	1.05882	0.09470
56		5	0.66200	0.56000	0.73000	0.07530	0.95203	0.84554	1.02440	0.07941
100		5	0.71600	0.63000	0.79000	0.06348	1.01065	0.91691	1.09476	0.07050
180		5	0.66200	0.54000	0.76000	0.09011	0.95286	0.82544	1.05882	0.09579
320		5	0.20200	0.13000	0.26000	0.05119	0.46354	0.36886	0.53507	0.06533

CETIS Report

Report Date: 18 Aug-04 11:33 AM
Analysis: 04-1965-4293

Macrocystis Germination and Germ Tube Growth Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Linear Regression	16-4174-1254	16-4174-1254	18 Aug-04 11:33 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.288	Yes	Yes	No	No

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.31241	0.00927	0.29423	0.33058	33.692	0.00000	Significant
Slope	9.31333	1.65825	6.06316	12.56351	5.616	0.00494	Significant
Intercept	-17.78890	4.13894	-25.90122	-9.67658	-4.298	0.01267	Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
7	-675.22360	-1.91005	0.10737	0.12179	6.50151	7.81473	0.08960	Non-Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	6.30969	2.52766	0.00050	Unequal Variances
Distribution	Shapiro-Wilk W	0.75496	0.92671	0.00000	Non-normal Distribution

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	0.7120	0.7		Passes acceptability criteria

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	236.8586	201.71510	256.82120
50	279.8408	258.65920	292.80050

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.71200	0.64000	0.82000	0.01395	0.06834	356	500
18		5	0.66200	0.54000	0.73000	0.01489	0.07294	331	500
32		5	0.68600	0.53000	0.76000	0.01841	0.09017	343	500
56		5	0.66200	0.56000	0.73000	0.01537	0.07530	331	500
100		5	0.71600	0.63000	0.79000	0.01296	0.06348	358	500
180		5	0.66200	0.54000	0.76000	0.01839	0.09011	331	500
320		5	0.20200	0.13000	0.26000	0.01045	0.05119	101	500

CETIS Report

Report Date: 18 Aug-04 11:33 AM
Analysis: 13-3196-6978

Macrocystis Germination and Germ Tube Growth Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Linear Interpolation	16-4174-1254	16-4174-1254	18 Aug-04 11:33 AM	CETISv1.024

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	8144900	200	Yes	Two-Point Interpolation

Test Acceptability

Attribute	Statistic	Lower Limit	Upper Limit	Decision
Control Response	13.15	10		Passes acceptability criteria

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
10	107.1864	10.72678	135.09720
20	142.8475	101.57630	166.40960
25	160.678	120.50850	189.66100
50	272.4359	240.32620	289.45070

Data Summary

			Calculated Variate				
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	5	13.15000	11.75000	14.25000	0.20603	1.00933
18		5	13.00000	11.50000	14.75000	0.27243	1.33463
32		5	12.85000	11.50000	13.75000	0.17897	0.87678
56		5	12.60000	10.50000	13.50000	0.24367	1.19373
100		5	12.10000	10.00000	13.25000	0.28090	1.37614
180		5	9.15000	7.00000	10.00000	0.24896	1.21963
320		5	5.25000	4.75000	5.50000	0.06250	0.30619

Approved By [signature] 8/20/

CETIS Worksheet

Report Date: 19 Jul-04 11:09 AM
Link: 16-4174-1254/040720mprt

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay SD**

Start Date:	20 Jul-04	**Species:**	Macrocystis pyrifera	**Sample Code:**	040720mprt
End Date:	22 Jul-04	**Protocol:**	EPA/600/R-95/136 (1995)	**Sample Source:**	Reference Toxicant
Sampled:	20 Jul-04	**Material:**	Copper chloride	**Sample Station:**	

Conc-µg/L	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	LC	1	30					
0	LC	2	5					
0	LC	3	31					
0	LC	4	26					
0	LC	5	29					
18		1	13					
18		2	8					
18		3	2					
18		4	17					
18		5	10					
32		1	11					
32		2	3					
32		3	19					
32		4	28					
32		5	24					
56		1	12					
56		2	27					
56		3	32					
56		4	15					
56		5	7					
100		1	1					
100		2	25					
100		3	21					
100		4	9					
100		5	6					
180		1	4					
180		2	14					
180		3	18					
180		4	33					
180		5	16					
320		1	34					
320		2	22					
320		3	20					
320		4	23					
320		5	35					

QC = AH

Analyst: AH Reviewed By: 8-10-04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 20-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 040720mprt

End Date: 22-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** Internal

Sampled: | **Sample Station:** $CuCl_2$

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
1	100	68	6	5	6	4	6	4	6	4	5	4	2.5	12.5
2	100	68	4	4	6	7	4	6	4	5	4	5	2.5	12.25
3	100	53	3	7	5	3	7	7	6	6	6	4	2.5	13.5
4	100	54	3	5	3	2	4	4	5	4	3	6	2.5	9.75
5	100	64	8	3	4	4	7	5	5	6	6	7	2.5	13.75
6	100	63	5	6	6	4	4	4	6	5	3	3	2.5	11.5
7	100	73	5	7	6	7	4	6	5	5	4	5	2.5	13.5
8	100	66	3	4	4	8	5	4	5	3	7	3	2.5	11.5
9	100	72	3	4	4	3	4	4	4	5	4	5	2.5	10
10	100	70	7	4	5	5	7	6	4	7	5	6	2.5	14
11	100	73	4	4	5	5	4	4	4	7	5	4	2.5	11.5
12	100	73	5	6	5	5	5	6	4	4	6	6	2.5	13
13	100	54	7	4	6	6	5	4	7	5	9	6	2.5	14.75
14	100	74	3	2	4	5	4	4	4	5	4	5	2.5	10
15	100	61	4	7	6	4	5	5	5	6	5	5	2.5	13
16	100	62	5	5	3	4	3	4	4	3	4	3	2.5	9.5
17	100	73	4	4	7	5	5	5	7	6	3	4	2.5	12.5
18	100	65	4	3	2	5	6	5	2	3	5	3	2.5	9.5
19	100	70	7	5	6	6	4	4	2	6	5	6	2.5	12.75
20	100	18	3	2	3	2	2	2	2	2	2	2	2.5	5.5
21	100	79	4	7	4	4	6	6	4	8	4	6	2.5	13.25
22	100	20	2	3	2	2	2	3	2	2	2	2	2.5	5.5
23	100	13	2	2	3	2	2	2	2	2	2	2	2.5	5.25
24	100	76	5	8	4	5	5	6	4	7	6	5	2.5	13.75
25	100	76	5	4	5	5	7	6	3	5	6	7	2.5	13.25
26	100	73	5	4	5	5	3	5	6	5	5	4	2.5	11.75
27	100	56	2	4	7	5	5	4	3	4	5	3	2.5	10.5
28	100	71	4	8	4	4	5	4	5	8	5	4	2.5	12.75
29	100	69	7	6	6	3	6	5	6	6	3	6	2.5	13.5
30	100	68	6	6	4	6	5	5	5	4	4	5	2.5	12.5
31	100	82	3	8	4	4	4	9	6	7	7	5	2.5	14.25
32	100	68	5	7	5	5	4	5	4	6	5	6	2.5	13
33	100	76	4	2	2	3	2	2	4	3	3	3	2.5	7
34	100	26	2	2	3	2	2	2	2	2	2	2	2.5	5.25
35	100	24	2	1	2	2	2	2	2	2	2	2	2.5	4.75

data entry QC

QC Check: AH 8/18/04 **Final Review:** [illegible] 8/20/04 **Analyst:** AH 8-18-04

Macrocystis Germination and Germ Tube Growth Test — **AMEC Bioassay Laboratory - San Diego**

Start Date: 20-Jul-04 | **Species:** *Macrocystis pyrifera* | **Test ID:** 040720mprt

End Date: 22-Jul-04 | **Protocol:** EPA/600/R-95/136 (1995 West Coast Manual) | **Sample Source:** Internal

Sampled: | **Sample Station:** $CuCl_2$

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
1	100	68	6	5	6	4	6	4	6	4	5	4	2.5	
2	100	68	4	4	6	7	4	6	4	5	4	5		
3	100	53	3	7	5	3	7	7	6	6	6	4		
4	100	54	3	5	3	2	4	4	5	4	3	6		
5	100	64	8	3	4	4	7	5	5	6	6	3		
6	100	63	5	6	6	4	4	4	6	5	3	3		
7	100	73	5	7	6	7	4	6	5	5	4	5		
8	100	66	3	4	4	4	5	4	5	3	7	3		
9	100	72	3	4	4	3	4	4	4	5	4	5		
10	100	70	7	4	5	5	7	6	4	7	5	6		
11	100	73	4	4	5	3	4	4	4	7	5	4		
12	100	73	5	6	5	5	5	6	4	4	6	6		
13	100	54	7	4	6	6	5	4	7	5	4	5		
14	100	74	3	2	4	5	4	4	4	5	4	5		
15	100	61	4	7	6	4	5	5	5	6	5	3		
16	100	62	6	5	3	4	3	4	4	3	4	3		
17	100	73	4	4	3	5	5	5	7	6	3	4		
18	100	65	4	3	2	5	6	5	2	3	3	3		
19	100	70	7	5	6	6	4	4	2	6	5	6		
20	100	68	3	2	3	2	2	2	2	2	2	2		
21	100	79	4	7	4	4	6	6	4	8	4	6		
22	100	80	2	3	2	2	2	3	2	2	2	2		
23	100	73	2	2	3	2	2	2	2	2	2	2		
24	100	76	5	8	4	5	5	6	4	7	6	5		
25	100	76	5	4	5	5	7	6	3	5	6	7		
26	100	73	5	4	5	5	3	5	6	5	5	4		
27	100	56	2	4	7	5	5	4	3	4	5	3		
28	100	71	4	8	4	4	5	4	5	8	5	4		
29	100	69	7	6	6	3	6	5	6	6	3	6		
30	100	68	6	6	4	6	5	5	5	4	4	5		
31	100	82	8	8	4	4	4	9	6	7	7	5		
32	100	68	5	7	5	5	4	5	4	6	5	6		
33	100	76	4	2	2	3	2	2	4	3	3	3		
34	100	26	2	2	3	2	2	2	2	2	2	2		
35	100	24	2	1	2	2	2	2	2	2	2	2		

QC Check: 8-10-04

Final Review: 8/20/04

Kelp Spore Germination Bioassay Worksheet

Client: INTERNAL
Test No.: 040720MDRT
Tech. Initials: AH

Start/End Dates: 7-20-04 / 7-22-04
Start/End Times: 14:45 / 1300
Test Species: *Macrocystis pyrifera*

Date Collected: 7-20-04
Kelp Collector: AH, JR
Collection Location: La Jolla Cove
Conditions (weather, etc.): Sunny, surgy 2-4' vis.
Dilution Water Source (Client I: _____): ~~Scripps pier~~ SWC
Dilution Water Source (Client II: _____):
Dilution Water Source (Client III: _____):
Dilution Water Source (Reference Toxicant): Scripps pier

Time of Initial Rinsing and Dessication: 12:00 (keep kelp from each collecting bag separated)
Time of Rinsing and Transfer to Release Beakers: 13:45 (keep kelp from each collecting bag separated)
Conditions of Zoospore Density and Motility (beaker 1):
Time of Blade Removal From Release Beaker 1/Beaker 2 (if needed):

Density Counts (target = 90): 98 117 117 128 79 Mean: 107.8

Mean 1078 * 10,000 = 1,078,000 spores per ml (Density of Spore Release)

Calculate the volume of spore stock to add to each test container:

(225,000 spores/container)/(density of spore release) = _____ ml stock/container

In cases of a spore release = 900,000 spores/ml, the volume is 0.25 ml.

If density > 900,000 spores/ml, calculate a dilution factor, x, and create a new spore stock of 900,000 cells/ml and add 0.25 ml:

Density of spore release 1,078,000 * $\frac{0.25 \text{ ml}}{1 \text{ container}}$ = $\frac{269,500 \text{ spores}}{225,000 \text{ spores}}$ = 1.2 (x)

Example: 980,000 * 0.25 / 225,000 = 1.09 (100 ml stock + 9 ml sw)

In cases of a spore release from 450,000 to 899,000 spores/ml, the volume added should not exceed 0.5 ml. (This volume exceeds the EPA and MBP required volume of no greater than 1% of the total test solution volume. However, it may sometimes be necessary to exceed the required limit of 0.3 ml in order to achieve the desired spore density).

If the density of spore release is < 450,000 spores/ml, check the density of the spores in the second release beaker.

Time of Inoculation: 14:45 Amount inoculated: 0.25 ml 24-hour germination check: 70%, SH

Comments: 24 hr QC: 70%.

QC Check: SC 8-10-04 Final Review: AH 8/20/04

AMEC Earth & Environmental
Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr. Suite B
San Diego, CA 92121

Raw Datasheet
Water Quality Measurements
Marine Chronic Bioassay

Client : INTERNAL
Test Species: *Macrocystis pyrifera*
Sample ID: CuCl2
Start/End Dates: 7-20-04 / 7-22-04
Test No: 040720MPRT
Start/End Times: 1445 / 1300
Analyst: AH
Test Type: Kelp Spore Germination and Growth

	Initial Readings			Final Readings		
Concentration (µg/L)	D.O. (mg/L)	pH (pH units)	Salinity (ppt)	D.O. (mg/L)	pH (pH units)	Salinity (ppt)
LabControl	9.2	8.02	34.0	6.9	7.93	34.3
18	9.1	8.02	33.4	6.8	7.91	34.2
32	9.1	8.03	34.0	6.8	7.93	34.4
56	9.2	8.04	34.0	6.7	7.93	34.4
100	9.2	8.04	33.7	6.7	7.94	34.3
180	9.1	8.03	33.5	6.7	7.92	34.0
320 µg/L	9.1	8.03	33.0	6.7	7.91	33.6

Comments:

QC Check: BC 8-10-04
Final Review: AH 8/20/04

APPENDIX D
ANALYTICAL CHEMISTRY DATA

Calscience
Environmental
Laboratories, Inc.

July 29, 2004

Chris Stransky
AMEC Earth and Environmental
5510 Morehouse Drive, Suite B
San Diego, CA 92121-0000

Subject: **Calscience Work Order No.:** **04-07-1119**
Client Reference: **City of Buenaventure/SCRE**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 07/21/04 and analyzed in accordance with the attached chain-of-custody. An anomaly is apparent in the data whereas the DOC values exceed the TOC values, even though DOC was undetected in the Method Blank. DOC frequently exceeds the TOC values at low levels due to the presence of DOC in the filters used during sample prep. A possible high bias in the DOC results is also indicated by the matrix spike data being above the control range.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The original report of any subcontracted analysis is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Sincerely,

Calscience Environmental
Laboratories, Inc.
Robert Stearns
Project Manager

Michael J. Crisostomo
Quality Assurance Manager

Calscience Environmental Laboratories, Inc.

ANALYTICAL REPORT

AMEC Earth and Environmental	Date Received:	07/21/04
5510 Morehouse Drive, Suite 300	Work Order No.:	04-07-1119
San Diego, CA 92121-3723	Preparation:	EPA 3005A Filt.
	Method:	EPA 6020
	Unit:	ug/L
Project: City of Buenaventure/SCRE		

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
A-2	04-07-1119-1	07/20/04	Aqueous	07/22/04	07/22/04	040722L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	3.44	1.00	1		Selenium	2.95	1.00	1	
Nickel	8.03	1.00	1		Zinc	1.43	1.00	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
B-1	04-07-1119-2	07/20/04	Aqueous	07/22/04	07/22/04	040722L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	3.27	1.00	1		Selenium	1.26	1.00	1	
Nickel	6.31	1.00	1		Zinc	17.5	1.00	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
B-3	04-07-1119-3	07/20/04	Aqueous	07/22/04	07/22/04	040722L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	3.35	1.00	1		Selenium	2.03	1.00	1	
Nickel	7.85	1.00	1		Zinc	2.17	1.00	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
C-2	04-07-1119-4	07/20/04	Aqueous	07/22/04	07/22/04	040722L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	3.03	1.00	1		Selenium	3.41	1.00	1	
Nickel	8.38	1.00	1		Zinc	ND	1.00	1	

Calscience Environmental Laboratories, Inc.

ANALYTICAL REPORT

AMEC Earth and Environmental	Date Received:	07/21/04
5510 Morehouse Drive, Suite 300	Work Order No.:	04-07-1119
San Diego, CA 92121-3723	Preparation:	EPA 3020A Total
	Method:	EPA 6020
	Unit:	ug/L
Project: City of Buenaventure/SCRE		Page 2 of 2

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
A-2	**04-07-1119-1**	**07/20/04**	**Aqueous**	**07/22/04**	**07/22/04**	**040722L01**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	3.45	1.00	1		Selenium	2.21	1.00	1	
Nickel	8.27	1.00	1		Zinc	2.26	1.00	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
B-1	**04-07-1119-2**	**07/20/04**	**Aqueous**	**07/22/04**	**07/22/04**	**040722L01**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	3.47	1.00	1		Selenium	1.74	1.00	1	
Nickel	6.66	1.00	1		Zinc	17.2	1.00	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
B-3	**04-07-1119-3**	**07/20/04**	**Aqueous**	**07/22/04**	**07/22/04**	**040722L01**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	3.67	1.00	1		Selenium	2.23	1.00	1	
Nickel	8.11	1.00	1		Zinc	3.65	1.00	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
C-2	**04-07-1119-4**	**07/20/04**	**Aqueous**	**07/22/04**	**07/22/04**	**040722L01**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	3.41	1.00	1		Selenium	2.91	1.00	1	
Nickel	8.85	1.00	1		Zinc	1.53	1.00	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
Method Blank	**096-06-003-643**	**N/A**	**Aqueous**	**07/22/04**	**07/22/04**	**040722L01**

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	ND	1.00	1		Selenium	ND	1.00	1	
Nickel	ND	1.00	1		Zinc	ND	1.00		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

AMEC Earth and Environmental
5510 Morehouse Drive, Suite B
San Diego, CA 92121-0000

Date Received: 07/21/04
Work Order No: 04-07-1119

Project: City of Buenaventure/SCRE

Client Sample Number	Lab Sample Number	Date Collected	Matrix
A-2	04-07-1119-1	07/20/04	Aqueous

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Solids, Total Suspended	28	1.0	1		mg/L	N/A	07/22/04	EPA 160.2
Cyanide, Total	ND	0.050	1		mg/L	N/A	07/26/04	EPA 335.2
Carbon, Total Organic	2.3	0.5	1		mg/L	N/A	07/22/04	EPA 415.1
Carbon, Dissolved Organic	2.7	0.5	1		mg/L	N/A	07/21/04	EPA 415.1

Client Sample Number	Lab Sample Number	Date Collected	Matrix
B-1	04-07-1119-2	07/20/04	Aqueous

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Solids, Total Suspended	ND	1.0	1		mg/L	N/A	07/22/04	EPA 160.2
Cyanide, Total	ND	0.050	1		mg/L	N/A	07/26/04	EPA 335.2
Carbon, Total Organic	5.8	0.5	1		mg/L	N/A	07/22/04	EPA 415.1
Carbon, Dissolved Organic	7.3	0.5	1		mg/L	N/A	07/21/04	EPA 415.1

Client Sample Number	Lab Sample Number	Date Collected	Matrix
B-3	04-07-1119-3	07/20/04	Aqueous

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Solids, Total Suspended	28	1.0	1		mg/L	N/A	07/22/04	EPA 160.2
Cyanide, Total	ND	0.050	1		mg/L	N/A	07/26/04	EPA 335.2
Carbon, Total Organic	2.5	0.5	1		mg/L	N/A	07/22/04	EPA 415.1
Carbon, Dissolved Organic	2.8	0.5	1		mg/L	N/A	07/21/04	EPA 415.1

Client Sample Number	Lab Sample Number	Date Collected	Matrix
C-2	04-07-1119-4	07/20/04	Aqueous

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Solids, Total Suspended	38	1.0	1		mg/L	N/A	07/22/04	EPA 160.2
Cyanide, Total	ND	0.050	1		mg/L	N/A	07/26/04	EPA 335.2
Carbon, Total Organic	2.4	0.5	1		mg/L	N/A	07/22/04	EPA 415.1
Carbon, Dissolved Organic	2.8	0.5	1		mg/L	N/A	07/21/04	EPA 415.1

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

ANALYTICAL REPORT

AMEC Earth and Environmental
5510 Morehouse Drive, Suite 300
San Diego, CA 92121-3723

Date Received: 07/21/04
Work Order No.: 04-07-1119

Project: City of Buenaventure/SCRE

Client Sample Number:	Lab Sample Number	Date Collected	Matrix
Method Blank		**N/A**	**Aqueous**

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Cyanide, Total	ND	0.050	1		mg/L	N/A	07/26/04	EPA 335.2
Carbon, Total Organic	ND	0.50	1		mg/L	N/A	07/22/04	EPA 415.1
Carbon, Dissolved Organic	ND	0.50	1		mg/L	N/A	07/21/04	EPA 415.1

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

AMEC Earth and Environmental
5510 Morehouse Drive, Suite B
San Diego, CA 92121-0000

Date Received: 07/21/04
Work Order No: 04-07-1119

Project: City of Buenaventure/SCRE

Matrix: Aqueous

Parameter	Method	Quality Control Sample ID	Date Analyzed	Date Extracted	MS% REC	MSD % REC	%REC CL	RPD	RPD CL	Qualifiers
Cyanide, Total	EPA 335.2	04-07-1120-1	07/26/04	N/A	82	84	70-130	2	0-25	
Carbon, Total Organic	EPA 415.1	A-2	07/22/04	N/A	129	126	70-130	2	0-25	
Carbon, Dissolved Organic	EPA 415.1	A-2	07/21/04	N/A	140	154	70-130	7	0-25	3

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Laboratory Control Sample

AMEC Earth and Environmental
5510 Morehouse Drive, Suite B
San Diego, CA 92121-0000

Date Received: N/A
Work Order No: 04-07-1119

Project: City of Buenaventure/SCRE

Matrix : Aqueous

Parameter	Method	Quality Control Sample ID	Date Analyzed	Date Extracted	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	Qualifiers
Cyanide, Total	EPA 335.2	099-05-061-1,471	07/26/04	N/A	0.20	0.21	105	80-120	
Carbon, Total Organic	EPA 415.1	099-05-097-1,698	07/22/04	N/A	5.0	4.9	98	80-120	
Carbon, Dissolved Organic	EPA 415.1	099-05-115-255	07/21/04	N/A	5.0	5.0	100	80-120	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Duplicate

AMEC Earth and Environmental
5510 Morehouse Drive, Suite B
San Diego, CA 92121-0000

Date Received: 07/21/04
Work Order No: 04-07-1119

Project: City of Buenaventure/SCRE

Matrix: Aqueous

Parameter	Method	QC Sample ID	Date Analyzed	Sample Conc	DUP Conc	RPD	RPD CL	Qualifiers
Solids, Total Suspended	EPA 160.2	04-07-1102-2	07/22/04	10	11	10	0-25	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

AMEC Earth and Environmental
5510 Morehouse Drive, Suite B
San Diego, CA 92121-0000

Date Received: 07/21/04
Work Order No: 04-07-1119
Preparation: EPA 3020A Total
Method: EPA 6020

Project: City of Buenaventure/SCRE

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
04-07-0254-1	Aqueous	ICP/MS A	07/22/04	07/22/04	040722S01

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Copper	91	91	80-120	0	0-20	
Nickel	96	97	80-120	2	0-20	
Selenium	86	83	80-120	3	0-20	
Zinc	84	85	80-120	1	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

nelac

AMEC Earth and Environmental
5510 Morehouse Drive, Suite B
San Diego, CA 92121-0000

Project: City of Buenaventure/SCRE

Date Received: N/A
Work Order No: 04-07-1119
Preparation: EPA 3020A Total
Method: EPA 6020

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
096-06-003-643	Aqueous	ICP/MS A	07/22/04	07/22/04	040722L01

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Copper	100	102	80-120	1	0-20	
Nickel	100	101	80-120	2	0-20	
Selenium	82	84	80-120	3	0-20	
Zinc	92	94	80-120	2	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 04-07-1119

Qualifier	Definition
*	See applicable analysis comment.
1	Surrogate compound recovery was out of control due to a required sample dilution, therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike or Matrix Spike Duplicate compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported with no further corrective action required.
A	Result is the average of all dilutions, as defined by the method.
B	Analyte was present in the associated method blank.
C	Analyte presence was not confirmed on primary column.
D	The analyte concentration was reported from analysis of the diluted sample.
E	Concentration exceeds the calibration range.
H	Sample received and/or analyzed past the recommended holding time.
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
N	Nontarget Analyte.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
U	Undetected at the laboratory method detection limit.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 7/20/04

Page 1 of 1

LABORATORY CLIENT: AMEC	CLIENT PROJECT NAME / NUMBER: City of Buenaventura / SCRE	P.O. NO.:
ADDRESS: 5510 Morehouse Dr	PROJECT CONTACT: Chris Stransky / Howard Bailey	QUOTE NO.:
CITY: San Diego STATE: CA ZIP: 92121	SAMPLER(S) (SIGNATURE)	LAB USE ONLY: 07-1119
TEL: 858-458-9044 FAX: 858 587-3961 E-MAIL: chris-stransky@amec.com		

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ 10 DAYS — Standard

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___ / ___ / ___.

SPECIAL INSTRUCTIONS
Metals DL of 1ppb
* Sample salinity 1.5 to 3ppt

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH_4 / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	Total CN*	TOC, DOC	TSS	Total + Dissolved Cu, Ni, Se, Zn
1	A-2	SCRE	7/20/04	1450	AQ	6																X	X	X	X
2	B-1	↓	↓	1340	↓	↓																↓	↓	↓	↓
3	B-3			1100																					
4	C-2			0950																					

Relinquished by: (Signature)	Received by: (Signature)	Date: 7/21/4	Time: 1220
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date: 7/21/4	Time: 1625

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Yellow and Pink copies respectively.

02/01/99 Revision

Q&Q Graphic (714) 898-9702

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 04 - 07 - 1119

Cooler 1 of 1

SAMPLE RECEIPT FORM

CLIENT: Amec DATE: 7/21/4

TEMPERATURE – SAMPLES RECEIVED BY:

CALSCIENCE COURIER:

- _____ Chilled, cooler with temperature blank provided.
- _____ Chilled, cooler without temperature blank.
- ✓ Chilled and placed in cooler with wet ice.
- _____ Ambient and placed in cooler with wet ice.
- _____ Ambient temperature.
- 4.4 °C Temperature blank.

LABORATORY (Other than Calscience Courier):

- _____ °C Temperature blank.
- _____ °C IR thermometer.
- _____ Ambient temperature.

Initial: [signature]

CUSTODY SEAL INTACT:

Sample(s): _____ Cooler: _____ No (Not Intact) : _____ Not Applicable (N/A): ✓

Initial: [signature]

SAMPLE CONDITION:

	Yes	No	N/A
Chain-Of-Custody document(s) received with samples	✓		
Sample container label(s) consistent with custody papers	✓		
Sample container(s) intact and good condition	✓		
Correct containers for analyses requested	✓		
Proper preservation noted on sample label(s)	✓		
VOA vial(s) free of headspace.			✓
Tedlar bag(s) free of condensation			✓

Initial: [signature]

COMMENTS:

APPENDIX E
FIELD COLLECTION DATA

Santa Clara River Estuary Evaluation
City of Buenaventura

Field Water Quality Measurement Log

2003 – 2004

Sample Collection Date: 7/20/04 **Sampler:** BCS, NB

Sample ID (Max depth)	Depth (ft)	Temp °C	Salinity (ppt)/	Cond. (umhos-cm)	pH	DO (mg/L)	Comments/ Observations
D-1	Surface	25.1	2.7	5110	8.97	>20	0905 - position on mark
	Mid	24.9	2.7	5170	8.97	>20	
max 3'4"	Bottom	24.9	2.8	5210	–	–	
C-1	S	25.2	3.0	5540	9.47	>20	0920
	M	25.2	3.0	5550	9.47	>20	Position on mark
max 2'6"	B	25.2	3.0	5540	9.44	>20	
C-2	S	25.3	2.9	5460	9.53	>20	0935
	M	25.2	2.9	5440	9.40	>20	34' 14.052
max 3'4"	B	25.1	2.9	5340	–	–	119' 15.392
C-3	S	25.1	2.9	5390	9.52	>20	1005 *Surface remeasured post w/consistent results.
	M	25.1	2.9	5400	9.29	>20	
Max 4'8"	B	25.0	7.5	13320*	–	–	34' 14.031 119' 15.391
B-3	S	25.4	2.8	5250	9.52	>20	1040
	M	25.4	2.9	5320	9.54	>20	34' 14.031
Max 5'4"	B	25.8	9.5	9340	–	–	119' 15.646
B-4	S	26.0	3.0	5640	9.72	>20	1120
	M	25.9	3.0	5640	9.69	>20	34' 13.893
Max 4'	B	24.4	3.2	5890	–	–	119' 15.572

This is a copied version of field log page, actual log page was splattered with ink. -AH

Santa Clara River Estuary Evaluation
City of Buenaventura

Field Water Quality Measurement Log

2003 – 2004

Sample Collection Date: 7/20/04 **Sampler:** ES NB

Sample ID (max depth)	Depth (ft)	Temp °C	Salinity (ppt)/	Cond. (umhos-cm)	pH	DO (mg/L)	Comments/ Observations
B-2	T	26.4	2.6	4770	9.27	>20	1310 D.O. just above 19 mg/L from readout (*)
	M	–	–	–	–	–	34° 13.969
2'0"	B	26.4	2.7	4840	9.54	>20	119° 15.704
B-1	T	25.9	1.3	2500	7.69	5.0	1340 * double checked surface value
	M	25.1	1.3	2570	9.04*	4.0	34° 14.094
4'5"	B	27.0	4.7	8890	–	–	119° 15.793
A-1	T	26.8	3.1	5830	9.73	>20	1425
	M	26.7	3.2	5840	9.73	>20	34° 13.984
3'8"	B	26.0	4.6	8230	–	–	119° 15.892
A2	T	26.6	3.0	5620	9.77	>20	1450 salinity = 6.0 @ 4'6"
	M	26.6	3.0	5660	9.75	>20	34° 13.882
5'6"	B	26.1	7.7	14570	–	–	119° 15.843
A3	T	27.1	3.1	5790	9.84	>20	
	M	27.0	3.1	5850	9.83	>20	
4'3"	B	25.8	~~3.8~~ NS 4.0	~~7800~~ NB 7700	–	–	34° 13.760 119° 15.819

(*) pH meter checked - reads 7.03 for 7 standard

Santa Clara River Estuary Evaluation
City of Buenaventura

Oct 2003 - Oct 2004

FIELD SAMPLE EVENT LOG

Agencies: AMEC		Sample Date: 7/20/04	
Chief Scientist/ scientific crew:[1]: Chris Stransky, Nick Bubbe			
Vessel: Pentaro, Longboard			
High Tide (ft):	Time:	High Tide:	Time:
Low Tide (ft):	Time:	Low Tide:	Time:

SAMPLING EVENT NOTES

Dry Season "closed berm" Sampling event Full estuary/ Water only collections at sites A-2, B-1, B-3, & C-2

Chronic toxicity (mussel, mysid, topsmelt, Kelp, Fathead minnow, C. dubia, Selenastrum)

WEIR - Bivalve

Analyzed Total CN, Total & Dissolved Cu, Se, Ni, Zn, PC, DOC, TSS

APPENDIX F
SAMPLE RECEIPT INFORMATION

AMEC Earth & Environmental
Aquatic & Terrestrial Toxicology Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121

Sample Check-In Information
Marine Test

Client: City of Buenaventura
Sample ID: A-2/B-1/B-3/C-2

Test Initiation Date: 7-21-04
Test No.(s): 0407-031 to 046
Test(s) Performed: Mysid/Kelp/Topsmelt/Mussel

	Sample (A, B, C, Receiving Water, etc.)			
	A-2	B-1	B-3	C-2
Alkalinity (mg/L)*	171	184	183	147
Hardness (mg/L)* ª	917	540	813	882
Check-In Temp (°C)	19.3	18.4	18.2	18.5
DO (mg/L)	10.3	7.7	10.4	9.3
pH (units)	9.73	7.79	9.55	9.20
Salinity (ppt)	3.1	1.4	2.9	2.9
Cond. (µmhos-cm)	5160	2370	4760	4830
Total Chlorine (mg/L)	0.01	0.03	<0.01	0.02
Free Chlorine (mg/L)	–	–	–	–
STS added (g)	–	–	–	–
Final Free Chlorine (mg/L)	–	–	–	–

* = mg/L as $CaCO_3$, ª = Measured for freshwater samples only, NA = Not Applicable

Sample Description: All- light yellow, clear, no odor, light debris B1- no debris

Dilution Water Source: (LAB SW) w/brine (Kelp, Bivalve) (ART SW) (Mysid, Topsmelt) Other: _____ Alkalinity: 95 Salinity: 30ppt

Additional Control? Y N = _____ Alkalinity: _____ Salinity: _____

Sample Manipulations Required? Y (N)

Sample Salted w/ artificial salt? (Y) N If yes, what ppt? 30 ppt Mysid Topsmelt

Sample salted w/brine? (Y) N If yes, what ppt? 34ppt Kelp

Filtration? Y (N) Filter Pore Size: _____ Organisms Debris Post-check: _____

Aeration? Y (N) Length of Time: _____ Final DO: _____ Final pH: _____

pH Adjustment? Y (N) Initial pH: _____ Final pH: _____

Subsamples Collected for Additional Chemistry? Y N Sample Type(s): _____

Sample Shipped Via: Hand delivered

Comments: _____

Analysts: SH QC Check: AH 8-17-04

AMEC Earth & Environmental
Aquatic & Terrestrial Toxicology Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121

Sample Check-In Information
Freshwater Test

Client: City of Buenaventura
Sample ID: A-2/B-1/B-3/C-2

Test Initiation Date: 7-21-04
Test No.(s): 0407-047 to 058
Test(s) Performed: Ceriodaphnia/Fathead/Selenastr

	Sample (A, B, C, Receiving Water, etc.)			
	A-2	B-1	B-3	C-2
Alkalinity (mg/L)*	171	184	183	147
Hardness (mg/L)*	917	540	813	882
Check-in Temp (°C)	19.3	18.4	18.2	18.5
DO (mg/L)	10.3	7.7	10.4	9.3
pH (units)	9.73	7.79	9.55	9.20
Cond. (µmhos-cm)	5160	AH ~~7.4 2370~~ 2370	4760	4830
Total Chlorine (mg/L)	0.01	~~2370~~ 0.03	< 0.01	0.02
Free Chlorine (mg/L)	—	—	—	—
STS added (g)	—	—	—	—
Final Free Chlorine (mg/L)	—	—	—	—

* = mg/L as $CaCO_3$, NA = Not Applicable

Sample Description: All - light yellow, clear, no odor, light debris (B1-no debris

Dilution Water Source: (8:2) Culligan Other: _____ Alkalinity: 154 Hardness: 280

Additional Control? (Y) N = pH salt (control adjusted to 9.6 Alkalinity: (A) Hardness: (A)

Sample Manipulations Required? Y (N)

Filtration? Y (N) Filter Pore Size: _____ Organisms Debris Post-check: _____

Aeration? Y (N) Length of Time: _____ Final DO: _____ Final pH: _____

pH Adjustment? Y (N) Initial pH: _____ Final pH: _____

Subsamples Collected for Additional Chemistry? Y (N) Sample Type(s): _____

Sample Shipped Via: hand delivered

Comments: (A) alkalinity and hardness for pH-adj. control was not measured.

Analysts: SH QC Check: AH 8-17-04

APPENDIX G
CHAIN-OF-CUSTODY FORMS

Chain of Custody

Earth & Environmental, Inc.
AMEC San Diego Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121
Phone: 858-458-9044 FAX 858-587-3961

Date 7-20-04 Page 1 of 1

Sample Collection by: Chris Stransky / Nicke Bunker

Company City of Buenaventura
Address
City State Zip
Contact
Phone No. Karen Wahn 805-677-4128
Dan Pfeiffer -4131

Mail Report to (if different)

Company
Address
City State Zip
Contact
Phone No.

ANALYSIS REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	A. affinis chronic	A. bahia chronic	M. pyrifera chronic	M. galloprovincialis chronic	P. promelas chronic	C. dubia chronic	S. capricornutum chronic
A-2	7/20/04	14:50	H2O	5gal bucket	5		X	X	X	X	X	X	X
B-1	↓	13:40	↓	↓	5		↓	↓	↓	↓	↓	↓	↓
B-3		10:40			5								
C-2		09:35			5								

PROJECT INFORMATION

CLIENT
P.O. NO.
SHIPPED VIA: Collected & transported by AMEC staff

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	20
CHAIN OF CUSTODY SEALS	Y
REC'D. GOOD CONDITION/COLD	Y
CONFORMS TO RECORD	Y

SPECIAL INSTRUCTIONS/COMMENTS:

Freshwater tests – 100% sample only w/ salt control if salinity of sample ≥1

RELINQUISHED BY

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY

(Signature) (Time)
(Printed Name) (Date)
(Company)

RELINQUISHED BY

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)

Steven Hackford 7-21-04
(Signature) (Time)
Steven Hackford 7:45
(Printed Name) (Date)
04-0535 → 0538
AMEC Bioassay Lab Log-in No.

Additional disposal charges may apply.

DISTRIBUTION: WHITE, CANARY - AMEC Bioassay Lab, PINK - Originator

City of Buenaventura
Water-Effect Ratio Report
July 04 Dry Weather Sampling Event
Santa Clara River Estuary

Prepared by
Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, California 92121
(858) 587-7333

INTRODUCTION

As part of a continued monitoring and characterization effort of the Santa Clara River Estuary (SCRE), a water-effect ratio (WER) was determined for copper using ambient water samples collected on July 20, 2004. The WER was conducted following guidance and procedure published in EPA Method 822-R-01-005 (Streamlined Water-Effect Ratio Procedure for Discharge of Copper). Blue mussel larvae (*Mytilus galloprovincialis*) bioassays were initiated on July 22, 2004 at Nautilus' laboratory located in San Diego, CA. The embryo development test was chosen for this WER due to its sensitivity to copper; toxicity to bivalve larvae is the primary driver for EPA's derivation of water quality criterion for copper in marine waters (3.1 µg/L, US EPA 2000). Measurements of copper concentrations in support of the WER were performed by Calscience Environmental Laboratories (CEL) located in Garden Grove, CA.

In addition to the WER, ambient water toxicity was evaluated using other freshwater (e.g. alga *Selenastrum capricornutum*, the water flea *Ceriodaphnia dubia*, and the fathead minnow *Pimephales promelas*) and marine organisms (e.g. giant kelp *Macrocystis pyrifera*, the opossum shrimp *Americamysis bahia*, and the Pacific topsmelt *Atherinops affinis*).

METHODS AND MATERIALS

SAMPLE COLLECTION, TRANSPORT, AND PREPARATION

Ambient water samples were collected from four of the eleven ambient monitoring locations (specifically sites A-2, B-1, B-3, and C-2). Sites for water collection were selected based on location within the estuary and water depth (i.e. centrally located sites with enough water to provide an adequate sample volume for testing). Sample collection time, global positioning system (GPS) coordinates, water depth, temperature, dissolved oxygen (DO), salinity, and pH were recorded in a field logbook and is summarized in Appendix E.

All equipment used for water collection was cleaned thoroughly with Alconox soap and rinsed with site water. Collections were performed using a hand pump connected to ½" clear PVC tubing. The end of the tubing was held at mid-depth to collect the water and pumped into 20-L plastic-lined buckets; a total of five buckets were collected at each site.

Nautilus personnel transported all samples to the laboratory where samples were placed in a 4°C cold room overnight. The following day, the contents of all sample containers from each site were composited and water quality parameters of temperature, DO, conductivity, salinity, pH, total residual chlorine, alkalinity, and hardness were measured and recorded in a logbook. A portion of each composited sample was removed and spiked with nominal copper concentrations of 0, 9.0, 15, 25, 40, 65, and 100 µg/L. For comparison, polished laboratory seawater (PSW) was also spiked with copper on the same day with final concentrations of 0, 1.8, 3.0, 5.0, 8.4, 14, 23, and 39 µg/L. Laboratory seawater was polished by filtration through a Gelman 0.20-µm filter. Spiked samples were placed in a 15°C temperature-controlled room and allowed to equilibrate overnight. Subsamples of all test concentrations were collected prior to test initiation for analytical verification of copper concentrations.

BIOASSAY PROTOCOLS

Test conditions and Quality Assurance/Quality Control (QA/QC) requirements for the blue mussel embryo development test are summarized in Table 1.

Table 1. Test Conditions and QA/QC Summary for the 48-Hour Bivalve Embryo Development Test.

Test organism	*Mytilus galloprovincialis*
Test organism source	Field Collected by Nautilus Personnel
Test duration	48 Hours
Test solution renewal	None
Feeding	None
Test initiation date and time	Within 24 hours of copper addition to samples
Test chamber	30-ml glass scintillation vial
Test solution volume	10 ml
Test temperature	15 ± 1°C
Dilution water	None
Test concentrations (µg/L copper added to 100% sample)[a]	0, 9, 15, 25, 40, 65, and 100
Number of organisms/chamber	250-300
Number of replicates	5
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test Protocol	ASTM Designation E 724-98
Test acceptability criteria for controls	≥ 90% normal
Reference toxicant	Copper chloride
Reference toxicant test concentrations (µg/L) Polished Seawater [b] Natural Seawater [c]	 0, 1.8, 3.0, 5.0, 8.4, 14, 23, and 39 0, 2.5, 5.0, 10, 20, and 40

[a] In order to determine the WER for full-strength sample, Forty Fathoms™ sea salt, as opposed to hypersaline brine, was added to each sample in order to raise the salinity to 30 ppt. An additional control, composed of Forty Fathoms™ sea salt and deionized water, was also tested to ensure observed effects were not due to the addition of artificial salt.

[b] The polished seawater copper reference toxicant test was used for calculation of the water-effect ratio for each estuary sample.

[c] The copper reference toxicant test using natural seawater is performed concurrently with all bivalve embryo tests conducted at Nautilus to evaluate variability in test procedures and sensitivity of organisms over time.

STATISTICAL ANALYSES

Analysis of ambient water and reference toxicant data was conducted using CETIS™ Comprehensive Environmental Toxicity Information System and Database Software, Version 1.025B. Statistical differences from the control and No Observed Effect Concentrations (NOEC) were determined for each test using Dunnett's or Steel's Many-One Rank Tests. Median Effect Concentration (EC_{50}) values were determined using Maximum Likelihood Probit Analysis (linear regression). The choice of statistical method used was dependent upon specific assumptions met by the data.

CHEMICAL ANALYSES

Analysis of total copper in selected estuary samples was performed by CEL (Appendix D).

WATER-EFFECT RATIO CALCULATION FOR COPPER

Measured concentrations of copper were used for all calculations in this report. Total copper was measured in copper-spiked test concentrations that bracketed dose responses. The WER was calculated for each site by dividing the EC50 for copper in the sample, by the EC50 for copper in the Scripps polished seawater.

RESULTS AND DISCUSSION

A detailed data summary is contained in Appendix A. Statistical analyses and raw data can be found in Appendix B, and reference toxicant data are located in Appendix C. Analytical chemistry data reports and field collection data can be found in Appendices D, and E, respectively. Finally, chain-of-custody information is provided in Appendix F.

Copper EC_{50} values and WER calculations are summarized in Table 2. Mean normal development was 84 to 89 percent in the unspiked estuary samples, compared to 87 to 92 percent in the artificial salt controls. Total copper EC_{50} values calculated for estuary samples based on measured copper concentrations ranged from 83.4 to 90.5 µg/L. For comparison, the mean EC_{50} calculated for polished seawater spiked with copper was 12.2 µg/L. The calculated WER values ranged from 6.84 to 7.42, with a geometric mean of 7.06.

Table 2. Total Copper WER Values for Santa Clara River Estuary Samples Calculated using Scripps Polished Seawater (measured concentrations)

Sample	EC_{50} (µg/L Total Cu)	Water-Effect Ratio
Site A-2	83.4	6.84
Site B-1	85.4	7.00
Site B-3	90.5	7.42
Site C-2	85.3	6.99
Polished Scripps Seawater [a]	12.2	NA
Scripps Seawater [b]	8.17	NA

[a] Seawater from Scripps (see footnote b) was polished at Nautilus by passing it through a 0.2-µm filter.

[b] Seawater from the Scripps Institute of Oceanography was sand filtered on-site prior to collection. This seawater was used used to conduct a standard copper reference toxicant test included here and in the laboratory reference toxicant control chart.

QA/QC

The bivalve development tests conducted on estuary samples resulted in lab controls with mean normal development of 88 to 89 percent, just below the 90 percent criterion. However, the results were deemed acceptable for reporting purposes because: 1) the mean values for normal development were close to the criterion; and 2) the range of values among control replicates included several values exceeding the criterion.

The reference toxicant test conducted met test acceptability criteria, and the EC_{50} fell within two standard deviations of laboratory control chart mean (Appendix C).

LITERATURE CITED

American Society for Testing and Materials (ASTM), 1999. Standard guide for conducting static acute toxicity tests starting with embryos of four species of saltwater bivalve molluscs. ASTM Designation: E 724-98.

Tidepool Scientific Software. 2001-2002. Comprehensive Environmental Toxicity Information System (CETIS), version 1.025B.

U.S. EPA. 2000. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. Federal Register Volume 65 No. 97, May 2000.

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

APPENDIX A
TEST RESULT SUMMARY

Appendix Table A-1. Water-Effect Ratio Summary Results
City of Buenaventura
Santa Clara River Estuary Dry Sampling Event
Test Initiation Date: July 22, 2004
Test Species: *Mytilus galloprovincialis*

Site ID	Nominal Spiked Copper (µg/L) [a]	Measured Total Copper (µg/L) [b]	Mean Percent Normal Development [c]	EC_{50} (µg/L total copper) [d]
A-2	Lab Control	5.61	89 +/- 4.6	**83.4 (58.9-122)**
	Salt Control	8.68	92 +/- 1.9	
	0 (Unspiked Sample)	3.45	86 +/- 6.5	
	9.0	NM	86 +/- 5.6	
	15	NM	**77 +/- 1.9**	
	25	39.0	**83 +/- 7.8**	
	40	54.4	**66 +/- 37**	
	65	80.2	**51 +/- 30**	
	100	116	**27 +/- 6.8**	
B-1	Lab Control	5.61	89 +/- 4.6	**85.4 (82.7-88.8)**
	Salt Control	8.68	92 +/- 1.9	
	0 (Unspiked Sample)	3.47	84 +/- 3.4	
	9.0	NM	90 +/- 2.5	
	15	NM	84 +/- 15	
	25	NM	**69 +/- 38**	
	40	53.0	87 +/- 4.3	
	65	79.8	**64 +/- 10**	
	100	115	**0.46 +/- 1.0**	
B-3	Lab Control	5.61	88 +/- 4.3	**90.5 (84.4-95.9)**
	Salt Control	8.68	87 +/- 4.5	
	0 (Unspiked Sample)	3.67	86 +/- 8.8	
	9.0	NM	86 +/- 4.7	
	15	NM	82 +/- 3.3	
	25	NM	85 +/- 5.5	
	40	51.9	81 +/- 6.1	
	65	75.1	**72 +/- 12**	
	100	116	**6.8 +/- 3.3**	
C-2	Lab Control	5.61	88 +/- 4.3	**85.3 (71.7-94.9)**
	Salt Control	8.68	87 +/- 4.5	
	0 (Unspiked Sample)	3.41	89 +/- 1.7	
	9.0	NM	86 +/- 2.4	
	15	NM	87 +/- 4.3	
	25	NM	80 +/- 15	
	40	49.2	86 +/- 4.3	
	65	77.1	**58 +/- 3.2**	
	100	114	**9.8 +/- 2.6**	
Laboratory Polished Seawater (PSW)	0 (Lab Control)	NM	86 +/- 2.9	**12.2**
	1.8	NM	87 +/- 2.7	
	3.0	NM	90 +/- 2.9	
	5.0	8.79	82 +/- 7.0	
	8.4	12.6	**62 +/- 7.1**	
	14	13.0	**6.0 +/- 3.7**	
	23	24.0	**0.40 +/- 0.89**	
	39	NM	**0.00**	
Copper Reference Toxicant Test	0 (Lab Control)	NM	91 +/- 2.5	**8.17 (7.52-8.67)**
	2.5	NM	83 +/- 5.9	
	5.0	NM	83 +/- 3.4	
	10	NM	**21 +/- 7.9**	
	20	NM	**0.00**	
	40	NM	**0.00**	

[a] Nominal spiked concentrations do not include the background concentrations of copper in the field samples.

[b] Total measured copper includes spiked plus background concentrations of copper in each sample.

[c] Values presented for mean percent normal development in unspiked samples are results from the tests initiated on 21 July 2004 for 100% sample amended with artificial sea salts. All values are shown +/- 1 standard deviation.

[d] EC_{50} values were calculated using measured copper concentrations and were based on comparison to the salt control. Development in the unspiked sample was not included in the analysis. The 95% confidence intervals are displayed below each value in parentheses.

Values in **bold** indicate a significant decrease in normal development was observed in that test concentration relative to the control.

APPENDIX B
STATISTICAL ANALYSIS SUMMARIES
& RAW BENCH DATASHEETS

CETIS Test Summary

Report Date: 21 Oct-04 11:24 AM
Link: 19-4018-7366/0407-061a

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Test No:	10-3873-8927	**Test Type:**	Development	**Duration:**	46h
Start Date:	22 Jul-04 05:00 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
Ending Date:	24 Jul-04 03:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	22 Jul-04 05:00 PM	**Brine:**	Forty Fathoms		

Sample No:	13-3403-5050	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sample Date:	20 Jul-04 02:50 PM	**Code:**	0407-061a	**Project:**	
Receive Date:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Sample Age:	50h (19.3 °C)	**Station:**	WER (A-2)		

Comments: Date entered with measured copper values

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
02-9525-3472	Proportion Normal	< 39	39	N/A	37.05%	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
13-0300-2359	Proportion Normal	25	54.84115	21.30472	72.59219	Linear Regression
		50	83.39790	58.86151	121.90670	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
5.6	Lab Control	5	0.88600	0.85000	0.96000	0.02040	0.04561	5.15%
8.7	Salt Control	5	0.91600	0.89000	0.94000	0.00872	0.01949	2.13%
39		5	0.82567	0.70130	0.90000	0.03467	0.07752	9.39%
54.4		5	0.65910	0.00000	0.88000	0.16609	0.37140	56.35%
80.2		5	0.50913	0.01000	0.75000	0.13504	0.30197	59.31%
115		5	0.26621	0.20455	0.37000	0.03028	0.06772	25.44%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
5.6	Lab Control	0.86000	0.96000	0.85000	0.86000	0.90000
8.7	Salt Control	0.91000	0.94000	0.89000	0.93000	0.91000
39		0.70130	0.83000	0.88000	0.81707	0.90000
54.4		0.78000	0.00000	0.88000	0.86000	0.77551
80.2		0.75000	0.64000	0.01000	0.44565	0.70000
115		0.37000	0.28000	0.27000	0.20455	0.20652

CETIS Analysis Detail

Report Date: 21 Oct-04 11:24 AM
Analysis: 02-9525-3472/0407-061a

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	19-4018-7366	19-4018-7366	21 Oct-04 11:23 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		<39	39		N/A	37.05%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	26.38464	13.27671	0.00003	Unequal Variances
Distribution	Shapiro-Wilk W	0.75326	0.88746	0.00001	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.748323	0.4370809	4	5.35	0.00429	Significant Effect
Error	1.635272	0.0817636	20			
Total	3.38359559	0.5188445	24			

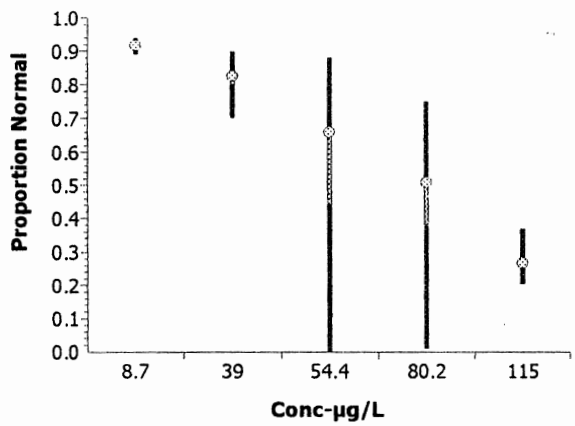
Group Comparisons

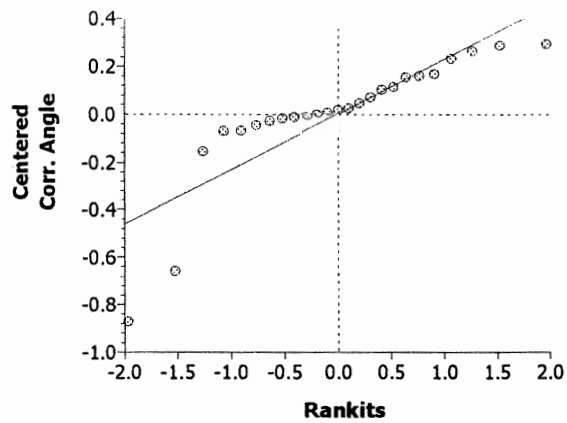
Sample	vs	Sample	Statistic	Critical	P Level	Ties	Decision(0.05)
8.7		39	16	17	<= 0.0500	1	Significant Effect
8.7		54.4	15	17	<= 0.0500	1	Significant Effect
8.7		80.2	15	17	<= 0.0500	1	Significant Effect
8.7		115	15	17	<= 0.0500	1	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
8.7	Salt Control	5	0.91600	0.89000	0.94000	0.01949	1.27826	1.23273	1.32333	0.03540
39		5	0.82567	0.70130	0.90000	0.07752	1.14667	0.99257	1.24905	0.09937
54.4		5	0.65910	0.00000	0.88000	0.37140	0.92283	0.05002	1.21705	0.49185
80.2		5	0.50913	0.01000	0.75000	0.30197	0.75935	0.10017	1.04720	0.38734
115		5	0.26621	0.20455	0.37000	0.06772	0.53979	0.46931	0.65389	0.07579

Graphics





CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	19-4018-7366	19-4018-7366	21 Oct-04 11:23 AM	CETISv1.025

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.084	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.08262	0.05947	-0.04234	0.20757	1.389	0.29926	Not Significant
Slope	3.70500	1.18787	1.20938	6.20062	3.119	0.08925	Not Significant
Intercept	-2.11788	2.23721	-6.81808	2.58232	-0.947	0.44373	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
4	-575.74210	-0.57163	0.26991	0.45371	432.03600	28.86930	0.00000	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	1.18042	3.05557	0.35899	Equal Variances
Distribution	Shapiro-Wilk W	0.75472	0.90456	0.00007	Non-normal Distribution

Point Estimates

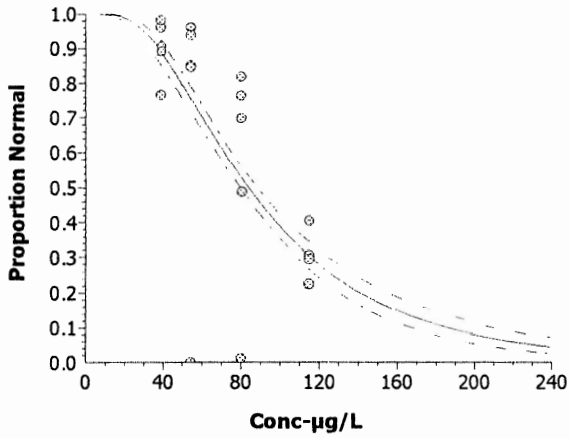
% Effect	Conc-µg/L	95% LCL	95% UCL
25	54.84115	21.30472	72.59219
50	83.39790	58.86151	121.90670

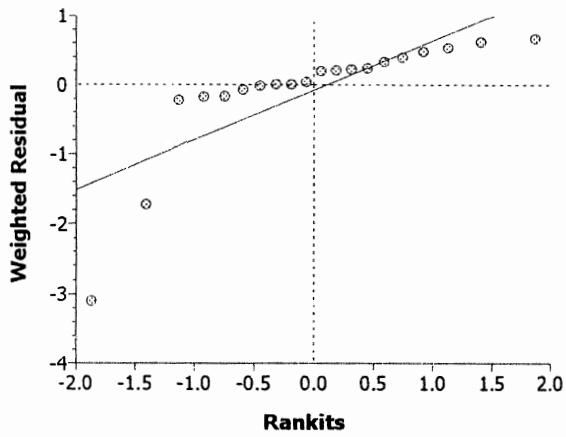
Data Summary

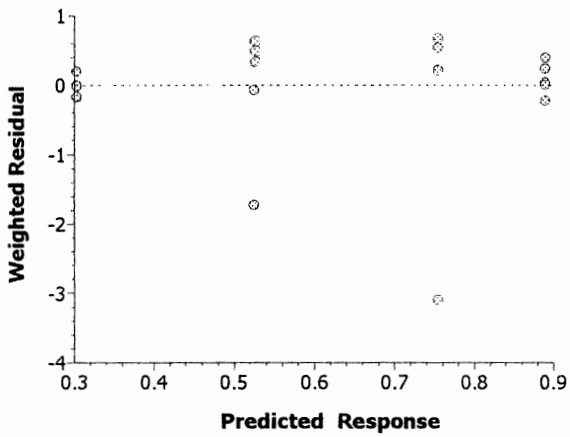
			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
8.7	Salt Control	5	0.91600	0.89000	0.94000	0.00398	0.01949	458	500
39		5	0.82567	0.70130	0.90000	0.01582	0.07752	382	459
54.4		5	0.65910	0.00000	0.88000	0.07581	0.37140	328	498
80.2		5	0.50913	0.01000	0.75000	0.06164	0.30197	251	492
115		5	0.26621	0.20455	0.37000	0.01382	0.06772	129	480

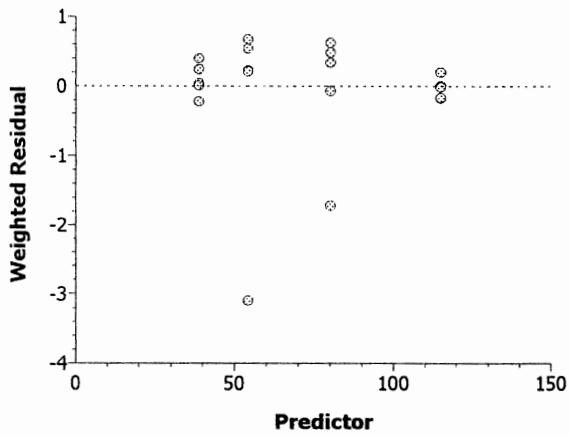
CETIS Analysis Detail

Graphics









CETIS Report

Report Date: 23 Aug-04 10:08 AM
Link: 15-6742-6728/0407-061

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Test:	10-3873-8927	Test Type:	Development	Duration:	46 Hours
Start Date:	22 Jul-04 05:00 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
End Date:	24 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	~~Carlsbad Aquafarms~~ field collected AH
Setup Date:	22 Jul-04 05:00 PM	Brine:	Forty Fathoms		

Sample:	01-4344-4927	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 02:50 PM	Code:	0407-061	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	50 Hours (19.3 °C)	Station:	WER (A-2)		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
20-4366-2275	Proportion Normal	9	15	11.61895	0.34469	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-% ug/L	95% LCL	95% UCL	Method
03-8386-7232	Proportion Normal	25	41.51814	11.22233	58.65912	Linear Regression
		50	71.43471	46.57259	115.29440	

Proportion Normal Summary

Conc-% ug/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.88600	0.85000	0.96000	0.02040	0.04561	5.15%
0	Salt Control	5	0.91600	0.89000	0.94000	0.00872	0.01949	2.13%
9		5	0.86449	0.78000	0.92000	0.02486	0.05559	6.43%
15		5	0.76821	0.42045	0.89000	0.08742	0.19549	25.45%
25		5	0.82567	0.70130	0.90000	0.03467	0.07752	9.39%
40		5	0.65910	0.00000	0.88000	0.16609	0.37140	56.35%
65		5	0.50913	0.01000	0.75000	0.13504	0.30197	59.31%
100		5	0.26621	0.20455	0.37000	0.03028	0.06772	25.44%

Proportion Normal Detail

Conc-% ug/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.86000	0.96000	0.85000	0.86000	0.90000
0	Salt Control	0.91000	0.94000	0.89000	0.93000	0.91000
9		0.84000	0.89873	0.92000	0.78000	0.88372
15		0.89000	0.84000	0.84000	0.42045	0.85057
25		0.70130	0.83000	0.88000	0.81707	0.90000
40		0.78000	0.00000	0.88000	0.86000	0.77551
65		0.75000	0.64000	0.01000	0.44565	0.70000
100		0.37000	0.28000	0.27000	0.20455	0.20652

CETIS Report

Report Date: 19 Aug-04 10:31 AM
Analysis: 20-4366-2275

Bivalve Larval Survival and Development Test A-2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	15-6742-6728	15-6742-6728	19 Aug-04 10:30 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		9	15	11.11	11.61895	34.47%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	32.42927	16.81190	0.00001	Unequal Variances
Distribution	Shapiro-Wilk W	0.77397	0.91004	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.105092	0.3508486	6	5.32	0.00090	Significant Effect
Error	1.845265	0.0659023	28			
Total	3.95035672	0.416751	34			

Group Comparisons

Control	vs	Conc-% (ug/L)	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		9	19	16	>0.05	1	Non-Significant Effect
		15	15.5	16	<=0.05	3	Significant Effect
		25	16	16	<=0.05	1	Significant Effect
		40	15	16	<=0.05	1	Significant Effect
		65	15	16	<=0.05	1	Significant Effect
		100	15	16	<=0.05	1	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-% (ug/L)	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.91600	0.89000	0.94000	0.01949	1.27826	1.23273	1.32333	0.03540
9		5	0.86449	0.78000	0.92000	0.05559	1.19913	1.08259	1.28404	0.07941
15		5	0.76821	0.42045	0.89000	0.19549	1.08614	0.70551	1.23273	0.21492
25		5	0.82567	0.70130	0.90000	0.07752	1.14667	0.99257	1.24905	0.09937
40		5	0.65910	0.00000	0.88000	0.37140	0.92283	0.05002	1.21705	0.49185
65		5	0.50913	0.01000	0.75000	0.30197	0.75935	0.10017	1.04720	0.38734
100		5	0.26621	0.20455	0.37000	0.06772	0.53979	0.46931	0.65389	0.07579

CETIS Report

Report Date: 19 Aug-04 10:31 AM
Analysis: 03-8386-7232

Bivalve Larval Survival and Development Test A-2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	15-6742-6728	15-6742-6728	19 Aug-04 10:30 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.084	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.12687	0.04767	0.02922	0.22453	2.661	0.05631	Not Significant
Slope	2.86199	0.97092	0.87316	4.85083	2.948	0.04206	Significant
Intercept	-0.30587	1.74111	-3.87238	3.26063	-0.176	0.86908	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
15	-751.40970	-0.10687	0.34941	0.48290	577.24700	41.33714	0.00000	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	1.57754	2.52766	0.19869	Equal Variances
Distribution	Shapiro-Wilk W	0.70112	0.92671	0.00000	Non-normal Distribution

Point Estimates

% Effect	Conc-% (mg/L)	95% LCL	95% UCL
25	41.51814	11.22233	58.65912
50	71.43471	46.57259	115.29440

Data Summary

Conc-% (mg/L)	Control Type	Count	Calculated Variate(A/B) Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.91600	0.89000	0.94000	0.00398	0.01949	458	500
9		5	0.86449	0.78000	0.92000	0.01135	0.05559	401	465
15		5	0.76821	0.42045	0.89000	0.03990	0.19549	368	475
25		5	0.82567	0.70130	0.90000	0.01582	0.07752	382	459
40		5	0.65910	0.00000	0.88000	0.07581	0.37140	328	498
65		5	0.50913	0.01000	0.75000	0.06164	0.30197	251	492
100		5	0.26621	0.20455	0.37000	0.01382	0.06772	129	480

CETIS Worksheet

Report Date: 19 Jul-04 2:33 PM
Link: 15-6742-6728/0407-061

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date: ~~21~~ 22 Jul-04	Species: Mytilis galloprovincialis	Sample Code: 0407-061	
End Date: ~~23~~ 24 Jul-04	Protocol: ASTM ~~(1993)~~ 1994 1999	Sample Source: City of Buenaventura	
Sampled: 20 Jul-04	Material: Estuarine Monitoring Sample	Sample Station: WER (A-2)	

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
			161	82	67	MC
			162	92	41	MC
			163	98	76	MC
			164	100	37	MC
			165	100	75	RG
			166	100	78	RG
			167	100	93	MC
			168	100	83	RG
			169	100	1	RG
			170	100	0	RG
			171	100	78	RG
			172	100	70	RG
			173	100	84	RG
			174	100	94	MC
			175	100	89	MC
			176	100	91	MC
			177	100	86	RG
			178	100	96	MC
			179	86	76	RG
			180	100	86	RG
			181	100	85	MC
			182	100	64	RG
			183	100	84	RG
			184	100	89	RG
			185	100	27	MC
			186	100	90	MC
			187	100	86	MC
			188	100	~~28~~ 84 ~~MC~~ RG	
			189	RG ~~100~~ 79	71	RG
			190	RG ~~79~~ 100	28	MC
			191	77	54	RG
			192	92	19	MC
			193	100	92	RG
			194	88	18	MC
			195	100	91	MC
			196	100	90	RG
			197	88	37	RG
			198	87	74	RG
			199	100	86	MC
			200	100	88	RG

Sites A-2 and B-1 will share LC - SC. data entry QC: AH

CETIS Worksheet

Report Date: 19 Jul-04 2:33 PM
Link: 15-6742-6728/0407-061

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Start Date: ~~22~~ AH 21 Jul-04	Species: Mytilis galloprovincialis	Sample Code: 0407-061	
End Date: ~~24~~ 23 Jul-04	Protocol: ASTM ~~(1993)~~ 1999	Sample Source: City of Buenaventura	
Sampled: 20 Jul-04	Material: Estuarine Monitoring Sample	Sample Station: WER (A-2)	

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
0	LC	1	199	100	86	
0	LC	2	178	100	96	
0	LC	3	181	100	85	
0	LC	4	187		86	
0	LC	5	186		90	
0	SC	1	195		91	
0	SC	2	174		94	
0	SC	3	175		89	
0	SC	4	167		93	
0	SC	5	176		91	
9		1	188			
9		2	189			
9		3	193			
9		4	171			
9		5	179			
15		1	184			
15		2	173			
15		3	183			
15		4	197			
15		5	198			
25		1	191	77	54	
25		2	168	100	83	
25		3	200	100	88	
25		4	161	82	67	
25		5	196	100	90	
40		1	166	100	78	
40		2	170	100	0	
40		3	180	100	88	
40		4	177	100	86	
40		5	163	98	76	
65		1	165	100	75	
65		2	182	100	64	
65		3	169	100	1	
65		4	162	92	41	
65		5	172	100	70	
100		1	164	100	37	
100		2	190	100	28	
100		3	185	100	27	
100		4	194	88	18	
100		5	192	92	19	

Sites A-2 and B-1 will share LC & SC

QC: SH

Analyst: SH Reviewed By: AH 8-12-

Bivalve Development Bioassay Worksheet

Client: City of Ventura
Test No.: 0407-061-065, 0407222mgrt
Test Species: M. galloprovincialis
Tech Initials: JR

Start Date/Time: 7/22/04 17:00
End Date/Time: 7/24/04 15:00
Date Received: 7/22/04

Sample Type: WER

Test Chamber Type and Sample Volume: 30ml Shell Vials ; 10ml

Spawn Initiation Time: 1145

	Male	Female
Number of Spawners:		

Spawn Condition: Fair to Poor

Fertilization Time: 1530

Egg Stock Density Calculation:

Eggs Counted (x):		
	7	11
	13	18
	10	13
	6	12
	5	12
Mean	8.2	13.2

Overall Mean: 10.7

Mean: 10.7 X 42 = 449.7 eggs/ml

Initial Stock - 449.7 eggs/ml / Inoculum Stock - 400 eggs/ml = Stock Dilution Factor 1.12

Percent Division Upon Inoculation: 30

Time of Inoculation: 1700

Comments:

Reviewed/ Date: AH 8-12-04

AMEC Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121
(858) 458-9044

Marine Chronic Bioassay **Water Quality Measurements** Raw Datasheet

Client: City of Ventura
Sample ID: WER A-2, B-1
Test No.: 0407-061, 062

Test Species: M. galloprovincialis
Start/End Dates: 7-22-04 / 7-26-04
Start/End Times: 1700 1500 AM

Concentration mg/L Cu	Temperature (°C)			Salinity (ppt)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	15.1	14.4	14.5	30.0	30.2	30.2	8.9	9.0	9.2	8.04	7.96	7.95
Salt Control	15.1	14.4	14.5	30.0	30.2	30.4	8.0	8.9	9.2	8.35	8.24	8.15
A-2 9 mg/L	15.3	14.2	14.5	30.0	~~30.1~~ 30.3 MC	30.5	9.0	8.0	8.7	8.88	8.70	8.59
A-2 15	15.4	14.2	14.4	30.2	30.6	30.7	9.1	8.0	8.7	8.89	8.70	8.60
A-2 25	15.4	14.2	14.3	30.3	30.6	30.7	9.1	8.0	8.7	8.90	8.71	8.60
A-2 40	15.4	14.1	14.3	30.2	30.5	30.7	9.2	8.0	8.7	8.90	8.71	8.60
A-2 65	15.3	14.0	14.3	30.2	30.5	30.6	9.3	8.1	8.6	8.90	8.71	8.59
A-2 100	15.5	14.0	14.2	30.1	30.4	30.6	9.4	8.0	8.5	8.90	8.71	8.59
B-1 9	15.4	14.7	14.5	30.0	30.1	30.2	9.2	8.3	9.0	8.23	8.29	8.32
B-1 15	15.2	14.4	14.4	30.1	30.1	30.5	9.2	8.4	9.1	8.23	8.28	8.32
B-1 25	15.4	14.4	14.4	30.1	30.3	30.5	9.3	8.4	9.1	8.23	8.29	8.32
B-1 40	15.4	14.4	14.4	30.0	30.2	30.5	9.3	8.5	9.1	8.24	8.29	8.32
B-1 65	15.4	14.1	14.3	30.0	30.2	30.5	9.3	8.6	9.1	8.24	8.29	8.32
B-1 100	15.4	14.0	14.2	29.9	30.1	30.4	9.3	8.7	9.1	8.23	8.29	8.32

Technician Initials:	0	24	48
	JR	MC	SH

Animal Source/Date Received: Mission Bay 7/22/04

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AH 8-12-04

Final Review: [signature] 8/18/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

CETIS Test Summary

Report Date: 21 Oct-04 11:14 AM
Link: 12-1341-7417/0407-062a

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Test No:	10-3873-8927	**Test Type:**	Development	**Duration:**	46h
Start Date:	22 Jul-04 05:00 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
Ending Date:	24 Jul-04 03:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	22 Jul-04 05:00 PM	**Brine:**	Forty Fathoms		

Sample No:	03-2295-1435	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sample Date:	20 Jul-04 01:40 PM	**Code:**	0407-062a	**Project:**	
Receive Date:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Sample Age:	51h (18.4 °C)	**Station:**	WER (B-1)		

Comments: Data entered with measured copper values

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
07-8260-1802	Proportion Normal	53	79.8	65.034	6.74%	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
07-3648-8776	Proportion Normal	25	79.01229	75.87711	81.57116	Linear Regression
		50	85.41254	82.74161	88.84130	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
5.6	Lab Control	5	0.88600	0.85000	0.96000	0.02040	0.04561	5.15%
8.7	Salt Control	5	0.91600	0.89000	0.94000	0.00872	0.01949	2.13%
53		5	0.86800	0.83000	0.94000	0.01934	0.04324	4.98%
79.8		5	0.64400	0.49000	0.76000	0.04589	0.10262	15.93%
115		5	0.00460	0.00000	0.02299	0.00460	0.01028	223.61

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
5.6	Lab Control	0.86000	0.96000	0.85000	0.86000	0.90000
8.7	Salt Control	0.91000	0.94000	0.89000	0.93000	0.91000
53		0.86000	0.87000	0.94000	0.83000	0.84000
79.8		0.62000	0.76000	0.71000	0.49000	0.64000
115		0.00000	0.02299	0.00000	0.00000	0.00000

CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	12-1341-7417	12-1341-7417	21 Oct-04 11:13 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		53	79.8	1.89	65.034	6.74%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	5.16940	11.34487	0.15981	Equal Variances
Distribution	Shapiro-Wilk W	0.91082	0.86826	0.06605	Normal Distribution

ANOVA Table

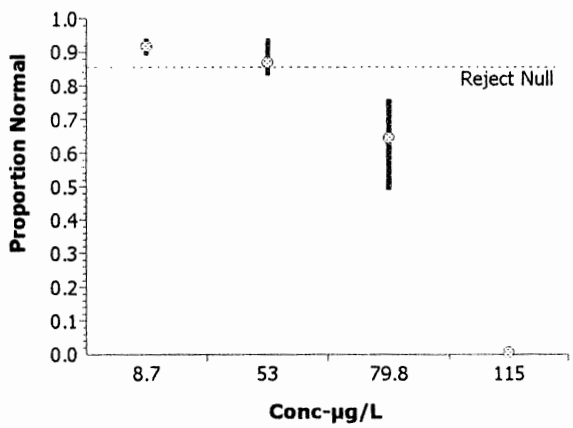
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	4.589399	1.5298	3	309.71	0.00000	Significant Effect
Error	0.079032	0.0049395	16			
Total	4.66843086	1.5347391	19			

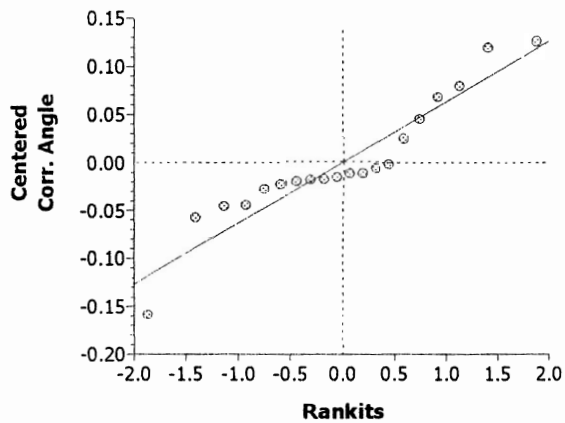
Group Comparisons

Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
8.7		53	1.68122	2.23	> 0.0500	0.09912	Non-Significant Effect
8.7		79.8	7.74391	2.23	<= 0.0500	0.09912	Significant Effect
8.7		115	27.1244	2.23	<= 0.0500	0.09912	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
8.7	Salt Control	5	0.91600	0.89000	0.94000	0.01949	1.27826	1.23273	1.32333	0.03540
53		5	0.86800	0.83000	0.94000	0.04324	1.20353	1.14581	1.32333	0.07055
79.8		5	0.64400	0.49000	0.76000	0.10262	0.93404	0.77540	1.05882	0.10744
115		5	0.00460	0.00000	0.02299	0.01028	0.07258	0.05002	0.15221	0.04455

Graphics





CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	12-1341-7417	12-1341-7417	21 Oct-04 11:13 AM	CETISv1.025

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.084	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.10799	0.01732	0.07057	0.14540	6.236	0.10123	Not Significant
Slope	19.93939	2.83307	13.81892	26.05987	7.038	0.08985	Not Significant
Intercept	-33.51337	5.42566	-45.23481	-21.79194	-6.177	0.10218	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
8	-327.26000	-1.68076	0.05015	0.09422	40.45851	22.36203	0.00035	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	1.76328	3.58743	0.21212	Equal Variances
Distribution	Shapiro-Wilk W	0.87625	0.88071	0.04274	Non-normal Distribution

Point Estimates

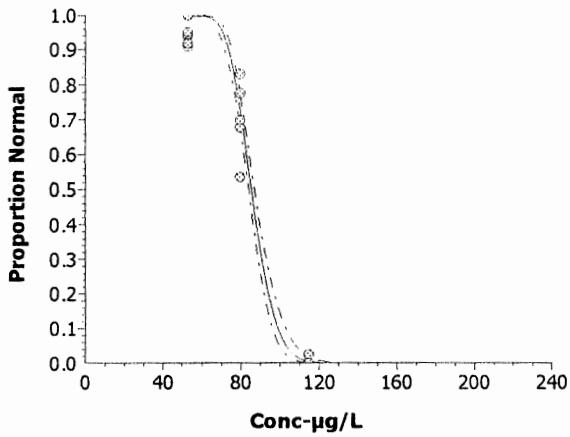
% Effect	Conc-µg/L	95% LCL	95% UCL
25	79.01229	75.87711	81.57116
50	85.41254	82.74161	88.84130

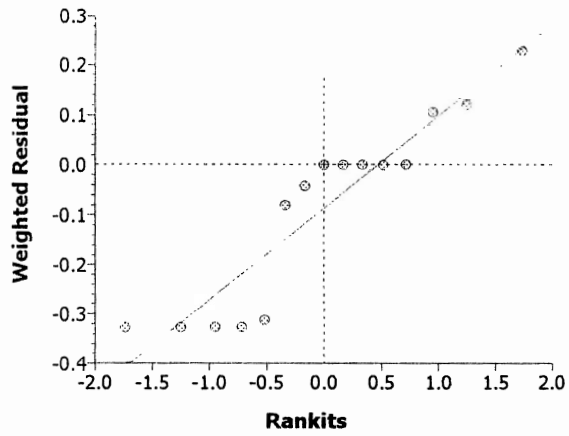
Data Summary

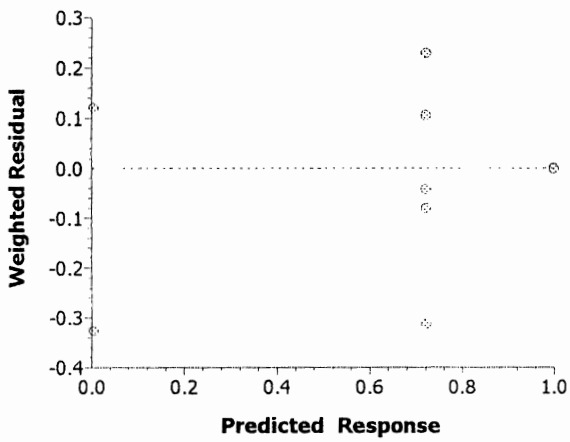
			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
8.7	Salt Control	5	0.91600	0.89000	0.94000	0.00398	0.01949	458	500
53		5	0.86800	0.83000	0.94000	0.00883	0.04324	434	500
79.8		5	0.64400	0.49000	0.76000	0.02095	0.10262	322	500
115		5	0.00460	0.00000	0.02299	0.00210	0.01028	2	449

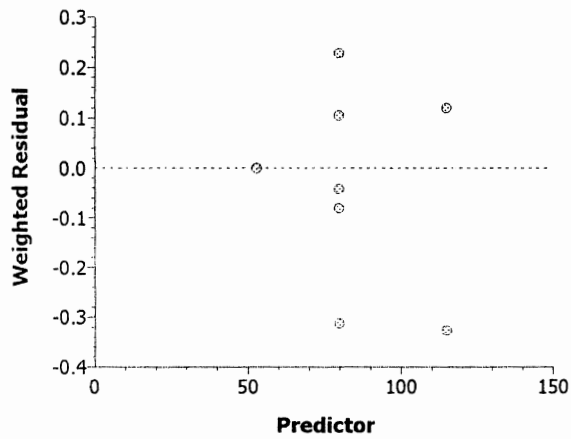
CETIS Analysis Detail

Graphics









CETIS Report

Report Date: 23 Aug-04 10:00 AM
Link: 06-2836-6117/0407-062

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Test:	10-3873-8927	Test Type:	Development	Duration:	46 Hours
Start Date:	22 Jul-04 05:00 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
End Date:	24 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	~~Carlsbad Aquafarms~~ Field collected
Setup Date:	22 Jul-04 05:00 PM	Brine:	Forty Fathoms		

Sample:	03-6446-9006	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 01:40 PM	Code:	0407-062	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	51 Hours (18.4 °C)	Station:	WER (B-1)		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
16-2969-9876	Proportion Normal	40	65	50.99020	0.25045	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-% (µg/L)	95% LCL	95% UCL	Method
05-8513-2623	Proportion Normal	50	59.72227	57.79022	61.71891	Trimmed Spearman-Karber

Proportion Normal Summary

Conc-% (µg/L)	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.88600	0.85000	0.96000	0.02040	0.04561	5.15%
0	Salt Control	5	0.91600	0.89000	0.94000	0.00872	0.01949	2.13%
9		5	0.89800	0.88000	0.94000	0.01114	0.02490	2.77%
15		5	0.84000	0.58000	0.94000	0.06595	0.14748	17.56%
25		5	0.69000	0.02000	0.88000	0.16772	0.37503	54.35%
40		5	0.86800	0.83000	0.94000	0.01934	0.04324	4.98%
65		5	0.64400	0.49000	0.76000	0.04589	0.10262	15.93%
100		5	0.00460	0.00000	0.02299	0.00460	0.01028	223.61

Proportion Normal Detail

Conc-% (µg/L)	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.86000	0.96000	0.85000	0.86000	0.90000
0	Salt Control	0.94000	0.91000	0.89000	0.93000	0.91000
9		0.89000	0.88000	0.94000	0.90000	0.88000
15		0.94000	0.58000	0.90000	0.91000	0.87000
25		0.87000	0.83000	0.88000	0.02000	0.85000
40		0.86000	0.87000	0.94000	0.83000	0.84000
65		0.62000	0.76000	0.71000	0.49000	0.64000
100		0.00000	0.02299	0.00000	0.00000	0.00000

CETIS Report

Report Date: 23 Aug-04 10:00 AM
Analysis: 16-2969-9876

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	06-2836-6117	06-2836-6117	23 Aug-04 9:59 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		40	65	2.50	50.99020	25.04%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	40.63643	16.81190	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.69970	0.91004	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.382684	0.897114	6	23.02	0.00000	Significant Effect
Error	1.091374	0.0389776	28			
Total	6.47405744	0.9360916	34			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		9	21	16	>0.05	4	Non-Significant Effect
		15	22.5	16	>0.05	2	Non-Significant Effect
		25	15	16	<=0.05	1	Significant Effect
		40	19.5	16	>0.05	2	Non-Significant Effect
		65	15	16	<=0.05	1	Significant Effect
		100	15	16	<=0.05	1	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.91600	0.89000	0.94000	0.01949	1.27826	1.23273	1.32333	0.03540
9		5	0.89800	0.88000	0.94000	0.02490	1.24784	1.21705	1.32333	0.04423
15		5	0.84000	0.58000	0.94000	0.14748	1.18123	0.86574	1.32333	0.18163
25		5	0.69000	0.02000	0.88000	0.37503	0.97596	0.14190	1.21705	0.46706
40		5	0.86800	0.83000	0.94000	0.04324	1.20353	1.14581	1.32333	0.07055
65		5	0.64400	0.49000	0.76000	0.10262	0.93404	0.77540	1.05882	0.10744
100		5	0.00460	0.00000	0.02299	0.01028	0.07258	0.05002	0.15221	0.04455

CETIS Report

Report Date: 23 Aug-04 10:00 AM
Analysis: 05-8513-2623

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Trimmed Spearman-Karber	06-2836-6117	06-2836-6117	23 Aug-04 10:00 AM	CETISv1.024

Spearman-Karber Options

Threshold Option	Lower Threshold	Trim Level	Mu	Sigma
Control Threshold	0.084	1.97%	1.776136	0.00714098

Point Estimates

EC50/LC50	95% LCL	95% UCL
59.72227	57.79022	61.71891

Data Summary

Conc-ppm	Control Type	Count	Calculated Variate(A/B) Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.91600	0.89000	0.94000	0.00398	0.01949	458	500
9		5	0.89800	0.88000	0.94000	0.00508	0.02490	449	500
15		5	0.84000	0.58000	0.94000	0.03010	0.14748	420	500
25		5	0.69000	0.02000	0.88000	0.07655	0.37503	345	500
40		5	0.86800	0.83000	0.94000	0.00883	0.04324	434	500
65		5	0.64400	0.49000	0.76000	0.02095	0.10262	322	500
100		5	0.00460	0.00000	0.02299	0.00210	0.01028	2	449

CETIS Worksheet

Report Date: 19 Jul-04 2:35 PM
Link: 06-2836-6117

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date: ~~21~~ 22 Jul-04	Species: Mytilis galloprovincialis	Sample Code: 0407-062	
End Date: ~~24~~ 23 Jul-04	Protocol: ASTM ~~(1993)~~ 1999.	Sample Source: City of Buenaventura	
Sampled: ~~20~~ 20 Jul-04	Material: Estuarine Monitoring Sample	Sample Station: WER (B-1)	

Conc-Rep	Code	Rep	Pos	# Counted	# Normal		Re-Count		Notes
			201	93	82	RS	100	89	SD
			202	111	92	RS	100	86	SD
			203	84	0	MC			
			204	104	94	RS	100	87	SD
			205	85	74	RS	100	87	
			206	87	2	MC			
			207	104	79	RS	100	83	SD
			208	108	66	RS	100	76	SD
			209	86	0	MC			
			210	102	93	RS	100	90	SD
			211	100	85	RS	100	85	↓
			212	115	96	RS	100	88	
			213	81	36	RS	100	58	ME
			214	116	54	RS	100	62	ME
			215	92	0	MC			
			216	102	42	RS	100	71	MC
			217	79	2	RS	100	2	ME
			218	103	86	RS	100	83	MC
			219	98	84	RS	100	94	ME
			220	86	42	RS	100	49	MC
			221	100	90	MC			
			222	100	88	ME			
			223	100	88	ME			
			224	100	94	ME			
			225	100	94	MC			
			226	100	91	MC			
			227	100	89	ME			
			228	100	0	MC			
			229	100	64	ME			
			230	100	87	ME			

Sites A-2 and B-1 will share LC + SC ; data entry QC ~~Eff~~

Analyst: RS, MC Reviewed By: AH 8-12-04

CETIS Worksheet

Report Date: 19 Jul-04 2:35 PM
Link: 06-2836-6117

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date: ~~21~~ 22 Jul-04	Species: Mytilis galloprovincialis	Sample Code: 0407-062	
End Date: ~~28~~ 29 Jul-04	Protocol: ASTM ~~(1993)~~ 1999	Sample Source: City of Buenaventura	
Sampled: 20 Jul-04	Material: Estuarine Monitoring Sample	Sample Station: WER (B-1)	

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
9		1	227			
9		2	223			
9		3	225			
9		4	221			
9		5	222			
15		1	224			
15		2	213			
15		3	210			
15		4	226			
15		5	230			
25		1	205			
25		2	207			
25		3	212			
25		4	217			
25		5	211			
40		1	202	100	86	
40		2	204	100	87	
40		3	219	100	94	
40		4	218	100	83	
40		5	201	100	84	
65		1	214	100	62	
65		2	208	100	76	
65		3	216	100	71	
65		4	220	100	49	
65		5	229	100	64	
100		1	209	86	0	
100		2	206	87	2	
100		3	228	100	0	
100		4	215	92	0	
100		5	203	84	0	

Sites A-2 and B-1 will share LC + SC

QC: SH

CETIS Test Summary

Report Date: 21 Oct-04 11:16 AM
Link: 04-3401-7925/0410-063a

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Test No:	10-3873-8927	**Test Type:**	Development	**Duration:**	46h
Start Date:	22 Jul-04 05:00 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
Ending Date:	24 Jul-04 03:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	22 Jul-04 05:00 PM	**Brine:**	Forty Fathoms		
Sample No:	11-4911-3396	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sample Date:	20 Jul-04 10:40 AM	**Code:**	0410-063a	**Project:**	
Receive Date:	21 Jul-04 07:45 AM	**Source:**	City of Buenaventura		
Sample Age:	54h (18.2 °C)	**Station:**	WER (B-3)		

Comments: Data entered with measured copper values.

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
13-1131-6345	Proportion Normal	51.9	75.1	62.431	10.90%	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
00-8347-8297	Proportion Normal	25	80.31321	72.77174	85.94550	Linear Regression
		50	90.52885	84.36038	95.86558	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
5.6	Lab Control	5	0.87800	0.82000	0.93000	0.01934	0.04324	4.93%
8.7	Salt Control	5	0.87000	0.83000	0.94000	0.02025	0.04528	5.20%
51.9		5	0.80800	0.73000	0.90000	0.02746	0.06140	7.60%
75.1		5	0.71800	0.53000	0.83000	0.05417	0.12112	16.87%
116		5	0.06800	0.03000	0.12000	0.01463	0.03271	48.10%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
5.6	Lab Control	0.82000	0.86000	0.93000	0.91000	0.87000
8.7	Salt Control	0.85000	0.94000	0.84000	0.83000	0.89000
51.9		0.79000	0.73000	0.80000	0.90000	0.82000
75.1		0.82000	0.83000	0.53000	0.71000	0.70000
116		0.06000	0.12000	0.07000	0.03000	0.06000

CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	04-3401-7925	04-3401-7925	21 Oct-04 11:16 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		51.9	75.1	1.93	62.431	10.90%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.48721	11.34487	0.47761	Equal Variances
Distribution	Shapiro-Wilk W	0.92823	0.86826	0.14265	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.845392	0.9484642	3	111.48	0.00000	Significant Effect
Error	0.1361236	0.0085077	16			
Total	2.98151608	0.9569719	19			

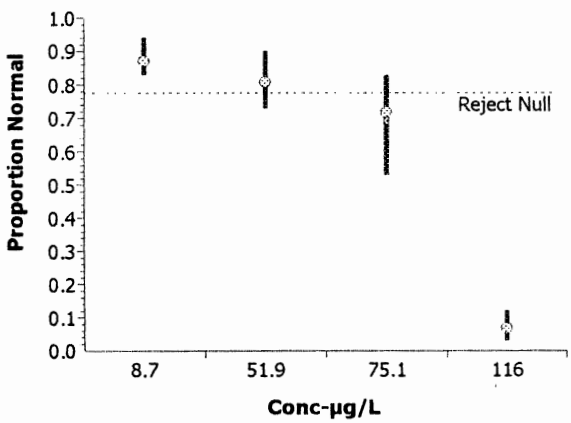
Group Comparisons

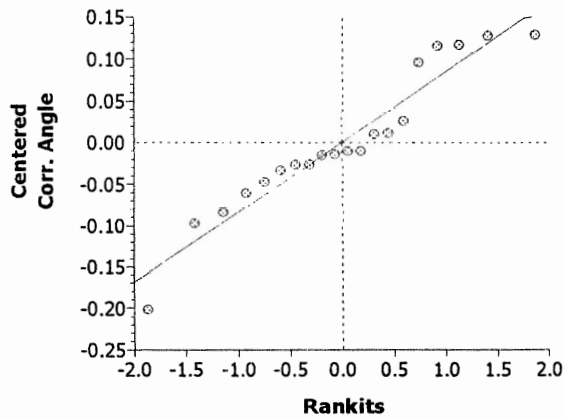
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
8.7		51.9	1.46134	2.23	> 0.0500	0.13009	Non-Significant Effect
8.7		75.1	3.24704	2.23	<= 0.0500	0.13009	Significant Effect
8.7		116	16.2634	2.23	<= 0.0500	0.13009	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
8.7	Salt Control	5	0.87000	0.83000	0.94000	0.04528	1.20685	1.14581	1.32333	0.07309
51.9		5	0.80800	0.73000	0.90000	0.06140	1.12160	1.02440	1.24905	0.08176
75.1		5	0.71800	0.53000	0.83000	0.12112	1.01743	0.81542	1.14581	0.13369
116		5	0.06800	0.03000	0.12000	0.03271	0.25810	0.17408	0.35374	0.06428

Graphics





CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	04-3401-7925	04-3401-7925	21 Oct-04 11:16 AM	CETISv1.025

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.13	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.16028	0.02389	0.10867	0.21189	6.709	0.09420	Not Significant
Slope	12.97095	1.56828	9.58288	16.35902	8.271	0.07660	Not Significant
Intercept	-20.38139	3.11643	-27.11403	-13.64875	-6.540	0.09659	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
5	-311.55800	-1.57131	0.07710	0.06823	53.92818	22.36203	0.00000	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	5.31557	3.58743	0.01652	Unequal Variances
Distribution	Shapiro-Wilk W	0.91077	0.88071	0.14244	Normal Distribution

Point Estimates

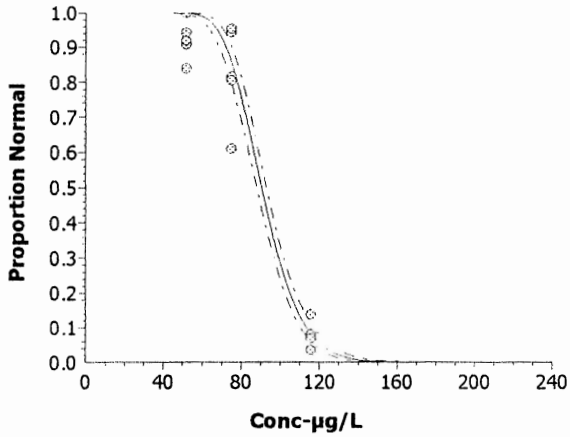
% Effect	Conc-µg/L	95% LCL	95% UCL
25	80.31321	72.77174	85.94550
50	90.52885	84.36038	95.86558

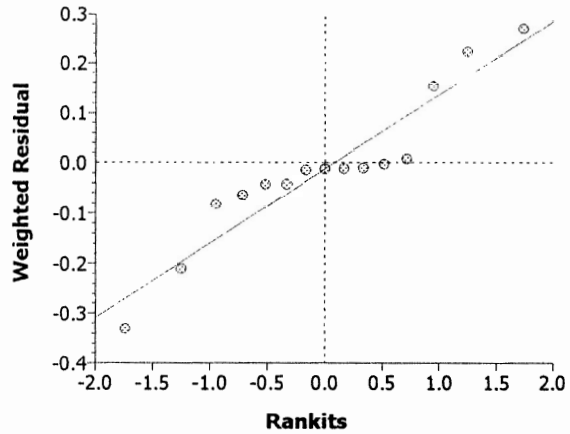
Data Summary

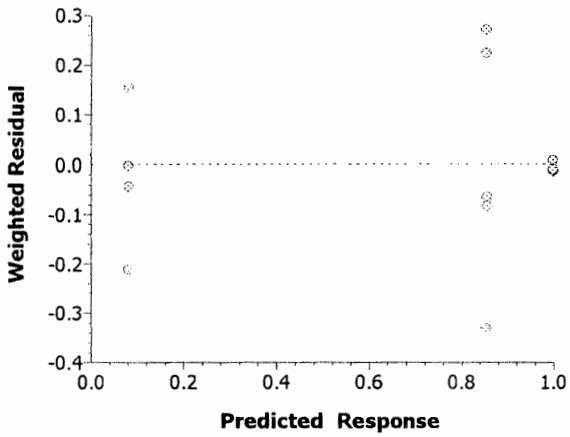
			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
8.7	Salt Control	5	0.87000	0.83000	0.94000	0.00924	0.04528	435	500
51.9		5	0.80800	0.73000	0.90000	0.01253	0.06140	404	500
75.1		5	0.71800	0.53000	0.83000	0.02472	0.12112	359	500
116		5	0.06800	0.03000	0.12000	0.00668	0.03271	34	500

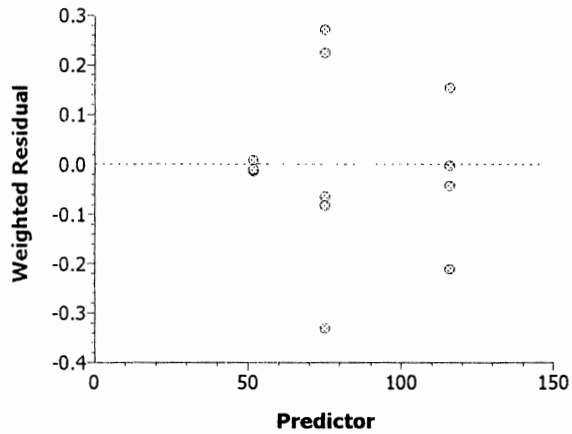
CETIS Analysis Detail

Graphics









CETIS Report

Report Date: 23 Aug-04 10:10 AM
Link: 20-4972-3352/0407-063

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Test:	10-3873-8927	Test Type:	Development	Duration:	46 Hours
Start Date:	22 Jul-04 05:00 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
End Date:	24 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	~~Carlsbad Aquafarms~~ AH Field Collected
Setup Date:	22 Jul-04 05:00 PM	Brine:	Forty Fathoms		

Sample:	06-3770-9493	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 10:40 AM	Code:	0407-063	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	54 Hours (18.2 °C)	Station:	WER (B-3)		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
08-0736-8131	Proportion Normal	40	65	50.99020	0.10798	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-% mg/l2	95% LCL	95% UCL	Method
07-5906-3447	Proportion Normal	25	69.39398	65.15742	72.86250	Linear Regression
		50	78.14755	74.60044	81.42194	

Proportion Normal Summary

Conc-% mg/l2	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.87800	0.82000	0.93000	0.01934	0.04324	4.93%
0	Salt Control	5	0.87000	0.83000	0.94000	0.02025	0.04528	5.20%
9		5	0.85847	0.80233	0.92000	0.02123	0.04747	5.53%
15		5	0.82200	0.78000	0.87000	0.01463	0.03271	3.98%
25		5	0.84933	0.78667	0.92000	0.02471	0.05525	6.50%
40		5	0.80800	0.73000	0.90000	0.02746	0.06140	7.60%
65		5	0.71800	0.53000	0.83000	0.05417	0.12112	16.87%
100		5	0.06800	0.03000	0.12000	0.01463	0.03271	48.10%

Proportion Normal Detail

Conc-% mg/l2	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.82000	0.86000	0.93000	0.91000	0.87000
0	Salt Control	0.85000	0.94000	0.84000	0.83000	0.89000
9		0.88000	0.80233	0.92000	0.82000	0.87000
15		0.83000	0.87000	0.82000	0.78000	0.81000
25		0.78667	0.84000	0.92000	0.81000	0.89000
40		0.79000	0.73000	0.80000	0.90000	0.82000
65		0.82000	0.83000	0.53000	0.71000	0.70000
100		0.06000	0.12000	0.07000	0.03000	0.06000

CETIS Report

Report Date: 19 Aug-04 10:47 AM
Analysis: 08-0736-8131

Bivalve Larval Survival and Development Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	20-4972-3352	20-4972-3352	19 Aug-04 10:47 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		40	65	2.50	50.99020	10.80%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	5.13173	16.81190	0.52703	Equal Variances
Distribution	Shapiro-Wilk W	0.95244	0.91004	0.17578	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	3.462545	0.5770908	6	85.64	0.00000	Significant Effect
Error	0.1886894	0.0067389	28			
Total	3.65123405	0.5838297	34			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		9	0.3409441	2.408571	>0.05	0.1250502	Non-Significant Effect
		15	1.35402	2.408571	>0.05	0.1250502	Non-Significant Effect
		25	0.5691272	2.408571	>0.05	0.1250502	Non-Significant Effect
		40	1.641965	2.408571	>0.05	0.1250502	Non-Significant Effect
		65	3.648373	2.408571	<=0.05	0.1250502	Significant Effect
		100	18.27362	2.408571	<=0.05	0.1250502	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.87000	0.83000	0.94000	0.04528	1.20685	1.14581	1.32333	0.07309
9		5	0.85847	0.80233	0.92000	0.04747	1.18915	1.11006	1.28404	0.06963
15		5	0.82200	0.78000	0.87000	0.03271	1.13655	1.08259	1.20193	0.04350
25		5	0.84933	0.78667	0.92000	0.05525	1.17730	1.09068	1.28404	0.08000
40		5	0.80800	0.73000	0.90000	0.06140	1.12160	1.02440	1.24905	0.08176
65		5	0.71800	0.53000	0.83000	0.12112	1.01743	0.81542	1.14581	0.13369
100		5	0.06800	0.03000	0.12000	0.03271	0.25810	0.17408	0.35374	0.06428

CETIS Report

Report Date: 19 Aug-04 10:47 AM
Analysis: 07-5906-3447

Bivalve Larval Survival and Development Test B-3 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	20-4972-3352	20-4972-3352	19 Aug-04 10:47 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.13	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.15763	0.01190	0.13325	0.18201	13.246	0.00019	Significant
Slope	13.07313	1.20701	10.60069	15.54558	10.831	0.00041	Significant
Intercept	-19.74633	2.32041	-24.49947	-14.99320	-8.510	0.00105	Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
7	-263.01960	-1.51045	0.07649	0.03577	73.41887	41.33714	0.00001	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	8.27480	2.52766	0.00008	Unequal Variances
Distribution	Shapiro-Wilk W	0.69983	0.92671	0.00000	Non-normal Distribution

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	69.39398	65.15742	72.86250
50	78.14755	74.60044	81.42194

Data Summary

Conc-µg/L	Control Type	Count	Calculated Variate(A/B) Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.87000	0.83000	0.94000	0.00924	0.04528	435	500
9		5	0.85847	0.80233	0.92000	0.00969	0.04747	418	486
15		5	0.82200	0.78000	0.87000	0.00668	0.03271	411	500
25		5	0.84933	0.78667	0.92000	0.01128	0.05525	405	475
40		5	0.80800	0.73000	0.90000	0.01253	0.06140	404	500
65		5	0.71800	0.53000	0.83000	0.02472	0.12112	359	500
100		5	0.06800	0.03000	0.12000	0.00668	0.03271	34	500

CETIS Worksheet

Report Date: 19 Jul-04 2:38 PM
Link: 20-4972-3352

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

AH

Start Date: ~~22~~ 21 Jul-04	Species: Mytilis galloprovincialis	Sample Code: 0407-063	
End Date: ~~24~~ 23 Jul-04	Protocol: ASTM ~~1993~~ 1994	Sample Source: City of Buenaventura	
Sampled: 20 Jul-04	Material: Estuarine Monitoring Sample	Sample Station: WER (B-3)	

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
			231	100	53	RG
			232	100	92	RG
			233	100	84	MC
			234	100	70	RG
			235	100	3	MC
			236	100	80	RG
			237	75	59	RG
			238	100	78	RG
			239	100	82	RG
			240	86	69	RG
			241	100	89	MC
			242	100	79	SH
			243	100	83	SH
			244	100	81	SH
			245	100	91	MC
			246	100	88	SH
			247	100	93	MC
			248	100	83	SH
			249	100	82	SH
			250	100	83	MC
			251	100	89	SH
			252	100	87	SH
			253	100	7	MC
			254	100	84	SH
			255	100	82	SH
			256	100	85	MC
			257	100	90	SH
			258	100	87	MC
			259	100	86	MC
			260	100	12	MC
			261	100	94	MC
			262	100	92	SH
			263	100	81	SH
			264	100	6	MC
			265	100	73	SD
			266	100	87	"
			267	100	71	"
			268	100	6	MC
			269	100	82	SD
			270	100	82	MC

Sites B-3 and C-2 will share LC + SC. data entry QC = AH

Analyst: RG, MC, SD, SH Reviewed By: AH 8-12-04

CETIS Worksheet

Report Date: 19 Jul-04 2:38 PM
Link: 20-4972-3352

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date: ~~22~~ AH 21 Jul-04	**Species:** Mytilis galloprovincialis	**Sample Code:** 0407-063
End Date: ~~24~~ 23 Jul-04	**Protocol:** ASTM ~~1993~~ 1994	**Sample Source:** City of Buenaventura
Sampled: 20 Jul-04	**Material:** Estuarine Monitoring Sample	**Sample Station:** WER (B-3)

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
0	LC	1	270	100	82	
0	LC	2	259		86	
0	LC	3	247		93	
0	LC	4	245		91	
0	LC	5	258		87	
0	SC	1	256		85	
0	SC	2	261		94	
0	SC	3	233		84	
0	SC	4	250		83	
0	SC	5	241		89	
9		1	246			
9		2	240			
9		3	232			
9		4	239			
9		5	266			
15		1	243			
15		2	252			
15		3	269			
15		4	238			
15		5	263			
25		1	237			
25		2	254			
25		3	262			
25		4	244			
25		5	251			
40		1	242	100	79	
40		2	265		73	
40		3	236		80	
40		4	257		90	
40		5	249		82	
65		1	255		82	
65		2	248		83	
65		3	231		53	
65		4	267		71	
65		5	234		70	
100		1	264		6	
100		2	260		12	
100		3	253		7	
100		4	235		3	
100		5	268		6	

Sites B-3 and C-2 will share LC + SC.

QC: SH

Analyst: SH Reviewed By: AH 8-12-04

Marine Chronic Bioassay

Water Quality Measurements

Raw Datasheet

Client: City of Buenaventura
Sample ID: WER B-3, C-2
Test No.: 0407-063, 064

Test Species: M. galloprovincialis
Start/End Dates: 7-22-04 / 7-27-04
Start/End Times: 1700 1500

Concentration ug/L Cu	Temperature (°C)			Salinity (ppt)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control 2	15.1	14.3	14.6	30.0	29.9	30.1	8.9	8.7	9.1	8.04	7.99	7.92
Salt Control 2	15.1	14.2	14.6	30.0	30.2	30.4	8.0	8.6	9.1	8.35	8.15	8.13
B-3 9	15.5	14.4	14.7	29.9	29.9	30.0	9.1	8.3	8.9	8.80	8.67	8.59
B-3 15	15.5	14.4	14.7	29.8	29.8	30.1	9.3	8.3	8.9	8.81	8.66	8.59
B-3 25	15.4	14.3	14.6	29.6	29.6	30.1	9.3	8.3	8.9	8.83	8.68	8.59
B-3 40	15.6	14.3	14.6	29.3	29.6	30.0	9.4	8.3	8.9	8.84	8.69	8.60
B-3 65	15.7	14.4	14.5	29.5	29.8	29.9	9.5	8.3	8.9	8.83	8.69	8.59
B-3 100	15.8	14.5	14.6	29.4	29.7	29.8	9.5	8.3	8.8	8.84	8.69	8.60
C-2 9	15.4	14.3	14.6	30.1	30.3	30.4	8.8	8.4	8.8	8.62	8.48	8.42
C-2 15	15.4	14.3	14.7	30.2	30.5	30.5	8.8	8.3	8.9	8.62	8.48	8.42
C-2 25	15.4	14.3	14.6	30.2	30.5	30.5	9.0	8.3	8.8	8.63	8.49	8.43
C-2 40	15.5	14.3	14.6	30.1	30.4	30.5	9.0	8.3	8.8	8.64	8.49	8.43
C-2 65	15.5	14.4	14.6	30.1	30.4	30.4	9.2	8.3	8.8	8.64	8.49	8.43
C-2 100	15.5	14.4	14.6	30.0	30.3	30.3	9.3	8.3	8.8	8.64	8.49	8.43

Technician Initials:	0	24	48
	JR	MC	SH

Animal Source/Date Received: Mission Bay 7/22/04

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AH 8-12-04

Final Review: [signature] 8/20/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

CETIS Test Summary

Report Date: 21 Oct-04 8:52 AM
Link: 05-9101-4703/0407-064a

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Test No:	10-3873-8927	**Test Type:**	Development	**Duration:**	46h
Start Date:	22 Jul-04 05:00 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
Ending Date:	24 Jul-04 03:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	22 Jul-04 05:00 PM	**Brine:**	Forty Fathoms		

Sample No:	09-5211-2850	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sample Date:	22 Jul-04 05:00 PM	**Code:**	0407-064a	**Project:**	
Receive Date:	24 Jul-04 03:00 PM	**Source:**	City of Buenaventura		
Sample Age:	N/A (18.5 °C)	**Station:**	WER (C-2)		

Comments: Data entered with measured values from CalScience

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
03-1582-5287	Proportion Normal	49.2	77.1	61.590	28.49%	Steel's Many-One Rank
14-3317-8484		49.2	77.1	61.590	27.82%	Steel's Many-One Rank

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
5.61	Lab Control	5	0.87800	0.82000	0.93000	0.01934	0.04324	4.93%
8.68	Salt Control	5	0.87000	0.83000	0.94000	0.02025	0.04528	5.20%
49.2		5	0.85600	0.80000	0.92000	0.01939	0.04336	5.07%
77.1		5	0.57600	0.01000	0.75000	0.14232	0.31825	55.25%
114		5	0.09800	0.07000	0.13000	0.01158	0.02588	26.41%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
5.61	Lab Control	0.82000	0.86000	0.93000	0.91000	0.87000
8.68	Salt Control	0.85000	0.94000	0.84000	0.83000	0.89000
49.2		0.92000	0.84000	0.86000	0.80000	0.86000
77.1		0.66000	0.01000	0.73000	0.73000	0.75000
114		0.09000	0.12000	0.13000	0.08000	0.07000

CETIS Test Summary

Report Date: 21 Oct-04 8:57 AM
Link: 05-9101-4703/0407-064a

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Test No:	10-3873-8927	**Test Type:**	Development	**Duration:**	46h
Start Date:	22 Jul-04 05:00 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
Ending Date:	24 Jul-04 03:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	22 Jul-04 05:00 PM	**Brine:**	Forty Fathoms		

Sample No:	09-5211-2850	**Material:**	Estuarine Monitoring Sample	**Client:**	City of Buenaventura
Sample Date:	22 Jul-04 05:00 PM	**Code:**	0407-064a	**Project:**	
Receive Date:	24 Jul-04 03:00 PM	**Source:**	City of Buenaventura		
Sample Age:	N/A (18.5 °C)	**Station:**	WER (C-2)		

Comments: Data entered with measured values from CalScience

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
11-7178-5784	Proportion Normal	25	72.52674	52.96722	82.15459	Linear Regression
		50	85.27448	71.72765	94.87134	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
5.61	Lab Control	5	0.87800	0.82000	0.93000	0.01934	0.04324	4.93%
8.68	Salt Control	5	0.87000	0.83000	0.94000	0.02025	0.04528	5.20%
49.2		5	0.85600	0.80000	0.92000	0.01939	0.04336	5.07%
77.1		5	0.57600	0.01000	0.75000	0.14232	0.31825	55.25%
114		5	0.09800	0.07000	0.13000	0.01158	0.02588	26.41%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
5.61	Lab Control	0.82000	0.86000	0.93000	0.91000	0.87000
8.68	Salt Control	0.85000	0.94000	0.84000	0.83000	0.89000
49.2		0.92000	0.84000	0.86000	0.80000	0.86000
77.1		0.66000	0.01000	0.73000	0.73000	0.75000
114		0.09000	0.12000	0.13000	0.08000	0.07000

CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	05-9101-4703	05-9101-4703	21 Oct-04 8:50 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		49.2	77.1	2.03	61.590	28.49%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	23.00484	11.34487	0.00004	Unequal Variances
Distribution	Shapiro-Wilk W	0.67903	0.86826	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.600446	0.8668153	3	19.40	0.00001	Significant Effect
Error	0.7148252	0.0446766	16			
Total	3.31527096	0.9114918	19			

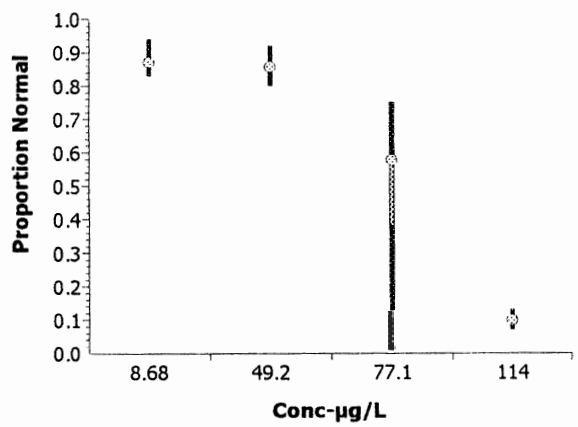
Group Comparisons

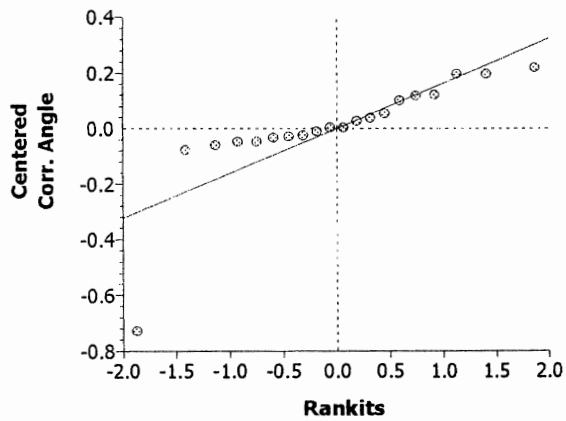
Sample	vs	Sample	Statistic	Critical	P Level	Ties	Decision(0.05)
8.68		49.2	26.5	17	> 0.0500	2	Non-Significant Effect
8.68		77.1	15	17	<= 0.0500	1	Significant Effect
8.68		114	15	17	<= 0.0500	0	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
8.68	Salt Control	5	0.87000	0.83000	0.94000	0.04528	1.20685	1.14581	1.32333	0.07309
49.2		5	0.85600	0.80000	0.92000	0.04336	1.18501	1.10715	1.28404	0.06431
77.1		5	0.57600	0.01000	0.75000	0.31825	0.82888	0.10017	1.04720	0.40908
114		5	0.09800	0.07000	0.13000	0.02588	0.31636	0.26776	0.36886	0.04338

Graphics





CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	05-9101-4703	05-9101-4703	21 Oct-04 8:56 AM	CETISv1.025

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.13	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.13205	0.04260	0.04001	0.22408	3.100	0.19868	Not Significant
Slope	9.59159	2.33131	4.55511	14.62808	4.114	0.15179	Not Significant
Intercept	-13.51963	4.57069	-23.39401	-3.64526	-2.958	0.20755	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
3	-267.15200	-1.40953	0.10426	0.27572	175.05550	22.36203	0.00000	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	1.01255	3.58743	0.42393	Equal Variances
Distribution	Shapiro-Wilk W	0.65821	0.88071	0.00001	Non-normal Distribution

Point Estimates

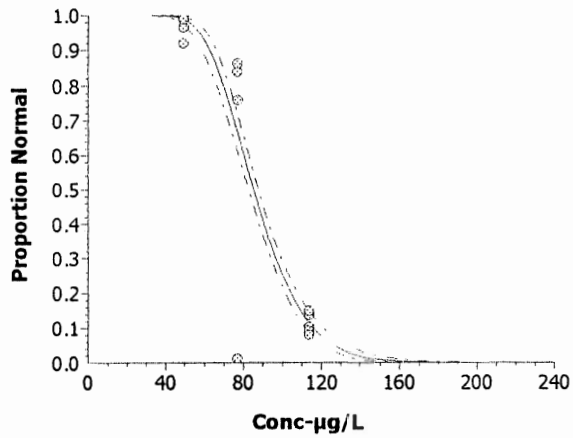
% Effect	Conc-µg/L	95% LCL	95% UCL
25	72.52674	52.96722	82.15459
50	85.27448	71.72765	94.87134

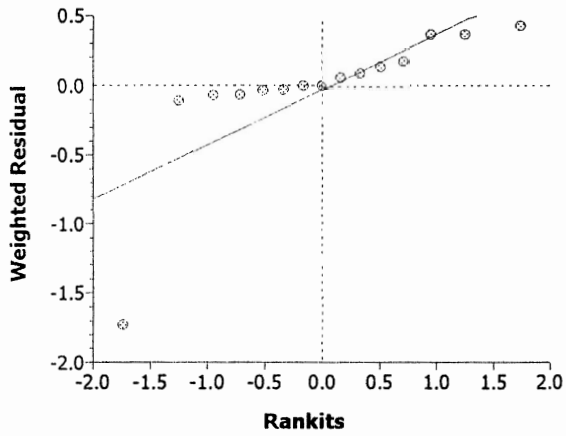
Data Summary

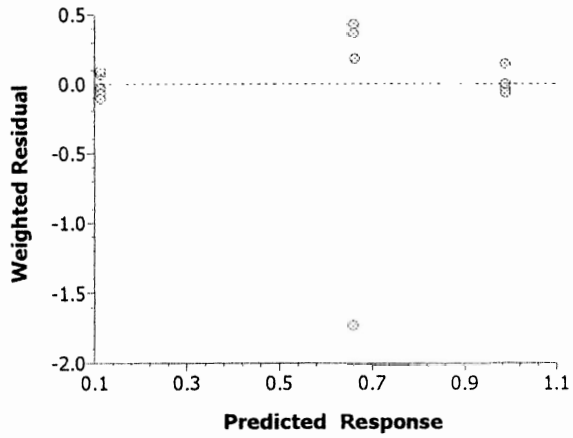
			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
8.68	Salt Control	5	0.87000	0.83000	0.94000	0.00924	0.04528	435	500
49.2		5	0.85600	0.80000	0.92000	0.00885	0.04336	428	500
77.1		5	0.57600	0.01000	0.75000	0.06496	0.31825	288	500
114		5	0.09800	0.07000	0.13000	0.00528	0.02588	49	500

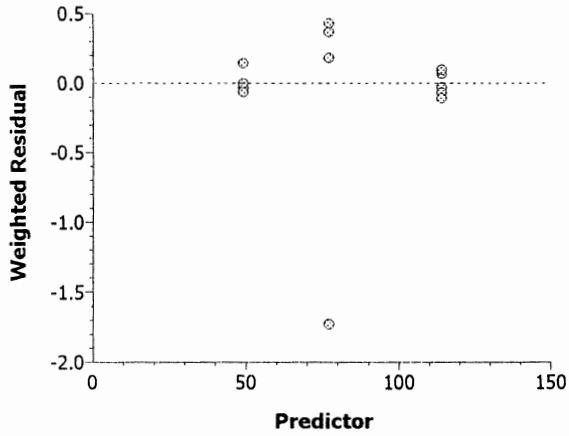
CETIS Analysis Detail

Graphics









CETIS Report

Report Date: 23 Aug-04 10:10 AM
Link: 03-3239-1095/0407-064

Bivalve Larval Survival and Development Test

AMEC Bioassay SD

Test:	10-3873-8927	Test Type:	Development	Duration:	46 Hours
Start Date:	22 Jul-04 05:00 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
End Date:	24 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	~~Carlsbad Aquafarms~~ Field collected AH
Setup Date:	22 Jul-04 05:00 PM	Brine:	Forty Fathoms		

Sample:	02-2229-8424	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sampled:	20 Jul-04 09:35 AM	Code:	0407-064	Project:	
Received:	21 Jul-04 07:45 AM	Source:	City of Buenaventura		
Hold Time:	55 Hours (18.5 °C)	Station:	WER (C-2)		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
13-8993-6609	Proportion Normal	40	65	50.99020	0.25353	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method
05-8197-3207	Proportion Normal	25	61.64165	50.12504	68.61827	Linear Regression
		50	73.31651	64.97266	80.20047	

Proportion Normal Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.87800	0.82000	0.93000	0.01934	0.04324	4.93%
0	Salt Control	5	0.87000	0.83000	0.94000	0.02025	0.04528	5.20%
9		5	0.85800	0.83000	0.89000	0.01068	0.02387	2.78%
15		5	0.86800	0.81000	0.92000	0.01934	0.04324	4.98%
25		5	0.80000	0.54000	0.90000	0.06656	0.14883	18.60%
40		5	0.85600	0.80000	0.92000	0.01939	0.04336	5.07%
65		5	0.57600	0.01000	0.75000	0.14232	0.31825	55.25%
100		5	0.09800	0.07000	0.13000	0.01158	0.02588	26.41%

Proportion Normal Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.91000	0.93000	0.87000	0.86000	0.82000
0	Salt Control	0.84000	0.89000	0.83000	0.85000	0.94000
9		0.83000	0.87000	0.89000	0.84000	0.86000
15		0.86000	0.90000	0.92000	0.81000	0.85000
25		0.85000	0.54000	0.89000	0.90000	0.82000
40		0.92000	0.84000	0.86000	0.80000	0.86000
65		0.66000	0.01000	0.73000	0.73000	0.75000
100		0.09000	0.12000	0.13000	0.08000	0.07000

CETIS Report

Bivalve Larval Survival and Development Test C-2 — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	03-3239-1095	03-3239-1095	19 Aug-04 10:58 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		40	65	2.50	50.99020	25.35%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	36.83924	16.81190	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.71981	0.91004	0.00000	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	3.319016	0.5531693	6	18.11	0.00000	Significant Effect
Error	0.8554191	0.0305507	28			
Total	4.17443484	0.5837199	34			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		9	26.5	16	>0.05	3	Non-Significant Effect
		15	28.5	16	>0.05	1	Non-Significant Effect
		25	25	16	>0.05	2	Non-Significant Effect
		40	26.5	16	>0.05	2	Non-Significant Effect
		65	15	16	<=0.05	1	Significant Effect
		100	15	16	<=0.05	0	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.87000	0.83000	0.94000	0.04528	1.20685	1.14581	1.32333	0.07309
9		5	0.85800	0.83000	0.89000	0.02387	1.18541	1.14581	1.23273	0.03452
15		5	0.86800	0.81000	0.92000	0.04324	1.20265	1.11977	1.28404	0.06472
25		5	0.80000	0.54000	0.90000	0.14883	1 12259	0.82544	1.24905	0.17253
40		5	0.85600	0.80000	0.92000	0.04336	1.18501	1.10715	1.28404	0.06431
65		5	0.57600	0.01000	0.75000	0.31825	0.82888	0.10017	1.04720	0.40908
100		5	0.09800	0.07000	0.13000	0.02588	0.31636	0.26776	0.36886	0.04338

CETIS Report

Report Date: 19 Aug-04 11:10 AM
Analysis: 05-8197-3207

Bivalve Larval Survival and Development Test C-2 — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	03-3239-1095	03-3239-1095	19 Aug-04 10:58 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.13	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.14834	0.02247	0 10232	0.19436	6.603	0.00273	Significant
Slope	8.95410	1.77531	5.31754	12.59065	5.044	0.00726	Significant
Intercept	-11.70120	3.36867	-18.60161	-4.80078	-3.474	0.02550	Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
7	-219.85520	-1.30680	0.11168	0.16494	265.48960	41.33714	0.00000	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	1.41847	2.52766	0.25024	Equal Variances
Distribution	Shapiro-Wilk W	0.50980	0.92671	0.00000	Non-normal Distribution

Point Estimates

% Effect	Conc-%	95% LCL	95% UCL
25	61.64165	50.12504	68.61827
50	73.31651	64.97266	80.20047

Data Summary

			Calculated Variate(A/B)						
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.87000	0.83000	0.94000	0.00924	0.04528	435	500
9		5	0.85800	0.83000	0.89000	0.00487	0.02387	429	500
15		5	0.86800	0.81000	0.92000	0.00883	0.04324	434	500
25		5	0.80000	0.54000	0.90000	0.03038	0.14883	400	500
40		5	0.85600	0.80000	0.92000	0.00885	0.04336	428	500
65		5	0.57600	0.01000	0.75000	0.06496	0.31825	288	500
100		5	0.09800	0.07000	0.13000	0.00528	0.02588	49	500

Approved By: [signature] 8/20

CETIS Worksheet

Report Date: 19 Jul-04 2:40 PM
Link: 03-3239-1095

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

AH

Start Date: ~~22~~ ~~21~~ Jul-04 | Species: Mytilis galloprovincialis | Sample Code: 0407-064
End Date: ~~24~~ ~~23~~ Jul-04 | Protocol: ASTM ~~(1993)~~ 1994 | Sample Source: City of Buenaventura
Sampled: 20 Jul-04 | Material: Estuarine Monitoring Sample | Sample Station: WER (C-2)

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
			271	100	75	SD
			272		82	
			273		66	
			274		73	
			275		80	
			276		86	
			277		83	
			278		1	
			279	100	7	MC
			280	100	73	SD
			281	100	86	SD
			282	100	92	SH
			283	100	13	MC
			284	100	89	SH
			285	100	85	SH
			286	100	9	MC
			287	100	84	SH
			288	100	81	SH
			289	100	87	SH
			290	100	92	SH
			291	100	90	SH
			292	100	12	MC
			293	100	8	MC
			294	100	86	SH
			295	100	84	SH
			296	100	89	SH
			297	100	85	SH
			298	100	86	SH
			299	100	90	SH
			300	100	54	SH

sites B-3 and C-2 will share MC and SC data entry QC AH

Analyst: SD, MC, SH Reviewed By: AH 8-12-04

CETIS Worksheet

Report Date: 19 Jul-04 2:39 PM
Link: 03-3239-1095

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Start Date: ~~22~~ 24 Jul-04	Species: Mytilis galloprovincialis	Sample Code: 0407-064	
End Date: ~~24~~ 23 Jul-04	Protocol: ASTM ~~1993~~ 1994	Sample Source: City of Buenaventura	
Sampled: 20 Jul-04	Material: Estuarine Monitoring Sample	Sample Station: WER (C-2)	

Conc-%	Code	Rep	Pos	# Counted	# Normal	Notes
9		1	277	100	83	
9		2	289		87	
9		3	296		89	
9		4	287		84	
9		5	281		86	
15		1	276		86	
15		2	291		90	
15		3	282		92	
15		4	288		81	
15		5	285		85	
25		1	297		85	
25		2	300		54	
25		3	284		89	
25		4	299		90	
25		5	272		82	
40		1	290		92	
40		2	295		84	
40		3	298		86	
40		4	275		80	
40		5	294		86	
65		1	273		96	
65		2	278		1	
65		3	280		73	
65		4	274		73	
65		5	271		75	
100		1	286		9	
100		2	292		12	
100		3	283		13	
100		4	293		8	
100		5	279		7	

Sites B3 and C-2 will share LC-SC

QC: SH

Analyst: SH Reviewed By: AH 8-12-04

APPENDIX C
REFERENCE TOXICANT DATA

POLISHED SEAWATER

CETIS Test Summary

Report Date: 21 Oct-04 11:58 AM
Link: 07-8602-7552/0407-065a

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Test No:	08-1535-5748	**Test Type:**	Development	**Duration:**	46h
Start Date:	22 Jul-04 05:00 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
Ending Date:	24 Jul-04 03:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	Field Collected
Setup Date:	22 Jul-04 05:00 PM	**Brine:**	Not Applicable		

Sample No:	07-3040-6887	**Material:**	Copper chloride	**Client:**	Internal
Sample Date:	22 Jul-04 05:00 PM	**Code:**	0407-065a	**Project:**	
Receive Date:	22 Jul-04 05:00 PM	**Source:**	Reference Toxicant		
Sample Age:	N/A	**Station:**	Polished Sea Water		

Comments: Data entered with measured copper values

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
14-7348-0399	Proportion Normal	8.8	12.6	10.530	9.59%	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
03-6063-3038	Proportion Normal	25	10.78552	N/A	N/A	Linear Regression
		50	12.20004	N/A	N/A	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
5.6	Lab Control	5	0.86200	0.83000	0.90000	0.01281	0.02864	3.32%
8.8		5	0.81600	0.73000	0.90000	0.03124	0.06986	8.56%
12.6		5	0.62400	0.55000	0.73000	0.03187	0.07127	11.42%
13		5	0.06000	0.00000	0.10000	0.01643	0.03674	61.24%
24		5	0.00400	0.00000	0.02000	0.00400	0.00894	223.61

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
5.6	Lab Control	0.84000	0.83000	0.88000	0.86000	0.90000
8.8		0.73000	0.90000	0.81000	0.87000	0.77000
12.6		0.55000	0.73000	0.65000	0.62000	0.57000
13		0.00000	0.07000	0.07000	0.10000	0.06000
24		0.00000	0.00000	0.00000	0.00000	0.02000

CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	07-8602-7552	07-8602-7552	21 Oct-04 11:57 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		8.8	12.6	11.36	10.530	9.59%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	4.92669	13.27671	0.29490	Equal Variances
Distribution	Shapiro-Wilk W	0.97023	0.88746	0.64928	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.46492	1.36623	4	239.14	0.00000	Significant Effect
Error	0.1142619	0.0057131	20			
Total	5.57918146	1.371943	24			

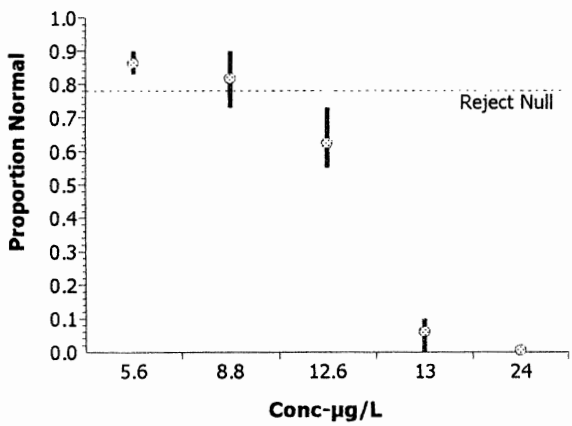
Group Comparisons

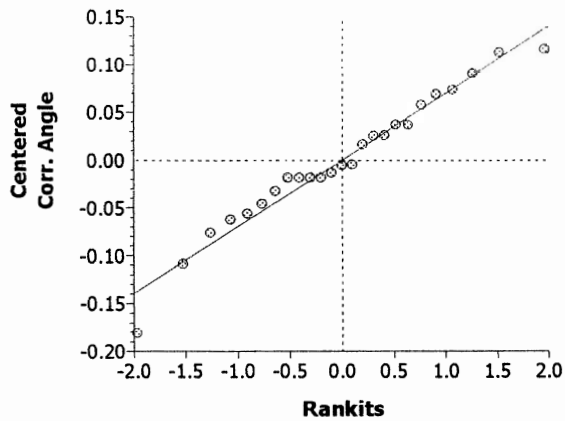
Sample	vs	Sample	Statistic	Critical	P Level	MSD	Decision(0.05)
5.6		8.8	1.22469	2.3	> 0.0500	0.10995	Non-Significant Effect
5.6		12.6	5.85160	2.3	<= 0.0500	0.10995	Significant Effect
5.6		13	20.0975	2.3	<= 0.0500	0.10995	Significant Effect
5.6		24	23.498	2.3	<= 0.0500	0.10995	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
5.6	Lab Control	5	0.86200	0.83000	0.90000	0.02864	1.19170	1.14581	1.24905	0.04215
8.8		5	0.81600	0.73000	0.90000	0.06986	1.13315	1.02440	1.24905	0.09230
12.6		5	0.62400	0.55000	0.73000	0.07127	0.91197	0.83548	1.02440	0.07476
13		5	0.06000	0.00000	0.10000	0.03674	0.23095	0.05002	0.32175	0.10484
24		5	0.00400	0.00000	0.02000	0.00894	0.06840	0.05002	0.14190	0.04109

Graphics





CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	07-8602-7552	07-8602-7552	21 Oct-04 11:58 AM	CETISv1.025

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.138	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.14130	0.09650	-0.06143	0.34404	1.464	0.28069	Not Significant
Slope	12.60246	11.13267	-10.78640	35.99133	1.132	0.37508	Not Significant
Intercept	-8.69083	12.27361	-34.47674	17.09508	-0.708	0.55229	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
6	-369.41260	-0.68961	0.07935	3.44435	747.13900	28.86930	0.00000	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	1.00338	3.05557	0.43638	Equal Variances
Distribution	Shapiro-Wilk W	0.73460	0.90456	0.00003	Non-normal Distribution

Point Estimates

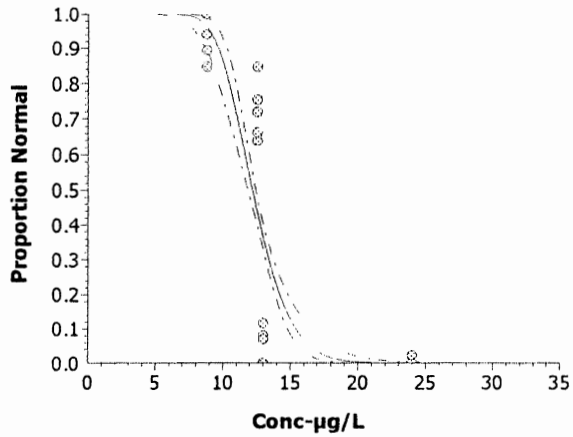
% Effect	Conc-µg/L	95% LCL	95% UCL
25	10.78552	N/A	N/A
50	12.20004	N/A	N/A

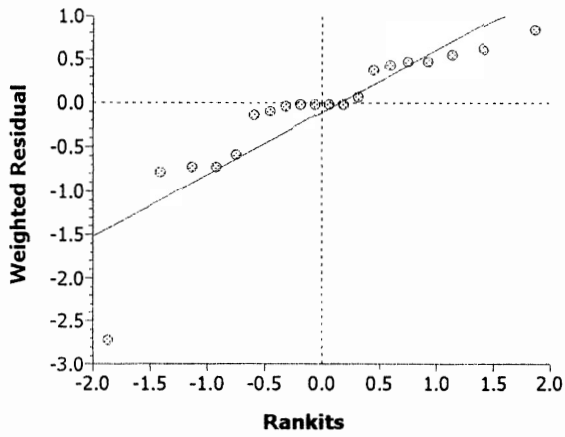
Data Summary

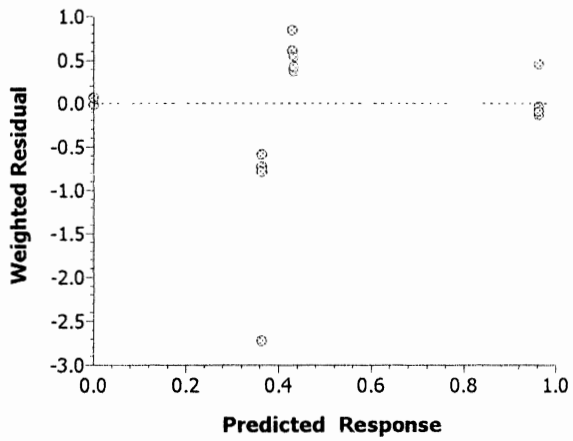
			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
5.6	Lab Control	5	0.86200	0.83000	0.90000	0.00585	0.02864	431	500
8.8		5	0.81600	0.73000	0.90000	0.01426	0.06986	408	500
12.6		5	0.62400	0.55000	0.73000	0.01455	0.07127	312	500
13		5	0.06000	0.00000	0.10000	0.00750	0.03674	30	500
24		5	0.00400	0.00000	0.02000	0.00183	0.00894	2	500

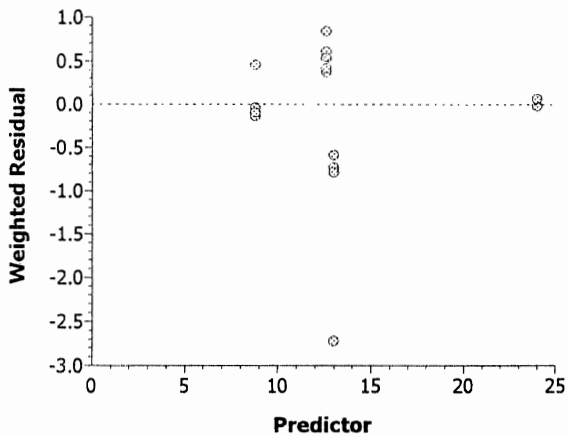
CETIS Analysis Detail

Graphics









CETIS Report

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Test:	08-1535-5748	**Test Type:**	Development	**Duration:**	46 Hours
Start Date:	22 Jul-04 05:00 PM	**Protocol:**	ASTM E724-98 (1999)	**Species:**	Mytilis galloprovincialis
End Date:	24 Jul-04 03:00 PM	**Dil Water:**	Laboratory Seawater	**Source:**	~~Carlsbad Aquafarms~~ AH Field Collected
Setup Date:	22 Jul-04 05:00 PM	**Brine:**	Not Applicable		

Sample:	09-6819-3015	**Material:**	Copper chloride	**Client:**	Internal
Sampled:	22 Jul-04 05:00 PM	**Code:**	0407-065	**Project:**	
Received:	22 Jul-04 05:00 PM	**Source:**	Reference Toxicant		
Hold Time:	N/A	**Station:**	Polished Sea Water		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
06-4207-8533	Proportion Normal	5	8.4	6.48074	0.09384	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
07-0289-3444	Proportion Normal	25	8.058964	7.29823	8.66549	Linear Regression
		50	9.676855	9.04547	10.26220	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.86200	0.83000	0.90000	0.01281	0.02864	3.32%
1.8		5	0.87200	0.83000	0.90000	0.01200	0.02683	3.08%
3		5	0.89800	0.86000	0.94000	0.01281	0.02864	3.19%
5		5	0.81600	0.73000	0.90000	0.03124	0.06986	8.56%
8.4		5	0.62400	0.55000	0.73000	0.03187	0.07127	11.42%
14		5	0.06000	0.00000	0.10000	0.01643	0.03674	61.24%
23		5	0.00400	0.00000	0.02000	0.00400	0.00894	223.61
39		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.84000	0.83000	0.88000	0.86000	0.90000
1.8		0.89000	0.83000	0.87000	0.87000	0.90000
3		0.89000	0.90000	0.90000	0.86000	0.94000
5		0.73000	0.90000	0.81000	0.87000	0.77000
8.4		0.55000	0.73000	0.65000	0.62000	0.57000
14		0.00000	0.07000	0.07000	0.10000	0.06000
23		0.00000	0.00000	0.00000	0.00000	0.02000
39		0.00000	0.00000	0.00000	0.00000	0.00000

CETIS Report

Report Date: 19 Aug-04 11:09 AM
Analysis: 06-4207-8533

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	03-9819-1062	03-9819-1062	19 Aug-04 11:04 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		5	8.4	20.00	6.48074	9.38%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	7.64002	18.47531	0.36540	Equal Variances
Distribution	Shapiro-Wilk W	0.97410	0.91882	0.57530	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	9.915489	1.416498	7	297.97	0.00000	Significant Effect
Error	0.1521212	0.0047538	32			
Total	10.0676104	1.4212522	39			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		1.8	-0.3346494	2.4425	>0.05	0.1065086	Non-Significant Effect
		3	-1.297812	2.4425	>0.05	0.1065086	Non-Significant Effect
		5	1.342582	2.4425	>0.05	0.1065086	Non-Significant Effect
		8.4	6.41491	2.4425	<=0.05	0.1065086	Significant Effect
		14	22.0322	2.4425	<=0.05	0.1065086	Significant Effect
		23	25.76003	2.4425	<=0.05	0.1065086	Significant Effect
		39	25.08728	2.4425	<=0.05	0.1065086	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.86200	0.83000	0.90000	0.02864	1.19170	1.14581	1.24905	0.04215
1.8		5	0.87200	0.83000	0.90000	0.02683	1.20629	1.14581	1.24905	0.03944
3		5	0.89800	0.86000	0.94000	0.02864	1.24829	1.18730	1.32333	0.04897
5		5	0 81600	0.73000	0.90000	0.06986	1.13315	1.02440	1.24905	0.09230
8 4		5	0.62400	0.55000	0.73000	0.07127	0.91197	0.83548	1.02440	0.07476
14		5	0.06000	0.00000	0.10000	0.03674	0.23095	0.05002	0.32175	0.10484
23		5	0.00400	0.00000	0.02000	0.00894	0.06840	0.05002	0.14190	0.04109
39		5	0.00000	0.00000	0.00000	0.00000	0.09773	0.05002	0.22551	0.07423

CETIS Report

Report Date: 19 Aug-04 11:09 AM
Analysis: 07-0289-3444

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	03-9819-1062	03-9819-1062	19 Aug-04 11:04 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.138	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.13470	0.01458	0.10503	0.16437	9.236	0.00025	Significant
Slope	8.48895	0.89983	6.65824	10.31966	9.434	0.00023	Significant
Intercept	-3.36785	0.92289	-5.24548	-1.49022	-3.649	0.01476	Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
11	-42.37252	-0.39673	0.11780	0.04651	114.15730	47.39989	0.00000	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	1.36381	2.37321	0.26044	Equal Variances
Distribution	Shapiro-Wilk W	0.59857	0.93382	0.00000	Non-normal Distribution

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	8.058964	7.29823	8.66549
50	9.676855	9.04547	10.26220

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.86200	0.83000	0.90000	0.00585	0.02864	431	500
1.8		5	0.87200	0.83000	0.90000	0.00548	0.02683	436	500
3		5	0.89800	0.86000	0.94000	0.00585	0.02864	449	500
5		5	0.81600	0.73000	0.90000	0.01426	0.06986	408	500
8.4		5	0.62400	0.55000	0.73000	0.01455	0.07127	312	500
14		5	0.06000	0.00000	0.10000	0.00750	0.03674	30	500
23		5	0.00400	0.00000	0.02000	0.00183	0.00894	2	500
39		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	289

CETIS Worksheet

Report Date: 19 Jul-04 11:50 AM
Link: 03-9819-1062/0407-065

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date: ~~21~~ 22 Jul-04	Species: Mytilis galloprovincialis	Sample Code: 0407-065	
End Date: ~~23~~ 24 Jul-04	Protocol: ASTM ~~1993~~ 1994	Sample Source: Reference Toxicant	
Sampled: ~~21~~ 22 Jul-04	Material: Copper chloride	Sample Station: Polished Sea Water	

Conc-µg/L	Code	Rep	Pos	# Counted	# Normal		Re-read # Counted	Re-read # Normal	Notes
			1	100	2	MC			
			2	106	0	MC			
			3	100	55				
			4	100	89				
			5	100	86				
			6	100	83				
			7	100	0				
			8		90				
			9		0				
			10		94		# Counted	# Normal	
			11	3	0	RS	5	0	90
			12	110	37	RS	100	73	
			13	131	23	RS	100	62	
			14	108	19	RS		77	
			15	101	89	RS	0	90	
			16	109	0	RS	100	7	
			17	108	0	RS		~~92~~ 10	
			18	100	~~94~~ 62 JR	RS		83	
			19	96	65	RS		84	
			20	102	46	RS		87	
			21	100	0	RG	~~92~~	0	
			22	100	90	RG	~~100~~	~~72~~	
			23	100	87	RG			
			24	99	82	RS	100	81	
			25	157	3	RS		57	
			26	116	0	RS		7	
			27	105	0	RS		65	
			28	171	0	RS	100	73	MC
			29	55	0	RS	69	0	
			30	111	35	RS	100	90	
			31	97	0	RS	100	6	
			32	86	0	RS	100	0	
			33	136	78	RS	100	86	
			34	104	37	RS	100	87	
			35	110	0	RS	100	0	
			36	104	57	RS	100	88	
			37	0	0	RS	25	0	
			38	130	63	RS	100	90	
			39	69	0	RS	90	0	
			40	103	74	RS	100	89	

data entry QC=AH

Analyst: MC, RS Reviewed By: AH 8-12-04

CETIS Worksheet

Report Date: 19 Jul-04 11:50 AM
Link: 03-9819-1062/0407-065

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

AH

Start Date: ~~21~~ 22 Jul-04 | Species: Mytilis galloprovincialis | Sample Code: 0407-065
End Date: ~~23~~ 24 Jul-04 | Protocol: ASTM (~~1993~~) 1994 | Sample Source: Reference Toxicant
Sampled: ~~21~~ 22 Jul-04 | Material: Copper chloride | Sample Station: Polished Sea Water

Conc-µg/L	Code	Rep	Pos	# Counted	# Normal	Notes
0	LC	1	19	100	84	
0	LC	2	18		83	
0	LC	3	36		88	
0	LC	4	33		86	
0	LC	5	38		90	
1.8		1	4			
1.8		2	6			
1.8		3	23			
1.8		4	34			
1.8		5	30			
3		1	40			
3		2	22			
3		3	15			
3		4	5			
3		5	10			
5		1	12	100	73	
5		2	8		90	
5		3	24		81	
5		4	20		87	
5		5	14		77	
8.4		1	3		55	
8.4		2	28		73	
8.4		3	27		65	
8.4		4	13		62	
8.4		5	25		57	
14		1	7		0	
14		2	26		7	
14		3	16		7	
14		4	17		10	
14		5	31		6	
23		1	32		0	
23		2	2		0	
23		3	21		0	
23		4	35		0	
23		5	1		2	
39		1	37			
39		2	39			
39		3	29			
39		4	9			
39		5	11			

QC: SH

Marine Chronic Bioassay

Water Quality Measurements

Raw Datasheet

Client: City of Ventura
Sample ID: Polished sea water
Test No.: 0407-065

Test Species: M. galloprovincialis
Start/End Dates: 7-22-04 / 7-23-04
Start/End Times: 1700 1520

Concentration of copper ug/L	Temperature (°C)			Salinity (ppt)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	JR 0	24	48	0	24	48	0	24	48
Lab Control	15.4	14.4	14.6	~~33.9~~ 30.1	30.0	29.9	9.1	8.7	9.0	7.87	7.91	7.91
1.8	15.3	14.4	14.7	~~34.5~~ 29.8	30.2	30.3	9.2	8.7	9.1	7.89	7.91	7.94
3	15.3	14.4	14.7	~~34.5~~ 30.0	30.2	30.3	9.2	8.7	9.1	7.88	7.91	7.93
5	15.3	14.5	14.7	~~34.5~~ 30.0	30.2	30.4	9.2	8.7	9.2	7.85	7.90	7.93
8.4	15.4	14.6	14.7	~~34.5~~ 30.0	30.2	30.4	9.2	8.6	9.3	7.87	7.91	7.93
14	15.5	14.6	14.7	~~34.5~~ 30.1	30.3	30.3	9.2	8.7	9.3	7.87	7.91	7.93
23	15.6	14.6	14.7	~~34.2~~ 30.1	30.2	30.3	9.2	8.7	9.3	7.86	7.91	7.93
39	15.6	14.7	14.7	~~34.2~~ 30.2	30.2	30.2	9.2	8.6	9.3	7.84	7.90	7.93

Technician Initials:	0	24	48
	JR	MC	SH

Animal Source/Date Received: Mission Bay 7/22/04

Comments:
0 hrs:
24 hrs:
48 hrs:

QC Check: AH 8-12-04

Final Review: 8/20/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

NATURAL SEAWATER

CETIS Report

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Test:	10-0748-9302	Test Type:	Development	Duration:	46 Hours
Start Date:	22 Jul-04 05:00 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
End Date:	24 Jul-04 03:00 PM	Dil Water:	Laboratory Seawater	Source:	Field Collected
Setup Date:	22 Jul-04 05:00 PM	Brine:	Not Applicable		

Sample:	06-7117-4213	Material:	Copper chloride	Client:	Internal
Sampled:	22 Jul-04 05:00 PM	Code:	040722mgrt	Project:	
Received:	22 Jul-04 05:00 PM	Source:	Reference Toxicant		
Hold Time:	N/A	Station:			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
14-6839-7916	Proportion Normal	2.5	5	3.53553	0.06057	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
12-5495-9475	Proportion Normal	25	6.746125	5.88542	7.36043	Linear Regression
		50	8.170764	7.52133	8.66711	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.90600	0.87000	0.93000	0.01122	0.02510	2.77%
2.5		5	0.83400	0.75000	0.89000	0.02619	0.05857	7.02%
5		5	0.82800	0.78000	0.86000	0.01530	0.03421	4.13%
10		5	0.21000	0.14000	0.31000	0.03536	0.07906	37.65%
20		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
40		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.92000	0.87000	0.89000	0.93000	0.92000
2.5		0.80000	0.89000	0.88000	0.85000	0.75000
5		0.78000	0.81000	0.86000	0.86000	0.83000
10		0.14000	0.17000	0.28000	0.15000	0.31000
20		0.00000	0.00000	0.00000	0.00000	0.00000
40		0.00000	0.00000	0.00000	0.00000	0.00000

CETIS Report

Report Date: 19 Aug-04 11:26 AM
Analysis: 14-6839-7916

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	10-6041-7464	10-6041-7464	19 Aug-04 11:25 AM	CETISv1.024

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		2.5	5	40.00	3.53553	6.06%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	32.12762	15.08628	0.00001	Unequal Variances
Distribution	Shapiro-Wilk W	0.98513	0.89981	0.94662	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	7.794126	1.558825	5	482.17	0.00000	Significant Effect
Error	0.07759104	0.003233	24			
Total	7.87171707	1.5620581	29			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		2.5	17.5	16	>0.05	2	Non-Significant Effect
		5	15	16	<=0.05	2	Significant Effect
		10	15	16	<=0.05	1	Significant Effect
		20	15	16	<=0.05	2	Significant Effect
		40	15	16	<=0.05	2	Significant Effect

Data Summary

			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.90600	0.87000	0.93000	0.02510	1.26116	1.20193	1.30303	0.04218
2 5		5	0.83400	0.75000	0.89000	0.05857	1.15545	1.04720	1.23273	0.07767
5		5	0.82800	0.78000	0.86000	0.03420	1.14455	1.08259	1.18730	0.04503
10		5	0.21000	0.14000	0.31000	0.07906	0.47086	0.38350	0.59050	0.09608
20		5	0.00000	0.00000	0.00000	0.00000	0.05074	0.05002	0.05363	0.00161
40		5	0.00000	0.00000	0.00000	0.00000	0.09593	0.07077	0.11204	0.01801

CETIS Report

Report Date: 19 Aug-04 11:26 AM
Analysis: 12-5495-9475

Bivalve Larval Survival and Development Test — AMEC Bioassay SD

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Regression	10-6041-7464	10-6041-7464	19 Aug-04 11:26 AM	CETISv1.024

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.
Log-Normal	Control Threshold	0.094	Yes	Yes	No	Yes

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)
Threshold	0.13143	0.01367	0.10316	0.15970	9.618	0.00239	Significant
Slope	8.10604	0.97868	6.08149	10.13060	8.283	0.00369	Significant
Intercept	-2.39484	0.96156	-4.38399	-0.40570	-2.491	0.08844	Not Significant

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)
8	-398.41990	-0.29544	0.12336	0.06238	39.20660	35.17247	0.03887	Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P Level	Decision(0.05)
Variances	Modified Levene	8.03815	2.74006	0.00032	Unequal Variances
Distribution	Shapiro-Wilk W	0.77519	0.91820	0.00004	Non-normal Distribution

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	6.746125	5.88542	7.36043
50	8.170764	7.52133	8.66711

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.90600	0.87000	0.93000	0.00512	0.02510	453	500
2.5		5	0.83400	0.75000	0.89000	0.01195	0.05857	417	500
5		5	0.82800	0.78000	0.86000	0.00698	0.03420	414	500
10		5	0.21000	0.14000	0.31000	0.01614	0.07906	105	500
20		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	487
40		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	150

CETIS Worksheet

Report Date: 22 Jul-04 11:07 AM
Link: 10-6041-7464/040722mgrt

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	22 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	040722mgrt
End Date:	24 Jul-04	**Protocol:**	ASTM ~~(1993)~~ 1999	**Sample Source:**	Reference Toxicant
Sampled:	22 Jul-04	**Material:**	Copper chloride	**Sample Station:**	

Conc-µg/L	Code	Rep	Pos	# Counted	# Normal	Counted	Norm	Notes
0	LC	1	14	~~106 176~~	~~27~~	100	~~87~~	
0	LC	2	4	~~73~~	~~0~~	100	87	
0	LC	3	17	~~103~~	~~0~~	100	89	
0	LC	4	12	~~95~~	~~74~~	100	93	
0	LC	5	21	~~107~~	~~85~~	100	92	
2.5		1	5	~~109~~	~~24~~	100	80	
2.5		2	11	~~75~~	~~0~~	100	89	
2.5		3	27	100	88			
2.5		4	18	100	85			
2.5		5	28	100	75			
5		1	29	100	78			
5		2	23	100	81			
5		3	30	100	86			
5		4	24	100	86			
5		5	25	100	83			
10		1	16	100	14			
10		2	3	100	17			
10		3	6	100	28			
10		4	1	100	15			
10		5	26	100	31			
20		1	7	100	0			
20		2	2	100	0			
20		3	19	87	0			
20		4	22	100	0			
20		5	20	100	0			
40		1	13	50	0			
40		2	15	20	0			
40		3	8	35	0			
40		4	9	25	0			
40		5	10	20	0			

Analyst: AH Reviewed By: AH 8-12-04

CETIS Worksheet

Report Date: 22 Jul-04 11:07 AM
Link: 10-6041-7464/040722mgrt

Bivalve Larval Survival and Development Test — **AMEC Bioassay SD**

Start Date:	22 Jul-04	**Species:**	Mytilis galloprovincialis	**Sample Code:**	040722mgrt
End Date:	24 Jul-04	**Protocol:**	ASTM ~~(1993)~~ 1999	**Sample Source:**	Reference Toxicant
Sampled:	22 Jul-04	**Material:**	Copper chloride	**Sample Station:**	

Conc-µg/L	Code	Rep	Pos	# Counted	# Normal		Re-read		Notes
			1	176	27	RS	100	15	MC
			2	73	0	RS	100	0	
			3	103	0	RS	100	17	
			4	95	74	RS	100	87	
			5	107	85	RS	100	80	
			6	109	27	RS	100	28	RG
			7	75	0	RS	100	0	
			8	56	0	RS	35	0	
			9	47	0	RS	25	0	
			10	28	0	RS	20	0	
			11	76	71	RS	100	89	
			12	120	109	RS	100	93	
			13	39	0	RS	50	0	
			14	96	83	RS	100	92	
			15	17	0	RS	20	0	
			16	105	21	RS	100	14	
			17	100	89	MC			
			18	100	85				
			19	87	0				
			20	100	0				
			21	100	92				
			22	100	0				
			23	100	81				
			24	100	86				
			25	100	83				
			26	100	31				
			27	100	88				
			28	100 MC	75				
			29	100	78				
			30	100	86				

data entry QC = AH

Analyst: RS, MC Reviewed By: AH 8-12

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date:	07/22/2004	Test ID:	040722mgrt	Sample ID:	REF-Ref Toxicant
End Date:	07/24/2004	Lab ID:	AEESD-AMEC Bioassay SD	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	ASTM 1999	Test Species:	MG-Mytilis galloprovincialis
Comments:					

Conc-ug/L	1	2	3	4	5
L-Lab Control	0.9200	0.8700	0.8900	0.9300	0.9200
2.5	0.8000	0.8900	0.8800	0.8500	0.7500
5	0.7800	0.8100	0.8600	0.8600	0.8300
10	0.1400	0.1700	0.2800	0.1500	0.3100
20	0.0000	0.0000	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
L-Lab Control	0.9060	1.0000	1.2612	1.2019	1.3030	3.344	5			47	500
2.5	0.8340	0.9205	1.1554	1.0472	1.2327	6.722	5	17.50	16.00	83	500
*5	0.8280	0.9139	1.1446	1.0826	1.1873	3.934	5	15.00	16.00	86	500
*10	0.2100	0.2318	0.4709	0.3835	0.5905	20.406	5	15.00	16.00	395	500
*20	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5	15.00	16.00	500	500
*40	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5	15.00	16.00	500	500

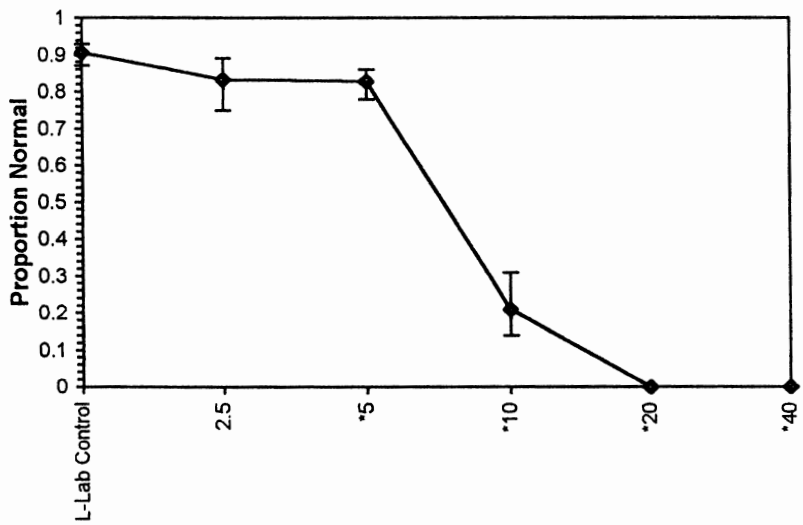
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96477	0.9	0.08223	0.2438
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	2.5	5	3.53553	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.11221	0.74941	6.64337	9.58105	0.094	5.66228	7.81472	0.13	0.91231	0.12327	8
Intercept	-2.4008	0.73648	-3.8443	-0.9573							
TSCR	0.13147	0.01046	0.11096	0.15197							

Point	Probits	ug/L	95% Fiducial Limits	
EC01	2.674	4.22217	3.49122	4.82353
EC05	3.355	5.12323	4.41583	5.68908
EC10	3.718	5.67974	5.00333	6.21442
EC15	3.964	6.08898	5.44205	6.59747
EC20	4.158	6.43516	5.81692	6.91998
EC25	4.326	6.74779	6.15791	7.2105
EC40	4.747	7.6046	7.09993	8.00745
EC50	5.000	8.17159	7.72351	8.54105
EC60	5.253	8.78086	8.38477	9.12877
EC75	5.674	9.89582	9.53554	10.278
EC80	5.842	10.3766	9.99942	10.8113
EC85	6.036	10.9665	10.5444	11.4945
EC90	6.282	11.7567	11.2434	12.4478
EC95	6.645	13.0338	12.3266	14.0525
EC99	7.326	15.8153	14.5823	17.7207



Reviewed by: AH 10/18/10

Bivalve Development Bioassay Worksheet

Client: City of Ventura
Test No.: 0407-061 > 065, 040722mgrt
Test Species: M. galloprovincialis
Tech Initials: JR

Start Date/Time: 7/22/04 17:00
End Date/Time: 7/24/04 15:00
Date Received: 7/22/04

Sample Type: WER

Test Chamber Type and Sample Volume: 30ml Shell Vials ; 10ml

Spawn Initiation Time: 1145

	Male	Female
Number of Spawners:		

Spawn Condition: Fair to Poor

Fertilization Time: 1530

Egg Stock Density Calculation:

Eggs Counted (x):		
	7	11
	13	18
	10	13
	6	12
	5	12
Mean	8.2	13.2

Overall Mean: 10.7

Mean: 10.7 X 42 = 449.7 eggs/ml

Initial Stock - 449.7 eggs/ml / Inoculum Stock - 400 eggs/ml = Stock Dilution Factor 1.12

Percent Division Upon Inoculation: 30

Time of Inoculation: 1700

Comments:

Reviewed/ Date: 7/20/04

AMEC Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121
(858) 458-9044

Marine Chronic Bioassay **Water Quality Measurements** Raw Datasheet

Client: Internal
Sample ID: CuCl2
Test No.: 040722mgrt

Test Species: M. galloprovincialis
Start/End Dates: 7.22.04 7.26.04
Start/End Times: 1700 1500

Concentration ug/L	Temperature (°C)			Salinity (ppt)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
LC	(A)	14.6	14.8	(A)	34.5	34.3	(A)	8.8	9.1	(A)	7.93	SH 7.98
2.5	↓	14.4	15.0	34.4 ~~33.9~~ mc		34.3	↓	8.8	9.2	↓	7.97	7.96
5		14.3	14.7		34.5	34.5		8.8	9.3		7.97	7.97
10		14.4	14.6		34.5	34.5		8.8	9.3		7.97	7.97
20		14.4	14.7		34.4	34.6		8.9	9.3		7.97	7.97
40		14.4	14.6	↓	34.5	34.6	↓	8.9	9.3	↓	7.97	7.97

Technician Initials:	0	24	48
	(A)	ue	SH

Animal Source/Date Received: Mission Bay 7.22.04

Comments:
0 hrs: (A) rdgs not taken
24 hrs:
48 hrs:

QC Check: AH 8-12-04 Final Review: [illegible] 8/20/04

AMEC Earth and Environmental
Bioassay Laboratory
5550 Morehouse Dr., Suite B
San Diego, CA 92121

APPENDIX D
ANALYTICAL CHEMISTRY DATA

Calscience
Environmental
Laboratories, Inc.

September 22, 2004 **Revised Report**

Chris Stransky
Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Subject: **Calscience Work Order No.:** **04-09-0244**
Client Reference: **Buenaventura July 04 WER**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 09/03/04 and analyzed in accordance with the attached chain-of-custody. This report has been revised in order to replace data for sample Polished SW-14. The original concentration reported for this sample was determined to be incorrect, and has been replaced.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The original report of any subcontracted analysis is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Calscience Environmental
Laboratories, Inc.
Robert Stearns
Project Manager

Calscience Environmental Laboratories, Inc.

Analytical Report

Nautilus Environmental		Date Received:	09/03/04
5550 Morehouse Drive, Suite 150		Work Order No:	04-09-0244
San Diego, CA 92121		Preparation:	EPA 3010A Total
		Method:	EPA 6010B

Project: Buenaventura July 04 WER

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2-25	04-09-0244-1	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	39.0	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2-40	04-09-0244-2	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	54.4	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2-65	04-09-0244-3	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	80.2	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2-100	04-09-0244-4	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	116	5	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-2-LC	04-09-0244-5	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	5.61	5.00	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1-SC	04-09-0244-6	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	8.68	5.00	1		ug/L

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Date Received: 09/03/04
Work Order No: 04-09-0244
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: Buenaventura July 04 WER

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1-0(unspiked)	04-09-0244-7	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	6.15	5.00	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1-40	04-09-0244-8	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	53.0	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1-65	04-09-0244-9	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	79.8	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1-100	04-09-0244-10	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	115	5	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-3-40	04-09-0244-11	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	51.9	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-3-65	04-09-0244-12	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	75.1	5.0	1		ug/L

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Date Received: 09/03/04
Work Order No: 04-09-0244
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: Buenaventura July 04 WER

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-3-100	04-09-0244-13	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	116	5	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-C-2-40	04-09-0244-14	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	49.2	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-C-2-65	04-09-0244-15	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	77.1	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-C-2-100	04-09-0244-16	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	114	5	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
Polished SW-5.0	04-09-0244-17	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	8.79	5.00	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
Polished SW-8.4	04-09-0244-18	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	12.6	5.0	1		ug/L

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Analytical Report

Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Date Received: 09/03/04
Work Order No: 04-09-0244
Preparation: EPA 3010A Total
Method: EPA 6010B

Project: Buenaventura July 04 WER

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
Polished SW-14	04-09-0244-19	09/02/04	Aqueous	09/03/04	09/21/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	13.0	10.0	2		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
Polished SW-23	04-09-0244-20	09/02/04	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	24.0	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
Method Blank	097-01-003-4,143	N/A	Aqueous	09/03/04	09/07/04	040903L11

Parameter	Result	RL	DF	Qual	Units
Copper	ND	5.00	1		ug/L

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Date Received: 09/03/04
Work Order No: 04-09-0244
Preparation: EPA 3010A Total
Method: EPA 6010B

Project Buenaventura July 04 WER

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
Polished SW-23	Aqueous	ICP 3300	09/03/04	09/07/04	040903P11

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Copper	112	112	80-120	0	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

Nautilus Environmental	Date Received: N/A
5550 Morehouse Drive, Suite 150	Work Order No: 04-09-0244
San Diego, CA 92121	Preparation: EPA 3010A Total
	Method: EPA 6010B

Project: Buenaventura July 04 WER

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
097-01-003-4,143	Aqueous	ICP 3300	09/03/04	09/07/04	040903L11

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Copper	100	99	80-120	0	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 04-09-0244

Qualifier	Definition
*	See applicable analysis comment.
1	Surrogate compound recovery was out of control due to a required sample dilution, therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike or Matrix Spike Duplicate compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported with no further corrective action required.
A	Result is the average of all dilutions, as defined by the method.
B	Analyte was present in the associated method blank.
C	Analyte presence was not confirmed on primary column.
D	The analyte concentration was reported from analysis of the diluted sample.
E	Concentration exceeds the calibration range.
H	Sample received and/or analyzed past the recommended holding time.
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
N	Nontarget Analyte.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
U	Undetected at the laboratory method detection limit.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 04 - 09 - 0244

Cooler 1 of 1

SAMPLE RECEIPT FORM

CLIENT: Amec **DATE:** 9/3/14

TEMPERATURE – SAMPLES RECEIVED BY:

CALSCIENCE COURIER:

_____ Chilled, cooler with temperature blank provided.
_____ Chilled, cooler without temperature blank.
✓ Chilled and placed in cooler with wet ice.
_____ Ambient and placed in cooler with wet ice.
_____ Ambient temperature.
4.0 °C Temperature blank.

LABORATORY (Other than Calscience Courier):

_____ °C Temperature blank.
_____ °C IR thermometer.
_____ Ambient temperature.

Initial: [signature]

CUSTODY SEAL INTACT:

Sample(s): _____ Cooler: _____ No (Not Intact) : _____ Not Applicable (N/A): ✓

Initial: [signature]

SAMPLE CONDITION:

	Yes	No	N/A
Chain-Of-Custody document(s) received with samples	✓		
Sample container label(s) consistent with custody papers	✓		
Sample container(s) intact and good condition	✓		
Correct containers for analyses requested	✓		
Proper preservation noted on sample label(s)			✓
VOA vial(s) free of headspace.			✓
Tedlar bag(s) free of condensation			✓

Initial: [signature]

COMMENTS:

APPENDIX E
FIELD COLLECTION DATA

Appendix Table E-1. Field Sample Collection Summary

City of Beunaventura

Santa Clara River Estuary Dry Weather Sampling Event

Sample Collection Date: July 20, 2004

Site	Collection Time [a]	Latitude 34°...	Longitude 119°...	Water Sample Depth (m)
A-2	1450	13.882	15.843	1.7
B-1	1340	14.094	15.793	1.3
B-3	1040	14.031	15.646	1.6
C-2	0935	14.052	15.392	1.0

[a] Start of collection time at each site location

Appendix Table E-2. Field Water Quality Measurements

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Sample Collection Date: July 20, 2004

Sample		Temperature (°C)	Salinity (ppt)	Conductivity (umhos/cm)	pH (units)	DO (mg/L)
A-2	Surface	26.6	3.0	5620	9.77	>20
	Middle	26.6	3.0	5660	9.75	>20
	Bottom	26.1	7.7	14570	--	--
B-1	Surface	25.9	1.3	2500	7.69	5.0
	Middle	25.1	1.3	2570	9.04	4.0
	Bottom	27.0	4.7	8890	--	--
B-3	Surface	25.4	2.8	5250	9.52	>20
	Middle	25.4	2.9	5320	9.54	>20
	Bottom	25.8	9.5	9340	--	--
C-2	Surface	25.3	2.9	5460	9.53	>20
	Middle	25.2	2.9	5440	9.4	>20
	Bottom	25.1	2.9	5340	--	--

Note: Due to limitations of cord length on the pH and DO meters, sites do not have readings for the bottom depth.

APPENDIX F
CHAIN-OF-CUSTODY FORMS

Chain of Custody

Earth & Environmental, Inc.
AMEC San Diego Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121
Phone: 858-458-9044 FAX 858-587-3961

Date 7-20-04 Page 1 of 1

Sample Collection by: Chris Stransky / Nicki Burke

Company City of Buenaventura
Address
City State Zip
Contact
Phone No. Karen Walh 805-677-4128
Dan Pfeiffer -4131

Mail Report to (if different)

Company
Address
City State Zip
Contact
Phone No.

ANALYSIS REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	A. affinis chronic	A. bahama chronic	M. pyrifera chronic	M. galloprovincialis chronic	P. promelas chronic	L. dentata chronic	S. purpuratus chronic
A-2	7/20/04	14:50	H2O	5gal bucket	5		X	X	X	X	X	X	X
B-1		13:40			5								
B-3		10:40			5								
C-2		09:35			5								

PROJECT INFORMATION

CLIENT
P.O. NO.
SHIPPED VIA: Collected & transported by AMEC staff

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	20
CHAIN OF CUSTODY SEALS	Y
REC'D. GOOD CONDITION/COLD	Y
CONFORMS TO RECORD	Y

SPECIAL INSTRUCTIONS/COMMENTS:

Freshwater tests – 100% sample only w/ salt control if salinity of sample ≥1

RELINQUISHED BY

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY

(Signature) (Time)
(Printed Name) (Date)
(Company)

RELINQUISHED BY

(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)

(Signature) 7-21-04 (Time) 7:45
Steven Hackford
(Printed Name) 04-0535 → 0538 (Date)
AMEC Bioassay Lab Log-in No.

Additional disposal charges may apply.

DISTRIBUTION: WHITE, CANARY - AMEC Bioassay Lab, PINK - Originator

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 9/2/04

Page 1 of 82

LABORATORY CLIENT: Nautilus Environmental (formerly AMEC)	CLIENT PROJECT NAME / NUMBER: Buenaventura July '04 WER	P.O. NO.:
ADDRESS: 5550 Morehouse Dr. Suite 150	PROJECT CONTACT: Chris Stransky	QUOTE NO.:
CITY: San Diego STATE: CA ZIP: 92121	SAMPLER(S): (SIGNATURE)	LAB USE ONLY: 09-0254
TEL: 858-775-5547 FAX: 858-587-3961 E-MAIL: chris@nautilus-environmental.com		

TURNAROUND TIME
☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___ / ___ / ___.

SPECIAL INSTRUCTIONS

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH_4 / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	Total copper
1	SCRE. A-2-25		9/2/04	11:10	SW	1																X
2	A-2-40			11:15																		
3	A-2-65			11:20																		
4	A-2-100			11:25																		
5	B-1-LC			11:50																		
6	B-1-SC			11:55																		
7	B-1-0 (unspiked)			12:12																		
8	B-1-40			12:00																		
9	B-1-65			12:05																		
10	B-1-100			12:10																		

Relinquished by: (Signature)	Received by: (Signature)	Date: 9/3/4	Time: 1330
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date: 9/3/4	Time: 1655

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CHAIN OF CUSTODY RECORD

Date 9/2/04

Page 2 of 32

LABORATORY CLIENT: Nautilus Environmental (formerly AMEC)
ADDRESS: 5550 Morehouse Dr. Suite 150
CITY: San Diego STATE: CA ZIP: 92121
TEL: 858-775-5547 FAX: 858-587-3961 E-MAIL: chris@nautilusenvironmental.com

CLIENT PROJECT NAME / NUMBER: Buenaventura July '04 WER
PROJECT CONTACT: Chris Stransky
SAMPLER(S): (SIGNATURE)

P.O. NO.:
QUOTE NO.:
LAB USE ONLY: 09-02

TURNAROUND TIME
☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☐ 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___ / ___ / ___.

SPECIAL INSTRUCTIONS

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH_4 / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	X Total copper
11	SCRE. B-3-40		9/2/04	12:22	SW	1																X
12	B-3-65			12:25																		
13	B-3-100			12:27																		
14	C-2-40			13:07																		
15	C-2-65			13:10																		
16	C-2-100			13:13																		
17	Polished SW-5.0			13:32																		
18	-8.4			13:35																		
19	-14			13:40																		
20	-28			13:42																		

Relinquished by: (Signature)	Received by: (Signature)	Date: 9/3/4	Time: 1330
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date: 9/3/4	Time: 1655

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