

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

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INTRODUCTION

Toxicity tests and chemical analyses were conducted on ambient water samples collected on September 28, 2004 from the Santa Clara River Estuary (SCRE) located in the City of San Buenaventura, CA. This fourth sampling effort for the project was characterized as a “dry weather” event. Samples for this round of testing were collected during a high tide; the estuary was full of water, but the sand berm was breached. Mr. Chris Stransky and Mr. John Rudolph of Nautilus Environmental, LLC (Nautilus) 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 initiated on September 29, 2004 at Nautilus’ laboratory located in San Diego, CA. Chemical analyses were performed by Calscience Environmental Laboratories (CEL) located in Garden Grove, CA.

METHODS AND MATERIALS

SAMPLE COLLECTION, TRANSPORT, AND RECEIPT

Ambient water samples were collected from four of the eleven ambient monitoring locations (specifically sites A-2, B-1, B-3, and C-3). 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 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 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 then removed for test initiation and the remainder of each sample was held at 4°C until required for use.

BIOASSAY PROTOCOLS

Test conditions and Quality Assurance/Quality Control (QA/QC) requirements for each bioassay performed are summarized in Tables 1 through 7. Freshwater tests were conducted for sites B-1 and C-3 only, because salinity measured in samples collected from sites A-2 (33 ppt) and B-3 (23 ppt) were well out of the tolerance range for all three freshwater test species. For sites B-1 and C-3, additional controls prepared to match the salinity of each sample (1.1 and 3.0 ppt for B-1 and C-3, respectively) were tested concurrently in order to evaluate the role of salinity in any observed toxicity.

Table 1. Test Conditions and QA/QC Summary for the Fathead Minnow 7-Day Survival and Growth Test.

Test organism	<i>Pimephales promelas</i>
Test organism source	Aquatic Biosystems, Inc. (Fort Collins, CO)
Test duration	7 days
Test solution renewal	Daily
Feeding	Three times per day
Test initiation date and time	Within 36 hours of sample collection
Test chambers	400-ml disposable plastic cups
Test solution volume	250 ml
Test temperature	25 ± 1 °C
Dilution water	Dilute Mineral Water (8 parts Nanopure, 2 parts Perrier®)
Test concentrations (% sample)	100, and 0 (control)
Number of organisms/chamber	10
Number of replicates	4
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test Protocol	EPA-821-R-02-013
Test acceptability criteria for controls	Means of ≥ 80% survival and ≥ 0.25 mg biomass
Reference toxicant	Copper chloride

Table 2. Test Conditions and QA/QC Summary for the Water Flea 7-Day Survival and Reproduction Test.

Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house cultures
Test duration	7 days
Test solution renewal	Daily
Feeding	Daily
Test initiation date and time	Within 36 hours of sample collection
Test chambers	30-ml disposable plastic cups
Test solution volume	15 ml
Test temperature	25 ± 1 °C
Dilution water	Dilute Mineral Water (8 parts Nanopure, 2 parts Perrier®)
Test concentrations (% sample)	100, and 0 (control)
Number of organisms/chamber	1
Number of replicates	10
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test Protocol	EPA-821-R-02-013
Test acceptability criteria for controls	1) ≥ 80% mean survival; 2) 60% of the surviving females must produce at least 3 broods of offspring; and 3) total reproduction must be ≥ 15 offspring per surviving female.
Reference toxicant	Copper chloride

Table 3. Test Conditions and QA/QC Summary for the 96-Hour Algal Growth Inhibition Test.

Test organism	<i>Selenastrum capricornutum</i>
Test organism source	In-house cultures
Test duration	96 Hours
Test solution renewal	None
Feeding	Macro- and micro-nutrients added to test solutions prior to test initiation.
Test initiation date and time	Within 36 hours of sample collection
Test chambers	125-ml Erlenmeyer flasks
Test solution volume	50 ml
Test temperature	25 ± 1 °C
Dilution water	Nutrient-enriched deionized water
Test concentrations (% sample)	100 ^a , and 0 (control)
Initial cell density	10,000 cells/ml ± 10%
Number of replicates	5 ^b (one was used only as a surrogate for measuring pH and temperature during the exposure period).
Photoperiod	Continuous light at 400 ± 40 ft-c
Aeration	None
Test Protocol	EPA-821-R-02-013
Test acceptability criteria for controls	Final cell density ≥ 1.0 x 10 ⁶ cells/ml with ≤ 20% variability among test replicates.
Reference toxicant	Copper chloride

^a Prior to test initiation, each sample was inspected under a microscope and found to have heavy debris 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.

^b An additional flask containing filtered sample not inoculated with algae was also tested as a blank to ensure that there was no interference in measuring chlorophyll-a fluorescence at test termination.

Table 4. Test Conditions and QA/QC Summary for the Pacific Topsmelt 7-Day Survival and Growth Test.

Test organism	<i>Atherinops affinis</i>
Test organism source	Aquatic Biosystems, Inc. (Fort Collins, CO)
Test duration	7 days
Test solution renewal	Daily
Feeding	Two times per day
Test initiation date and time	Within 36 hours of sample collection
Test chambers	1-L plastic tri-pour beakers
Test solution volume	500 ml
Test temperature	20 ± 1 °C
Dilution water	34 ppt natural seawater (sample A-2) 30 ppt artificial seawater (sites B-1, B-3, and C-3)
Test concentrations (% sample)	100, highest concentration from tests conducted with brine ^a , 50, 25, and 0 (control)
Number of organisms/chamber	5
Number of replicates	5
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test Protocol	EPA/600/R-95/136
Test acceptability criteria for controls	Means of ≥ 80% survival and ≥ 0.85 mg biomass
Reference toxicant	Copper chloride

^a For consistency with species requiring brine, concentrations of 65, 88, and 66 percent sample were prepared and tested for sites B-1, B-3, and C-3, respectively. No additional concentration was prepared for site A-2, because it did not require salinity adjustment.

Table 5. Test Conditions and QA/QC Summary for the Opossum Shrimp 7-Day Survival and Growth Test.

Test organism	<i>Americamysis bahia</i>
Test organism source	Aquatic Biosystems, Inc. (Fort Collins, CO)
Test duration	7 days
Test solution renewal	Daily
Feeding	Two times per day
Test initiation date and time	Within 36 hours of sample collection
Test chambers	400-ml plastic tri-pour beakers
Test solution volume	500 ml
Test temperature	25 ± 1 °C
Dilution water	34 ppt natural seawater (sample A-2) 30 ppt artificial seawater (sites B-1, B-3, and C-3)
Test concentrations (% sample)	100, highest concentration from tests conducted with brine ^a , 50, 25, and 0 (control)
Number of organisms/chamber	5
Number of replicates	8
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test Protocol	EPA-821-R-02-014
Test acceptability criteria for controls	Means of ≥ 80% survival and ≥ 0.20 mg biomass
Reference toxicant	Copper chloride

^a For consistency with species requiring brine, concentrations of 65, 88, and 66 percent sample were prepared and tested for sites B-1, B-3, and C-3, respectively. No additional concentration was prepared for site A-2, because it did not require salinity adjustment.

Table 6. Test Conditions and QA/QC Summary for the 48-Hour Bivalve Embryo Development Test.

Test organism	<i>Mytilus galloprovincialis</i>
Test organism source	Carlsbad Aquafarms
Test duration	48 Hours
Test solution renewal	None
Feeding	None
Test initiation date and time	Within 36 hours of elutriate preparation
Test chamber	30-ml glass scintillation vial
Test solution volume	10 ml
Test temperature	15 ± 1 °C
Dilution water	30 ppt laboratory seawater
Test concentrations (% sample) ^a	100, and 0 (control) (w/artificial sea salts) ^b Highest testable concentration, 50, 25, and 0 ^c
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

^a Sample A-2 was tested at 100, 50, 25, and 0 percent sample with a negative control consisting of 34 ppt natural seawater.

^b 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 rather than hypersaline brine. 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.

^c Due to the low salinities of samples from sites B-1, B-3, and C-3, 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 for each sample: 65 percent for B-1; 88 percent for B-3; and 66 percent for C-3. An additional control composed of hypersaline brine and deionized water was also tested to ensure observed mortality was not due to the addition of hypersaline brine rather than other toxic constituents.

Table 7. Test Conditions and QA/QC Summary for the 48-Hour Giant Kelp Germination and Growth Test.

Test organism	<i>Macrocystis pyrifera</i>
Test organism source	La Jolla Cove, CA (field-collected by Nautilus staff)
Test duration	48 Hours
Test solution renewal	None
Feeding	None
Test initiation date and time	Within 36 hours of elutriate preparation
Test chamber	50-ml glass Petri dishes
Test solution volume	30 ml
Test temperature	15 ± 1 °C
Dilution water	32 ppt laboratory seawater
Test concentrations (% sample) ^a	100, and 0 (control) (w/artificial sea salts) ^b Highest testable concentration, 50, 25, and 0 ^c
Number of organisms/chamber	225,000
Number of replicates	5
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test Protocol	EPA/600/R-95/136
Test acceptability criteria for controls	Mean of ≥ 70% germination and tube length of ≥ 10 µm.
Reference toxicant	Copper chloride

a Sample A-2 was tested at 100, 50, 25, and 0 percent sample with a negative control consisting of 34 ppt natural seawater.

b 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. 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 hypersaline brine or artificial salt rather than other toxic constituents.

c Due to the low salinities of samples from sites B-1, B-3, and C-3, 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 for each sample: 62 percent for B-1; 84 percent for B-3; and 63 percent for C-3. An additional control composed of hypersaline brine and deionized water was also tested to ensure observed mortality was not due to the addition of hypersaline brine or artificial salt rather than other toxic constituents.

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, Wilcoxon Rank Sum, Steel's Many-One Rank, or Fisher's Exact Multiple Comparisons Tests. Median Lethal Concentration (LC₅₀) or Median Effect Concentration (EC₅₀) values were determined for marine and freshwater reference toxicant bioassays using Maximum Likelihood Probit, Trimmed Spearman-Kärber, or Linear Interpolation Analyses. 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 D).

WATER-EFFECT RATIO CALCULATION FOR COPPER

Water-effect ratios (WERs) were calculated for all four estuary samples using the blue mussel embryo development test. The embryo development test using *Mytilus galloprovincialis* 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 criteria for copper in marine waters (see Table 9 for values).

Water samples for the WER analysis were spiked with nominal concentrations of copper 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. In addition, a standard copper reference toxicant test was also conducted using unpolished seawater. Final nominal concentrations of copper in the reference toxicant test were 0, 2.5, 5.0, 10, 20, and 40 µg/L. A copper reference toxicant test is performed concurrently with all bivalve embryo tests conducted at Nautilus to evaluate variability in test procedures and sensitivity of organisms over time. All samples

spiked with copper were thoroughly mixed for approximately 5 minutes, covered and maintained at the test temperature of 15°C overnight. Samples were spiked with copper on the evening of field sample collection. Subsamples of all test concentrations were collected on the following day (test initiation date) for analytical verification of copper concentrations.

The 48-hour bivalve embryo tests were initiated on the day following sample collection. Bivalve tests were performed following the same methods employed for the unspiked estuary samples (Table 6). Measured concentrations of copper were used for all calculations in this report. Total and dissolved copper were measured in all field-collected samples. Total copper was measured in copper-spiked test concentrations that bracketed dose responses.

RESULTS AND DISCUSSION

Detailed data summaries are 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. All data associated with the WER study are provided in Appendix F. Finally, chain-of-custody information is provided in Appendix G.

FRESHWATER SPECIES

Performing toxicity tests with freshwater organisms on the estuary samples was complicated by the fact that the salinities were higher than freshwater, and could pose variable levels of stress on the test organisms. Consequently, where appropriate, the samples were tested with concurrent salinity controls; to separate salinity effects from other constituents present in the sample, statistical comparisons were made between each full-strength sample and the appropriate salinity control. In this sampling event, tests were conducted only on samples collected from B-1 and C-3. The salinities in samples from the remaining sites approached those found in seawater and exceeded the survival thresholds for the freshwater test species.

Fathead Minnow 7-Day Survival and Growth

Survival of fathead minnow larvae was 98 percent in sample B-1 and 83 percent in sample C-3. Salinity did appear to have a slight effect on fathead minnow survival;

survival in the B-1 salinity control (1.1 ppt) was close to that observed in the laboratory dilution water control (90 percent) while survival in the C-3 salinity control (3.0 ppt) was only 80 percent (Figure 1). Because of the close correspondence in survival results between sample C-3 and its salinity control, the reduction in survival appears to be related to salinity, rather than the presence of toxic constituents.

No adverse effects on larval growth were observed. The mean dry biomass of fish exposed to the samples and their corresponding salinity controls ranged from 0.32 to 0.39 mg (Figure 1).

Water Flea 7-Day Survival and Reproduction

As with fathead minnows, salinity also affected survival of *Ceriodaphnia*. Mean survival in the B-1 and C-3 salinity controls was 90 and 40 percent, respectively. However, this effect did not translate directly to the estuary samples as it did with fathead minnows; survival was 80 percent in both samples (Figure 2).

With respect to reproduction, no adverse effect was observed for sample B-1 or its salinity control. However, sample C-3 did exhibit reduced reproduction, but was not significantly reduced compared to the salinity control (Figure 2). This result suggests reduced reproduction was caused by the sample salinity, rather than other toxic components.

96-Hour Algal Growth Inhibition

While cell growth in the salinity controls was reduced compared to the lab control, both B-1 and C-3 salinity controls met the test acceptability criteria. Toxicity was observed for both B-1 and C-3, as reduced cell numbers were observed in both filtered and unfiltered estuary samples relative to the appropriate salinity controls. In addition, cell density in the unfiltered samples was lower than that in the filtered samples, suggesting that particulate material in the samples interfered with cell growth to some extent (Figure 3).

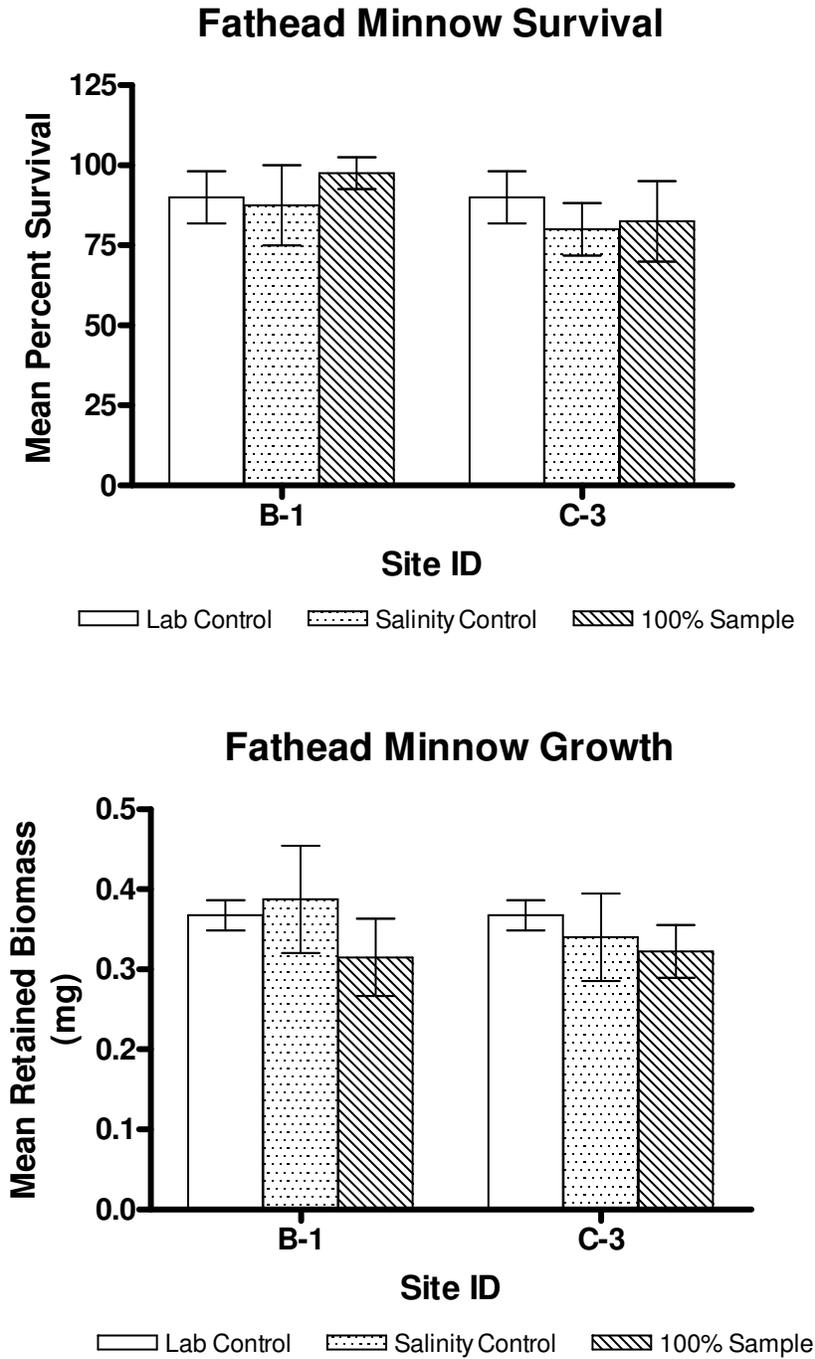


Figure 1. Summary of toxicity test results for fathead minnow 7-day survival and growth. Mean ($\pm 1SD$) values in 100 percent sample are displayed. No statistically significant decreases were observed compared to concurrent salinity controls.

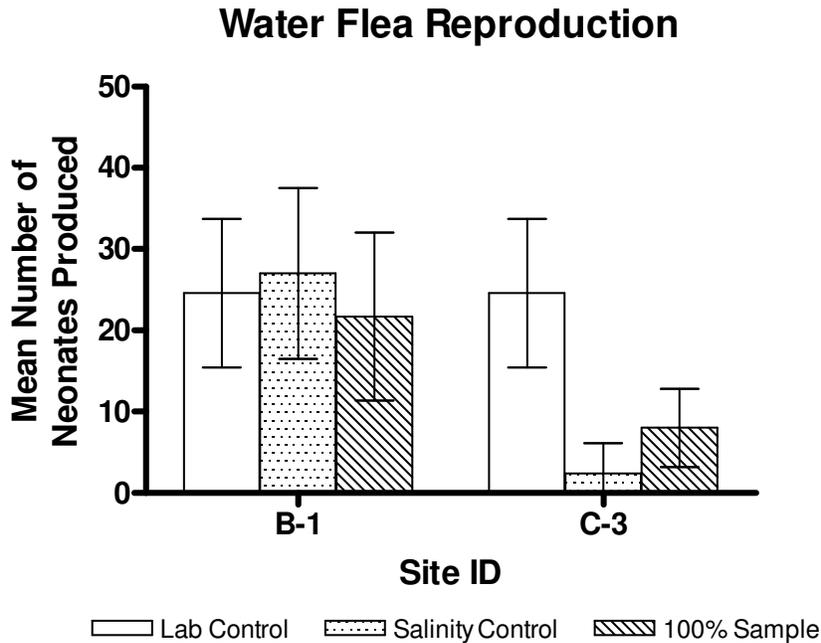
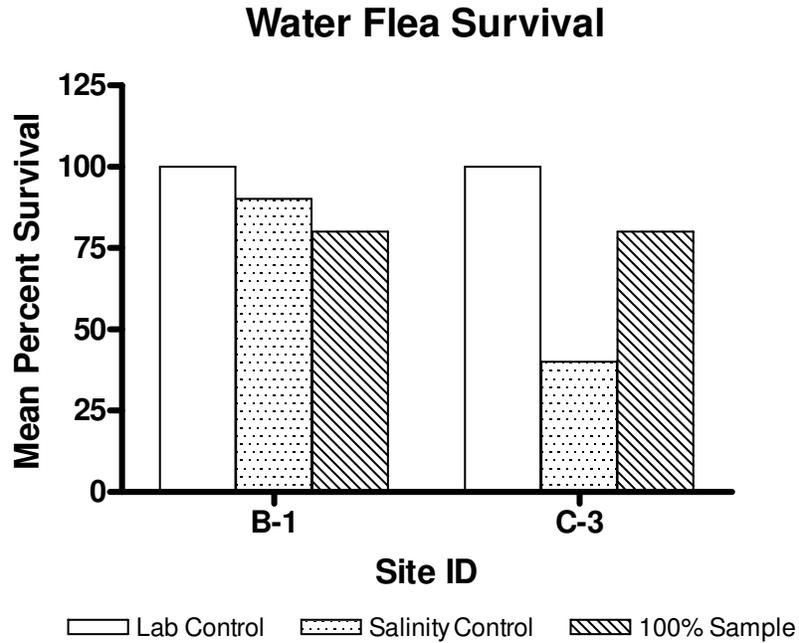


Figure 2. Summary of toxicity test results for water flea 7-day survival and reproduction. Mean ($\pm 1SD$ for reproduction) values in 100 percent sample are displayed. No statistically significant decreases were observed relative to the concurrent salinity controls.

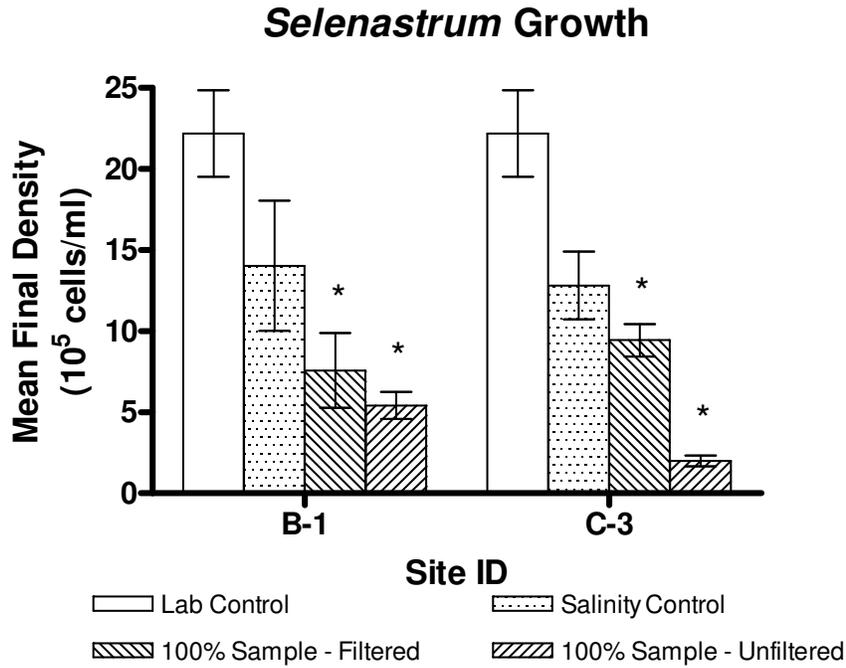


Figure 3. Summary of toxicity test results for algal growth inhibition. Mean (± 1 SD) values in 100 percent sample are displayed. Filtered and unfiltered samples showed a significant decrease relative to the salinity controls.

MARINE SPECIES

Pacific Topsmelt 7-Day Survival and Growth

Survival of topsmelt larvae was high across all test concentrations and samples, ranging from 92 to 100 percent (Figure 4, Appendix Table A-4). A reduction in growth was observed relative to the control for site A-2 only. Mean biomass in 100 percent sample from this site was 1.3 mg compared to 1.6 mg in the control. Mean biomass in the remaining undiluted samples was 1.2 mg (Figure 4).

Opossum Shrimp 7-Day Survival and Growth

No adverse effects on survival were observed for mysids. Mean survival ranged from 93 to 100 percent (Figure 5, Appendix Table A-5). However, reductions in growth were observed for sites A-2, B-1, and B-3 relative to the artificial salt control. For site A-2, mean biomass in the undiluted sample was 0.32 mg compared to 0.42 mg in the control. Growth in samples B-1 and B-3 were more strongly affected; mean biomass was 0.14 and 0.24 mg, respectively (Figure 5).

Bivalve Embryo Development

Mussel embryo development was not impacted by exposure to estuary samples. Normal development was high in both samples amended with hypersaline brine and with artificial sea salts. Mean normal development ranged from 87 to 94 percent among test concentrations and sample sites (Figure 6, Appendix Table A-6).

48-Hour Giant Kelp Germination and Growth

No significant reductions in giant kelp spore germination were observed (Figure 7). However, spores exposed to samples from sites A-2 and B-1 did exhibit reduced germ tube length in undiluted sample relative to the appropriate controls. Mean tube length was 13 μm for site A-2, and 15 μm for site B-1 (Figure 7), compared with approximately 15 μm and 17 μm in their respective corresponding controls.

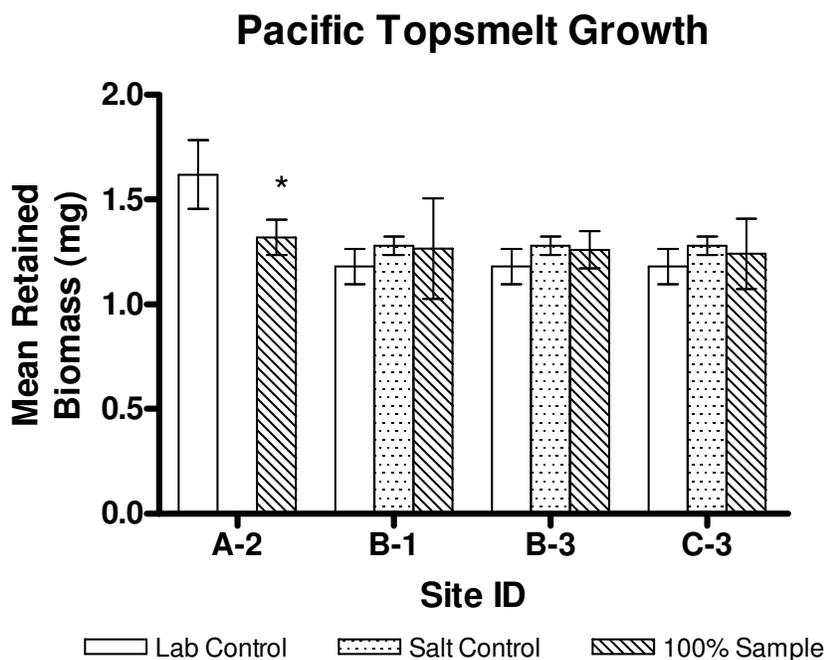
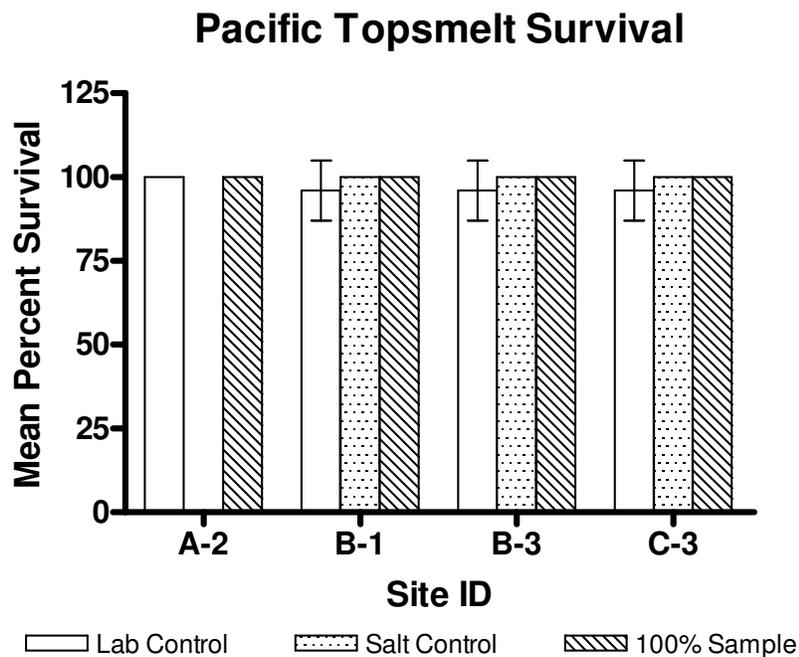


Figure 4. Summary of toxicity test results for Pacific topsmelt 7-day survival and growth. Mean ($\pm 1SD$) values in 100 percent sample are displayed. A reduction in growth was observed for sample A-2 relative to the laboratory seawater control.

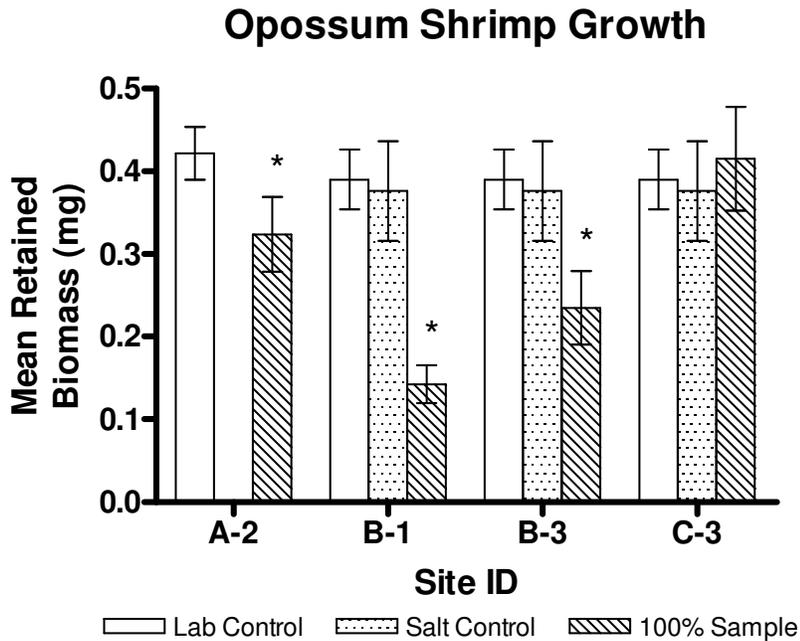
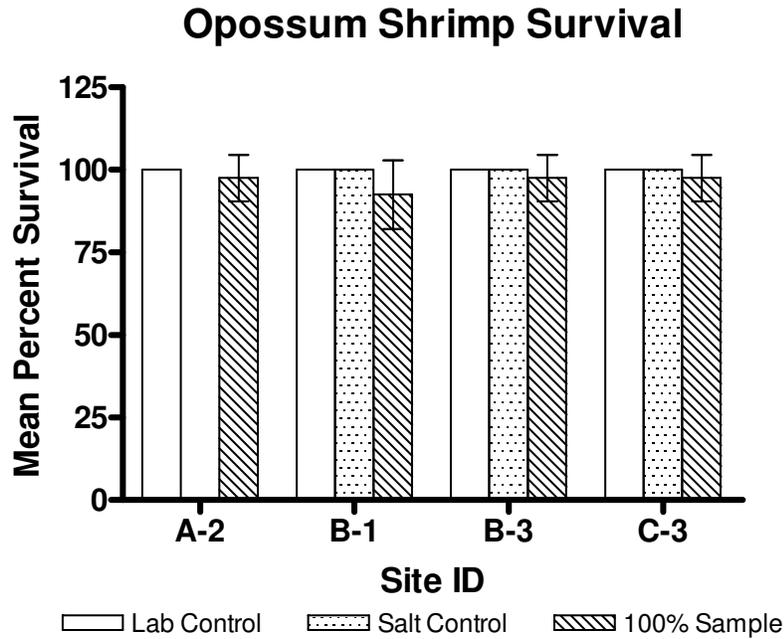


Figure 5. Summary of toxicity test results for opossum shrimp 7-day survival and growth. Mean ($\pm 1SD$) values in 100 percent sample are displayed. No statistically significant decreases in survival were observed compared to concurrent salt controls. Significant decreases in growth were observed for samples A-2, B-1, and B-3.

Mussel Larval Development

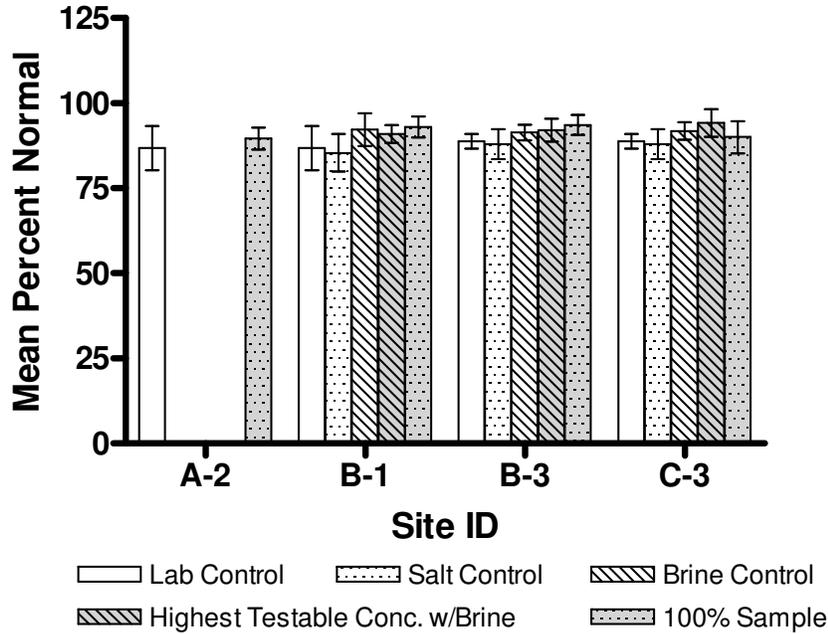
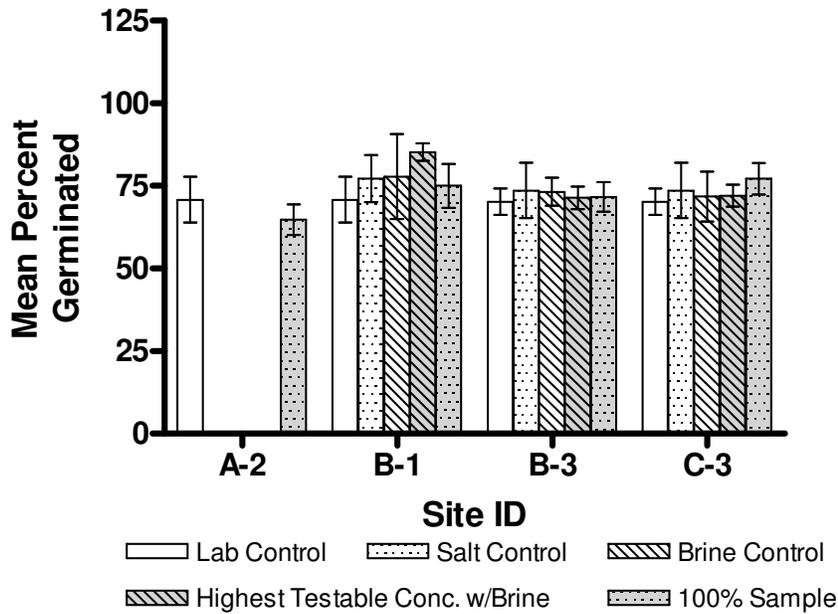


Figure 6. Summary of toxicity test results for bivalve 48-hour embryo development using *Mytilus galloprovincialis*. Mean ($\pm 1SD$) values in the highest testable concentration with brine as well as the 100% sample are displayed. No statistically significant decreases were observed compared to the appropriate concurrent controls.

Giant Kelp Germination



Giant Kelp Growth

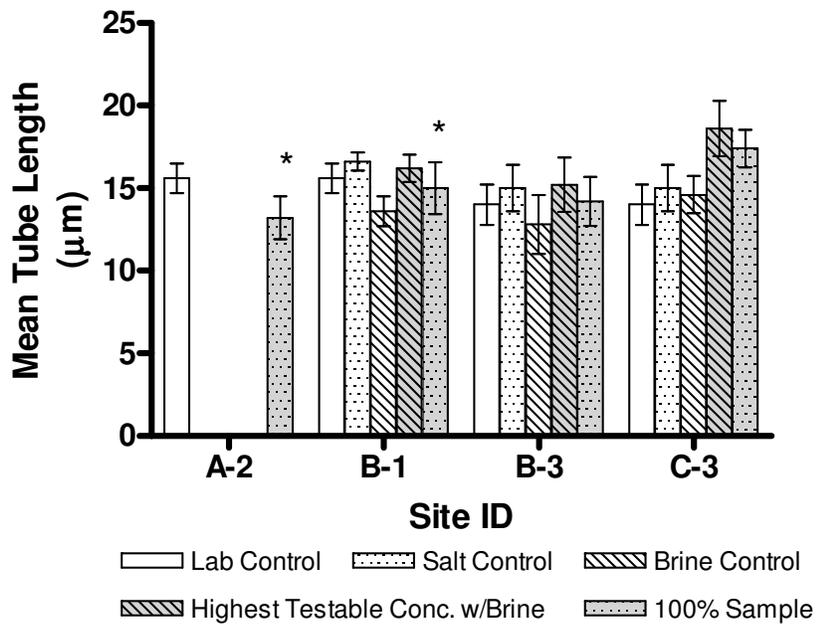


Figure 7. Summary of toxicity test results for giant kelp spore germination and growth. Mean ($\pm 1SD$) values for each site are displayed. No statistically significant decreases in germination were observed compared to appropriate concurrent controls. A significant decrease in growth was observed for sample A-2 relative to the laboratory seawater control.

AMBIENT WATER ANALYTICAL CHEMISTRY RESULTS

Dissolved and total copper concentrations in samples A-2, B-3, and C-3 were all below the method detection limit of 5.00 µg/L. Dissolved copper in sample B-1 was reported as 8.38 µg/L. However, the total copper concentration reported for this sample was below the method detection limit suggesting that preparation of the sample for measuring dissolved copper may have added a small amount of copper. It is also important to note that the method detection limit for copper is above the EPA protective water quality criterion for marine species of 3.1 µg/L. However, this value was determined using the 48-hour bivalve embryo development test, which showed no toxicity in these samples. Moreover, concentrations of nickel, selenium, and zinc were relatively low, and all below their respective water quality guidelines. This suggests that these contaminants were unlikely to be associated with toxicity (Table 9). Measurements for cyanide, total organic carbon (TOC), dissolved organic carbon (DOC), and total suspended solids (TSS) are included in Table 10.

Table 8. Summary of Total and Dissolved Contaminant Concentrations Measured in Santa Clara River Estuary Samples Collected September 28, 2004

Sample	Form	Concentration (µg/L)				
		Cyanide	Copper	Nickel	Selenium	Zinc
A-2	Dissolved	NM	<5.00	<5.00	7.30*	<5.00
	Total	<50	<5.00	<5.00	<5.00	<5.00
B-1	Dissolved	NM	8.38*	<5.00	7.47	16.5
	Total	<50	<5.00	<5.00	9.99	17.4
B-3	Dissolved	NM	<5.00	<5.00	<5.00	5.03*
	Total	<50	<5.00	<5.00	<5.00	<5.00
C-3	Dissolved	NM	<5.00	5.86	<5.00	<5.00
	Total	<50	<5.00	6.28	7.04	<5.00

*In these cases the dissolved metal concentration exceeds the total. However, both sets of results (e.g. total and dissolved metals) met analytical laboratory quality assurance and reporting criteria. In addition, true differences in concentrations are difficult to detect close to the method reporting limit.

NM – Not measured.

Table 9. EPA Water Quality Criteria for the Protection of Aquatic Life ^a as reported in “Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California,” (US EPA 2000).

Sample	Concentration (µg/L)				
	Cyanide ^b	Copper	Nickel	Selenium	Zinc
EPA Marine Acute CMC	1	4.8	74	290	90
EPA Marine Chronic CCC	1	3.1	8.2	71	81
EPA Freshwater Acute CMC ^c	22	13	470	13-186 ^d	120
EPA Freshwater Chronic CCC ^c	5.2	9.0	52	5 total	120

^a Values expressed as a dissolved fraction excluding the EPA freshwater CCC value for selenium

^b Values expressed in terms of free cyanide (e.g. µg CN/L)

^c Values are hardness dependant and based in this table on a hardness of 100 mg/L CaCO₃

^d Freshwater CMC depends on ratio of selenite to selenate

CMC - Criterion Maximum Concentration

CCC - Criterion Continuous Concentration

Table 10. Summary of Analytical Chemistry Measurements in addition to contaminants in Santa Clara River Estuary Samples Collected September 28, 2004

Sample	Total Organic Carbon (mg/L)	Dissolved Organic Carbon (mg/L)	Total Suspended Solids (mg/L)
A-2	11	9.6	25
B-1	18	15	17
B-3	11	8.6	15
C-3	18	18	12

WATER-EFFECT RATIO

Copper EC₅₀ values and WER calculations are summarized in Table 11. Detailed WER results are available in Appendix F. Mean normal development was 90 to 93 percent in the unspiked estuary samples, compared to 92 percent in the laboratory control. Total copper EC₅₀ values calculated for estuary samples based on measured copper concentrations ranged from 18.2 to > 85.1 µg/L. For comparison, the mean EC₅₀ calculated for polished seawater spiked with copper was 11.5 µg/L. The calculated WER values ranged from 1.58 to > 7.40, with a geometric mean of 4.1.

Table 11. Total Copper WER Values for Santa Clara River Estuary Samples Calculated using Scripps Polished Seawater (measured concentrations)^a

Sample	EC ₅₀ (µg/L Total Cu)	Water-Effect Ratio
Site A-2	18.2	1.58
Site B-1	81.3	7.07
Site B-3	39.7	3.45
Site C-3	>85.1	>7.40
Polished Scripps Seawater (PSW) ^a	11.5	NA
Scripps Seawater ^b	11.1	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 i the laboratory reference toxicant control chart.

QA/QC

FRESHWATER SPECIES

Laboratory controls met acceptability criteria for all three freshwater species tested. Mean percent survival for the fathead minnow lab control was 90 percent (> 80 percent criterion); mean dry biomass was 0.36 mg (> 0.25 mg criterion). No mortality was observed in the lab controls for the water flea test, which has a minimum mean survival criterion of 80 percent. Mean reproduction was 25 offspring (> 15 offspring minimum). Finally, the lab control for the green alga test had a mean final density of 22.2 x 10⁵ cells/ml and variability among control replicates of 12 percent. Acceptability criteria for this test are a minimum mean final density of 10 x 10⁵ 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 (Appendix C). While the water flea reference toxicant test met acceptability criteria, LC₅₀ (survival) and EC₅₀ (reproduction) values both just exceeded their respective two-standard deviation control limits. Statistically, it is expected that a single value will fall out of range approximately five percent of the time. Conversely, it is also possible that the test organisms were less sensitive than is typical in this laboratory. In addition, the control limits were based on only ten data points, and it is possible that an increased sample size may change the limits. Regardless, according to the EPA protocol, an out-of-control data point does not invalidate the test data. After close examination of the water sample and reference toxicant test data, all results were deemed acceptable for reporting purposes.

MARINE SPECIES

Laboratory controls met acceptability criteria for three of the four marine species tested: Pacific topsmelt, opossum shrimp, and giant kelp. The bivalve development test resulted in lab controls with mean normal development of 87 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 the range of values among control replicates included several values exceeding the criterion; 2) no toxicity was observed in the tests; and 3) the percent minimum significant differences (MSDp) between test concentrations and the control were low, indicating the test was sensitive. Topsmelt mean control survival ranged from 96 to 100 percent and mean dry biomass ranged from 1.2 to 1.6 mg. Both endpoints exceeded the minimum requirements of 80 percent survival and 0.85 mg biomass, respectively. Mean percent survival for both of the opossum shrimp controls was 100 percent, which also exceeded the minimum requirement of 80 percent. The mean dry biomass ranged from 0.39 to 0.42 mg (> 0.2 mg criterion). Finally, the kelp test controls exhibited 71 to 72 mean percent germination and 14 to 15 μ m mean spore length, exceeding the criteria of 70 percent and 10 μ m, respectively.

Reference toxicant tests conducted using topsmelt, opossum shrimp, and giant kelp met test acceptability criteria, and fell within two standard deviations of laboratory control

chart means (Appendix C). Again, the control for the mussel embryo development test fell short of the 90 percent normal development criterion; mean normal development was 89 percent in the control. However, a typical dose-response was observed in the test, and the EC₅₀ fell within two standard deviations of the historical laboratory mean (Appendix C), suggesting that the results were representative of responses typically obtained in this laboratory.

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APPENDIX A
CHRONIC 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: September 29, 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	A	10	100	90 +/- 8.2	0.38	0.36 +/- 0.02
	B	9	90			
	C	9	90			
	D	8	80			
Salinity Control #1 (1.1 ppt) B-1	A	10	100	88 +/- 13	0.41	0.39 +/- 0.07
	B	7	70			
	C	9	90			
	D	9	90			
Salinity Control #2 (3.0 ppt) C-3	A	9	90	80 +/- 8.2	0.40	0.34 +/- 0.06
	B	8	80			
	C	7	70			
	D	8	80			
B-1	A	9	90	98 +/- 5.0	0.27	0.32 +/- 0.05
	B	10	100			
	C	10	100			
	D	10	100			
C-3	A	8	80	83 +/- 13	0.34	0.33 +/- 0.03
	B	7	70			
	C	10	100			
	D	8	80			

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

Values in **bold** indicate a significant decrease in survival or reproduction was observed in that test concentration relative to the control.

C. DUBIA

Appendix A-2. Water Flea 7-Day Survival and Reproduction Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: September 29, 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	1	100	100 +/- 0.00	33	25 +/- 9.1
	2	100		33	
	3	100		30	
	4	100		6.0	
	5	100		26	
	6	100		34	
	7	100		16	
	8	100		23	
	9	100		28	
	10	100		17	
Salinity Control #1 (1.1 ppt) B-1	1	100	90 +/- 32	38	27 +/- 11
	2	100		24	
	3	100		29	
	4	100		26	
	5	100		29	
	6	100		25	
	7	100		30	
	8	100		33	
	9	100		36	
	10	0.00		0.0	
Salinity Control #2 (3.0 ppt) C-3	1	0.00	40 +/- 52	0.0	2.4 +/- 3.7
	2	100		8.0	
	3	100		0.0	
	4	0.00		0.0	
	5	0.00		0.0	
	6	0.00		0.0	
	7	0.00		0.0	
	8	100		10	
	9	0.00		2.0	
	10	100		4.0	
B-1	1	100	80 +/- 42	31	22 +/- 10
	2	100		35	
	3	100		28	
	4	100		14	
	5	0.00		0.0	
	6	100		28	
	7	100		25	
	8	100		22	
	9	0.00		13	
	10	100		21	
C-3	1	100	80 +/- 42	8.0	8.0 +/- 4.8
	2	100		10	
	3	100		10	
	4	100		8.0	
	5	0.00		0.0	
	6	100		6.0	
	7	100		14	
	8	100		11	
	9	100		13	
	10	0.00		0.0	

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

Values in bold indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

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: September 29, 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	A	0.100	22.0	22.2 +/- 2.66	21900	22100
	B	0.100	24.1		24000	
	C	0.100	24.2		24100	
	D	0.100	18.5		18400	
Salinity Control #1 (1.1 ppt) B-1	A	0.100	18.7	14.0 +/- 4.03	18600	13938
	B	0.100	8.95		8850	
	C	0.100	13.7		13600	
	D	0.100	14.8		14700	
Salinity Control #2 (3.0ppt) C-3	A	0.100	13.7	12.8 +/- 2.08	13600	12725
	B	0.100	15.3		15200	
	C	0.100	10.6		10500	
	D	0.100	11.7		11600	
B-1 Filtered	A	0.100	10.2	7.56 +/- 2.28	10100	7470
	B	0.100	8.7		8550	
	C	0.100	6.34		6240	
	D	0.100	5.09		4990	
B-1 Unfiltered	A	0.100	5.73	5.42 +/- 0.836	5630	5320
	B	0.100	6.37		6270	
	C	0.100	4.4		4300	
	D	0.100	5.18		5080	
C-3 Filtered	A	0.100	9.9	9.45 +/- 1.00	9810	9355
	B	0.100	10.2		10100	
	C	0.100	9.73		9630	
	D	0.100	7.98		7880	
C-3 Unfiltered	A	0.100	2.18	2.01 +/- 0.333	2080	1910
	B	0.100	2.18		2080	
	C	0.100	1.51		1410	
	D	0.100	2.17		2070	
Blank B-1	A	0.100	0.050	NA	-50	NA
Blank C-3	A	0.100	0.350	NA	250	NA

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

Values in bold indicate a significant decrease in cell density was observed in that test concentration relative to the control.

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: September 29, 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 #1	A	5	100	100 +/- 0.00	1.5	1.6 +/- 0.16
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
25%	A	5	100	100 +/- 0.00	1.2	1.4 +/- 0.18
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
50%	A	5	100	100 +/- 0.00	1.8	1.4 +/- 0.20
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
100%	A	5	100	100 +/- 0.00	1.3	1.3 +/- 0.06
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			

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

Values in bold indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

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: September 29, 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 #2	A	4	80	96 +/- 8.9	1.1	1.2 +/- 0.10
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
Salt Control	A	5	100	100 +/- 0.00	1.2	1.3 +/- 0.05
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
25%	A	5	100	92 +/- 18	1.6	1.3 +/- 0.23
	B	5	100			
	C	5	100			
	D	5	100			
	E	3	60			
50%	A	5	100	100 +/- 0.00	1.2	1.4 +/- 0.10
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
65%	A	5	100	100 +/- 0.00	1.3	1.2 +/- 0.10
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
100%	A	5	100	100 +/- 0.00	0.93	1.2 +/- 0.22
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			

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

Values in bold indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

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: September 29, 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 #2	A	4	80	96 +/- 8.9	1.1	1.2 +/- 0.10
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
Salt Control	A	5	100	100 +/- 0.00	1.2	1.3 +/- 0.05
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
25%	A	5	100	100 +/- 0.00	1.3	1.3 +/- 0.12
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
50%	A	5	100	100 +/- 0.00	1.4	1.3 +/- 0.08
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
88%	A	5	100	100 +/- 0.00	1.2	1.3 +/- 0.07
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
100%	A	5	100	100 +/- 0.00	1.3	1.2 +/- 0.07
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			

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

Values in **bold** indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

Appendix Table A-4 (Con'd). Site C-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: September 29, 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 #2	A	4	80	96 +/- 8.9	1.1	1.2 +/- 0.10
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
Salt Control	A	5	100	100 +/- 0.00	1.2	1.3 +/- 0.05
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
25%	A	5	100	92 +/- 11	1.6	1.3 +/- 0.24
	B	4	80			
	C	5	100			
	D	4	80			
	E	5	100			
50%	A	5	100	100 +/- 0.00	1.3	1.4 +/- 0.14
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
66%	A	5	100	92 +/- 18	1.5	1.2 +/- 0.18
	B	3	60			
	C	5	100			
	D	5	100			
	E	5	100			
100%	A	5	100	100 +/- 0.00	1.5	1.2 +/- 0.16
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			

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

Values in **bold** indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

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: September 29, 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 #1	A	*	*		*			
	B	5	100		0.37			
	C	*	*		*			
	D	5	100	100 +/- 0.00	0.45	0.42 +/- 0.03		
	E	5	100		0.40			
	F	5	100		0.45			
	G	5	100		0.44			
	H	5	100		0.42			
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25%	A	5	100		95 +/- 9.3		0.37	0.36 +/- 0.05
	B	4	80				0.30	
	C	5	100	0.39				
	D	5	100	0.35				
	E	5	100	0.31				
	F	5	100	0.42				
	G	5	100	0.43				
	H	4	80	0.34				
<hr/>								
50%	A	5	100	100 +/- 0.00	0.26	0.37 +/- 0.05		
	B	5	100		0.37			
	C	5	100		0.36			
	D	5	100		0.35			
	E	5	100		0.39			
	F	5	100		0.42			
	G	5	100		0.39			
	H	5	100		0.43			
<hr/>								
100%	A	4	80	98 +/- 7.1	0.28	0.32 +/- 0.05		
	B	5	100		0.35			
	C	5	100		0.28			
	D	5	100		0.41			
	E	5	100		0.35			
	F	5	100		0.30			
	G	5	100		0.29			
	H	5	100		0.33			

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

* Replicates excluded, test chambers spilled at test termination.

Values in **bold** indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

**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: September 29, 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 #2	A	5	100	100 +/- 0.00	0.39	0.39 +/- 0.04
	B	5	100		0.36	
	C	5	100		0.40	
	D	5	100		0.40	
	E	5	100		0.34	
	F	5	100		0.45	
	G	5	100		0.42	
	H	5	100		0.36	
Salt Control	A	5	100	100 +/- 0.00	0.34	0.38 +/- 0.06
	B	5	100		0.39	
	C	5	100		0.40	
	D	5	100		0.51	
	E	5	100		0.36	
	F	5	100		0.32	
	G	5	100		0.34	
	H	5	100		0.35	
25%	A	5	100	100 +/- 0.00	0.34	0.34 +/- 0.03
	B	5	100		0.31	
	C	5	100		0.32	
	D	5	100		0.34	
	E	5	100		0.30	
	F	5	100		0.34	
	G	5	100		0.40	
	H	5	100		0.36	
50%	A	5	100	100 +/- 0.00	0.20	0.25 +/- 0.04
	B	5	100		0.30	
	C	5	100		0.26	
	D	5	100		0.21	
	E	5	100		0.26	
	F	5	100		0.30	
	G	5	100		0.24	
	H	5	100		0.26	
65%	A	5	100	100 +/- 0.00	0.29	0.23 +/- 0.04
	B	5	100		0.17	
	C	5	100		0.21	
	D	5	100		0.26	
	E	5	100		0.19	
	F	5	100		0.23	
	G	5	100		0.24	
	H	5	100		0.23	
100%	A	4	80	93 +/- 10	0.15	0.14 +/- 0.02
	B	5	100		0.18	
	C	5	100		0.14	
	D	5	100		0.12	
	E	4	80		0.11	
	F	4	80		0.13	
	G	5	100		0.16	
	H	5	100		0.15	

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

Values in **bold** indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

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: September 29, 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 #2	A	5	100	100 +/- 0.00	0.39	0.39 +/- 0.04
	B	5	100		0.36	
	C	5	100		0.40	
	D	5	100		0.40	
	E	5	100		0.34	
	F	5	100		0.45	
	G	5	100		0.42	
	H	5	100		0.36	
Salt Control	A	5	100	100 +/- 0.00	0.34	0.38 +/- 0.06
	B	5	100		0.39	
	C	5	100		0.40	
	D	5	100		0.51	
	E	5	100		0.36	
	F	5	100		0.32	
	G	5	100		0.34	
	H	5	100		0.35	
25%	A	5	100	100 +/- 0.00	0.28	0.33 +/- 0.04
	B	5	100		0.34	
	C	5	100		0.41	
	D	5	100		0.30	
	E	5	100		0.36	
	F	5	100		0.30	
	G	5	100		0.35	
	H	5	100		0.32	
50%	A	4	80	98 +/- 7.1	0.25	0.31 +/- 0.03
	B	5	100		0.29	
	C	5	100		0.29	
	D	5	100		0.33	
	E	5	100		0.29	
	F	5	100		0.30	
	G	5	100		0.33	
	H	5	100		0.36	
88%	A	5	100	100 +/- 0.00	0.34	0.32 +/- 0.05
	B	5	100		0.28	
	C	5	100		0.34	
	D	5	100		0.42	
	E	5	100		0.37	
	F	5	100		0.28	
	G	5	100		0.27	
	H	5	100		0.26	
100%	A	5	100	98 +/- 7.1	0.28	0.24 +/- 0.05
	B	5	100		0.26	
	C	5	100		0.30	
	D	5	100		0.24	
	E	5	100		0.19	
	F	5	100		0.21	
	G	4	80		0.17	
	H	5	100		0.23	

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

Values in **bold** indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

Appendix Table A-5 (Con'd). Site C-3 Opossum Shrimp 7-Day Survival and Growth Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: September 29, 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 #2	A	5	100	100 +/- 0.00	0.39	0.39 +/- 0.04
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
	F	5	100			
	G	5	100			
	H	5	100			
Salt Control	A	5	100	100 +/- 0.00	0.34	0.38 +/- 0.06
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
	F	5	100			
	G	5	100			
	H	5	100			
25%	A	5	100	98 +/- 7.1	0.35	0.34 +/- 0.05
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
	F	4	80			
	G	5	100			
	H	5	100			
50%	A	5	100	97 +/- 7.6	0.35	0.32 +/- 0.03
	B	4	80			
	C	5	100			
	D	*	*			
	E	5	100			
	F	5	100			
	G	5	100			
	H	5	100			
66%	A	5	100	100 +/- 0.00	0.37	0.31 +/- 0.05
	B	5	100			
	C	5	100			
	D	5	100			
	E	5	100			
	F	5	100			
	G	5	100			
	H	5	100			
100%	A	5	100	98 +/- 7.1	0.39	0.41 +/- 0.06
	B	5	100			
	C	4	80			
	D	5	100			
	E	5	100			
	F	5	100			
	G	5	100			
	H	5	100			

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

* Replicate excluded, mysids not added to test chamber at test initiation.

Values in **bold** indicate a significant decrease in survival or growth was observed in that test concentration relative to the control.

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: September 29, 2004
Test Species: *Mytilus galloprovincialis*

Concentration	Replicate	Percent Normal Development	Mean Percent Normal Development^a
Lab Control #1	A	81	87 +/- 6.5
	B	84	
	C	82	
	D	91	
	E	96	
25%	A	89	89 +/- 3.4
	B	90	
	C	84	
	D	93	
	E	90	
50%	A	90	90 +/- 2.9
	B	94	
	C	91	
	D	86	
	E	90	
100%	A	91	90 +/- 3.2
	B	91	
	C	84	
	D	90	
	E	92	

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

Values in **bold** indicate a significant decrease in normal development was observed in that test concentration relative to the control.

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: September 29, 2004
Test Species: *Mytilus galloprovincialis*

Concentration^a	Replicate	Percent Normal Development	Mean Percent Normal Development^b
Lab Control #1	A	81	87 +/- 6.5
	B	84	
	C	82	
	D	91	
	E	96	
Salt Control #1	A	76	85 +/- 5.5
	B	86	
	C	87	
	D	88	
	E	90	
Brine Control	A	94	92 +/- 4.7
	B	84	
	C	95	
	D	92	
	E	96	
25%	A	86	87 +/- 1.7
	B	86	
	C	85	
	D	89	
	E	88	
50%	A	93	89 +/- 5.2
	B	88	
	C	87	
	D	82	
	E	95	
65%	A	87	91 +/- 2.8
	B	90	
	C	92	
	D	92	
	E	94	
100%	A	89	93 +/- 3.0
	B	96	
	C	96	
	D	91	
	E	93	

^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 statistical 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.

Values in **bold** indicate a significant decrease in normal development was observed in that test concentration relative to the control.

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: September 29, 2004

Test Species: *Mytilus galloprovincialis*

Concentration^a	Replicate	Percent Normal Development	Mean Percent Normal Development^b
Lab Control #2	A	87	89 +/- 2.3
	B	92	
	C	90	
	D	87	
	E	88	
Salt Control #2	A	92	88 +/- 4.2
	B	83	
	C	85	
	D	87	
	E	93	
Brine Control	A	89	91 +/- 2.5
	B	94	
	C	93	
	D	89	
	E	92	
25%	A	91	93 +/- 3.3
	B	96	
	C	90	
	D	97	
	E	91	
50%	A	93	92 +/- 6.0
	B	98	
	C	93	
	D	92	
	E	81	
88%	A	87	92 +/- 3.2
	B	96	
	C	93	
	D	93	
	E	91	
100%	A	95	94 +/- 2.9
	B	93	
	C	94	
	D	89	
	E	97	

^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 statistical 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.

Values in **bold** indicate a significant decrease in normal development was observed in that test concentration relative to the control.

Appendix Table A-6 (Con'd). Site C-3 48-Hour Bivalve Embryo Development Test Results
City of Buenaventura
Santa Clara River Estuary Dry Weather Sampling Event
Test Initiation Date: September 29, 2004
Test Species: *Mytilus galloprovincialis*

Concentration^a	Replicate	Percent Normal Development	Mean Percent Normal Development^b
Lab Control #2	A	87	89 +/- 2.3
	B	92	
	C	90	
	D	87	
	E	88	
Salt Control #2	A	92	88 +/- 4.2
	B	83	
	C	85	
	D	87	
	E	93	
Brine Control	A	94	92 +/- 2.6
	B	89	
	C	90	
	D	95	
	E	91	
25%	A	94	90 +/- 2.4
	B	91	
	C	88	
	D	88	
	E	89	
50%	A	93	92 +/- 5.1
	B	96	
	C	84	
	D	89	
	E	96	
66%	A	96	94 +/- 4.0
	B	95	
	C	97	
	D	96	
	E	87	
100%	A	93	90 +/- 4.8
	B	92	
	C	95	
	D	84	
	E	86	

^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 statistical 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.

Values in **bold** indicate a significant decrease in normal development was observed in that test concentration relative to the control.

M. PYRIFERA

Appendix Table A-7. 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: September 29, 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	71 +/- 6.9	16	15 +/- 1.0
	B	77		15	
	C	61		15	
	D	78		15	
	E	69		17	
25%	A	61	71 +/- 7.4	16	15 +/- 0.59
	B	80		14	
	C	71		16	
	D	67		16	
	E	76		15	
50%	A	56	59 +/- 6.6	15	15 +/- 1.0
	B	68		15	
	C	53		15	
	D	64		14	
	E	54		17	
100%	A	66	65 +/- 4.7	12	13 +/- 1.3
	B	58		13	
	C	65		15	
	D	64		12	
	E	71		14	

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

Values in **bold** indicate a significant decrease in germination or tube length was observed in that test concentration relative to the control.

Appendix Table A-7 (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: September 29, 2004

Test Species: *Macrocystis pyrifera*

Concentration ^a	Replicate	Percent Germinated	Mean Percent Germinated ^b	Spore Length (μm)	Mean Spore Length (μm) ^b
Lab Control #1	A	69	71 +/- 6.9	16	15 +/- 1.0
	B	77		15	
	C	61		15	
	D	78		15	
	E	69		17	
Salt Control #1	A	75	77 +/- 7.2	16	17 +/- 0.31
	B	76		17	
	C	85		17	
	D	67		16	
	E	83		17	
Brine Control	A	84	78 +/- 13	14	13 +/- 0.68
	B	84		14	
	C	81		12	
	D	55		14	
	E	85		14	
25%	A	48	78 +/- 17	16	15 +/- 1.5
	B	82		13	
	C	89		17	
	D	82		14	
	E	87		15	
50%	A	83	84 +/- 1.9	16	16 +/- 1.2
	B	83		15	
	C	82		16	
	D	86		18	
	E	86		16	
62%	A	87	85 +/- 2.7	16	16 +/- 1.0
	B	88		17	
	C	85		16	
	D	85		15	
	E	81		17	
100%	A	71	75 +/- 6.6	13	15 +/- 1.5
	B	68		17	
	C	72		16	
	D	83		15	
	E	81		14	

^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 statistical 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.

Values in bold indicate a significant decrease in germination or tube length was observed in that test concentration relative to the control.

Appendix Table A-7 (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: September 29, 2004

Test Species: *Macrocystis pyrifera*

Concentration ^a	Replicate	Percent Germinated	Mean Percent Germinated ^b	Spore Length (μm)	Mean Spore Length (μm) ^b
Lab Control #2	A	70	70 +/- 4.0	14	14 +/- 1.1
	B	66		16	
	C	67		14	
	D	76		13	
	E	72		13	
Salt Control #2	A	72	74 +/- 8.4	17	15 +/- 1.6
	B	85		13	
	C	72		15	
	D	62		15	
	E	77		15	
Brine Control	A	73	76 +/- 5.6	12	13 +/- 1.4
	B	78		12	
	C	67		12	
	D	76		16	
	E	72		12	
25%	A	76	72 +/- 4.6	13	13 +/- 1.2
	B	71		11	
	C	70		14	
	D	76		12	
	E	65		14	
50%	A	66	72 +/- 5.5	14	13 +/- 0.91
	B	78		12	
	C	69		12	
	D	78		13	
	E	70		14	
84%	A	68	71 +/- 3.4	15	15 +/- 1.6
	B	72		14	
	C	73		14	
	D	76		18	
	E	68		15	
100%	A	77	72 +/- 4.5	14	14 +/- 1.2
	B	65		15	
	C	70		14	
	D	72		12	
	E	74		16	

^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 statistical 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.

Values in **bold** indicate a significant decrease in germination or tube length was observed in that test concentration relative to the control.

Appendix Table A-7 (Con'd). Site C-3 48-Hour Kelp Spore Germination and Growth Test Results

City of Buenaventura

Santa Clara River Estuary Dry Weather Sampling Event

Test Initiation Date: September 29, 2004

Test Species: *Macrocystis pyrifera*

Concentration^a	Replicate	Percent Germinated	Mean Percent Germinated^b	Spore Length (μm)	Mean Spore Length (μm)^b
Lab Control #2	A	70	70 +/- 4.0	14	14 +/- 1.1
	B	66		16	
	C	67		14	
	D	76		13	
	E	72		13	
Salt Control #2	A	72	74 +/- 8.4	17	15 +/- 1.6
	B	85		13	
	C	72		15	
	D	62		15	
	E	77		15	
Brine Control	A	80	72 +/- 7.6	15	15 +/- 1.2
	B	80		16	
	C	68		13	
	D	66		15	
	E	65		14	
25%	A	61	65 +/- 3.4	17	17 +/- 2.1
	B	70		19	
	C	63		14	
	D	66		19	
	E	65		19	
50%	A	69	68 +/- 7.3	17	17 +/- 0.80
	B	64		17	
	C	72		16	
	D	59		18	
	E	78		18	
63%	A	76	72 +/- 3.3	19	19 +/- 1.7
	B	69		20	
	C	75		16	
	D	69		20	
	E	71		18	
100%	A	70	77 +/- 4.8	17	17 +/- 0.95
	B	82		17	
	C	76		18	
	D	77		16	
	E	81		19	

^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 statistical 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.

Values in **bold** indicate a significant decrease in germination or tube length was observed in that test concentration relative to the control.

APPENDIX B
STATISTICAL ANALYSIS SUMMARIES
& RAW BENCH DATASHEETS

FRESHWATER

P. PROMELAS

CETIS Test Summary

Fathead Minnow 7-d Larval Survival and Growth Test						Nautilus Environmental (CA)		
Test No:	01-6674-8537	Test Type:	Growth-Survival (7d)	Duration:	6d 23h	Species:	Pimephales promelas	
Start Date:	29 Sep-04 01:30 PM	Protocol:	EPA/821/R-02-013 (2002)	Source:	Aquatic Biosystems, CO			
Ending Date:	06 Oct-04 12:30 PM	Dil Water:	Not Applicable	Brine:	Not Applicable			
Setup Date:	29 Sep-04 01:30 PM	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample No:	03-3861-8381	Code:	0409-106	Project:				
Sample Date:	28 Sep-04 09:20 AM	Source:	City of Buenaventura					
Receive Date:	28 Sep-04 08:30 PM	Station:	B-1					
Sample Age:	28h (16.6 °C)							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
17-7908-1817	7d Proportion Survived	100	> 100	N/A	15.14%	Equal Variance t		
07-1645-8177	Mean Dry Biomass-mg	100	> 100	N/A	21.16%	Equal Variance t		
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
17-7908-1817	7d Proportion Survived	Control Response	0.875	0.8 - N/A	Passes acceptability criteria			
07-1645-8177	Mean Dry Biomass-mg	Control Response	0.3885	0.25 - N/A	Passes acceptability criteria			
07-1645-8177	Mean Dry Biomass-mg	MSDp	0.21161	0.12 - 0.3	Passes acceptability criteria			
7d Proportion Survived Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.90000	0.80000	1.00000	0.04082	0.08165	9.07%
0	Salt Control	4	0.87500	0.70000	1.00000	0.06292	0.12583	14.38%
100		4	0.97500	0.90000	1.00000	0.02500	0.05000	5.13%
Mean Dry Biomass-mg Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	0.36450	0.33800	0.37700	0.00921	0.01841	5.05%
0	Salt Control	4	0.38850	0.29800	0.46400	0.03451	0.06902	17.77%
100		4	0.31625	0.27200	0.37100	0.02448	0.04895	15.48%
7d Proportion Survived Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4			
0	Lab Control	1.00000	0.90000	0.90000	0.80000			
0	Salt Control	1.00000	0.70000	0.90000	0.90000			
100		0.90000	1.00000	1.00000	1.00000			
Mean Dry Biomass-mg Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4			
0	Lab Control	0.37700	0.33800	0.36600	0.37700			
0	Salt Control	0.40800	0.29800	0.38400	0.46400			
100		0.27200	0.37100	0.34400	0.27800			

CETIS Analysis Detail

Fathead Minnow 7-d Larval Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	10-6144-8399	10-6144-8399	28 Dec-04 2:42 PM	CETISv1.025

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	15.14%

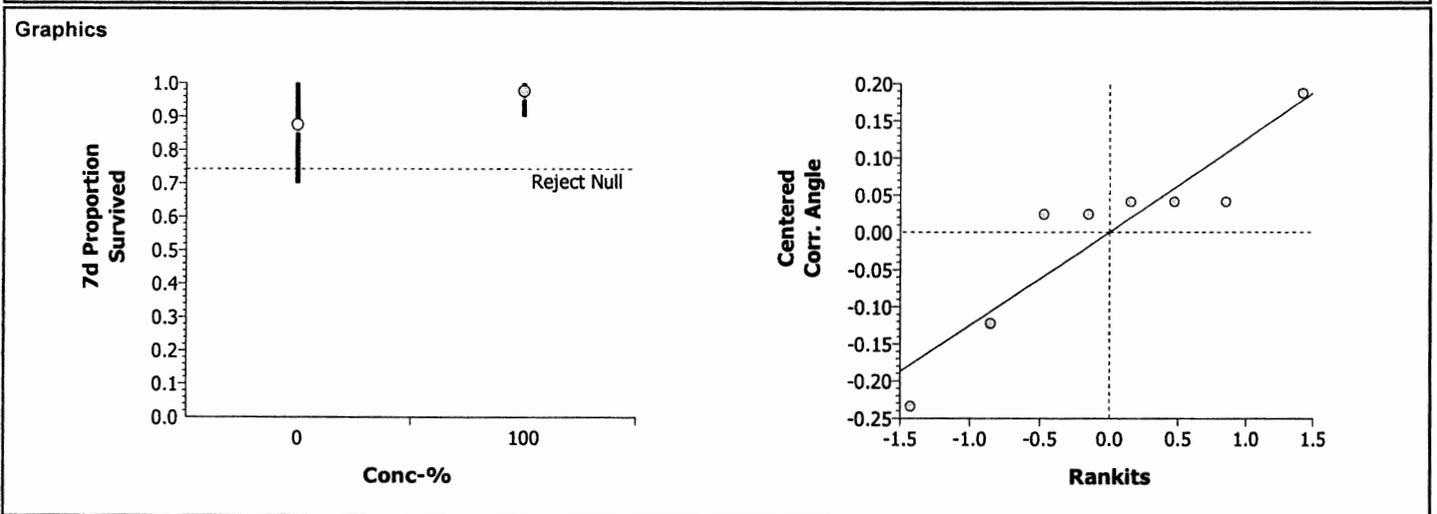
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.875	0.8 - N/A	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	4.55904	47.46723	0.24458	Equal Variances
Distribution	Shapiro-Wilk W	0.86890	0.74935	0.14661	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0426072	0.042607	1	2.31	0.17946	Non-Significant Effect
Error	0.1107333	0.018456	6			
Total	0.15334043	0.0610627	7			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-1.5194	1.94318	0.9103	0.18666	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	0.87500	0.70000	1.00000	0.12583	1.22532	0.99116	1.41202	0.17399
100		4	0.97500	0.90000	1.00000	0.05000	1.37127	1.24905	1.41202	0.08149



CETIS Analysis Detail

Fathead Minnow 7-d Larval Survival and Growth Test Nautilus Environmental (CA)

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	10-6144-8399	10-6144-8399	28 Dec-04 2:42 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	21.16%

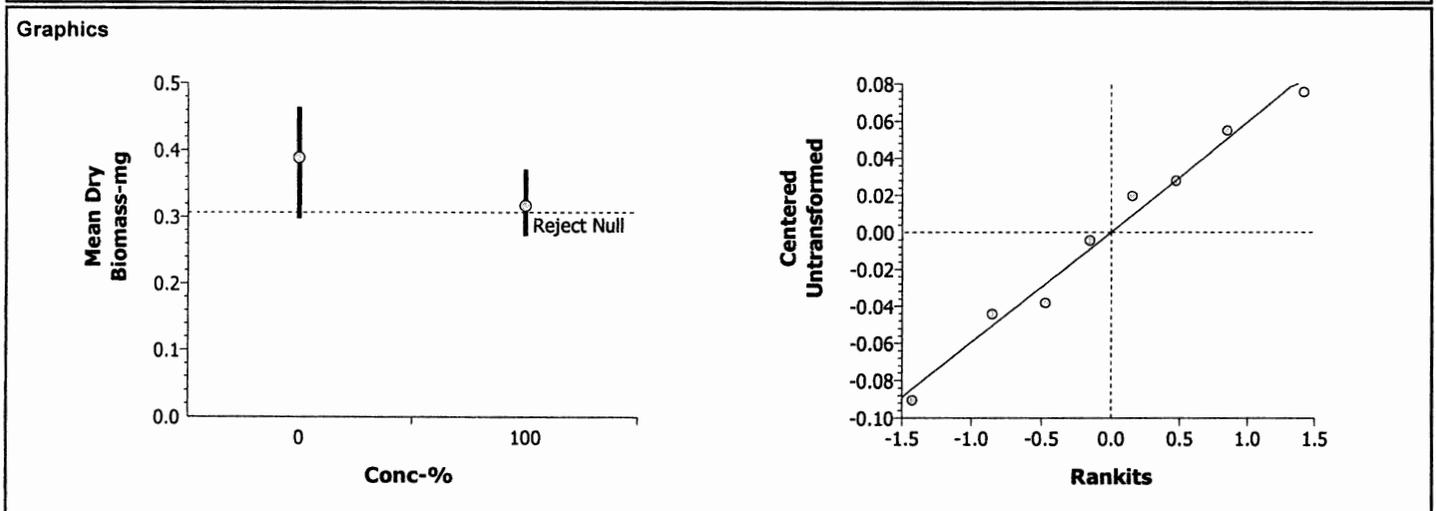
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.3885	0.25 - N/A	Passes acceptability criteria
MSDp	0.21161	0.12 - 0.3	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.98796	47.46723	0.58681	Equal Variances
Distribution	Shapiro-Wilk W	0.97393	0.74935	0.91645	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0104401	0.010440	1	2.92	0.13856	Non-Significant Effect
Error	0.0214798	0.00358	6			
Total	0.0319199	0.0140201	7			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	1.70771	1.94318	0.0693	0.08221	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	0.38850	0.29800	0.46400	0.06902				
100		4	0.31625	0.27200	0.37100	0.04895				



CETIS Test Summary

Report Date: 28 Dec-04 2:37 PM

Link: 20-8267-0658/0409-108

Fathead Minnow 7-d Larval Survival and Growth Test							Nautilus Environmental (CA)				
Test No:	05-6666-2131	Test Type:	Growth-Survival (7d)	Duration:	6d 23h	Start Date:	29 Sep-04 01:30 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Pimephales promelas
Ending Date:	06 Oct-04 12:30 PM	Dil Water:	Not Applicable	Source:	Aquatic Biosystems, CO	Setup Date:	29 Sep-04 01:30 PM	Brine:	Not Applicable		
Sample No:	11-7952-9119	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura	Sample Date:	28 Sep-04 03:30 PM	Code:	0409-108	Project:	
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura			Sample Age:	22h (20.6 °C)	Station:	C-3		
Comparison Summary											
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method					
02-2203-2225	7d Proportion Survived	100	> 100	N/A	22.00%	Equal Variance t					
04-5494-4607	Mean Dry Biomass-mg	100	> 100	N/A	18.52%	Equal Variance t					
Test Acceptability											
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision						
02-2203-2225	7d Proportion Survived	Control Response	0.8	0.8 - N/A	Fails acceptability criteria						
04-5494-4607	Mean Dry Biomass-mg	Control Response	0.33850	0.25 - N/A	Passes acceptability criteria						
04-5494-4607	Mean Dry Biomass-mg	MSDp	0.18522	0.12 - 0.3	Passes acceptability criteria						
7d Proportion Survived Summary											
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV			
0	Lab Control	4	0.90000	0.80000	1.00000	0.04082	0.08165	9.07%			
0	Salt Control	4	0.80000	0.70000	0.90000	0.04082	0.08165	10.21%			
100		4	0.82500	0.70000	1.00000	0.06292	0.12583	15.25%			
Mean Dry Biomass-mg Summary											
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV			
0	Lab Control	4	0.36450	0.33800	0.37700	0.00921	0.01841	5.05%			
0	Salt Control	4	0.33850	0.26500	0.39900	0.02819	0.05639	16.66%			
100		4	0.32500	0.29400	0.36100	0.01569	0.03138	9.66%			
7d Proportion Survived Detail											
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4						
0	Lab Control	1.00000	0.90000	0.90000	0.80000						
0	Salt Control	0.90000	0.80000	0.70000	0.80000						
100		0.80000	0.70000	1.00000	0.80000						
Mean Dry Biomass-mg Detail											
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4						
0	Lab Control	0.37700	0.33800	0.36600	0.37700						
0	Salt Control	0.39900	0.26500	0.35900	0.33100						
100		0.34100	0.29400	0.36100	0.30400						

CETIS Analysis Detail

Fathead Minnow 7-d Larval Survival and Growth Test	Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	20-8267-0658	20-8267-0658	28 Dec-04 2:37 PM	CETISv1.025

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	22.00%

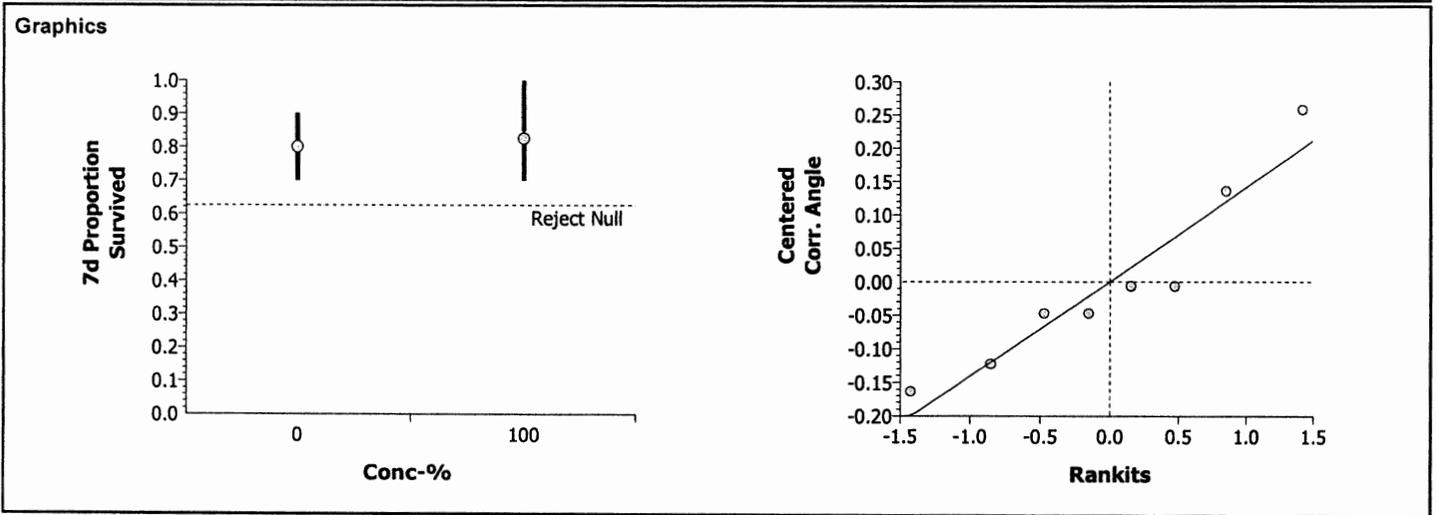
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.8	0.8 - N/A	Fails acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.91671	47.46723	0.40277	Equal Variances
Distribution	Shapiro-Wilk W	0.91290	0.74935	0.35132	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0033199	0.00332	1	0.15	0.70994	Non-Significant Effect
Error	0.130901	0.021817	6			
Total	0.13422094	0.0251368	7			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-0.3901	1.94318	0.6450	0.20295	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	0.80000	0.70000	0.90000	0.08165	1.11362	0.99116	1.24905	0.10555
100		4	0.82500	0.70000	1.00000	0.12583	1.15437	0.99116	1.41202	0.18026



CETIS Analysis Detail

Fathead Minnow 7-d Larval Survival and Growth Test Nautilus Environmental (CA)

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	20-8267-0658	20-8267-0658	28 Dec-04 2:37 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	18.52%

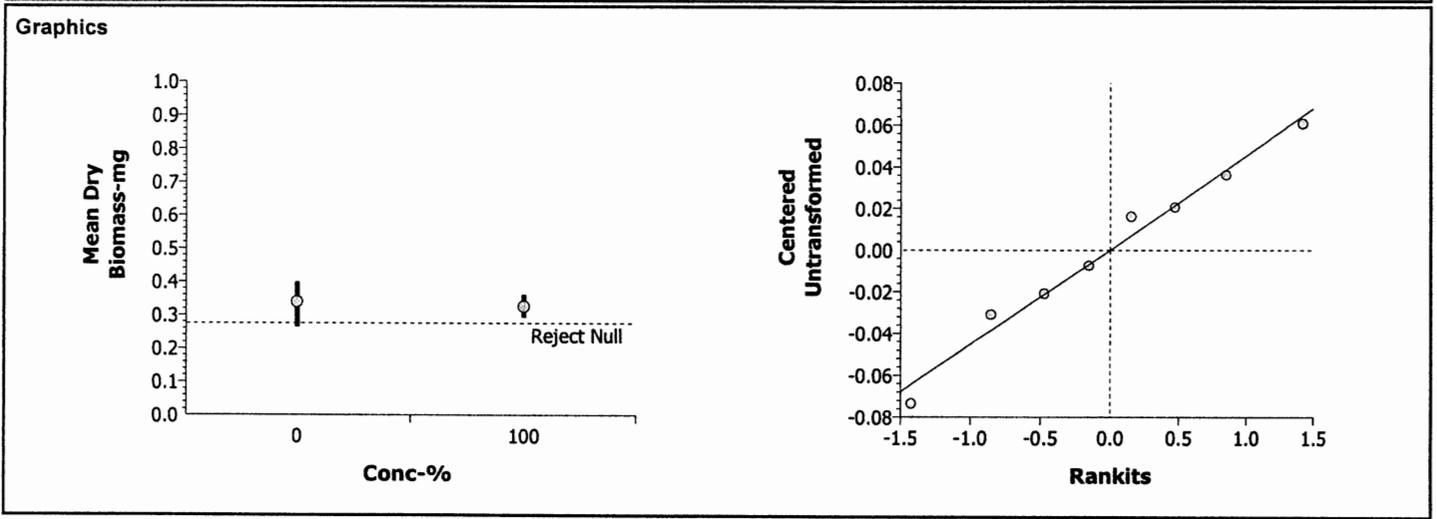
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.33850	0.25 - N/A	Passes acceptability criteria
MSDp	0.18522	0.12 - 0.3	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.22919	47.46723	0.36140	Equal Variances
Distribution	Shapiro-Wilk W	0.98352	0.74935	0.97809	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0003645	0.000364	1	0.18	0.69022	Non-Significant Effect
Error	0.012493	0.002082	6			
Total	0.01285750	0.0024467	7			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	0.4184	1.94318	0.3451	0.0627	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	0.33850	0.26500	0.39900	0.05639				
100		4	0.32500	0.29400	0.36100	0.03138				



Freshwater Chronic Bioassay

Larval Fish Survival & Weights

Test Species: P. promelas

Client Name: City of Buena Ventura

Test Date: 9/29/04

Sample ID: B-1, C-3

Test No.: 0409-106, 108

Conc. (100%)	Rep.	Test Day								Percent Survival	pan wt. (g)	pan + fish (g)
		0	1	2	3	4	5	6	7			
Lab Control	a	10	10	10	10	10	10	10	10	100	0.02326	0.02703
	b	10	10	10	10	10	9	9	9	90	0.02126	0.02464
	c	10	10	10	9	10	10	10	9	90	0.02412	0.02778
	d	10	10	10	10	10	9	8	8	80	0.02132	0.02509
B-1 Salt Cont. (0.9 ppt) AH	a	10	10	10	10	10	10	10	10	100	0.02052	0.02460
	b	10	10	10	10	10	9	7	7	70	0.02194	0.02492
	c	10	10	10	10	10	10	10	9	90	0.01983	0.02367
	d	10	10	10	10	10	10	10	9	90	0.02052	0.02516
B-1 100%	a	10	10	10	10	10	10	9	9	90	0.01934	0.02206
	b	10	10	10	10	10	10	10	10	100	0.02208	0.02579
	c	10	10	10	10	10	10	10	10	100	0.02139	0.02483
	d	10	10	10	10	10	10	10	10	100	0.01968	0.02246
C-3 100%	a	10	10	10	10	10	9	9	8	80	0.02151	0.02492
	b	10	10	10	10	10	10	7	7	70	0.02142	0.02434
	c	10	10	10	10	10	10	10	10	100	0.01951	0.02312
	d	10	10	10	10	10	10	8	8	80	0.02063	0.02367
C-3 Salt Cont. 3 ppt	a	10	10	10	10	9	9	9	9	90	0.02047	0.02446
	b	10	10	10	10	10	10	9	8	80	0.01944	0.02209
	c	10	10	10	10	10	10	7	7	70	0.02131	0.02490
	d	10	10	10	10	10	8	8	8	80	0.02044	0.02395
	a											
	b											
	c											
	d											
	a											
	b											
	c											
	d											

Tech Initials: SGR RB RB RB RL RB RL RL

Feeding Times (day):

	0	1	2	3	4	5	6
-	0820	0900	0845	0845	0815	0820	
-	1315	1400	1300	1330	1232	1240	
	1600	1630	1600	1435	1430	1600	1530

Weight Data:
 Date/Time in: 10-6-04 / 1245
 Date/Time out: 10-7-04 / 1510
 Oven Temp (°C): 65
 Tech Initials: RL

Comments: _____

QC Check: RB 12/21/04
 Final Review: RB 12/28/04

Client: City of Benavventura
 Sample ID: B-1, C-3
 Test No: 0409-106, 108

Test Species: P. promelas
 Start Date/Time: 9-29-04 / 11330
 End Date/Time: 10-6-04 / 1230

Concentration	Lab Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.24	8.23	8.10	8.12	8.29	8.14	8.18	
DO (mg/L)	7.0	7.8	7.5	7.7	7.8	7.6	7.7	
Cond. (µmhos/cm)	215	222	221	216	213	215	212	
Temp (°C)	24.8	25.7	25.4	25.3	25.4	24.4	25.1	
Final								
pH		8.18	7.64	7.69	7.78	7.74	7.85	7.90
DO (mg/L)		7.3	5.7	5.8	5.9	6.1	5.8	6.3
Temp (°C)		24.6	24.2	24.7	25.6	24.7	25.5	25.7

Concentration	B-1 100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.96	7.84	7.92	7.89	7.95	7.91	7.92	
DO (mg/L)	8.8	6.7	8.9	9.5	10.2	9.7	10.2	
Cond. (µmhos/cm)	2480	2470	2520	2600	2450	2440	2400	
Temp (°C)	25.0	24.9	25.3	25.8	24.4	24.3	24.3	
Final								
pH		8.06	7.81	8.03	8.01	7.89	7.76	7.82
DO (mg/L)		6.2	5.0	5.7	5.2	5.3	4.7	5.1
Temp (°C)		24.8	25.4	24.7	25.8	24.9	25.5	25.9

Concentration	Salt Control #1 (1.0ppt) B-1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.25	8.18	8.16	8.14	8.19	8.14	8.17	
DO (mg/L)	7.6	8.5	8.6	8.7	9.4	9.5	10.2	
Cond. (µmhos/cm)	2330	2350	2350	2420	2290	2310	2270	
Temp (°C)	24.9	24.4	25.3	25.6	24.6	24.3	24.3	
Final								
pH		8.01	7.59	7.68	7.74	7.70	7.72	7.75
DO (mg/L)		7.2	6.1	6.0	6.1	6.2	6.2	6.3
Temp (°C)		24.7	25.1	24.6	25.7	24.8	25.5	25.7

Concentration	C-3 100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.95	7.98	7.97	7.96	7.98	7.96	7.95	
DO (mg/L)	9.0	8.2	9.2	9.4	10.4	10.0	10.4	
Cond. (µmhos/cm)	5700	5680	5690	5880	5550	5590	5500	
Temp (°C)	25.0	25.1	25.3	25.8	24.3	24.3	24.2	
Final								
pH		8.21	7.94	8.05	8.07	8.06	7.88	7.95
DO (mg/L)		7.1	4.9	5.8	5.9	6.0	5.0	4.6
Temp (°C)		24.9	25.5	24.7	25.8	24.9	25.5	25.8

Concentration	Salt Control #2 (3.0ppt) C-3							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.21	8.14	8.10	8.10	8.12	8.08	8.05	
DO (mg/L)	7.5	9.1	8.7	8.8	9.7	9.7	10.2	
Cond. (µmhos/cm)	5480	5490	5550	5710	5470	5430	5410	
Temp (°C)	25.1	24.8	25.3	25.7	24.5	24.3	24.7	
Final								
pH		7.96	7.65	7.75	7.90	7.10	7.64	7.68
DO (mg/L)		7.0	6.4	6.1	6.4	6.3	6.3	6.1
Temp (°C)		24.7	25.4	24.7	25.7	24.9	25.5	25.8

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)								

Animal Source/Date Received: ABS 9-29-04

Animal Age at Initiation: 448 hours

Comments: ⓐ Sample DO was supersaturated. Heated + cooled to get DO to 108% DO saturation prior to initiation.

QC Check: afj 12/27/04

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

Final Review: AH 12/28/04

C. DUBIA

Report Date: 28 Dec-04 2:16 PM

Link: 04-4893-5142/0409-110

CETIS Test Summary

Ceriodaphnia 7-d Survival and Reproduction Test							Nautilus Environmental (CA)				
Test No:	19-2505-8962	Test Type:	Reproduction-Survival (7d)			Duration:	7d 0h				
Start Date:	29 Sep-04 02:00 PM	Protocol:	EPA/821/R-02-013 (2002)			Species:	Ceriodaphnia dubia				
Ending Date:	06 Oct-04 02:00 PM	Dil Water:	Not Applicable			Source:	In-House Culture				
Setup Date:	29 Sep-04 02:00 PM	Brine:	Not Applicable								
Sample No:	10-0249-1803	Material:	Estuarine Monitoring Sample			Client:	City of Buenaventura				
Sample Date:	28 Sep-04 10:30 AM	Code:	0409-110			Project:					
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura								
Sample Age:	28h (16.6 °C)	Station:	B-1								
Comparison Summary											
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method					
10-9914-6993	7d Proportion Survived	100	> 100	N/A	N/A	Fisher's Exact					
01-1148-5745	Reproduction	100	> 100	N/A	29.96%	Equal Variance t					
Test Acceptability											
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision						
10-9914-6993	7d Proportion Survived	Control Response	0.9	0.8 - N/A	Passes acceptability criteria						
01-1148-5745	Reproduction	Control Response	27	15 - N/A	Passes acceptability criteria						
01-1148-5745	Reproduction	MSDp	0.29957	0.13 - 0.47	Passes acceptability criteria						
7d 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	Salt Control	10	0.90000	0.00000	1.00000	0.10000	0.31623	35.14%			
100		10	0.80000	0.00000	1.00000	0.13333	0.42164	52.70%			
Reproduction Summary											
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV			
0	Lab Control	10	24.6	6	34	2.8914	9.1433	37.17%			
0	Salt Control	10	27	0	38	3.33	10.530	39.00%			
100		10	21.7	0	35	3.2662	10.328	47.60%			
7d 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	Salt Control	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.00000
100		1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	0.00000	1.00000
Reproduction 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	33	33	30	6	26	34	16	23	28	17
0	Salt Control	38	24	29	26	29	25	30	33	36	0
100		31	35	28	14	0	28	25	22	13	21

CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test Nautilus Environmental (CA)

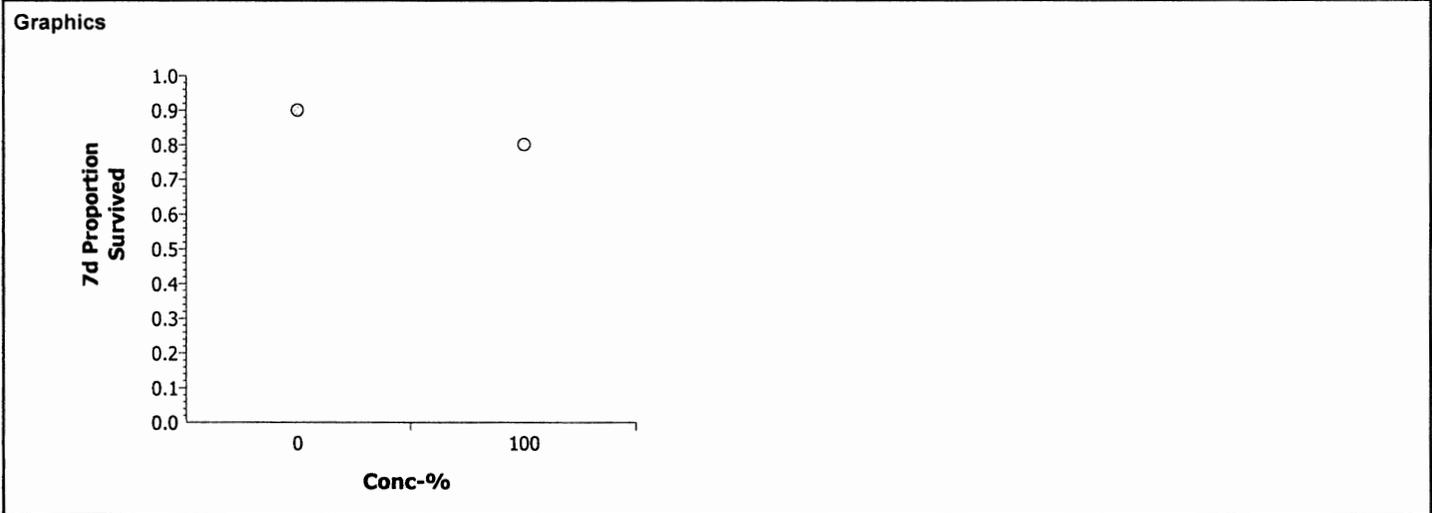
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	04-4893-5142	04-4893-5142	28 Dec-04 2:15 PM	CETISv1.025

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

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.9	0.8 - N/A	Passes acceptability criteria

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	9	1	10
100		8	2	10



CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Reproduction	Comparison	04-4893-5142	04-4893-5142	28 Dec-04 2:16 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	29.96%

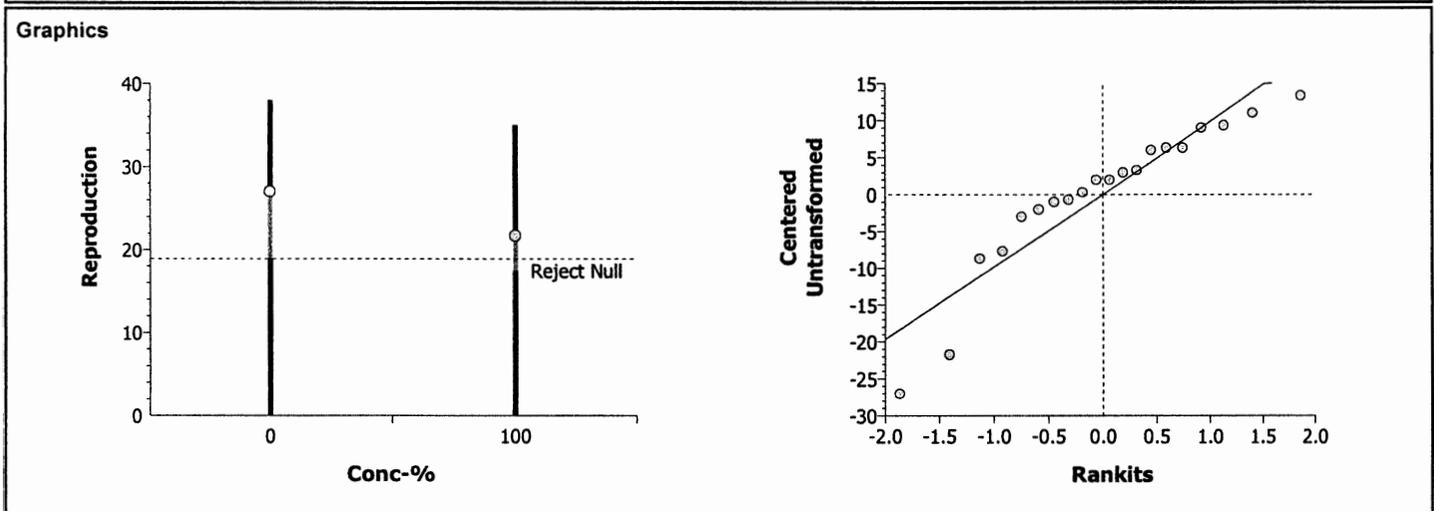
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	27	15 - N/A	Passes acceptability criteria
MSDp	0.29957	0.13 - 0.47	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.03948	6.54109	0.95496	Equal Variances
Distribution	Shapiro-Wilk W	0.87784	0.86826	0.01526	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	140.45	140.45	1	1.29	0.27075	Non-Significant Effect
Error	1958.1	108.7833	18			
Total	2098.54997	249.23333	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	1.13627	1.73406	0.1354	8.08837	Non-Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	10	27	0	38	10.530				
100		10	21.7	0	35	10.328				



CETIS Test Summary

Ceriodaphnia 7-d Survival and Reproduction Test							Nautilus Environmental (CA)				
Test No:	07-3137-9826	Test Type:	Reproduction-Survival (7d)	Duration:	7d 0h						
Start Date:	29 Sep-04 02:00 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Ceriodaphnia dubia						
Ending Date:	06 Oct-04 02:00 PM	Dil Water:	Not Applicable	Source:	In-House Culture						
Setup Date:	29 Sep-04 02:00 PM	Brine:	Not Applicable								
Sample No:	11-4838-5603	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura						
Sample Date:	28 Sep-04 03:30 PM	Code:	0409-112	Project:							
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura								
Sample Age:	22h (20.6 °C)	Station:	C-3								
Comparison Summary											
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method					
17-3543-6816	7d Proportion Survived	100	> 100	N/A	N/A	Fisher's Exact					
09-9505-1311	Reproduction	100	> 100	N/A	139.69%	Equal Variance t					
Test Acceptability											
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision						
17-3543-6816	7d Proportion Survived	Control Response	0.4	0.8 - N/A	Fails acceptability criteria						
09-9505-1311	Reproduction	Control Response	2.4	15 - N/A	Fails acceptability criteria						
09-9505-1311	Reproduction	MSDp	1.39688	0.13 - 0.47	Fails acceptability criteria						
7d 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	Salt Control	10	0.40000	0.00000	1.00000	0.16330	0.51640	129.10			
100		10	0.80000	0.00000	1.00000	0.13333	0.42164	52.70%			
Reproduction Summary											
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV			
0	Lab Control	10	24.6	6	34	2.8914	9.1433	37.17%			
0	Salt Control	10	2.4	0	10	1.1851	3.7476	156.15			
100		10	8	0	14	1.5275	4.8305	60.38%			
7d 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	Salt Control	0.00000	1.00000	1.00000	0.00000	0.00000	0.00000	0.00000	1.00000	0.00000	1.00000
100		1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	1.00000	0.00000
Reproduction 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	33	33	30	6	26	34	16	23	28	17
0	Salt Control	0	8	0	0	0	0	0	10	2	4
100		8	10	10	8	0	6	14	11	13	0

CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Reproduction	Comparison	08-6547-5968	08-6547-5968	28 Dec-04 2:26 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	139.69%

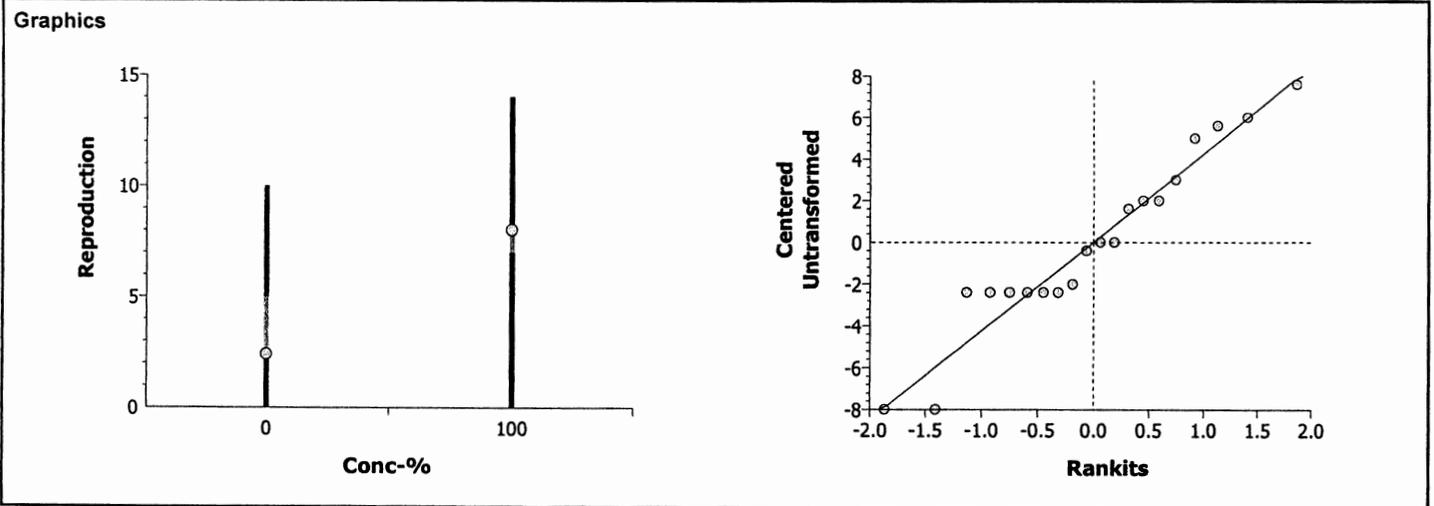
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	2.4	15 - N/A	Fails acceptability criteria
MSDp	1.39688	0.13 - 0.47	Fails acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.66139	6.54109	0.46121	Equal Variances
Distribution	Shapiro-Wilk W	0.94110	0.86826	0.24847	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	156.8	156.8	1	8.39	0.00962	Significant Effect
Error	336.4	18.68889	18			
Total	493.199997	175.48889	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-2.8966	1.73406	0.9952	3.35252	Non-Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	10	2.40000	0.00000	10.0000	3.74759				
100		10	8.00000	0.00000	14.0000	4.83046				



CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test					Nautilus Environmental (CA)
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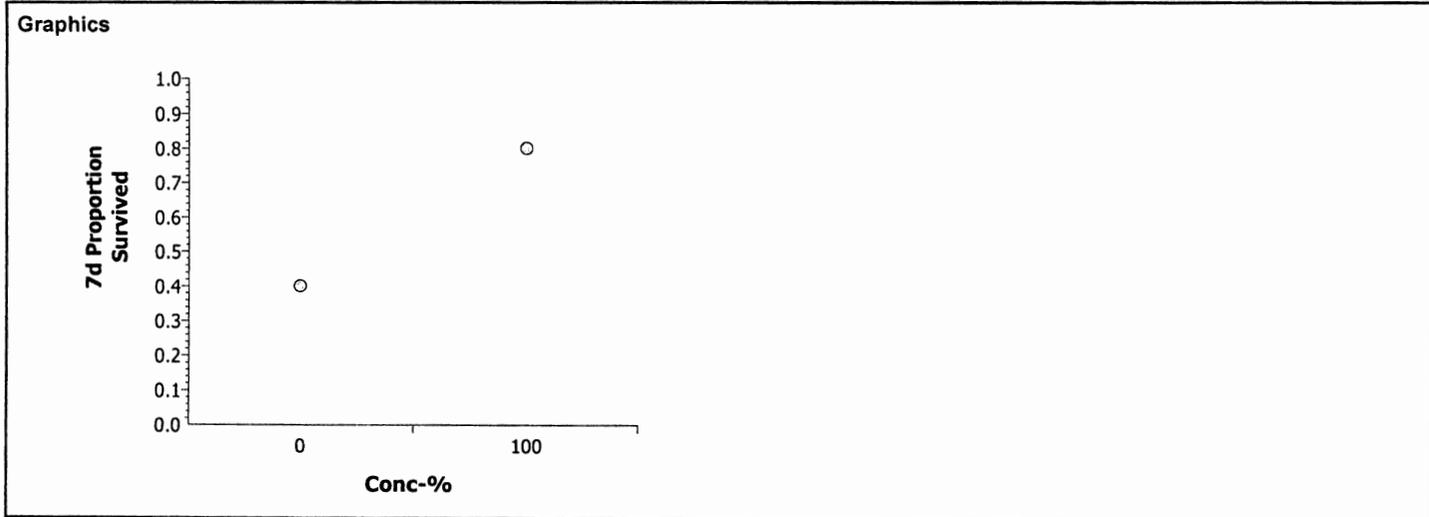
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	08-6547-5968	08-6547-5968	28 Dec-04 2:25 PM	CETISv1.025

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

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.4	0.8 - N/A	Fails acceptability criteria

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	4	6	10
100		8	2	10



Client/Sample ID: City of Buena Ventura / B-1, C-3
 Test No: 0409-110,112

Start Date/Time: 9-29-04 / 1400
 End Date/Time: 10-6-04 / 1400

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
Lab Control	1	0	0	0	0	14	13	0		33	
	2	0	0	0	6	10	0	17		33	
	3	0	0	6	0	4	15	21		30	
	4	0	0	0	0	6	4	2		6	
	5	0	0	0	6	8	12	0		26	
	6	0	0	0	6	12	0	16		34	16 SH
	7	0	0	0	0	0	3	13		16	
	8	0	0	0	4	16	13	17		23	
	9	0	0	5	0	10	13	16		28	
	10	0	0	0	0	2	6	9		17	
Analyst	SD	SD	PS	PR	AH	AH	PS	RY			

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
B-1 100%	1	6	0	0	6	0	10	15		31	
	2	0	0	0	0	10	11	14		35	
	3	0	0	0	4	12	12	0	11	28	
	4	0	0	0	0	1	4	6	0	14	
	5	0	0	0	0	0	0	0	0	0	
	6	0	0	0	0	4	9	0	15	28	
	7	0	0	0	0	6	10	9	21	25	
	8	0	0	0	0	5	9	8	9	22	10 SH
	9	0	0	0	0	0	7/d	0	0	13/d	
	10	0	0	0	0	2	9	10	4	21	

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
Salt Control #1	1	0	0	0	6	15	17	0		38	
	2	0	0	0	5	9	0	10		24	
	3	0	0	5	0	12	12	17		29	
	4	0	0	0	5	10	0	11		26	11 SH
	5	0	0	0	6	10	13	0		29	
	6	0	0	0	6	3	0	16		25	
	7	0	0	0	6	13	11	19		30	
	8	0	0	0	8	10	0	17		33	
	9	0	0	5	0	13	18	20		36	
	10	0/d	-	-	-	-	-	-		0/d	

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
C-3 100%	1	0	0	0	0	5	3	0		8	
	2	0	0	0	0	5	5	0		10	
	3	0	0	0	0	0	0	7		7	
	4	0	0	0	0	0	0	0		0	
	5	0	0	0	0	0	0	0		0	
	6	0	0	0	0	6	16	0	1	23	
	7	0	0	0	0	0	0	0		0	
	8	0	0	0	0	0	0	0		0	8 SH
	9	0	0	0	0	0	0	0		0	
	10	0	0	0	0	0	0	0		0	

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
Salt Control #2	1	0	0	0	old	-	-	-		old	
	2	0	0	0	old	1	7	0		8	
	3	0	0	0	0	0	0	0		0	0 SH
	4	old	-	-	-	-	-	-		old	
	5	old	-	-	-	-	-	-		old	
	6	0	0	-	-	-	-	-		old	
	7	0	0	0	old	-	-	-		old	
	8	0	0	0	2	3	0	3		10	
	9	0	0	0	0	2/d	-	-		2/d	
	10	0	0	0	0	3	0	1		4	

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
	1	0	0								
	2	0	0								
	3	0	0								
	4	0	0								
	5	0	0								
	6	0	0								
	7	0	0								
	8	0	0								
	9	0	0								
	10	old	-	-	-	-	-	-		old	

Time Fed (day): (0) 1400 (1) 1030 (2) 1510 (3) 1235 (4) 1300 (5) 1440 (6) 1030 (7) _____ (8) _____

Comments: first 3 broods only included in reproduction totals

QC Check: [Signature] 12/21/04

Final Review: AH 12/28/04

Freshwater Chronic Bioassay

Water Quality Measurements

Client: City of Buena Ventura
 Sample ID: B-1, C-3
 Test No: 0409-110,112

Test Species: C. dubia
 Start Date/Time: 9-29-04 11400
 End Date/Time: 10-6-04 / 1400

Concentration	Lab Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.24	7.73	8.10	8.12	8.29	8.26	8.18	
DO (mg/L)	7.6	7.6	7.5	7.7	7.8	7.5	7.7	
Cond. (µmhos/cm)	215	222	221	216	213	214	212	
Temp (°C)	24.8	25.4	25.4	25.3	25.1	25.0	25.1	
Final								
pH		7.82	7.98	7.98	8.07	7.94	7.93	7.91
DO (mg/L)		8.0	8.3	7.8	8.2	8.1	8.2	8.1
Temp (°C)		24.7	24.9	24.5	24.3	25.0	24.9	24.7

Concentration	B-1 100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.96	7.89	7.92	7.89	7.95	7.91	7.92	
DO (mg/L)	8.8	8.7	8.9	9.5	10.2	9.7	10.2	
Cond. (µmhos/cm)	2480	2470	2520	2600	2450	2440	2400	
Temp (°C)	25.0	24.9	25.8	25.8	24.4	24.3	24.3	
Final								
pH		8.26	8.25	8.22	8.36	8.22	8.26	8.25
DO (mg/L)		7.8	8.3	7.7	8.0	8.4	8.2	8.1
Temp (°C)		24.7	24.9	24.5	24.3	25.0	24.9	24.7

Concentration	Salt Control #1 (1.1 ppt) B-1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.25	8.14	8.16	8.14	8.14	8.14	8.17	
DO (mg/L)	7.6	8.5	8.6	8.7	9.4	9.5	10.2	
Cond. (µmhos/cm)	2330	2330	2350	2420	2290	2310	2270	
Temp (°C)	24.9	24.8	25.3	25.6	24.6	24.3	24.3	
Final								
pH		7.81	7.95	8.01	8.03	7.96	7.89	7.99
DO (mg/L)		8.1	8.3	7.8	8.3	8.3	8.3	8.2
Temp (°C)		24.7	24.9	24.5	24.3	25.0	24.9	24.7

Concentration	C-3 100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	7.95	7.96	7.97	7.96	7.98	7.96	7.95	
DO (mg/L) 9.0	4.7(A)	5.2	9.2	9.4	10.4	10.0	10.4	
Cond. (µmhos/cm)	5700	5680	5690	5880	5550	5590	5500	
Temp (°C)	25.0	25.1	25.8	25.8	24.3	24.3	24.2	
Final								
pH		8.30	8.22	8.22	8.31	8.31	8.42	8.31
DO (mg/L)		8.0	8.3	7.8	8.7	8.0	8.3	8.0
Temp (°C)		24.7	24.9	24.5	24.3	25.0	24.9	24.7

Concentration	Salt Control #2 (3.0 ppt) C-3							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.21	8.10	8.10	8.10	8.12	8.08	8.03	
DO (mg/L)	7.5	9.1	8.7	8.8	9.7	9.7	10.2	
Cond. (µmhos/cm)	5480	5410	5550	5740	5470	5430	5410	
Temp (°C)	25.1	24.8	25.3	25.7	24.5	24.3	24.7	
Final								
pH		7.93	7.94	8.01	8.10	7.91	7.93	7.92
DO (mg/L)		8.2	8.3	7.8	8.1	8.4	8.2	8.1
Temp (°C)		24.7	24.9	24.5	24.3	25.0	24.9	24.7

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)								

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

Analysts:	Initial:	0	1	2	3	4	5	6	7
		AH	SD	SH	SH	AH	AH	lee	
	Final:		SD	SH	SH	Rg	Rg	D	KH

Comments: (A) Sample DO was supersaturated. Heated + cooled to get DO to 108% saturation prior to initiation.

QC Check: [Signature] 12/27/04

Final Review: AH 12/28/04

Freshwater Chronic Bioassay

Brood Selection Datasheet

Client/Sample ID: Buena Ventura/B1, C-3 Start Date: 9/29/04
Test Number: 0409-110, 112 Start Time: 1400
Test Species: C. dubia

Test Rep #	Brood Board #	Cup #
1	53	2
2	53	4
3	53	5
4	53	6
5	53	11
6	53	12
7	53	13
8	53	18
9	53	19
10	53	21

Verified by: STG

Comments: _____

QC Check: [Signature] 12/21/04

Final Review: Alt 12/28/04

S. CAPRICORNUTUM

Report Date: 13 Jan-05 2:41 PM

Link: 13-9646-0741/0409-114

CETIS Test Summary

Selenastrum Growth Test				Nautilus Environmental (CA)				
Test No:	15-2193-0729	Test Type:	Cell Growth	Duration:	94h	Species:	Selenastrum capricornutum	
Start Date:	29 Sep-04 03:30 PM	Protocol:	EPA/821/R-02-013 (2002)	Dil Water:	Not Applicable	Source:	Aquatic Biosystems, CO	
Ending Date:	03 Oct-04 01:50 PM	Brine:	Not Applicable					
Setup Date:	29 Sep-04 03:30 PM							
Sample No:	13-7326-2103	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura	Project:		
Sample Date:	28 Sep-04 09:20 AM	Code:	0409-114					
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	30h (16.6 °C)	Station:	B-1					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
10-7830-6154	Cell Density	< 100	100	N/A	21.72%	Equal Variance t		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method		
14-1567-5618	Cell Density	25	46.49776	38.38539	70.48632	Linear Interpolation		
		50	92.99553	76.77077	N/A			
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
10-7830-6154	Cell Density	Control CV	0.28678	N/A - 0.2	Fails acceptability criteria			
14-1567-5618	Cell Density	Control CV	0.28678	N/A - 0.2	Fails acceptability criteria			
10-7830-6154	Cell Density	Control Response	1404000	1000000 - N/A	Passes acceptability criteria			
14-1567-5618	Cell Density	Control Response	1404000	1000000 - N/A	Passes acceptability criteria			
10-7830-6154	Cell Density	MSDp	0.21722	0.091 - 0.29	Passes acceptability criteria			
Cell Density Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	2.22E+6	1.85E+6	2.42E+6	1.33E+5	2.66E+5	11.98%
0	Salt Control	4	1.40E+6	8.95E+5	1.87E+6	2.01E+5	4.03E+5	28.68%
100		4	7.56E+5	5.09E+5	1.02E+6	1.14E+5	2.28E+5	30.14%
100 unfilt.	Untreated	4	5.42E+5	4.40E+5	6.37E+5	4.18E+4	8.36E+4	15.42%
Cell Density Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4			
0	Lab Control	2.20E+6	2.41E+6	2.42E+6	1.85E+6			
0	Salt Control	1.87E+6	8.95E+5	1.37E+6	1.48E+6			
100		1.02E+6	8.65E+5	6.34E+5	5.09E+5			
100 unfilt.	Untreated	5.73E+5	6.37E+5	4.40E+5	5.18E+5			

CETIS Analysis Detail

Selenastrum Growth Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	13-9646-0741	13-9646-0741	28 Dec-04 2:56 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		<100	100		N/A	21.72%

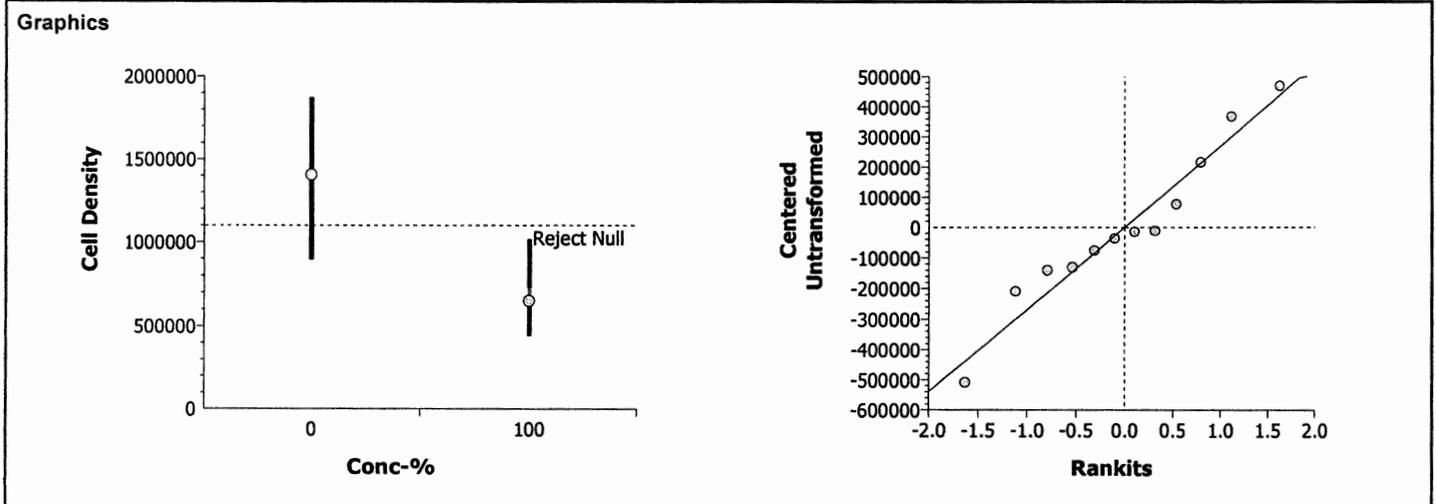
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control CV	0.28678	N/A - 0.2	Fails acceptability criteria
Control Response	1404000	1000000 - N/A	Passes acceptability criteria
MSDp	0.21722	0.091 - 0.29	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	4.22379	10.88245	0.10634	Equal Variances
Distribution	Shapiro-Wilk W	0.95792	0.80465	0.69939	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.52E+12	1.52E+12	1	20.13	0.00117	Significant Effect
Error	7.550E+11	7.55E+10	10			
Total	2.2746E+12	1.595E+12	11			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	4.48626	1.81246	0.0006	304972	Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	1.40E+6	8.95E+5	1.87E+6	4.03E+5				
100		8	6.49E+5	4.40E+5	1.02E+6	1.96E+5				



CETIS Analysis Detail

Selenastrum Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Linear Interpolation	13-9646-0741	13-9646-0741	28 Dec-04 3:13 PM	CETISv1.025

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	8144900	200	Yes	Two-Point Interpolation

Test Acceptability

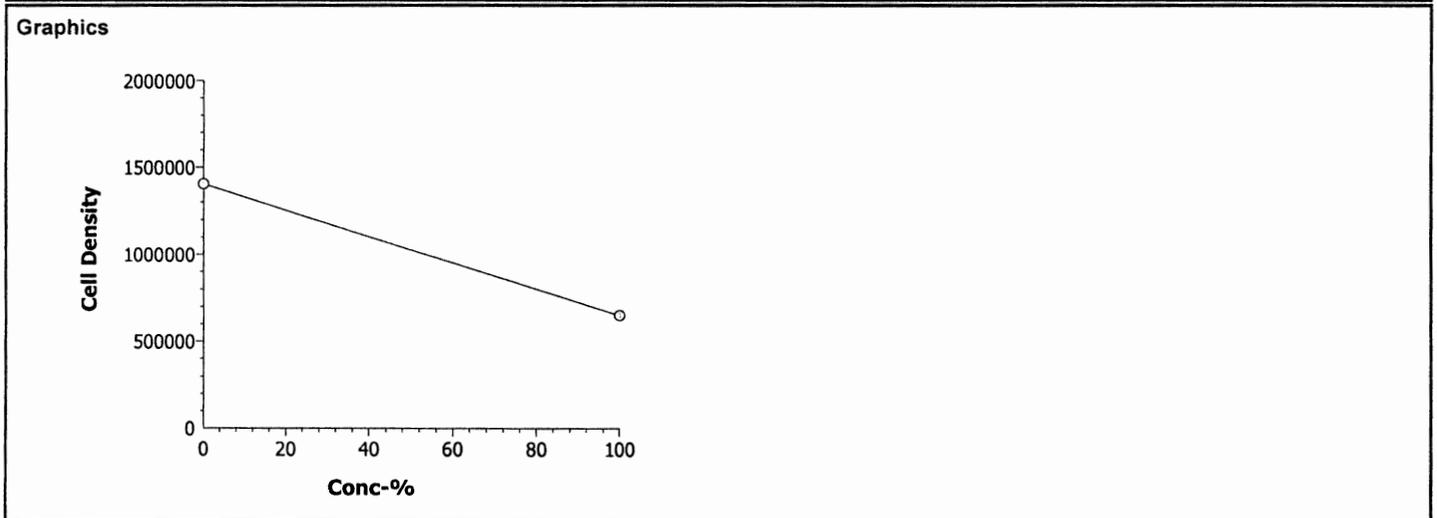
Attribute	Statistic	Acceptable Range	Decision
Control CV	0.28678	N/A - 0.2	Fails acceptability criteria
Control Response	1404000	1000000 - N/A	Passes acceptability criteria

Point Estimates

% Effect	Conc-%	95% LCL	95% UCL
25	46.49776	38.38539	70.48632
50	92.99553	76.77077	N/A

Data Summary

Conc-%	Control Type	Count	Calculated Variate				
			Mean	Minimum	Maximum	SE	SD
0	Salt Control	4	1.40E+6	8.95E+5	1.87E+6	8.22E+4	4.03E+5
100		8	6.49E+5	4.40E+5	1.02E+6	4.00E+4	1.96E+5



CETIS Test Summary

Report Date: 28 Dec-04 3:11 PM

Link: 03-2958-1486/0409-116

Selenastrum Growth Test				Nautilus Environmental (CA)				
Test No:	15-7357-7705	Test Type:	Cell Growth	Duration:	94h			
Start Date:	29 Sep-04 03:30 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Selenastrum capricornutum			
Ending Date:	03 Oct-04 01:50 PM	Dil Water:	Not Applicable	Source:	Aquatic Biosystems, CO			
Setup Date:	29 Sep-04 03:30 PM	Brine:	Not Applicable					
Sample No:	05-9932-9607	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 03:30 PM	Code:	0409-116	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	24h (20.6 °C)	Station:	C-3					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
14-1774-0378	Cell Density	< 100	100	N/A	30.82%	Equal Variance t		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method		
04-7924-4585	Cell Density	25	45.16101	32.51075	72.16208	Linear Interpolation		
		50	90.32201	65.02151	N/A			
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
04-7924-4585	Cell Density	Control CV	0.16231	N/A - 0.2	Passes acceptability criteria			
14-1774-0378	Cell Density	Control CV	0.16231	N/A - 0.2	Passes acceptability criteria			
04-7924-4585	Cell Density	Control Response	1283250	1000000 - N/A	Passes acceptability criteria			
14-1774-0378	Cell Density	Control Response	1283250	1000000 - N/A	Passes acceptability criteria			
14-1774-0378	Cell Density	MSDp	0.30817	0.091 - 0.29	Fails acceptability criteria			
Cell Density Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	2.22E+6	1.85E+6	2.42E+6	1.33E+5	2.66E+5	11.98%
0	Salt Control	4	1.28E+6	1.06E+6	1.53E+6	1.04E+5	2.08E+5	16.23%
100		4	9.45E+5	7.98E+5	1.02E+6	4.97E+4	9.95E+4	10.53%
100	Unfilt. Untreated	4	2.01E+5	1.51E+5	2.18E+5	1.67E+4	3.33E+4	16.59%
Cell Density Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4			
0	Lab Control	2.20E+6	2.41E+6	2.42E+6	1.85E+6			
0	Salt Control	1.37E+6	1.53E+6	1.06E+6	1.17E+6			
100		9.91E+5	1.02E+6	9.73E+5	7.98E+5			
100	Unfilt. Untreated	2.18E+5	2.18E+5	1.51E+5	2.17E+5			

CETIS Analysis Detail

Selenastrum Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Comparison	03-2958-1486	03-2958-1486	28 Dec-04 3:10 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		<100	100		N/A	30.82%

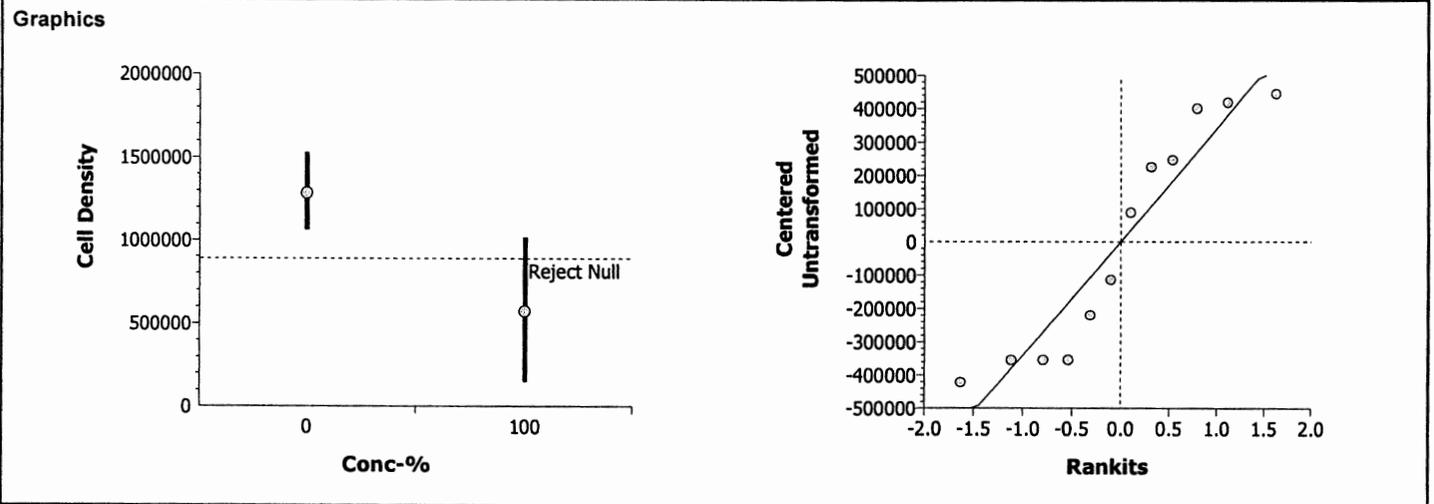
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control CV	0.16231	N/A - 0.2	Passes acceptability criteria
Control Response	1283250	1000000 - N/A	Passes acceptability criteria
MSDp	0.30817	0.091 - 0.29	Fails acceptability criteria

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)	
Variances	Variance Ratio	3.75182	44.43410	0.30477	Equal Variances	
Distribution	Shapiro-Wilk W	0.87059	0.80465	0.06992	Normal Distribution	

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.346E+12	1.35E+12	1	10.60	0.00864	Significant Effect
Error	1.27E+12	1.27E+11	10			
Total	2.6152E+12	1.473E+12	11			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	3.25578	1.81246	0.0043	395459	Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	4	1.28E+6	1.06E+6	1.53E+6	2.08E+5				
100		8	5.73E+5	1.51E+5	1.02E+6	4.03E+5				



CETIS Analysis Detail

Selenastrum Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Linear Interpolation	03-2958-1486	03-2958-1486	28 Dec-04 3:10 PM	CETISv1.025

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7607235	200	Yes	Two-Point Interpolation

Test Acceptability

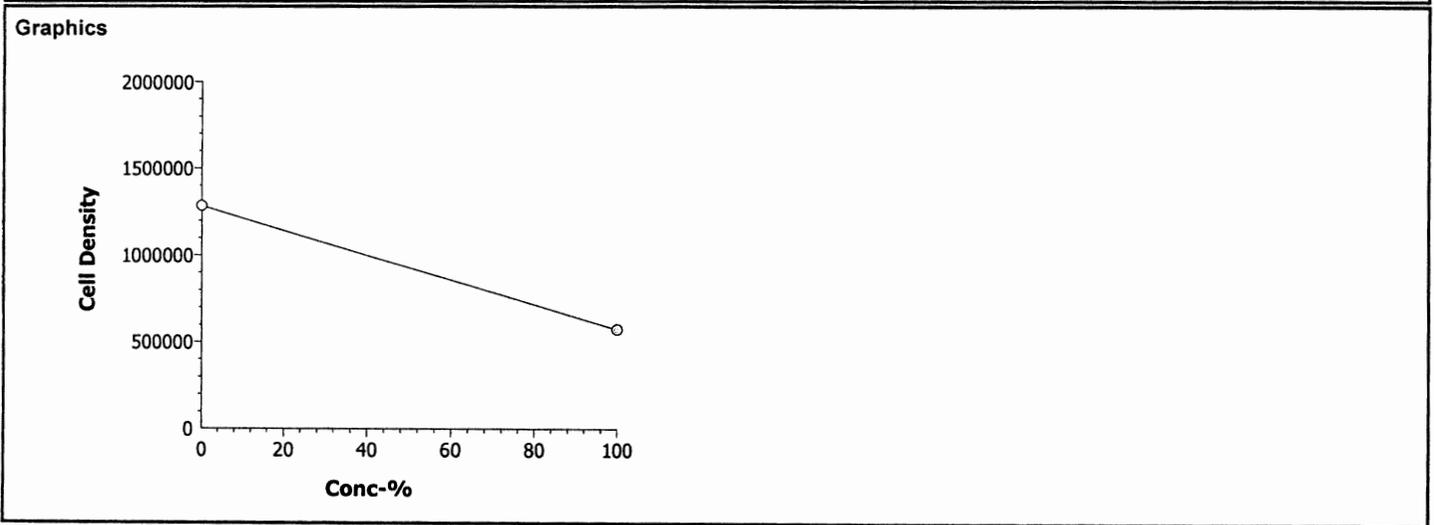
Attribute	Statistic	Acceptable Range	Decision
Control CV	0.16231	N/A - 0.2	Passes acceptability criteria
Control Response	1283250	1000000 - N/A	Passes acceptability criteria

Point Estimates

% Effect	Conc-%	95% LCL	95% UCL
25	45.16101	32.51075	72.16208
50	90.32201	65.02151	N/A

Data Summary

Conc-%	Control Type	Count	Calculated Variate				
			Mean	Minimum	Maximum	SE	SD
0	Salt Control	4	1.28E+6	1.06E+6	1.53E+6	4.25E+4	2.08E+5
100		8	5.73E+5	1.51E+5	1.02E+6	8.24E+4	4.03E+5



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

Test Species: S. capricornutum

Client: City of Buena Ventura

Test Date: 9-29-04

Sample ID: B-1, C-3

Start/End Times: 1030 | 130

Test No: 0409-114, 116

Analyst: AH

Random Number	Dilution	Cell Density (fluorometric) (cells/ml * 10 ⁶)	Cell Density (microscopic) (cells/ml * 10 ⁶)
Blank	NA		
Cal Check 1 (NEW, Solid, Effluent Blanks)		B-1 0.05 0.00, 2.18, C-3 0.35	
Lab Control A		22.00	
LC B		24.05	
LC C		24.15	
LC D		18.47	
Salt Control #1 A		18.73	
SC1 B		8.95	
SC1 C		13.67	
SC1 D		14.81	
Salt control #2 A		13.71	
SC2 B		15.30	
SC2 C		10.63	
SC2 D		11.69	
Cal Check 2 (NEW, Solid, Effluent Blanks)		B-1 0.05 0.00, 2.18, C-3 0.35	
B-1 A filt		10.17	
B-1 B filt		8.65	
B-1 C filt		6.34	
B-1 D filt		5.09 3.60	
B-1 A unfilt		5.73	
B-1 B unfilt		6.37	
B-1 C unfilt		4.40	
B-1 D unfilt		5.18	
C-3 A filt		9.91	
C-3 B		10.17	
C-3 C		9.73	
C-3 D		7.98	
Cal Check 3 (NEW, Solid, Effluent Blanks)			

-3A unfilt. 2.18
 -3B 1.51
 -3C 2.17
 -3D 2.18

Comments: _____

QC Check: [Signature] 6/21/04

Final Review: AH 12/28/04

Freshwater Chronic Bioassay

Water Quality Measurements
Algal Growth Inhibition

Test Species: S. capricornutum

Client: City of Buena Ventura

Test Date: 9-29-04

Sample ID: B-1, C-3

Start/End Times: 9:15:30/1350

Test No: 0409-114, 116

Analyst: AH

Concentration (%)	Initial Readings				Final Readings	
	D.O. (mg/L)	Conductivity (umhos-cm)	Alkalinity (mg/L)	Hardness (mg/L)	D.O. (mg/L)	Conductivity (umhos-cm)
Lab Control	7.0	97.6 2140	14	11	7.7	109.1
B-1 Salt Control (1 ppt)	7.1	2140	14	350	7.4	2940
B-1 filtered (100%)	7.2	2340	153	468	7.1	2390
C-3 filtered (100%)	7.2	5220	340	>1000	7.2	5070
C-3 Salt Cont (3 ppt)	7.0	5120	27	742	7.3	4530
B-1 unfiltered	9.4	2330	153	468	8.1	2310
C-3 unfiltered	10.4	5330	340	>1000	6.3	5240

	0 Hour	24 Hour (A)	48 Hour	72 Hour	96 Hour
pH/Temperature (°C): Lab Control	7.38 / 24.6	7.51 / 26.6	8.01 / 26.1	8.02 / 25.7	9.46 / 26.4
pH/Temperature (°C): SC 1	7.58 / 24.6	7.35 / 27.2	7.58 / 26.1	8.47 / 25.7	9.31 / 26.4
pH/Temperature (°C): SC 2	7.88 / 24.6	7.38 / 27.6	7.41 / 26.0	8.77 / 25.7	9.22 / 26.4
pH/Temperature (°C): B-1 filt	7.98 / 24.6	8.46 / 27.1	8.32 / 26.2	8.80 / 26.1	9.41 / 26.4
pH/Temperature (°C): C-3 filt	8.04 / 24.6	8.39 / 27.1	8.26 / 26.2	8.47 / 26.3	8.71 / 26.4
pH/Temperature (°C): B-1 unfilt	7.97 / 24.6	8.66 / 26.9	8.90 / 26.1	9.41 / 26.4	9.57 / 26.4
pH/Temperature (°C): C-3 unfilt	7.96 / 24.6	8.31 / 27.1	9.19 / 26.2	9.43 / 26.4	8.82 / 26.4

Comments: (A) temp exceeds 26°C max - more fans added

QC Check: [Signature] Final Review: AH 12/28/04

Freshwater Chronic Bioassay

Algal Growth Inhibition Worksheet

Client : City of Buena Ventura Test Species: S. capricornutum
 Sample ID: B-1, C-3 Test Date: 9-29-04
 Test No: 0409-114,116 Analyst: AH

Source/Date Stock Culture Started: 9-23-04

Stock Cell Density Measurements: 39.48
40.50
40.28 Mean: 40.34
40.65
40.81

(mean no. * 100,000)/(500,000) = x (dilution factor): 8.07

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: 2
1 Mean: 1.3

Test Initiation Time: 15:30

Test Termination Time: 12:50

Comments: _____

QC Check: [Signature] 12/27/04

Final Review: AH 12/28/04

MARINE

A. AFFINIS

CETIS Test Summary

Pacific Topsmelt 7-d Survival and Growth Test						Nautilus Environmental (CA)		
Test No:	14-0656-5950	Test Type:	Growth-Survival (7d)	Duration:	6d 23h	Start Date:	29 Sep-04 03:00 PM	
Start Date:	29 Sep-04 03:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Species:	Atherinops affinis	Ending Date:	06 Oct-04 02:40 PM	
Ending Date:	06 Oct-04 02:40 PM	Dil Water:	Artificial Saltwater Lab Seawater	Source:	Aquatic Biosystems, CO	Setup Date:	29 Sep-04 03:00 PM	
Setup Date:	29 Sep-04 03:00 PM	Brine:	40 Fathoms N/A					
Sample No:	14-2803-6476	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura	Sample Date:	28 Sep-04 10:30 AM	
Sample Date:	28 Sep-04 10:30 AM	Code:	0409-089	Project:		Receive Date:	28 Sep-04 08:30 PM	
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura			Sample Age:	28h (17.9 °C)	
Sample Age:	28h (17.9 °C)	Station:	A-2					
Comments:	Laboratory seawater was used as dilution water for sample A-2, as no salinity adjustment with artificial sea salts was needed for this sample.							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
11-8379-5047	7d Proportion Survived	100	> 100	N/A	5.00%	Steel's Many-One Rank		
07-9605-7724	Mean Dry Biomass-mg	50	100	70.711	13.93%	Dunnett's Multiple Comparison		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method		
18-0999-5980	Mean Dry Biomass-mg	25	> 100.00000	N/A	N/A	Linear Interpolation		
		50	> 100.00000	N/A	N/A			
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
11-8379-5047	7d Proportion Survived	Control Response	1	0.8 - N/A	Passes acceptability criteria			
07-9605-7724	Mean Dry Biomass-mg	Control Response	1.6336	0.85 - N/A	Passes acceptability criteria			
18-0999-5980	Mean Dry Biomass-mg	Control Response	1.6336	0.85 - N/A	Passes acceptability criteria			
11-8379-5047	7d Proportion Survived	MSDp	0.05000	N/A - 0.25	Passes acceptability criteria			
07-9605-7724	Mean Dry Biomass-mg	MSDp	0.13930	N/A - 0.5	Passes acceptability criteria			
7d Proportion Survived Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
Mean Dry Biomass-mg Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.63360	1.44800	1.82000	0.07309	0.16343	10.00%
25		5	1.39680	1.21400	1.60000	0.08291	0.18538	13.27%
50		5	1.42040	1.26600	1.76800	0.08880	0.19857	13.98%
100		5	1.33360	1.23400	1.39800	0.02694	0.06024	4.52%
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	1.00000	1.00000		
25		1.00000	1.00000	1.00000	1.00000	1.00000		
50		1.00000	1.00000	1.00000	1.00000	1.00000		
100		1.00000	1.00000	1.00000	1.00000	1.00000		
Mean Dry Biomass-mg Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	1.47600	1.72800	1.44800	1.82000	1.69600		
25		1.24200	1.58600	1.60000	1.21400	1.34200		
50		1.76800	1.34400	1.34800	1.37600	1.26600		
100		1.34400	1.39800	1.34200	1.35000	1.23400		

CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	08-8933-4414	08-8933-4414	28 Dec-04 12:44 PM	CETISv1.025

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	5.00%

Test Acceptability

Attribute	Statistic	Acceptable Range	Decision
Control Response	1	0.8 - N/A	Passes acceptability criteria
MSDp	0.05000	N/A - 0.25	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	65535.00000	5.29221	0.00000	Unequal Variances

ANOVA Table

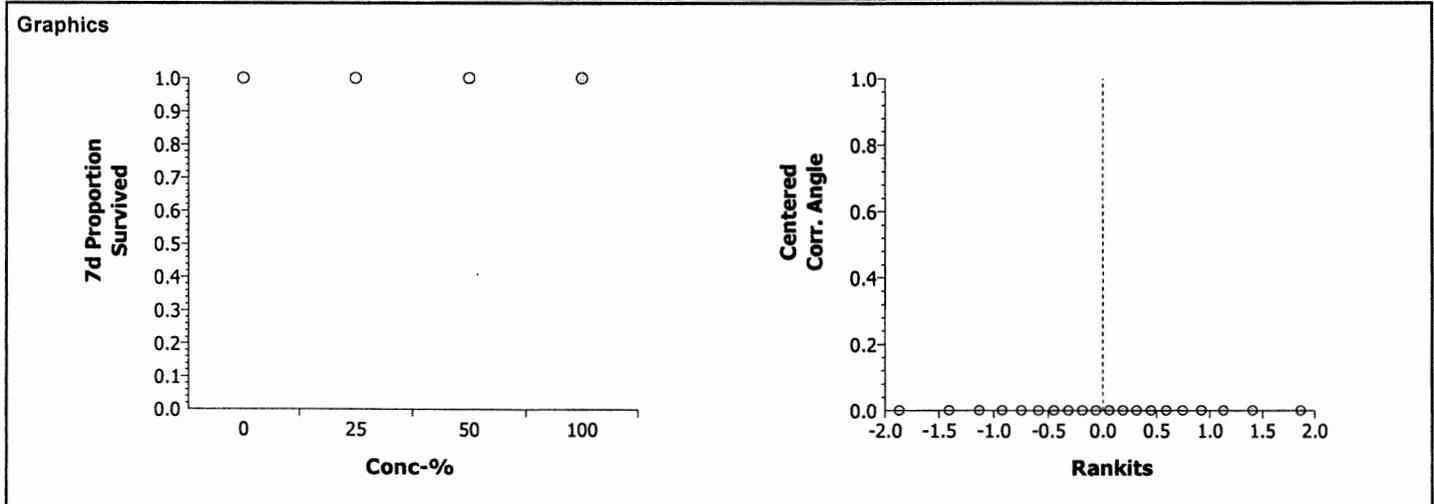
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0	0	3	65535.0	0.00000	Significant Effect
Error	0	0	16			
Total	0	0	19			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		25	27.5	17	> 0.0500	1	Non-Significant Effect
		50	27.5	17	> 0.0500	1	Non-Significant Effect
		100	27.5	17	> 0.0500	1	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
25		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
50		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
100		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020



CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	08-8933-4414	08-8933-4414	28 Dec-04 12:44 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		50	100	2.00	70.711	13.93%

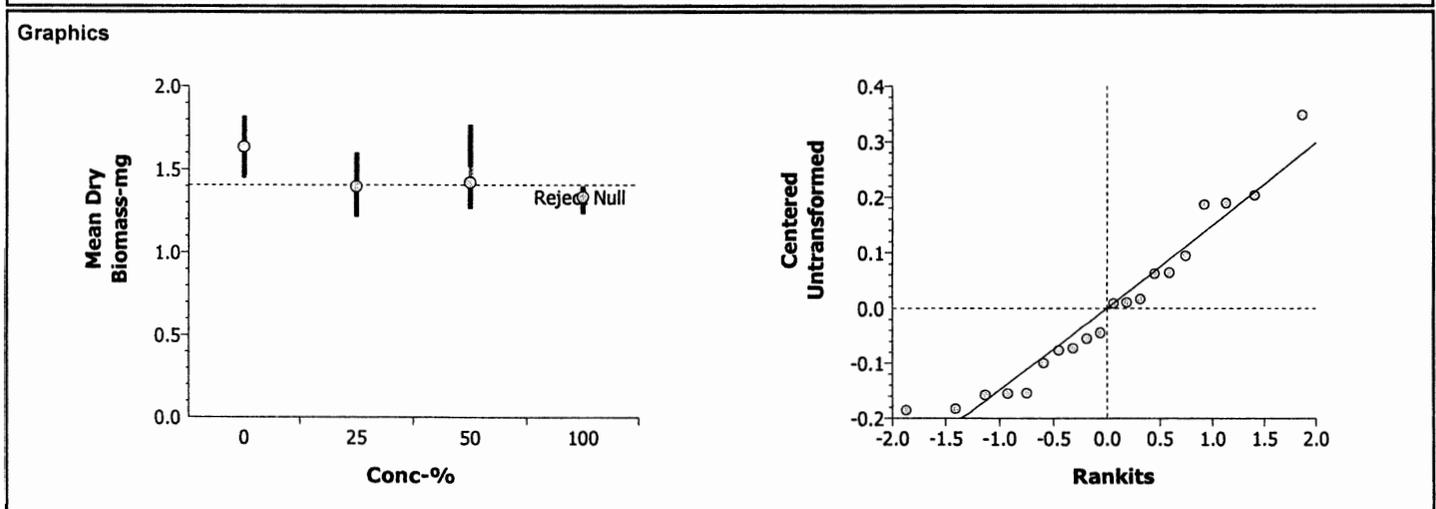
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1.6336	0.85 - N/A	Passes acceptability criteria
MSDp	0.13930	N/A - 0.5	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	4.53563	11.34487	0.20913	Equal Variances
Distribution	Shapiro-Wilk W	0.93524	0.86826	0.19342	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.2545173	0.084839	3	3.26	0.04915	Significant Effect
Error	0.4165346	0.026033	16			
Total	0.67105192	0.1108725	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		25	2.32052	2.23	<= 0.0500	0.22756	Significant Effect
		50	2.08926	2.23	> 0.0500	0.22756	Non-Significant Effect
		100	2.93985	2.23	<= 0.0500	0.22756	Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	1.63360	1.44800	1.82000	0.16343				
25		5	1.39680	1.21400	1.60000	0.18538				
50		5	1.42040	1.26600	1.76800	0.19857				
100		5	1.33360	1.23400	1.39800	0.06024				



CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test					Nautilus Environmental (CA)
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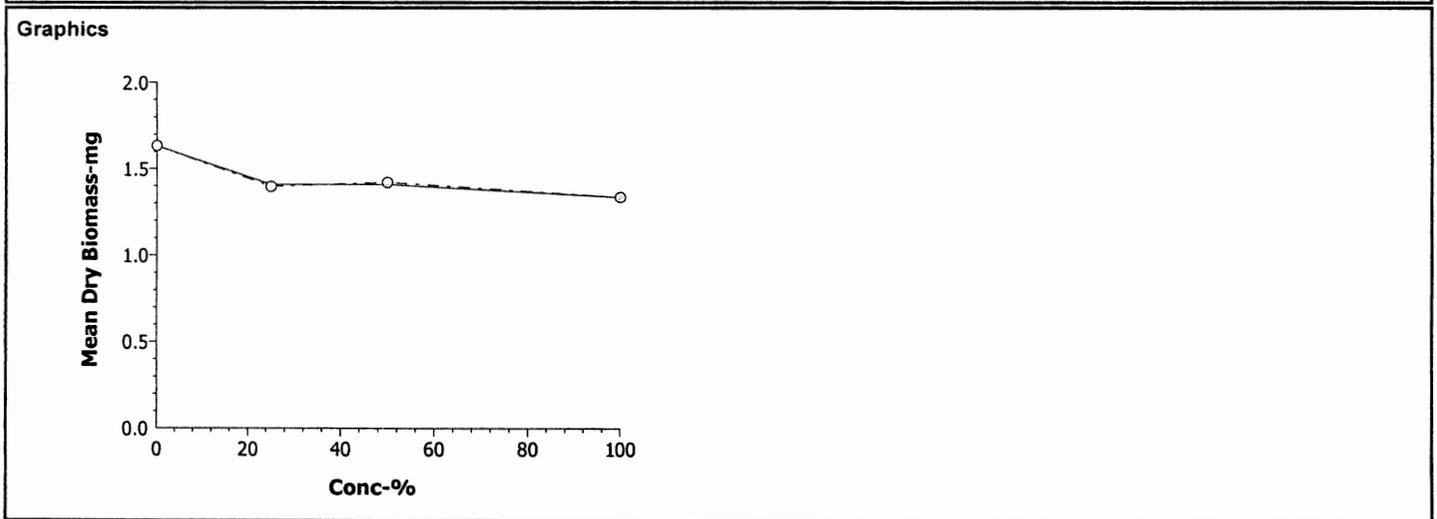
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Linear Interpolation	08-8933-4414	08-8933-4414	28 Dec-04 12:44 PM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	140176	200	Yes	Two-Point Interpolation

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1.6336	0.85 - N/A	Passes acceptability criteria

Point Estimates			
% Effect	Conc-%	95% LCL	95% UCL
25	> 100.00000	N/A	N/A
50	> 100.00000	N/A	N/A

Data Summary		Calculated Variate					
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	5	1.63360	1.44800	1.82000	0.03336	0.16343
25		5	1.39680	1.21400	1.60000	0.03784	0.18538
50		5	1.42040	1.26600	1.76800	0.04053	0.19857
100		5	1.33360	1.23400	1.39800	0.01230	0.06024



Marine Chronic Bioassay

Larval Fish Survival & Weights

Client Name: City of Buenaventura

Test Species: A. affinis

Sample ID: A-2

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-089

End Date/Time: 10/06/04 / 1440

Conc. (<u> </u> % <u> </u>)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + fish (g)
		0	1	2	3	4	5	6	7			
Lab Control	a	5	5	5	5	5	5	5	5	100	0.02284	0.03022
#1	b	5	5	5	5	5	5	5	5	100	0.02036	0.02900
	c	5	5	5	5	5	5	5	5	100	0.01922	0.02646
	d	5	5	5	5	5	5	5	5	100	0.01925	0.02835
	e	5	5	5	5	5	5	5	5	100	0.01841	0.02689
25	a	5	5	5	5	5	5	5	5	100	0.02003	0.02624
	b	5	5	5	5	5	5	5	5	100	0.01825	0.02618
	c	5	5	5	5	5	5	5	5	100	0.01835	0.02635
	d	5	5	5	5	5	5	5	5	100	0.01864	0.02471
	e	5	5	5	5	5	5	5	5	100	0.01709	0.02380
50	a	5	5	5	5	5	5	5	5	100	0.01961	0.02845
	b	5	5	5	5	5	5	5	5	100	0.01890	0.02562
	c	5	5	5	5	5	5	5	5	100	0.01988	0.02662
	d	5	5	5	5	5	5	5	5	100	0.01951	0.02639
	e	5	5	5	5	5	5	5	5	100	0.01827	0.02460
100	a	5	5	5	5	5	5	5	5	100	0.01736	0.02408
	b	5	5	5	5	5	5	5	5	100	0.01785	0.02484
	c	5	5	5	5	5	5	5	5	100	0.01766	0.02437
	d	5	5	5	5	5	5	5	5	100	0.01871	0.02546
	e	5	5	5	5	5	5	5	5	100	0.01779	0.02396
	a											
	b											
	c											
	d											
	e											
	a											
	b											
	c											
	d											
	e											

Tech Initials: YR/SD RZ RZ SH RG RZ SH RZ

Feeding Times (day):

	0	1	2	3	4	5	6
-	0820	0900	0845	0845	0845	0820	
1600	1630	1600	1435	1430	1600	1530	

Weight Data:
 Date/Time in: 10-6-04/1450
 Date/Time out: 10-8-04/0915
 Oven Temp (°C): 65°
 Tech Initials: LC

Comments: _____

QC Check: OK
 Final Review: AK 1/17/05

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: A. affinis

Sample ID: A-2

Start Date/Time: 09/29/04 / 1500

Test No: 0409-089

End Date/Time: 10/06/04 / 1440

Concentration	Lab Control *j								
Day	0	1	2	3	4	5	6	7	
Initial									
pH	8.03	7.98	7.95	7.93	7.97	7.96	7.93		
DO (mg/L)	6.4	7.6	8.0	7.2	8.0	8.8	7.7		
Salinity (ppt)	33.9	33.5	33.6	33.6	33.6	33.9	33.8		
Temp (°C)	20.8	20.4	20.3	20.4	19.7	19.7	20.6		
Final									
pH		7.85	7.72	7.94	7.68	7.74	7.61	7.64	
DO (mg/L)		6.4	6.2	6.0	5.5	6.7	6.1	5.5	
Temp (°C)		20.2	20.1	19.8	20.4	20.4	20.4	20.2	

Concentration	100%								
Day	0	1	2	3	4	5	6	7	
Initial									
pH	8.12	8.04	8.04	7.93	7.99	7.92	7.82		
DO (mg/L)	7.3	5.7	7.5	6.0	6.5	6.0	5.9		
Salinity (ppt)	32.2	32.1	31.8	31.6	32.1	32.3	32.1		
Temp (°C)	20.1	19.5	20.9	20.8	20.3	20.0	20.5		
Final									
pH		7.86	7.73	7.81	7.84	7.82	7.70	7.73	
DO (mg/L)		6.6	6.4	6.2	6.3	6.2	5.9	5.8	
Temp (°C)		20.2	20.0	19.7	20.3	20.2	20.3	20.2	

Concentration	25% k								
Day	0	1	2	3	4	5	6	7	
Initial									
pH	8.06	8.20	7.98	7.94	8.00	7.95	7.92		
DO (mg/L)	7.0	7.8	7.8	6.9	6.7	8.3	7.3		
Salinity (ppt)	33.3	33.0	33.2	33.0	33.0	33.5	33.4		
Temp (°C)	20.8	20.0	20.2	20.4	20.7	20.0	20.0		
Final									
pH		7.82	7.74	7.97	7.78	7.84	7.78	7.71	
DO (mg/L)		6.6	6.6	6.2	5.8	6.6	6.3	6.2	
Temp (°C)		20.2	20.2	19.8	20.3	20.4	20.2	20.4	

Concentration									
Day	0	1	2	3	4	5	6	7	
Initial									
pH									
DO (mg/L)									
Salinity (ppt)									
Temp (°C)									
Final									
pH									
DO (mg/L)									
Temp (°C)									

Concentration	50%								
Day	0	1	2	3	4	5	6	7	
Initial									
pH	8.08	8.04	8.00	7.93	8.00	7.95	7.87		
DO (mg/L)	7.1	7.6	7.9	6.8	6.8	7.6	6.9		
Salinity (ppt)	33.0	32.8	32.7	32.5	32.0	33.3	33.1		
Temp (°C)	20.6	20.2	20.1	20.4	20.2	20.0	20.5		
Final									
pH		7.81	8.02	7.86	7.79	7.87	7.74	7.73	
DO (mg/L)		6.5	6.8	6.1	5.8	6.4	6.0	6.1	
Temp (°C)		20.2	20.0	19.7	20.3	20.2	20.2	20.4	

Concentration									
Day	0	1	2	3	4	5	6	7	
Initial									
pH									
DO (mg/L)									
Salinity (ppt)									
Temp (°C)									
Final									
pH									
DO (mg/L)									
Temp (°C)									

Animal Source/Date Received: ABS / 9-26-04

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

Animal Age at Initiation: 14 days

Comments: * Accepted sample before renewals

QC Check: [Signature] 12/27/04

Final Review: AH 11/17/05

CETIS Test Summary

Report Date: 28 Dec-04 12:53 PM

Link: 06-8826-9790/0409-090

Pacific Topsmelt 7-d Survival and Growth Test							Nautilus Environmental (CA)	
Test No:	14-0656-5950	Test Type:	Growth-Survival (7d)	Duration:	6d 23h			
Start Date:	29 Sep-04 03:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Species:	Atherinops affinis			
Ending Date:	06 Oct-04 02:40 PM	Dil Water:	Artificial Saltwater	Source:	Aquatic Biosystems, CO			
Setup Date:	29 Sep-04 03:00 PM	Brine:	Forty Fathoms					
Sample No:	13-4181-8140	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 09:26 AM	Code:	0409-090	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	30h (16.6 °C)	Station:	B-1					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
16-3780-0587	7d Proportion Survived	100	> 100	N/A	12.35%	Steel's Many-One Rank		
06-5293-7740	Mean Dry Biomass-mg	100	> 100	N/A	18.29%	Dunnett's Multiple Comparison		
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
16-3780-0587	7d Proportion Survived	Control Response	1	0.8 - N/A	Passes acceptability criteria			
06-5293-7740	Mean Dry Biomass-mg	Control Response	1.26080	0.85 - N/A	Passes acceptability criteria			
16-3780-0587	7d Proportion Survived	MSDp	0.12351	N/A - 0.25	Passes acceptability criteria			
06-5293-7740	Mean Dry Biomass-mg	MSDp	0.18288	N/A - 0.5	Passes acceptability criteria			
7d Proportion Survived Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
0	Salt Control	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		5	0.92000	0.60000	1.00000	0.08000	0.17889	19.44%
50		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
65		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
Mean Dry Biomass-mg Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.19480	1.06400	1.34800	0.04723	0.10562	8.84%
0	Salt Control	5	1.26080	1.19200	1.31800	0.02052	0.04588	3.64%
25		5	1.34480	1.01600	1.62600	0.10283	0.22993	17.10%
50		5	1.36200	1.24600	1.51400	0.04632	0.10359	7.61%
65		5	1.19720	1.09200	1.34200	0.04631	0.10354	8.65%
100		5	1.24880	0.93400	1.45400	0.09920	0.22181	17.76%
7d Proportion Survived Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.80000	1.00000	1.00000	1.00000	1.00000		
0	Salt Control	1.00000	1.00000	1.00000	1.00000	1.00000		
25		1.00000	1.00000	1.00000	1.00000	0.60000		
50		1.00000	1.00000	1.00000	1.00000	1.00000		
65		1.00000	1.00000	1.00000	1.00000	1.00000		
100		1.00000	1.00000	1.00000	1.00000	1.00000		
Mean Dry Biomass-mg Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	1.06400	1.18600	1.34800	1.14400	1.23200		
0	Salt Control	1.19200	1.25400	1.31800	1.26000	1.28000		
25		1.62600	1.47800	1.26400	1.34000	1.01600		
50		1.24600	1.34200	1.40800	1.30000	1.51400		
65		1.34200	1.10200	1.21400	1.23600	1.09200		
100		0.93400	1.37200	1.45400	1.10000	1.38400		

CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	06-8826-9790	06-8826-9790	28 Dec-04 12:53 PM	CETISv1.025

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	12.35%

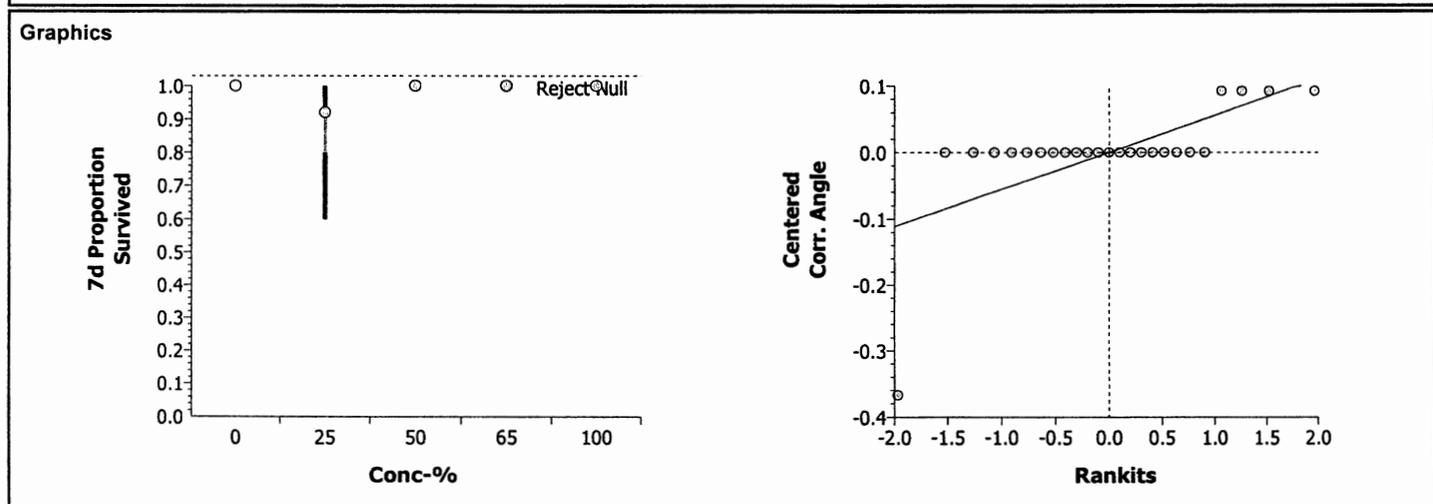
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1	0.8 - N/A	Passes acceptability criteria
MSDp	0.12351	N/A - 0.25	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	1.40000	4.43069	0.26999	Equal Variances
Distribution	Shapiro-Wilk W	0.45030	0.88746	0.00000	Non-normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0337392	0.008435	4	1.00	0.43068	Non-Significant Effect
Error	0.168696	0.008435	20			
Total	0.20243517	0.0168696	24			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	25	17	> 0.0500	1	Non-Significant Effect
		50	27.5	17	> 0.0500	1	Non-Significant Effect
		65	27.5	17	> 0.0500	1	Non-Significant Effect
		100	27.5	17	> 0.0500	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	5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
25		5	0.92000	0.60000	1.00000	0.17889	1.25344	0.88608	1.34528	0.20536
50		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
65		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
100		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020



CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	06-8826-9790	06-8826-9790	28 Dec-04 12:53 PM	CETISv1.025

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	18.29%

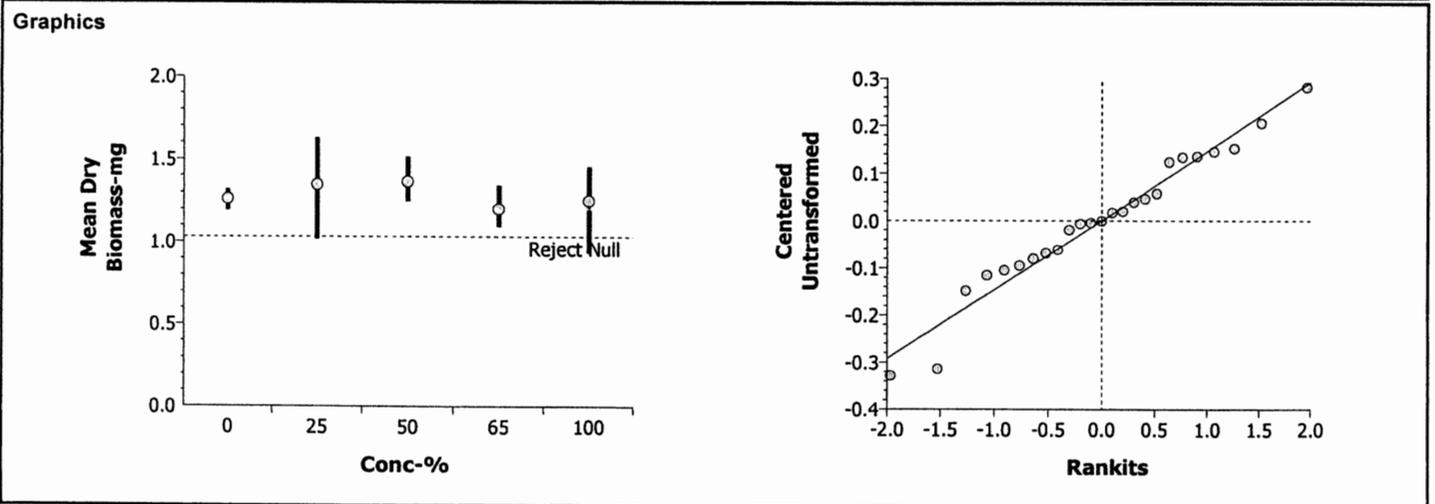
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1.26080	0.85 - N/A	Passes acceptability criteria
MSDp	0.18288	N/A - 0.5	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	10.05810	13.27671	0.03946	Equal Variances
Distribution	Shapiro-Wilk W	0.96347	0.88746	0.49330	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.09542	0.023855	4	0.95	0.45627	Non-Significant Effect
Error	0.5025073	0.025125	20			
Total	0.59792724	0.0489804	24			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-0.8379	2.3	> 0.0500	0.23058	Non-Significant Effect
		50	-1.0095	2.3	> 0.0500	0.23058	Non-Significant Effect
		65	0.63441	2.3	> 0.0500	0.23058	Non-Significant Effect
		100	0.1197	2.3	> 0.0500	0.23058	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	1.26080	1.19200	1.31800	0.04588				
25		5	1.34480	1.01600	1.62600	0.22993				
50		5	1.36200	1.24600	1.51400	0.10359				
65		5	1.19720	1.09200	1.34200	0.10354				
100		5	1.24880	0.93400	1.45400	0.22181				



Marine Chronic Bioassay

Larval Fish Survival & Weights

Client Name: City of Buenaventura

Test Species: A. affinis

Sample ID: B-1

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-090

End Date/Time: 10/06/04 / 1440

Conc. (<u> </u> % <u> </u>)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + fish (g)	
		0	1	2	3	4	5	6	7				
Lab Control	a	5	5	5	5	5	4	4	4	80	0.02026	0.02022 ^{MC}	0.0255:
	#2	b	5	5	5	5	5	5	5	100	0.01789	0.02908 ^{MC}	0.02382
	c	5	5	5	5	5	5	5	5	100	0.01785	0.02644 ^{MC}	0.02459
	d	5	5	5	5	5	5	5	5	100	0.01869	0.02835 ^{MC}	0.02441
	e	5	5	5	5	5	5	5	5	100	0.01679	0.02687 ^{MC}	0.02295
Salt Control	a	5	5	5	5	5	5	5	5	100	0.02006	0.02602	
	b	5	5	5	5	5	5	5	5	100	0.01910	0.02537	
	c	5	5	5	5	5	5	5	5	100	0.01895	0.02554	
	d	5	5	5	5	5	5	5	5	100	0.01959	0.02589 ^{MC}	0.02589
	e	5	5	5	5	5	5	5	5	100	0.01773	0.02589 ^{MC}	0.02413
25	a	5	5	5	5	5	5	5	5	100	0.01940	0.02753	
	b	5	5	5	5	5	5	5	5	100	0.01948	0.02687	
	c	5	5	5	5	5	5	5	5	100	0.01774	0.02406	
	d	5	5	5	5	5	5	5	5	100	0.01929	0.02599	
	e	5	5	5	5	4	4	2	3	60	0.01782	0.02290	
50	a	5	5	5	5	5	5	5	5	100	0.01905	0.02528	
	b	5	5	5	5	5	5	5	5	100	0.01881	0.02552	
	c	5	5	5	5	5	5	5	5	100	0.01853	0.02557	
	d	5	5	5	5	5	5	5	5	100	0.01850	0.02501	
	e	5	5	5	5	5	5	5	5	100	0.01738	0.02495	
65	a	5	5	5	5	5	5	5	5	100	0.01878	0.02549	
	b	5	5	5	5	5	5	5	5	100	0.01698	0.02249	
	c	5	5	5	5	5	5	5	5	100	0.01870	0.02477	
	d	5	5	5	5	5	5	5	5	100	0.01804	0.02422	
	e	5	5	5	5	5	5	5	5	100	0.01849	0.02395	
100	a	5	5	5	5	5	5	5	5	100	0.01832	0.02299	
	b	5	5	5	5	5	5	5	5	100	0.01759	0.02445	
	c	5	5	5	5	5	5	5	5	100	0.01997	0.02718	
	d	5	5	5	5	5	5	5	5	100	0.01894	0.02444	
	e	5	5	5	5	5	5	5	5	100	0.01863	0.02575	
	a												
	b												
	c												
	d												
	e												
Tech Initials		YR/SD	02	02	SA	RH	02	SA	02				

Feeding Times (day):

	0	1	2	3	4	5	6
-	0820	0900	0945	0945	0915	0820	
1600	1630	1600	1435	1430	1600	1530	

Weight Data: 1450
 Date/Time in: 10-6-04/1300 AS
 Date/Time out: 10-8-04/0915
 Oven Temp (°C): 60.5°
 Tech Initials: MC

Comments: _____

QC Check: [Signature] 10/21/04
 Final Review: AR 11/7/05

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura
 Sample ID: B-1
 Test No: 0409-090

Test Species: A. affinis
 Start Date/Time: 09/29/04 1500
 End Date/Time: 10/06/04 1440

Concentration	Lab Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.03	8.24	7.95	7.95	7.97	8.29	7.96	
DO (mg/L)	8.5	6.9	7.3	7.4	7.0	8.1	8.0	
Salinity (ppt)	30.1	30.0	29.8	29.9	30.2	30.3	29.2	
Temp (°C)	19.0	20.1	20.1	20.4	20.7	20.4	19.7	
Final								
pH		8.12	8.11	7.89	7.68	7.70	7.62	7.65
DO (mg/L)		6.2	6.2	5.9	5.6	6.2	5.9	6.1
Temp (°C)		20.1	20.1	19.8	20.3	20.4	20.3	20.4

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.51	8.41	8.33	8.36	8.61	8.23	
DO (mg/L)	7.5	6.3	7.1	5.8	7.4	6.2	6.6	
Salinity (ppt)	29.9	30.1	30.2	29.9	30.5	30.7	30.6	
Temp (°C)	20.1	20.7	20.3	20.4	20.7	20.8	20.5	
Final								
pH		8.23	8.17	8.33	8.16	8.22	8.11	8.10
DO (mg/L)		6.1	6.7	5.8	6.0	5.6	5.7	5.7
Temp (°C)		20.2	19.9	19.6	20.1	20.0	20.3	20.3

Concentration	Salt Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.43	8.28	7.96	8.36	8.35	8.38	8.24	
DO (mg/L)	7.3	6.8	8.0	6.8	6.2	6.6	7.5	
Salinity (ppt)	29.4	29.4	29.9	29.7	30.1	30.2	30.2	
Temp (°C)	20.3	20.4	20.4	20.4	20.7	20.9	20.7	
Final								
pH		8.15	8.14	8.30	7.97	8.02	7.96	7.89
DO (mg/L)		6.5	6.6	6.0	5.9	6.5	6.2	5.8
Temp (°C)		20.2	20.1	19.8	20.3	20.4	20.3	20.4

Concentration	65%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.40	8.35	8.40	8.32	8.36	8.42	8.39	
DO (mg/L)	7.6	6.9	7.1	6.0	7.4	6.0	7.4	
Salinity (ppt)	30.1	30.3	30.3	30.1	30.5	30.9	30.9	
Temp (°C)	20.0	20.0	20.3	20.5	20.6	20.8	20.1	
Final								
pH		8.25	8.18	8.35	8.19	8.25	8.17	8.15
DO (mg/L)		6.2	6.6	6.0	6.0	6.1	6.0	6.1
Temp (°C)		20.2	19.9	19.6	20.0	20.0	20.3	20.3

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.41	8.33	8.45	8.34	8.36	8.38	8.23	
DO (mg/L)	7.4	7.0	6.9	6.3	6.2	6.5	6.9	
Salinity (ppt)	29.7	29.8	29.9	29.9	30.3	30.4	30.4	
Temp (°C)	20.2	20.0	20.5	20.4	20.7	20.9	20.7	
Final								
pH		8.10	8.06	8.31	8.05	8.11	8.06	8.01
DO (mg/L)		6.4	6.1	6.1	5.6	5.8	5.6	5.5
Temp (°C)		20.2	20.0	19.6	20.3	20.0	20.3	20.3

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.38	8.35	8.35	8.31	8.37	8.38	8.45	
DO (mg/L)	7.8	6.9	7.5	5.9	7.7	6.0	7.6	
Salinity (ppt)	30.5	30.8	30.7	30.4	30.7	31.1	31.4	
Temp (°C)	19.9	20.0	20.6	19.6	20.1	20.2	20.1	
Final								
pH		8.29	8.27	8.42	8.28	8.31	8.20	8.23
DO (mg/L)		6.2	6.3	6.0	5.8	6.0	6.0	6.0
Temp (°C)		20.1	20.0	19.6	19.9	20.0	20.3	20.3

Animal Source/Date Received: ABS / 9-26-04
 Animal Age at Initiation: 14 days

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

Comments: _____
 QC Check: 9/29/04 12/27/04

Final Review: AH 11/17/05

CETIS Test Summary

Report Date: 28 Dec-04 1:02 PM

Link: 01-8452-1405/0409-091

Pacific Topsmelt 7-d Survival and Growth Test						Nautilus Environmental (CA)		
Test No:	14-0656-5950	Test Type:	Growth-Survival (7d)	Duration:	6d 23h	Species:	Atherinops affinis	
Start Date:	29 Sep-04 03:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Source:	Aquatic Biosystems, CO			
Ending Date:	06 Oct-04 02:40 PM	Dil Water:	Artificial Saltwater					
Setup Date:	29 Sep-04 03:00 PM	Brine:	Forty Fathoms					
Sample No:	12-0768-2418	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 12:21 PM	Code:	0409-091	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	27h (17.2 °C)	Station:	B-3					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
09-1118-8369	7d Proportion Survived	100	> 100	N/A	5.00%	Equal Variance t		
16-7443-0635	Mean Dry Biomass-mg	100	> 100	N/A	9.33%	Dunnett's Multiple Comparison		
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
09-1118-8369	7d Proportion Survived	Control Response	1	0.8 - N/A	Passes acceptability criteria			
16-7443-0635	Mean Dry Biomass-mg	Control Response	1.26080	0.85 - N/A	Passes acceptability criteria			
09-1118-8369	7d Proportion Survived	MSDp	0.05000	N/A - 0.25	Passes acceptability criteria			
16-7443-0635	Mean Dry Biomass-mg	MSDp	0.09333	N/A - 0.5	Passes acceptability criteria			
7d Proportion Survived Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
0	Salt Control	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
88		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
Mean Dry Biomass-mg Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.19480	1.06400	1.34800	0.04723	0.10562	8.84%
0	Salt Control	5	1.26080	1.19200	1.31800	0.02052	0.04588	3.64%
25		5	1.30240	1.17400	1.50000	0.05522	0.12348	9.48%
50		5	1.28800	1.17600	1.40000	0.03551	0.07940	6.16%
88		5	1.26600	1.19600	1.36200	0.02989	0.06683	5.28%
100		5	1.24080	1.18800	1.35200	0.03032	0.06779	5.46%
7d Proportion Survived Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.80000	1.00000	1.00000	1.00000	1.00000		
0	Salt Control	1.00000	1.00000	1.00000	1.00000	1.00000		
25		1.00000	1.00000	1.00000	1.00000	1.00000		
50		1.00000	1.00000	1.00000	1.00000	1.00000		
88		1.00000	1.00000	1.00000	1.00000	1.00000		
100		1.00000	1.00000	1.00000	1.00000	1.00000		
Mean Dry Biomass-mg Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	1.06400	1.18600	1.34800	1.14400	1.23200		
0	Salt Control	1.19200	1.25400	1.31800	1.26000	1.28000		
25		1.25200	1.17400	1.25600	1.50000	1.33000		
50		1.40000	1.17600	1.28800	1.29600	1.28000		
88		1.19600	1.29000	1.36200	1.27200	1.21000		
100		1.25600	1.21600	1.19200	1.18800	1.35200		

CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	01-8452-1405	06-8826-9790	28 Dec-04 1:02 PM	CETISv1.025

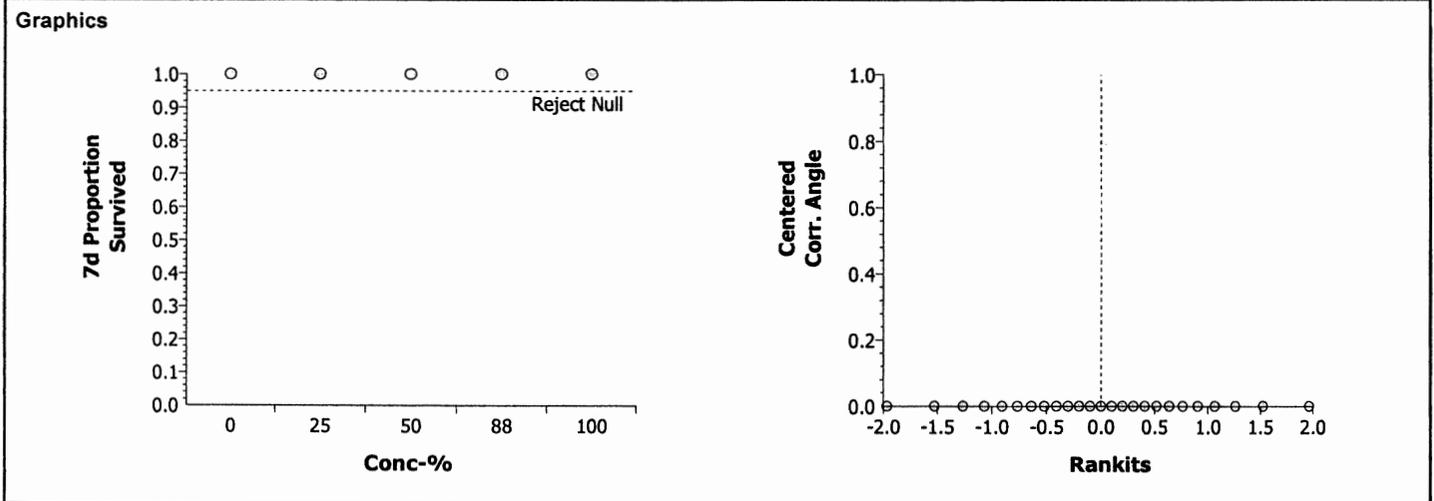
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Angular (Corrected)		100	>100	1.00	N/A	5.00%

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1	0.8 - N/A	Passes acceptability criteria
MSDp	0.05000	N/A - 0.25	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	65535.00000	4.43069	0.00000	Unequal Variances

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	0	1.85955	0.5000	0	Non-Significant Effect
		50	0	1.85955	0.5000	0	Non-Significant Effect
		88	0	1.85955	0.5000	0	Non-Significant Effect
		100	0	1.85955	0.5000	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	5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
25		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
50		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
88		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
100		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020



CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	01-8452-1405	06-8826-9790	28 Dec-04 12:59 PM	CETISv1.025

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	9.33%

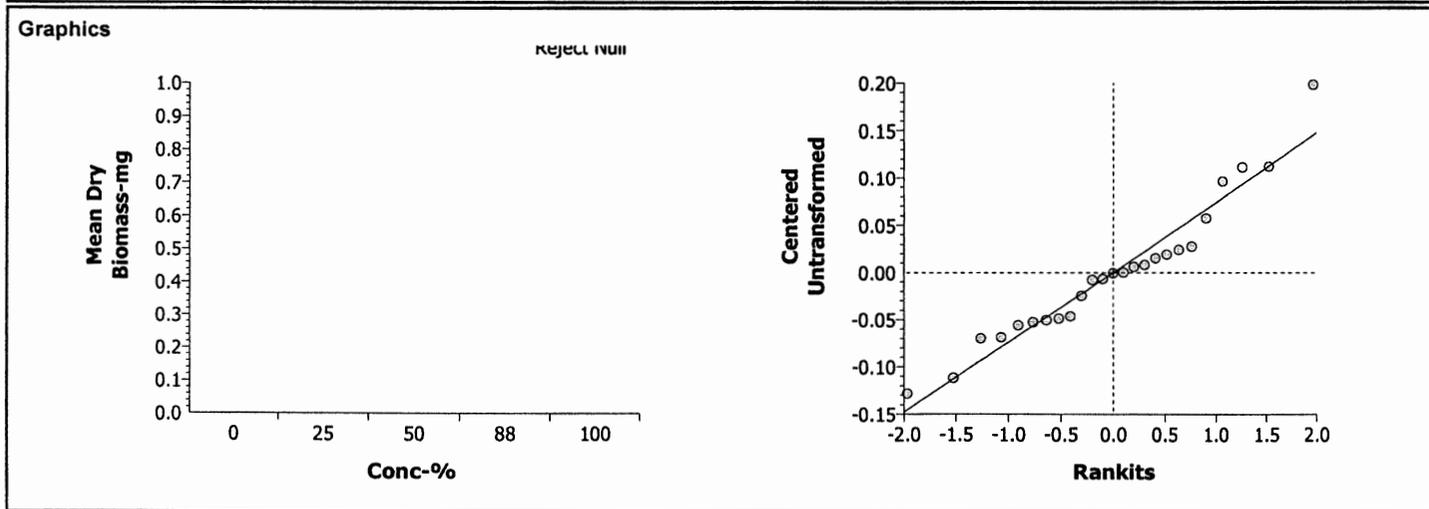
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1.26080	0.85 - N/A	Passes acceptability criteria
MSDp	0.09333	N/A - 0.5	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	3.85762	13.27671	0.42562	Equal Variances
Distribution	Shapiro-Wilk W	0.95066	0.88746	0.27003	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0115712	0.002893	4	0.44	0.77676	Non-Significant Effect
Error	0.1308687	0.006543	20			
Total	0.14243994	0.0094362	24			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-0.8131	2.3	> 0.0500	0.11767	Non-Significant Effect
		50	-0.5317	2.3	> 0.0500	0.11767	Non-Significant Effect
		88	-0.1016	2.3	> 0.0500	0.11767	Non-Significant Effect
		100	0.39093	2.3	> 0.0500	0.11767	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	1.26080	1.19200	1.31800	0.04588				
25		5	1.30240	1.17400	1.50000	0.12348				
50		5	1.28800	1.17600	1.40000	0.07940				
88		5	1.26600	1.19600	1.36200	0.06683				
100		5	1.24080	1.18800	1.35200	0.06779				



Marine Chronic Bioassay

Larval Fish Survival & Weights

Client Name: City of Buenaventura

Test Species: A. affinis

Sample ID: B-3

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-091

End Date/Time: 10/06/04 / 1440

Conc. (<u> </u> % <u> </u>)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + fish (g)	
		0	1	2	3	4	5	6	7				
Lab Control #2	a	5	5	5	5	5	4	4	4	80	See B-1		
	b	5	5	5	5	5	5	5	5	100			
	c	5	5	5	5	5	5	5	5	100			
	d	5	5	5	5	5	5	5	5	100			
	e	5	5	5	5	5	5	5	5	100			
Salt Control	a	5	5	5	5	5	5	5	5	100			
	b	5	5	5	5	5	5	5	5	100			
	c	5	5	5	5	5	5	5	5	100			
	d	5	5	5	5	5	5	5	5	100			
	e	5	5	5	5	5	5	5	5	100			
25	a	5	5	5	5	5	5	5	5	100		0.01839	0.02465
	b	5	5	5	5	5	5	5	5	100		0.01797	0.02384
	c	5	5	5	5	5	5	5	5	100		0.01721	0.02349
	d	5	5	5	5	5	5	5	5	100		0.01635	0.02385
	e	5	5	5	5	5	5	5	5	100		0.01860	0.02524
50	a	5	5	5	5	5	5	5	5	100	0.01899	0.02599	
	b	5	5	5	5	5	5	5	5	100	0.01736	0.02324	
	c	5	5	5	5	5	5	5	5	100	0.01844	0.02488	
	d	5	5	5	5	5	5	5	5	100	0.01589	0.02237	
	e	5	5	5	5	5	5	5	5	100	0.01796	0.02436	
88	a	5	5	5	5	5	5	5	5	100	0.02084	0.02682	
	b	5	5	5	5	5	5	5	5	100	0.02052	0.02697	
	c	5	5	5	5	5	5	5	5	100	0.02099	0.02780	
	d	5	5	5	5	5	5	5	5	100	0.01940	0.02576	
	e	5	5	5	5	5	5	5	5	100	0.01959	0.02564	
100	a	5	5	5	5	5	5	5	5	100	0.02030	0.02658	
	b	5	5	5	5	5	5	5	5	100	0.01893	0.02501	
	c	5	5	5	5	5	5	5	5	100	0.01939	0.02535	
	d	5	5	5	5	5	5	5	5	100	0.02051	0.02645	
	e	5	5	5	5	5	5	5	5	100	0.01989	0.02665	
	a												
	b												
	c												
	d												
	e												
Tech Initials		YR/SD	PS	RS	SA	Rg	RS	SA	RS				

Feeding Times (day):

	0	1	2	3	4	5	6
-	0820	0900	0845	0845	0845	0820	
1600	1630	1600	1435	1430	1600	1530	

Weight Data:
 Date/Time in: 10-6-04/1450
 Date/Time out: 10-8-04/0715
 Oven Temp (°C): 65°
 Tech Initials: mc

Comments: _____

QC Check: [Signature]
 Final Review: SA 11/7/05

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: A. affinis

Sample ID: B-3

Start Date/Time: 09/29/04 1500

Test No: 0409-091

End Date/Time: 10/06/04 1440

Concentration	Lab Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.03	8.24	7.95	7.95	7.47	8.29	7.96	
DO (mg/L)	8.5	6.9	7.3	7.4	7.0	8.1	8.0	
Salinity (ppt)	30.1	30.0	29.8	30.2	30.2	30.3	29.2	
Temp (°C)	19.0	20.1	20.1	20.4	20.7	20.4	19.7	
Final								
pH		8.12	8.11	7.99	7.68	7.70	7.62	7.65
DO (mg/L)		6.2	6.2	5.9	5.6	6.2	5.9	6.1
Temp (°C)		20.1	20.1	19.8	20.3	20.4	20.3	20.4

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.36	8.26	8.24	8.22	8.21	8.36	8.24	
DO (mg/L)	7.4	7.0	7.8	7.4	7.7	6.8	6.9	
Salinity (ppt)	29.7	29.9	29.4	29.8	30.3	30.7	29.3	
Temp (°C)	20.2	20.1	20.4	20.3	20.5	21.0	20.4	
Final								
pH		8.12	8.02	8.14	8.02	8.16	8.02	8.00
DO (mg/L)		6.5	6.5	6.0	5.7	5.9	6.8	5.9
Temp (°C)		20.1	19.9	19.5	20.0	20.0	20.3	20.4

Concentration	Salt Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.43	8.28	7.96	8.36	8.35	8.38	8.24	
DO (mg/L)	7.3	6.8	8.0	6.8	7.22	6.6	7.5	
Salinity (ppt)	29.4	29.4	29.9	29.7	30.2	30.2	30.2	
Temp (°C)	20.2	20.4	20.4	20.4	20.87	20.9	20.7	
Final								
pH		8.15	8.14	8.30	7.97	8.02	7.96	7.89
DO (mg/L)		6.5	6.6	6.0	5.9	6.5	6.2	5.8
Temp (°C)		20.2	20.1	19.8	20.3	20.4	20.3	20.4

Concentration	88%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.30	8.26	8.20	8.29	8.23	8.14	8.12	
DO (mg/L)	7.3	7.4	7.8	8.3	7.9	6.8	5.8	
Salinity (ppt)	29.9	30.4	30.4	30.5	30.5	31.2	31.1	
Temp (°C)	20.0	19.4	20.5	19.4	19.9	20.1	20.5	
Final								
pH		8.10	8.08	8.21	8.09	8.15	8.09	7.99
DO (mg/L)		6.6	6.6	6.0	5.8	6.1	6.1	6.1
Temp (°C)		20.2	19.8	19.5	20.0	20.1	20.3	20.4

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.40	8.27	8.40	8.35	8.27	8.56	8.26	
DO (mg/L)	7.4	6.4	7.8	7.0	7.4	6.6	7.1	
Salinity (ppt)	29.5	29.7	28.5	29.7	30.2	30.4	29.9	
Temp (°C)	20.2	20.2	20.5	20.8	20.7	21.0	20.2	
Final								
pH		8.14	8.01	8.16	7.97	8.08	8.01	8.00
DO (mg/L)		6.4	6.0	6.0	5.3	5.6	6.0	5.7
Temp (°C)		20.1	20.0	19.5	20.0	20.0	20.3	20.3

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.27	8.26	8.17	8.28	8.20	8.35	8.08	
DO (mg/L)	7.5	7.5	7.6	8.8	7.7	6.9	6.2	
Salinity (ppt)	30.0	29.4	30.4	30.1	30.5	30.9	30.6	
Temp (°C)	20.0	20.0	20.5	20.2	20.3	20.0	20.5	
Final								
pH		8.13	8.13	8.28	8.11	8.20	8.08	8.00
DO (mg/L)		6.9	6.8	6.2	5.7	6.3	6.0	6.0
Temp (°C)		20.0	19.9	19.6	20.1	20.1	20.3	20.4

Animal Source/Date Received: ABS / 9-26-04

Analysts:	Initial:	0	1	2	3	4	5	6	7
	SH	RB	RB	SH	RB	AH	ue		
	Final:	RB	RB	RB	AH	RB	MC	SH	

Animal Age at Initiation: 14 days

Comments: _____

QC Check: [Signature] 12/27/04

Final Review: AH 11/17/05

CETIS Test Summary

Report Date: 28 Dec-04 1:08 PM

Link: 11-3224-7628/0409-092

Pacific Topsmelt 7-d Survival and Growth Test							Nautilus Environmental (CA)	
Test No:	14-0656-5950	Test Type:	Growth-Survival (7d)	Duration:	6d 23h			
Start Date:	29 Sep-04 03:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Species:	Atherinops affinis			
Ending Date:	06 Oct-04 02:40 PM	Dil Water:	Artificial Saltwater	Source:	Aquatic Biosystems, CO			
Setup Date:	29 Sep-04 03:00 PM	Brine:	Forty Fathoms					
Sample No:	13-4382-9421	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 03:30 PM	Code:	0409-092	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	23h (20.6 °C)	Station:	C-3					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
19-8087-4793	7d Proportion Survived	100	> 100	N/A	14.02%	Steel's Many-One Rank		
07-1888-3524	Mean Dry Biomass-mg	100	> 100	N/A	19.15%	Dunnnett's Multiple Comparison		
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
19-8087-4793	7d Proportion Survived	Control Response	1	0.8 - N/A	Passes acceptability criteria			
07-1888-3524	Mean Dry Biomass-mg	Control Response	1.26080	0.85 - N/A	Passes acceptability criteria			
19-8087-4793	7d Proportion Survived	MSDp	0.1402	N/A - 0.25	Passes acceptability criteria			
07-1888-3524	Mean Dry Biomass-mg	MSDp	0.19155	N/A - 0.5	Passes acceptability criteria			
7d Proportion Survived Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
0	Salt Control	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
50		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
66		5	0.92000	0.60000	1.00000	0.08000	0.17889	19.44%
100		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
Mean Dry Biomass-mg Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	1.19480	1.06400	1.34800	0.04723	0.10562	8.84%
0	Salt Control	5	1.26080	1.19200	1.31800	0.02052	0.04588	3.64%
25		5	1.30240	0.99800	1.64000	0.10816	0.24186	18.57%
50		5	1.36640	1.17800	1.57200	0.06365	0.14232	10.42%
66		5	1.21200	0.97200	1.48000	0.08055	0.18012	14.86%
100		5	1.24400	1.11200	1.50200	0.07003	0.15660	12.59%
7d Proportion Survived Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.80000	1.00000	1.00000	1.00000	1.00000		
0	Salt Control	1.00000	1.00000	1.00000	1.00000	1.00000		
25		1.00000	0.80000	1.00000	0.80000	1.00000		
50		1.00000	1.00000	1.00000	1.00000	1.00000		
66		1.00000	0.60000	1.00000	1.00000	1.00000		
100		1.00000	1.00000	1.00000	1.00000	1.00000		
Mean Dry Biomass-mg Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	1.06400	1.18600	1.34800	1.14400	1.23200		
0	Salt Control	1.19200	1.25400	1.31800	1.26000	1.28000		
25		1.64000	1.17200	1.29800	0.99800	1.40400		
50		1.31600	1.17800	1.39200	1.37400	1.57200		
66		1.48000	0.97200	1.21000	1.20000	1.19800		
100		1.50200	1.27200	1.19400	1.11200	1.14000		

CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	11-3224-7628	06-8826-9790	28 Dec-04 1:08 PM	CETISv1.025

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	14.02%

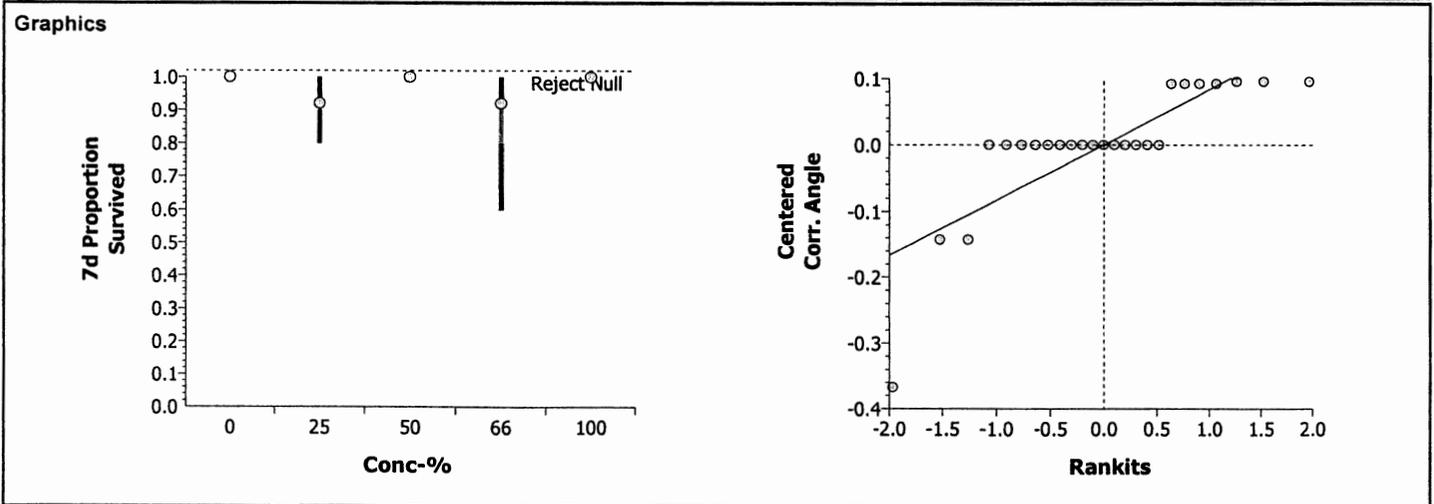
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1	0.8 - N/A	Passes acceptability criteria
MSDp	0.1402	N/A - 0.25	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	1.73184	4.43069	0.18253	Equal Variances
Distribution	Shapiro-Wilk W	0.68221	0.88746	0.00000	Non-normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0525358	0.013134	4	1.11	0.37954	Non-Significant Effect
Error	0.2367454	0.011837	20			
Total	0.28928128	0.0249712	24			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	22.5	17	> 0.0500	2	Non-Significant Effect
		50	27.5	17	> 0.0500	1	Non-Significant Effect
		66	25	17	> 0.0500	1	Non-Significant Effect
		100	27.5	17	> 0.0500	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	5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
25		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043
50		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
66		5	0.92000	0.60000	1.00000	0.17889	1.25344	0.88608	1.34528	0.20536
100		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020



CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	11-3224-7628	06-8826-9790	28 Dec-04 1:08 PM	CETISv1.025

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	19.15%

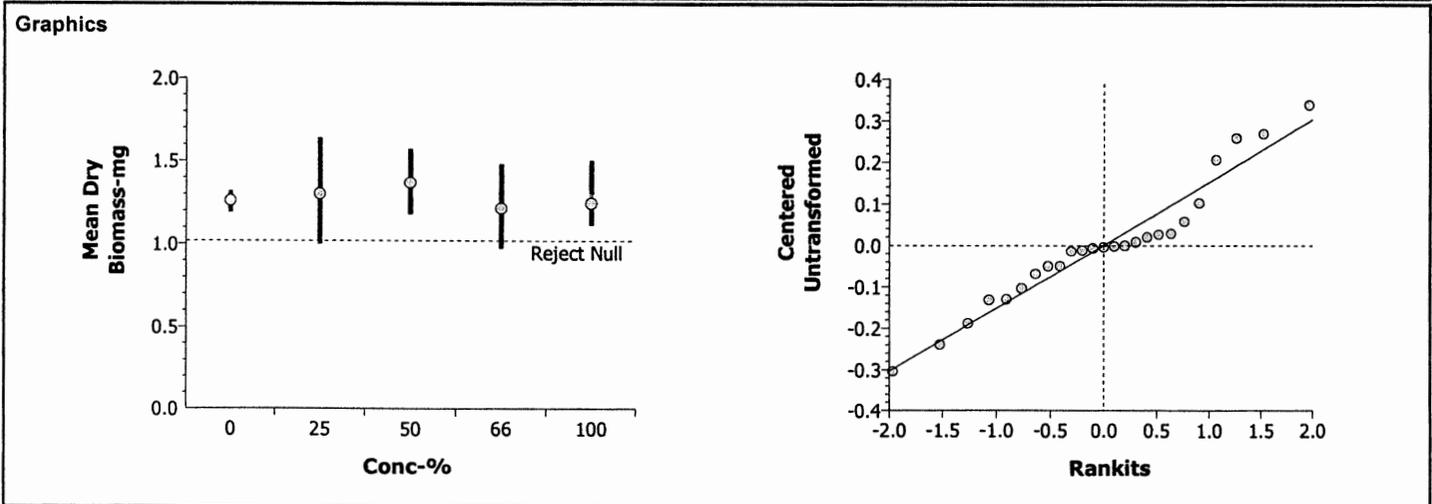
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1.26080	0.85 - N/A	Passes acceptability criteria
MSDp	0.19155	N/A - 0.5	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	7.56998	13.27671	0.10866	Equal Variances
Distribution	Shapiro-Wilk W	0.94727	0.88746	0.22781	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0710694	0.017767	4	0.64	0.63707	Non-Significant Effect
Error	0.5512753	0.027564	20			
Total	0.62234475	0.0453311	24			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	-0.3962	2.3	> 0.0500	0.24151	Non-Significant Effect
		50	-1.0057	2.3	> 0.0500	0.24151	Non-Significant Effect
		66	0.46475	2.3	> 0.0500	0.24151	Non-Significant Effect
		100	0.16	2.3	> 0.0500	0.24151	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	1.26080	1.19200	1.31800	0.04588				
25		5	1.30240	0.99800	1.64000	0.24186				
50		5	1.36640	1.17800	1.57200	0.14232				
66		5	1.21200	0.97200	1.48000	0.18012				
100		5	1.24400	1.11200	1.50200	0.15660				



Marine Chronic Bioassay

Larval Fish Survival & Weights

Client Name: City of Buenaventura

Test Species: A. affinis

Sample ID: C-3

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-092

End Date/Time: 10/06/04 / 1450

Conc. (<u> </u> % <u> </u>)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + fish (g)
		0	1	2	3	4	5	6	7			
Lab Control #L	a	5	5	5	5	5	4	4	4	80	Rep. B	
	b	5	5	5	5	5	5	5	5	100		
	c	5	5	5	5	5	5	5	5	100		
	d	5	5	5	5	5	5	5	5	100		
	e	5	5	5	5	5	5	5	5	100		
Salt Control	a	5	5	5	5	5	5	5	5	100		
	b	5	5	5	5	5	5	5	5	100		
	c	5	5	5	5	5	5	5	5	100		
	d	5	5	5	5	5	5	5	5	100		
	e	5	5	5	5	5	5	5	5	100		
25	a	5	5	5	5	5	5	5	5	100	0.02073	0.02893
	b	5	5	5	5	5	5	4	4	80	0.02195	0.02781
	c	5	5	5	5	5	5	5	5	100	0.02265	0.02914
	d	5	5	5	5	5	5	4	4	80	0.02171	0.02670
	e	5	5	5	5	5	5	5	5	100	0.02004	0.02706
50	a	5	5	5	5	5	5	5	5	100	0.02067	0.02725
	b	5	5	5	5	5	5	5	5	100	0.02119	0.02708
	c	5	5	5	5	5	5	5	5	100	0.02059	0.02755
	d	5	5	5	5	5	5	5	5	100	0.02017	0.02704
	e	5	5	5	5	5	5	5	5	100	0.02198	0.02984
66	a	5	5	5	5	5	5	5	5	100	0.01983	0.02723
	b	5	5	5	5	5	4	3	3	60	0.02152	0.02638
	c	5	5	5	5	5	5	5	5	100	0.02131	0.02736
	d	5	5	5	5	5	5	5	5	100	0.02194	0.02794
	e	5	5	5	5	5	5	5	5	100	0.02133	0.02732
100	a	5	5	5	5	5	5	5	5	100	0.02057	0.02808
	b	5	5	5	5	5	5	5	5	100	0.01925	0.02561
	c	5	5	5	5	5	5	5	5	100	0.02154	0.02751
	d	5	5	5	5	5	5	5	5	100	0.01924	0.02480
	e	5	5	5	5	5	5	5	5	100	0.01832	0.02402
	a											
	b											
	c											
	d											
	e											
Tech Initials		YR/SD	RS	RS	SH	RG	RS	SH	RS			

Feeding Times (day):

	0	1	2	3	4	5	6
-		0820	0900	0845	0445	0915	0820
1600		1630	1600	1435	1430	1600	1530

Weight Data: ¹⁵⁰⁰
 Date/Time in: 10-6-04/1300
 Date/Time out: 10-8-04/0915
 Oven Temp (°C): 65°
 Tech Initials: mc

Comments: _____

QC Check: [Signature] 12/27/04
 Final Review: AF 1/17/05

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: A. affinis

Sample ID: C-3

Start Date/Time: 09/29/04 11500

Test No: 0409-092

End Date/Time: 10/06/04 1450

Concentration	Lab Control #2								
	Day	0	1	2	3	4	5	6	7
	Initial								
pH	8.03	8.24	7.95	7.95	7.97	8.29	7.96		
DO (mg/L)	8.5	6.9	7.3	7.4	7.0	8.1	8.0		
Salinity (ppt)	30.1	30.0	29.8	30.2	30.2	30.3	29.2		
Temp (°C)	19.0	20.1	20.1	20.4	20.7	20.4	19.7		
	Final								
pH		8.12	8.11	7.89	7.68	7.70	7.62	7.65	
DO (mg/L)		6.2	6.2	5.9	5.6	6.2	5.9	6.1	
Temp (°C)		20.1	20.1	19.8	20.3	20.4	20.3	20.4	

Concentration	50%								
	Day	0	1	2	3	4	5	6	7
	Initial								
pH	8.23	8.22	8.23	8.12	8.20	8.52	8.09		
DO (mg/L)	7.4	6.9	7.1	7.0	7.6	6.6	6.8		
Salinity (ppt)	29.5	29.9	29.9	30.0	30.4	30.4	30.4		
Temp (°C)	20.5	20.0	20.3	20.8	20.6	20.8	20.5		
	Final								
pH		8.18	8.21	8.40	8.23	8.18	8.09	8.07	
DO (mg/L)		6.3	6.4	5.8	5.6	5.6	5.4	5.7	
Temp (°C)		20.1	19.9	19.6	20.0	20.0	20.3	20.5	

Concentration	Salt Control								
	Day	0	1	2	3	4	5	6	7
	Initial								
pH	8.43	8.28	7.96	8.36	8.35	8.38	8.24		
DO (mg/L)	7.3	6.8	8.0	6.8	6.2	6.6	7.5		
Salinity (ppt)	29.4	29.4	29.9	29.7	30.1	30.2	30.2		
Temp (°C)	20.3	20.4	20.4	20.4	20.7	20.9	20.7		
	Final								
pH		8.15	8.14	8.30	7.97	8.02	7.96	7.89	
DO (mg/L)		6.5	6.6	6.0	5.9	6.5	6.2	5.8	
Temp (°C)		20.2	20.1	19.8	20.3	20.4	20.3	20.4	

Concentration	66%								
	Day	0	1	2	3	4	5	6	7
	Initial								
pH	8.19	8.22	8.17	8.06	8.16	8.31	8.18		
DO (mg/L)	7.3	7.0	7.1	6.8	7.8	6.6	7.6		
Salinity (ppt)	29.7	30.1	29.9	30.0	30.6	30.6	30.4		
Temp (°C)	20.5	20.1	20.3	20.6	20.7	21.0	20.0		
	Final								
pH		8.18	8.21	8.12	8.21	8.18	8.10	8.12	
DO (mg/L)		6.4	6.7	5.9	5.9	5.8	5.7	5.9	
Temp (°C)		20.1	19.9	19.6	20.1	20.1	20.3	20.5	

Concentration	25%								
	Day	0	1	2	3	4	5	6	7
	Initial								
pH	8.31	8.24	8.55	8.24	8.27	7.95	8.16		
DO (mg/L)	7.4	6.9	6.9	7.0	7.3	6.6	7.6		
Salinity (ppt)	29.5	30.0	29.9	29.8	30.0	30.3	30.4		
Temp (°C)	20.4	20.1	20.3	20.8	20.7	20.9	20.7		
	Final								
pH		8.14	8.12	8.33	8.11	8.09	8.03	7.99	
DO (mg/L)		6.2	5.9	5.6	5.6	5.2	5.4	5.6	
Temp (°C)		20.3	20.0	19.5	19.9	19.9	20.2	20.4	

Concentration	100%								
	Day	0	1	2	3	4	5	6	7
	Initial								
pH	8.09	8.13	8.05	7.96	8.11	7.93	8.17		
DO (mg/L)	7.3	7.1	7.3	6.5	8.1	6.5	7.4		
Salinity (ppt)	29.7	30.5	30.4	30.1	30.7	30.7	30.6		
Temp (°C)	20.6	19.5	20.1	20.2	20.7	20.2	19.7		
	Final								
pH		8.10	8.05	8.31	8.18	8.13	8.65	8.04	
DO (mg/L)		6.4	6.4	5.9	5.4	5.9	5.6	5.5	
Temp (°C)		20.1	19.9	19.6	20.1	20.1	20.3	20.5	

Animal Source/Date Received: ABS / 9-26-04

Animal Age at Initiation: 14 days

Comments: _____

QC Check: [Signature] 12/21/04

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

Final Review: AH 1/17/05

A. BAHIA

CETIS Test Summary

Report Date: 28 Dec-04 11:26 AM

Link: 13-7342-5744/0409-093

Mysid 7-d Survival and Growth Test			Nautilus Environmental (CA)						
Test No:	20-4434-8567	Test Type:	Growth-Survival (7d)	Duration:	6d 21h				
Start Date:	29 Sep-04 03:00 PM	Protocol:	EPA/821/R-02-014 (2002)	Species:	Mysidopsis bahia <i>Americamysis</i>				
Ending Date:	06 Oct-04 12:40 PM	Dil Water:	Artificial Saltwater Lab Seawater	Source:	Aquatic Biosystems, CO				
Setup Date:	29 Sep-04 03:00 PM	Brine:	Forty Fathoms N/A						
Sample No:	01-4334-3801	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura				
Sample Date:	28 Sep-04 10:30 AM	Code:	0409-093	Project:					
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura						
Sample Age:	28h (17.9 °C)	Station:	A-2						
Comments:	Laboratory seawater was used as dilution water for sample A-2, as no salinity adjustment with artificial sea salts was needed for this sample.								
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method			
03-7449-7261	7d Proportion Survived	100	> 100	N/A	9.47%	Bonferroni Adj Wilcoxon Rank Sum			
13-3022-7939	Mean Dry Biomass-mg	50	100	70.711	13.14%	Bonferroni Adj t			
Point Estimate Summary									
Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method			
16-4684-8604	Mean Dry Biomass-mg	25	> 100.00000	N/A	N/A	Linear Interpolation			
		50	> 100.00000	N/A	N/A				
7d Proportion Survived Summary									
Conc-%	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	0.95000	0.80000	1.00000	0.03273	0.09258	9.75%	
50		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%	
100		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%	
Mean Dry Biomass-mg Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Lab Control	8	0.42067	0.37400	0.44800	0.01236	0.03027	7.20%	
25		8	0.36450	0.30400	0.42600	0.01654	0.04678	12.83%	
50		8	0.37150	0.26400	0.42600	0.01829	0.05173	13.93%	
100		8	0.32200	0.27600	0.41000	0.01652	0.04672	14.51%	
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	N/A	1.00000	N/A	1.00000	1.00000	1.00000	1.00000	1.00000
25		1.00000	0.80000	1.00000	1.00000	1.00000	1.00000	1.00000	0.80000
50		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		0.80000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
Mean Dry Biomass-mg Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	N/A	0.37400	N/A	0.44800	0.39800	0.44800	0.44000	0.41600
25		0.36800	0.30400	0.39200	0.35000	0.31200	0.42400	0.42600	0.34000
50		0.26400	0.37200	0.35800	0.34800	0.39400	0.42400	0.38600	0.42600
100		0.27600	0.34800	0.27800	0.41000	0.35200	0.29800	0.28600	0.32800

CETIS Analysis Detail

Mysid 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	13-7342-5744	13-7342-5744	28 Dec-04 11:26 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj Wilcoxon Rank Su	C > T	Angular (Corrected)		100	>100	1.00	N/A	9.47%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	1.18596	4.63657	0.33436	Equal Variances
Distribution	Shapiro-Wilk W	0.64711	0.89981	0.00000	Non-normal Distribution

ANOVA Table

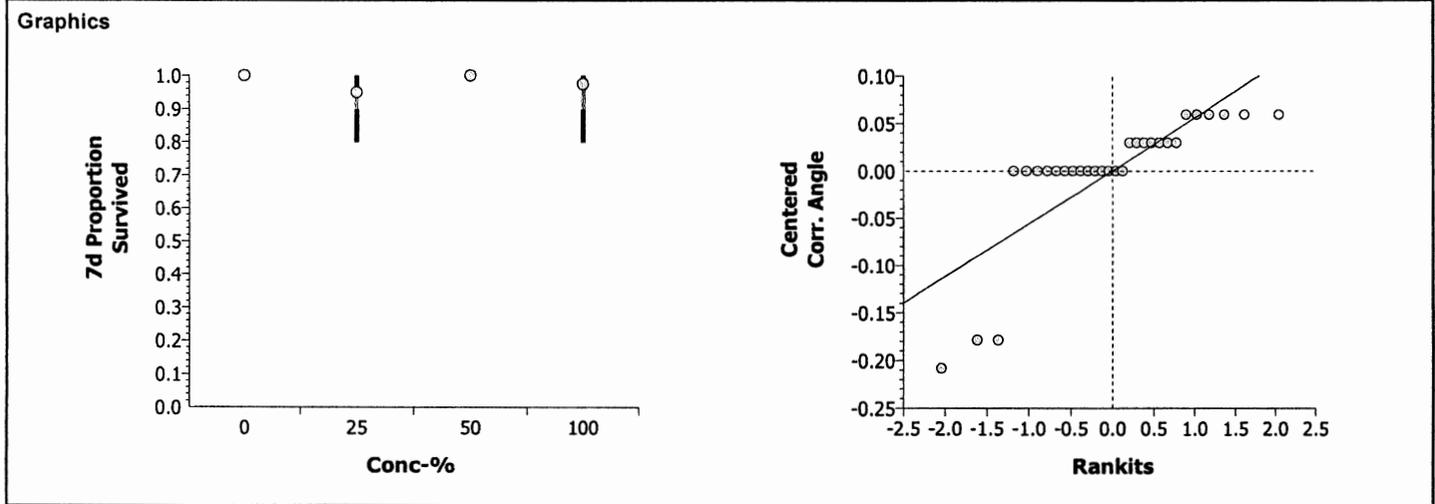
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0184301	0.006143	3	1.19	0.33436	Non-Significant Effect
Error	0.1346813	0.005180	26			
Total	0.15311132	0.0113234	29			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		25	54		0.2454	2	Non-Significant Effect
		50	60		0.4749	1	Non-Significant Effect
		100	57		0.3773	1	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	6	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
25		8	0.95000	0.80000	1.00000	0.09258	1.28575	1.10715	1.34528	0.11023
50		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
100		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419



CETIS Analysis Detail

Mysid 7-d Survival and Growth Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	13-7342-5744	13-7342-5744	28 Dec-04 11:26 AM	CETISv1.025

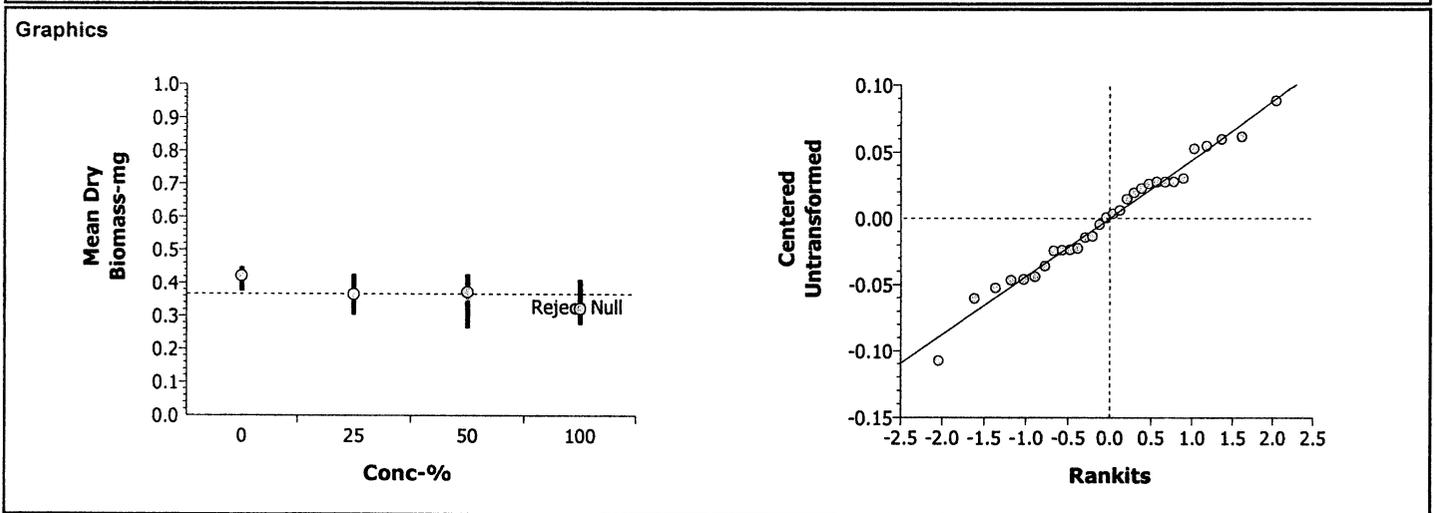
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Untransformed		50	100	2.00	70.711	13.14%

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.46522	11.34487	0.69032	Equal Variances
Distribution	Shapiro-Wilk W	0.98406	0.89981	0.92979	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0336765	0.011226	3	5.41	0.00498	Significant Effect
Error	0.0539134	0.002074	26			
Total	0.0875899	0.0132991	29			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		25	2.28388	2.24724	0.0154	0.05527	Significant Effect
		50	1.99924	2.24724	0.0281	0.05527	Non-Significant Effect
		100	4.01204	2.24724	0.0002	0.05527	Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	6	0.42067	0.37400	0.44800	0.03027				
25		8	0.36450	0.30400	0.42600	0.04678				
50		8	0.37150	0.26400	0.42600	0.05173				
100		8	0.32200	0.27600	0.41000	0.04672				



CETIS Analysis Detail

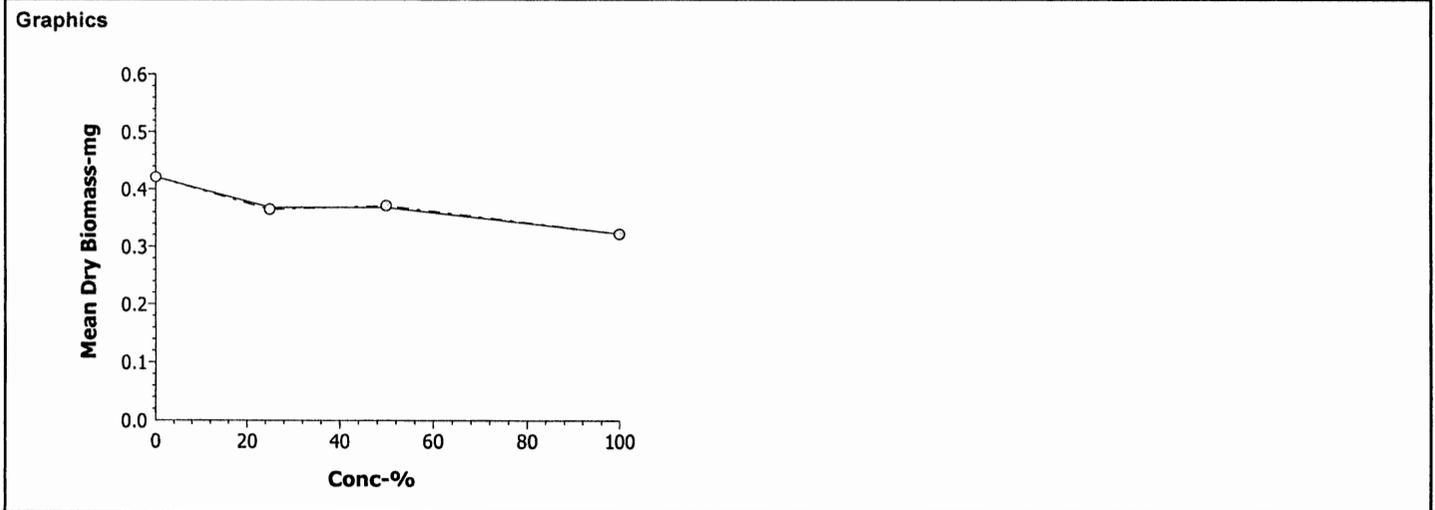
Mysid 7-d Survival and Growth Test	Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Linear Interpolation	13-7342-5744	13-7342-5744	28 Dec-04 11:26 AM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	2895624	200	Yes	Two-Point Interpolation

Point Estimates			
% Effect	Conc-%	95% LCL	95% UCL
25	> 100.00000	N/A	N/A
50	> 100.00000	N/A	N/A

Data Summary			Calculated Variate				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	6	0.42067	0.37400	0.44800	0.00618	0.03027
25		8	0.36450	0.30400	0.42600	0.00955	0.04678
50		8	0.37150	0.26400	0.42600	0.01056	0.05173
100		8	0.32200	0.27600	0.41000	0.00954	0.04672



Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: City of Buenaventura

Test Species: A. bahia

Sample ID: A-2

Start Date/Time: 09/29/04 /1500

Test No.: 0409-093

End Date/Time: 10/06/04 /1240

Conc. (<u> </u> %)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
Lab Control	a	5	5	5	5	5	4	4	4	-	0.01880	-
	b	5	5	5	5	5	5	5	5	100	0.02067	0.02067
	c	5	5	5	5	5	5	5	5	-	-	-
	d	5	5	5	5	5	5	5	5	100	0.02141	0.02365
	e	5	5	5	5	5	5	5	5	100	0.02177	0.02374
	f	5	5	5	5	5	5	5	5	100	0.02242	0.02446
	g	5	5	5	5	5	5	5	5	100	0.02027	0.02247
	h	5	5	5	5	5	5	5	5	100	0.02009	0.02217
25	a	5	5	5	5	5	5	5	5	100	0.01933	0.02087
	b	5	5	4	4	4	4	4	4	80	0.01950	0.02088
	c	5	5	5	5	5	5	5	5	100	0.01952	0.02145
	d	5	5	5	5	5	5	5	5	100	0.02132	0.02416
	e	5	5	5	5	5	5	5	5	100	0.01917	0.02073
	f	5	5	5	5	5	5	5	5	100	0.02039	0.02251
	g	5	5	5	5	5	5	5	5	100	0.01974	0.02187
	h	5	5	4	4	4	4	4	4	80	0.01894	0.02064
50	a	5	5	5	5	5	5	5	5	100	0.01864	0.01996
	b	5	5	5	5	5	5	5	5	100	0.02030	0.02216
	c	5	5	5	5	5	5	5	5	100	0.01898	0.02277
	d	5	5	5	5	5	5	5	5	100	0.01930	0.02104
	e	5	5	5	5	5	5	5	5	100	0.02079	0.02270
	f	5	5	5	5	5	5	5	5	100	0.02150	0.02362
	g	5	5	5	5	5	5	5	5	100	0.02223	0.02416
	h	5	5	5	5	5	5	5	5	100	0.02006	0.02219
100	a	5	5	4	4	4	4	4	4	80	0.02150	0.02288
	b	5	5	5	5	5	5	5	5	100	0.02057	0.02231
	c	5	5	5	5	5	5	5	5	100	0.02014	0.02153
	d	5	5	5	5	5	5	5	5	100	0.01932	0.02137
	e	5	5	5	5	5	5	5	5	100	0.02095	0.02271
	f	5	5	5	5	5	5	5	5	100	0.01908	0.02057
	g	5	5	5	5	5	5	5	5	100	0.02032	0.02175
	h	5	5	5	5	5	5	5	5	100	0.02230	0.02397
Tech Initials	RS	RS	AH	SA	Rg	Rg	UL	RS				

Feeding Times (day):

0	1	2	3	4	5	6
-	0820	0900	0845	0845	0915	0820
1600	1630	1600	1435	1430	1600	1530

Weight Data:
 Date/Time in: 10-6-04/1240
 Date/Time out: 10-6-04/1245
 Oven Temp (°C): 65
 Tech Initials: SO

Comments: ①Cups spilled

QC Check: [Signature]
 Final Review: AH 1/17/05

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: A. bahia

Sample ID: A-2

Start Date/Time: 09/29/04 11500

Test No: 0409-093

End Date/Time: 10/06/04 11240

Concentration	Lab Control #1							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.03	7.98	7.98	7.93	7.97	7.96	7.93	
DO (mg/L)	6.9	7.6	7.1	7.2	8.0	8.8	7.7	
Salinity (ppt)	33.9	33.5	33.8	33.6	33.6	33.9	33.8	
Temp (°C)	25.0	25.0	24.9	25.0	25.0	25.0	25.0	
Final								
pH	7.90	7.87	7.88	7.89	7.85	7.72	7.82	
DO (mg/L)	6.0	6.2	6.9	5.3	5.1	4.9	5.0	
Temp (°C)	25.1	24.9	24.6	24.7	24.9	25.5	25.3	

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.12	8.04	7.99	7.93	7.99	7.92	7.82	
DO (mg/L)	7.3	5.7	6.4	6.0	6.5	6.0	5.4	
Salinity (ppt)	32.2	32.1	32.1	31.6	32.1	32.3	32.1	
Temp (°C)	25.0	25.0	25.3	25.0	25.0	25.0	25.0	
Final								
pH	7.98	7.95	7.89	7.87	7.88	7.80	7.80	
DO (mg/L)	6.1	6.1	6.0	5.1	5.7	5.4	5.4	
Temp (°C)	25.1	25.3	24.4	24.7	25.1	25.4	25.0	

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.06	7.20	7.93	7.94	8.00	7.95	7.92	
DO (mg/L)	7.0	7.0	6.6	6.9	6.7	8.3	7.3	
Salinity (ppt)	33.3	33.0	33.5	33.0	33.0	33.5	33.4	
Temp (°C)	25.0	25.0	25.9	25.0	25.0	25.0	25.0	
Final								
pH	7.89	7.88	7.91	7.90	7.83	7.74	7.87	
DO (mg/L)	5.5	6.1	6.0	5.2	5.4	5.0	5.9	
Temp (°C)	25.3	25.1	24.6	24.8	24.9	25.5	25.5	

Concentration								
Day	0	1	2	3	4	5	6	7
Initial								
pH								
DO (mg/L)								
Salinity (ppt)								
Temp (°C)								
Final								
pH								
DO (mg/L)								
Temp (°C)								

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.08	8.04	7.95	7.93	8.00	7.95	7.87	
DO (mg/L)	7.1	7.6	4.7	6.3	6.8	7.6	6.9	
Salinity (ppt)	33.0	32.8	33.0	32.5	32.6	33.3	33.1	
Temp (°C)	25.0	25.0	25.9	25.0	25.0	25.0	25.0	
Final								
pH	7.91	7.85	7.88	7.90	7.84	7.75	7.78	
DO (mg/L)	5.6	6.0	6.0	5.3	5.6	5.4	5.2	
Temp (°C)	25.3	25.3	24.4	24.7	25.0	25.3	25.4	

Concentration								
Day	0	1	2	3	4	5	6	7
Initial								
pH								
DO (mg/L)								
Salinity (ppt)								
Temp (°C)								
Final								
pH								
DO (mg/L)								
Temp (°C)								

Animal Source/Date Received: ABS / 9-29-04

Analysts:	Initial:	SH	PS	AH	PS	SH	RG	AH	ME	
	Final:		PS	PS	PS	AH	PS	ME	SH	

Animal Age at Initiation: 7 days

Comments: _____

QC Check: 10/12/04

Final Review: AH 11/7/05

CETIS Test Summary

Report Date: 28 Dec-04 12:05 PM

Link: 03-7265-8576/0409-094

Mysid 7-d Survival and Growth Test							Nautilus Environmental (CA)		
Test No:	20-4434-8567	Test Type:	Growth-Survival (7d)	Duration:	6d 21h				
Start Date:	29 Sep-04 03:00 PM	Protocol:	EPA/821/R-02-014 (2002)	Species:	Mysidopsis bahia Americamysis				
Ending Date:	06 Oct-04 12:40 PM	Dil Water:	Artificial Saltwater	Source:	Aquatic Biosystems, CO				
Setup Date:	29 Sep-04 03:00 PM	Brine:	Forty Fathoms						
Sample No:	16-3931-0087	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura				
Sample Date:	28 Sep-04 09:26 AM	Code:	0409-094	Project:					
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura						
Sample Age:	30h (16.6 °C)	Station:	B-1						
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method			
06-4563-9527	7d Proportion Survived	100	> 100	N/A	8.02%	Steel's Many-One Rank			
06-9650-4993	Mean Dry Biomass-mg	25	50	35.355	11.81%	Dunnett's Multiple Comparison			
Point Estimate Summary									
Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method			
13-3832-0857	Mean Dry Biomass-mg	25	41.52045	30.76297	53.22672	Linear Interpolation			
		50	81.01691	69.34811	89.01843				
7d Proportion Survived Summary									
Conc-%	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%	
0	Salt 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%	
65		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%	
100		8	0.92500	0.80000	1.00000	0.03660	0.10351	11.19%	
Mean Dry Biomass-mg Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Lab Control	8	0.38975	0.34000	0.45000	0.01250	0.03537	9.07%	
0	Salt Control	8	0.37700	0.32200	0.51400	0.02162	0.06114	16.22%	
25		8	0.33925	0.29600	0.39600	0.01108	0.03135	9.24%	
50		8	0.25375	0.20000	0.30000	0.01275	0.03607	14.21%	
65		8	0.22900	0.17200	0.29000	0.01316	0.03723	16.26%	
100		8	0.14050	0.10800	0.17800	0.00789	0.02232	15.88%	
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	1.00000	1.00000	1.00000	1.00000
0	Salt 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
65		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		0.80000	1.00000	1.00000	1.00000	0.80000	0.80000	1.00000	1.00000
Mean Dry Biomass-mg Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.38600	0.36000	0.39800	0.40000	0.34000	0.45000	0.42000	0.36400
0	Salt Control	0.34000	0.39400	0.39600	0.51400	0.35800	0.32200	0.34000	0.35200
25		0.34200	0.31000	0.32200	0.34200	0.29600	0.34200	0.39600	0.36400
50		0.20000	0.30000	0.26000	0.21400	0.26200	0.30000	0.23800	0.25600
65		0.29000	0.17200	0.21400	0.25600	0.19000	0.23400	0.24400	0.23200
100		0.15000	0.17800	0.13800	0.12000	0.10800	0.12600	0.15600	0.14800

CETIS Analysis Detail

Mysid 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	03-7265-8576	03-7265-8576	28 Dec-04 12:05 PM	CETISv1.025

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	8.02%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	4.20000	3.90824	0.00700	Unequal Variances
Distribution	Shapiro-Wilk W	0.59474	0.91882	0.00000	Non-normal Distribution

ANOVA Table

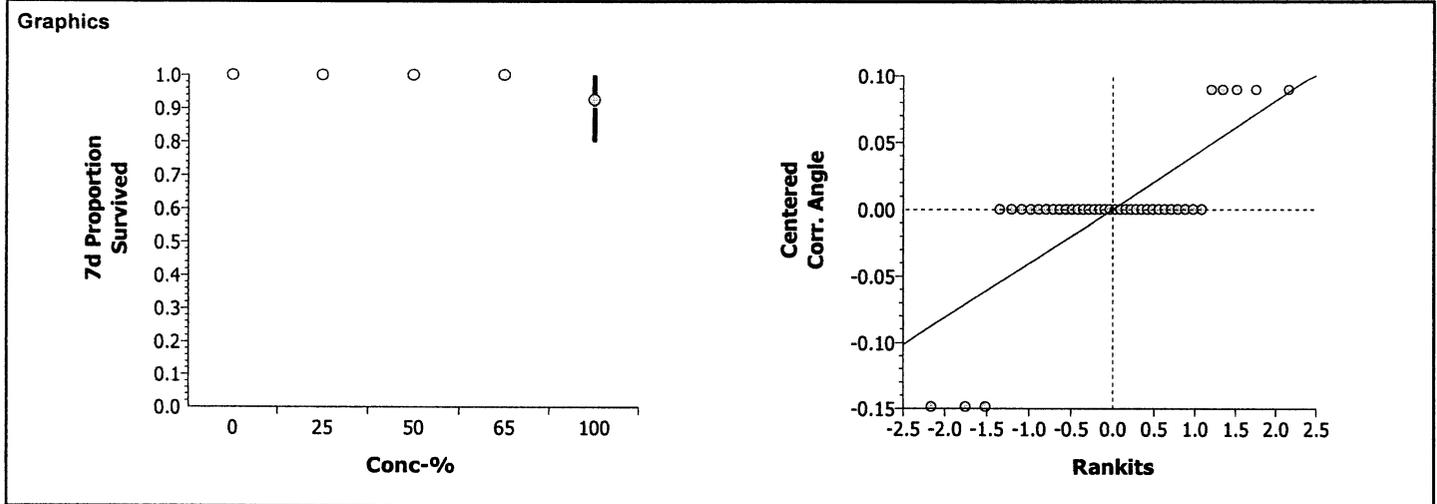
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0510371	0.012759	4	4.20	0.00700	Significant Effect
Error	0.1063273	0.003038	35			
Total	0.15736442	0.0157972	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	68	47	> 0.0500	1	Non-Significant Effect
		50	68	47	> 0.0500	1	Non-Significant Effect
		65	68	47	> 0.0500	1	Non-Significant Effect
		100	56	47	> 0.0500	2	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt 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
65		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
100		8	0.92500	0.80000	1.00000	0.10351	1.25598	1.10715	1.34528	0.12325



CETIS Analysis Detail

Mysid 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	03-7265-8576	03-7265-8576	28 Dec-04 12:05 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		25	50	4.00	35.355	11.81%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	7.26568	13.27671	0.12250	Equal Variances
Distribution	Shapiro-Wilk W	0.92587	0.91882	0.01706	Normal Distribution

ANOVA Table

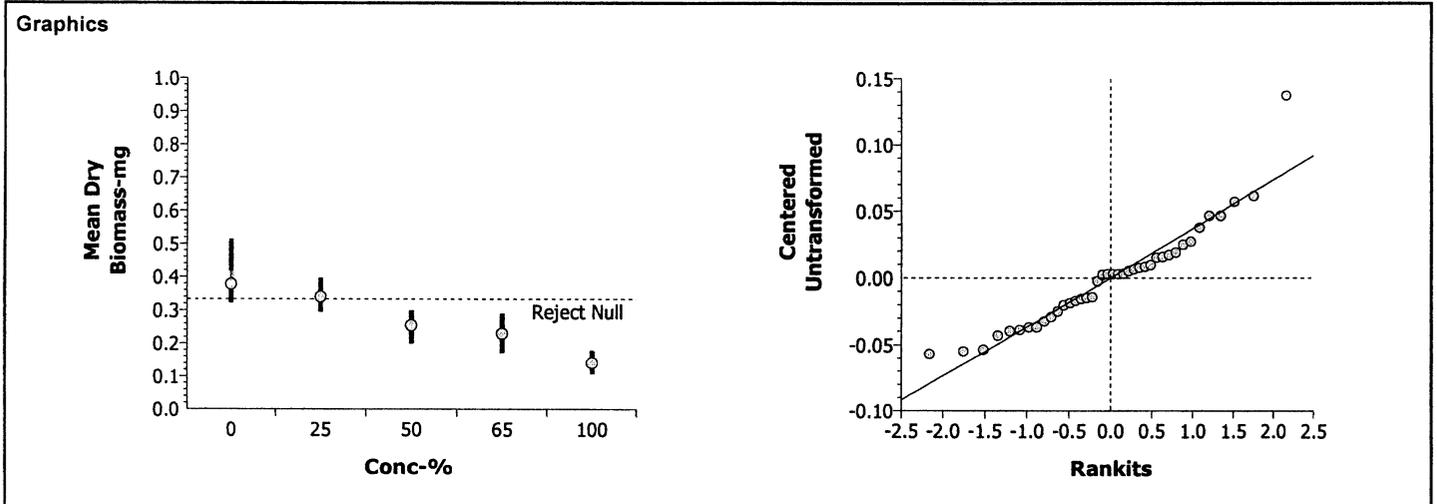
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.2795026	0.069876	4	44.19	0.00000	Significant Effect
Error	0.055345	0.001581	35			
Total	0.33484758	0.0714569	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	1.89865	2.23857	> 0.0500	0.04451	Non-Significant Effect
		50	6.19886	2.23857	<= 0.0500	0.04451	Significant Effect
		65	7.44367	2.23857	<= 0.0500	0.04451	Significant Effect
		100	11.8948	2.23857	<= 0.0500	0.04451	Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.37700	0.32200	0.51400	0.06114				
25		8	0.33925	0.29600	0.39600	0.03135				
50		8	0.25375	0.20000	0.30000	0.03607				
65		8	0.22900	0.17200	0.29000	0.03723				
100		8	0.14050	0.10800	0.17800	0.02232				



CETIS Analysis Detail

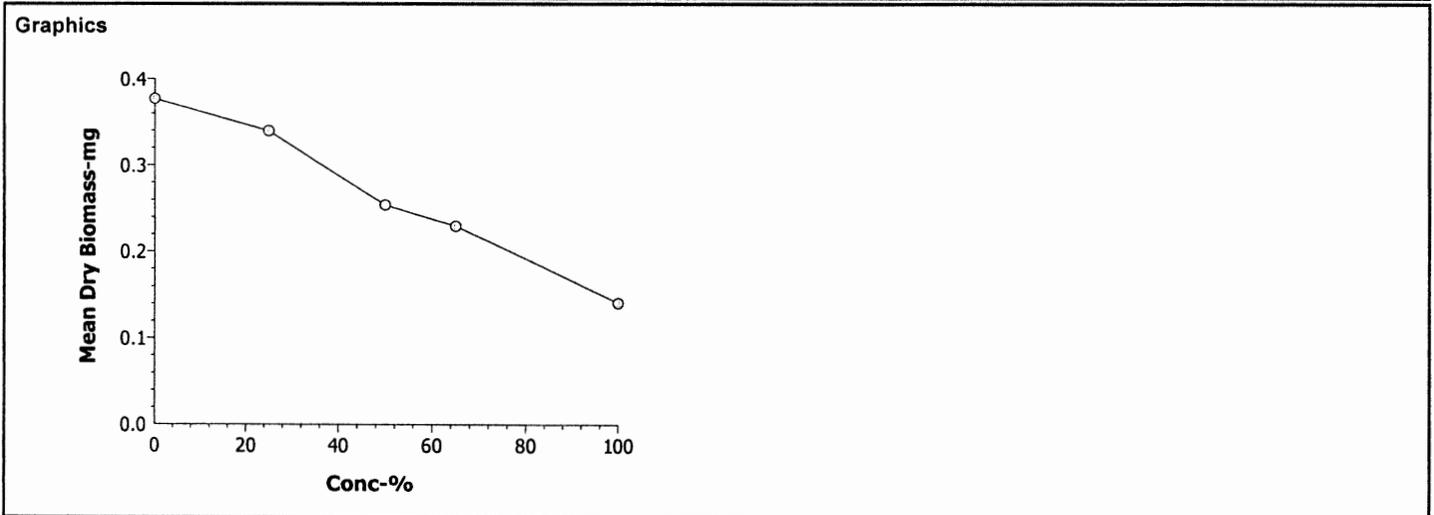
Mysid 7-d Survival and Growth Test					Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Linear Interpolation	03-7265-8576	03-7265-8576	28 Dec-04 12:05 PM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	3019480	200	Yes	Two-Point Interpolation

Point Estimates			
% Effect	Conc-%	95% LCL	95% UCL
25	41.52045	30.76297	53.22672
50	81.01691	69.34811	89.01843

Data Summary			Calculated Variate				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Salt Control	8	0.37700	0.32200	0.51400	0.01248	0.06114
25		8	0.33925	0.29600	0.39600	0.00640	0.03135
50		8	0.25375	0.20000	0.30000	0.00736	0.03607
65		8	0.22900	0.17200	0.29000	0.00760	0.03723
100		8	0.14050	0.10800	0.17800	0.00456	0.02232



Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: City of Buenaventura

Test Species: A. bahia

Sample ID: B-1

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-094

End Date/Time: 10/06/04 / 13:10 1240

Conc. (%)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
Lab Control 2	a	5	5	5	5	5	5	5	5	100	0.02084	0.02277
	b	5	5	5	5	5	5	5	5	100	0.01993	0.02173
	c	5	5	5	5	5	5	5	5	100	0.01940	0.02139
	d	5	5	5	5	5	5	5	5	100	0.02029	0.02229
	e	5	5	5	5	5	5	5	5	100	0.02058	0.02228
	f	5	5	5	5	5	5	5	5	100	0.02062	0.02287
	g	5	5	5	5	5	5	5	5	100	0.02099	0.02309
	h	5	5	5	5	5	5	5	5	100	0.02113	0.02295
Salt Control	a	5	5	5	5	5	5	5	5	100	0.02140	0.02310
	b	5	5	5	5	5	5	5	5	100	0.01974	0.02171
	c	5	5	5	5	5	5	5	5	100	0.02012	0.02210
	d	5	5	5	5	5	5	5	5	100	0.02090	0.02216
	e	5	5	5	5	5	5	5	5	100	0.01991	0.02170
	f	5	5	5	5	5	5	5	5	100	0.01908	0.02069
	g	5	5	5	5	5	5	5	5	100	0.01989	0.02159
	h	5	5	5	5	5	5	5	5	100	0.01930	0.02106
25	a	5	5	5	5	5	5	5	5	100	0.01933	0.02018
	b	5	5	5	5	5	5	5	5	100	0.01950	0.02092
	c	5	5	5	5	5	5	5	5	100	0.01952	0.02128
	d	5	5	5	5	5	5	5	5	100	0.02132	0.02062
	e	5	5	5	5	5	5	5	5	100	0.01917	0.02049
	f	5	5	5	5	5	5	5	5	100	0.02039	0.01915
	g	5	5	5	5	5	5	5	5	100	0.01974	0.02029
	h	5	5	5	5	5	5	5	5	100	0.01894	0.01990
50	a	5	5	5	5	5	5	5	5	100	0.01864	0.01920
	b	5	5	5	5	5	5	5	5	100	0.02030	0.02147
	c	5	5	5	5	5	5	5	5	100	0.01898	0.02255
	d	5	5	5	5	5	5	5	5	100	0.01930	0.02202
	e	5	5	5	5	5	5	5	5	100	0.02079	0.02069
	f	5	5	5	5	5	5	5	5	100	0.02150	0.02149
	g	5	5	5	5	5	5	5	5	100	0.02223	0.01983
	h	5	5	5	5	5	5	5	5	100	0.02006	0.01938
Tech Initials		RS	JB	JK	SH	RG	RL	ME	PS			

Feeding Times (day):

	0	1	2	3	4	5	6
-		0820	0900	0845	0845	0815	0820
1600		1630	1600	1435	1430	1600	1530

Weight Data:
 Date/Time in: 10-6-04/1240
 Date/Time out: 10-7-04/1245
 Oven Temp (°C): 65
 Tech Initials: SD

Comments: _____

QC Check: [Signature]
 Final Review: [Signature]

Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: City of Buenaventura

Test Species: A. bahia

Sample ID: B-1

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-094

End Date/Time: 10/06/04 / 1240

Conc. (%)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
65	a	5	5	5	5	5	5	5	5	100	0.02062	0.02257
	b	5	5	5	5	5	5	5	5	100	0.02086	0.02172
	c	5	5	5	5	5	5	5	5	100	0.02075	0.02182
	d	5	5	5	5	5	5	5	5	100	0.02051	0.02179
	e	5	5	5	5	5	5	5	5	100	0.02036	0.02131
	f	5	5	5	5	5	5	5	5	100	0.02180	0.02297
	g	5	5	5	5	5	5	5	5	100	0.01984	0.02106
	h	5	5	5	5	5	5	5	5	100	0.02157	0.02273
100	a	5	5	5	5	4	4	4	4	80	0.02210	0.02285
	b	5	5	5	5	5	5	5	5	100	0.02250	0.02139
	c	5	5	5	5	5	5	5	5	100	0.02074	0.02143
	d	5	5	5	5	5	5	5	5	100	0.02089	0.02149
	e	5	4	4	4	4	4	4	4	80	0.02044	0.02098
	f	5	5	4	4	4	4	4	4	80	0.02021	0.02084
	g	5	5	5	5	5	5	5	5	100	0.02110	0.02188
	h	5	5	5	5	5	5	5	5	100	0.02189	0.02263
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											

Tech Initials: RS RB JRC SH RG RL ME JB

Feeding Times (day):

	0	1	2	3	4	5	6
-		0820	0900	0845	0845	0815	0820
1600	1630	1600	1435	1430	1400	1520	

Weight Data:
 Date/Time in: 10-6-09/1240
 Date/Time out: 10-7-09/1245
 Oven Temp (°C): 65
 Tech Initials: SD

Comments: _____

QC Check: JB 12/21/04
 Final Review: AP 1/17/05

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura

Test Species: A. bahia

Sample ID: B-1

Start Date/Time: 09/29/04 / 1500

Test No: 0409-094

End Date/Time: 10/06/04 / 1240

Concentration	Lab Control *2							
Day	0	1	2	3	4	5	6	7
	Initial							
pH	8.03	8.24	7.90	7.95	7.97	8.29	7.96	
DO (mg/L)	8.5	6.9	7.0	7.4	7.0	8.1	8.6	
Salinity (ppt)	30.1	30.0	30.0	30.2	30.2	30.3	29.2	
Temp (°C)	25.0	25.0	25.2	25.0	24.7	24.4	25.0	
	Final							
pH		7.91	7.86	7.86	7.87	7.81	7.70	7.78
DO (mg/L)		6.2	6.5	5.8	5.5	5.3	4.9	5.4
Temp (°C)		25.2	24.9	24.6	24.7	24.9	25.5	25.4

Concentration	50%							
Day	0	1	2	3	4	5	6	7
	Initial							
pH	8.41	8.31	8.36	8.33	8.36	8.61	8.23	
DO (mg/L)	7.5	6.3	6.2	5.8	7.4	6.2	6.6	
Salinity (ppt)	29.9	30.1	30.4	29.9	30.5	30.7	30.6	
Temp (°C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
	Final							
pH		8.26	8.19	8.25	8.22	8.16	8.11	8.12
DO (mg/L)		5.4	6.0	5.6	4.7	5.2	4.6	5.1
Temp (°C)		25.0	24.8	24.9	24.8	24.8	25.5	25.8

Concentration	Salt Control							
Day	0	1	2	3	4	5	6	7
	Initial							
pH	8.43	8.28	8.44	8.36	8.35	8.38	8.24	
DO (mg/L)	7.3	6.8	6.2	6.8	6.2	6.6	7.5	
Salinity (ppt)	29.4	29.4	29.9	29.7	30.1	30.2	30.2	
Temp (°C)	25.0	25.0	25.7	25.0	25.0	25.0	25.0	
	Final							
pH		8.14	8.02	8.13	8.06	8.04	8.00	8.04
DO (mg/L)		5.6	6.4	5.8	5.2	5.4	4.8	5.1
Temp (°C)		25.2	24.9	24.5	24.7	25.0	25.6	25.5

Concentration	65%							
Day	0	1	2	3	4	5	6	7
	Initial							
pH	8.40	8.35	8.35	8.32	8.36	8.42	8.39	
DO (mg/L)	7.6	6.9	6.1	6.0	7.4	6.0	7.4	
Salinity (ppt)	30.1	30.3	30.5	30.1	30.5	30.9	30.9	
Temp (°C)	25.0	25.0	24.9	25.0	25.0	25.0	25.0	
	Final							
pH		8.26	8.23	8.27	8.25	8.23	8.14	8.17
DO (mg/L)		5.3	5.8	5.3	4.7	5.5	4.6	4.6
Temp (°C)		24.9	24.8	24.9	24.8	25.1	25.0	25.7

Concentration	25%							
Day	0	1	2	3	4	5	6	7
	Initial							
pH	8.41	8.33	8.70	8.34	8.36	8.38	8.23	
DO (mg/L)	7.4	7.0	6.1	6.3	6.2	6.5	6.9	
Salinity (ppt)	29.7	29.8	29.9	29.9	30.3	30.4	30.4	
Temp (°C)	25.0	25.0	25.2	25.0	25.0	25.0	25.0	
	Final							
pH		8.21	8.12	8.23	8.16	8.20	8.07	8.08
DO (mg/L)		5.5	5.7	5.5	4.6	5.2	5.0	4.7
Temp (°C)		25.0	25.1	24.9	24.9	24.9	25.5	25.8

Concentration	100%							
Day	0	1	2	3	4	5	6	7
	Initial							
pH	8.38	8.35	8.31	8.31	8.37	8.38	8.45	
DO (mg/L)	7.8	6.9	6.3	5.9	7.7	6.0	7.6	
Salinity (ppt)	30.5	30.8	30.8	30.4	30.7	31.1	31.4	
Temp (°C)	25.0	25.0	24.9	25.0	25.0	25.0	25.0	
	Final							
pH		8.29	8.17	8.28	8.29	8.27	8.19	8.23
DO (mg/L)		5.5	6.3	5.4	4.7	5.2	4.6	4.5
Temp (°C)		24.9	24.7	24.9	24.7	25.0	25.5	25.6

Animal Source/Date Received: ABS / 9-29-04

Analysts:	Initial:	0	1	2	3	4	5	6	7
		SH	RB	AH	RB	SH	RY	AH	UC
	Final:		RB	RB	RB	AH	RB	UC	SH

Animal Age at Initiation: 7 days

Comments: _____

QC Check: [Signature]

Final Review: AH 1/17/05

Report Date: 28 Dec-04 12:14 PM

Link: 17-6949-1627/0409-095

CETIS Test Summary

Mysid 7-d Survival and Growth Test						Nautilus Environmental (CA)			
Test No:	20-4434-8567	Test Type:	Growth-Survival (7d)	Duration:	6d 21h	Species:	Mysidopsis bahia Americamysis	Source:	Aquatic Biosystems, CO
Start Date:	29 Sep-04 03:00 PM	Protocol:	EPA/821/R-02-014 (2002)	Dil Water:	Artificial Saltwater	Brine:	Forty Fathoms		
Ending Date:	06 Oct-04 12:40 PM								
Setup Date:	29 Sep-04 03:00 PM								
Sample No:	07-9301-3162	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura				
Sample Date:	28 Sep-04 12:21 PM	Code:	0409-095	Project:					
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura						
Sample Age:	27h (17.2 °C)	Station:	B-3						
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method			
19-1135-2588	7d Proportion Survived	100	> 100	N/A	7.91%	Steel's Many-One Rank			
11-7783-9958	Mean Dry Biomass-mg	25	50	35.355	14.27%	Dunnett's Multiple Comparison			
Point Estimate Summary									
Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method			
06-1978-2130	Mean Dry Biomass-mg	25	92.72131	40.98839	98.48521	Linear Interpolation			
		50	> 100.00000	N/A	N/A				
7d Proportion Survived Summary									
Conc-%	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%	
0	Salt 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	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%	
88		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%	
100		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%	
Mean Dry Biomass-mg Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Lab Control	8	0.38975	0.34000	0.45000	0.01250	0.03537	9.07%	
0	Salt Control	8	0.37700	0.32200	0.51400	0.02162	0.06114	16.22%	
25		8	0.33150	0.28400	0.40600	0.01424	0.04027	12.15%	
50		8	0.30550	0.25200	0.36000	0.01159	0.03279	10.73%	
88		8	0.32000	0.26400	0.41600	0.01924	0.05441	17.00%	
100		8	0.23650	0.16600	0.30400	0.01640	0.04640	19.62%	
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	1.00000	1.00000	1.00000	1.00000
0	Salt 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		0.80000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
88		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	0.80000	1.00000
Mean Dry Biomass-mg Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.38600	0.36000	0.39800	0.40000	0.34000	0.45000	0.42000	0.36400
0	Salt Control	0.34000	0.39400	0.39600	0.51400	0.35800	0.32200	0.34000	0.35200
25		0.28400	0.33600	0.40600	0.29800	0.36000	0.29600	0.34800	0.32400
50		0.25200	0.29200	0.28800	0.32600	0.29200	0.30400	0.33000	0.36000
88		0.34200	0.28200	0.33800	0.41600	0.36600	0.28400	0.26800	0.26400
100		0.28400	0.26400	0.30400	0.23800	0.19400	0.21000	0.16600	0.23200

CETIS Analysis Detail

Mysid 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	17-6949-1627	03-7265-8576	28 Dec-04 12:13 PM	CETISv1.025

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	7.91%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	0.75000	3.90824	0.56473	Equal Variances
Distribution	Shapiro-Wilk W	0.43945	0.91882	0.00000	Non-normal Distribution

ANOVA Table

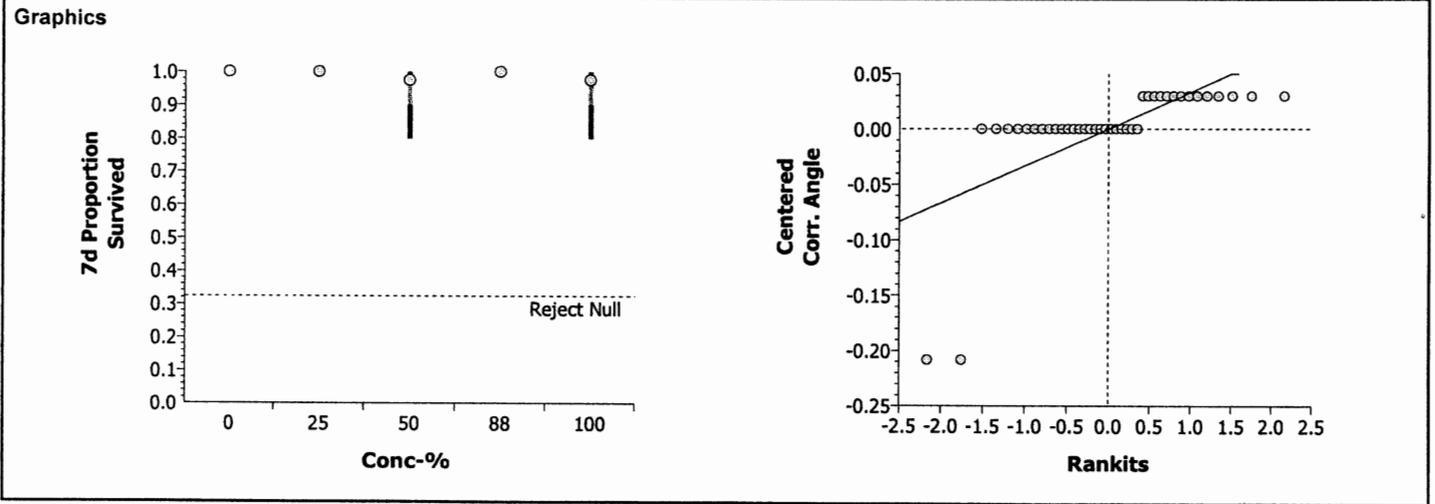
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0085062	0.002127	4	0.75	0.56473	Non-Significant Effect
Error	0.0992388	0.002835	35			
Total	0.10774500	0.0049619	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	68	47	> 0.0500	1	Non-Significant Effect
		50	64	47	> 0.0500	1	Non-Significant Effect
		88	68	47	> 0.0500	1	Non-Significant Effect
		100	64	47	> 0.0500	1	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt 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	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
88		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
100		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419



CETIS Analysis Detail

Mysid 7-d Survival and Growth Test Nautilus Environmental (CA)

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	17-6949-1627	03-7265-8576	28 Dec-04 12:14 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		25	50	4.00	35.355	14.27%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	3.03846	13.27671	0.55141	Equal Variances
Distribution	Shapiro-Wilk W	0.94287	0.91882	0.06270	Normal Distribution

ANOVA Table

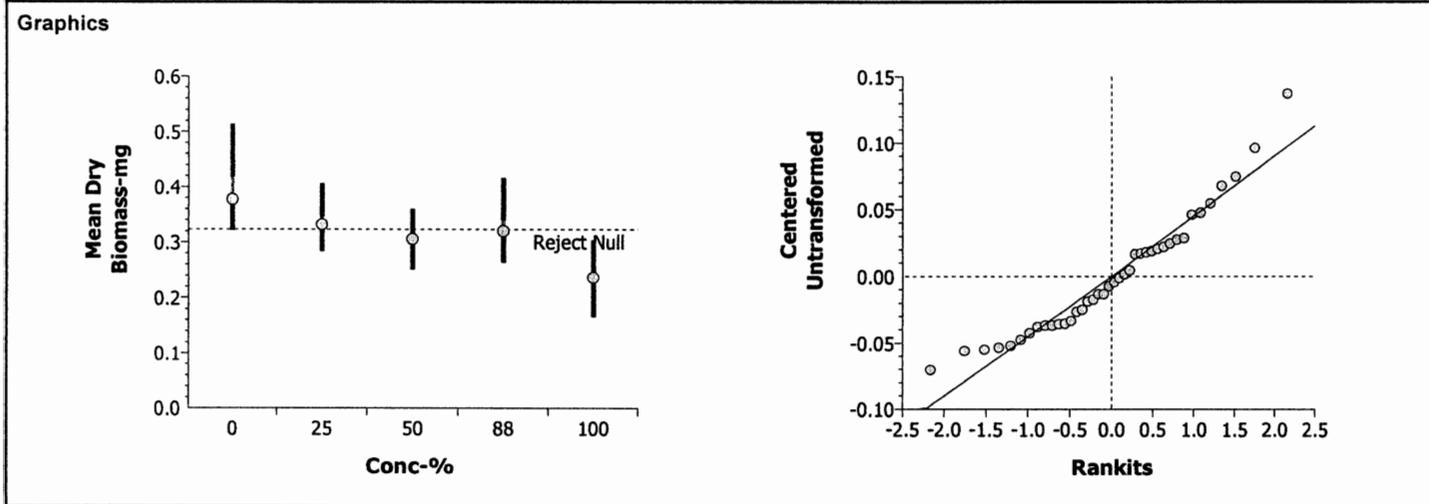
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0831176	0.020779	4	9.00	0.00004	Significant Effect
Error	0.0808341	0.00231	35			
Total	0.16395166	0.0230889	39			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	1.89356	2.23857	> 0.0500	0.05379	Non-Significant Effect
		50	2.97559	2.23857	<= 0.0500	0.05379	Significant Effect
		88	2.37215	2.23857	<= 0.0500	0.05379	Significant Effect
		100	5.84713	2.23857	<= 0.0500	0.05379	Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.37700	0.32200	0.51400	0.06114				
25		8	0.33150	0.28400	0.40600	0.04027				
50		8	0.30550	0.25200	0.36000	0.03279				
88		8	0.32000	0.26400	0.41600	0.05441				
100		8	0.23650	0.16600	0.30400	0.04640				



CETIS Analysis Detail

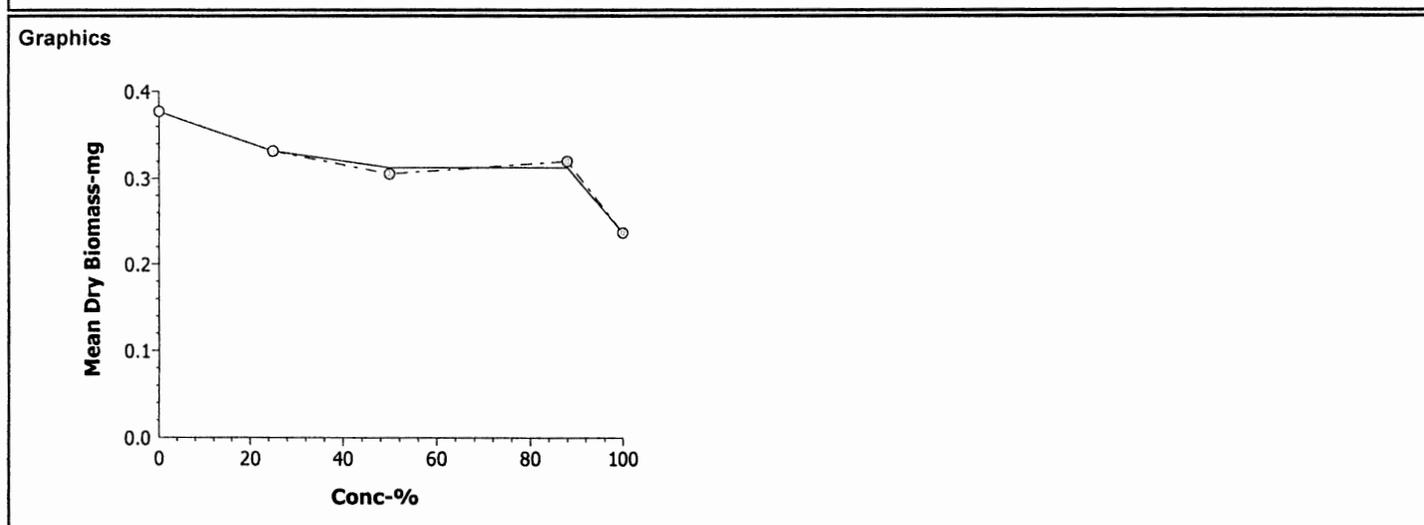
Mysid 7-d Survival and Growth Test					Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Linear Interpolation	17-6949-1627	03-7265-8576	28 Dec-04 12:14 PM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7747400	200	Yes	Two-Point Interpolation

Point Estimates			
% Effect	Conc-%	95% LCL	95% UCL
25	92.72131	40.98839	98.48521
50	> 100.00000	N/A	N/A

Data Summary			Calculated Variate				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Salt Control	8	0.37700	0.32200	0.51400	0.01248	0.06114
25		8	0.33150	0.28400	0.40600	0.00822	0.04027
50		8	0.30550	0.25200	0.36000	0.00669	0.03279
88		8	0.32000	0.26400	0.41600	0.01111	0.05441
100		8	0.23650	0.16600	0.30400	0.00947	0.04640



Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: City of Buenaventura Test Species: A. bahia

Sample ID: B-3 Start Date/Time: 09/29/04 / 1500

Test No.: 0409-095 End Date/Time: 10/06/04 / 1220 1240

Conc. (__%__)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
Lab Control 2	a	5	5	5	5	5	5	5	5	100	100%	
	b	5	5	5	5	5	5	5	5	100		
	c	5	5	5	5	5	5	5	5	100		
	d	5	5	5	5	5	5	5	5	100		
	e	5	5	5	5	5	5	5	5	100		
	f	5	5	5	5	5	5	5	5	100		
	g	5	5	5	5	5	5	5	5	100		
	h	5	5	5	5	5	5	5	5	100		
Salt Control	a	5	5	5	5	5	5	5	5	100		
	b	5	5	5	5	5	5	5	5	100		
	c	5	5	5	5	5	5	5	5	100		
	d	5	5	5	5	5	5	5	5	100		
	e	5	5	5	5	5	5	5	5	100		
	f	5	5	5	5	5	5	5	5	100		
	g	5	5	5	5	5	5	5	5	100		
	h	5	5	5	5	5	5	5	5	100		
25	a	5	5	5	5	5	5	5	5	100	0.02174	0.02314
	b	5	5	5	5	5	5	5	5	100	0.02183	0.02361
	c	5	5	5	5	5	5	5	5	100	0.02176	0.02379
	d	5	5	5	5	5	5	5	5	100	0.02319	0.02468
	e	5	5	5	5	5	5	5	5	100	0.02197	0.02377
	f	5	5	5	5	5	5	5	5	100	0.02299	0.02447
	g	5	5	5	5	5	5	5	5	100	0.02321	0.02495
	h	5	5	5	5	5	5	5	5	100	0.02251	0.02413
50	a	5	5	5	5	5	4	4	4	80	0.02239	0.02365
	b	5	5	5	5	5	5	5	5	100	0.02268	0.02414
	c	5	5	5	5	5	5	5	5	100	0.02179	0.02323
	d	5	5	5	5	5	5	5	5	100	0.02089	0.02252
	e	5	5	5	5	5	5	5	5	100	0.02146	0.02362 ⁵⁰ 0.0222 ^c
	f	5	5	5	5	5	5	5	5	100	0.02210	0.02362
	g	5	5	5	5	5	5	5	5	100	0.02273	0.02438
	h	5	5	5	5	5	5	5	5	100	0.02248	0.02428

Tech Initials: RS RS/AH JK SH RL RL MC B

Feeding Times (day):

	0	1	2	3	4	5	6
-		0820	0900	0845	0845	0915	0820
1600		1630	1600	1435	1430	1600	1530

Weight Data:
 Date/Time in: 10-6-04/1240
 Date/Time out: 10-7-04/1245
 Oven Temp (°C): 65
 Tech Initials: SO

Comments: _____

QC Check: off 10/27/04
 Final Review: AH 11/7/05

Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: City of Buenaventura

Test Species: A. bahia

Sample ID: B-3

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-095

End Date/Time: 10/06/04 / 1240 1240

Conc. (%)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
88	a	5	5	5	5	5	5	5	5	100	0.02215	0.02356
	b	5	5	5	5	5	5	5	5	100	0.02131	0.02272
	c	5	5	5	5	5	5	5	5	100	0.02010	0.02179
	d	5	5	5	5	5	5	5	5	100	0.02063	0.02271
	e	5	5	5	5	5	5	5	5	100	0.02196	0.02379
	f	5	5	5	5	5	5	5	5	100	0.02189	0.02331
	g	5	5	5	5	5	5	5	5	100	0.02205	0.02339
	h	5	5	5	5	5	5	5	5	100	0.02143	0.02275
100	a	5	5	5	5	5	5	5	5	100	0.02083	0.02225
	b	5	5	5	5	5	5	5	5	100	0.02043	0.02175
	c	5	5	5	5	5	5	5	5	100	0.02131	0.02283
	d	5	5	5	5	5	5	5	5	100	0.02132	0.02251
	e	5	5	5	5	5	5	5	5	100	0.02228	0.02325
	f	5	5	5	5	5	5	5	5	100	0.02221	0.02326
	g	5	5	4	4	4	4	4	4	80	0.02082	0.02165
	h	5	5	5	5	5	5	5	5	100	0.02121	0.02237
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											

Tech Initials: RS R6 AH SH R9 R9 MC RB

Feeding Times (day):

	0	1	2	3	4	5	6
-		0820	0900	0845	0845	0815	0820
	1600	1630	1600	1435	1430	1600	1530

Comments: _____

Weight Data:
 Date/Time in: 10-6-04/1240
 Date/Time out: 10-6-04/1245
 Oven Temp (°C): 65
 Tech Initials: SD
 QC Check: SD 10/27/04
 Final Review: AH 11/7/05

Client: City of Buenaventura

Test Species: A. bahia

Sample ID: B-3

Start Date/Time: 09/29/04 11500

Test No: 0409-095

End Date/Time: 10/06/04 1240

Concentration	Lab Control #2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.03	8.24	7.90	7.95	7.97	8.29	7.96	
DO (mg/L)	8.5	6.9	7.0	7.4	7.0	8.1	8.0	
Salinity (ppt)	30.1	30.0	30.0	30.2	30.2	30.3	29.2	
Temp (°C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Final								
pH		7.71	7.89	7.86	7.87	7.81	7.76	7.78
DO (mg/L)		6.2	6.3	5.8	5.5	5.3	4.9	5.4
Temp (°C)		25.2	24.9	24.6	24.7	24.9	25.5	25.4

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.36	8.26	8.22	8.32	8.21	8.36	8.24	
DO (mg/L)	7.4	7.0	5.4	7.4	7.7	6.8	6.9	
Salinity (ppt)	29.7	29.9	28.1	29.8	30.3	30.7	29.3	
Temp (°C)	25.0	25.0	24.8	25.0	25.0	25.0	25.0	
Final								
pH		8.16	8.13	8.11	8.08	8.08	8.01	8.06
DO (mg/L)		6.0	6.2	5.6	5.0	5.3	5.0	5.7
Temp (°C)		25.1	24.9	24.8	24.8	25.0	25.5	24.6

Concentration	Salt Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.43	8.28	8.44	8.36	8.35	8.38	8.24	
DO (mg/L)	7.3	6.8	6.2	6.8	6.2	6.6	7.5	
Salinity (ppt)	29.4	29.4	29.9	29.7	30.1	30.2	30.2	
Temp (°C)	25.0	25.0	25.7	25.0	25.0	25.0	25.0	
Final								
pH		8.14	8.09	8.13	8.06	8.04	8.06	8.04
DO (mg/L)		5.6	6.6	5.8	5.2	5.4	4.8	5.1
Temp (°C)		25.2	25.0	24.5	24.7	25.0	25.6	25.5

Concentration	88%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.30	8.26	8.19	8.29	8.23	8.14	8.12	
DO (mg/L)	7.3	7.4	5.9	8.3	7.9	6.8	5.8	
Salinity (ppt)	29.9	30.9	30.8	30.5	30.5	31.2	31.1	
Temp (°C)	25.0	25.0	24.8	25.0	25.0	25.0	25.0	
Final								
pH		8.14	8.13	8.13	8.08	8.13	8.02	8.11
DO (mg/L)		6.1	5.9	5.7	5.4	5.6	5.4	5.3
Temp (°C)		25.4	24.9	24.5	24.8	25.1	25.5	25.8

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.40	8.27	8.35	8.35	8.27	8.56	8.26	
DO (mg/L)	7.4	6.4	5.9	7.0	7.4	6.6	7.1	
Salinity (ppt)	29.5	29.7	28.9	29.7	30.2	30.4	29.9	
Temp (°C)	25.0	25.0	24.9	25.0	25.0	25.0	25.0	
Final								
pH		8.17	8.08	8.11	8.04	8.09	8.01	8.03
DO (mg/L)		5.7	6.1	5.9	4.6	5.3	5.2	5.0
Temp (°C)		25.1	24.8	24.9	24.7	24.9	25.5	25.2

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.21	8.26	8.12	8.28	8.20	8.35	8.08	
DO (mg/L)	7.5	7.5	5.9	8.8	7.7	6.9	6.2	
Salinity (ppt)	30.0	29.4	31.0	30.1	30.5	30.9	30.6	
Temp (°C)	25.0	25.0	24.8	25.0	25.0	25.0	25.0	
Final								
pH		8.17	8.14	8.14	8.14	8.12	8.05	8.13
DO (mg/L)		6.0	6.2	5.9	5.5	5.2	5.4	5.6
Temp (°C)		25.5	25.0	24.7	24.8	25.0	25.4	25.8

Animal Source/Date Received: ABS / 9-29-04

Analysts:	Initial:	0	1	2	3	4	5	6	7
		SH	R2	R2/AH	SH	R4	AH	ML	
	Final:		R2	R2	R2	AH	R2	MLC	SH

Animal Age at Initiation: 7 days

Comments: _____

QC Check: q/AH 12/27/04

Final Review: AH 1/17/05

Report Date: 28 Dec-04 12:21 PM

Link: 11-4445-1610/0409-096

CETIS Test Summary

Mysid 7-d Survival and Growth Test						Nautilus Environmental (CA)			
Test No:	20-4434-8567	Test Type:	Growth-Survival (7d)	Duration:	6d 21h	Species:	<i>Ametia camysis</i> <i>Mysidopsis bahia</i>	Source:	Aquatic Biosystems, CO
Start Date:	29 Sep-04 03:00 PM	Protocol:	EPA/821/R-02-014 (2002)	Dil Water:	Artificial Saltwater	Brine:	Forty Fathoms		
Ending Date:	06 Oct-04 12:40 PM								
Setup Date:	29 Sep-04 03:00 PM								
Sample No:	05-2671-3889	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura				
Sample Date:	28 Sep-04 03:30 PM	Code:	0409-096	Project:					
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura						
Sample Age:	23h (20.6 °C)	Station:	C-3						
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method			
06-3797-5928	7d Proportion Survived	100	> 100	N/A	8.89%	Bonferroni Adj Wilcoxon Rank Sum			
08-9118-8425	Mean Dry Biomass-mg	100	> 100	N/A	16.81%	Bonferroni Adj t			
7d Proportion Survived Summary									
Conc-%	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%	
0	Salt Control	8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%	
25		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%	
50		8	0.97143	0.80000	1.00000	0.02857	0.07559	7.78%	
66		8	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%	
100		8	0.97500	0.80000	1.00000	0.02500	0.07071	7.25%	
Mean Dry Biomass-mg Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Lab Control	8	0.38975	0.34000	0.45000	0.01250	0.03537	9.07%	
0	Salt Control	8	0.37700	0.32200	0.51400	0.02162	0.06114	16.22%	
25		8	0.33700	0.24800	0.41400	0.01683	0.04759	14.12%	
50		8	0.31686	0.26800	0.36200	0.01305	0.03452	10.90%	
66		8	0.31475	0.25800	0.41200	0.01919	0.05427	17.24%	
100		8	0.41500	0.31600	0.49400	0.02295	0.06492	15.64%	
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	1.00000	1.00000	1.00000	1.00000
0	Salt 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	0.80000	1.00000	1.00000
50		1.00000	0.80000	1.00000	N/A	1.00000	1.00000	1.00000	1.00000
66		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	0.80000	1.00000	1.00000	1.00000	1.00000	1.00000
Mean Dry Biomass-mg Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Lab Control	0.38600	0.36000	0.39800	0.40000	0.34000	0.45000	0.42000	0.36400
0	Salt Control	0.34000	0.39400	0.39600	0.51400	0.35800	0.32200	0.34000	0.35200
25		0.35400	0.37000	0.33400	0.31400	0.41400	0.24800	0.33400	0.32800
50		0.34600	0.26800	0.34200	N/A	0.30600	0.28400	0.31000	0.36200
66		0.36600	0.26800	0.25800	0.30000	0.30200	0.27000	0.34200	0.41200
100		0.39200	0.42800	0.31600	0.49400	0.33600	0.46000	0.48200	0.41200

CETIS Analysis Detail

Mysid 7-d Survival and Growth Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	11-4445-1610	03-7265-8576	28 Dec-04 12:21 PM	CETISv1.025

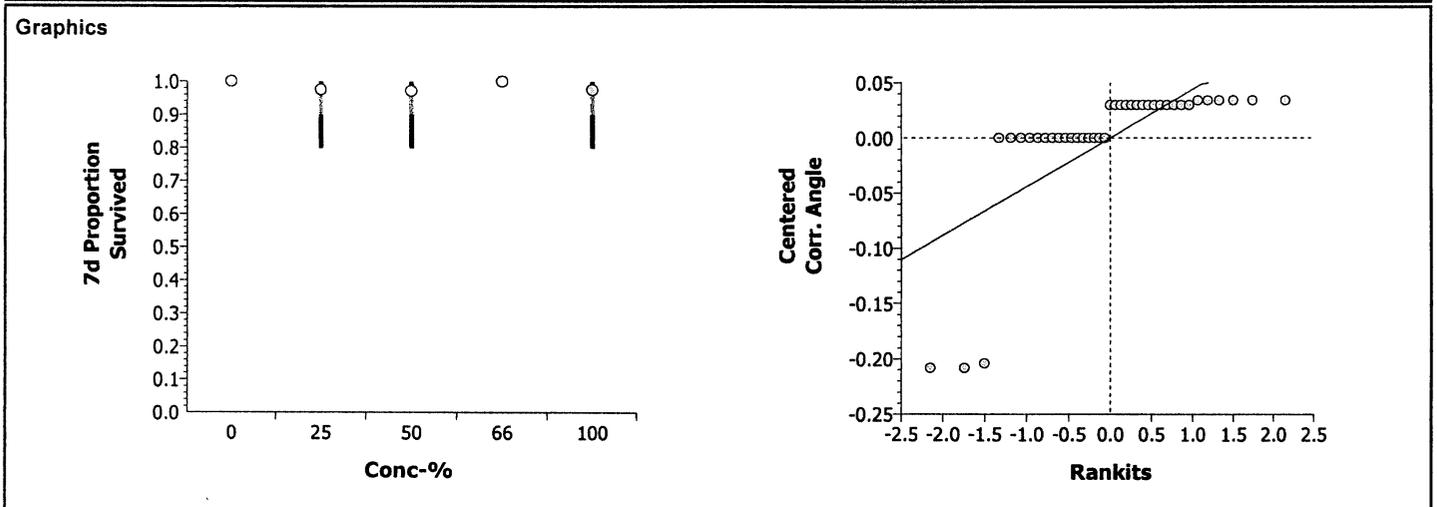
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj Wilcoxon Rank Su	C > T	Angular (Corrected)		100	>100	1.00	N/A	8.89%

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	0.61166	3.92733	0.65708	Equal Variances
Distribution	Shapiro-Wilk W	0.48917	0.91742	0.00000	Non-normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0091917	0.002298	4	0.53	0.71556	Non-Significant Effect
Error	0.1478456	0.004348	34			
Total	0.15703726	0.0066463	38			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		25	64		0.3605	1	Non-Significant Effect
		50	52		0.3472	1	Non-Significant Effect
		66	68		0.4796	1	Non-Significant Effect
		100	64		0.3605	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	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
25		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
50		7	0.97143	0.80000	1.00000	0.07559	1.31126	1.10715	1.34528	0.09001
66		8	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00019
100		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419



CETIS Analysis Detail

Mysid 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	11-4445-1610	03-7265-8576	28 Dec-04 12:21 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Untransformed		100	>100	1.00	N/A	16.81%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.64463	13.27671	0.61894	Equal Variances
Distribution	Shapiro-Wilk W	0.98164	0.91742	0.82712	Normal Distribution

ANOVA Table

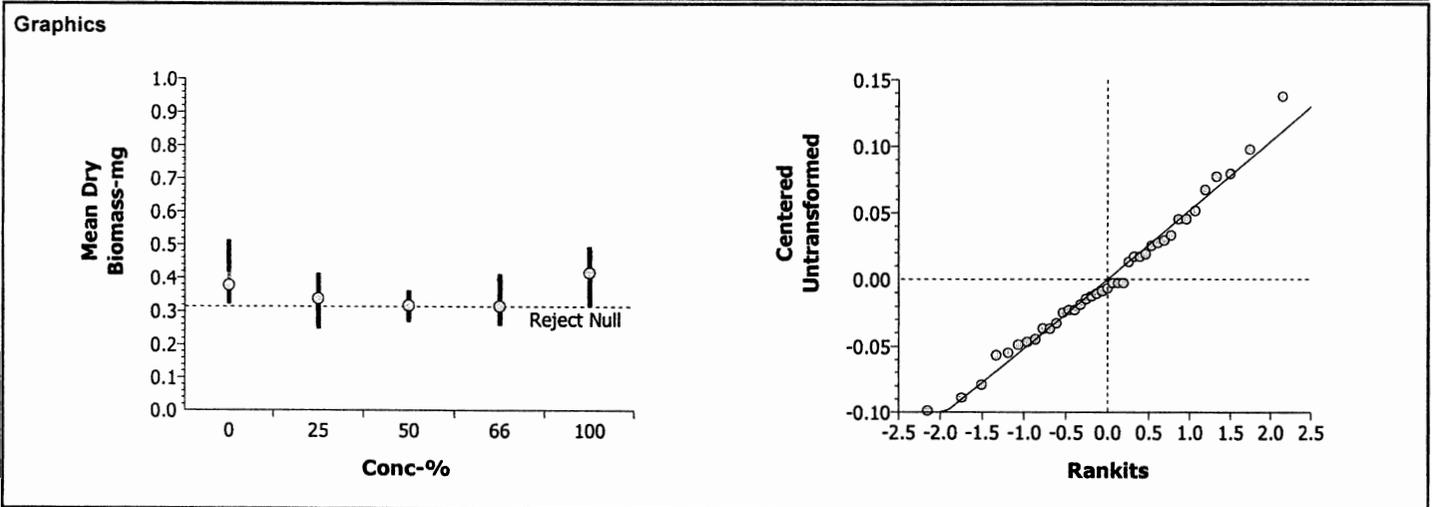
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0582566	0.014564	4	4.99	0.00284	Significant Effect
Error	0.0992942	0.002920	34			
Total	0.15755082	0.0174846	38			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		25	1.48036	2.34506	0.0740	0.06336	Non-Significant Effect
		50	2.15036	2.34506	0.0194	0.06559	Non-Significant Effect
		66	2.30381	2.34506	0.0137	0.06336	Non-Significant Effect
		100	-1.4063	2.34506	0.9157	0.06336	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	8	0.37700	0.32200	0.51400	0.06114				
25		8	0.33700	0.24800	0.41400	0.04759				
50		7	0.31686	0.26800	0.36200	0.03452				
66		8	0.31475	0.25800	0.41200	0.05427				
100		8	0.41500	0.31600	0.49400	0.06492				



Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: City of Buenaventura

Test Species: A. bahia

Sample ID: C-3

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-096

End Date/Time: 10/06/04 / 1200 1240

Conc. (<u> </u> %)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
Lab Control	a	5	5	5	5	5	5	5	5	100	See	
	b	5	5	5	5	5	5	5	5	100		
	c	5	5	5	5	5	5	5	5	100		
	d	5	5	5	5	5	5	5	5	100		
	e	5	5	5	5	5	5	5	5	100		
	f	5	5	5	5	5	5	5	5	100		
	g	5	5	5	5	5	5	5	5	100		
	h	5	5	5	5	5	5	5	5	100		
Salt Control	a	5	5	5	5	5	5	5	5	100		
	b	5	5	5	5	5	5	5	5	100		
	c	5	5	5	5	5	5	5	5	100		
	d	5	5	5	5	5	5	5	5	100		
	e	5	5	5	5	5	5	5	5	100		
	f	5	5	5	5	5	5	5	5	100		
	g	5	5	5	5	5	5	5	5	100		
	h	5	5	5	5	5	5	5	5	100		
25	a	5	5	5	5	5	5	5	5	100	0.02087	0.02264
	b	5	5	5	5	5	5	5	5	100	0.02088	0.02273
	c	5	5	5	5	5	5	5	5	100	0.02145	0.02312
	d	5	5	5	5	5	5	5	5	100	0.02146	0.02303
	e	5	5	5	5	5	5	5	5	100	0.02213	0.02420
	f	5	5	5	5	5	5	4	4	80	0.02154	0.02278
	g	5	5	5	5	5	5	5	5	100	0.02011	0.02178
	h	5	5	5	5	5	5	5	5	100	0.01972	0.02136
50	a	5	5	5	5	5	5	5	5	100	0.02007	0.02180
	b	5	5	5	5	5	5	4	4	80	0.02038	0.02172
	c	5	5	5	5	5	5	5	5	100	0.02133	0.02304
	d	5	0	-	-	-	-	-	-	LOST	-	-
	e	5	5	5	5	5	5	5	5	100	0.02157	0.02310
	f	5	5	5	5	5	5	5	5	100	0.01699	0.01841
	g	5	5	5	5	5	5	5	5	100	0.01754	0.01909
	h	5	5	5	5	5	5	5	5	100	0.01766	0.01947
Tech Initials	RS	RS	AH	SH	RH	RH	ML	ML				

Feeding Times (day):

	0	1	2	3	4	5	6
	-	0820	0900	0845	0845	0815	0820
	1600	1630	1600	1435	1430	1600	1530

Weight Data:
 Date/Time in: 10-6-04/1240
 Date/Time out: 10-7-04/1245
 Oven Temp (°C): 65
 Tech Initials: SD

Comments: No Mysids in cup.

QC Check: [Signature]
 Final Review: AMH 11/7/05

Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: City of Buenaventura

Test Species: A. bahia

Sample ID: C-3

Start Date/Time: 09/29/04 / 1500

Test No.: 0409-096

End Date/Time: 10/06/04 / 1200 1240

Conc. (%)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
66	a	5	5	5	5	5	5	5	5	100	0.01855	0.02038
	b	5	5	5	5	5	5	5	5	100	0.01922	0.02056
	c	5	5	5	5	5	5	5	5	100	0.02113	0.02242
	d	5	5	5	5	5	5	5	5	100	0.02020	0.02170
	e	5	5	5	5	5	5	5	5	100	0.01805	0.01956
	f	5	5	5	5	5	5	5	5	100	0.01807	0.01942
	g	5	5	5	5	5	5	5	5	100	0.01833	0.02004
	h	5	5	5	5	5	5	5	5	100	0.01961	0.02107
100	a	5	5	5	5	5	5	5	5	100	0.02030	0.02226
	b	5	5	5	5	5	5	5	5	100	0.01822	0.02034
	c	5	4	4	4	4	4	4	4	80	0.01893	0.02051
	d	5	5	5	5	5	5	5	5	100	0.01910	0.02157
	e	5	5	5	5	5	5	5	5	100	0.01940	0.02108
	f	5	5	5	5	5	5	5	5	100	0.01825	0.02055
	g	5	5	5	5	5	5	5	5	100	0.02032	0.02273
	h	5	5	5	5	5	5	5	5	100	0.01949	0.02155
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											

Tech Initials: RS Rg AH SH Rg Rg MC Rg

Feeding Times (day):

	0	1	2	3	4	5	6
-		0820	0900	0845	0845	0815	0820
1600		1630	1600	1435	1430	1600	1530

Weight Data:
 Date/Time in: 10-6-04/1240
 Date/Time out: 10-7-04/1245
 Oven Temp (°C): 65
 Tech Initials: S

Comments: _____

QC Check: [Signature] 10/27/04
 Final Review: AW 11/17/05

Client: City of Buenaventura

Test Species: A. bahia

Sample ID: C-3

Start Date/Time: 09/29/04 / 1500

Test No: 0409-096

End Date/Time: 10/06/04 / 1240

Concentration	Lab Control *2							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.03	8.24	7.90	7.95	7.97	8.24	7.96	
DO (mg/L)	6.5	6.9	7.0	7.4	7.0	8.1	8.0	
Salinity (ppt)	30.1	30.0	30.0	30.2	30.2	30.3	29.2	
Temp (°C)	25.0	25.0	25.2	25.0	25.0	25.0	25.0	
Final								
pH		7.91	7.86	7.86	7.87	7.81	7.70	7.78
DO (mg/L)		6.2	6.5	5.8	5.5	5.3	4.9	5.4
Temp (°C)		25.2	24.9	24.6	24.7	24.9	25.5	25.4

Concentration	50%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.23	8.26	8.36	8.02	8.20	8.52	8.09	
DO (mg/L)	7.4	7.0	6.2	7.0	7.6	6.6	6.8	
Salinity (ppt)	29.5	29.9	30.4	30.0	30.4	30.4	30.4	
Temp (°C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Final								
pH		8.21	8.18	8.22	8.24	8.21	8.09	8.14
DO (mg/L)		5.8	7.8	6.0	5.5	5.2	5.3	5.4
Temp (°C)		25.2	25.0	24.8	25.1	25.0	25.3	25.8

Concentration	Salt Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.43	8.28	8.44	8.36	8.35	8.38	8.24	
DO (mg/L)	7.3	6.8	6.2	6.8	6.2	6.6	7.5	
Salinity (ppt)	29.4	29.4	29.9	29.7	30.1	30.2	30.2	
Temp (°C)	25.0	25.0	25.7	25.0	25.0	25.0	25.0	
Final								
pH		8.19	8.02	8.13	8.06	8.04	8.06	8.04
DO (mg/L)		5.6	6.4	5.8	5.2	5.4	4.8	5.1
Temp (°C)		25.2	24.9	24.5	24.7	25.0	25.6	25.5

Concentration	66%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.19	8.26	8.35	8.06	8.16	8.31	8.18	
DO (mg/L)	7.3	7.4	6.1	6.8	7.8	6.6	7.6	
Salinity (ppt)	29.7	30.4	30.5	30.0	30.6	30.6	30.4	
Temp (°C)	25.0	25.0	24.9	25.0	25.0	25.0	25.0	
Final								
pH		8.19	8.16	8.19	8.20	8.17	8.07	8.10
DO (mg/L)		5.4	5.8	5.4	5.8	5.3	5.1	5.0
Temp (°C)		25.2	25.0	24.9	25.2	25.1	25.4	25.8

Concentration	25%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.31	8.27	8.40	8.24	8.27	7.95	8.16	
DO (mg/L)	7.4	6.4	6.1	7.0	7.3	6.6	7.0	
Salinity (ppt)	29.5	29.7	29.9	29.8	30.0	30.3	30.4	
Temp (°C)	25.0	25.0	25.2	25.0	25.0	25.0	25.0	
Final								
pH		8.20	8.15	8.20	8.19	8.18	8.08	8.13
DO (mg/L)		5.9	5.9	5.7	5.4	5.3	5.4	5.3
Temp (°C)		25.3	24.9	24.7	25.0	25.0	25.4	25.8

Concentration	100%							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.09	8.26	8.31	8.26	8.11	7.93	8.17	
DO (mg/L)	7.3	7.5	6.3	6.5	8.1	6.5	7.4	
Salinity (ppt)	29.7	29.4	30.8	30.1	30.7	30.7	30.6	
Temp (°C)	25.0	24.8	24.9	25.0	25.0	25.0	25.0	
Final								
pH		8.00	7.94	7.93	7.99	7.94	7.90	8.7.88
DO (mg/L)		6.0	5.8	4.4	5.0	5.1	4.9	4.4
Temp (°C)		24.7	25.0	24.9	25.1	25.2	25.5	25.9

Animal Source/Date Received: ABS / 9-29-04

Analysts: Initial: SH RB AH SH RB AH me

Animal Age at Initiation: 7 days

Final: RB RB RB AH RB me SH

Comments:

QC Check: [Signature] 12/27/04

Final Review: AH 1/17/05

M. GALLOPROVINCIALIS

Report Date: 13 Jan-05 1:24 PM

Link: 08-7942-4394/0409-101

CETIS Test Summary

Bivalve Larval Survival and Development Test			Nautilus Environmental (CA)					
Test No:	07-5530-3356	Test Type:	Development-Survival	Duration:	69h			
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Scripps Seawater	Source:	Carlsbad Aquafarms			
Setup Date:	29 Sep-04 02:30 PM	Brine:	Frozen Seawater N/A					
Sample No:	17-5497-4087	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 10:30 AM	Code:	0409-101	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	28h (17.9 °C)	Station:	A-2					
Comments:	No artificial salt/brine addition needed for this sample - dilutions prepared with natural seawater.							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
16-8378-4938	Proportion Normal	100	> 100	N/A	7.42%	Dunnett's Multiple Comparison		
Proportion Normal Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.86800	0.81000	0.96000	0.02888	0.06458	7.44%
25		5	0.89389	0.84000	0.93478	0.01530	0.03422	3.83%
50		5	0.90150	0.86000	0.94000	0.01287	0.02879	3.19%
100		5	0.89615	0.84000	0.92308	0.01452	0.03247	3.62%
Proportion Normal Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.81000	0.84000	0.82000	0.91000	0.96000		
25		0.89247	0.90000	0.84000	0.93478	0.90217		
50		0.90217	0.94000	0.91000	0.86000	0.89535		
100		0.91000	0.90769	0.84000	0.90000	0.92308		

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	08-7942-4394	08-7942-4394	10 Jan-05 1:43 PM	CETISv1.025			
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	7.42%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	3.46955	11.34487	0.32473	Equal Variances
Distribution	Shapiro-Wilk W	0.93535	0.86826	0.19441	Normal Distribution

ANOVA Table

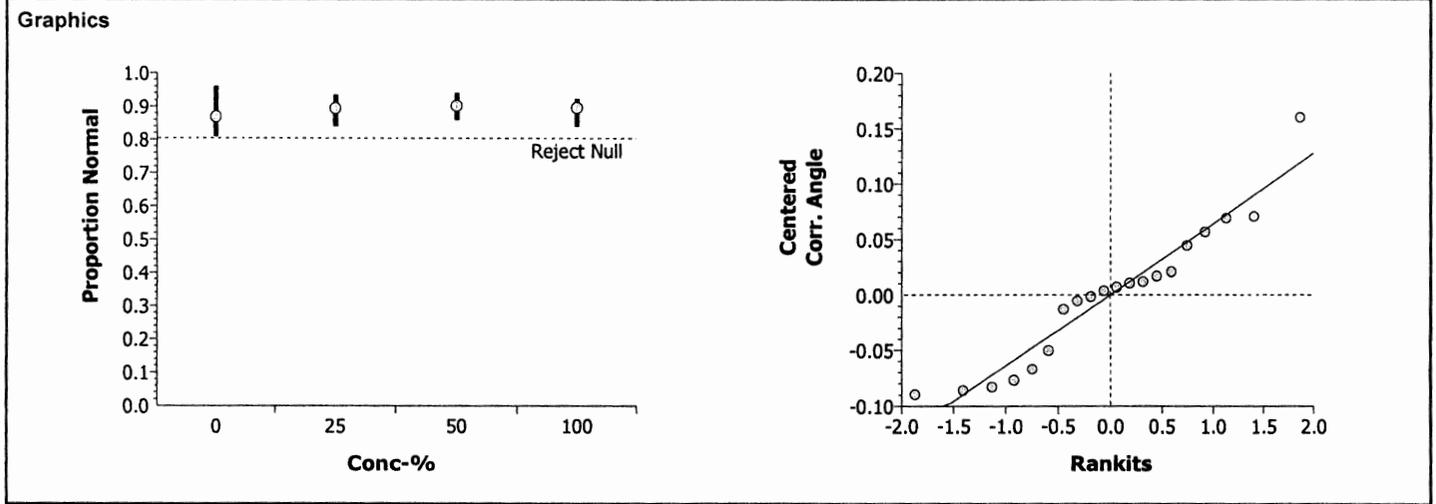
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0057257	0.001909	3	0.40	0.75705	Non-Significant Effect
Error	0.0769457	0.004809	16			
Total	0.08267136	0.0067177	19			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		25	-0.7434	2.23	> 0.0500	0.09781	Non-Significant Effect
		50	-1.0194	2.23	> 0.0500	0.09781	Non-Significant Effect
		100	-0.8165	2.23	> 0.0500	0.09781	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.86800	0.81000	0.96000	0.06458	1.20945	1.11977	1.36944	0.10638
25		5	0.89389	0.84000	0.93478	0.03422	1.24205	1.15928	1.31256	0.05480
50		5	0.90150	0.86000	0.94000	0.02879	1.25416	1.18730	1.32333	0.04890
100		5	0.89615	0.84000	0.92308	0.03247	1.24526	1.15928	1.28976	0.05026



CETIS Worksheet

Bivalve Larval Survival and Development Test Nautilus Environmental AMEC Bioassay SD

Start Date: 29 Sep-04 Species: Mytilis galloprovincialis Sample Code: 0409-101
 End Date: ~~02~~ 01 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: A-2

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			36			100	86	RG
			37			—	—	
			38			100	84	RG
			39			100	90	RG
			40			100	76	RG
			41			100	91	RG
			42			95	59	RG
			43			100	96	
			44			100	90	RG
			45			91	84	RG
			46			—	—	
			47			—	—	
			48			—	—	
			49			100	84	
			50			—	—	
			51			—	—	
			52			100	82	
			53			100	81	
			54			100	94	
			55			100	91	
			56			85	75	
			57			100	90	
			58			92	86	
			59			100	80	MC
			60			92	83	MC
			61			—	—	
			62			92	85	MC
			63			93	83	MC
			64			—	—	
			65			80	77	MC
			66			—	—	
			67			—	—	
			68			100	87	MC
			69			100	84	MC
			70			100	91	MC

CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 28 Sep-04 11:36 AM
 Link: 08-7942-4394/0409-101

Bivalve Larval Survival and Development Test Nautilus Environmental AMEC Bioassay SD

Start Date: 29 Sep-04 Species: Mytilis galloprovincialis Sample Code: 0409-101
 End Date: ~~01~~ Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: A-2

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	B	1	46					
0	B	2	37					
0	B	3	66					
0	B	4	61					
0	B	5	67					
0	LCI	1	53			100	81	
0	LCI	2	49			100	84	
0	LCI	3	52			100	82	
0	LCI	4	55			100	91	
0	LCI	5	43			100	96	
0	SCI	1	40					
0	SCI	2	36					
0	SCI	3	68					
0	SCI	4	56					
0	SCI	5	44					
25		1	63					
25		2	39					
25		3	38					
25		4	58					
25		5	62					
50		1	60					
50		2	54					
50		3	70					
50		4	59					
50		5	65					
65		1	51					
65		2	50					
65		3	48					
65		4	64					
65		5	47					
100		1	41					
100		2	42					
100		3	69					
100		4	57					
100		5	45					

not needed

Use 1st & 2nd SC for B-3

not needed

QC:SH

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura
 Sample ID: A-2, B-1
 Test No.: 0409-101, 102

Test Species: M. galloprovincialis
 Start Date/Time: 09/29/04 1430
 End Date/Time: 10-2-04 1600

Use as
2nd SC
for B-3 SC#

Concentration ____%	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)			SAL	T°	DO	PH
	0	24	48	0	24	48	0	24	48	0	24	48				
Lab Control #1	33.3	33.3	33.5	14.3	16.0	16.0	7.3	8.2	8.5	8.10	8.10	7.99	33.1	14.5	8.1	8.21
Salt Control #1	29.3	29.5	29.8	14.3	15.7	15.1	6.9	7.9	8.6	8.36	8.34	8.14	30.0	14.4	8.4	8.31
Brine Control A-2																
25% (A-2)	32.9	32.9	33.4	14.3	15.6	15.1	7.1	8.1	8.9	8.12	8.12	8.01	33.5	14.3	8.3	8.22
50% (A-2)	32.8	33.0	33.4	14.3	15.6	15.1	7.1	8.3	8.2	8.11	8.11	8.01	33.0	14.3	8.3	8.2
100% (A-2)	32.2	32.4	32.9	14.3	15.5	15.0	7.0	8.3	8.9	8.11	8.12	8.02	33.3	14.3	8.2	8.25
Brine Control B-1	30.8	30.7	30.8	14.3	16.0	15.6	6.8	8.3	8.1	8.10	7.96	7.96	30.7	14.8	8.3	8.18
25% (B-1)	29.5	29.7	30.0	14.3	15.7	15.4	6.9	8.1	8.7	8.20	8.17	8.13	30.3	14.6	8.4	8.36
50% (B-1)	30.2	30.4	30.4	14.3	15.6	15.5	7.0	8.2	8.8	8.06	8.14	8.15	30.7	14.6	8.4	8.39
65% (B-1)	30.4	30.5	30.8	14.3	15.7	15.4	7.1	8.3	8.9	7.98	8.12	8.16	30.9	14.5	8.4	8.42
100% (B-1)	30.7	30.8	31.0	14.3	15.7	15.4	7.0	8.0	8.7	8.37	8.41	8.37	31.0	14.5	8.4	8.58

Technician Initials:

0	24	48	72
RS	RS	RS	RS

Animal Source/Date Received: Carlsbad Aquafarms

Comments: 0 hrs: _____
 24 hrs: _____
 48 hrs: _____

QC Check: Alt 10/20/04 Final Review: [Signature] 1/10/05

CETIS Test Summary

Bivalve Larval Survival and Development Test			Nautilus Environmental (CA)		
Test No:	07-5530-3356	Test Type:	Development-Survival	Duration:	69h
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Scripps Seawater	Source:	Carlsbad Aquafarms
Setup Date:	29 Sep-04 02:30 PM	Brine:	Frozen Seawater		
Sample No:	12-5086-4407	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura
Sample Date:	28 Sep-04 09:26 AM	Code:	0409-102	Project:	
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura		
Sample Age:	29h (16.6 °C)	Station:	B-1		
Comments: 100% sample salted with 40 Fathoms artificial salt					

Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
05-3440-3510	Proportion Normal	100	> 100	N/A	6.54%	Equal Variance t
03-7487-8840		65	> 65	N/A	5.38%	Dunnett's Multiple Comparison

Proportion Normal Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.92217	0.84211	0.95745	0.02093	0.04681	5.08%
0	Salt Control	5	0.85400	0.76000	0.90000	0.02441	0.05459	6.39%
25		5	0.86753	0.85227	0.89011	0.00743	0.01662	1.92%
50		5	0.88794	0.81690	0.94737	0.02316	0.05178	5.83%
65		5	0.90855	0.86765	0.94186	0.01250	0.02794	3.08%
100		5	0.92886	0.89000	0.96053	0.01335	0.02985	3.21%

Proportion Normal Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.94186	0.84211	0.94898	0.92045	0.95745
0	Salt Control	0.76000	0.86000	0.87000	0.88000	0.90000
25		0.86000	0.85526	0.85227	0.89011	0.88000
50		0.92857	0.87952	0.86735	0.81690	0.94737
65		0.86765	0.89655	0.91667	0.92000	0.94186
100		0.89000	0.96053	0.95522	0.91000	0.92857

Note: see A-2 summary report for lab control data

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	04-2089-8811	04-2089-8811	13 Jan-05 1:28 PM	CETISv1.025

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	5.38%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	5.33533	11.34487	0.14883	Equal Variances
Distribution	Shapiro-Wilk W	0.96261	0.86826	0.57679	Normal Distribution

ANOVA Table

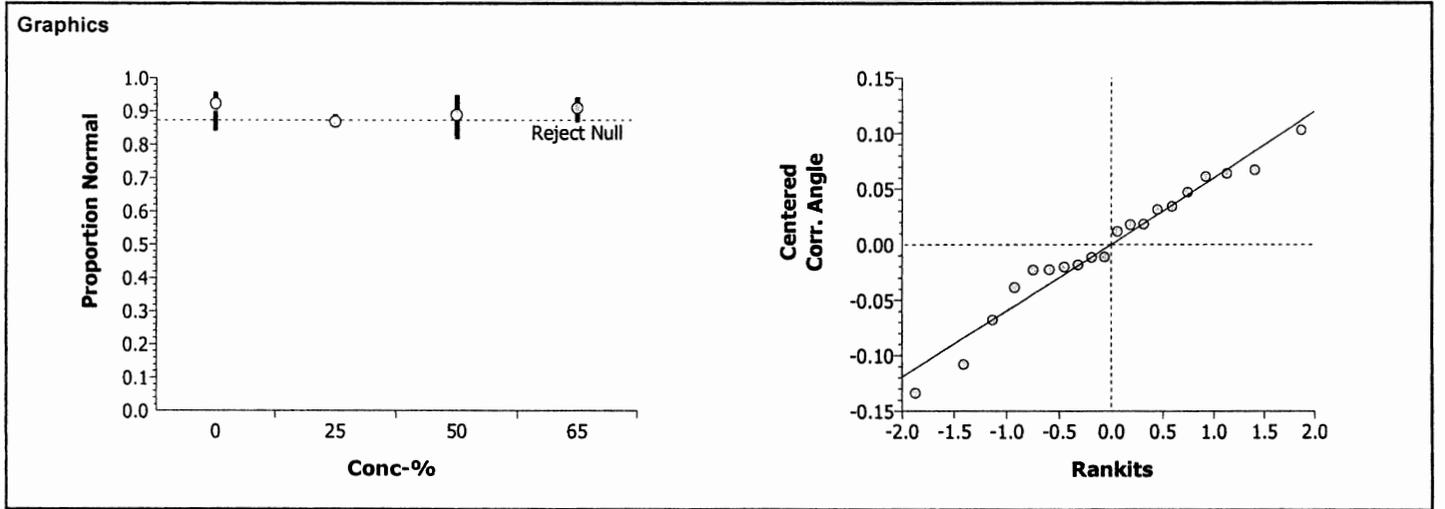
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0259239	0.008641	3	2.11	0.13965	Non-Significant Effect
Error	0.0656416	0.004103	16			
Total	0.09156556	0.0127439	19			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	2.40048	2.23	<= 0.0500	0.09034	Significant Effect
		50	1.47013	2.23	> 0.0500	0.09034	Non-Significant Effect
		65	0.73675	2.23	> 0.0500	0.09034	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	5	0.92217	0.84211	0.95745	0.04681	1.29606	1.16216	1.36302	0.08017
25		5	0.86753	0.85227	0.89011	0.01662	1.19881	1.17629	1.23291	0.02485
50		5	0.88794	0.81690	0.94737	0.05178	1.23650	1.12863	1.33932	0.08391
65		5	0.90855	0.86765	0.94186	0.02794	1.26621	1.19845	1.32728	0.04822



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	04-2089-8811	04-2089-8811	13 Jan-05 1:28 PM	CETISv1.025

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	6.54%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.53927	23.15450	0.68623	Equal Variances
Distribution	Shapiro-Wilk W	0.91722	0.78055	0.31812	Normal Distribution

ANOVA Table

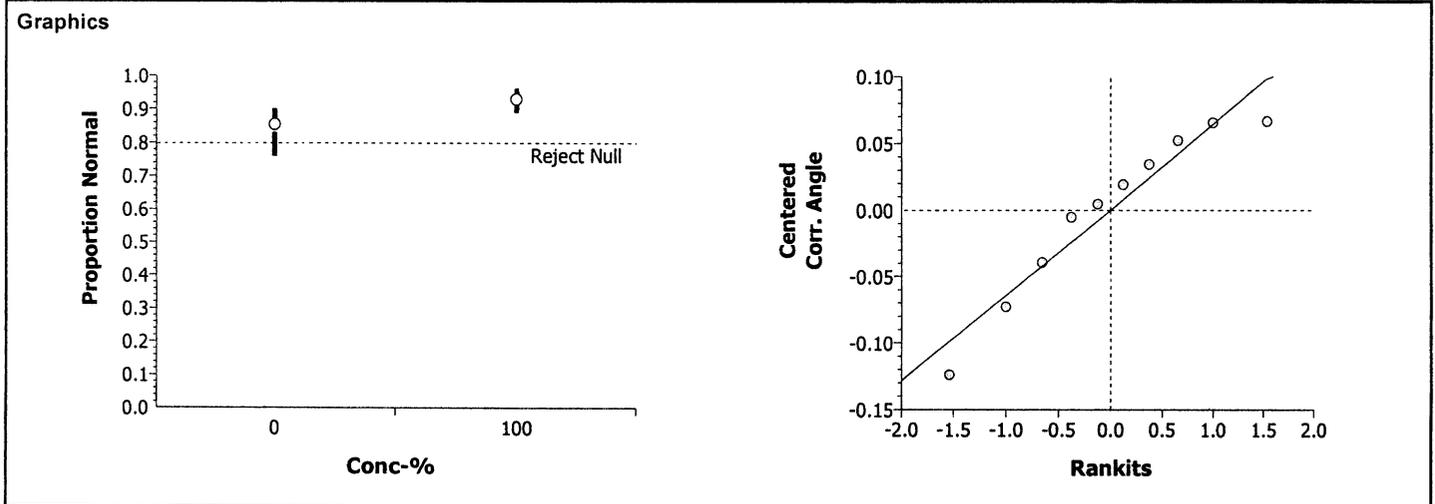
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0376126	0.037613	1	8.56	0.01914	Significant Effect
Error	0.035168	0.004396	8			
Total	0.07278053	0.0420086	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-2.9251	1.85955	0.9904	0.07798	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.85400	0.76000	0.90000	0.05459	1.18283	1.05882	1.24905	0.07300
100		5	0.92886	0.89000	0.96053	0.02985	1.30549	1.23273	1.37079	0.05884



CETIS Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental ~~AMEC Bioassay SD~~

Start Date: 29 Sep-04 Species: Mytilis galloprovincialis Sample Code: 0409-102
 End Date: ~~01~~⁰² Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: B-1

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			71			100	91	SD
			72			-	92	
			73			100	92	
			74			76	65	
			75			76	73	
			76			-	-	
			77			70	65	
			78			84	78	
			79			76	72	
			80			67	64	
			81			95	80	
			82			88	81	
			83			-	-	
			84			94	90	
			85			-	-	
			86			98	93	
			87			-	-	
			88			-	-	
			89			87	78	
			90			86	81	
			91			100	88	
			92			100	86	
			93			91	81	
			94			98	85	
			95			-	-	
			96			-	-	
			97			83	73	
			98			-	-	
			99			68	59	
			100			86	81	
			101			-	-	
			102			71	58	
			103			100	89	
			104			96	88	
			105			88	75	

Lined out replicates are U-1 and S-1, share with A-2

CETIS Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental ~~AMEC Bioassay SD~~

Start Date: 29 Sep-04 Species: *Mytilis galloprovincialis* Sample Code: 0409-102
 End Date: 20 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: B-1

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	B	1	90					
0	B	2	81					
0	B	3	86					
0	B	4	82					
0	B	5	84					
Share	LC	1	87					
LC and	LC	2	85					
SC1	LC	3	76					
with	LC	4	88					
A-2	LC	5	101					
	SC	1	83					
	SC	2	96					
	SC	3	95					
	SC	4	72					
	SC	5	98					
25		1	92					
25		2	74					
25		3	105					
25		4	93					
25		5	91					
50		1	78					
50		2	97					
50		3	94					
50		4	102					
50		5	79					
65		1	99					
65		2	89					
65		3	104					
65		4	73					
65		5	100					
100		1	103					
100		2	75					
100		3	80					
100		4	71					
100		5	77					

QC: SH

Brine Dilution Worksheet

Client: City of Buenaventura

Analyst: JR

Sample ID: B-1

Test Date: 09/29/2004

Test No: 0409-102

Test Type: Bivalve Development

Salinity of Effluent 1.7

Salinity of Brine 81.6

Target Salinity 30

Test Dilution Volume 250

Salinity Adjustment Factor: TS - SE
SB - TS

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.55

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
25	62.5	0.55	34.3	250
50	125.0	0.55	68.6	250
65	161	0.55	88.5	250

DI Volume

Brine Control	152	0.58	88.5	250
----------------------	-----	------	------	-----

Brine Control Salinity Adjustment Factor 279.9

Brine Control Calculation:
$$\frac{TS - 0}{SB - TS}$$

Nautilus Environmental
AMEC Earth and Environmental, Inc.
San Diego Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121

Report Date: 12 Jan-05 1:44 PM

Link: 17-3487-6148/0409-103

CETIS Test Summary

Bivalve Larval Survival and Development Test							Nautilus Environmental (CA)	
Test No:	07-5530-3356	Test Type:	Development-Survival	Duration:	69h	Species:	Mytilis galloprovincialis	
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Dil Water:	Scripps Seawater	Source:	Carlsbad Aquafarms	
Ending Date:	02 Oct-04 11:00 AM	Brine:	Frozen Seawater					
Setup Date:	29 Sep-04 02:30 PM							
Comments:	100% sample salted with 40 Fathoms artificial salt							
Sample No:	01-0974-4225	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 12:21 PM	Code:	0409-103	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	26h (17.2 °C)	Station:	B-3					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
03-4040-2385	Proportion Normal	100	> 100	N/A	5.53%	Equal Variance t		
05-8011-9177		88	> 88	N/A	7.04%	Dunnett's Multiple Comparison		
Proportion Normal Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.91275	0.88608	0.94444	0.01141	0.02552	2.80%
0	Lab Control	5	0.89006	0.87013	0.92537	0.01024	0.02290	2.57%
0	Salt Control	5	0.87956	0.83333	0.93000	0.01861	0.04161	4.73%
25		5	0.92879	0.89706	0.96875	0.01476	0.03300	3.55%
50		5	0.91635	0.81443	0.97561	0.02699	0.06036	6.59%
88		5	0.92031	0.87356	0.95890	0.01412	0.03158	3.43%
100		5	0.93613	0.89130	0.97000	0.01295	0.02896	3.09%
Proportion Normal Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Brine Control	0.88750	0.94444	0.92771	0.88608	0.91803		
0	Lab Control	0.87013	0.92537	0.90000	0.87324	0.88158		
0	Salt Control	0.91566	0.83333	0.85135	0.86747	0.93000		
25		0.91011	0.96000	0.89706	0.96875	0.90805		
50		0.93258	0.97561	0.93506	0.92405	0.81443		
88		0.87356	0.95890	0.93000	0.93000	0.90909		
100		0.94595	0.92958	0.94382	0.89130	0.97000		

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	17-3487-6148	17-3487-6148	12 Jan-05 1:43 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		88	>88	1.14	N/A	7.04%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.67728	11.34487	0.44410	Equal Variances
Distribution	Shapiro-Wilk W	0.97145	0.86826	0.75845	Normal Distribution

ANOVA Table

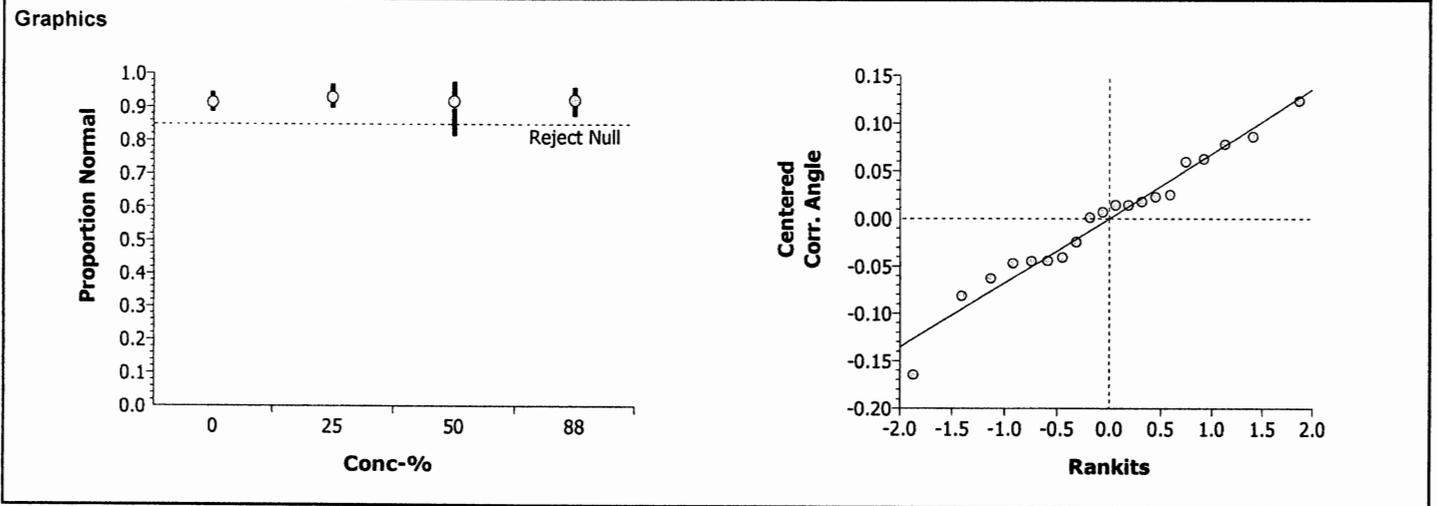
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0028495	0.00095	3	0.18	0.90822	Non-Significant Effect
Error	0.0843054	0.005269	16			
Total	0.08715492	0.0062189	19			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	-0.7344	2.23	> 0.0500	0.10238	Non-Significant Effect
		50	-0.371	2.23	> 0.0500	0.10238	Non-Significant Effect
		88	-0.3371	2.23	> 0.0500	0.10238	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	5	0.91275	0.88608	0.94444	0.02552	1.27343	1.22651	1.33286	0.04585
25		5	0.92879	0.89706	0.96875	0.03300	1.30714	1.24418	1.39309	0.06869
50		5	0.91635	0.81443	0.97561	0.06036	1.29046	1.12545	1.41398	0.10406
88		5	0.92031	0.87356	0.95890	0.03158	1.28890	1.20726	1.36666	0.05853



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	17-3487-6148	17-3487-6148	10 Jan-05 2:05 PM	CETISv1.025

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	5.53%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.25705	23.15450	0.82990	Equal Variances
Distribution	Shapiro-Wilk W	0.94833	0.78055	0.61832	Normal Distribution

ANOVA Table

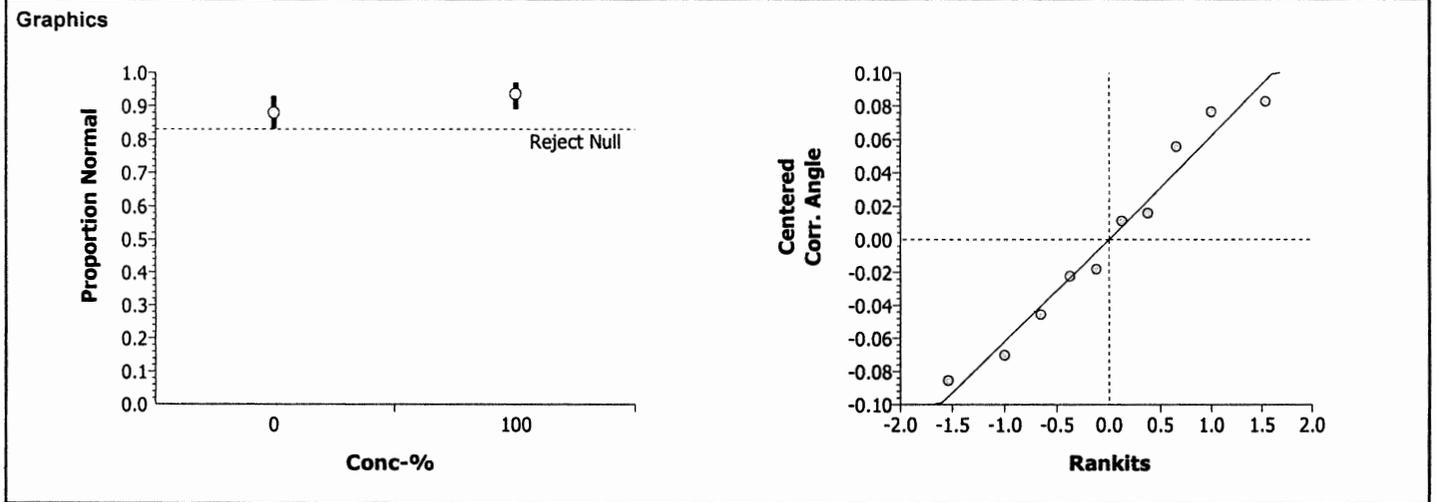
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0248775	0.024877	1	6.37	0.03563	Significant Effect
Error	0.0312597	0.003907	8			
Total	0.05613716	0.028785	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-2.5232	1.85955	0.9822	0.07352	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.87956	0.83333	0.93000	0.04161	1.22052	1.15026	1.30303	0.06597
100		5	0.93613	0.89130	0.97000	0.02896	1.32028	1.23482	1.39671	0.05884



CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 28 Sep-04 11:26 AM
 Link: 17-3487-6148/0409-103

Bivalve Larval Survival and Development Test Nautilus Environmental - AMEC Bioassay GP

Start Date: 29 Sep-04 Species: Mytilis galloprovincialis Sample Code: 0409-103
 End Date: ~~02~~ 01 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: B-3

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			106			100	JR 53 96	AA JR
			107			100	49 93	AA
			108			100	60 93	AA
			109			100 87	54 79	AA
			110			100	59 97	AA
			111			100	93	JR
			112			76	67	JR
			113			73	70	RG 1-4-05
			114			40	75	RG 1-4-05
			115			97	79	MC 1-4-05
			116			88	80	
			117			71	62	
			118			74	63	
			119			89	83	
			120			89	84	
			121			67	62	
			122			74	70	
			123			83	72	
			124			80	71	
			125			83	77	
			126			82	80	
			127			61	56	
			128			87	76	
			129			90	85	
			130			92	82	
			131			83	76	
			132			77	67	
			133			79	70	
			134			68	61	
			135			79	73	
			136			77	72	
			137			64	62	
			138			89	81	
			139			70	63	
			140			71	66	

CETIS Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental

AMEC-Bioassay SD

Start Date: 29 Sep-04	Species: Mytilis galloprovincialis	Sample Code: 0409-103
End Date: 01 Oct-04	Protocol: ASTM E724-98 (1999)	Sample Source: City of Buenaventura
Sampled: 28 Sep-04	Material: Estuarine Monitoring Sample	Sample Station: B-3

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	B	1	124					
0	B	2	129					
0	B	3	125					
0	B	4	133					
0	B	5	127					
0	LC2	1	132					
0	LC2	2	121					
0	LC2	3	139					
0	LC2	4	117					
0	LC2	5	112					
0	SC2	1	131					
0	SC2	2	114					
0	SC2	3	118					
0	SC2	4	123					
0	SC2	5	107					
25		1	138					
25		2	106					
25		3	134					
25		4	137					
25		5	109					
50		1	119					
50		2	126					
50		3	136					
50		4	135					
50		5	115					
65		1	128					
65		2	113					
65		3	111					
65		4	108					
65		5	116					
100		1	122					
100		2	140					
100		3	120					
100		4	130					
100		5	110					

QC:SH

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura
 Sample ID: B-3, C-23
 Test No.: 0409-103, 104

Test Species: M. galloprovincialis
 Start Date/Time: 09/29/04 1430
 End Date/Time: 10-2-04 1400

Concentration ____%____	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)			SAL	T°	DO	PH
	0	24	48	0	24	48	0	24	48	0	24	48				
Lab Control #2	29.5	29.3	29.5	14.3	15.7	15.5	7.2	8.4	8.5	8.02	8.02	8.01	29.0	14.8	8.0	8.15
Salt Control #2	29.3	29.5	29.8	14.3	15.5	15.2	7.6	8.3	8.7	8.34	8.27	8.11	30.0	14.8	8.3	8.21
Brine Control (B-3)	29.5	29.5	29.8	14.3	15.4	15.2	6.8	8.1	8.8	8.30	8.23	8.09	29.9	14.8	8.2	8.24
25% (B-3)	29.6	29.6	30.0	14.3	15.4	15.2	6.9	8.1	8.8	8.28	8.25	8.14	29.9	14.6	8.3	8.34
50% (B-3)	29.6	29.7	30.1	14.3	15.4	15.1	6.9	8.1	8.9	8.21	8.22	8.15	30.1	14.5	8.4	8.36
88% (B-3)	30.3	29.4	30.1	14.3	15.5	15.4	7.1	8.3	8.6	8.06	8.17	8.22	30.8	14.5	8.3	8.31
100% (B-3)	30.2	30.3	30.6	14.3	15.5	15.3	6.8	8.4	8.9	8.29	8.29	8.23	30.8	14.6	8.3	8.43
Brine Control (C-23)	30.7	30.7	31.0	14.3	15.8	15.4	6.8	8.3	8.9	8.11	8.09	8.01	31.0	14.5	8.0	8.12
25% (C-23)	29.6	29.8	30.1	14.3	15.7	15.4	6.7	8.1	8.8	8.11	8.24	8.21	30.3	14.5	8.4	8.47
50% (C-23)	29.9	29.8	30.1	14.3	15.7	15.4	6.9	8.2	8.8	8.03	8.22	8.26	30.4	14.3	8.3	8.50
66% (C-3)	30.1	30.5	30.9	14.3	15.7	15.4	7.2	8.4	8.9	8.03	8.20	8.27	30.9	14.3	8.4	8.54
100% (C-23)	29.9	30.2	30.7	14.3	15.4	15.3	7.0	8.3	9.2	8.10	8.17	8.24	31.0	14.3	8.3	8.50

Technician Initials:

0	24	48	72
RS	PR	DB	LB

Animal Source/Date Received: Carlsbad Aquafarms

Comments: 0 hrs: _____
 24 hrs: _____
 48 hrs: _____

QC Check: AA 10/20/04 Final Review: [Signature] 11/10/05

Brine Dilution Worksheet

Client: City of Buenaventura

Analyst: JR

Sample ID: B-3

Test Date: 09/29/2004

Test No: 0409-103

Test Type: Bivalve Development

Salinity of Effluent	22.8
Salinity of Brine	81.6
Target Salinity	30
Test Dilution Volume	250

Salinity Adjustment Factor: $\frac{TS - SE}{SB - TS}$

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.14

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
25	62.5	0.14	8.7	250
50	125.0	0.14	17.4	250
88	219	0.14	30.6	250

DI Volume

Brine Control	53	0.58	30.6	250
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Brine Control Salinity Adjustment Factor 87.4

Brine Control Calculation: $\frac{TS - 0}{SB - TS}$

Nautilus Environmental
AMEC Earth and Environmental, Inc.
 San Diego Bioassay Laboratory
 5550 Morehouse Drive, Suite B
 San Diego, CA 92121

CETIS Test Summary

Report Date: 12 Jan-05 1:48 PM

Link: 17-3130-1611/0409-104

Bivalve Larval Survival and Development Test				Nautilus Environmental (CA)				
Test No:	07-5530-3356	Test Type:	Development-Survival	Duration:	69h			
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Scripps Seawater	Source:	Carlsbad Aquafarms			
Setup Date:	29 Sep-04 02:30 PM	Brine:	Frozen Seawater					
Comments:	100% sample salted with 40 Fathoms artificial salt							
Sample No:	00-8864-0873	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 03:30 PM	Code:	0409-104	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	23h (20.6 °C)	Station:	C-3					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
06-5534-4515	Proportion Normal	100	> 100	N/A	6.61%	Equal Variance t		
11-5203-5030		100	> 100	N/A	6.82%	Dunnett's Multiple Comparison		
Proportion Normal Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.91275	0.88608	0.94444	0.01141	0.02552	2.60%
0	Lab Control	5	0.89006	0.87013	0.92537	0.01024	0.02290	2.57%
0	Salt Control	5	0.87956	0.83333	0.93000	0.01861	0.04161	4.73%
25		5	0.90146	0.88312	0.94048	0.01090	0.02438	2.70%
50		5	0.91824	0.84091	0.96203	0.02293	0.05127	5.58%
66		5	0.94154	0.87209	0.97000	0.01774	0.03968	4.21%
100		5	0.90109	0.84043	0.94872	0.02139	0.04782	5.31%
Proportion Normal Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Brine Control	0.88750	0.94444	0.92771	0.88608	0.91803		
0	Lab Control	0.87013	0.92537	0.90000	0.87324	0.88158		
0	Salt Control	0.91566	0.83333	0.85135	0.86747	0.93000		
25		0.94048	0.91000	0.88372	0.88312	0.89000		
50		0.93548	0.96203	0.84091	0.89333	0.95946		
66		0.95506	0.94805	0.97000	0.96250	0.87209		
100		0.93421	0.92188	0.94872	0.84043	0.86022		

note: see analysis page for brine control data

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	17-3130-1611	17-3130-1611	12 Jan-05 1:47 PM	CETISv1.025

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	6.82%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.77546	13.27671	0.59608	Equal Variances
Distribution	Shapiro-Wilk W	0.93763	0.88746	0.13883	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0214255	0.005356	4	1.09	0.39043	Non-Significant Effect
Error	0.0987213	0.004936	20			
Total	0.12014684	0.0102924	24			

Group Comparisons

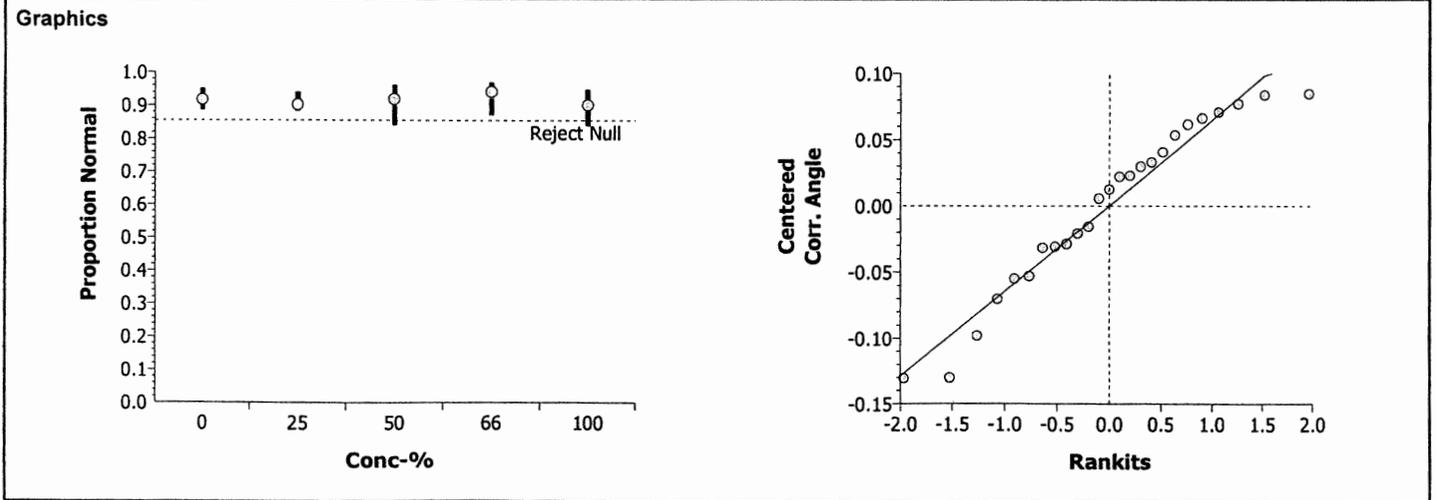
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	0.63579	2.3	> 0.0500	0.1022	Non-Significant Effect
		50	-0.208	2.3	> 0.0500	0.1022	Non-Significant Effect
		66	-1.1999	2.3	> 0.0500	0.1022	Non-Significant Effect
		100	0.54181	2.3	> 0.0500	0.1022	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	5	0.91718	0.88636	0.95122	0.02611	1.28182	1.22696	1.34810	0.04889
25		5	0.90146	0.88312	0.94048	0.02438	1.25357	1.22188	1.32433	0.04344
50		5	0.91824	0.84091	0.96203	0.05127	1.29107	1.16052	1.37467	0.09123
66		5	0.94154	0.87209	0.97000	0.03968	1.33514	1.20506	1.39671	0.07565
100		5	0.90109	0.84043	0.94872	0.04782	1.25775	1.15986	1.34236	0.07973

Data 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	Brine Control	0.93590	0.88636	0.90244	0.95122	0.91000					
25		0.94048	0.91000	0.88372	0.88312	0.89000					
50		0.93548	0.96203	0.84091	0.89333	0.95946					
66		0.95506	0.94805	0.97000	0.96250	0.87209					
100		0.93421	0.92188	0.94872	0.84043	0.86022					



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	17-3130-1611	17-3487-6148	10 Jan-05 2:14 PM	CETISv1.025

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	6.61%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.46040	23.15450	0.72259	Equal Variances
Distribution	Shapiro-Wilk W	0.89827	0.78055	0.20390	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0034644	0.003464	1	0.65	0.44443	Non-Significant Effect
Error	0.0428353	0.005354	8			
Total	0.04629967	0.0088188	9			

Group Comparisons

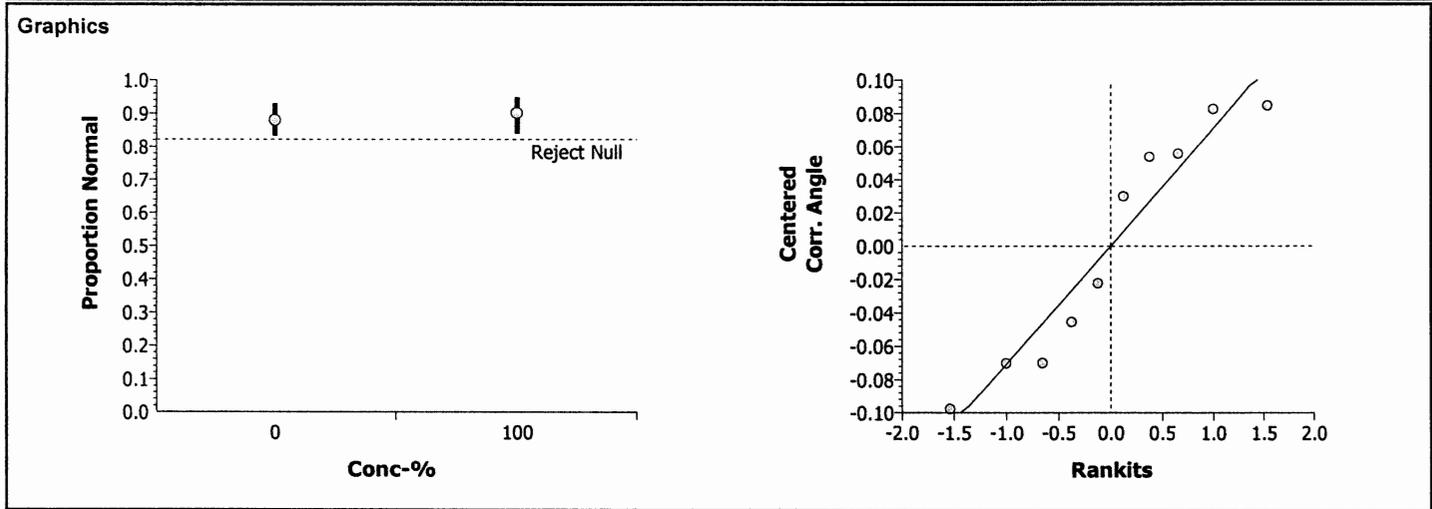
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-0.8044	1.85955	0.7778	0.08606	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.87956	0.83333	0.93000	0.04161	1.22052	1.15026	1.30303	0.06597
100		5	0.90109	0.84043	0.94872	0.04782	1.25775	1.15986	1.34236	0.07973

Data 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	Salt Control	0.91566	0.83333	0.85135	0.86747	0.93000					
100		0.93421	0.92188	0.94872	0.84043	0.86022					



CETIS Worksheet

Bivalve Larval Survival and Development Test Nautilus Environmental AMEG Bioassay SD

Start Date: 29 Sep-04 Species: Mytilis galloprovincialis Sample Code: 0409-104
 End Date: 01 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: G2 G3

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			141			100	89	SD
			142			-	-	
			143			86	70	
			144			88	74	
			145			77	68	
			146			80	77	
			147			82	78	
			148			100	91	
			149			100	91	
			150			93	80	
			151			94	79	
			152			-	-	
			153			-	-	
			154			75	67	R6 1-4-05
			155			100	97	
			156			88	78	
			157			-	-	
			158			-	-	
			159			93	87	
			160			78	74	
			161			-	-	
			162			89	85	
			163			-	-	
			164			-	-	
			165			86	75	
			166			84	79	
			167			77	73	
			168			82	74	
			169			78	73	
			170			-	-	
			171			64	59	
			172			76	71	
			173			-	-	
			174			74	71	
			175			79	76	

Lined out replicates are TC and SC, share with B-3.

CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 28 Sep-04 11:23 AM
 Link: 17-3130-1611/0409-104

Bivalve Larval Survival and Development Test Nautilus Environmental AMEC Bioassay SD

Start Date: 29 Sep-04 Species: Mytilus galloprovincialis Sample Code: 0409-104
 End Date: 01 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: ~~C-3~~

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	B	1	169					
0	B	2	156					
0	B	3	168					
0	B	4	147					
0	B	5	148					
0	LC	1	158					
0	LC	2	157					
0	LC	3	142					
0	LC	4	170					
0	LC	5	161					
0	SC	1	153					
0	SC	2	164					
0	SC	3	173					
0	SC	4	153					
0	SC	5	152					
25		1	166					
25		2	149					
25		3	143					
25		4	145					
25		5	141					
50		1	159					
50		2	175					
50		3	144					
50		4	154					
50		5	174					
65		1	162					
65		2	167					
65		3	155					
65		4	146					
65		5	165					
100		1	172					
100		2	171					
100		3	160					
100		4	151					
100		5	150					

Inare
 LC and SC
 with B-3

QC: SH

Brine Dilution Worksheet

Client: City of Buenaventura

Analyst: JR

Sample ID: C-3

Test Date: 09/29/2004

Test No: 0409-104

Test Type: Bivalve Development

Salinity of Effluent	3.4
Salinity of Brine	81.6
Target Salinity	30
Test Dilution Volume	250

Salinity Adjustment Factor: $\frac{TS - SE}{SB - TS}$

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.52

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
25	62.5	0.52	32.2	250
50	125.0	0.52	64.4	250
66	165	0.52	85.0	250

DI Volume

Brine Control	146	0.58	85.0	250
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Brine Control Salinity Adjustment Factor 266.7

Brine Control Calculation: $\frac{TS - 0}{SB - TS}$


~~AMEC Earth and Environmental, Inc.~~
San Diego Bioassay Laboratory
5550 Morehouse Drive. Suite B
San Diego, CA 92121

M. PYRIFERA

CETIS Test Summary

Macrocystis Germination and Germ Tube Growth Test						Nautilus Environmental (CA)		
Test No:	08-9135-4813	Test Type:	Growth-Germination	Duration:	48h	Species:	Macrocystis pyrifera	
Start Date:	29 Sep-04 02:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Source:	Field Collected			
Ending Date:	01 Oct-04 02:00 PM	Dil Water:	Laboratory Seawater					
Setup Date:	29 Sep-04 02:00 PM	Brine:	Frozen Seawater AH					
Comments:	100% sample salted with 40 Fathoms artificial salts - AH. No artificial salt needed for A-2.							
Sample No:	11-1980-7156	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 10:30 AM	Code:	0409-097	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	28h (17.9 °C)	Station:	A-2					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
02-3995-3502	Mean Length	50	100	70.711	9.37%	Dunnett's Multiple Comparison		
09-9633-4269	Proportion Germinated	100	> 100	N/A	12.90%	Dunnett's Multiple Comparison		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method		
01-3573-1302	Mean Length	25	> 100.00000	N/A	N/A	Linear Interpolation		
		50	> 100.00000	N/A	N/A			
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
01-3573-1302	Mean Length	Control Response	15.3	10 - N/A	Passes acceptability criteria			
02-3995-3502	Mean Length	Control Response	15.3	10 - N/A	Passes acceptability criteria			
09-9633-4269	Proportion Germinated	Control Response	0.708	0.7 - N/A	Passes acceptability criteria			
02-3995-3502	Mean Length	MSDp	0.09368	N/A - 0.2	Passes acceptability criteria			
09-9633-4269	Proportion Germinated	MSDp	0.12903	N/A - 0.2	Passes acceptability criteria			
Mean Length Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	15.3	14.5	17	0.4569	1.0216	6.68%
25		5	15.25	14.25	15.75	0.2622	0.5863	3.84%
50		5	14.95	14.25	16.75	0.4569	1.0216	6.83%
100		5	13.3	12.25	15.25	0.5831	1.3038	9.80%
Proportion Germinated Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.70800	0.61000	0.78000	0.03105	0.06943	9.81%
25		5	0.71000	0.61000	0.80000	0.03332	0.07450	10.49%
50		5	0.59000	0.53000	0.68000	0.02966	0.06633	11.24%
100		5	0.64800	0.58000	0.71000	0.02083	0.04658	7.19%
Mean Length Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	15.5	14.75	14.75	14.5	17		
25		15.5	14.25	15.75	15.5	15.25		
50		14.5	14.5	14.75	14.25	16.75		
100		12.25	12.75	15.25	12.25	14		
Proportion Germinated Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.69000	0.77000	0.61000	0.78000	0.69000		
25		0.61000	0.80000	0.71000	0.67000	0.76000		
50		0.56000	0.68000	0.53000	0.64000	0.54000		
100		0.66000	0.58000	0.65000	0.64000	0.71000		

CETIS Analysis Detail

Comparisons: Page 2 of 2
 Report Date: 28 Dec-04 10:26 AM
 Analysis: 09-9633-4269/0409-097

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	08-4792-3147	08-4792-3147	28 Dec-04 10:17 AM	CETISv1.025

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	12.90%

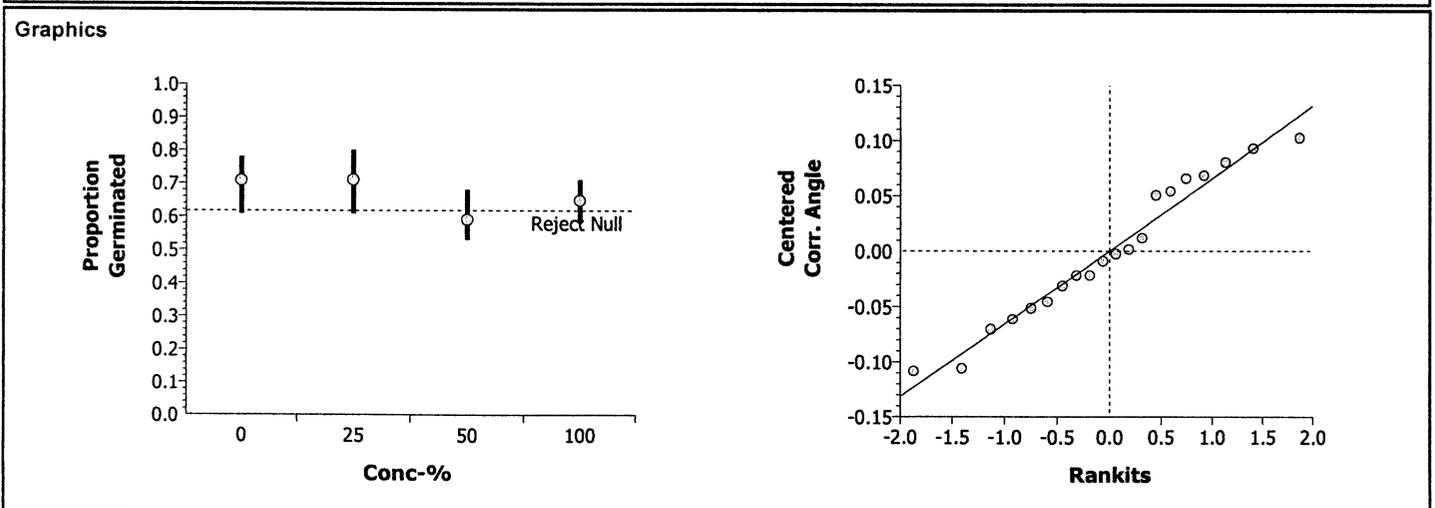
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.708	0.7 - N/A	Passes acceptability criteria
MSDp	0.12903	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.03498	11.34487	0.79279	Equal Variances
Distribution	Shapiro-Wilk W	0.95594	0.86826	0.45270	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0558389	0.018613	3	3.79	0.03162	Significant Effect
Error	0.0786679	0.004917	16			
Total	0.13450673	0.0235297	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		25	-0.0593	2.23	> 0.0500	0.09889	Non-Significant Effect
		50	2.82712	2.23	<= 0.0500	0.09889	Significant Effect
		100	1.48346	2.23	> 0.0500	0.09889	Non-Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.70800	0.61000	0.78000	0.06943	1.00202	0.89631	1.08259	0.07635
25		5	0.71000	0.61000	0.80000	0.07450	1.00465	0.89631	1.10715	0.08259
50		5	0.59000	0.53000	0.68000	0.06633	0.87665	0.81542	0.96953	0.06807
100		5	0.64800	0.58000	0.71000	0.04658	0.93623	0.86574	1.00212	0.04883



CETIS Analysis Detail

Comparisons: Page 1 of 2
 Report Date: 28 Dec-04 10:26 AM
 Analysis: 02-3995-3502/0409-097

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Mean Length	Comparison	08-4792-3147	08-4792-3147	28 Dec-04 10:17 AM	CETISv1.025			
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		50	100	2.00	70.711	9.37%

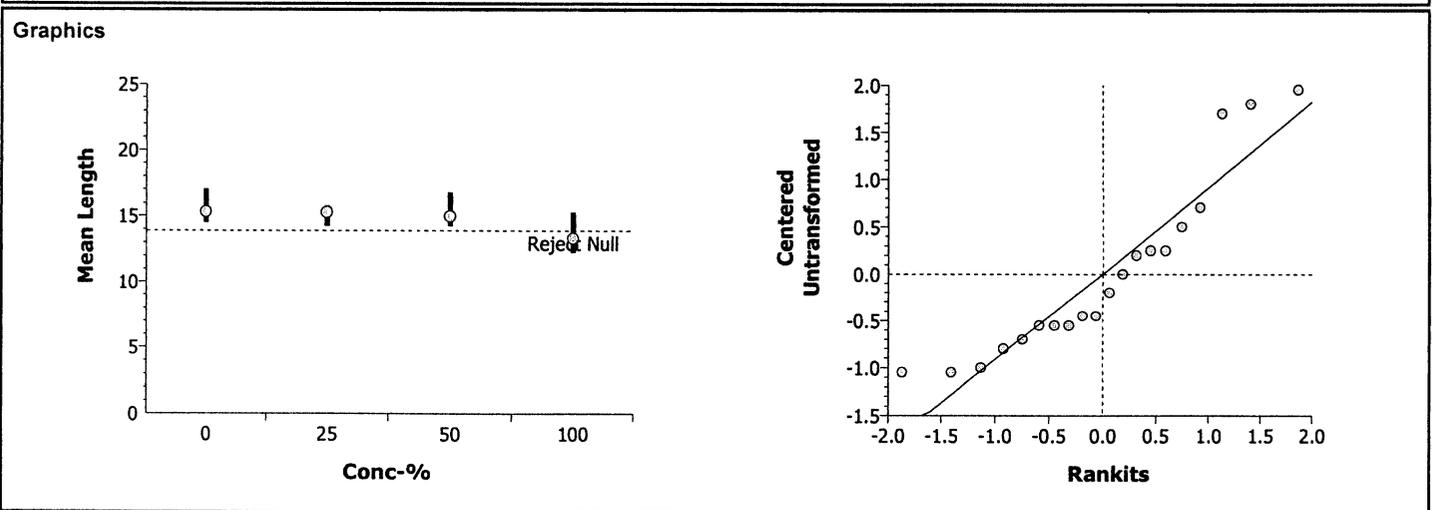
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	15.3	10 - N/A	Passes acceptability criteria
MSDp	0.09368	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.10372	11.34487	0.55116	Equal Variances
Distribution	Shapiro-Wilk W	0.87683	0.86826	0.01460	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	13.425	4.475	3	4.33	0.02044	Significant Effect
Error	16.525	1.032812	16			
Total	29.9499998	5.5078124	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		25	0.07779	2.23	> 0.0500	1.43333	Non-Significant Effect
		50	0.54454	2.23	> 0.0500	1.43333	Non-Significant Effect
		100	3.11164	2.23	<= 0.0500	1.43333	Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	15.3	14.5	17	1.0216				
25		5	15.25	14.25	15.75	0.5863				
50		5	14.95	14.25	16.75	1.0216				
100		5	13.3	12.25	15.25	1.3038				



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test	Nautilus Environmental (CA)
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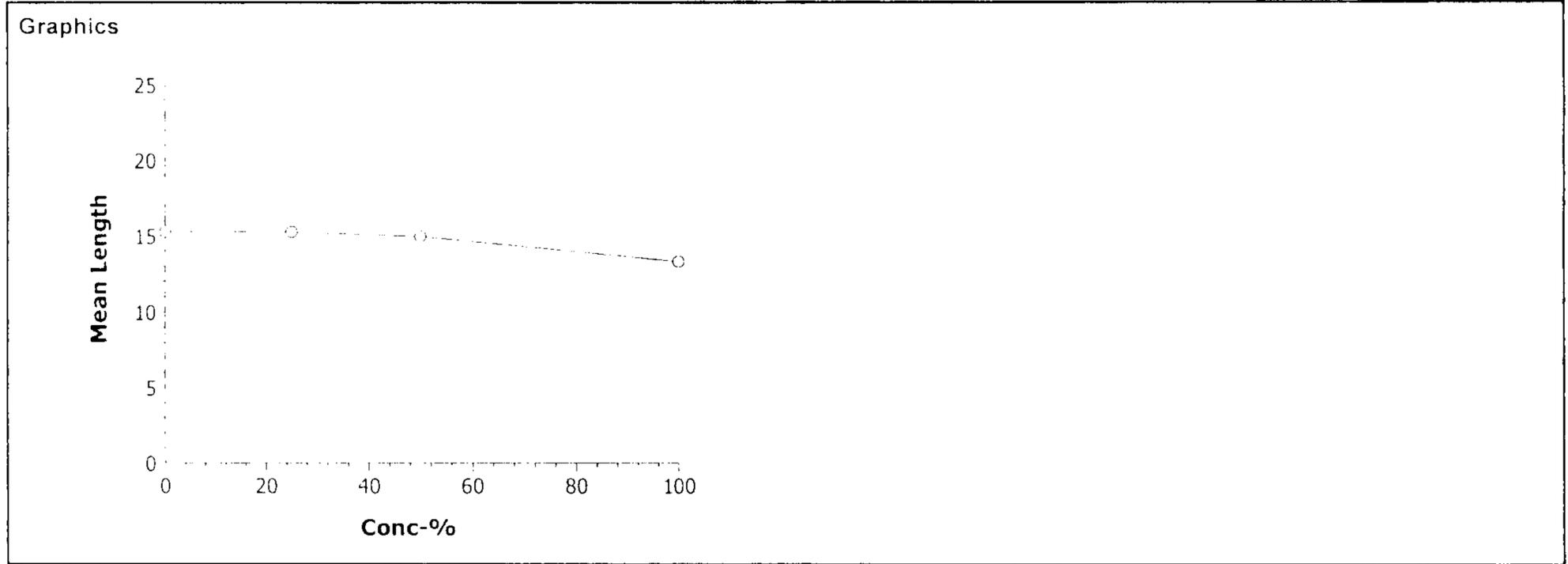
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Linear Interpolation	08-4792-3147	08-4792-3147	28 Dec-04 10:17 AM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7055475	200	Yes	Two-Point Interpolation

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	15.3	10 - N/A	Passes acceptability criteria

Point Estimates			
% Effect	Conc-%	95% LCL	95% UCL
25	> 100.00000	N/A	N/A
50	> 100.00000	N/A	N/A

Data Summary			Calculated Variate				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	5	15.3	14.5	17	0.20854	1.02164
25		5	15.25	14.25	15.75	0.11968	0.58630
50		5	14.95	14.25	16.75	0.20854	1.02164
100		5	13.3	12.25	15.25	0.26615	1.30384



Macrocystis Germination and Germ Tube Growth Test

Nautilus Environmental — AMEC Bioassay Laboratory — San Diego

Start Date: 29-Sep-04

Species: *Macrocystis pyrifera*

Test ID: 0409-097

End Date: 1-Oct-04

Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Sample Source: City of Buenaventura

Sampled: 28-Sep-04

Sample Station: A-2

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)	
36	100														
37	100														
38	100	53	7	6	5	7	6	5	5	5	6	7	2.5	14.75	
39	100	64	5	6	4	6	6	7	4	7	6	6	2.5	14.25	
40	100	75	6	6	6	6	6	6	8	6	7	8	2.5	16.25	
41	100	76	5	5	6	5	7	6	6	7	7	7	2.5	15.25	
42	100	85	8	8	8	7	5	6	8	5	7	6	2.5	17	
43	100	54	10	7	5	6	6	6	5	7	8	7	2.5	16.75	
44	100	61	7	5	5	5	7	6	5	7	6	6	2.5	14.75	
45	100	65	7	8	4	6	7	5	4	7	6	7	2.5	15.25	
46	100	76	5	6	6	6	8	6	6	6	9	8	2.5	16.5	
47	100														
48	100														
49	100	69	5	4	7	7	6	5	5	7	8	8	2.5	15.5	
50	100	61	8	6	7	5	4	6	5	5	9	7	2.5	15.5	
51	100														
52	100	67	6	5	6	5	8	8	5	7	6	6	2.5	15.5	
53	100														
54	100	83	6	6	6	7	8	6	8	6	6	7	2.5	16.5	
55	100	66	4	4	6	3	5	5	7	5	6	4	2.5	12.25	
56	100	71	7	6	6	6	6	7	5	5	9	6	2.5	15.75	
57	100	77	6	6	6	5	6	6	8	5	5	6	2.5	14.75	
58	100	64	4	5	4	6	6	5	5	4	6	4	2.5	12.25	
59	100														
60	100	56	7	5	4	3	6	6	8	6	7	6	2.5	14.5	
61	100	67	7	7	7	6	6	7	5	8	6	6	2.5	16.25	
62	100														
63	100	69	7	9	4	6	7	7	7	7	7	7	2.5	17	
64	100	58	4	5	6	4	4	6	7	4	5	6	2.5	12.75	
65	100	71	8	3	4	7	7	6	5	4	5	7	2.5	14	
66	100	78	5	7	4	4	7	6	5	7	6	7	2.5	14.5	
67	100	80	5	5	5	8	5	6	6	6	5	6	2.5	14.25	
68	100														
69	100	68	7	9	4	4	5	6	5	4	8	6	2.5	14.5	
70	100														

Analyst: AFB

QC Check: AFB 12/21/04

Final Review: AM 1/18/05

Macrocystis Germination and Germ Tube Growth Test

Nautilus Environmental

AMEC Bioassay Laboratory - San Diego

Start Date: 29-Sep-04
 End Date: 01-Oct-04
 Sampled: 28-Sep-04

Species: *Macrocystis pyrifera*
 Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Test ID: 0409-097
 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	—											2.5	#DIV/0!
37	100	—												#DIV/0!
38	100	53	7	6	5	7	6	5	5	5	6	7		#DIV/0!
39	100	64	5	6	4	6	6	7	4	7	6	6		#DIV/0!
40	100	75	6	6	6	6	6	6	8	6	7	8		#DIV/0!
41	100	76	5	5	6	5	7	6	6	4	7	7		#DIV/0!
42	100	85	8	8	8	7	5	6	8	5	7	6		#DIV/0!
43	100	54	10	7	5	6	6	6	5	7	8	7		#DIV/0!
44	100	61	7	5	5	5	7	6	5	7	6	6		#DIV/0!
45	100	65	7	8	4	6	7	5	4	7	6	7		#DIV/0!
46	100	76	5	6	6	6	8	6	6	6	9	8		#DIV/0!
47	100	—												#DIV/0!
48	100	—												#DIV/0!
49	100	69	5	4	5	7	6	5	5	7	8	8		#DIV/0!
50	100	61	8	6	7	5	4	6	5	5	9	7		#DIV/0!
51	100	—												#DIV/0!
52	100	67	6	5	6	5	8	8	5	7	6	6		#DIV/0!
53	100	—												#DIV/0!
54	100	83	6	6	6	7	8	6	8	6	6	7		#DIV/0!
55	100	SW 66	4	4	6	3	5	5	7	5	6	4		#DIV/0!
56	100	SW 71	7	6	6	6	6	7	5	5	9	6		#DIV/0!
57	100	77	6	6	6	5	6	6	8	5	5	8		#DIV/0!
58	100	64	4	5	4	6	6	5	5	4	6	4		#DIV/0!
59	100	—												#DIV/0!
60	100	56	7	5	4	3	6	6	8	6	7	6		#DIV/0!
61	100	67	7	7	7	6	6	7	5	8	6	6		#DIV/0!
62	100	—												#DIV/0!
63	100	69	7	9	4	6	7	7	7	7	7	7		#DIV/0!
64	100	58	4	5	6	4	4	6	7	4	5	6		#DIV/0!
65	100	71	8	3	4	7	7	6	5	4	5	7		#DIV/0!
66	100	78	5	7	4	4	7	6	5	7	6	7		#DIV/0!
67	100	80	5	5	5	8	5	6	6	6	5	6		#DIV/0!
68	100	—												#DIV/0!
69	100	68	7	9	4	4	5	6	5	4	8	6		#DIV/0!
70	100	—												#DIV/0!

Analyst: SH

QC Check: [Signature] 12/27/04

Final Review: [Signature] 12/27/04

CETIS Worksheet

Macrocystis Germination and Germ Tube Growth Test

Nautilus Environmental AMEC Bioassay SD

Start Date: 29 Sep-04 Species: *Macrocystis pyrifera* Sample Code: 0409-097
 End Date: 01 Oct-04 Protocol: EPA/600/R-95/136 (1995) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: A-2

Conc-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	B	1	36					
0	B	2	59					
0	B	3	48					
0	B	4	62					
0	B	5	47					
0	LC I	1	49					
0	LC I	2	57					
0	LC I	3	44					
0	LC I	4	66					
0	LC I	5	63					
0	SC I	1	40					
0	SC I	2	46					
0	SC I	3	42					
0	SC I	4	61					
0	SC I	5	54					
25		1	50					
25		2	67					
25		3	56					
25		4	52					
25		5	41					
50		1	60					
50		2	69					
50		3	38					
50		4	39					
50		5	43					
65		1	51					
65		2	70					
65		3	53					
65		4	37					
65		5	68					
100		1	55					
100		2	64					
100		3	45					
100		4	58					
100		5	65					

QC-R6

Marine Chronic Bioassay

Kelp Spore Germination & Growth Worksheet

Client: City of Brea/Ventura
Test No.: 0409-097, 098, 099, 100
Tech. Initials: RH

Start Date/Time: 9-29-04 1 1400
End Date/Time: 10/1/04 1 1400
Test Species: Macrocystis pyrifera

Date Collected: 9-28-04
Kelp Collector: Dave Gutoff
Collection Location: La Jolla Cove
Conditions (weather, etc.): good conditions, 10' vis
Dilution Water Source (Client I: City of Brea/Ventura Scripts):
Dilution Water Source (Client II: _____):
Dilution Water Source (Client III: _____):
Dilution Water Source (Reference Toxicant): _____

Time of Initial Rinsing and Dessication: 1000/9-28-04 (keep kelp from each collecting bag separated)
Time of Rinsing and Transfer to Release Beakers: 1245/9-28-04 (keep kelp from each collecting bag separated)
Conditions of Zoospore Density and Motility (beaker 1): good motility fairly dense, many flagellated cells
Time of Blade Removal From Release Beaker 1/Beaker 2 (if needed): 1345

Density Counts (target = 90): 53 45 57 60 66 Mean: 56.2
Mean 56.2 10,000 = 562,000 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) = 0.40 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 _____ * $\frac{0.25 \text{ ml}}{1 \text{ container}}$ = _____ spores = _____ (x)
225,000 spores

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 0.3 ml requirement 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: 0.50 ml 24-hour germination check: 92%

Comments: _____

QC Check: [Signature] 12/27/04 Final Review: AH 1/18/05

Marine Chronic Bioassay

Water Quality Measurements

Client : City of Buenaventura

Test Species: Macrocystis pyrifera

Sample ID: A-2

Start Date/Time: 9/29/04 1 1400

Test No: 0409-097

End Date/Time: 10/01/04 1 1400

Analyst: RC

Test Type: Kelp Spore Germination and Growth

Concentration (____%)	Initial Readings				Final Readings			
	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature 24 (°C)	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)
Lab Control #1	8.6	7.93	33.7	14.3 15.0	7.2	7.99	33.2	14.6
Salt Control #1	8.7	7.97	32.0	14.3 15.0	7.3	8.12	32.3	14.6
Brine Control								
25%	8.5	8.02	33.0	14.3 15.0	7.0	8.03	33.2	14.6
50%	8.2	8.06	33.1	14.3 15.0	7.2	8.04	32.8	14.6
75%								
100%	7.6	8.09	32.1	14.3 15.0	7.2	8.07	32.6	14.6

Comments: Salt Control #1 goes with sample B-1, A-2 did not need to be salted.

QC Check: [Signature] 12/21/04

Final Review: Att 1/18/05

CETIS Test Summary

Macrocystis Germination and Germ Tube Growth Test						Nautilus Environmental (CA)		
Test No:	08-9135-4813	Test Type:	Growth-Germination	Duration:	48h	Species:	Macrocystis pyrifera	
Start Date:	29 Sep-04 02:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Source:	Field Collected			
Ending Date:	01 Oct-04 02:00 PM	Dil Water:	Laboratory Seawater	Brine:	Frozen Seawater			
Setup Date:	29 Sep-04 02:00 PM	Comments: 100% sample salted with 40 Fathoms artificial salts.						
Sample No:	17-3524-6945	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 09:26 AM	Code:	0409-098	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	29h (16.6 °C)	Station:	B-1					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
12-2176-6171	Mean Length	< 100	100	N/A	8.94%	Unequal Variance t		
16-3886-8786		62	> 62	N/A	12.20%	Dunnett's Multiple Comparison		
20-6167-8610	Proportion Germinated	100	> 100	N/A	10.57%	Equal Variance t		
15-3294-9239		62	> 62	N/A	18.70%	Steel's Many-One Rank		
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
12-2176-6171	Mean Length	Control Response	16.5	10 - N/A	Passes acceptability criteria			
16-3886-8786	Mean Length	Control Response	13.4	10 - N/A	Passes acceptability criteria			
15-3294-9239	Proportion Germinated	Control Response	0.778	0.7 - N/A	Passes acceptability criteria			
20-6167-8610	Proportion Germinated	Control Response	0.77200	0.7 - N/A	Passes acceptability criteria			
12-2176-6171	Mean Length	MSDp	0.0894	N/A - 0.2	Passes acceptability criteria			
16-3886-8786	Mean Length	MSDp	0.12201	N/A - 0.2	Passes acceptability criteria			
15-3294-9239	Proportion Germinated	MSDp	0.18705	N/A - 0.2	Passes acceptability criteria			
20-6167-8610	Proportion Germinated	MSDp	0.10568	N/A - 0.2	Passes acceptability criteria			
Mean Length Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	13.4	12.25	14	0.3021	0.6755	5.04%
0	Salt Control	5	16.5	16.25	17	0.1369	0.3062	1.86%
25		5	15	13	16.75	0.6937	1.5512	10.34%
50		5	16.25	15	18.25	0.542	1.2119	7.46%
62		5	16.2	15	17.25	0.4569	1.0216	6.31%
100		5	14.65	12.75	16.5	0.6782	1.5166	10.35%
Proportion Germinated Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.77800	0.55000	0.85000	0.05739	0.12834	16.50%
0	Salt Control	5	0.77200	0.67000	0.85000	0.03200	0.07155	9.27%
25		5	0.77600	0.48000	0.89000	0.07527	0.16832	21.69%
50		5	0.84000	0.82000	0.86000	0.00837	0.01871	2.23%
62		5	0.85200	0.81000	0.88000	0.01200	0.02683	3.15%
100		5	0.75000	0.68000	0.83000	0.02950	0.06595	8.79%

Note: See A-7 test summary for lab control data.

CETIS Test Summary

Report Date: 13 Jan-05 11:57 AM

Link: 07-8344-2370/0409-098

Mean Length Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	13.5	13.5	12.25	13.75	14
0	Salt Control	16.25	16.5	17	16.25	16.5
25		16.25	13	16.75	14	15
50		16.25	15	15.75	18.25	16
62		15.5	17.25	16	15	17.25
100		12.75	16.5	15.5	15	13.5

Proportion Germinated Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.84000	0.84000	0.81000	0.55000	0.85000
0	Salt Control	0.75000	0.76000	0.85000	0.67000	0.83000
25		0.48000	0.82000	0.89000	0.82000	0.87000
50		0.83000	0.83000	0.82000	0.86000	0.86000
62		0.87000	0.88000	0.85000	0.85000	0.81000
100		0.71000	0.68000	0.72000	0.83000	0.81000

CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	07-8344-2370	07-8344-2370	13 Jan-05 11:56 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		62	>62	1.61	N/A	18.70%

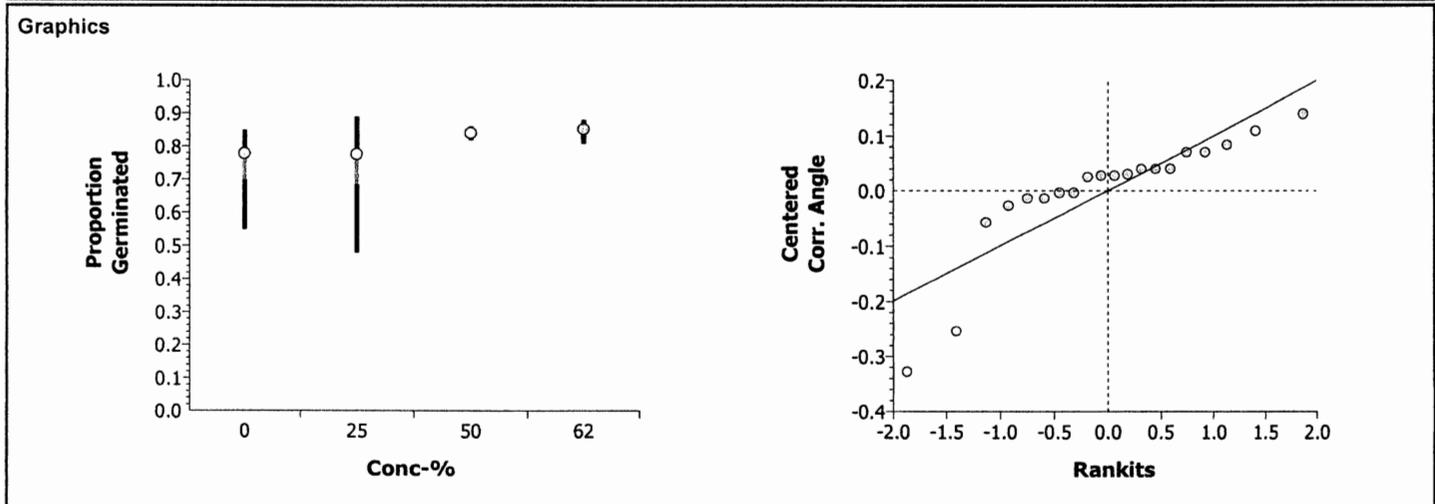
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.778	0.7 - N/A	Passes acceptability criteria
MSDp	0.18705	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	15.21461	11.34487	0.00164	Unequal Variances
Distribution	Shapiro-Wilk W	0.77120	0.86826	0.00015	Non-normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0305399	0.01018	3	0.70	0.56484	Non-Significant Effect
Error	0.2322028	0.014513	16			
Total	0.26274270	0.0246926	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	Ties	Decision(0.05)
Brine Control		25	29	17	> 0.0500	2	Non-Significant Effect
		50	31	17	> 0.0500	3	Non-Significant Effect
		62	35.5	17	> 0.0500	3	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	0.77800	0.55000	0.85000	0.12834	1.08938	0.83548	1.17310	0.14333
25		5	0.77600	0.48000	0.89000	0.16832	1.09307	0.76539	1.23273	0.18832
50		5	0.84000	0.82000	0.86000	0.01871	1.15977	1.13265	1.18730	0.02570
62		5	0.85200	0.81000	0.88000	0.02683	1.17699	1.11977	1.21705	0.03719



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	07-8344-2370	07-8344-2370	13 Jan-05 11:56 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		62	>62	1.61	N/A	12.20%

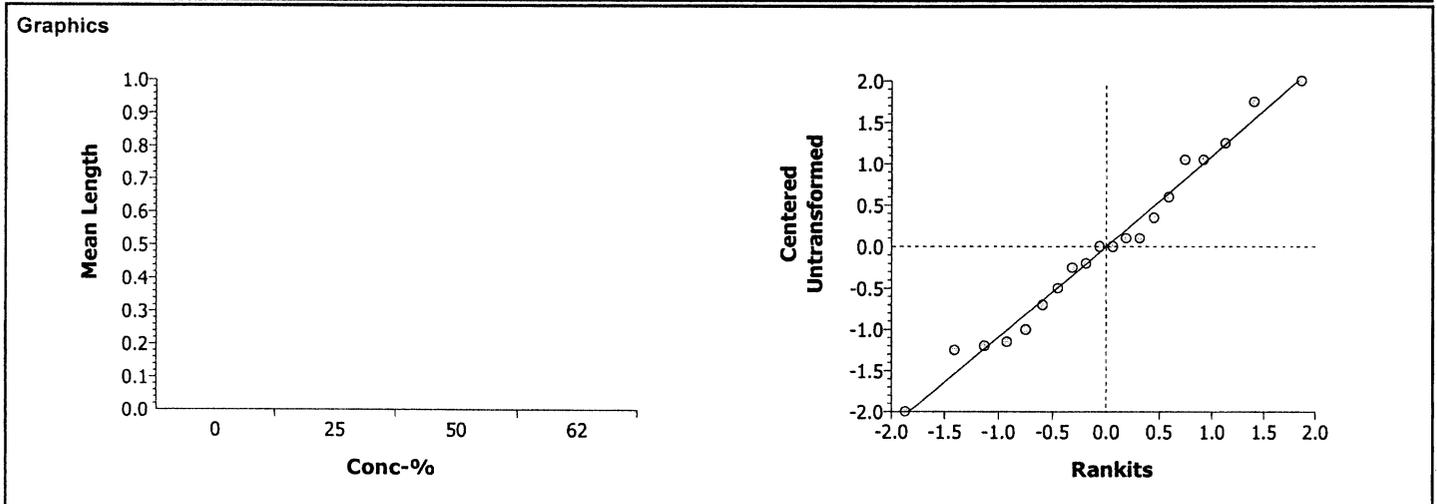
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	13.4	10 - N/A	Passes acceptability criteria
MSDp	0.12201	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	2.39554	11.34487	0.49446	Equal Variances
Distribution	Shapiro-Wilk W	0.97851	0.86826	0.89085	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	26.90937	8.969791	3	6.68	0.00393	Significant Effect
Error	21.5	1.34375	16			
Total	48.4093742	10.313541	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	-2.1824	2.23	> 0.0500	1.63491	Non-Significant Effect
		50	-3.8874	2.23	> 0.0500	1.63491	Non-Significant Effect
		62	-3.8192	2.23	> 0.0500	1.63491	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	13.4	12.25	14	0.6755				
25		5	15	13	16.75	1.5512				
50		5	16.25	15	18.25	1.2119				
62		5	16.2	15	17.25	1.0216				



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	07-8344-2370	07-8344-2370	13 Jan-05 11:55 AM	CETISv1.025

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	10.57%

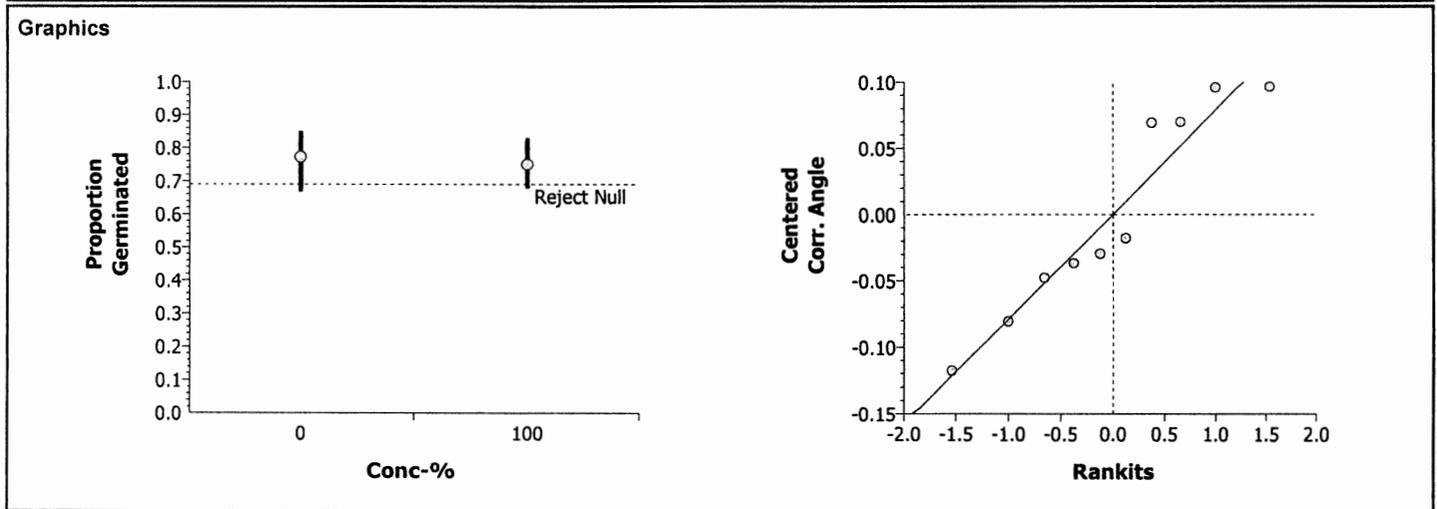
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.77200	0.7 - N/A	Passes acceptability criteria
MSDp	0.10568	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.20591	23.15450	0.86039	Equal Variances
Distribution	Shapiro-Wilk W	0.90440	0.78055	0.23593	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0017783	0.001778	1	0.27	0.61943	Non-Significant Effect
Error	0.053314	0.006664	8			
Total	0.05509233	0.0084426	9			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	0.51657	1.85955	0.3097	0.09601	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	0.77200	0.67000	0.85000	0.07155	1.07676	0.95886	1.17310	0.08536
100		5	0.75000	0.68000	0.83000	0.06595	1.05009	0.96953	1.14581	0.07773



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	07-8344-2370	07-8344-2370	13 Jan-05 11:56 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Unequal Variance t	C > T	Untransformed		<100	100		N/A	8.94%

Test Acceptability

Attribute	Statistic	Acceptable Range	Decision
Control Response	16.5	10 - N/A	Passes acceptability criteria
MSDp	0.0894	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	24.53333	23.15450	0.00896	Unequal Variances
Distribution	Shapiro-Wilk W	0.96794	0.78055	0.85353	Normal Distribution

ANOVA Table

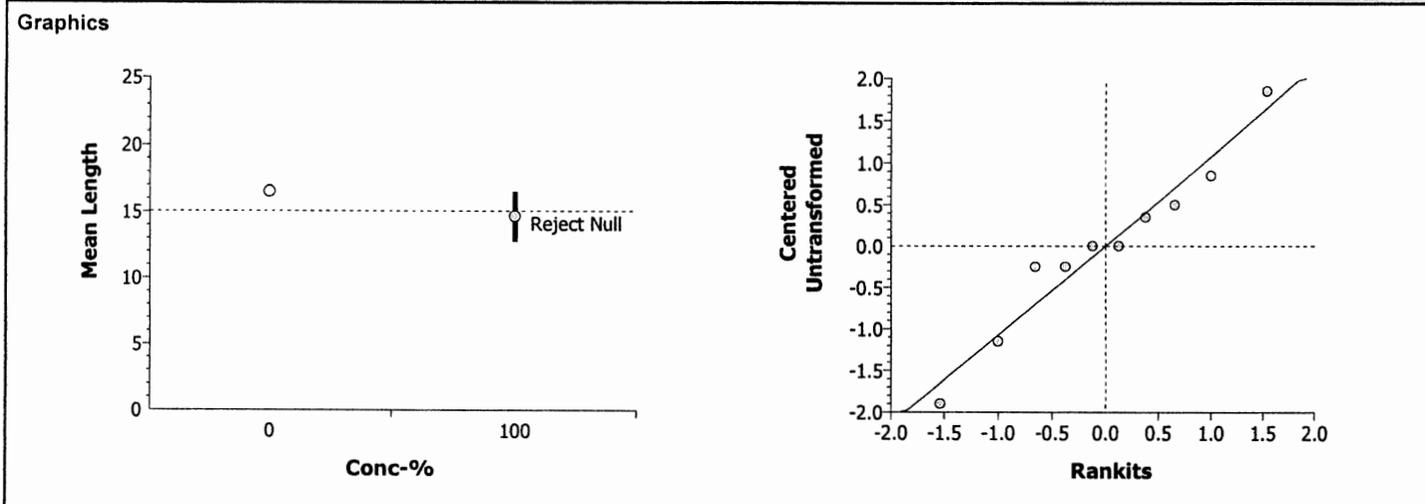
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	8.55625	8.55625	1	7.15	0.02820	Significant Effect
Error	9.575	1.196875	8			
Total	18.1312494	9.7531246	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	2.67373	2.13185	0.0278	1.47506	Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	16.5	16.25	17	0.3062				
100		5	14.65	12.75	16.5	1.5166				



Macrocystis Germination and Germ Tube Growth Test

Nautilus Environmental

AMEG Bioassay Laboratory - San Diego

Start Date: 29-Sep-04

Species: *Macrocystis pyrifera*

Test ID: 0409-098

End Date: 1-Oct-04

Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Sample Source: City of Buenaventura

Sampled: 28-Sep-04

Sample Station: B-1

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)	
71	100														
72	100	89	7	10	6	4	8	5	6	7	6	8	2.5	16.75	
73	100	71	8	4	4	5	4	8	5	6	5	2	2.5	12.75	
74	100	86	8	8	10	7	7	9	6	10	5	3	2.5	18.25	
75	100														
76	100	55	6	4	6	7	4	7	5	5	6	5	2.5	13.75	
77	100	82	7	8	5	6	5	8	5	4	7	8	2.5	15.75	
78	100														
79	100	72	5	6	6	7	5	7	8	6	7	5	2.5	15.5	
80	100														
81	100	68	8	6	6	5	7	6	6	8	7	7	2.5	16.5	
82	100	48	5	5	7	7	5	8	8	5	5	10	2.5	16.25	
83	100	82	7	5	7	4	6	6	7	6	3	5	2.5	14	
84	100														
85	100	83	7	6	6	9	4	8	6	7	6	6	2.5	16.25	
86	100	83	6	4	7	3	7	6	5	7	9	6	2.5	15	
87	100														
88	100	85	7	6	7	4	6	7	4	8	9	6	2.5	16	
89	100														
90	100	82	4	5	4	3	6	6	5	7	4	8	2.5	13	
91	100														
92	100														
93	100	86	7	9	7	5	5	7	6	6	5	7	2.5	16	
94	100	87	6	6	4	6	7	5	7	6	8	5	2.5	15	
95	100	81	6	5	6	5	3	5	4	8	3	4	2.5	12.25	
96	100	83	5	6	7	6	7	5	6	6	5	7	2.5	15	
97	100	81	6	5	4	4	7	7	6	5	6	4	2.5	13.5	
98	100	84	7	3	5	7	5	5	6	4	7	5	2.5	13.5	
99	100	85	6	7	3	6	6	7	6	5	8	6	2.5	15	
100	100	84	7	3	4	6	4	7	5	7	6	5	2.5	13.5	
101	100	87	7	5	6	7	7	8	6	5	4	7	2.5	15.5	
102	100	85	6	8	7	5	3	5	6	4	7	5	2.5	14	
103	100	81	7	6	8	5	5	8	8	8	9	5	2.5	17.25	
104	100	88	9	6	7	7	6	7	8	6	5	8	2.5	17.25	
105	100														

Analyst: *[Signature]*

QC Check: *[Signature]* 12/27/04

Final Review: *[Signature]* 1/18/05

Macrocyctis Germination and Germ Tube Growth Test

nautilus Environmental

AMEC Bioassay Laboratory - San Diego

Start Date: 29-Sep-04

Species: *Macrocyctis pyrifera*

Test ID: 0409-098

End Date: 01-Oct-04

Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Sample Source: City of Buenaventura

Sampled: 28-Sep-04

Sample Station: B-1

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)		
71	100	—														#DIV/0!
72	100	89	7	10	6	4	8	5	6	7	6	8	2.5 AH		#DIV/0!	
73	100	71	8	4	4	5	4	8	5	6	5	2			#DIV/0!	
74	100	86	8	8	10	7	7	9	6	10	5	3			#DIV/0!	
75	100	—	7												#DIV/0!	
76	100	55	6	4	6	7	4	7	5	5	6	5			#DIV/0!	
77	100	82	7	8	5	6	5	8	5	4	7	8			#DIV/0!	
78	100	—													#DIV/0!	
79	100	72	5	6	6	7	5	7	8	6	7	5			#DIV/0!	
80	100	—													#DIV/0!	
81	100	68	8	6	6	5	7	6	6	8	7	7			#DIV/0!	
82	100	48	5	5	7	7	5	8	8	5	5	10			#DIV/0!	
83	100	82	7	5	7	4	6	6	7	6	3	5	SC		#DIV/0!	
84	100	—													#DIV/0!	
85	100	83	7	6	6	9	4	8	6	7	6	6			#DIV/0!	
86	100	83	6	4	7	3	7	6	5	7	9	6			#DIV/0!	
87	100	—													#DIV/0!	
88	100	85	7	6	7	4	6	7	4	8	9	6			#DIV/0!	
89	100	—													#DIV/0!	
90	100	82	4	5	4	3	6	6	5	7	4	8			#DIV/0!	
91	100	—													#DIV/0!	
92	100	—													#DIV/0!	
93	100	86	7	9	7	5	5	7	6	6	5	7			#DIV/0!	
94	100	87	6	6	4	6	7	5	7	6	8	5			#DIV/0!	
95	100	81	6	5	6	5	3	5	4	8	3	4			#DIV/0!	
96	100	83	5	6	7	6	7	5	6	6	5	7			#DIV/0!	
97	100	81	6	5	4	4	7	7	6	5	6	4			#DIV/0!	
98	100	84	7	3	5	7	5	5	6	4	7	5			#DIV/0!	
99	100	85	6	7	3	6	6	7	6	5	8	6			#DIV/0!	
100	100	84	7	3	4	6	4	7	5	7	6	5			#DIV/0!	
101	100	87	7	5	6	7	7	8	6	6	4	7			#DIV/0!	
102	100	85	6	8	7	5	3	5	6	4	7	5			#DIV/0!	
103	100	81	7	6	8	5	5	8	8	8	9	5			#DIV/0!	
104	100	88	9	6	7	7	6	7	8	6	5	8			#DIV/0!	
105	100	—													#DIV/0!	

Lined out replicates are LC and SC. Share with A-2.

Analyst: AH, SC

QC Check: [Signature] 12/27/04

Final Review: [Signature] 12/27/04

CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 28 Sep-04 10:18 AM
 Link: 07-8344-2370/0409-098

Macrocyctis Germination and Germ Tube Growth Test Nautilus Environmental AMEC Bioassay-SD

Start Date: 29 Sep-04 Species: Macrocyctis pyriferia Sample Code: 0409-098
 End Date: 01 Oct-04 Protocol: EPA/600/R-95/136 (1995) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: B-1

Conc-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	B	1	98					
0	B	2	100					
0	B	3	95					
0	B	4	76					
0	B	5	102					
0	LC	1	105					
0	LC	2	78					
0	LC	3	80					
0	LC	4	84					
0	LC	5	91					
0	SC	1	71					
0	SC	2	75					
0	SC	3	87					
0	SC	4	92					
0	SC	5	89					
25		1	82					
25		2	90					
25		3	72					
25		4	83					
25		5	94					
50		1	85					
50		2	86					
50		3	77					
50		4	74					
50		5	93					
65		1	101					
65		2	104					
65		3	88					
65		4	99					
65		5	103					
100		1	73					
100		2	81					
100		3	79					
100		4	96					
100		5	97					

Share
LCI
and
SCI
WITH
A-2

Marine Chronic Bioassay

Water Quality Measurements

Client : City of Buenaventura

Test Species: Macrocystis pyrifera

Sample ID: B-1

Start Date/Time: 9/29/04 1 1400

Test No: 0409-098

End Date/Time: 10/01/04 1 1400

Analyst: RG

Test Type: Kelp Spore Germination and Growth

Concentration (____%)	Initial Readings				Final Readings			
	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature 15.0 14.3 (°C)	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)
Lab Control #2	8.6	8.01	32.1	15.0 14.3	7.3	8.03	32.7	14.6
Salt Control #1	8.7	7.97	32.0	15.0 14.3	7.3	8.12	32.3	14.6
Brine Control	7.9	7.97	32.0	15.0 14.3	7.1	8.00	32.2	14.6
25%	8.4	7.92	32.2	15.0 14.3	7.1	8.05	32.4	14.6
50%	8.5	7.87	32.3	15.0 14.3	7.1	8.20	32.4	14.6
62	8.7	7.84	32.5	15.0 14.3	7.1	8.21	32.9	14.6
100%	8.2	8.38	31.9	15.0 14.3	7.1	8.38	32.1	14.6

Comments: _____

QC Check: [Signature] 12/27/04

Final Review: _____

Brine Dilution Worksheet

Client: City of Buenaventura

Analyst: RG

Sample ID: B-1

Test Date: 09/29/2004

Test No: 0409-098

Test Type: Kelp Spore Germ. & Growth

Salinity of Effluent	1.7
Salinity of Brine	81.6
Target Salinity	32
Test Dilution Volume	250

Salinity Adjustment Factor: TS - SE
SB - TS

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.61

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
25	62.5	0.61	38.2	250
50	125.0	0.61	76.4	250
62	155	0.61	94.8	250

DI Volume

Brine Control	147	0.65	94.8	250
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Brine Control Salinity Adjustment Factor 304.2

Brine Control Calculation: TS - 0
SB - TS

Nautilus Environmental
~~AMEC Earth and Environmental, Inc.~~
San Diego Bioassay Laboratory
5550 Morehouse Drive, Suite B
San Diego, CA 92121

CETIS Test Summary

Report Date: 28 Dec-04 10:55 AM

Link: 11-8490-9839/0409-099

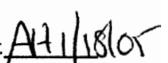
Macrocystis Germination and Germ Tube Growth Test							Nautilus Environmental (CA)	
Test No:	08-9135-4813	Test Type:	Growth-Germination	Duration:	48h			
Start Date:	29 Sep-04 02:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Species:	Macrocystis pyrifera			
Ending Date:	01 Oct-04 02:00 PM	Dil Water:	Laboratory Seawater	Source:	Field Collected			
Setup Date:	29 Sep-04 02:00 PM	Brine:	Frozen Seawater					
Comments:	100% sample salted with 40 Fathoms artificial salts.							
Sample No:	14-3193-4625	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 12:21 PM	Code:	0409-099	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	26h (17.2 °C)	Station:	B-3					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
05-3534-2890	Mean Length	100	> 100	N/A	11.16%	Equal Variance t		
06-9290-6254		84	> 84	N/A	13.93%	Dunnett's Multiple Comparison		
11-8848-3303	Proportion Germinated	100	> 100	N/A	10.81%	Equal Variance t		
08-6471-4743		84	> 84	N/A	8.91%	Dunnett's Multiple Comparison		
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
05-3534-2890	Mean Length	Control Response	14.8720	10 - N/A	Passes acceptability criteria			
06-9290-6254	Mean Length	Control Response	13.052	10 - N/A	Passes acceptability criteria			
08-6471-4743	Proportion Germinated	Control Response	0.75600	0.7 - N/A	Passes acceptability criteria			
11-8848-3303	Proportion Germinated	Control Response	0.73600	0.7 - N/A	Passes acceptability criteria			
05-3534-2890	Mean Length	MSDp	0.11158	N/A - 0.2	Passes acceptability criteria			
06-9290-6254	Mean Length	MSDp	0.13935	N/A - 0.2	Passes acceptability criteria			
08-6471-4743	Proportion Germinated	MSDp	0.08912	N/A - 0.2	Passes acceptability criteria			
11-8848-3303	Proportion Germinated	MSDp	0.10808	N/A - 0.2	Passes acceptability criteria			
Mean Length Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	13.052	12.220	15.600	0.639	1.4288	10.95%
0	Lab Control	5	13.936	13	15.86	0.5108	1.1422	8.20%
0	Salt Control	5	14.872	13	17.420	0.7139	1.5964	10.73%
25		5	12.688	10.920	13.78	0.5161	1.1540	9.10%
50		5	13.052	11.960	14.300	0.4061	0.9081	6.96%
84		5	15.236	14.04	17.940	0.7006	1.5665	10.28%
100		5	14.092	12.48	15.600	0.5354	1.1971	8.50%
Proportion Germinated Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.75600	0.67000	0.80000	0.02502	0.05595	7.40%
0	Lab Control	5	0.70200	0.66000	0.76000	0.01800	0.04025	5.73%
0	Salt Control	5	0.73600	0.62000	0.85000	0.03750	0.08385	11.39%
25		5	0.71600	0.65000	0.76000	0.02064	0.04615	6.45%
50		5	0.72200	0.66000	0.78000	0.02458	0.05495	7.61%
84		5	0.71400	0.68000	0.76000	0.01536	0.03435	4.81%
100		5	0.71600	0.65000	0.77000	0.02015	0.04506	6.29%

Report Date: 28 Dec-04 10:55 AM

Link: 11-8490-9839/0409-099

CETIS Test Summary

Mean Length Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	12.48	12.220	12.48	15.600	12.48
0	Lab Control	14.04	15.86	13.520	13	13.260
0	Salt Control	17.420	13	14.82	14.560	14.560
25		13	10.920	13.520	12.220	13.78
50		14.300	12.48	11.960	13	13.520
84		15.08	14.04	14.300	17.940	14.82
100		13.520	14.82	14.04	12.48	15.600
Proportion Germinated Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.73000	0.78000	0.67000	0.80000	0.80000
0	Lab Control	0.70000	0.66000	0.67000	0.76000	0.72000
0	Salt Control	0.72000	0.85000	0.72000	0.62000	0.77000
25		0.76000	0.71000	0.70000	0.76000	0.65000
50		0.66000	0.78000	0.69000	0.78000	0.70000
84		0.68000	0.72000	0.73000	0.76000	0.68000
100		0.77000	0.65000	0.70000	0.72000	0.74000



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	11-8490-9839	11-8490-9839	28 Dec-04 10:55 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	11.16%

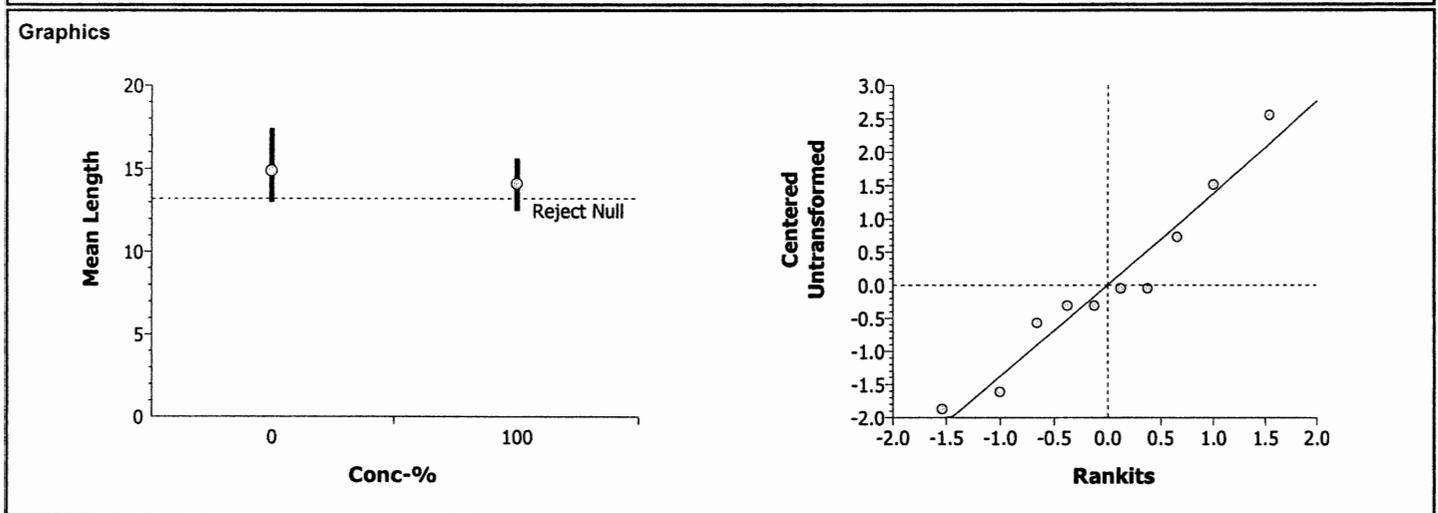
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	14.8720	10 - N/A	Passes acceptability criteria
MSDp	0.11158	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	1.77830	23.15450	0.59079	Equal Variances
Distribution	Shapiro-Wilk W	0.94717	0.78055	0.60463	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	1.521001	1.521001	1	0.76	0.40755	Non-Significant Effect
Error	15.92656	1.99082	8			
Total	17.4475619	3.5118207	9			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	0.87407	1.85955	0.2038	1.65941	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	14.872	13	17.42	1.5964				
100		5	14.092	12.48	15.6	1.1971				



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	11-8490-9839	11-8490-9839	28 Dec-04 10:55 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		84	>84	1.19	N/A	13.93%

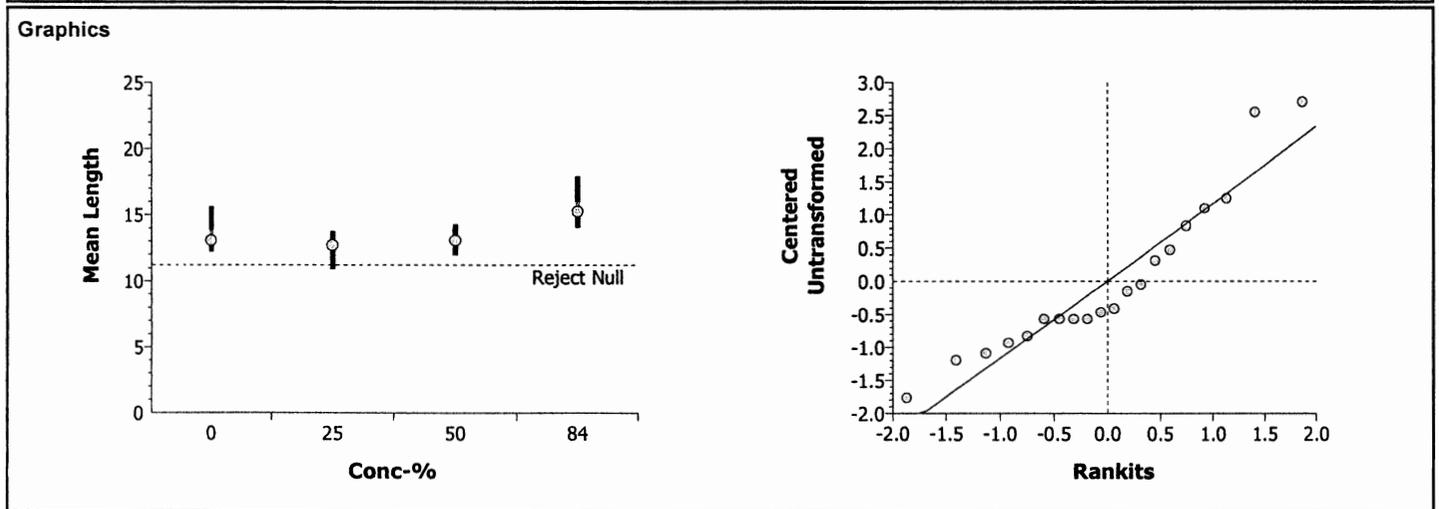
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	13.052	10 - N/A	Passes acceptability criteria
MSDp	0.13935	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.19283	11.34487	0.75472	Equal Variances
Distribution	Shapiro-Wilk W	0.90473	0.86826	0.05038	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	20.37126	6.79042	3	4.08	0.02487	Significant Effect
Error	26.60737	1.66296	16			
Total	46.9786263	8.4533805	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	0.44630	2.23	> 0.0500	1.81876	Non-Significant Effect
		50	-2E-07	2.23	> 0.0500	1.81876	Non-Significant Effect
		84	-2.6778	2.23	> 0.0500	1.81876	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	13.052	12.22	15.6	1.4288				
25		5	12.688	10.92	13.78	1.1540				
50		5	13.052	11.96	14.3	0.9081				
84		5	15.236	14.04	17.94	1.5665				



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test Nautilus Environmental (CA)

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	11-8490-9839	11-8490-9839	28 Dec-04 10:55 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		84	>84	1.19	N/A	8.91%

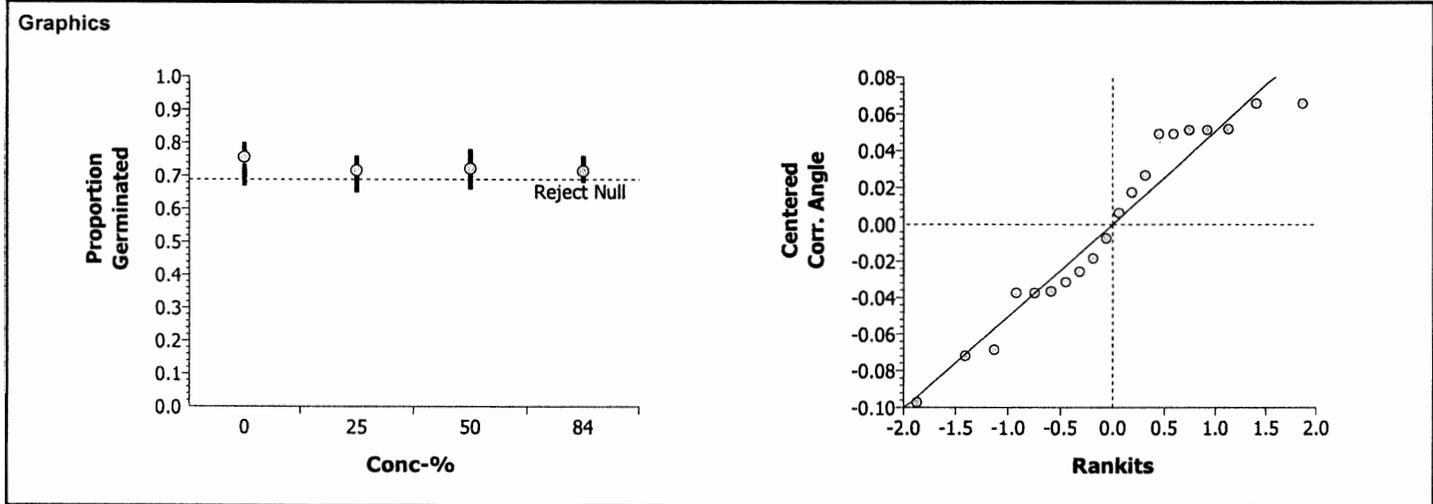
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.75600	0.7 - N/A	Passes acceptability criteria
MSDp	0.08912	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.09994	11.34487	0.77709	Equal Variances
Distribution	Shapiro-Wilk W	0.92508	0.86826	0.12421	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0077743	0.002591	3	0.86	0.47965	Non-Significant Effect
Error	0.0479588	0.002997	16			
Total	0.05573313	0.0055889	19			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	1.33698	2.23	> 0.0500	0.07722	Non-Significant Effect
		50	1.12772	2.23	> 0.0500	0.07722	Non-Significant Effect
		84	1.41315	2.23	> 0.0500	0.07722	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	0.75600	0.67000	0.80000	0.05595	1.05603	0.95886	1.10715	0.06398
25		5	0.71600	0.65000	0.76000	0.04615	1.00973	0.93774	1.05882	0.05100
50		5	0.72200	0.66000	0.78000	0.05495	1.01698	0.94826	1.08259	0.06194
84		5	0.71400	0.68000	0.76000	0.03435	1.00710	0.96953	1.05882	0.03819



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	11-8490-9839	11-8490-9839	28 Dec-04 10:55 AM	CETISv1.025

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	10.81%

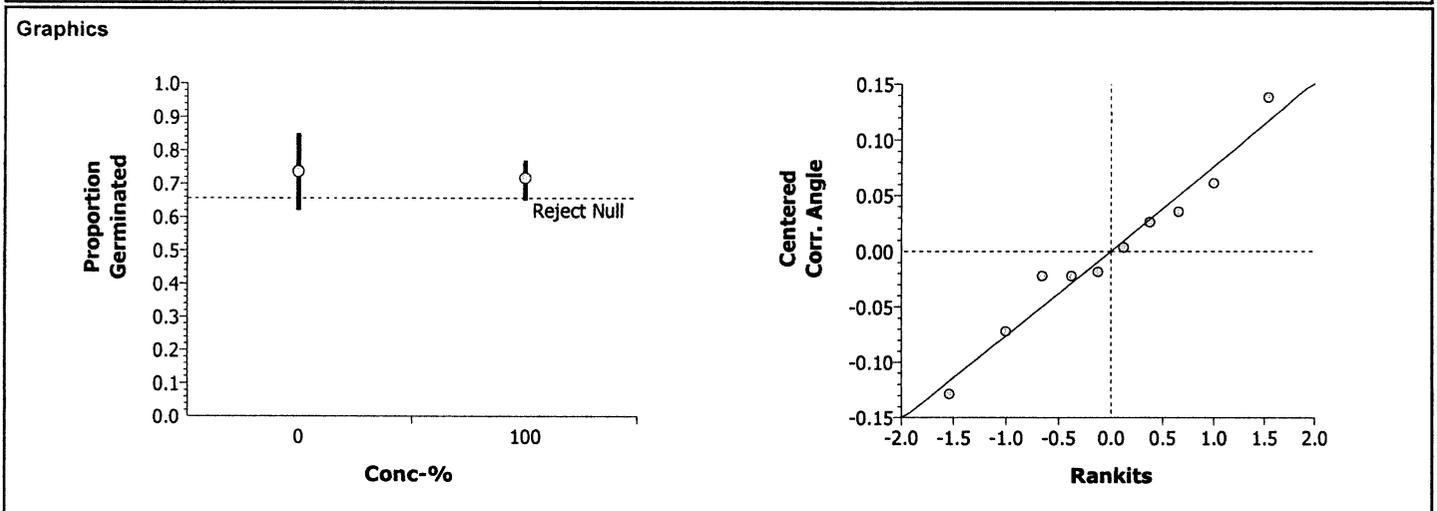
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.73600	0.7 - N/A	Passes acceptability criteria
MSDp	0.10808	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	3.80784	23.15450	0.22358	Equal Variances
Distribution	Shapiro-Wilk W	0.97581	0.78055	0.93125	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0016448	0.001645	1	0.28	0.61368	Non-Significant Effect
Error	0.0477027	0.005963	8			
Total	0.04934749	0.0076076	9			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	0.52520	1.85955	0.3068	0.09082	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	0.73600	0.62000	0.85000	0.08385	1.03534	0.90658	1.17310	0.09719
100		5	0.71600	0.65000	0.77000	0.04506	1.00969	0.93774	1.07062	0.04980



Macrocystis Germination and Germ Tube Growth Test

Nautilus Environmental

AMEG Bioassay Laboratory - San Diego

Start Date: 29-Sep-04

Species: *Macrocystis pyrifera*

Test ID: 0409-099

End Date: 1-Oct-04

Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Sample Source: City of Buenaventura

Sampled: 28-Sep-04

Sample Station: B-3

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)											Calibration Factor	Mean Tube Length (µm)
106	100	71	4	5	3	5	4	3	7	4	4	3	2.6	10.92	
107	100	68	6	7	7	8	5	6	5	4	5	5	2.6	15.08	
108	100	70	3	4	4	6	3	4	9	7	7	7	2.6	14.04	
109	100	77	4	5	5	6	7	5	7	6	5	6	2.6	14.56	
110	100	73	6	4	7	4	5	5	9	6	5	4	2.6	14.3	
111	100	72	5	6	5	7	8	9	6	8	7	6	2.6	17.42	
112	100	66	5	6	8	6	6	7	7	5	5	6	2.6	15.86	
113	100	65	6	5	5	7	8	6	6	5	4	5	2.6	14.82	
114	100	69	6	5	5	5	3	3	6	5	3	5	2.6	11.96	
115	100	78	4	6	5	5	4	5	4	6	5	4	2.6	12.48	
116	100	67	5	6	7	4	3	5	5	7	5	5	2.6	13.52	
117	100	72	5	5	6	4	5	5	4	3	5	6	2.6	12.48	
118	100	65	5	5	5	5	4	5	6	5	6	7	2.6	13.78	
119	100	80	7	6	5	5	6	5	6	5	7	8	2.6	15.6	
120	100	74	8	6	5	7	6	5	5	7	6	5	2.6	15.6	
121	100	73	5	5	5	4	5	5	6	3	5	5	2.6	12.48	
122	100	80	6	4	5	6	5	6	5	4	4	3	2.6	12.48	
123	100	76	5	6	5	5	4	4	5	5	3	5	2.6	12.22	
124	100	76	3	4	4	5	6	6	5	6	6	5	2.6	13	
125	100	76	5	4	5	6	4	5	4	5	6	6	2.6	13	
126	100	85	4	4	5	6	5	4	5	6	6	5	2.6	13	
127	100	62	9	5	4	6	7	6	5	4	5	5	2.6	14.56	
128	100	77	6	5	5	6	5	6	4	4	5	6	2.6	13.52	
129	100	78	4	4	5	5	6	5	6	5	5	5	2.6	13	
130	100	72	6	5	5	4	5	5	4	6	5	6	2.6	13.26	
131	100	78	6	6	5	4	5	3	5	4	4	5	2.6	12.22	
132	100	76	7	8	9	6	5	8	8	7	6	5	2.6	17.94	
133	100	72	7	7	6	5	5	4	7	6	5	5	2.6	14.82	
134	100	70	6	6	5	4	4	7	6	5	7	4	2.6	14.04	
135	100	70	5	5	6	5	6	4	6	5	5	5	2.6	13.52	
136	100	67	5	4	4	5	8	5	6	3	3	5	2.6	12.48	
137	100	68	5	6	5	5	7	6	5	4	6	8	2.6	14.82	
138	100	70	5	4	5	4	5	5	6	5	7	6	2.6	13.52	
139	100	72	6	7	8	6	5	5	5	3	4	5	2.6	14.04	
140	100	66	4	4	7	6	7	5	7	5	5	5	2.6	14.3	

Analyst: *[Signature]*

QC Check: *[Signature]* 12/27/04

Final Review: *[Signature]* 1/18/05

Macrocyctis Germination and Germ Tube Growth Test

Nautilus Environmental

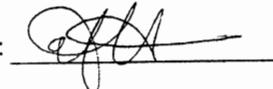
AMEC Bioassay Laboratory - San Diego

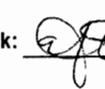
Start Date: 29-Sep-04
End Date: 01-Oct-04
Sampled: 28-Sep-04

Species: *Macrocyctis pyrifera*
Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Test ID: 0409-099
Sample Source: City of Buenaventura
Sample Station: B-3

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
106	100	11	4	5	3	5	4	3	7	4	4	3	2.6	#DIV/0!
107	100	108	6	7	7	8	5	6	5	4	5	5		#DIV/0!
108	100	70	3	4	4	6	3	4	9	7	7	7		#DIV/0!
109	100	77	4	5	5	6	7	5	7	6	5	6		#DIV/0!
110	100	13	6	4	7	4	5	5	9	6	5	4		#DIV/0!
111	100	72	5	6	5	7	8	9	6	8	7	6		#DIV/0!
112	100	65	6	5	5	7	8	6	6	5	4	5		#DIV/0!
113	100	66	5	6	8	6	6	1	7	5	5	6		#DIV/0!
114	100	69	6	5	5	5	3	3	6	5	3	5		#DIV/0!
115	100	78	4	6	5	5	4	5	4	6	5	4		#DIV/0!
116	100	67	5	6	5	4	3	5	5	7	5	5		#DIV/0!
117	100	72	5	5	6	4	5	5	4	3	5	6		#DIV/0!
118	100	65	5	5	5	5	4	5	6	5	6	7		#DIV/0!
119	100	80	7	6	5	5	6	5	6	5	7	8		#DIV/0!
120	100	74	4	6	5	4	6	5	5	1	6	5		#DIV/0!
121	100	13	5	5	5	4	5	5	6	3	5	5		#DIV/0!
122	100	80	6	4	5	6	5	6	5	4	4	5		#DIV/0!
123	100	70	5	6	5	5	4	4	5	5	3	5		#DIV/0!
124	100	76	3	4	4	5	6	6	5	6	6	5		#DIV/0!
125	100	76	5	4	5	6	4	5	4	5	6	6		#DIV/0!
126	100	85	4	4	5	6	5	4	5	6	6	5		#DIV/0!
127	100	62	9	5	4	6	7	6	5	4	5	5		#DIV/0!
128	100	77	6	5	5	6	5	6	4	4	5	6		#DIV/0!
129	100	78	4	4	5	4	6	5	6	5	5	5		#DIV/0!
130	100	72	6	5	5	4	5	5	4	6	5	6		#DIV/0!
131	100	78	6	5	5	4	5	3	5	4	4	5		#DIV/0!
132	100	76	7	8	4	6	5	8	8	7	6	5		#DIV/0!
133	100	72	7	7	6	5	5	4	7	6	5	5		#DIV/0!
134	100	70	6	6	5	4	4	7	6	5	7	4		#DIV/0!
135	100	70	5	5	6	5	5	4	6	5	5	5		#DIV/0!
136	100	67	5	4	4	5	5	5	6	3	3	5		#DIV/0!
137	100	68	5	6	5	5	7	6	5	4	6	8		#DIV/0!
138	100	70	5	4	5	4	5	5	6	5	7	6		#DIV/0!
139	100	72	6	7	5	6	5	5	5	3	4	5		#DIV/0!
140	100	66	4	4	7	6	7	5	7	5	5	5		#DIV/0!

Analyst: 

QC Check:  10/27/04

Final Review:  10/27/04

CETIS Worksheet

Macrocyctis Germination and Germ Tube Growth Test Nautilus Environmental ~~AMEC Bioassay SD~~

Start Date: 29 Sep-04 Species: Macrocyctis pyriferia Sample Code: 0409-099
 End Date: 01 Oct-04 Protocol: EPA/600/R-95/136 (1995) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: B-3

Conc-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	B	1	121					
0	B	2	131					
0	B	3	136					
0	B	4	119					
0	B	5	122					
0	LC2	1	108					
0	LC2	2	112					
0	LC2	3	116					
0	LC2	4	125					
0	LC2	5	130					
0	SC2	1	111					
0	SC2	2	126					
0	SC2	3	133					
0	SC2	4	127					
0	SC2	5	109					
25		1	124					
25		2	106					
25		3	135					
25		4	123					
25		5	118					
50		1	140					
50		2	115					
50		3	114					
50		4	129					
50		5	138					
65		1	107					
65		2	139					
65		3	110					
65		4	132					
65		5	137					
100		1	128					
100		2	113					
100		3	134					
100		4	117					
100		5	120					

84 AH

Marine Chronic Bioassay

Water Quality Measurements

Client : City of Buenaventura

Test Species: Macrocystis pyrifera

Sample ID: B-3

Start Date/Time: 9/29/04 1 1400

Test No: 0409-099

End Date/Time: 10/01/04 1 1400

Analyst: RG

Test Type: Kelp Spore Germination and Growth

Concentration (_____%)	Initial Readings				Final Readings			
	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)
Lab Control #2	8.4	8.01	32.1	14.3	7.3	8.03	32.7	14.6
Salt Control #1	8.7	7.97	32.0	14.3	7.3	8.12	32.3	14.6
Brine Control	8.3	8.00	32.1	14.3	7.3	7.99	32.5	14.6
25%	8.7	8.01	32.1	14.3	7.3	8.05	32.4	14.6
50%	8.6	8.02	32.2	14.3	7.2	8.14	32.4	14.6
84	8.7	8.06	31.9	14.3	7.2	8.21	32.0	14.6
100%	7.4	8.31	32.1	14.3	7.1	8.25	32.7	14.6

Comments: _____

QC Check: [Signature] 12/27/04

Final Review: [Signature] 12/27/04

Brine Dilution Worksheet

Client: City of Buenaventura

Analyst: RG

Sample ID: B-3

Test Date: 09/29/2004

Test No: 0409-099

Test Type: Kelp Spore Germ. & Growth

Salinity of Effluent	22.8
Salinity of Brine	81.6
Target Salinity	32
Test Dilution Volume	250

Salinity Adjustment Factor:	$\frac{TS - SE}{SB - TS}$
-----------------------------	---------------------------

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.19

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
25	62.5	0.19	11.6	250
50	125.0	0.19	23.2	250
84	211	0.19	39.1	250

DI Volume

Brine Control	61	0.65	39.1	250
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Brine Control Salinity Adjustment Factor 113.0

Brine Control Calculation:

$$\frac{TS - 0}{SB - TS}$$

Nautilus Environmental
AMEC Earth and Environmental, Inc.
 San Diego Bioassay Laboratory
 5550 Morehouse Drive, Suite B
 San Diego, CA 92121

CETIS Test Summary

Macrocystis Germination and Germ Tube Growth Test						Nautilus Environmental (CA)			
Test No:	08-9135-4813	Test Type:	Growth-Germination	Duration:	48h	Species:	Macrocystis pyrifera	Source:	Field Collected
Start Date:	29 Sep-04 02:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Dil Water:	Laboratory Seawater	Brine:	Frozen Seawater		
Ending Date:	01 Oct-04 02:00 PM								
Setup Date:	29 Sep-04 02:00 PM								
Comments:	100% sample salted with 40 Fathoms artificial salts.								
Sample No:	06-2497-0299	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura	Project:			
Sample Date:	28 Sep-04 03:30 PM	Code:	0409-100						
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura						
Sample Age:	22h (20.6 °C)	Station:	C-3						
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method			
11-0383-2999	Mean Length	100	> 100	N/A	14.19%	Dunnett's Multiple Comparison			
02-9817-5845	Proportion Germinated	100	> 100	N/A	11.41%	Dunnett's Multiple Comparison			
Test Acceptability									
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision				
11-0383-2999	Mean Length	Control Response	14.55	10 - N/A	Passes acceptability criteria				
02-9817-5845	Proportion Germinated	Control Response	0.71800	0.7 - N/A	Passes acceptability criteria				
11-0383-2999	Mean Length	MSDp	0.14192	N/A - 0.2	Passes acceptability criteria				
02-9817-5845	Proportion Germinated	MSDp	0.11414	N/A - 0.2	Passes acceptability criteria				
Mean Length Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Brine Control	5	14.55	13	16.25	0.5208	1.1646	8.00%	
25		5	17.45	14.25	19	0.9233	2.0646	11.83%	
50		5	17.15	16.25	18	0.3588	0.8023	4.68%	
63		5	18.5	15.75	20	0.7624	1.7048	9.21%	
100		5	17.25	16.25	18.75	0.4257	0.952	5.52%	
Proportion Germinated Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Brine Control	5	0.71800	0.65000	0.80000	0.03382	0.07563	10.53%	
25		5	0.65000	0.61000	0.70000	0.01517	0.03391	5.22%	
50		5	0.68400	0.59000	0.78000	0.03265	0.07301	10.67%	
63		5	0.72000	0.69000	0.76000	0.01483	0.03317	4.61%	
100		5	0.77200	0.70000	0.82000	0.02131	0.04764	6.17%	
Mean Length Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5			
0	Brine Control	14.5	16.25	13	14.75	14.25			
25		16.5	18.5	14.25	19	19			
50		16.75	16.75	16.25	18	18			
63		19.25	19.5	15.75	20	18			
100		17	16.75	17.5	16.25	18.75			
Proportion Germinated Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5			
0	Brine Control	0.80000	0.80000	0.68000	0.66000	0.65000			
25		0.61000	0.70000	0.63000	0.66000	0.65000			
50		0.69000	0.64000	0.72000	0.59000	0.78000			
63		0.76000	0.69000	0.75000	0.69000	0.71000			
100		0.70000	0.82000	0.76000	0.77000	0.81000			



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	12-9767-7869	12-9767-7869	28 Dec-04 11:02 AM	CETISv1.025

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	11.41%

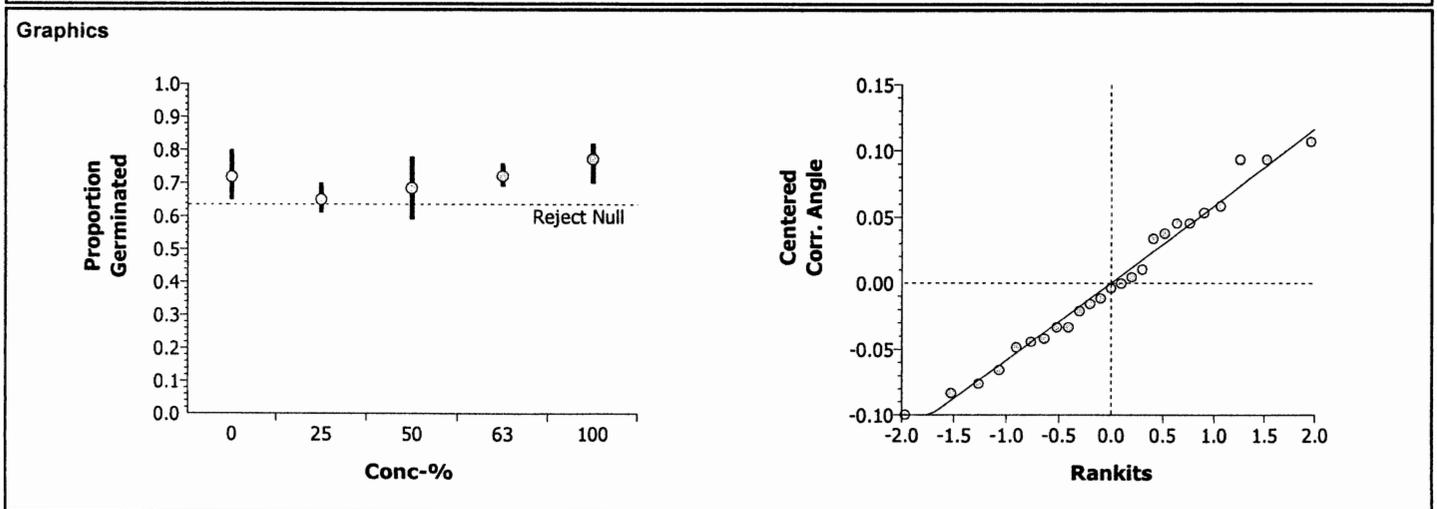
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.71800	0.7 - N/A	Passes acceptability criteria
MSDp	0.11414	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	4.52270	13.27671	0.33986	Equal Variances
Distribution	Shapiro-Wilk W	0.97196	0.88746	0.69144	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0515724	0.012893	4	3.31	0.03098	Significant Effect
Error	0.0779001	0.003895	20			
Total	0.12947243	0.0167881	24			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	1.92269	2.3	> 0.0500	0.09078	Non-Significant Effect
		50	0.96558	2.3	> 0.0500	0.09078	Non-Significant Effect
		63	0.00559	2.3	> 0.0500	0.09078	Non-Significant Effect
		100	-1.5362	2.3	> 0.0500	0.09078	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	0.71800	0.65000	0.80000	0.07563	1.01397	0.93774	1.10715	0.08583
25		5	0.65000	0.61000	0.70000	0.03391	0.93808	0.89631	0.99116	0.03576
50		5	0.68400	0.59000	0.78000	0.07301	0.97585	0.87589	1.08259	0.07931
63		5	0.72000	0.69000	0.76000	0.03317	1.01375	0.98030	1.05882	0.03716
100		5	0.77200	0.70000	0.82000	0.04764	1.07460	0.99116	1.13265	0.05621



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	12-9767-7869	11-8490-9839	28 Dec-04 11:03 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Equal Variance t	C > T	Untransformed		100	>100	1.00	N/A	10.39%

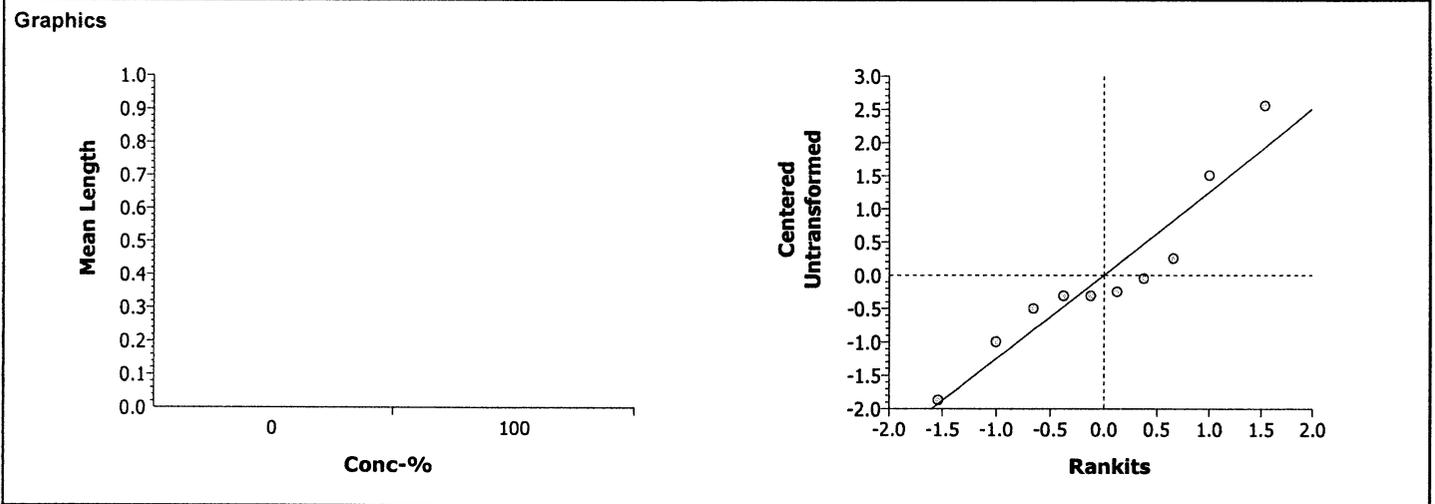
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	14.8720	10 - N/A	Passes acceptability criteria
MSDp	0.10394	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.81216	23.15450	0.34066	Equal Variances
Distribution	Shapiro-Wilk W	0.91415	0.78055	0.29641	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	14.13721	14.13721	1	8.18	0.02113	Significant Effect
Error	13.81908	1.727385	8			
Total	27.9562893	15.864594	9			

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-2.8608	1.85955	0.9894	1.54572	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	14.872	13	17.42	1.5964				
100		5	17.25	16.25	18.75	0.952				



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Comparison	12-9767-7869	11-8490-9839	28 Dec-04 11:03 AM	CETISv1.025

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%

Test Acceptability

Attribute	Statistic	Acceptable Range	Decision
Control Response	0.73600	0.7 - N/A	Passes acceptability criteria
MSDp	0.11138	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Variance Ratio	2.98962	23.15450	0.31396	Equal Variances
Distribution	Shapiro-Wilk W	0.97247	0.78055	0.90090	Normal Distribution

ANOVA Table

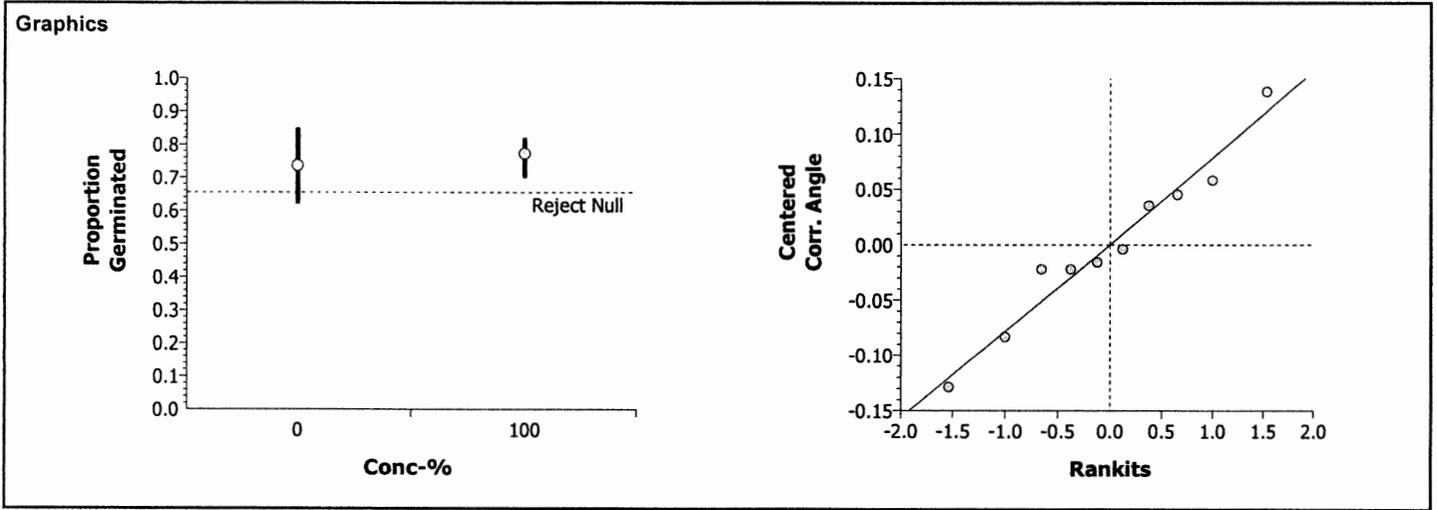
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.0038543	0.003854	1	0.61	0.45672	Non-Significant Effect
Error	0.0504182	0.006302	8			
Total	0.0542725	0.0101566	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		100	-0.7820	1.85955	0.7716	0.09337	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.73600	0.62000	0.85000	0.08385	1.03534	0.90658	1.17310	0.09719
100		5	0.77200	0.70000	0.82000	0.04764	1.07460	0.99116	1.13265	0.05621



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Comparison	12-9767-7869	12-9767-7869	28 Dec-04 11:02 AM	CETISv1.025

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	14.19%

Test Acceptability

Attribute	Statistic	Acceptable Range	Decision
Control Response	14.55	10 - N/A	Passes acceptability criteria
MSDp	0.14192	N/A - 0.2	Passes acceptability criteria

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	4.43832	13.27671	0.34992	Equal Variances
Distribution	Shapiro-Wilk W	0.92631	0.88746	0.07666	Normal Distribution

ANOVA Table

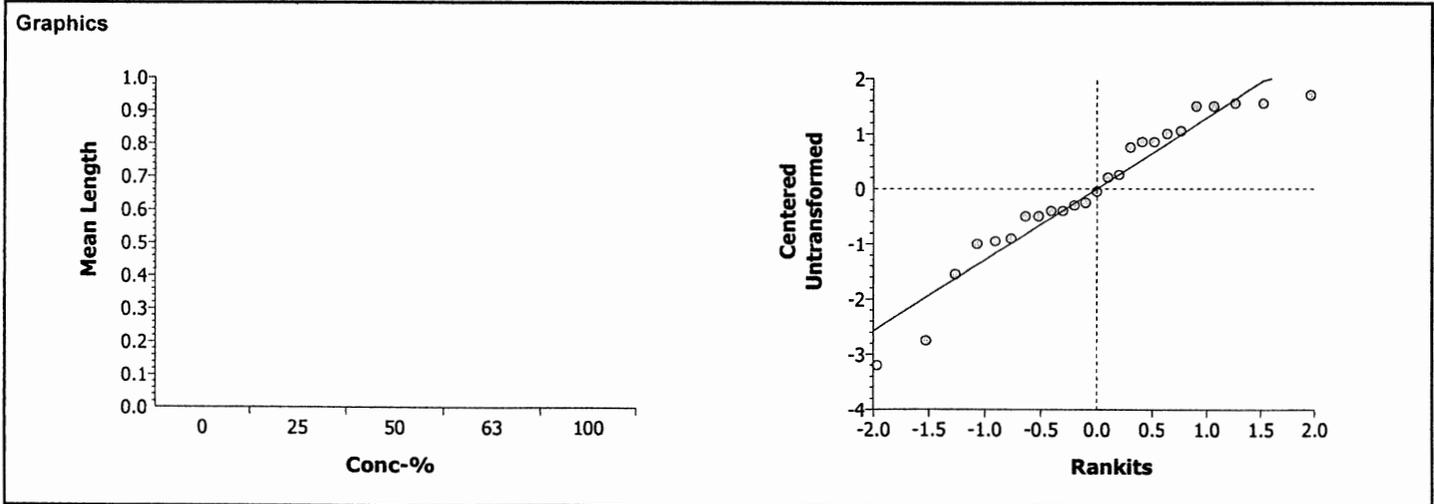
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	42.69	10.6725	4	5.30	0.00448	Significant Effect
Error	40.3	2.015	20			
Total	82.989979	12.6875	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P Level	MSD	Decision(0.05)
Brine Control		25	-3.2302	2.3	> 0.0500	2.06488	Non-Significant Effect
		50	-2.8960	2.3	> 0.0500	2.06488	Non-Significant Effect
		63	-4.3998	2.3	> 0.0500	2.06488	Non-Significant Effect
		100	-3.0074	2.3	> 0.0500	2.06488	Non-Significant Effect

Data Summary

Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Brine Control	5	14.55	13	16.25	1.1646				
25		5	17.45	14.25	19	2.0646				
50		5	17.15	16.25	18	0.8023				
63		5	18.5	15.75	20	1.7048				
100		5	17.25	16.25	18.75	0.952				



CETIS Test Summary

Report Date: 28 Dec-04 11:05 AM

Link: 12-9767-7869/0409-100

Macrocystis Germination and Germ Tube Growth Test				Nautilus Environmental (CA)				
Test No:	08-9135-4813	Test Type:	Growth-Germination	Duration:	48h			
Start Date:	29 Sep-04 02:00 PM	Protocol:	EPA/600/R-95/136 (1995)	Species:	Macrocystis pyrifera			
Ending Date:	01 Oct-04 02:00 PM	Dil Water:	Laboratory Seawater	Source:	Field Collected			
Setup Date:	29 Sep-04 02:00 PM	Brine:	Frozen Seawater					
Comments:	100% sample salted with 40 Fathoms artificial salts.							
Sample No:	06-2497-0299	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 03:30 PM	Code:	0409-100	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	22h (20.6 °C)	Station:	C-3					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
04-2574-4596	Mean Length	100	> 100	N/A	10.39%	Equal Variance t		
08-0364-2011	Proportion Germinated	100	> 100	N/A	11.14%	Equal Variance t		
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
04-2574-4596	Mean Length	Control Response	14.8720	10 - N/A	Passes acceptability criteria			
08-0364-2011	Proportion Germinated	Control Response	0.73600	0.7 - N/A	Passes acceptability criteria			
04-2574-4596	Mean Length	MSDp	0.10394	N/A - 0.2	Passes acceptability criteria			
08-0364-2011	Proportion Germinated	MSDp	0.11138	N/A - 0.2	Passes acceptability criteria			
Mean Length Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	13.052	12.220	15.600	0.639	1.4288	10.95%
0	Lab Control	5	13.936	13	15.86	0.5108	1.1422	8.20%
0	Salt Control	5	14.872	13	17.420	0.7139	1.5964	10.73%
25		5	17.45	14.25	19	0.9233	2.0646	11.83%
50		5	17.15	16.25	18	0.3588	0.8023	4.68%
63		5	18.5	15.75	20	0.7624	1.7048	9.21%
100		5	17.25	16.25	18.75	0.4257	0.952	5.52%
Proportion Germinated Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Brine Control	5	0.75600	0.67000	0.80000	0.02502	0.05595	7.40%
0	Lab Control	5	0.70200	0.66000	0.76000	0.01800	0.04025	5.73%
0	Salt Control	5	0.73600	0.62000	0.85000	0.03750	0.08385	11.39%
25		5	0.65000	0.61000	0.70000	0.01517	0.03391	5.22%
50		5	0.68400	0.59000	0.78000	0.03265	0.07301	10.67%
63		5	0.72000	0.69000	0.76000	0.01483	0.03317	4.61%
100		5	0.77200	0.70000	0.82000	0.02131	0.04764	6.17%

See p.1 of summary for brine control data.

CETIS Test Summary

Mean Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	12.48	12.220	12.48	15.600	12.48
0	Lab Control	14.04	15.86	13.520	13	13.260
0	Salt Control	17.420	13	14.82	14.560	14.560
25		16.5	18.5	14.25	19	19
50		16.75	16.75	16.25	18	18
63		19.25	19.5	15.75	20	18
100		17	16.75	17.5	16.25	18.75

Proportion Germinated Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Brine Control	0.73000	0.78000	0.67000	0.80000	0.80000
0	Lab Control	0.70000	0.66000	0.67000	0.76000	0.72000
0	Salt Control	0.72000	0.85000	0.72000	0.62000	0.77000
25		0.61000	0.70000	0.63000	0.66000	0.65000
50		0.69000	0.64000	0.72000	0.59000	0.78000
63		0.76000	0.69000	0.75000	0.69000	0.71000
100		0.70000	0.82000	0.76000	0.77000	0.81000

See p 1 of Summary for brine control data.

Macrocystis Germination and Germ Tube Growth Test

Nautilus Environmental

-AMEG Bioassay Laboratory - San Diego

Start Date: 29-Sep-04

Species: *Macrocystis pyrifera*

Test ID: 0409-100

End Date: 1-Oct-04

Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Sample Source: City of Buenaventura

Sampled: 28-Sep-04

Sample Station: C-3

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)	
141	100														
142	100	72	7	6	7	7	7	6	6	5	7	7	2.5	16.25	
143	100														
144	100	66	5	6	6	5	7	7	7	5	4	7	2.5	14.75	
145	100	71	8	5	8	10	8	6	7	7	7	6	2.5	18	
146	100														
147	100	82	7	6	7	7	7	7	7	6	6	7	2.5	16.75	
148	100	69	8	5	9	7	9	8	8	8	8	8	2.5	19.5	
149	100	80	4	8	7	7	5	7	7	7	6	7	2.5	16.25	
150	100	66	9	7	7	6	7	8	8	5	9	10	2.5	19	
151	100														
152	100	78	7	6	7	8	9	10	5	4	8	8	2.5	18	
153	100	75	5	5	5	7	8	7	9	5	5	7	2.5	15.75	
154	100	69	8	5	7	7	7	6	7	8	5	7	2.5	16.75	
155	100	76	9	7	7	7	8	9	8	8	6	8	2.5	19.25	
156	100	77	6	6	6	6	7	7	6	7	8	6	2.5	16.25	
157	100	68	6	7	4	6	4	4	5	5	4	7	2.5	13	
158	100														
159	100	65	7	5	5	5	5	8	6	6	4	6	2.5	14.25	
160	100	70	5	8	7	7	6	7	7	7	7	7	2.5	17	
161	100														
162	100	70	7	10	7	8	5	8	8	8	6	7	2.5	18.5	
163	100	65	7	6	7	7	8	10	10	7	6	8	2.5	19	
164	100	63	4	7	5	5	4	7	8	6	6	5	2.5	14.25	
165	100														
166	100	69	7	9	8	8	8	8	9	8	7	8	2.5	20	
167	100	64	5	7	7	8	6	5	7	8	7	7	2.5	16.75	
168	100	80	6	5	6	7	6	6	4	6	6	6	2.5	14.5	
169	100														
170	100	81	8	6	6	6	7	8	8	9	9	8	2.5	18.75	
171	100														
172	100	61	8	5	8	7	7	7	5	7	6	6	2.5	16.5	
173	100	59	6	9	6	8	6	7	7	7	9	7	2.5	18	
174	100														
175	100	76	7	7	6	8	8	7	6	7	6	8	2.5	17.5	

Analyst: *GH*

QC Check: *GH 12/27/04*

Final Review: *AH 1/18/05*

Macrocyctis Germination and Germ Tube Growth Test

Nautilus Environmental

AMEC Bioassay Laboratory - San Diego

Start Date: 29-Sep-04
End Date: 01-Oct-04
Sampled: 28-Sep-04

Species: *Macrocyctis pyrifera*
Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Test ID: 0409-100
Sample Source: City of Buenaventura
Sample Station: ^{off} ~~B-2~~ C-3

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)	
141	100	—												2.5	#DIV/0!
142	100	72	7	6	7	7	7	6	6	5	7	7			#DIV/0!
143	100	—													#DIV/0!
144	100	66	5	6	6	5	7	7	7	5	4	7			#DIV/0!
145	100	71	8	5	8	10	8	6	7	7	7	6			#DIV/0!
146	100	—													#DIV/0!
147	100	82	7	6	7	7	7	7	7	6	6	7			#DIV/0!
148	100	69	8	5	9	7	9	8	8	8	8	8			#DIV/0!
149	100	80	4	8	7	7	5	7	7	7	6	7			#DIV/0!
150	100	66	9	7	7	6	7	8	8	5	9	10			#DIV/0!
151	100	—													#DIV/0!
152	100	78	7	6	7	8	9	10	5	5	8	8			#DIV/0!
153	100	75	5	5	5	7	8	7	9	5	5	7			#DIV/0!
154	100	69	8	5	7	7	7	6	7	8	5	7			#DIV/0!
155	100	76	9	7	7	7	8	9	8	8	6	8			#DIV/0!
156	100	77	6	6	6	6	7	7	6	7	8	6			#DIV/0!
157	100	68	6	7	4	6	4	4	5	5	4	7			#DIV/0!
158	100	—													#DIV/0!
159	100	65	7	5	5	5	5	8	6	6	4	6			#DIV/0!
160	100	70	5	8	7	7	6	7	7	7	7	7			#DIV/0!
161	100	—													#DIV/0!
162	100	70	7	10	7	8	5	8	8	8	6	7			#DIV/0!
163	100	65	7	6	7	7	8	10	10	7	6	8			#DIV/0!
164	100	63	4	7	5	5	4	7	8	6	6	5			#DIV/0!
165	100	—													#DIV/0!
166	100	69	7	9	8	8	8	8	9	8	7	8			#DIV/0!
167	100	64	5	7	7	8	6	5	7	8	7	7			#DIV/0!
168	100	80	6	5	6	7	6	6	4	6	6	6			#DIV/0!
169	100	—													#DIV/0!
170	100	81	8	6	6	6	7	8	8	9	9	8			#DIV/0!
171	100	—													#DIV/0!
172	100	61	8	5	8	7	7	7	5	7	6	6			#DIV/0!
173	100	59	6	9	6	8	6	7	7	7	9	7			#DIV/0!
174	100	—													#DIV/0!
175	100	76	7	7	6	8	8	7	6	7	6	8		✓	#DIV/0!

lined out replicates are LC and SC, share with B-3

Analyst: SH

QC Check: [Signature] 12/27/04

Final Review: [Signature] 12/27/04

CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 28 Sep-04 10:22 AM
 Link: 12-9767-7869/0409-100

Macrocyctis Germination and Germ Tube Growth Test Nautilus Environmental AMEG Bioassay SD

Start Date: 29 Sep-04 Species: Macrocyctis pyrifera Sample Code: 0409-100
 End Date: 01 Oct-04 Protocol: EPA/600/R-95/136 (1995) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: ~~6-2-C-3~~

Conc-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	B	1	168					
0	B	2	149					
0	B	3	157					
0	B	4	144					
0	B	5	159					
0	LC	1	165					
0	LC	2	146					
0	LC	3	151					
0	LC	4	161					
0	LC	5	174					
0	SC	1	171					
0	SC	2	169					
0	SC	3	143					
0	SC	4	141					
0	SC	5	158					
25		1	172					
25		2	162					
25		3	164					
25		4	150					
25		5	163					
50		1	154					
50		2	167					
50		3	142					
50		4	173					
50		5	152					
65		1	155					
65		2	148					
65		3	153					
65		4	166					
65		5	145					
100		1	160					
100		2	147					
100		3	175					
100		4	156					
100		5	170					

Share
 LC 2 and
 SC 2
 with B-30

63

QC-26

Marine Chronic Bioassay

Water Quality Measurements

Client : City of Buena Ventura

Test Species: Macrocystis pyrifera

Sample ID: ~~049~~ C-2 C-3

Start Date/Time: 9/29/04 1 14.00

Test No: 0409-100

End Date/Time: 10/01/04 1 1400

Analyst: RG

Test Type: Kelp Spore Germination and Growth

Concentration (____%)	Initial Readings				Final Readings			
	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)
Lab Control #2	8.6	8.01	32.1	14.3	7.3	8.03	32.7	14.6
Salt Control #1	8.7	7.97	32.0	14.3	7.3	8.12	32.3	14.6
Brine Control	7.8	7.97	32.4	14.3	7.2	8.04	32.6	14.6
25%	8.2	7.96	31.9	14.3	7.2	8.22	32.2	14.6
50%	8.7	7.91	32.0	14.3	7.1	8.35	32.2	14.6
63	8.8	7.82	32.0	14.3	7.2	8.29	32.2	14.6
100%	7.7	8.13	31.9	14.3	7.2	8.30	32.7	14.6

Comments: _____

QC Check:  10/27/04

Final Review: AH 11/18/05

Brine Dilution Worksheet

Client: City of Buenaventura

Analyst: RG

Sample ID: C-3

Test Date: 09/29/2004

Test No: 0409-100

Test Type: Kelp Spore Germ. & Growth

Salinity of Effluent	3.4
Salinity of Brine	81.6
Target Salinity	32
Test Dilution Volume	250

Salinity Adjustment Factor:	TS - SE
	SB - TS

TS = target salinity
SE = salinity of effluent
SB = salinity of brine

Salinity Adjustment Factor = 0.58

Concentration %	Effluent Volume (mL)	Salinity Adjustment	Brine Volume (mL)	Dilute to to: (mL)
Control	NA	NA	NA	250
25	62.5	0.58	36.0	250
50	125.0	0.58	72.1	250
63	159	0.58	91.4	250

DI Volume

Brine Control	142	0.65	91.4	250
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Brine Control Salinity Adjustment Factor

291.0

Brine Control Calculation:

$$\frac{TS - 0}{SB - TS}$$

Nautilus Environmental
~~AMEG Earth and Environmental, Inc.~~
 San Diego Bioassay Laboratory
 5550 Morehouse Drive, Suite B
 San Diego, CA 92121

APPENDIX C
REFERENCE TOXICANT DATA

FRESHWATER

P. PROMELAS

CETIS Test Summary

Report Date: 18 Jan-05 3:27 PM

Link: 03-8928-6184/040928PPRT

Fathead Minnow 7-d Larval Survival and Growth Test				Nautilus Environmental (CA)				
Test No:	10-9606-4877	Test Type:	Growth-Survival (7d)	Duration:	6d 23h	Species:	Pimephales promelas	
Start Date:	28 Sep-04 02:00 PM	Protocol:	EPA/821/R-02-013 (2002)	Source:	Aquatic Biosystems, CO			
Ending Date:	05 Oct-04 01:20 PM	Dil Water:	Diluted Mineral Water (8:2)					
Setup Date:	28 Sep-04 02:00 PM	Brine:						
Sample No:	13-3678-0743	Material:	Copper chloride	Client:	Internal			
Sample Date:	28 Sep-04	Code:	040928PPRT	Project:				
Receive Date:	28 Sep-04	Source:	Reference Toxicant					
Sample Age:	14h	Station:						
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
03-6734-0616	7d Proportion Survived	< 15	15	N/A	14.38%	Dunnett's Multiple Comparison		
15-2187-0933	Mean Dry Biomass-mg	15	30	21.213	18.93%	Dunnett's Multiple Comparison		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
02-1910-3411	7d Proportion Survived	25	26.08359	14.20986	37.86447	Linear Regression		
		50	68.53082	49.10260	94.44238			
00-5649-0096	Mean Dry Biomass-mg	25	38.35451	10.13491	87.16339	Linear Interpolation		
		50	92.20737	67.26385	113.52450			
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
02-1910-3411	7d Proportion Survived	Control Response	0.975	0.8 - N/A	Passes acceptability criteria			
03-6734-0616	7d Proportion Survived	Control Response	0.975	0.8 - N/A	Passes acceptability criteria			
00-5649-0096	Mean Dry Biomass-mg	Control Response	0.378	0.25 - N/A	Passes acceptability criteria			
15-2187-0933	Mean Dry Biomass-mg	Control Response	0.378	0.25 - N/A	Passes acceptability criteria			
15-2187-0933	Mean Dry Biomass-mg	MSDp	0.18927	0.12 - 0.3	Passes acceptability criteria			
7d Proportion Survived Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	4	0.97500	0.90000	1.00000	0.02500	0.05000	5.13%
15		4	0.75000	0.60000	0.90000	0.06455	0.12910	17.21%
30		4	0.70000	0.60000	0.80000	0.04082	0.08165	11.66%
60		4	0.65000	0.50000	0.80000	0.06455	0.12910	19.86%
120		4	0.37500	0.20000	0.50000	0.07500	0.15000	40.00%
240		4	0.10000	0.00000	0.20000	0.04082	0.08165	81.65%
Mean Dry Biomass-mg Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	4	0.37800	0.35200	0.39200	0.00891	0.01781	4.71%
15		4	0.31525	0.28900	0.34600	0.01476	0.02951	9.36%
30		4	0.28900	0.26500	0.34700	0.01951	0.03902	13.50%
60		4	0.26925	0.18500	0.33400	0.03210	0.06419	23.84%
120		4	0.11975	0.05900	0.18100	0.02822	0.05644	47.13%
240		4	0.02825	0.00000	0.05700	0.01181	0.02363	83.64%

CETIS Test Summary

Report Date: 18 Jan-05 3:27 PM

Link: 03-8928-6184/040928PPRT

7d Proportion Survived Detail					
Conc- μ g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1.00000	1.00000	1.00000	0.90000
15		0.90000	0.70000	0.80000	0.60000
30		0.70000	0.80000	0.70000	0.60000
60		0.80000	0.50000	0.60000	0.70000
120		0.30000	0.20000	0.50000	0.50000
240		0.10000	0.00000	0.10000	0.20000

Mean Dry Biomass-mg Detail					
Conc- μ g/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	0.39200	0.38200	0.35200	0.38600
15		0.34600	0.29100	0.33500	0.28900
30		0.26500	0.34700	0.27700	0.26700
60		0.33400	0.18500	0.30000	0.25800
120		0.08700	0.05900	0.15200	0.18100
240		0.03300	0.00000	0.02300	0.05700

CETIS Analysis Detail

Fathead Minnow 7-d Larval Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	03-8928-6184	03-8928-6184	18 Jan-05 3:26 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnnett's Multiple Comparison	C > T	Angular (Corrected)		<15	15		N/A	14.38%

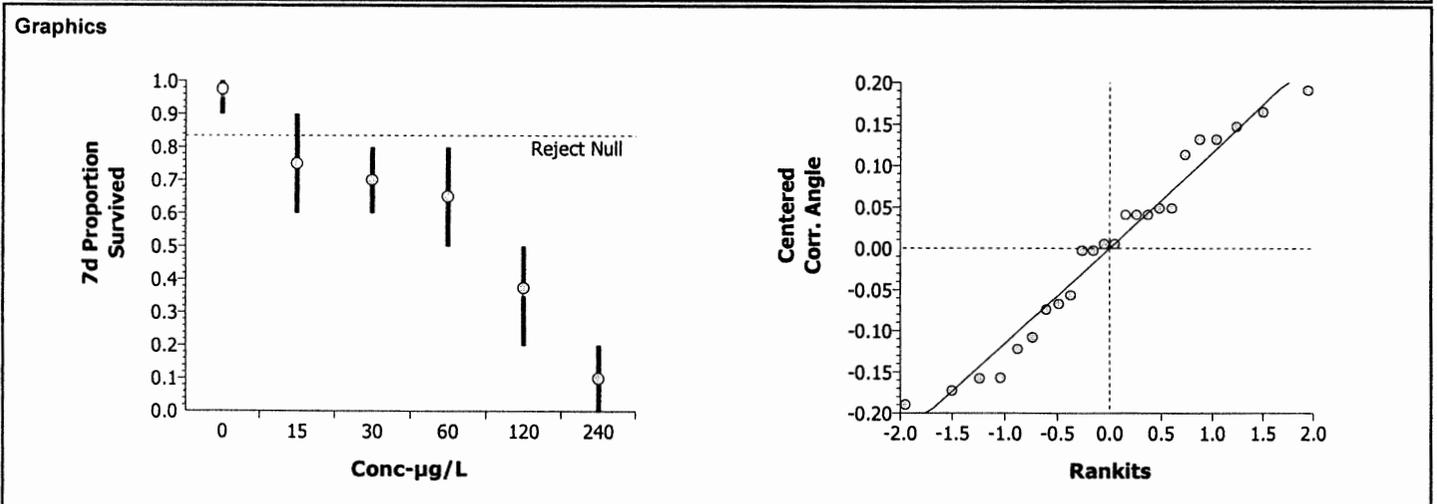
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.975	0.8 - N/A	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	1.91035	15.08628	0.86141	Equal Variances
Distribution	Shapiro-Wilk W	0.95318	0.88421	0.32316	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	2.633412	0.526683	5	31.86	0.00000	Significant Effect
Error	0.2975425	0.016530	18			
Total	2.93095484	0.5432126	23			

Group Comparisons							
Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Water		15	3.44196	2.41	<= 0.0500	0.2191	Significant Effect
		30	4.15112	2.41	<= 0.0500	0.2191	Significant Effect
		60	4.71694	2.41	<= 0.0500	0.2191	Significant Effect
		120	7.89499	2.41	<= 0.0500	0.2191	Significant Effect
		240	11.6023	2.41	<= 0.0500	0.2191	Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	4	0.97500	0.90000	1.00000	0.05000	1.37127	1.24905	1.41202	0.08149
15		4	0.75000	0.60000	0.90000	0.12910	1.05836	0.88608	1.24905	0.15593
30		4	0.70000	0.60000	0.80000	0.08165	0.99388	0.88608	1.10715	0.09031
60		4	0.65000	0.50000	0.80000	0.12910	0.94245	0.78540	1.10715	0.13825
120		4	0.37500	0.20000	0.50000	0.15000	0.65352	0.46365	0.78540	0.15947
240		4	0.10000	0.00000	0.20000	0.08165	0.31648	0.15878	0.46365	0.12461

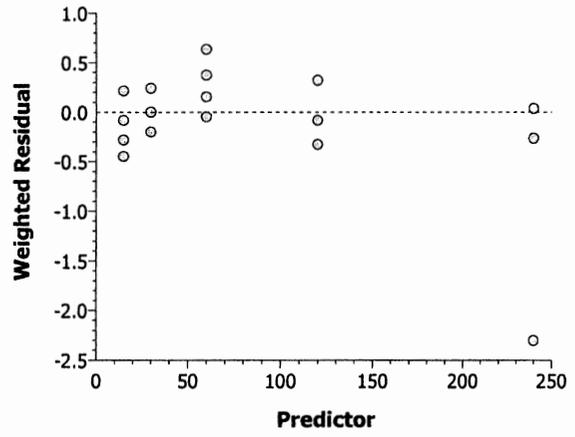
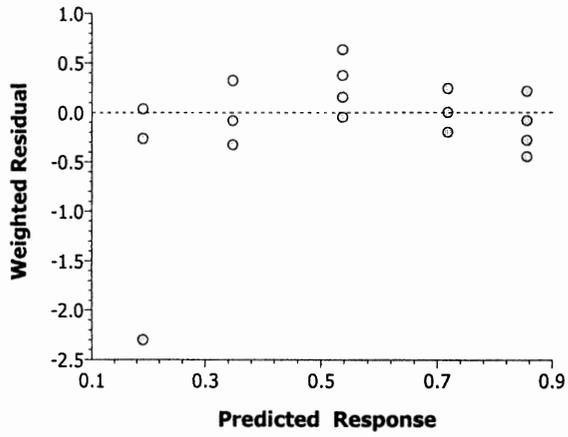
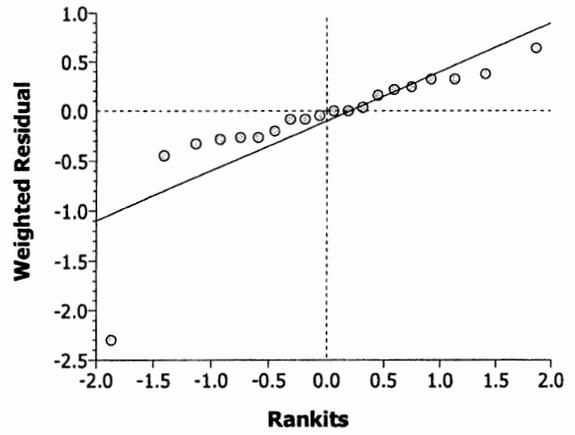
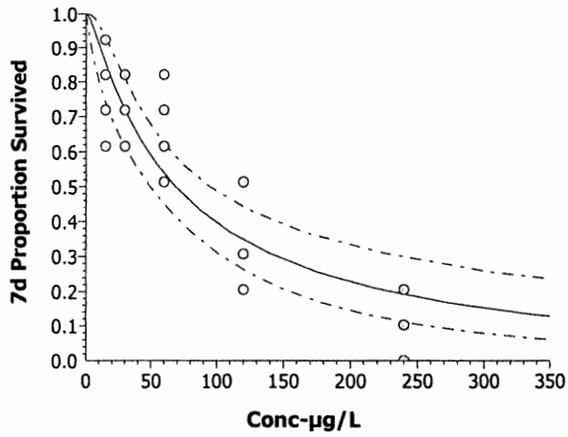


CETIS Analysis Detail

Fathead Minnow 7-d Larval Survival and Growth Test						Nautilus Environmental (CA)			
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version				
7d Proportion Survived	Linear Regression	03-8928-6184	03-8928-6184	18 Jan-05 3:26 PM	CETISv1.025				
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	0.03186	0.02761	-0.02226	0.08599	1.154	0.33213	Not Significant		
Slope	1.60777	0.26334	1.09161	2.12393	6.105	0.00883	Significant		
Intercept	2.04832	0.49082	1.08630	3.01033	4.173	0.02505	Significant		
Regression Summary									
Itrs	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)	
6	-59.65158	1.27401	0.62198	0.10307	17.42585	28.86930	0.49403	Non-Significant Heterogeneity	
Residual Analysis									
Attribute	Method	Statistic	Critical	P Level	Decision(0.05)				
Variances	Modified Levene	0.46773	2.95825	0.79406	Equal Variances				
Distribution	Shapiro-Wilk W	0.84213	0.90456	0.00318	Non-normal Distribution				
Test Acceptability									
Attribute	Statistic	Acceptable Range	Decision						
Control Response	0.975	0.8 - N/A	Passes acceptability criteria						
Point Estimates									
% Effect	Conc-µg/L	95% LCL	95% UCL						
25	26.08359	14.20986	37.86447						
50	68.53082	49.10260	94.44238						
Data Summary									
Conc-µg/L	Control Type	Count	Calculated Variate(A/B)						
			Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Water	4	0.97500	0.90000	1.00000	0.01021	0.05000	39	40
15		4	0.75000	0.60000	0.90000	0.02635	0.12910	30	40
30		4	0.70000	0.60000	0.80000	0.01667	0.08165	28	40
60		4	0.65000	0.50000	0.80000	0.02635	0.12910	26	40
120		4	0.37500	0.20000	0.50000	0.03062	0.15000	15	40
240		4	0.10000	0.00000	0.20000	0.01667	0.08165	4	40

CETIS Analysis Detail

Graphics



CETIS Analysis Detail

Fathead Minnow 7-d Larval Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	03-8928-6184	03-8928-6184	18 Jan-05 3:27 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Untransformed		15	30	6.67	21.213	18.93%

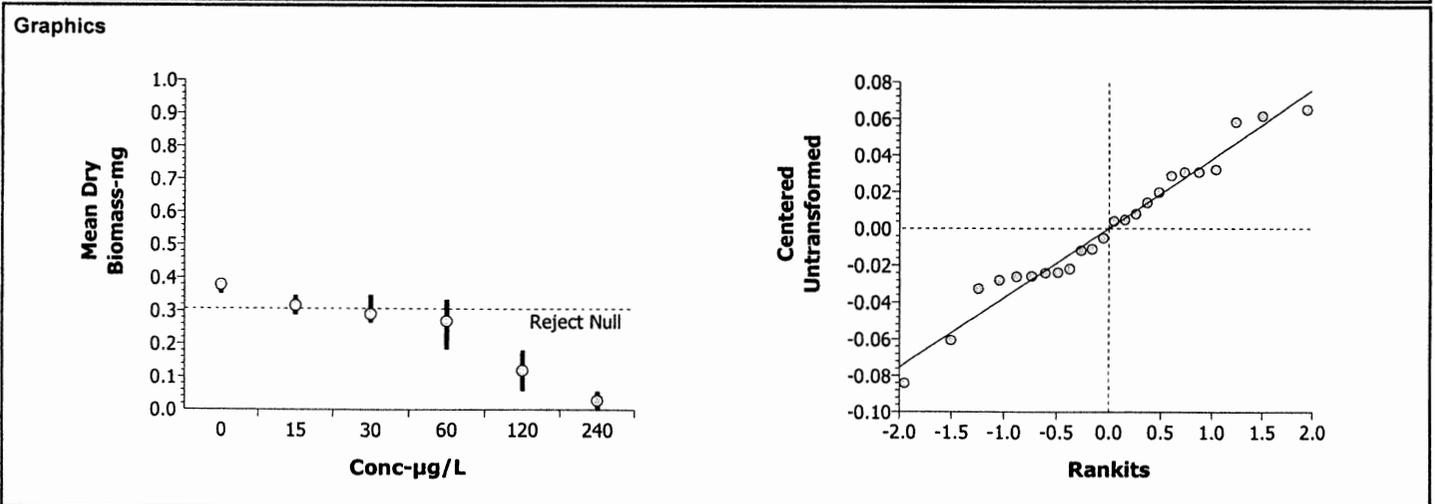
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.378	0.25 - N/A	Passes acceptability criteria
MSDp	0.18927	0.12 - 0.3	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	6.04022	15.08628	0.30233	Equal Variances
Distribution	Shapiro-Wilk W	0.96729	0.88421	0.59643	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.3479515	0.069590	5	39.48	0.00000	Significant Effect
Error	0.0317250	0.001763	18			
Total	0.37967651	0.0713528	23			

Group Comparisons							
Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Water		15	2.1138	2.41	> 0.0500	0.07154	Non-Significant Effect
		30	2.99806	2.41	<= 0.0500	0.07154	Significant Effect
		60	3.66336	2.41	<= 0.0500	0.07154	Significant Effect
		120	8.69943	2.41	<= 0.0500	0.07154	Significant Effect
		240	11.7817	2.41	<= 0.0500	0.07154	Significant Effect

Data Summary		Original Data					Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Water	4	0.37800	0.35200	0.39200	0.01781				
15		4	0.31525	0.28900	0.34600	0.02951				
30		4	0.28900	0.26500	0.34700	0.03902				
60		4	0.26925	0.18500	0.33400	0.06419				
120		4	0.11975	0.05900	0.18100	0.05644				
240		4	0.02825	0.00000	0.05700	0.02363				



CETIS Analysis Detail

Fathead Minnow 7-d Larval Survival and Growth Test **Nautilus Environmental (CA)**

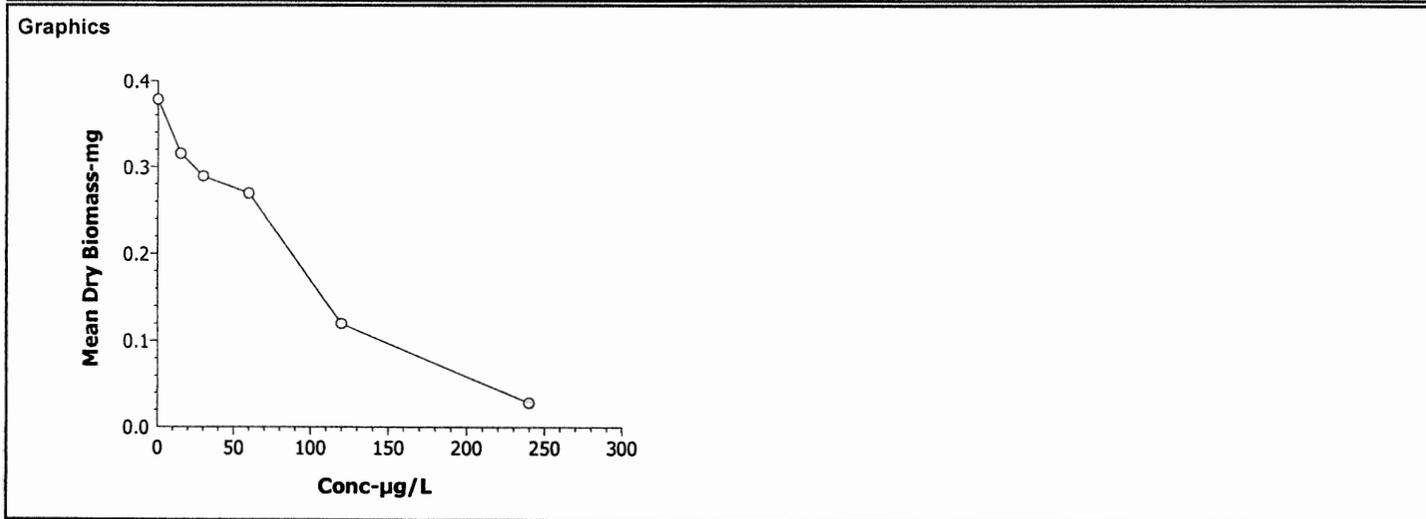
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Linear Interpolation	03-8928-6184	03-8928-6184	18 Jan-05 3:27 PM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	2895624	200	Yes	Two-Point Interpolation

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.378	0.25 - N/A	Passes acceptability criteria

Point Estimates			
% Effect	Conc-µg/L	95% LCL	95% UCL
25	38.35451	10.13491	87.16339
50	92.20737	67.26385	113.52450

Data Summary		Calculated Variate					
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Water	4	0.37800	0.35200	0.39200	0.00364	0.01781
15		4	0.31525	0.28900	0.34600	0.00602	0.02951
30		4	0.28900	0.26500	0.34700	0.00797	0.03902
60		4	0.26925	0.18500	0.33400	0.01310	0.06419
120		4	0.11975	0.05900	0.18100	0.01152	0.05644
240		4	0.02825	0.00000	0.05700	0.00482	0.02363



Freshwater Chronic Bioassay

Larval Fish Survival & Weights

Test Species: Promelas

Client Name: Internal

Test Date: 9-28-04

Sample ID: CuCl2

Test No.: 040928pprt

Conc. (μ g/L)	Rep.	Test Day								Percent Survival	pan wt. (g)	pan + fish (g)
		0	1	2	3	4	5	6	7			
Lab Control	a	10	10	10	10	10	10	10	10	100	0.03195	0.03587
	b	10	10	10	10	10	10	10	10	100	0.03158	0.03540
	c	10	10	10	10	10	10	10	10	100	0.02945	0.03297
	d	10	10	9	9	9	9	9	9	90	0.03010	0.03396
15	a	10	10	10	10	9	9	9	9	90	0.02876	0.03192
	b	10	8	8	8	7	7	7	7	70	0.03121	0.03412
	c	10	10	10	10	8	8	8	8	80	0.03165	0.03500
	d	10	10	10	10	7	6	6	6	60	0.02943	0.03232
30	a	10	10	8	8	7	7	7	7	70	0.03193	0.03458
	b	10	10	10	10	8	8	8	8	80	0.03173	0.03520
	c	10	10	8	8	6	7	7	7	70	0.03059	0.03336
	d	10	10	10	7	7	7	7	6	60	0.02945	0.03512
60	a	10	10	9	8	8	8	8	8	80	0.03116	0.03450
	b	10	10	8	5	5	5	5	5	50	0.02899	0.03084
	c	10	10	8	6	6	6	6	6	60	0.02977	0.03277
	d	10	10	8	6	7	7	7	7	70	0.02742	0.03000
120	a	10	8	3	3	3	3	3	3	30	0.03131	0.03218
	b	10	7	5	4	4	4	4	2	20	0.02920	0.02979
	c	10	10	7	6	5	5	5	5	50	0.03274	0.03276
	d	10	9	7	7	5	5	5	5	50	0.03175	0.03356
240	a	10	7	5	5	3	1	1	1	10	0.03186	0.03219
	b	10	7	5	5	4	3	1	0	0	0.03240	-
	c	10	6	2	2	2	2	2	1	10	0.03063	0.03086
	d	10	9	6	5	4	3	2	2	20	0.03175	0.03232
	a											
	b											
	c											
	d											
Tech Initials		RS	SA	RL	RL	RL						

Feeding Times (day):

	0	1	2	3	4	5	6
-		0745	0820	0900	0845	0845	0815
-		1335	1315	1400	1300	1330	1232
	1545	1600	1630	1600	1435	1430	1600

Weight Data:
 Date/Time in: 10/5/04 1320
 Date/Time out: 10/6/04 1500
 Oven Temp (°C): 65
 Tech Initials: RL

Comments: _____

QC Check: RL 10/10/05
 Final Review: RL 2/17/05

Freshwater Chronic Bioassay

Water Quality Measurements

Client: Internal
 Sample ID: CuCl2
 Test No: 040928 pprrt

Test Species: P. promelas
 Start Date/Time: 9-28-04 1400
 End Date/Time: 10-5-04 1320

Concentration	Lab Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.29	8.16	8.21	8.12	8.28	8.29	8.29	
DO (mg/L)	7.8	7.2	8.1	7.7	7.7	8.0	7.7	
Cond. (µmhos/cm)	212	215	219	217	216	217	218	
Temp (°C)	24.4	24.6	25.5	25.3	25.6	25.4	25.5	
Final								
pH		7.94	7.82	7.41	7.83	7.99	7.90	7.90
DO (mg/L)		6.9	6.7	6.3	6.1	6.5	6.7	6.2
Temp (°C)		25.3	24.4	24.5	24.4	25.3	24.7	25.4

Concentration	60 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.29	8.23	8.21	8.14	8.27	8.32	8.26	
DO (mg/L)	7.7	7.4	7.9	7.6	7.7	7.8	7.5	
Cond. (µmhos/cm)	215	212	224	218	216	213	217	
Temp (°C)	25.5	24.6	25.9	25.3	25.7	25.4	25.7	
Final								
pH		8.01	7.90	7.74	7.86	7.93	7.95	7.66
DO (mg/L)		7.4	7.1	7.2	7.1	6.4	6.6	6.1
Temp (°C)		25.6	24.6	24.9	24.5	25.4	24.8	25.8

Concentration	15 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.29	8.21	8.22	8.19	8.28	8.32	8.27	
DO (mg/L)	7.7	7.2	8.0	7.6	7.8	7.9	7.6	
Cond. (µmhos/cm)	217	214	227	218	216	215	218	
Temp (°C)	25.6	24.8	25.9	25.2	25.6	25.8	25.7	
Final								
pH		7.96	7.88	7.57	7.86	7.99	7.82	7.75
DO (mg/L)		6.9	6.7	6.5	6.9	6.6	6.7	6.6
Temp (°C)		25.3	24.5	24.5	24.4	25.5	24.8	25.7

Concentration	120 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.29	8.24	8.21	8.13	8.27	8.29	8.24	
DO (mg/L)	7.7	7.2	8.0	7.6	7.7	7.9	7.5	
Cond. (µmhos/cm)	214	211	214	215	216	211	216	
Temp (°C)	25.4	24.6	25.8	25.3	25.7	25.2	25.6	
Final								
pH		8.02	7.90	7.82	7.83	7.93	7.83	7.71
DO (mg/L)		7.6	7.1	7.2	7.3	6.5	6.5	6.1
Temp (°C)		25.6	24.5	24.9	24.5	25.4	24.7	25.8

Concentration	30 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.29	8.25	8.21	8.12	8.28	8.32	8.28	
DO (mg/L)	7.7	7.1	7.9	7.6	7.7	7.9	7.5	
Cond. (µmhos/cm)	217	214	222	219	216	215	218	
Temp (°C)	25.7	24.9	25.9	25.3	25.7	25.6	25.8	
Final								
pH		8.00	7.92	7.70	7.88	8.01	7.84	7.64
DO (mg/L)		7.4	7.2	6.9	7.0	6.7	6.6	5.8
Temp (°C)		25.5	24.4	24.9	24.4	25.4	24.7	25.8

Concentration	240 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.27	8.23	8.19	8.12	8.23	8.26	8.21	
DO (mg/L)	7.7	7.4	8.0	7.6	7.7	7.9	7.5	
Cond. (µmhos/cm)	211	209	215	213	222	208	212	
Temp (°C)	25.4	24.8	25.8	25.2	25.6	25.1	25.5	
Final								
pH		8.02	7.96	7.84	7.99	7.98	7.84	7.74
DO (mg/L)		7.7	7.9	7.2	7.4	6.8	6.6	6.5
Temp (°C)		25.6	24.6	25.2	24.4	25.3	24.7	25.7

Animal Source/Date Received: ABS/ 9-28-04
 Animal Age at Initiation: 48 hours

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

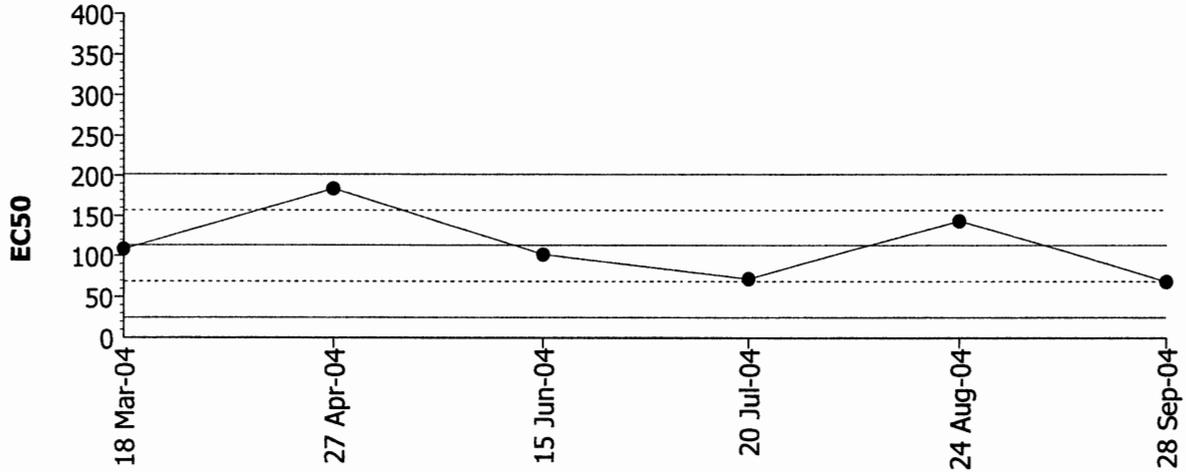
Comments: _____
 QC Check: [Signature]

Final Review: BCS 2/17/05

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Growth-Survival (7d) **Organism:** Pimephales promelas (Fathead Minn) **Material:** Copper chloride
Protocol: EPA/821/R-02-013 (2002) **Endpoint:** 7d Proportion Survived **Source:** Reference Toxicant-REF



Mean: 113.117 **Count:** 6 **-1s Warning Limit:** 68.9314 **-2s Action Limit:** 24.746
Sigma: 44.1854 **CV:** 39.06% **+1s Warning Limit:** 157.302 **+2s Action Limit:** 201.488

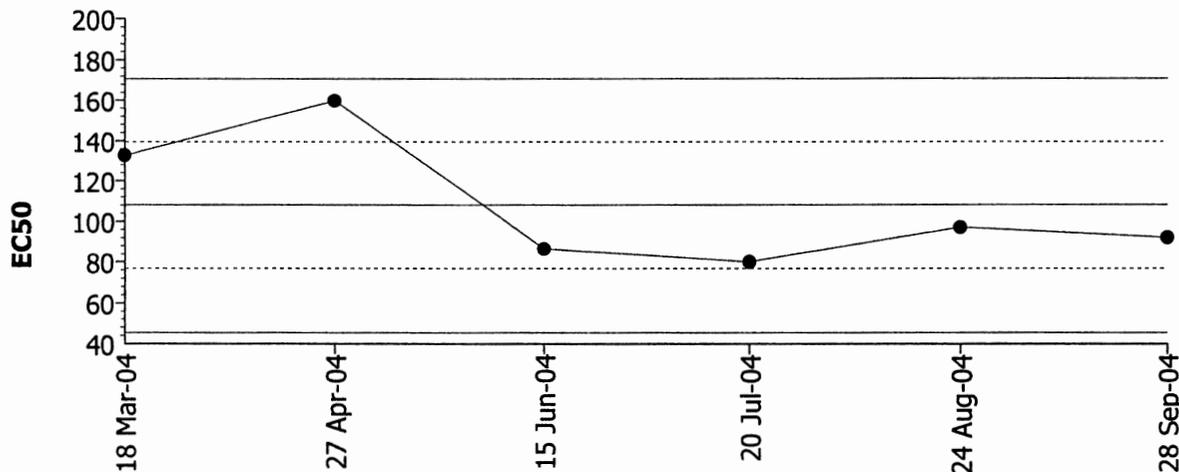
Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Mar	18	108.5512	-4.56560	-0.10333			05-8082-2348	08-0436-3472
2		Apr	27	183.8360	70.71920	1.60051	(+)		03-9136-6658	06-6076-5220
3		Jun	15	101.8321	-11.2847	-0.25539			00-2134-2076	01-2963-1882
4		Jul	20	72.11743	-40.9993	-0.92789			08-2514-0200	05-8061-6470
5		Aug	24	143.8333	30.71650	0.69517			15-7815-6846	04-9679-3585
6		Sep	28	68.53082	-44.5859	-1.00907	(-)		03-8928-6184	02-1910-3411

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Growth-Survival (7d) Organism: Pimephales promelas (Fathead Minn) Material: Copper chloride
 Protocol: EPA/821/R-02-013 (2002) Endpoint: Mean Dry Biomass-mg Source: Reference Toxicant-REF



Mean: 108.134 Count: 6 -1s Warning Limit: 76.8132 -2s Action Limit: 45.4927
 Sigma: 31.3205 CV: 28.96% +1s Warning Limit: 139.454 +2s Action Limit: 170.775

Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Mar	18	132.7899	24.65616	0.78722			05-8082-2348	04-7627-8237
2		Apr	27	159.8496	51.71586	1.65118	(+)		03-9136-6658	14-8015-1634
3		Jun	15	86.60516	-21.5285	-0.68736			00-2134-2076	12-6915-4979
4		Jul	20	80.07227	-28.0614	-0.89594			08-2514-0200	05-3092-7277
5		Aug	24	97.27808	-10.8556	-0.34660			15-7815-6846	05-2512-8271
6		Sep	28	92.20737	-15.9263	-0.50850			03-8928-6184	00-5649-0096

C. DUBIA

CETIS Test Summary

Report Date: 06 Jan-05 1:38 PM

Link: 09-0694-7140/040928CDRT

Ceriodaphnia 7-d Survival and Reproduction Test						Nautilus Environmental (CA)		
Test No:	13-5823-0826	Test Type:	Reproduction-Survival (7d)	Duration:	7d 0h	Species:	Ceriodaphnia dubia	
Start Date:	28 Sep-04 02:00 PM	Protocol:	EPA/821/R-02-013 (2002)	Source:	In-House Culture			
Ending Date:	05 Oct-04 02:00 PM	Dil Water:	Diluted Mineral Water (8:2)					
Setup Date:	28 Sep-04 02:00 PM	Brine:						
Sample No:	05-7578-2917	Material:	Copper chloride	Client:	Internal			
Sample Date:	28 Sep-04	Code:	040928CDRT	Project:				
Receive Date:	28 Sep-04	Source:	Reference Toxicant					
Sample Age:	14h	Station:						
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
03-9246-2768	7d Proportion Survived	100	200	141.421	N/A	Fisher's Exact		
08-5838-0449	Reproduction	100	200	141.421	25.86%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
10-2988-2068	7d Proportion Survived	50	114.86980	92.25968	143.02110	Trimmed Spearman-Kärber		
15-8026-4765	Reproduction	25	104.86780	45.00000	122.16270	Linear Interpolation		
		50	136.89900	100.72990	148.58870			
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
03-9246-2768	7d Proportion Survived	Control Response	1	0.8 - N/A	Passes acceptability criteria			
10-2988-2068	7d Proportion Survived	Control Response	1	0.8 - N/A	Passes acceptability criteria			
08-5838-0449	Reproduction	Control Response	26.6	15 - N/A	Passes acceptability criteria			
15-8026-4765	Reproduction	Control Response	26.6	15 - N/A	Passes acceptability criteria			
08-5838-0449	Reproduction	MSDp	0.25863	0.13 - 0.47	Passes acceptability criteria			
7d Proportion Survived Summary								
Conc-µg/L	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%
12.5		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
25		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
50		10	0.90000	0.00000	1.00000	0.10000	0.31623	35.14%
100		10	0.80000	0.00000	1.00000	0.13333	0.42164	52.70%
200		10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
Reproduction Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	10	26.6	19	35	1.7525	5.5418	20.83%
12.5		10	26.7	19	32	1.2115	3.8312	14.35%
25		10	25.2	21	28	0.7572	2.3944	9.50%
50		10	24.3	0	34	2.9704	9.3933	38.66%
100		10	21	5	37	3.6301	11.479	54.66%
200		10	0.2	0	2	0.2	0.6325	316.23

CETIS Test Summary

Report Date: 06 Jan-05 1:38 PM
 Link: 09-0694-7140/040928CDRT

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	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
12.5		1.00000	1.00000	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	1.00000	1.00000
50		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000
100		0.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000
200		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Reproduction Detail											
Conc-µg/L	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	20	31	27	27	35	31	19	28	19	29
12.5		28	19	30	24	23	29	27	29	26	32
25		27	21	25	26	27	27	22	26	23	28
50		26	20	34	22	27	27	0	28	30	29
100		5	29	29	19	25	26	37	7	5	28
200		0	0	0	0	0	0	0	0	0	2

CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental (CA)**

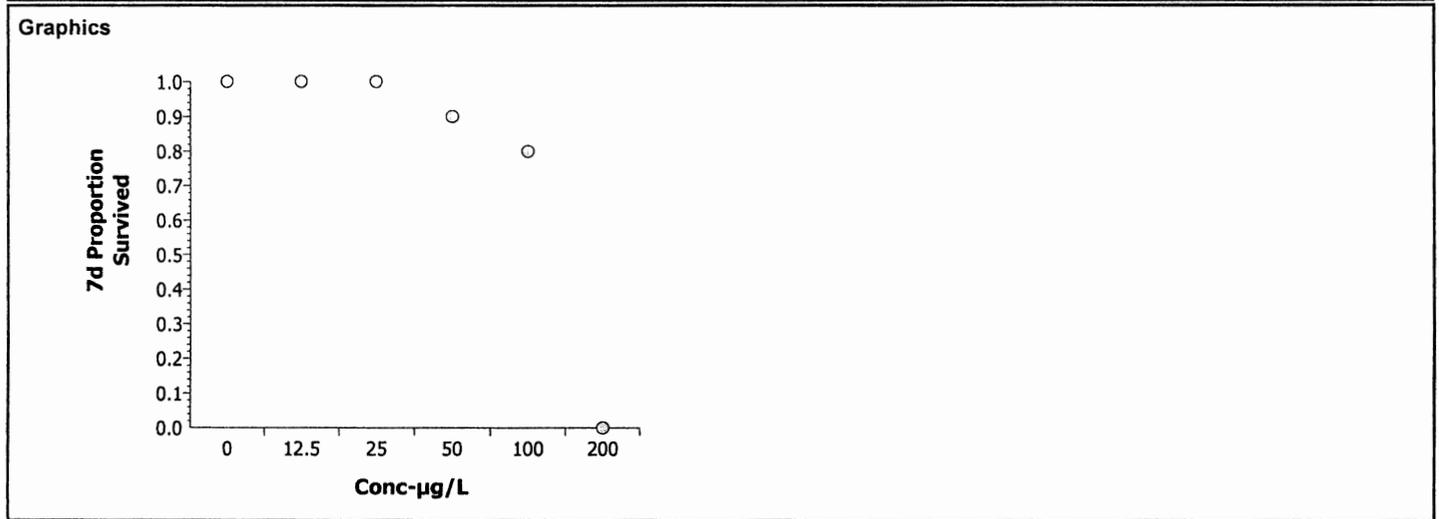
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	09-0694-7140	09-0694-7140	06 Jan-05 1:37 PM	CETISv1.025

Method	Alt H	Data Transform	NOEL	LOEL	Toxic Units	ChV	MSDp
Fisher's Exact	C > T	Untransformed	100	200	1.00	141.421	

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1	0.8 - N/A	Passes acceptability criteria

Group Comparisons					
Control	vs	Conc-µg/L	Statistic	Decision(0.05)	
Lab Control		12.5	1.00000	0.05000	Non-Significant Effect
		25	1.00000	0.05000	Non-Significant Effect
		50	0.50000	0.05000	Non-Significant Effect
		100	0.23684	0.05000	Non-Significant Effect
		200	0.00001	0.05000	Significant Effect

Data Summary				
Conc-µg/L	Control Type	Non-Responders	Responders	Total Observed
0	Lab Control	10	0	10
12.5		10	0	10
25		10	0	10
50		9	1	10
100		8	2	10
200		0	10	10



CETIS Analysis Detail

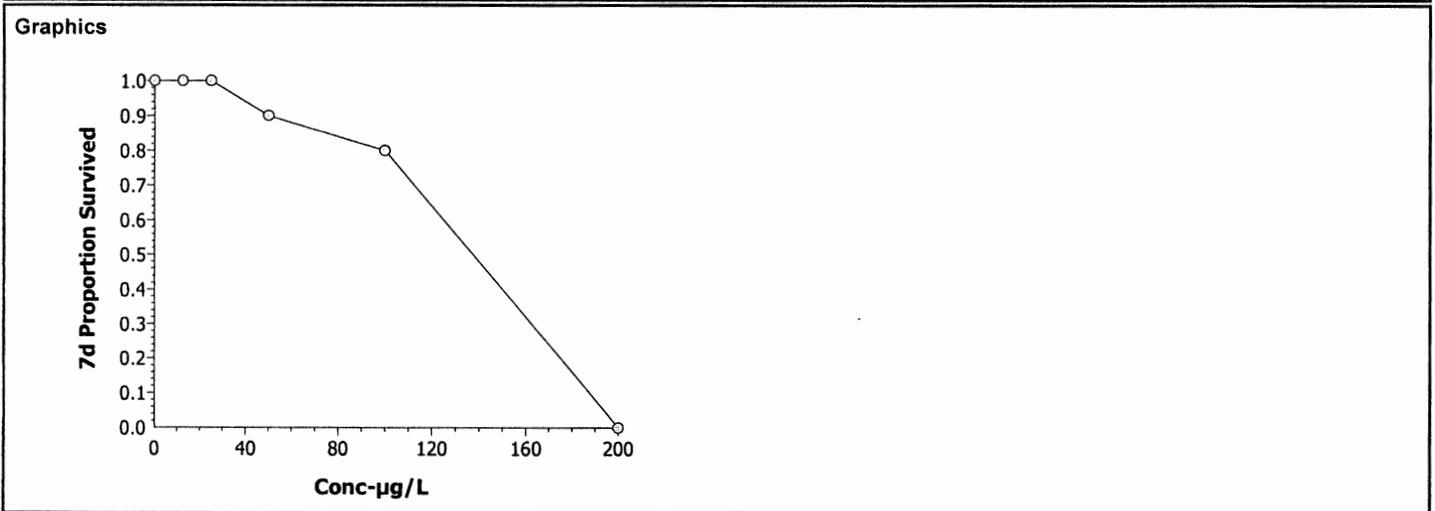
Ceriodaphnia 7-d Survival and Reproduction Test					Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Trimmed Spearman-Karber	09-0694-7140	09-0694-7140	06 Jan-05 1:38 PM	CETISv1.025

Spearman-Karber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0	0.00%	2.060206	0.04759702	114.86980	92.25968	143.02110

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1	0.8 - 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	10	1.00000	1.00000	1.00000	0.00000	0.00000	10	10
12.5		10	1.00000	1.00000	1.00000	0.00000	0.00000	10	10
25		10	1.00000	1.00000	1.00000	0.00000	0.00000	10	10
50		10	0.90000	0.00000	1.00000	0.06455	0.31623	9	10
100		10	0.80000	0.00000	1.00000	0.08607	0.42164	8	10
200		10	0.00000	0.00000	0.00000	0.00000	0.00000	0	10



CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Reproduction	Comparison	09-0694-7140	09-0694-7140	06 Jan-05 1:37 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Untransformed		100	200	1.00	141.421	25.86%

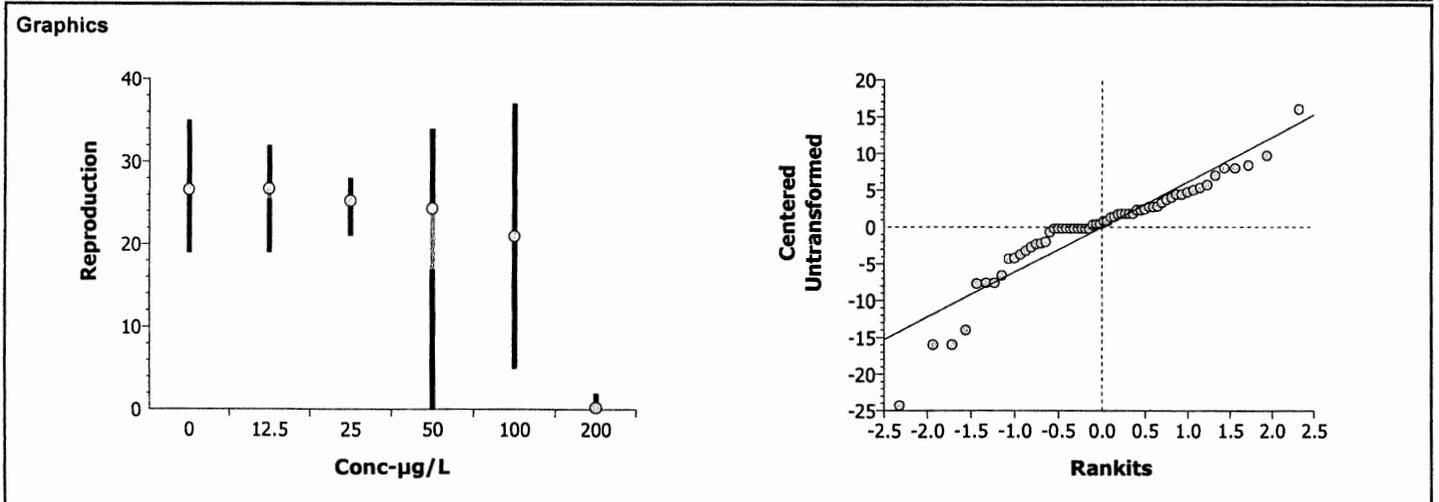
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	26.6	15 - N/A	Passes acceptability criteria
MSDp	0.25863	0.13 - 0.47	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	56.69709	15.08628	0.00000	Unequal Variances
Distribution	Kolmogorov-Smirnov D	0.20427	0.13307	0.00000	Non-normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5243.533	1048.707	5	23.17	0.00000	Significant Effect
Error	2443.8	45.25555	54			
Total	7687.33325	1093.9622	59			

Group Comparisons							
Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		12.5	103.5	75	> 0.0500	5	Non-Significant Effect
		25	90.5	75	> 0.0500	5	Non-Significant Effect
		50	99.5	75	> 0.0500	6	Non-Significant Effect
		100	90.5	75	> 0.0500	6	Non-Significant Effect
		200	55	75	<= 0.0500	4	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	10	26.6	19	35	5.5418				
12.5		10	26.7	19	32	3.8312				
25		10	25.2	21	28	2.3944				
50		10	24.3	0	34	9.3933				
100		10	21	5	37	11.479				
200		10	0.2	0	2	0.6325				



CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test					Nautilus Environmental (CA)
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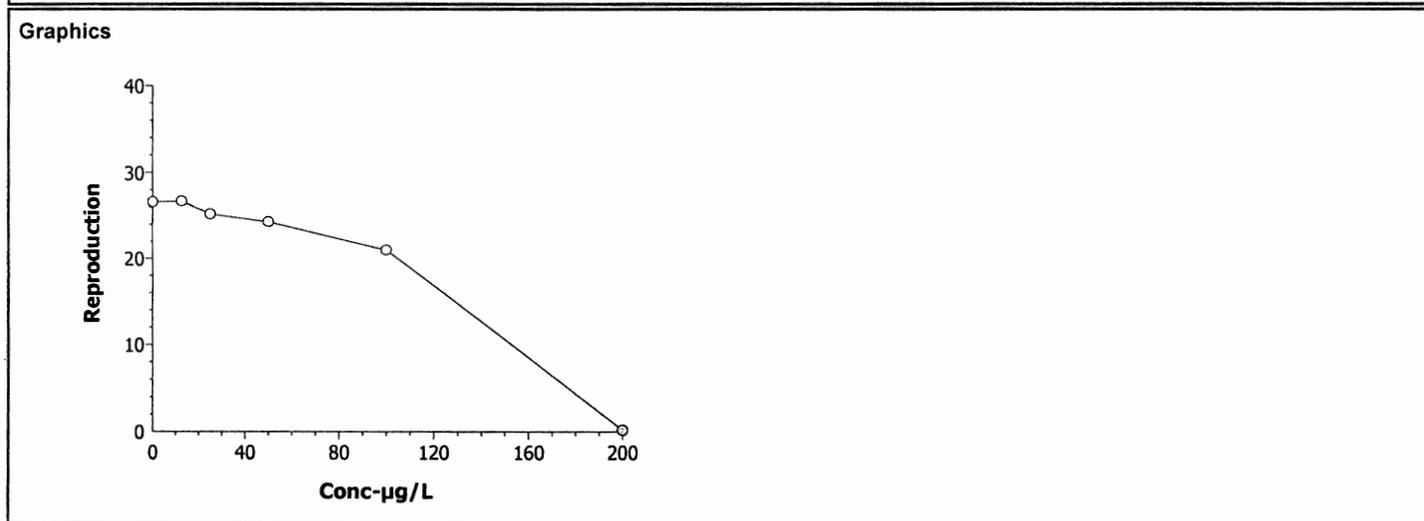
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Reproduction	Linear Interpolation	09-0694-7140	09-0694-7140	06 Jan-05 1:38 PM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7055475	200	Yes	Two-Point Interpolation

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	26.6	15 - N/A	Passes acceptability criteria

Point Estimates			
% Effect	Conc-µg/L	95% LCL	95% UCL
25	104.86780	45.00000	122.16270
50	136.89900	100.72990	148.58870

Data Summary		Calculated Variate					
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	10	26.6	19	35	1.13121	5.54176
12.5		10	26.7	19	32	0.78203	3.83116
25		10	25.2	21	28	0.48876	2.39444
50		10	24.3	0	34	1.91739	9.39326
100		10	21	5	37	2.34323	11.4795
200		10	0.2	0	2	0.1291	0.63246



Freshwater Chronic Bioassay

Daphnid Survival and Reproduction Datasheet

Test Species: C. dubia D. pulex D. magna

Client/Sample ID: Internal / CuCl2

Start Date/Time: 9-28-04 / 1400

Test No: 040928 cdrt

End Date/Time: 10-5-04 / 1400

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
LL	1	0	0	3	0	0	17	✓		20	
	2	0	0	5	0	11	15	✓		31	
	3	0	0	4	7	0	16	✓		27	
	4	0	0	5	9	13	0	✓		27	
	5	0	0	5	1	11	18	✓		35	17 ²⁸
	6	0	0	5	4	10	6	✓		31	
	7	0	0	5	4	6	9	✓		19	
	8	0	0	5	0	11	12	✓		28	
	9	0	0	0	5	8	6	✓		19	
	10	0	0	4	11	0	14	✓		29	
Analyst	SD	JD	JD	FR	AH	AH	ML				

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
50 ⁴ %	1	0	0	4	8	0	14	✓		26	
	2	0	0	5	0	9	6	✓		20	
	3	0	0	5	13	0	16	✓		34	
	4	0	0	5	5	12	0	✓		32	
	5	0	0	0	5	10	12	✓		27	
	6	0	0	4	0	2	15	✓		27	
	7	0	0	0	0/0	1	1	✓		0/0	
	8	0	0	3	1	12	14	✓		28	
	9	0	0	3	0	12	15	✓		30	15
	10	0	0	5	7	17	0	✓		29	

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
12.5 ⁴ %	1	0	0	4	0	0	16	✓		20	
	2	0	0	4	0	8	7	✓		19	
	3	0	0	5	0	1	15	✓		30	
	4	0	0	5	0	11	0	✓		24	
	5	0	0	5	0	9	11	✓		23	
	6	0	0	5	10	1	13	✓		29	
	7	0	0	5	5	9	13	✓		27	13 ¹⁸
	8	0	0	5	0	12	12	✓		29	
	9	0	0	4	0	8	13	✓		26	
	10	0	0	5	12	0	15	✓		32	

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
100 ⁴ %	1	0	0	5	0/0	-	-	✓		5/0	
	2	0	0	0	5	10	14	✓		29	
	3	0	0	4	10	0	15	✓		29	15
	4	0	0	3	7	9	0	✓		19	
	5	0	0	4	0	10	11	✓		25	
	6	0	0	5	10	0	11	✓		26	
	7	0	0	0	7	13	17	✓		37	
	8	0	0	1	6	0	0	✓		7	
	9	0	0	5	0/0	-	-	✓		5/0	
	10	0	0	5	12	11	0	✓		28	

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
25 ⁴ %	1	0	0	4	10	0	13	✓		27	
	2	0	0	3	1	8	9	✓		21	
	3	0	0	0	6	0	13	✓		25	
	4	0	0	3	6	0	11	✓		26	
	5	0	0	4	4	10	13	✓		27	
	6	0	0	4	9	6	14	✓		27	
	7	0	0	0	4	8	10	✓		22	
	8	0	0	0	1	9	16	✓		24	
	9	0	0	0	3	7	13	✓		23	
	10	0	0	4	12	0	12	✓		28	13 ¹⁸

Conc.	Rep	Daily Reproduction/ Survival								Total	QC
		1	2	3	4	5	6	7	8		
200 ⁴ %	1	0/d	-	-	-	-	-	-	-	0/d	
	2	0/d	-	-	-	-	-	-	-	0/d	
	3	0/d	-	-	-	-	-	-	-	0/d	
	4	0/d	-	-	-	-	-	-	-	0/d	
	5	0	0/d	-	-	-	-	-	-	0/d	
	6	0/d	-	-	-	-	-	-	-	0/d	
	7	0	0	0/0	-	-	-	-	-	0/d	
	8	0	0/d	-	-	-	-	-	-	0/d	
	9	0	0/d	-	-	-	-	-	-	0/d	
	10	0	0	2	0/0	-	-	-	-	2/d	

Time Fed (day): (0) 1400 (1) 1314 (2) 1050 (3) 1570 (4) 1300 (5) 1230 (6) 1420 (7) _____ (8) _____

Comments: _____
 QC Check: BA 1/6/05 Final Review: BCS 2/17/05

Client: Internal
 Sample ID: CuCl2
 Test No: 040928cdrt

Test Species: C. dubia
 Start Date/Time: 9-28-04 / 1400
 End Date/Time: 10-5-04 | 1400

Concentration	Lab Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.23	8.25	8.17	8.17	8.28	8.29	8.26	
DO (mg/L)	7.7	7.2	7.9	7.5	7.7	7.8	7.5	
Cond. (µmhos/cm)	219	215	227	217	216	212	214	
Temp (°C)	25.9	25.0	25.1	25.3	25.6	25.2	25.0	
Final								
pH		7.82	7.8	8.16	8.12	8.19	8.02	7.77
DO (mg/L)		8.20	8.1	8.3	7.9	8.1	8.4	7.8
Temp (°C)		24.6	24.7	24.9	24.5	24.3	25.0	24.9

Concentration	50 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.26	8.26	8.16	8.14	8.27	8.27	8.26	
DO (mg/L)	7.7	7.3	7.8	7.7	7.7	7.9	7.5	
Cond. (µmhos/cm)	213	219	215	217	216	214	213	
Temp (°C)	25.9	25.7	25.5	25.6	25.7	25.6	25.0	
Final								
pH		7.94	7.92	8.06	8.06	8.06	7.99	7.83
DO (mg/L)		8.12	8.1	8.3	7.8	7.9	8.1	7.8
Temp (°C)		24.6	24.7	24.9	24.5	24.9	25.0	24.9

Concentration	12.5 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.24	8.26	8.19	8.16	8.28	8.26	8.28	
DO (mg/L)	7.7	7.2	7.8	7.6	7.8	7.8	7.5	
Cond. (µmhos/cm)	219	217	217	218	216	215	214	
Temp (°C)	25.9	25.3	25.5	25.5	25.6	25.2	25.1	
Final								
pH		7.92	7.95	8.08	8.10	8.17	8.02	7.75
DO (mg/L)		8.16	8.1	8.3	7.8	7.9	8.3	7.7
Temp (°C)		24.6	24.7	24.9	24.5	24.3	25.0	24.9

Concentration	100 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.27	8.24	8.14	8.14	8.27	8.26	8.26	
DO (mg/L)	7.7	7.0	7.9	7.7	7.7	7.9	7.5	
Cond. (µmhos/cm)	213	221	214	216	216	211	212	
Temp (°C)	25.8	25.6	25.4	25.6	25.7	25.6	25.1	
Final								
pH		7.96	7.90	8.04	8.05	8.09	7.99	7.84
DO (mg/L)		8.22	8.1	8.3	7.8	7.9	8.1	7.8
Temp (°C)		24.6	24.7	24.9	24.5	24.9	25.0	24.9

Concentration	25 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.24	8.25	8.17	8.15	8.28	8.25	8.26	
DO (mg/L)	7.7	7.2	7.8	7.6	7.7	7.8	7.5	
Cond. (µmhos/cm)	217	218	210	217	216	214	214	
Temp (°C)	25.9	25.6	25.5	25.5	25.7	25.5	25.0	
Final								
pH		7.95	7.90	8.07	8.10	8.12	8.02	7.77
DO (mg/L)		8.15	8.0	8.3	7.8	8.1	8.1	7.8
Temp (°C)		24.6	24.7	24.9	24.5	24.3	25.0	24.9

Concentration	200 µg/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.26	8.22	8.13	8.12	8.23			
DO (mg/L)	7.8	7.0	7.8	7.7	7.7			
Cond. (µmhos/cm)	211	227	212	216	222			
Temp (°C)	25.0	25.7	25.4	25.5	25.6			
Final								
pH		8.01	8.09	8.04	8.03			
DO (mg/L)		8.27	8.1	8.4	7.9			
Temp (°C)		24.6	24.7	24.9	24.5			

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

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

Comments: _____
 QC Check: [Signature] 1/6/05

Final Review: BS 2/17/05

Freshwater Chronic Bioassay

Brood Selection Datasheet

Client/Sample ID: Internal/cuCl2
Test Number: 040928 cdrt
Test Species: C. dubia

Start Date: 9-28-04
Start Time: 1400

Test Rep #	Brood Board #	Cup #
1	53	2
2	53	11
3	53	13
4	53	15
5	53	19
6	53	25
7	53	27
8	53	31
9	53	32
10	53	30

Verified by: SH

Comments: _____

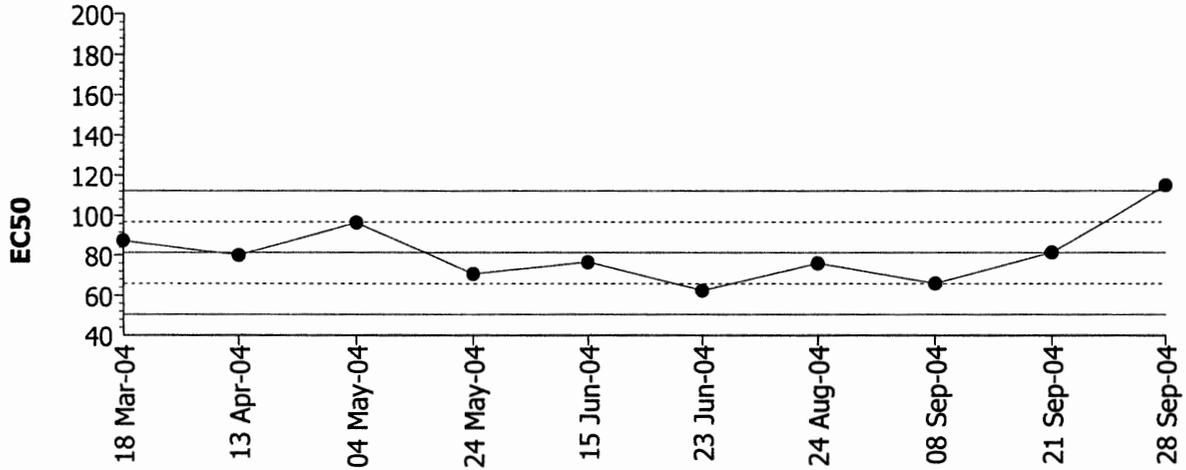
QC Check: [Signature] 1/6/05

Final Review: Bcs 2/17/05

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Reproduction-Survival (7d) Organism: Ceriodaphnia dubia (Water Flea) Material: Copper chloride
 Protocol: EPA/821/R-02-013 (2002) Endpoint: 7d Proportion Survived Source: Reference Toxicant-REF



Mean: 81.2245 Count: 10 -1s Warning Limit: 65.7531 -2s Action Limit: 50.2818
 Sigma: 15.4714 CV: 19.05% +1s Warning Limit: 96.6959 +2s Action Limit: 112.167

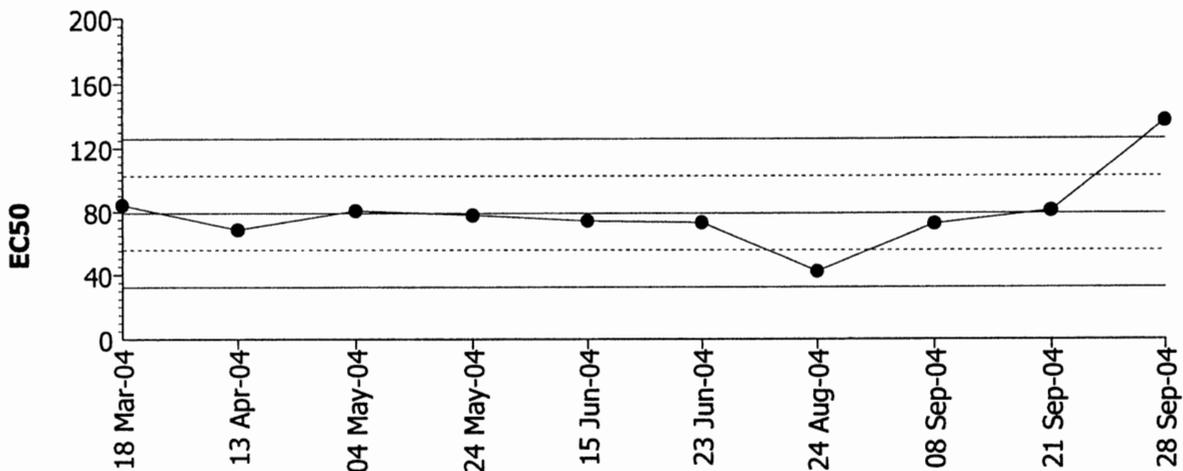
Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Mar	18	87.52046	6.29596	0.40694			04-6422-0205	08-5654-2838
2		Apr	13	80.02770	-1.19680	-0.07736			01-3394-5503	06-6515-8720
3		May	4	96.59364	15.36914	0.99339			09-5307-2446	07-2141-9247
4			24	70.71068	-10.5138	-0.67957			15-9929-3746	11-7383-7222
5		Jun	15	76.53999	-4.68451	-0.30279			11-9214-3922	04-8609-2097
6			23	62.43005	-18.7944	-1.21479	(-)		03-6129-4469	03-7472-2645
7		Aug	24	76.06281	-5.16169	-0.33363			03-9985-8572	11-5793-8978
8		Sep	8	65.97540	-15.2491	-0.98563			07-7729-8341	11-1706-1101
9			21	81.51447	0.28997	0.01874			13-6338-4717	01-6129-4090
10			28	114.8698	33.64530	2.17468	(+)	(+)	09-0694-7140	10-2988-2068

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Reproduction-Survival (7d) Organism: Ceriodaphnia dubia (Water Flea) Material: Copper chloride
 Protocol: EPA/821/R-02-013 (2002) Endpoint: Reproduction Source: Reference Toxicant-REF



Mean: 79.1602 Count: 10 -1s Warning Limit: 55.7294 -2s Action Limit: 32.2987
 Sigma: 23.4308 CV: 29.60% +1s Warning Limit: 102.591 +2s Action Limit: 126.022

Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Mar	18	84.13333	4.97317	0.21225			04-6422-0205	01-3389-2292
2		Apr	13	68.75000	-10.4101	-0.44429			01-3394-5503	09-3357-5188
3		May	4	80.68182	1.52166	0.06494			09-5307-2446	16-0279-1395
4			24	77.74725	-1.41291	-0.06030			15-9929-3746	03-8873-1673
5		Jun	15	74.33862	-4.82154	-0.20578			11-9214-3922	17-5558-3673
6			23	73.30918	-5.85098	-0.24971			03-6129-4469	03-9294-6738
7		Aug	24	42.21491	-36.9452	-1.57678	(-)		03-9985-8572	09-8094-8255
8		Sep	8	72.52747	-6.63269	-0.28308			07-7729-8341	02-9416-4113
9			21	81.00000	1.83984	0.07852			13-6338-4717	12-2240-4572
10			28	136.8990	57.73884	2.46423	(+)	(+)	09-0694-7140	15-8026-4765

S. CAPRICORNUTUM

CETIS Test Summary

Report Date: 17 Feb-05 12:01 PM

Link: 02-9946-5891/040930scrt

Selenastrum Growth Test			Nautilus Environmental (CA)					
Test No:	05-5194-7982	Test Type:	Cell Growth	Duration:	95h			
Start Date:	30 Sep-04 03:30 PM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Selenastrum capricornutum			
Ending Date:	04 Oct-04 03:00 PM	Dil Water:	Nutrient Enriched Water	Source:	In-House Culture			
Setup Date:	30 Sep-04 03:30 PM	Brine:	Not Applicable					
Sample No:	07-7345-9865	Material:	Copper chloride	Client:	Internal			
Sample Date:	30 Sep-04	Code:	040930scrt	Project:				
Receive Date:	30 Sep-04	Source:	Reference Toxicant					
Sample Age:	16h	Station:						
Comments:	Concurrent Reference Toxicant Test conducted with the City of Prosser and Buenaventura.							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
07-1505-7631	Cell Density	37.5	75	53.033	13.85%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
05-0028-9347	Cell Density	10	37.51464	5.89757	43.07721	Linear Interpolation		
		20	41.83908	31.23470	46.76581			
		25	44.00131	36.05431	48.61011			
		50	54.81242	49.61754	57.83161			
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
05-0028-9347	Cell Density	Control CV	0.10733	N/A - 0.2	Passes acceptability criteria			
07-1505-7631	Cell Density	Control CV	0.10733	N/A - 0.2	Passes acceptability criteria			
05-0028-9347	Cell Density	Control Response	1845250	1000000 - N/A	Passes acceptability criteria			
07-1505-7631	Cell Density	Control Response	1845250	1000000 - N/A	Passes acceptability criteria			
07-1505-7631	Cell Density	MSDp	0.13847	0.091 - 0.29	Passes acceptability criteria			
Cell Density Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	4	1.85E+6	1.56E+6	2.01E+6	9.90E+4	1.98E+5	10.73%
9.4		4	1.85E+6	1.77E+6	1.97E+6	4.71E+4	9.41E+4	5.10%
18.8		4	1.82E+6	1.64E+6	2.01E+6	8.16E+4	1.63E+5	8.98%
37.5		4	1.66E+6	1.34E+6	1.93E+6	1.23E+5	2.45E+5	14.75%
75		4	6.13E+4	4.90E+4	6.60E+4	4.09E+3	8.18E+3	13.36%
150		4	1.10E+4	9.00E+3	1.20E+4	7.07E+2	1.41E+3	12.86%
Cell Density Detail								
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4			
0	Lab Control	1.56E+6	1.91E+6	2.01E+6	1.91E+6			
9.4		1.97E+6	1.77E+6	1.87E+6	1.78E+6			
18.8		1.87E+6	2.01E+6	1.75E+6	1.64E+6			
37.5		1.71E+6	1.93E+6	1.68E+6	1.34E+6			
75		6.60E+4	6.50E+4	6.50E+4	4.90E+4			
150		1.10E+4	1.20E+4	9.00E+3	1.20E+4			



BOS 2/17/05

CETIS Analysis Detail

Selenastrum Growth Test						Nautilus Environmental (CA)					
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version						
Cell Density	Comparison	02-9946-5891	02-9946-5891	22 Oct-04 2:08 PM	CETISv1.025						
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp			
Steel's Many-One Rank	C > T	Untransformed		37.5	75	2.67	53.033	13.85%			
ANOVA Assumptions											
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)						
Variances	Bartlett	38.15119	15.08628	0.00000	Unequal Variances						
Distribution	Shapiro-Wilk W	0.91437	0.88421	0.04620	Normal Distribution						
ANOVA Table											
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)					
Between	1.656E+13	3.312E+12	5	147.32	0.00000	Significant Effect					
Error	4.047E+11	2.248E+10	18								
Total	1.6965E+13	3.335E+12	23								
Group Comparisons											
Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)				
Lab Control		9.4	16	10	> 0.0500	0	Non-Significant Effect				
		18.8	17	10	> 0.0500	0	Non-Significant Effect				
		37.5	15	10	> 0.0500	0	Non-Significant Effect				
		75	10	10	<= 0.0500	1	Significant Effect				
		150	10	10	<= 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	
0	Lab Control	4	1.85E+6	1.56E+6	2.01E+6	1.98E+5					
9.4		4	1.85E+6	1.77E+6	1.97E+6	9.41E+4					
18.8		4	1.82E+6	1.64E+6	2.01E+6	1.63E+5					
37.5		4	1.66E+6	1.34E+6	1.93E+6	2.45E+5					
75		4	6.13E+4	4.90E+4	6.60E+4	8.18E+3					
150		4	1.10E+4	9.00E+3	1.20E+4	1.41E+3					
Data Detail											
Conc-µg/L	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	1.56E+6	1.91E+6	2.01E+6	1.91E+6						
9.4		1.97E+6	1.77E+6	1.87E+6	1.78E+6						
18.8		1.87E+6	2.01E+6	1.75E+6	1.64E+6						
37.5		1.71E+6	1.93E+6	1.68E+6	1.34E+6						
75		6.60E+4	6.50E+4	6.50E+4	4.90E+4						
150		1.10E+4	1.20E+4	9.00E+3	1.20E+4						

CETIS Analysis Detail

Comparisons:

Page 2 of 2

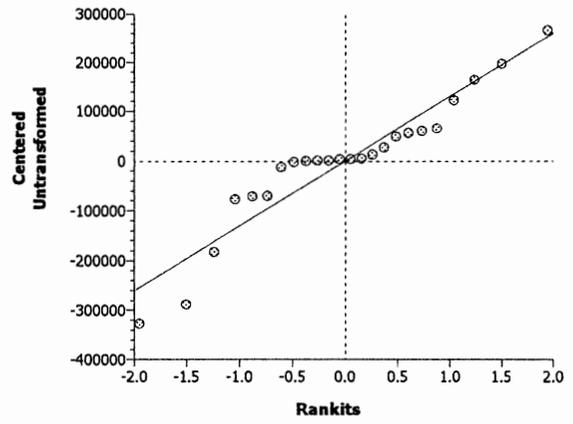
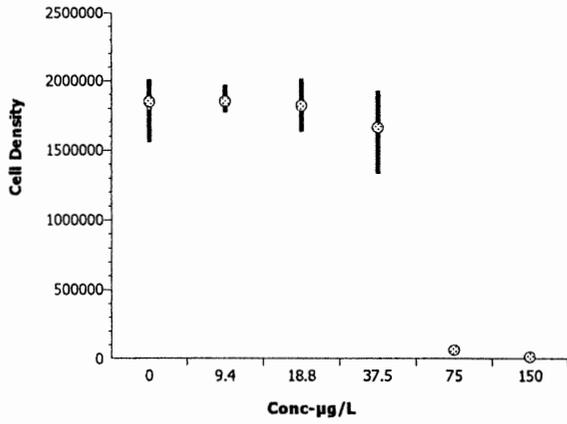
Report Date:

22 Oct-04 2:11 PM

Analysis:

07-1505-7631/040930scrt

Graphics



CETIS Analysis Detail

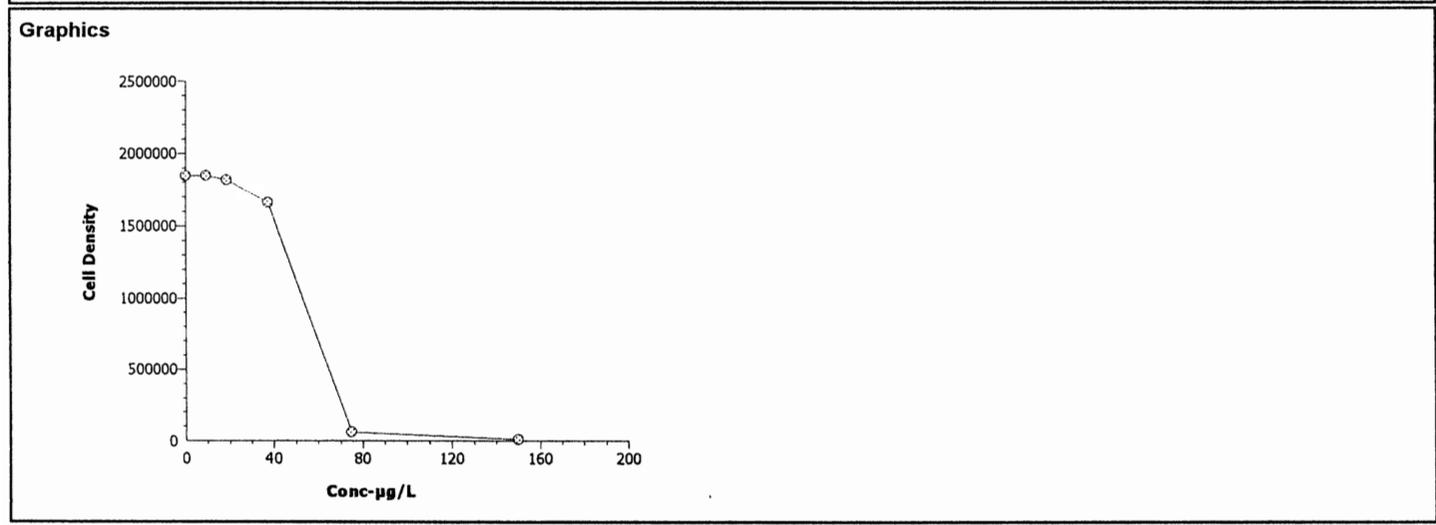
Selenastrum Growth Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Cell Density	Linear Interpolation	02-9946-5891	02-9946-5891	22 Oct-04 2:11 PM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7055475	200	Yes	Two-Point Interpolation

Point Estimates			
% Effect	Conc-µg/L	95% LCL	95% UCL
10	37.51464	5.89757	43.07721
20	41.83908	31.23470	46.76581
25	44.00131	36.05431	48.61011
50	54.81242	49.61754	57.83161

Data Summary		Calculated Variate					
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	4	1.85E+6	1.56E+6	2.01E+6	4.04E+4	1.98E+5
9.4		4	1.85E+6	1.77E+6	1.97E+6	1.92E+4	9.41E+4
18.8		4	1.82E+6	1.64E+6	2.01E+6	3.33E+4	1.63E+5
37.5		4	1.66E+6	1.34E+6	1.93E+6	5.00E+4	2.45E+5
75		4	6.13E+4	4.90E+4	6.60E+4	1.67E+3	8.18E+3
150		4	1.10E+4	9.00E+3	1.20E+4	2.89E+2	1.41E+3



Copper (II) Chloride Reference Toxicant
Selenastrum capricornutum
 Test Initiation Date: 30 September 2004

Concentration (%) $\mu\text{g/L}$	Replicate	Random Number	Cell Density ($\times 10^5$)
Lab Control	A	46	15.57
	B	44	19.05
	C	40	20.09
	D	47	19.10
MHSW Control	A	49	N/A
	B	30	↓
	C	31	
	D	54	
9.40	A	41	19.69
	B	50	17.70
	C	34	18.74
	D	35	17.76
18.8	A	33	18.73
	B	52	20.14
	C	36	17.47
	D	38	16.35
37.5	A	55	17.11
	B	29	19.28
	C	39	16.75
	D	51	13.35
75.0	A	48	0.66
	B	32	0.65
	C	37	0.65
	D	45	0.49
150	A	43	0.11
	B	56	0.12
	C	42	0.09
	D	53	0.12

QC = SD

QC = SC

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

Test Species: S. cupricornutum

Client: Internal

Test Date: 9/30/04

Sample ID: CUCe₂

Start/End Times: 15:30 / 1:00

Test No: 040930SCRT

Analyst: AH

Random Number	Dilution	Cell Density (fluorometric) (cells/ml *10 ⁵)	Cell Density (microscopic) (cells/ml *10 ⁴)
Blank	NA	0.0	
Cal Check 1 (NEW, Solid, Effluent Blanks)		2.19, 0.05 ^{PL} , 0.48 ^{PL}	
29		19.28	
30		22.41	
31		24.09	
32		0.65	
33		18.73	
34		18.74	
35		17.76	
36		17.47	
37		0.65	
38		16.35	
39		16.75	
40		20.09	
Cal Check 2 (NEW, Solid, Effluent Blanks)		2.20	
41		19.69	
42		0.09	
43		0.11	
44		19.05	
45		0.49	
46		15.57	
47		19.10	
48		0.66	
49		21.90	
50		17.70	
51		13.35	
52		20.14	
Cal Check 3 (NEW, Solid, Effluent Blanks)		2.20	

Comments: _____

QC Check: sc 10/20/04

Final Review: BOS 2/17/05

Freshwater Chronic Bioassay

Algal Growth Inhibition Worksheet

Client : City of Buena Vista, City of Prosser, Internal

Test Species: S. capricornutum

Sample ID: Prosser, Cncez

Test Date: 9/30/04

Test No: 0409-088

Analyst: Att

Source/Date Stock Culture Started: 9-23-04

Stock Cell Density Measurements: 44.90

45.00

Mean: 45.18

45.31

45.23

45.47

(mean no. * 100,000)/(500,000) = x (dilution factor):

$$\begin{array}{r}
 9.04 \\
 - 1.00 \text{ sele} \\
 \hline
 8.04 \text{ NEW}
 \end{array}
 \quad
 \begin{array}{r}
 20 \text{ mL} \\
 \hline
 1608 \text{ NEW}
 \end{array}$$

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 \pm 10%.

Inoculum Cell Density Confirmation Counts: 1
0
1

Mean: 0.67

Test Initiation Time: 1530 9/30/04

Test Termination Time: 1500 10/4/04

Comments: _____

QC Check: jc 10/20/04

Final Review: BCS 2/12/05

Freshwater Chronic Bioassay

Water Quality Measurements
Algal Growth Inhibition

Test Species: S. capri, cornutum

Client: Internal

Test Date: 9-30-04

Sample ID: CuCl₂ / Mod. Hard Water

Start/End Times: 15:30

Test No: 040930 scrt

Analyst: AH

Concentration <u>9.4</u>	Initial Readings				Final Readings	
	D.O. (mg/L)	Conductivity (umhos-cm)	Alkalinity (mg/L)	Hardness (mg/L)	D.O. (mg/L)	Conductivity (umhos-cm)
Lab Control	7.0	92.7	10	16	9.3	95.5
9.4	6.8	92.8	11	8	9.4	90.9
18.8	6.8	92.3	—	—	9.4	89.7
37.5	6.9	92.1	10	9	9.7	88.8
75	6.9	91.5	—	—	8.7	94.2
150 <u>ug/L</u>	7.0	90.7	15	13	8.5	94.2
Moderately Hard Water control	6.7	249	41	58	9.7	247

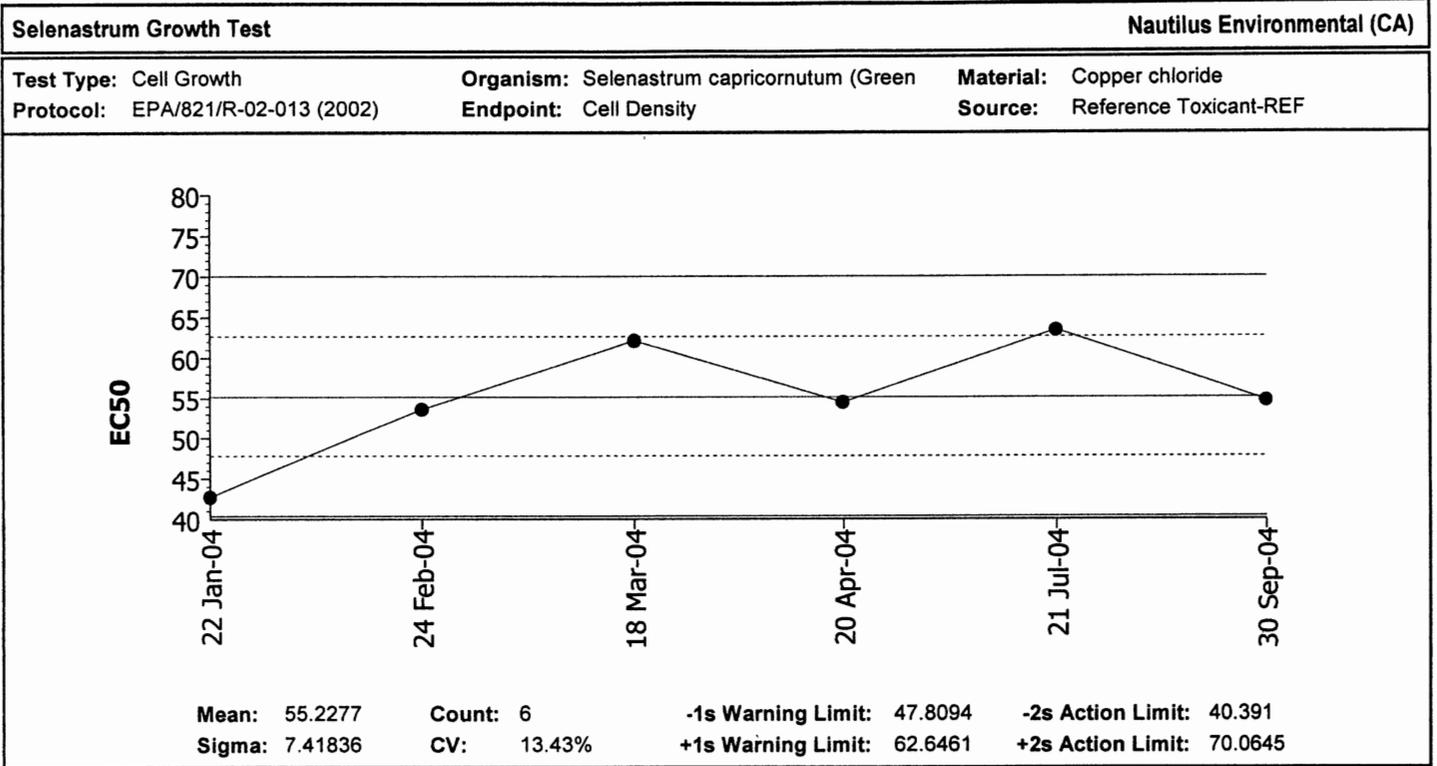
		0 Hour	24 Hour	48 Hour	72 Hour	96 Hour
pH/Temperature (°C):	Lab Control	7.18/24.7	7.53/26.4	7.94/26.4	9.38/26.6	9.27/26.6
pH/Temperature (°C):	9.4	7.20/24.7	7.43/26.5	7.93/26.4	9.45/26.5	9.25/26.6
pH/Temperature (°C):	18.8	7.17/24.7	7.42/26.8	7.99/26.5	9.40/26.4	9.37/26.7
pH/Temperature (°C):	37.5	7.21/24.7	7.38/26.7	7.72/26.4	9.27/26.8	9.14/26.9
pH/Temperature (°C):	75	7.20/24.7	7.37/26.6	7.57/26.5	8.72/26.6	9.77/26.9
pH/Temperature (°C):	150	7.15/24.7	7.33/26.7	7.38/26.4	7.23/26.8	7.66/26.9
pH/Temperature (°C):	MHWC	7.79/24.7	7.73/26.6	8.17/26.4	9.35/26.7	9.40/26.9

Comments: CuCl₂ set up w/ NEW. Run MHWC separate.

QC Check: sc 10/20/04

Final Review: BCS 2/17/05

CETIS QC Chart



Quality Control Data										
Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Jan	22	42.73970	-12.4880	-1.68339	(-)		11-0163-8710	00-9833-6682
2		Feb	24	53.64418	-1.58354	-0.21346			04-7456-4480	03-1936-6791
3		Mar	18	62.14433	6.91661	0.93236			10-8280-0048	02-4366-4555
4		Apr	20	54.53867	-0.68905	-0.09288			13-9906-5381	04-2100-3790
5		Jul	21	63.48700	8.25928	1.11336	(+)		11-5976-2294	11-4134-4405
6		Sep	30	54.81242	-0.41530	-0.05598			02-9946-5891	05-0028-9347

MARINE

A. AFFINIS

CETIS Test Summary

Report Date: 18 Jan-05 3:15 PM

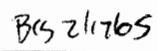
Link: 15-3863-7123/040929AART

Pacific Topsmelt 7-d Survival and Growth Test						Nautilus Environmental (CA)					
Test No:	16-1945-5604	Test Type:	Growth-Survival (7d)	Duration:	6d 21h	Start Date:	29 Sep-04 03:30 PM	Protocol:	EPA/600/R-95/136 (1995)	Species:	Atherinops affinis
Ending Date:	06 Oct-04 01:00 PM	Dil Water:	Laboratory Seawater	Source:	Aquatic Biosystems, CO	Setup Date:	29 Sep-04 03:30 PM	Brine:	Not Applicable		
Sample No:	11-3867-5125	Material:	Copper chloride	Client:	Internal	Sample Date:	29 Sep-04	Code:	040929AART	Project:	
Receive Date:	29 Sep-04	Source:	Reference Toxicant			Sample Age:	16h	Station:			
Comparison Summary											
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method					
07-9281-9434	7d Proportion Survived	100	200	141.421	16.33%	Dunnett's Multiple Comparison					
05-4496-2598	Mean Dry Biomass-mg	100	200	141.421	17.43%	Steel's Many-One Rank					
Point Estimate Summary											
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method					
14-8520-4306	7d Proportion Survived	25	126.40400	51.26948	154.74040	Linear Regression					
		50	143.96290	76.94768	170.88670						
12-4723-9363	Mean Dry Biomass-mg	25	100.57360	4.25270	122.43800	Linear Interpolation					
		50	134.77060	116.35990	150.10290						
Test Acceptability											
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision						
07-9281-9434	7d Proportion Survived	Control Response	0.96000	0.8 - N/A	Passes acceptability criteria						
14-8520-4306	7d Proportion Survived	Control Response	0.96000	0.8 - N/A	Passes acceptability criteria						
05-4496-2598	Mean Dry Biomass-mg	Control Response	1.38320	0.85 - N/A	Passes acceptability criteria						
12-4723-9363	Mean Dry Biomass-mg	Control Response	1.38320	0.85 - N/A	Passes acceptability criteria						
07-9281-9434	7d Proportion Survived	MSDp	0.16329	N/A - 0.25	Passes acceptability criteria						
05-4496-2598	Mean Dry Biomass-mg	MSDp	0.17434	N/A - 0.5	Passes acceptability criteria						
7d Proportion Survived Summary											
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV			
0	Lab Control	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%			
25		5	0.84000	0.80000	1.00000	0.04000	0.08944	10.65%			
50		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%			
100		5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%			
200		5	0.04000	0.00000	0.20000	0.04000	0.08944	223.61			
400		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%			
Mean Dry Biomass-mg Summary											
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV			
0	Lab Control	5	1.38320	1.01000	1.80800	0.12890	0.28823	20.84%			
25		5	1.26720	1.08400	1.40600	0.06072	0.13578	10.71%			
50		5	1.12240	0.87800	1.33400	0.07893	0.17649	15.72%			
100		5	1.04320	0.82200	1.19800	0.06138	0.13724	13.16%			
200		5	0.03200	0.00000	0.16000	0.03200	0.07155	223.61			
400		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%			

CETIS Test Summary

7d Proportion Survived Detail						
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.00000	1.00000	1.00000	0.80000	1.00000
25		0.80000	0.80000	1.00000	0.80000	0.80000
50		1.00000	1.00000	0.80000	1.00000	0.80000
100		0.60000	1.00000	0.80000	1.00000	1.00000
200		0.00000	0.00000	0.20000	0.00000	0.00000
400		0.00000	0.00000	0.00000	0.00000	0.00000

Mean Dry Biomass-mg Detail						
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	1.32800	1.01000	1.80800	1.31600	1.45400
25		1.21800	1.23000	1.40600	1.08400	1.39800
50		1.22200	1.15200	0.87800	1.33400	1.02600
100		0.82200	1.06800	1.04200	1.08600	1.19800
200		0.00000	0.00000	0.16000	0.00000	0.00000
400		0.00000	0.00000	0.00000	0.00000	0.00000

CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	15-3863-7123	15-3863-7123	18 Jan-05 3:14 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		100	200	1.00	141.421	16.33%

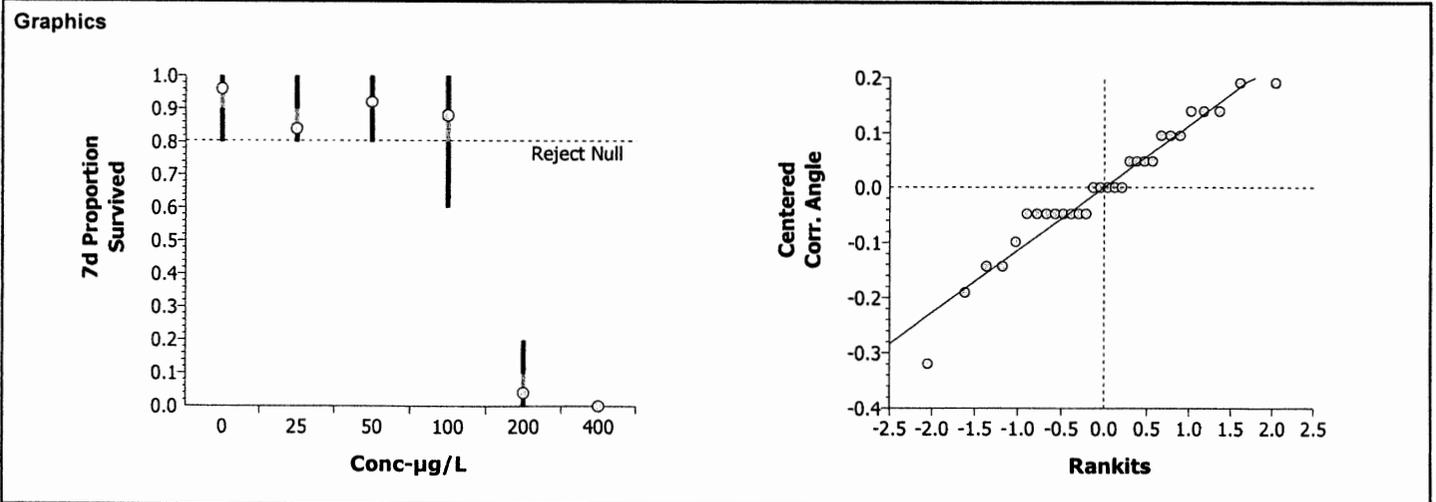
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.96000	0.8 - N/A	Passes acceptability criteria
MSDp	0.16329	N/A - 0.25	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	1.48211	3.89507	0.23254	Equal Variances
Distribution	Shapiro-Wilk W	0.95241	0.89981	0.23069	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	6.434807	1.286961	5	82.48	0.00000	Significant Effect
Error	0.3744697	0.015603	24			
Total	6.809277	1.3025643	29			

Group Comparisons							
Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		25	1.80859	2.36	> 0.0500	0.18644	Non-Significant Effect
		50	0.60286	2.36	> 0.0500	0.18644	Non-Significant Effect
		100	1.16253	2.36	> 0.0500	0.18644	Non-Significant Effect
		200	12.9684	2.36	<= 0.0500	0.18644	Significant Effect
		400	13.5713	2.36	<= 0.0500	0.18644	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	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
25		5	0.84000	0.80000	1.00000	0.08944	1.15478	1.10715	1.34528	0.10650
50		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043
100		5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635
200		5	0.04000	0.00000	0.20000	0.08944	0.27314	0.22551	0.46365	0.10650
400		5	0.00000	0.00000	0.00000	0.00000	0.22551	0.22551	0.22551	0.00003

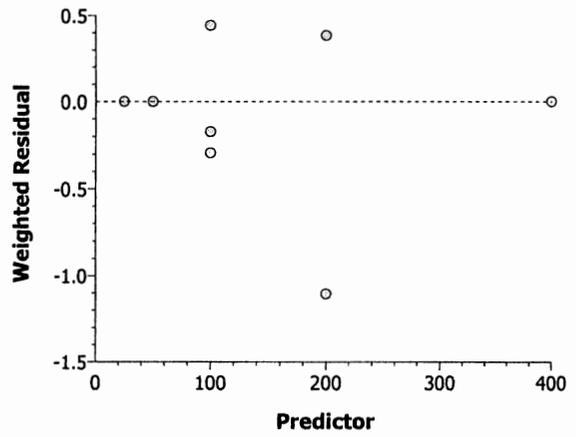
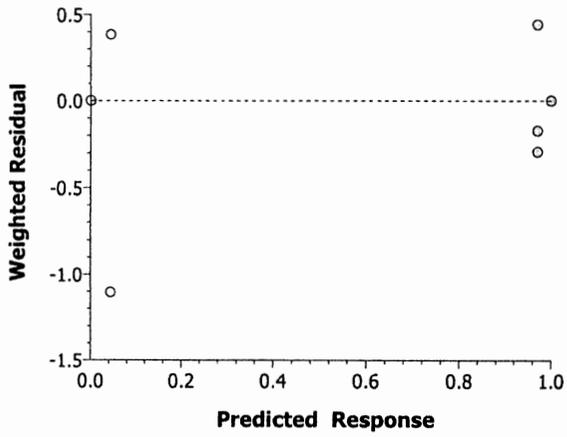
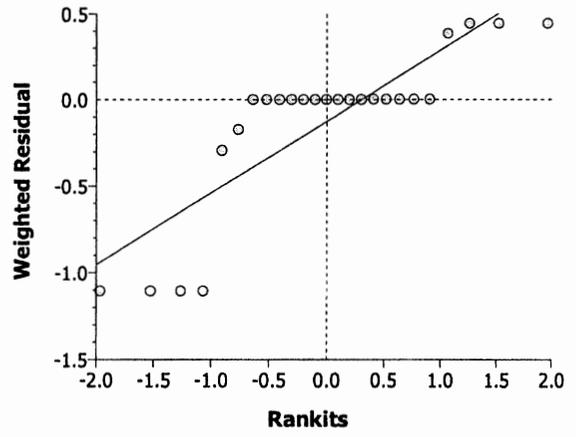
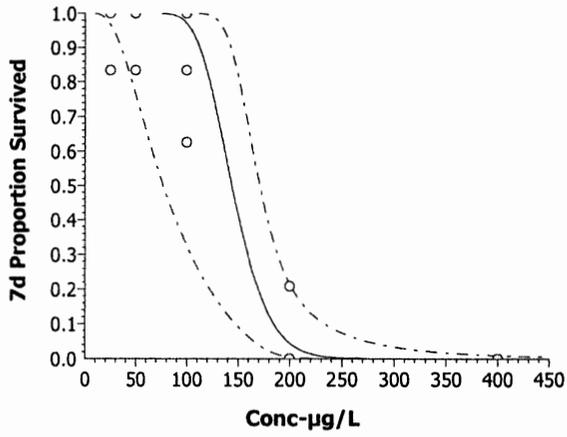


CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test						Nautilus Environmental (CA)			
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version				
7d Proportion Survived	Linear Regression	15-3863-7123	15-3863-7123	18 Jan-05 3:14 PM	CETISv1.025				
Linear Regression Options									
Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.			
Log-Normal	Control Threshold	0.04	Yes	Yes	No	No			
Regression Parameters									
Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)		
Threshold	0.09333	0.03359	0.02750	0.15917	2.779	0.06907	Not Significant		
Slope	11.94000	4.24311	3.62349	20.25650	2.814	0.06707	Not Significant		
Intercept	-20.76951	9.57209	-39.53081	-2.00821	-2.170	0.11848	Not Significant		
Regression Summary									
Itrs	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)	
8	-22.56485	-1.73949	0.08375	0.48515	16.31963	35.17247	0.84125	Non-Significant Heterogeneity	
Residual Analysis									
Attribute	Method	Statistic	Critical	P Level	Decision(0.05)				
Variances	Modified Levene	1.22966	2.74006	0.33386	Equal Variances				
Distribution	Shapiro-Wilk W	0.71770	0.91820	0.00000	Non-normal Distribution				
Test Acceptability									
Attribute	Statistic	Acceptable Range	Decision						
Control Response	0.96000	0.8 - N/A	Passes acceptability criteria						
Point Estimates									
% Effect	Conc-µg/L	95% LCL	95% UCL						
25	126.40400	51.26948	154.74040						
50	143.96290	76.94768	170.88670						
Data Summary									
Conc-µg/L	Control Type	Count	Calculated Variate(A/B)						
			Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.96000	0.80000	1.00000	0.01826	0.08944	24	25
25		5	0.84000	0.80000	1.00000	0.01826	0.08944	21	25
50		5	0.92000	0.80000	1.00000	0.02236	0.10954	23	25
100		5	0.88000	0.60000	1.00000	0.03651	0.17889	22	25
200		5	0.04000	0.00000	0.20000	0.01826	0.08944	1	25
400		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	25

CETIS Analysis Detail

Graphics



CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	15-3863-7123	15-3863-7123	18 Jan-05 3:14 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Untransformed		100	200	1.00	141.421	17.43%

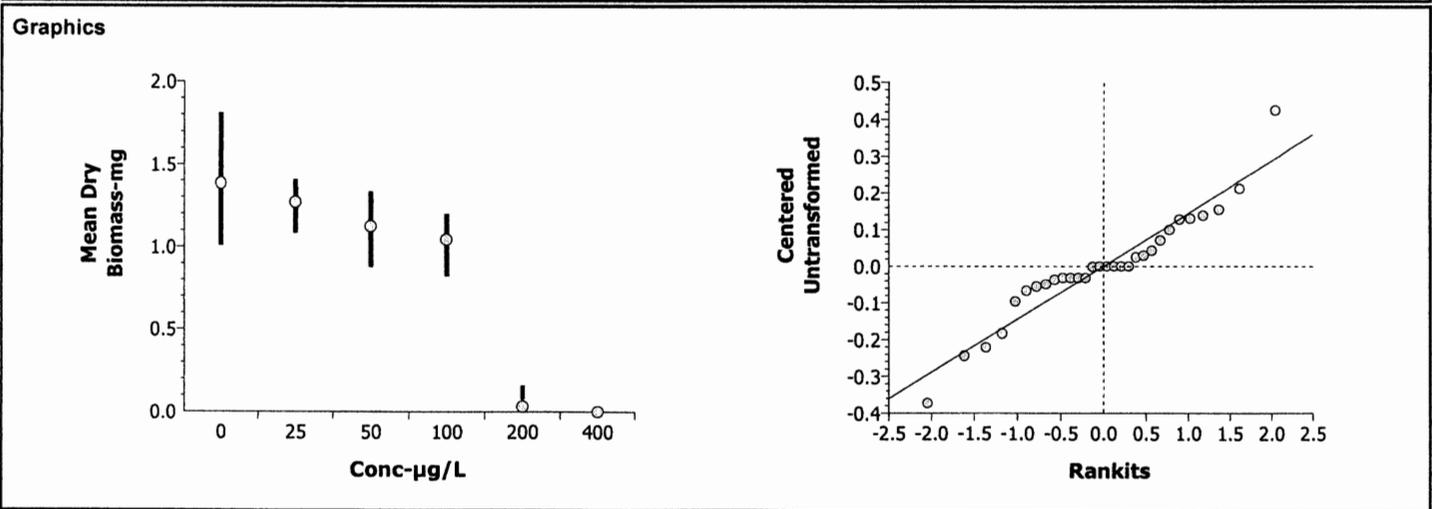
Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	1.38320	0.85 - N/A	Passes acceptability criteria
MSDp	0.17434	N/A - 0.5	Passes acceptability criteria

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	4.34191	3.89507	0.00590	Unequal Variances
Distribution	Shapiro-Wilk W	0.94090	0.89981	0.11735	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	9.75463	1.950926	5	74.74	0.00000	Significant Effect
Error	0.6264662	0.026103	24			
Total	10.3810962	1.9770288	29			

Group Comparisons							
Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		25	24	16	> 0.0500	0	Non-Significant Effect
		50	21	16	> 0.0500	0	Non-Significant Effect
		100	19	16	> 0.0500	0	Non-Significant Effect
		200	15	16	<= 0.0500	1	Significant Effect
		400	15	16	<= 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
0	Lab Control	5	1.38320	1.01000	1.80800	0.28823				
25		5	1.26720	1.08400	1.40600	0.13578				
50		5	1.12240	0.87800	1.33400	0.17649				
100		5	1.04320	0.82200	1.19800	0.13724				
200		5	0.03200	0.00000	0.16000	0.07155				
400		5	0.00000	0.00000	0.00000	0.00000				



CETIS Analysis Detail

Pacific Topsmelt 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Linear Interpolation	15-3863-7123	15-3863-7123	18 Jan-05 3:14 PM	CETISv1.025

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	5795186	200	Yes	Two-Point Interpolation

Test Acceptability

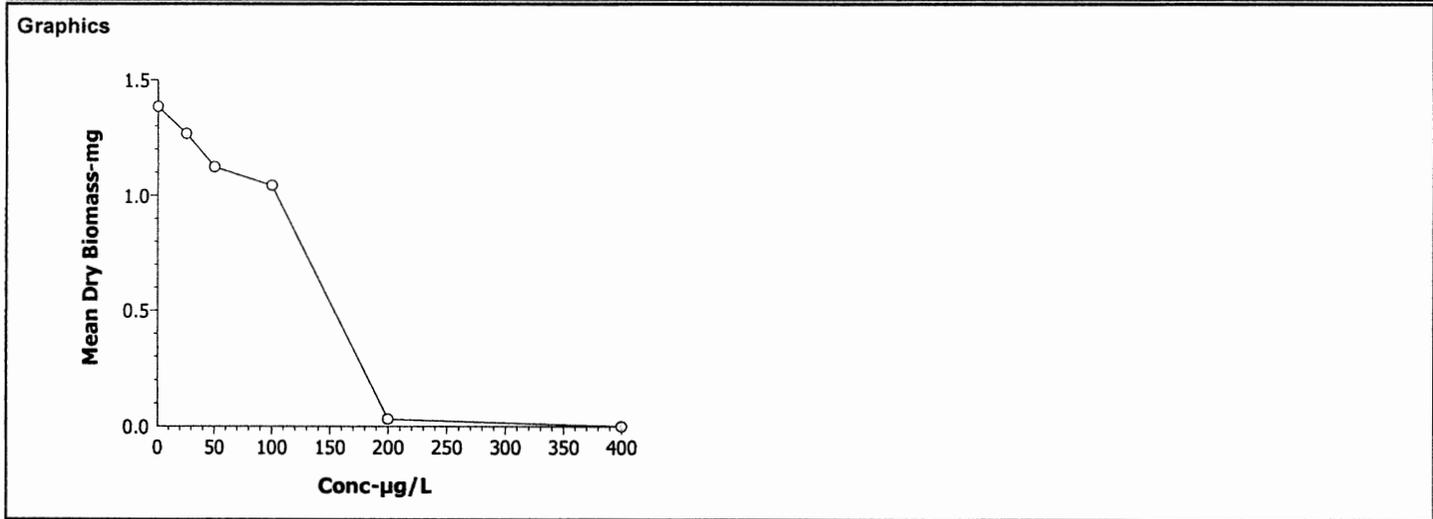
Attribute	Statistic	Acceptable Range	Decision
Control Response	1.38320	0.85 - N/A	Passes acceptability criteria

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	100.57360	4.25270	122.43800
50	134.77060	116.35990	150.10290

Data Summary

Conc-µg/L	Control Type	Count	Calculated Variate				
			Mean	Minimum	Maximum	SE	SD
0	Lab Control	5	1.38320	1.01000	1.80800	0.05883	0.28823
25		5	1.26720	1.08400	1.40600	0.02772	0.13578
50		5	1.12240	0.87800	1.33400	0.03603	0.17649
100		5	1.04320	0.82200	1.19800	0.02801	0.13724
200		5	0.03200	0.00000	0.16000	0.01461	0.07155
400		5	0.00000	0.00000	0.00000	0.00000	0.00000



Marine Chronic Bioassay

Larval Fish Survival & Weights

Client Name: Internal

Test Species: A. affinis

Sample ID: CuCl₂

Start Date/Time: 9-29-04 / 1530

Test No.: 040929 aart

End Date/Time: 10-6-04 / 1300

Conc. (ug/L)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + fish (g)
		0	1	2	3	4	5	6	7			
Lab Control	a	5	5	5	5	5	5	5	5	100	0.02135	0.02799
	b	5	5	5	5	5	5	5	5	100	0.02083	0.02588
	c	5	5	5	5	5	5	5	5	100	0.02298	0.03202
	d	5	4	5	4	4	4	4	4	80	0.02108	0.02766
	e	5	5	5	5	5	5	5	5	100	0.02347	0.03074
25	a	5	4	5	4	4	4	4	4	80	0.02285	0.03014 0.02874
	b	5	4	5	4	4	4	4	4	80	0.02399	0.03014
	c	5	5	5	5	5	5	5	5	100	0.02312	0.03015
	d	5	5	4	4	4	4	4	4	80	0.02519	0.03061
	e	5	4	4	4	4	4	4	4	80	0.02455	0.03154
50	a	5	5	5	5	5	5	5	5	100	0.02457	0.03068
	b	5	5	5	5	5	5	5	5	100	0.01824	0.02400
	c	5	5	5	4	4	4	4	4	80	0.01834	0.02273
	d	5	5	5	5	5	5	5	5	100	0.01905	0.02572
	e	5	5	5	4	4	4	4	4	80	0.01855	0.02368
100	a	5	4	4	4	4	3	3	3	60	0.01987	0.02398
	b	5	5	5	5	5	5	5	5	100	0.01964	0.02498
	c	5	5	4	4	4	4	4	4	80	0.01984	0.02505
	d	5	5	5	5	5	5	5	5	100	0.01888	0.02431
	e	5	5	5	5	5	5	5	5	100	0.02102	0.02701
200	a	5	0	0	0	0	0	0	-	0	-	-
	b	5	0	0	0	0	0	0	-	0	-	-
	c	5	1	1	1	1	1	1	1	20	0.02014	0.02094
	d	5	2	2	2	2	2	1	0	0	-	-
	e	5	2	2	2	2	0	0	0	0	-	-
400	a	5	0	-	-	-	-	-	-	0	-	-
	b	5	0	0	-	-	-	-	-	0	-	-
	c	5	0	0	-	-	-	-	-	0	-	-
	d	5	0	0	-	-	-	-	-	0	-	-
	e	5	0	0	-	-	-	-	-	0	-	-

Tech Initials: YR/SO, RB, SH, RH, RB, SH, RS

Feeding Times (day):

	0	1	2	3	4	5	6
-	0800	0900	0845	0845	0815	0820	
1600	1630	1600	1435	1430	1600	1530	

Weight Data:
 Date/Time in: 10-6-04/1300
 Date/Time out: 10-8-04/0900
 Oven Temp (°C): 65
 Tech Initials: mc

Comments: _____

QC Check: [Signature]
 Final Review: RS 2/17/05

Marine Chronic Bioassay

Water Quality Measurements

Client: Internal

Test Species: A. affinis

Sample ID: CuCl₂

Start Date/Time: 9-29-04 / 1530

Test No: 040929 aart

End Date/Time: 10 6 04 / 1300

Concentration	Lab Control							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.08	7.92	7.95	7.90	7.94	7.93	7.88	
DO (mg/L)	8.6	8.0	8.1	8.0	8.2	7.9	8.3	
Salinity (ppt)	29.5	29.3	29.7	30.0	30.2	30.4	30.0	
Temp (°C)	20.0	20.2	20.7	20.5	19.9	20.1	20.1	
Final								
pH		7.86	7.83	7.91	7.71	7.70	7.65	7.64
DO (mg/L)		7.5	6.5	5.9	5.4	5.8	6.1	5.7
Temp (°C)		19.9	19.9	19.6	20.2	20.0	20.1	20.9

Concentration	100 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.04	7.95	7.99	7.94	7.96	7.95	7.93	
DO (mg/L)	8.5	7.7	7.8	8.0	8.3	7.8	8.2	
Salinity (ppt)	29.7	29.0	29.4	29.9	29.2	30.1	29.5	
Temp (°C)	20.0	20.2	20.2	20.4	19.8	20.0	20.0	
Final								
pH		7.89	7.86	8.09	7.87	7.82	7.75	7.67
DO (mg/L)		7.5	7.4	6.4	6.6	6.7	6.0	6.0
Temp (°C)		20.0	20.0	19.7	20.1	20.1	20.1	20.2

Concentration	25 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.08	7.94	7.98	7.93	7.96	7.96	7.92	
DO (mg/L)	8.6	7.9	8.0	8.0	8.3	8.0	8.3	
Salinity (ppt)	29.6	29.2	29.8	30.0	29.9	30.3	29.7	
Temp (°C)	20.0	20.3	20.3	20.4	19.8	20.0	20.0	
Final								
pH		7.87	7.83	7.99	7.77	7.71	7.68	7.68
DO (mg/L)		7.4	7.1	6.1	5.8	6.3	5.9	6.0
Temp (°C)		19.9	19.8	19.6	20.1	20.1	20.1	20.3

Concentration	200 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.04	7.95	7.98	7.94	7.96	7.94	7.94	
DO (mg/L)	8.5	7.8	7.8	7.9	8.3	7.8	8.2	
Salinity (ppt)	29.7	29.0	29.1	29.5	29.7	29.7	29.3	
Temp (°C)	20.0	20.2	20.2	20.4	19.8	20.0	20.0	
Final								
pH		7.89	7.91	8.14	7.96	7.91	7.86	7.82
DO (mg/L)		7.6	7.6	7.1	7.0	7.0	6.9	6.9
Temp (°C)		20.0	20.0	19.6	20.1	20.1	20.1	19.5

Concentration	50 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.07	7.95	7.99	7.94	7.96	7.94	7.93	
DO (mg/L)	8.5	7.7	7.6	8.0	8.3	7.8	8.3	
Salinity (ppt)	29.6	29.1	29.5	29.9	29.2	30.3	29.8	
Temp (°C)	20.0	20.0	20.2	20.4	19.7	20.0	19.9	
Final								
pH		7.88	7.85	8.04	7.82	7.79	7.71	7.70
DO (mg/L)		7.5	7.2	6.1	6.1	6.6	6.0	6.0
Temp (°C)		19.9	19.9	19.6	20.1	20.0	20.1	20.3

Concentration	400 ug/L							
Day	0	1	2	3	4	5	6	7
Initial								
pH	8.04	7.94						
DO (mg/L)	8.4	7.9	all dead					
Salinity (ppt)	29.2	28.9	all dead					
Temp (°C)	20.0	20.0	all dead					
Final								
pH		7.89						
DO (mg/L)		7.7	all dead					
Temp (°C)		19.8	all dead					

Animal Source/Date Received: ABS / 9-28-04

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

Animal Age at Initiation: 12 days

Comments: _____

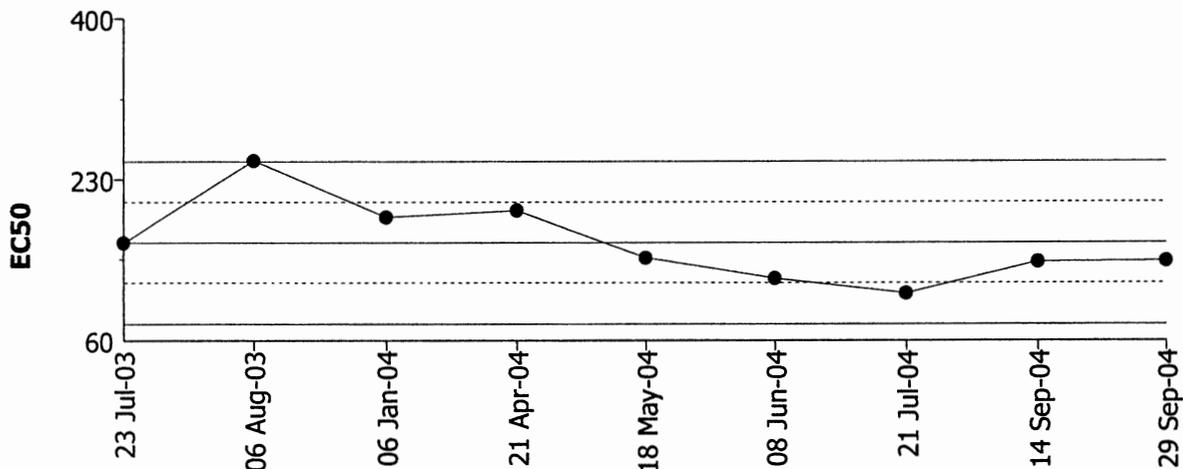
QC Check: [Signature] 1/18/05

Final Review: BCS 2/17/05

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Growth-Survival (7d) Organism: Atherinops affinis (Topsmelt) Material: Copper chloride
 Protocol: EPA/600/R-95/136 (1995) Endpoint: 7d Proportion Survived Source: Reference Toxicant-REF



Mean: 163.253 Count: 9 -1s Warning Limit: 120.349 -2s Action Limit: 77.4458
 Sigma: 42.9035 CV: 26.28% +1s Warning Limit: 206.156 +2s Action Limit: 249.06

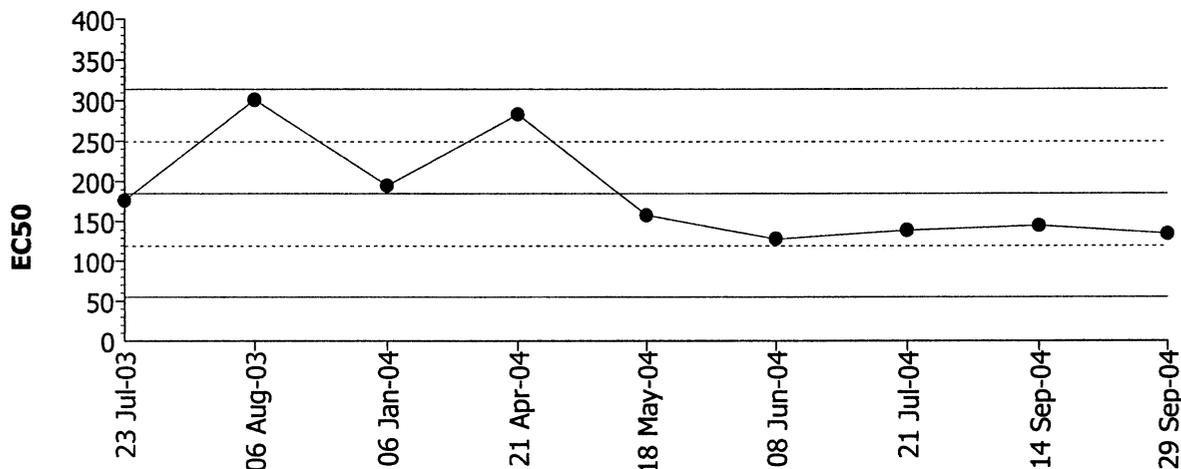
Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2003	Jul	23	163.1473	-0.10546	-0.00246			09-0554-1172	04-1119-2100
2		Aug	6	249.7610	86.50824	2.01635	(+)	(+)	13-7576-8964	20-3813-6001
3	2004	Jan	6	190.1277	26.87494	0.62640			10-1484-1987	04-0574-5118
4		Apr	21	197.3097	34.05684	0.79380			03-1486-7707	07-9780-7840
5		May	18	146.8543	-16.3984	-0.38222			10-9306-1961	08-4701-7250
6		Jun	8	125.3745	-37.8782	-0.88287			14-6414-5672	04-2034-0224
7		Jul	21	109.5876	-53.6651	-1.25083	(-)		19-1876-8605	08-1811-3849
8		Sep	14	143.1498	-20.1030	-0.46856			13-7296-2622	10-6485-6945
9			29	143.9629	-19.2898	-0.44961			15-3863-7123	14-8520-4306

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Growth-Survival (7d) Organism: Atherinops affinis (Topsmelt) Material: Copper chloride
 Protocol: EPA/600/R-95/136 (1995) Endpoint: Mean Dry Biomass-mg Source: Reference Toxicant-REF



Mean: 184.57 Count: 9 -1s Warning Limit: 119.788 -2s Action Limit: 55.0065
 Sigma: 64.7815 CV: 35.10% +1s Warning Limit: 249.351 +2s Action Limit: 314.133

Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2003	Jul	23	176.2014	-8.36813	-0.12917			09-0554-1172	12-0555-8701
2		Aug	6	301.3205	116.7509	1.80223	(+)		13-7576-8964	04-6424-0992
3	2004	Jan	6	194.8224	10.25287	0.15827			10-1484-1987	03-3477-2263
4		Apr	21	283.5708	99.00127	1.52823	(+)		03-1486-7707	13-3930-4373
5		May	18	157.6347	-26.9348	-0.41578			10-9306-1961	14-6538-5718
6		Jun	8	128.4834	-56.0861	-0.86577			14-6414-5672	11-2803-5281
7		Jul	21	139.1653	-45.4042	-0.70088			19-1876-8605	03-5892-6202
8		Sep	14	145.1567	-39.4128	-0.60840			13-7296-2622	07-4867-1382
9			29	134.7706	-49.7989	-0.76872			15-3863-7123	12-4723-9363

A. BAHIA

Report Date: 18 Jan-05 4:03 PM

Link: 11-6774-0355/040928MYRT

CETIS Test Summary

Mysid 7-d Survival and Growth Test						Nautilus Environmental (CA)			
Test No:	17-6172-7776	Test Type:	Growth-Survival (7d)	Duration:	7d 0h	Species:	Americamysis bahia	Source:	Aquatic Biosystems, CO
Start Date:	28 Sep-04 12:15 PM	Protocol:	EPA/821/R-02-014 (2002)	Dil Water:	Laboratory Seawater	Brine:	Not Applicable	Client:	Internal
Ending Date:	05 Oct-04 12:30 PM	Code:	040928MYRT	Project:		Material:	Copper chloride	Source:	Reference Toxicant
Setup Date:	28 Sep-04 12:15 PM	Station:		Sample No:	11-9651-0339	Sample Date:	28 Sep-04	Receive Date:	28 Sep-04
				Sample Age:	12h				
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method			
10-1496-3871	7d Proportion Survived	200	400	282.843	10.75%	Bonferroni Adj Wilcoxon Rank Sum			
12-2185-2308	Mean Dry Biomass-mg	100	200	141.421	10.81%	Bonferroni Adj t			
Point Estimate Summary									
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method			
20-1758-8435	7d Proportion Survived	50	250.53290	229.62060	273.34970	Trimmed Spearman-Kärber			
08-7200-7496	Mean Dry Biomass-mg	25	169.79590	140.20170	201.63630	Linear Interpolation			
		50	254.63410	238.05530	267.75750				
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	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%	
200		8	0.87500	0.60000	1.00000	0.05261	0.14880	17.01%	
400		8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%	
Mean Dry Biomass-mg Summary									
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Lab Control	8	0.29800	0.24400	0.34400	0.01178	0.03116	10.45%	
25		8	0.28925	0.26000	0.32000	0.00738	0.02087	7.21%	
50		8	0.29050	0.23600	0.33400	0.01164	0.03291	11.33%	
100		8	0.26625	0.22000	0.30000	0.00849	0.02401	9.02%	
200		8	0.20500	0.16200	0.24000	0.01086	0.03071	14.98%	
400		8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%	
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	N/A	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	0.80000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	0.80000	1.00000	1.00000	1.00000	1.00000	1.00000
200		1.00000	0.80000	0.60000	0.80000	1.00000	1.00000	0.80000	1.00000
400		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Mean Dry Biomass-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	0.29800	0.34400	N/A	0.32400	0.29000	0.29400	0.24400	0.29200
25		0.30400	0.26400	0.32000	0.30200	0.28400	0.26000	0.30000	0.28000
50		0.32000	0.27400	0.31800	0.29200	0.28800	0.23600	0.26200	0.33400
100		0.27000	0.26000	0.22000	0.28000	0.25000	0.28200	0.26800	0.30000
200		0.23800	0.16200	0.17600	0.22200	0.21200	0.24000	0.17200	0.21800
400		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

CETIS Analysis Detail

Mysid 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	11-6774-0355	11-6774-0355	18 Jan-05 4:02 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj Wilcoxon Rank Su	C > T	Angular (Corrected)		200	400	0.50	282.843	10.75%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	7.41624	3.50070	0.00005	Unequal Variances
Distribution	Shapiro-Wilk W	0.73436	0.92770	0.00000	Non-normal Distribution

ANOVA Table

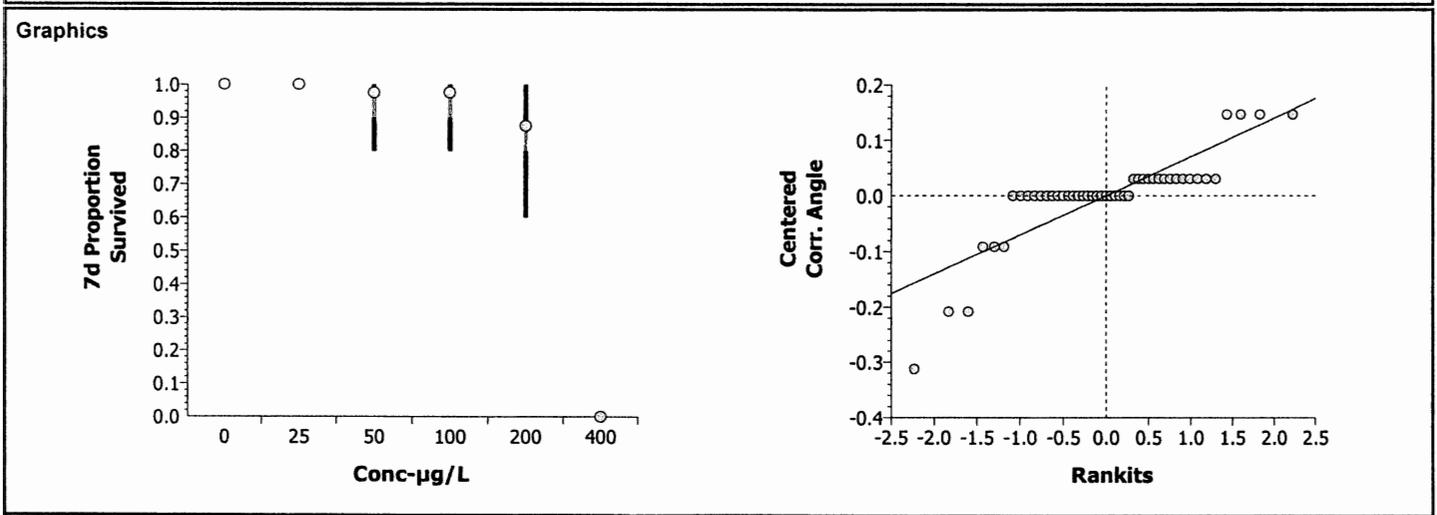
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	7.823153	1.564631	5	208.24	0.00000	Significant Effect
Error	0.3080629	0.007514	41			
Total	8.13121641	1.5721445	46			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		25	64		0.4775	1	Non-Significant Effect
		50	60.5		0.3472	1	Non-Significant Effect
		100	60.5		0.3472	1	Non-Significant Effect
		200	50		0.0603	2	Non-Significant Effect
		400	36		0.0002	2	Significant Effect

Data Summary

Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	7	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020
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
100		8	0.97500	0.80000	1.00000	0.07071	1.31552	1.10715	1.34528	0.08419
200		8	0.87500	0.60000	1.00000	0.14880	1.19858	0.88608	1.34528	0.17272
400		8	0.00000	0.00000	0.00000	0.00000	0.22551	0.22551	0.22551	0.00003



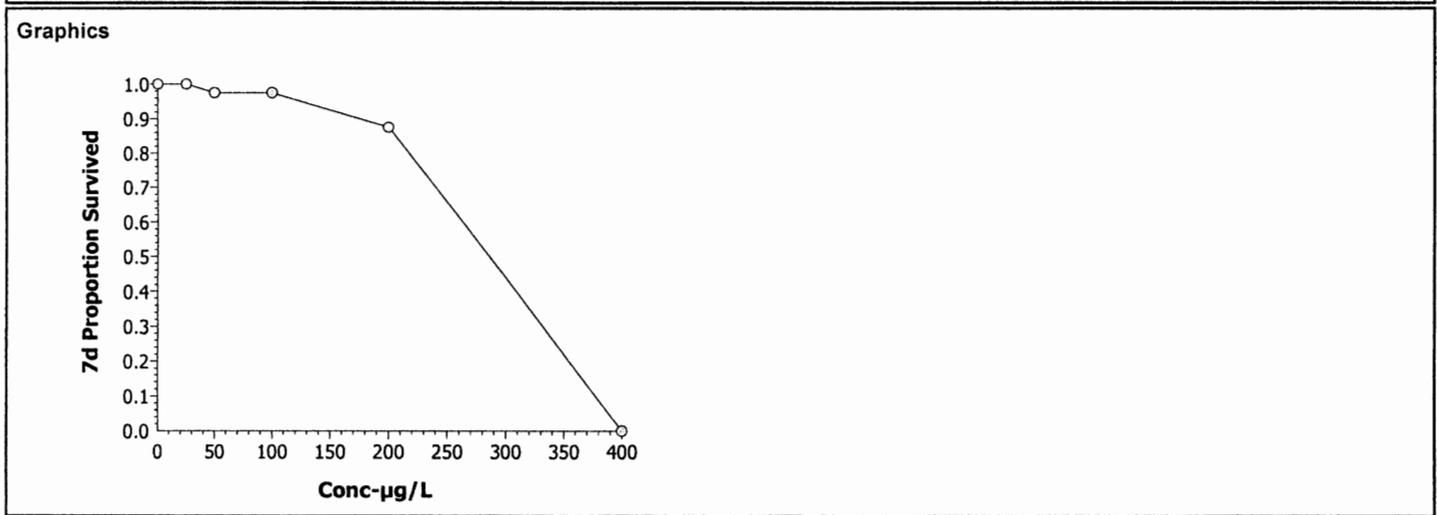
CETIS Analysis Detail

Mysid 7-d Survival and Growth Test	Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Trimmed Spearman-Kärber	11-6774-0355	11-6774-0355	18 Jan-05 4:03 PM	CETISv1.025

Spearman-Kärber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0	0.00%	2.398865	0.01892692	250.53290	229.62060	273.34970

Data Summary			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	7	1.00000	1.00000	1.00000	0.00000	0.00000	35	35
25		8	1.00000	1.00000	1.00000	0.00000	0.00000	40	40
50		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
200		8	0.87500	0.60000	1.00000	0.03037	0.14880	35	40
400		8	0.00000	0.00000	0.00000	0.00000	0.00000	0	40



CETIS Analysis Detail

Mysid 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Comparison	11-6774-0355	11-6774-0355	18 Jan-05 4:03 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Bonferroni Adj t	C > T	Untransformed		100	200	1.00	141.421	10.81%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	3.10021	3.50070	0.01829	Equal Variances
Distribution	Shapiro-Wilk W	0.95629	0.92770	0.12368	Normal Distribution

ANOVA Table

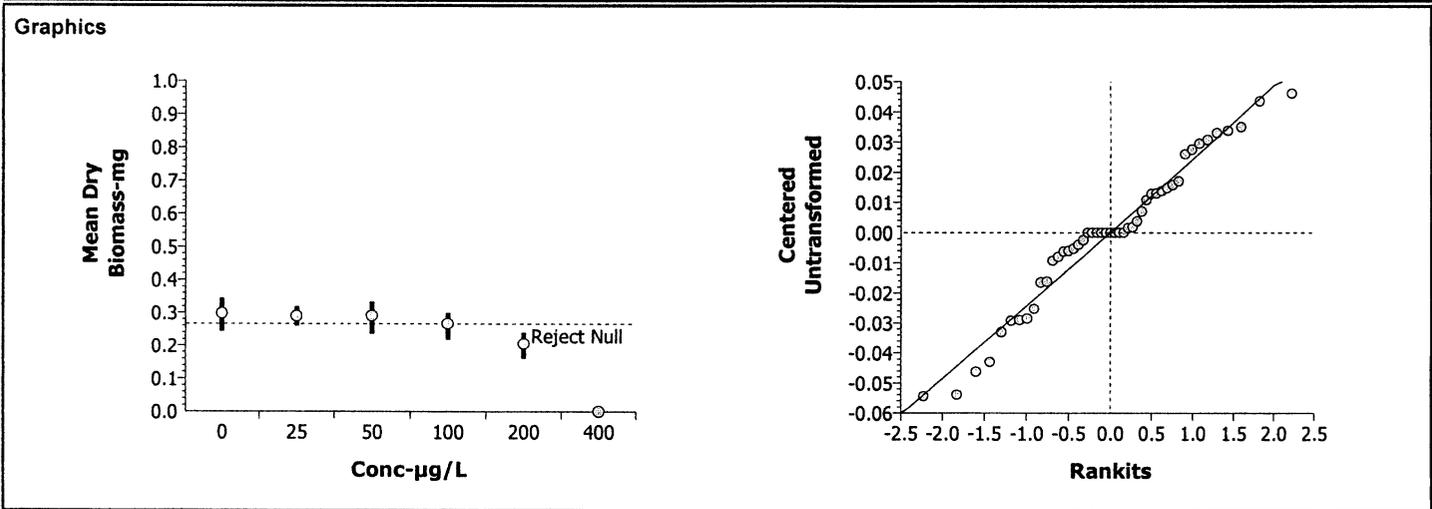
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.5263222	0.105264	5	159.32	0.00000	Significant Effect
Error	0.0270892	0.000661	41			
Total	0.55341134	0.1059251	46			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		25	0.65775	2.42080	0.2572	0.03220	Non-Significant Effect
		50	0.56379	2.42080	0.2880	0.03220	Non-Significant Effect
		100	2.38664	2.42080	0.0109	0.03220	Non-Significant Effect
		200	6.99078	2.42080	0.0000	0.03220	Significant Effect
		400	22.4006	2.42080	0.0000	0.03220	Significant Effect

Data Summary

Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	7	0.29800	0.24400	0.34400	0.03116				
25		8	0.28925	0.26000	0.32000	0.02087				
50		8	0.29050	0.23600	0.33400	0.03291				
100		8	0.26625	0.22000	0.30000	0.02401				
200		8	0.20500	0.16200	0.24000	0.03071				
400		8	0.00000	0.00000	0.00000	0.00000				



CETIS Analysis Detail

Mysid 7-d Survival and Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Dry Biomass-mg	Linear Interpolation	11-6774-0355	11-6774-0355	18 Jan-05 4:03 PM	CETISv1.025

Linear Interpolation Options

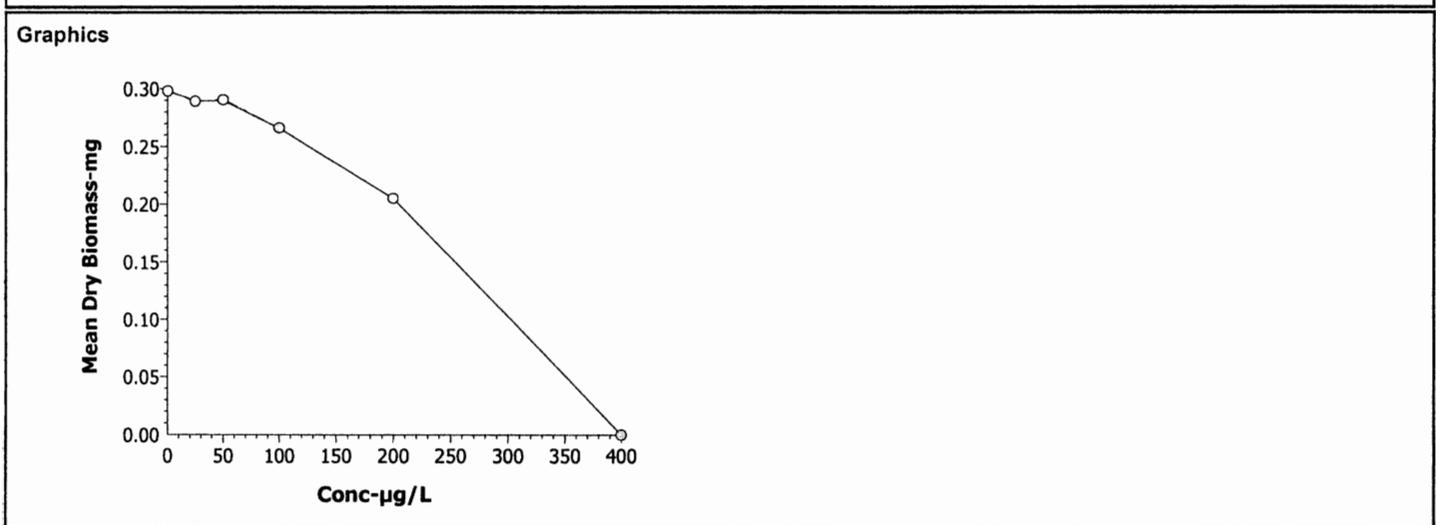
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7747400	200	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
25	169.79590	140.20170	201.63630
50	254.63410	238.05530	267.75750

Data Summary

Conc-µg/L	Control Type	Count	Calculated Variate				
			Mean	Minimum	Maximum	SE	SD
0	Lab Control	7	0.29800	0.24400	0.34400	0.00636	0.03116
25		8	0.28925	0.26000	0.32000	0.00426	0.02087
50		8	0.29050	0.23600	0.33400	0.00672	0.03291
100		8	0.26625	0.22000	0.30000	0.00490	0.02401
200		8	0.20500	0.16200	0.24000	0.00627	0.03071
400		8	0.00000	0.00000	0.00000	0.00000	0.00000



Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: Internal

Test Species: A. bahia

Sample ID: CuCl2

Start Date/Time: 9-28-04 1215

Test No.: 040928myrt

End Date/Time: 10-5-04 1230

Conc. (μ g/L)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
Lab Control	a	5	5	5	5	5	5	5	5	100	0.02864	0.03013
	b	5	5	5	5	5	5	5	5	100	0.02813	0.02985
	c	5	5	5	3*	3	3	3	3	100*	0.03017*	0.03114*
	d	5	5	5	5	5	5	5	5	100	0.03033	0.03195
	e	5	5	5	5	5	5	5	5	100	0.02976	0.03091
	f	5	5	5	5	5	5	5	5	100	0.03038	0.03185
	g	5	5	5	5	5	5	5	5	100	0.02984	0.03106
	h	5	5	5	5	5	5	5	5	100	0.03002	0.03148
25	a	5	5	5	5	5	5	5	5	100	0.03045	0.03197
	b	5	5	5	4	5	5	5	5	100	0.02457	0.02789
	c	5	5	5	4	5	5	5	5	100	0.03279	0.03439
	d	5	5	5	4	5	5	5	5	100	0.02613	0.02964
	e	5	5	5	4	5	5	5	5	100	0.03024	0.03166
	f	5	5	5	4	5	5	5	5	100	0.03136	0.03266
	g	5	5	5	4	5	5	5	5	100	0.03020	0.03170
	h	5	5	5	5	5	5	5	5	100	0.03017	0.03157
50	a	5	5	5	5	5	5	5	5	100	0.03204	0.03364
	b	5	5	5	4	4	4	4	4	80	0.03059	0.03196
	c	5	5	5	5	5	5	5	5	100	0.03000	0.03159
	d	5	5	5	4	5	5	5	5	100	0.03114	0.03260
	e	5	5	5	4	5	5	5	5	100	0.02894	0.03038
	f	5	5	5	4	5	5	5	5	100	0.03208	0.03326
	g	5	5	5	4	5	5	5	5	100	0.02947	0.03078
	h	5	5	5	4	5	5	5	5	100	0.02992	0.03159
100	a	5	5	5	4	5	5	5	5	100	0.03258	0.03004
	b	5	5	5	4	5	5	5	5	100	0.03153	0.03283
	c	5	5	4	4	4	4	4	4	80	0.03132	0.03242
	d	5	5	5	4	5	5	5	5	100	0.03168	0.03308
	e	5	5	5	4	5	5	5	5	100	0.02880	0.03005
	f	5	5	5	4	5	5	5	5	100	0.03262	0.03343
	g	5	5	5	4	5	5	5	5	100	0.03221	0.03355
	h	5	5	5	4	5	5	5	5	100	0.02850	0.03000
Tech Initials			RB	RB	JR	SH	RG	RB	ML			

Feeding Times (day):

	0	1	2	3	4	5	6
-		0745	0820	0900	0945	0945	0915
	1545	1600	1630	1600	1435	1430	1600

Weight Data:
 Date/Time in: 10/5/04 1250
 Date/Time out: 10/6/04 1500
 Oven Temp (°C): 45
 Tech Initials: RB

Comments: * Cup spilled - replicate excluded

QC Check: [Signature]
 Final Review: BS 2/17/05

Marine Chronic Bioassay

Larval Mysid Survival & Weights

Client Name: Internal

Test Species: A. bahia

Sample ID: CuCl2

Start Date/Time: 9-28-04 / 1215

Test No.: 040928myrt

End Date/Time: 10-5-04 / 1220

Conc. (μ g/L)	Rep.	Survival on Test Day:								Percent Survival	pan wt. (g)	pan + mysid (g)
		0	1	2	3	4	5	6	7			
200	a	5	5	5	5	5	5	5	5	100	0.03174	0.03293
	b	5	5	4	4	4	4	4	4	80	0.02799	0.02880
	c	5	5	3	3	3	3	3	3	60	0.03336	0.03124
	d	5	5	4	4	4	4	4	4	80	0.02955	0.03066
	e	5	5	5	5	5	5	5	5	100	0.02892	0.02998
	f	5	5	5	5	5	5	5	5	100	0.02858	0.02978
	g	5	5	4	4	4	4	4	4	80	0.03075	0.03161
	h	5	5	5	5	5	5	5	5	100	0.03025	0.03134
400	a	5	4	3	0	-	-	-	-	0	/	
	b	5	4	3	0	-	-	-	-	0		
	c	5	5	2	0	-	-	-	-	0		
	d	5	5	4	2	1	0	-	-	0		
	e	5	3	0	0	0	0	0	0	0		
	f	5	5	2	0	-	-	-	-	0		
	g	5	5	2	1	0	-	-	-	0		
	h	5	5	1	1	0	-	-	-	0		
	a											
	b											
	c											
	d											
	e											
	f											
	g											
	h											
Tech Initials		R2	R2	JR	SH	RG	RS					

Feeding Times (day):

	0	1	2	3	4	5	6
-		0745	0820	0900	0845	0845	0815
	1545	1600	1630	1600	1435	1430	1600

Weight Data:
 Date/Time in: 10/5/04 1250
 Date/Time out: 12/6/04 1500
 Oven Temp (°C): 65
 Tech Initials: RG

Comments: _____

QC Check: [Signature] 1/18/05
 Final Review: BCS 2/17/05

Client: Internal

Test Species: A. bahia

Sample ID: CuCl2

Start Date/Time: 9-28-04 / 1215

Test No: 040928myrt

End Date/Time: 10-5-04 / 1230

Concentration		Lab Control							
Day	0	1	2	3	4	5	6	7	
Initial									
pH	7.93	7.93	7.92	7.87	7.97	7.97	7.90		
DO (mg/L)	6.4	8.0	7.1	7.0	7.5	7.9	7.6		
Salinity (ppt)	28.9	29.7	30.0	29.9	30.1	30.1	30.4		
Temp (°C)	24.7	25.1	24.4	24.9	24.2	24.7	24.5		
Final									
pH		7.94	7.85	7.77	7.82	7.85	7.79	7.70	
DO (mg/L)		6.5	6.1	5.5	5.7	5.7	5.3	5.2	
Temp (°C)		25.6	24.6	25.4	24.5	24.3	24.8	25.7	

Concentration		100 µg/L							
Day	0	1	2	3	4	5	6	7	
Initial									
pH	7.88	7.92	7.93	7.91	7.96	7.96	7.91		
DO (mg/L)	6.4	7.4	7.1	6.8	7.4	8.0	7.5		
Salinity (ppt)	28.9	29.7	29.8	29.7	29.9	30.0	30.0		
Temp (°C)	24.6	25.6	24.6	25.1	24.3	24.7	24.4		
Final									
pH		7.91	7.91	7.85	7.78	7.79	7.83	7.70	
DO (mg/L)		6.3	6.4	6.4	5.6	5.4	5.6	5.3	
Temp (°C)		25.5	24.8	25.4	24.7	24.1	24.7	25.7	

Concentration		25 µg/L							
Day	0	1	2	3	4	5	6	7	
Initial									
pH	7.84	7.92	7.93	7.90	7.97	7.97	7.91		
DO (mg/L)	6.5	7.9	7.0	6.9	7.5	8.0	7.5		
Salinity (ppt)	29.0	29.6	30.0	29.9	30.1	30.2	30.3		
Temp (°C)	24.7	25.2	25.0	24.9	24.2	24.7	24.5		
Final									
pH		7.90	7.78	7.77	7.76	7.79	7.78	7.68	
DO (mg/L)		6.5	5.7	5.9	5.5	5.3	5.8	4.9	
Temp (°C)		25.6	24.8	25.5	24.7	24.3	24.7	25.8	

Concentration		200 µg/L							
Day	0	1	2	3	4	5	6	7	
Initial									
pH	7.88	7.90	7.94	7.91	7.95	7.96	7.91		
DO (mg/L)	6.5	7.0	7.0	6.9	7.4	8.1	7.5		
Salinity (ppt)	28.5	30.0	29.5	29.4	29.6	29.7	29.7		
Temp (°C)	24.6	25.6	24.4	25.1	24.2	24.7	24.3		
Final									
pH		7.91	7.91	7.91	7.87	7.76	7.89	7.79	
DO (mg/L)		6.3	6.5	7.0	5.8	5.0	6.0	5.7	
Temp (°C)		25.4	24.8	25.5	24.8	24.2	24.9	25.8	

Concentration		50 µg/L							
Day	0	1	2	3	4	5	6	7	
Initial									
pH	7.88	7.92	7.93	7.90	7.96	7.96	7.91		
DO (mg/L)	6.5	7.8	7.1	6.8	7.5	8.0	7.4		
Salinity (ppt)	29.0	30.0	29.9	29.8	30.1	30.1	30.3		
Temp (°C)	24.9	25.2	24.4	25.1	24.2	24.6	24.4		
Final									
pH		7.90	7.84	7.83	7.83	7.82	7.84	7.69	
DO (mg/L)		6.3	6.0	6.0	5.6	5.4	5.6	4.8	
Temp (°C)		25.7	24.8	25.5	24.7	24.2	24.7	25.8	

Concentration		400 µg/L							
Day	0	1	2	3	4	5	6	7	
Initial									
pH	7.88	7.89	7.93	7.91	7.95	7.95			
DO (mg/L)	6.5	6.9	7.1	6.9	7.4	8.0			
Salinity (ppt)	28.5	29.0	28.9	29.2	29.1	29.1			
Temp (°C)	24.6	25.9	24.4	25.2	24.3	24.7			
Final									
pH		7.90	7.89	7.93	7.92	7.95			
DO (mg/L)		6.2	6.5	6.8	6.2	6.0			
Temp (°C)		25.5	24.6	25.4	24.8	24.2			

Animal Source/Date Received: ABS/ 9-28-04

Analysts: Initial: SD RB SD SH RH AH

Animal Age at Initiation: 7 days

Final: RB RB RB RB RH RB uc

Comments: _____

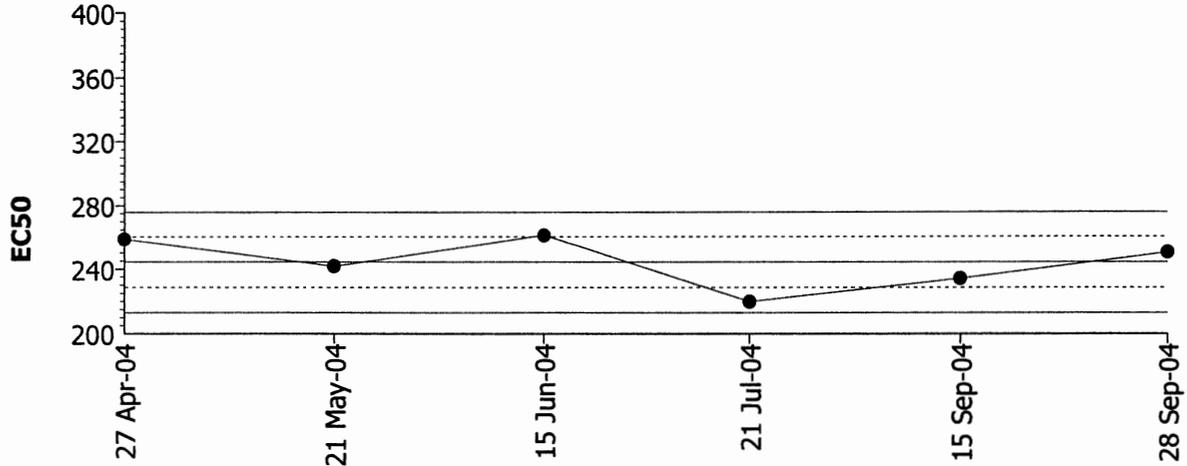
QC Check: [Signature] 1/18/05

Final Review: BCS 2/17/05

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Growth-Survival (7d) Organism: Americamysis bahia (Opossum Shri) Material: Copper chloride
 Protocol: EPA/821/R-02-014 (2002) Endpoint: 7d Proportion Survived Source: Reference Toxicant-REF



Mean: 244.417 Count: 6 -1s Warning Limit: 228.656 -2s Action Limit: 212.895
 Sigma: 15.7610 CV: 6.45% +1s Warning Limit: 260.178 +2s Action Limit: 275.939

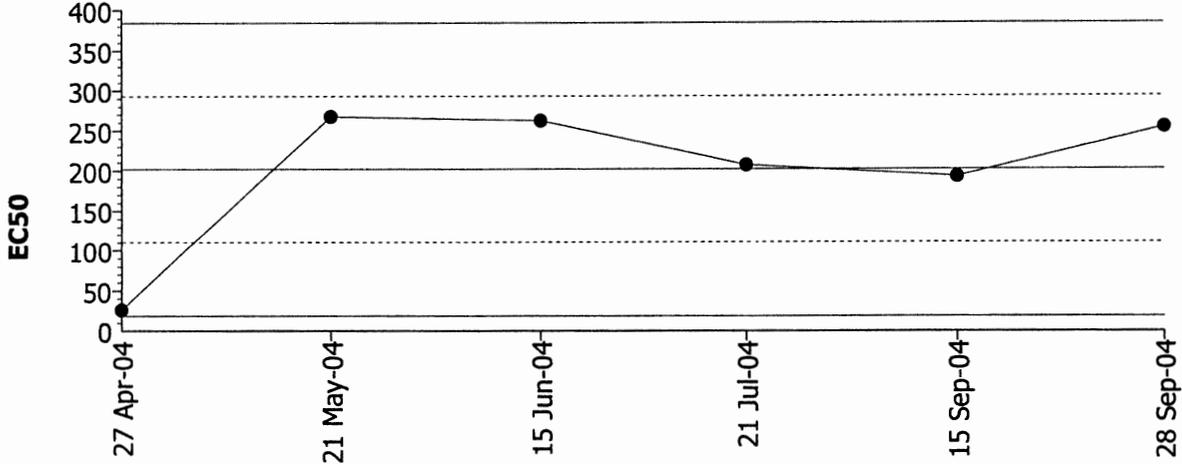
Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Apr	27	258.7923	14.37576	0.91211			03-7850-2349	01-9432-2314
2		May	21	241.8510	-2.56554	-0.16278			11-7321-0330	06-7525-6476
3		Jun	15	261.2044	16.78786	1.06515	(+)		02-7646-0236	12-2674-5191
4		Jul	21	219.7444	-24.6721	-1.56539	(-)		02-9063-5042	15-2505-0324
5		Sep	15	234.3742	-10.0423	-0.63716			04-2249-8254	04-6742-8783
6			28	250.5329	6.11636	0.38807			11-6774-0355	20-1758-8435

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Growth-Survival (7d) Organism: Americamysis bahia (Opossum Shri) Material: Copper chloride
 Protocol: EPA/821/R-02-014 (2002) Endpoint: Mean Dry Biomass-mg Source: Reference Toxicant-REF



Mean: 201.804 Count: 6 -1s Warning Limit: 110.265 -2s Action Limit: 18.7254
 Sigma: 91.5392 CV: 45.36% +1s Warning Limit: 293.343 +2s Action Limit: 384.882

Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Apr	27	25.88019	-175.923	-1.92184	(-)		03-7850-2349	05-0447-3306
2		May	21	267.5858	65.78191	0.71862			11-7321-0330	16-9221-6570
3		Jun	15	262.7812	60.97731	0.66613			02-7646-0236	04-5152-7583
4		Jul	21	207.2085	5.40461	0.05904			02-9063-5042	08-4138-5769
5		Sep	15	192.7336	-9.07029	-0.09909			04-2249-8254	18-8727-9291
6			28	254.6341	52.83021	0.57713			11-6774-0355	08-7200-7496

M. GALLOPROVINCIALIS

Report Date: 10 Jan-05 3:00 PM

Link: 08-9050-7758/040929mgrt

CETIS Test Summary

Bivalve Larval Survival and Development Test							Nautilus Environmental (CA)	
Test No:	03-8541-5445	Test Type:	Development-Survival	Duration:	69h			
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilus galloprovincialis			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Scripps Seawater	Source:	Carlsbad Aquafarms			
Setup Date:	29 Sep-04 02:30 PM	Brine:	Not Applicable					
Sample No:	01-8739-0735	Material:	Copper chloride	Client:	Internal			
Sample Date:	29 Sep-04	Code:	040929mgrt	Project:				
Receive Date:	29 Sep-04	Source:	Reference Toxicant					
Sample Age:	14h	Station:						
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
03-6964-1908	Proportion Normal	5	10	7.071	8.25%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
05-0963-3198	Proportion Normal	50	11.11001	10.76423	11.46690	Trimmed Spearman-Kärber		
Proportion Normal Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.88800	0.87000	0.91000	0.00800	0.01789	2.01%
2.5		5	0.88200	0.84000	0.92000	0.01281	0.02864	3.25%
5		5	0.85600	0.83000	0.89000	0.01077	0.02408	2.81%
10		5	0.60600	0.46000	0.83000	0.06592	0.14741	24.33%
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	0.90000	0.89000	0.87000	0.91000	0.87000		
2.5		0.88000	0.89000	0.84000	0.92000	0.88000		
5		0.87000	0.84000	0.89000	0.83000	0.85000		
10		0.49000	0.46000	0.60000	0.83000	0.65000		
20		0.00000	0.00000	0.00000	0.00000	0.00000		
40		0.00000	0.00000	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	08-9050-7758	08-9050-7758	10 Jan-05 2:57 PM	CETISv1.025

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	7.071	8.25%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	10.76437	3.89507	0.00002	Unequal Variances
Distribution	Shapiro-Wilk W	0.76533	0.89981	0.00001	Non-normal Distribution

ANOVA Table

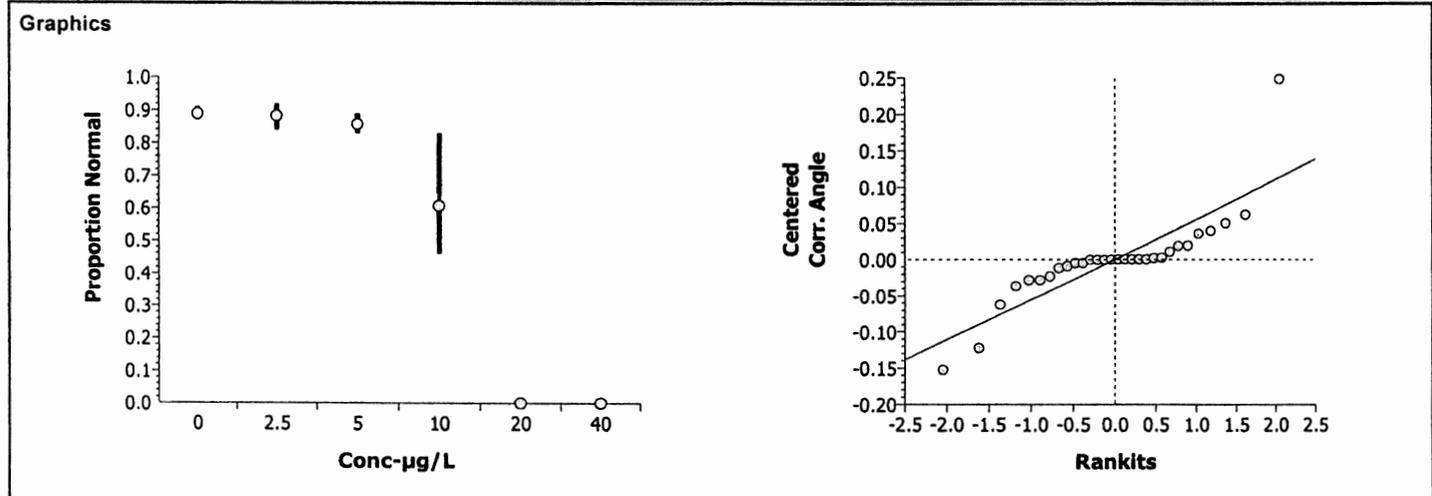
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.708604	1.141721	5	233.13	0.00000	Significant Effect
Error	0.1175357	0.004897	24			
Total	5.82614003	1.1466181	29			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		2.5	26.5	16	> 0.0500	3	Non-Significant Effect
		5	18.5	16	> 0.0500	2	Non-Significant Effect
		10	15	16	<= 0.0500	1	Significant Effect
		20	15	16	<= 0.0500	2	Significant Effect
		40	15	16	<= 0.0500	2	Significant Effect

Data Summary

Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.88800	0.87000	0.91000	0.01789	1.23035	1.20193	1.26610	0.02850
2.5		5	0.88200	0.84000	0.92000	0.02864	1.22203	1.15928	1.28404	0.04457
5		5	0.85600	0.83000	0.89000	0.02408	1.18257	1.14581	1.23273	0.03491
10		5	0.60600	0.46000	0.83000	0.14741	0.89808	0.74536	1.14581	0.15927
20		5	0.00000	0.00000	0.00000	0.00000	0.05050	0.05002	0.05215	0.00093
40		5	0.00000	0.00000	0.00000	0.00000	0.52360	0.52360	0.52360	0.00013



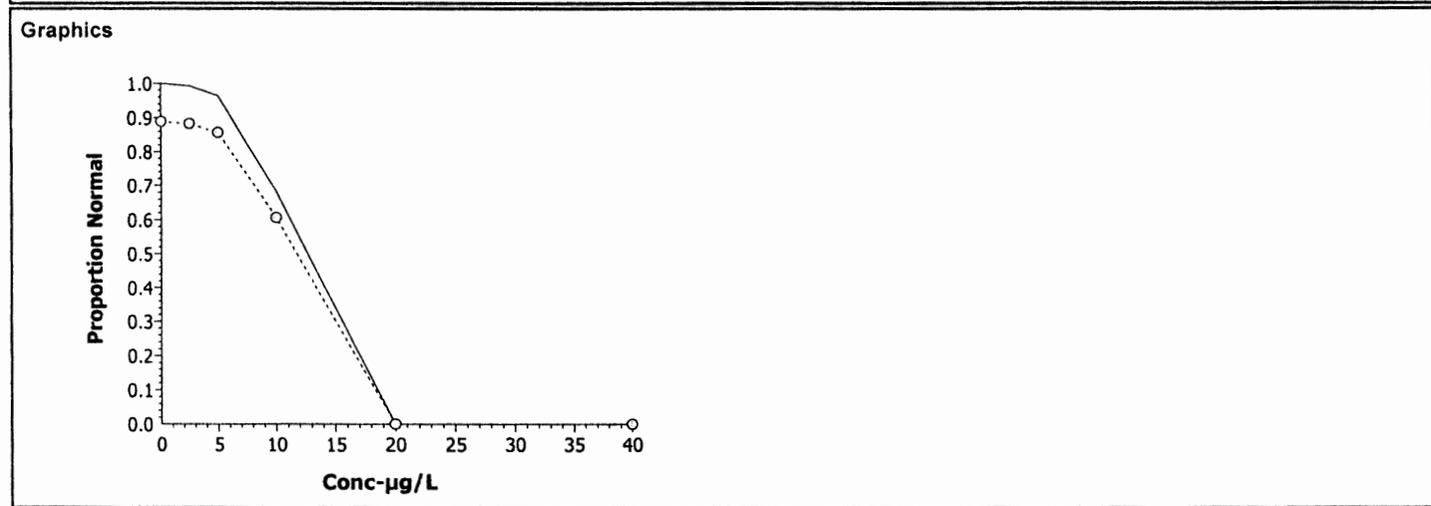
CETIS Analysis Detail

Bivalve Larval Survival and Development Test	Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Trimmed Spearman-Karber	08-9050-7758	08-9050-7758	10 Jan-05 2:59 PM	CETISv1.025

Spearman-Karber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0.112	0.68%	1.045714	0.00686579	11.11001	10.76423	11.46690

Data Summary			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.88800	0.87000	0.91000	0.00365	0.01789	444	500
2.5		5	0.88200	0.84000	0.92000	0.00585	0.02864	441	500
5		5	0.85600	0.83000	0.89000	0.00492	0.02408	428	500
10		5	0.60600	0.46000	0.83000	0.03009	0.14741	303	500
20		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	491
40		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	5



CETIS Worksheet

Data Worksheet: Page 1 of 1

Report Date: 28 Sep-04 11:39 AM

Link: 08-9050-7758/040929mgt

Bivalve Larval Survival and Development Test Nautilus Environmental ~~AMEC Bioassay SD~~

Start Date: 29 Sep-04 Species: Mytilis galloprovincialis Sample Code: 040929mgt
 End Date: ⁰² Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: Reference Toxicant
 Sampled: 29 Sep-04 Material: Copper chloride Sample Station:

Conc-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			1			100	55 91	AA SH 10/21/04 1-7-05
			2			98 100	0	AA SH 10/21
			3			100	66 84	AA SH 10/21
			4			100 0	0	SH 1-7-05
			5			0	0	
			6			100	65	
			7			100	87	
			8			100	89	
			9			100	0	
			10			100	92	
			11			100	83	
			12			100	83	
			13			100	46	
			14			100	60	
			15			100	49	
			16			92	0	
			17			100	88	
			18			100	88	
			19			100	87	
			20			100	84	
			21			100	85	
			22			0	0	
			23			100	87	
			24			99	0	
			25			0	0	
			26			100	89	
			27			100	89	
			28			100	0	
			29			0	0	
			30			100	90	↓

CETIS Worksheet

Data Worksheet: Page 1 of 1

Report Date: 28 Sep-04 11:39 AM

Link: 08-9050-7758/040929mgt

Bivalve Larval Survival and Development Test

Nautilus Environmental

AMEC Bioassay SD

Start Date: 29 Sep-04 **Species:** Mytilis galloprovincialis **Sample Code:** 040929mgt
End Date: 01 Oct-04 **Protocol:** ASTM E724-98 (1999) **Sample Source:** Reference Toxicant
Sampled: 29 Sep-04 **Material:** Copper chloride **Sample Station:**

Conc-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	30					
0	LC	2	26					
0	LC	3	7					
0	LC	4	1					
0	LC	5	23					
2.5		1	18					
2.5		2	8					
2.5		3	20					
2.5		4	10					
2.5		5	17					
5		1	19					
5		2	3					
5		3	27					
5		4	11					
5		5	21					
10		1	15					
10		2	13					
10		3	14					
10		4	12					
10		5	6					
20		1	28					
20		2	2					
20		3	16					
20		4	9					
20		5	24					
40		1	25					
40		2	4					
40		3	29					
40		4	5					
40		5	22					

QC:SH

Marine Chronic Bioassay

Water Quality Measurements

Client: Internal
 Sample ID: CuCl₂
 Test No.: 040929mgt

Test Species: M. galloprovincialis
 Start Date/Time: 09/29/2004 1430
 End Date/Time: 10-2-04 1100

Concentration ____µg/L____	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)			SAL	T°	DO	pH
	0	24	48	0	24	48	0	24	48	0	24	48				
Lab Control	33.1	33.7	33.4	14.3	16.3	14.7	7.4	8.4	8.6	8.15	8.07	7.97	33.4	14.9	8.4	7.97
2.5	33.2	33.5	33.5	14.3	16.0	14.9	7.5	8.5	8.8	8.14	8.11	7.99	34.0	14.5	8.6	8.02
5	33.1	33.4	33.7	14.3	16.1	15.8	7.6	8.3	8.9	8.15	8.10	7.99	34.0	14.7	8.1	8.07
10	33.0	33.4	33.8	14.3	16.1	15.8	7.7	8.4	8.9	8.15	8.10	7.99	34.0	14.5	8.5	8.07
20	32.7	33.3	33.7	14.3	16.0	15.8	7.7	8.4	8.9	8.15	8.11	7.99	33.9	14.4	8.5	8.02
40	33.0	33.1	33.6	14.3	16.0	15.8	7.6	8.4	9.0	8.15	8.11	8.00	33.8	14.4	8.4	8.07

Technician Initials:

0	24	48	72
RS	RS	RS	RS

Animal Source/Date Received: Cansland Aquafarms

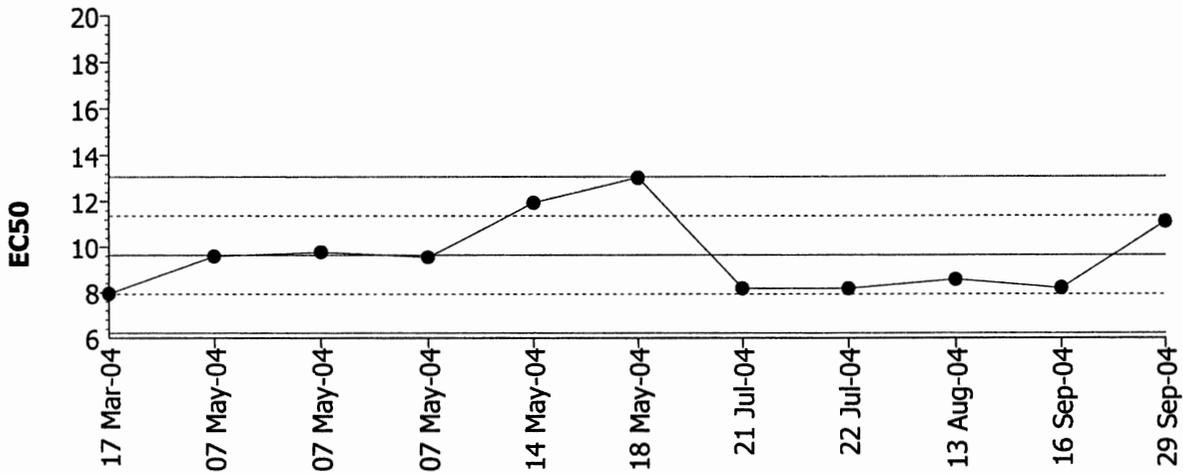
Comments: 0 hrs: _____
 24 hrs: _____
 48 hrs: _____

QC Check: AH 10/20/04 Final Review: [Signature] 1/10/05

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Development Organism: Mytilus galloprovincialis (Bay Mussel) Material: Copper chloride
 Protocol: ASTM E724-98 (1999) Endpoint: Proportion Normal Source: Reference Toxicant-REF



Mean: 9.64001 Count: 11 -1s Warning Limit: 7.927 -2s Action Limit: 6.21399
 Sigma: 1.71301 CV: 17.77% +1s Warning Limit: 11.3530 +2s Action Limit: 13.0660

Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Mar	17	7.94845	-1.69156	-0.98748			07-0718-5439	06-5279-9544
2		May	7	9.58867	-0.05134	-0.02997			15-8395-5288	14-8282-6566
3			7	9.77986	0.13985	0.08164			15-8395-5288	16-3535-8279
4			7	9.54346	-0.09655	-0.05636			15-8395-5288	10-4563-3091
5			14	11.93694	2.29693	1.34087	(+)		12-7186-2401	03-8733-5192
6			18	13.02629	3.38628	1.97680	(+)		13-7134-0508	18-1746-8913
7		Jul	21	8.17105	-1.46895	-0.85753			09-2239-2847	03-8913-8180
8			22	8.17076	-1.46924	-0.85770			10-6041-7464	12-5495-9475
9		Aug	13	8.56574	-1.07427	-0.62712			12-2022-9458	14-1756-2838
10		Sep	16	8.19887	-1.44114	-0.84129			14-8927-7427	10-7122-5839
11			29	11.11001	1.47000	0.85814			08-9050-7758	05-8719-5453

M. PYRIFERA

CETIS Test Summary

Macrocystis Germination and Germ Tube Growth Test						Nautilus Environmental (CA)		
Test No:	12-5309-2415	Test Type:	Growth-Germination	Duration:	48h	Species:	Macrocystis pyrifera	
Start Date:	28 Sep-04	Protocol:	EPA/600/R-95/136 (1995)	Source:	Field Collected			
Ending Date:	30 Sep-04	Dil Water:	Laboratory Seawater					
Setup Date:	28 Sep-04 12:00 AM	Brine:	Not Applicable					
Sample No:	09-3795-1893	Material:	Copper chloride	Client:	Internal			
Sample Date:	28 Sep-04	Code:	040928mprt	Project:				
Receive Date:	28 Sep-04	Source:	Reference Toxicant					
Sample Age:	N/A	Station:						
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
06-7156-5676	Mean Length	32	56	42.332	14.92%	Bonferroni Adj t		
10-0159-7613	Proportion Germinated	32	56	42.332	4.79%	Dunnett's Multiple Comparison		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
06-0423-0465	Mean Length	25	103.20990	52.19506	120.01520	Linear Interpolation		
		50	139.50620	124.90860	150.30280			
05-4617-1680	Proportion Germinated	50	135.02490	130.50040	139.70630	Trimmed Spearman-Kärber		
Test Acceptability								
Analysis	Endpoint	Attribute	Statistic	Acceptable Range	Decision			
06-0423-0465	Mean Length	Control Response	14.7	10 - N/A	Passes acceptability criteria			
06-7156-5676	Mean Length	Control Response	14.7	10 - N/A	Passes acceptability criteria			
05-4617-1680	Proportion Germinated	Control Response	0.94600	0.7 - N/A	Passes acceptability criteria			
10-0159-7613	Proportion Germinated	Control Response	0.94600	0.7 - N/A	Passes acceptability criteria			
06-7156-5676	Mean Length	MSDp	0.14917	N/A - 0.2	Passes acceptability criteria			
10-0159-7613	Proportion Germinated	MSDp	0.04791	N/A - 0.2	Passes acceptability criteria			
Mean Length Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	14.7	13.5	17	0.6393	1.4296	9.73%
18		5	13.9	13.25	15.25	0.35	0.7826	5.63%
32		5	13.55	12	14.5	0.4430	0.9906	7.31%
56		5	12.45	11.5	13	0.3	0.6708	5.39%
100		5	11.35	9.75	13	0.6255	1.3987	12.32%
180		5	3.25	2.5	4.25	0.2850	0.6374	19.61%
320		5	2.875	2.5	3.25	0.375	0.5303	18.45%
Proportion Germinated Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.94600	0.92000	0.97000	0.00872	0.01949	2.06%
18		5	0.90800	0.85000	0.95000	0.01655	0.03701	4.08%
32		5	0.90800	0.87000	0.95000	0.01319	0.02950	3.25%
56		5	0.87400	0.84000	0.93000	0.01568	0.03507	4.01%
100		5	0.80800	0.80000	0.82000	0.00374	0.00837	1.04%
180		5	0.19000	0.13000	0.25000	0.02074	0.04637	24.40%
320		5	0.01800	0.00000	0.06000	0.01200	0.02683	149.07

CETIS Test Summary

Report Date: 18 Jan-05 4:31 PM

Link: 14-9538-8730/040928mprt

Mean Length Detail						
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	13.5	17	13.5	14.75	14.75
18		13.75	13.5	13.75	13.25	15.25
32		13.25	14.25	14.5	12	13.75
56		11.5	12.75	12	13	13
100		13	11.25	12.5	9.75	10.25
180		3.25	3.25	4.25	2.5	3
320		N/A	2.5	N/A	3.25	N/A

Proportion Germinated Detail						
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.94000	0.92000	0.94000	0.96000	0.97000
18		0.92000	0.92000	0.95000	0.85000	0.90000
32		0.87000	0.92000	0.95000	0.90000	0.90000
56		0.85000	0.93000	0.87000	0.84000	0.88000
100		0.82000	0.80000	0.81000	0.81000	0.80000
180		0.18000	0.22000	0.25000	0.13000	0.17000
320		0.00000	0.03000	0.00000	0.06000	0.00000



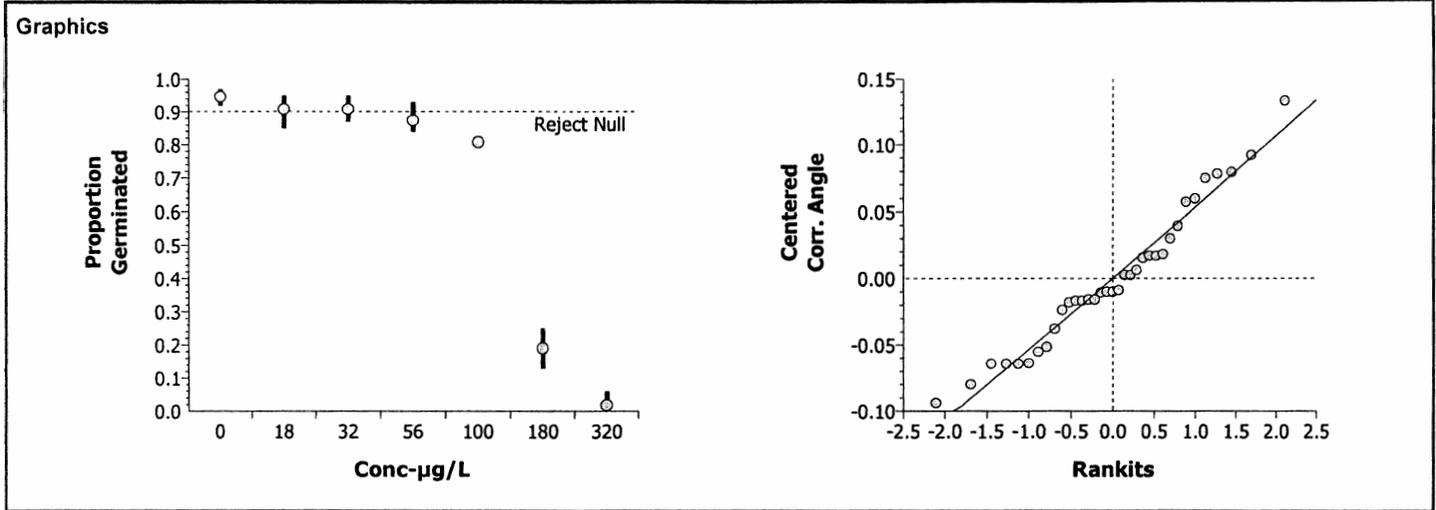
Bcs 2/17/05

CETIS Analysis Detail

Comparisons: Page 3 of 4
 Report Date: 18 Jan-05 4:31 PM
 Analysis: 10-0159-7613/040928mprt

Macrocystis Germination and Germ Tube Growth Test							Nautilus Environmental (CA)			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Proportion Germinated	Comparison		14-9538-8730	14-9538-8730	18 Jan-05 4:31 PM	CETISv1.025				
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp		
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		32	56	3.13	42.332	4.79%		
Test Acceptability										
Attribute	Statistic	Acceptable Range	Decision							
Control Response	0.94600	0.7 - N/A	Passes acceptability criteria							
MSDp	0.04791	N/A - 0.2	Passes acceptability criteria							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)					
Variances	Bartlett	11.56641	16.81190	0.07237	Equal Variances					
Distribution	Shapiro-Wilk W	0.96491	0.91004	0.38680	Normal Distribution					
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)				
Between	6.978679	1.163113	6	339.30	0.00000	Significant Effect				
Error	0.0959832	0.003428	28							
Total	7.07466190	1.1665411	34							
Group Comparisons										
Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)			
Lab Control		18	1.95166	2.40857	> 0.0500	0.08919	Non-Significant Effect			
		32	1.98491	2.40857	> 0.0500	0.08919	Non-Significant Effect			
		56	3.46994	2.40857	<= 0.0500	0.08919	Significant Effect			
		100	5.99719	2.40857	<= 0.0500	0.08919	Significant Effect			
		180	24.0513	2.40857	<= 0.0500	0.08919	Significant Effect			
		320	33.083	2.40857	<= 0.0500	0.08919	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	0.94600	0.92000	0.97000	0.01949	1.33937	1.28404	1.39671	0.04407
18		5	0.90800	0.85000	0.95000	0.03701	1.26710	1.17310	1.34528	0.06295
32		5	0.90800	0.87000	0.95000	0.02950	1.26587	1.20193	1.34528	0.05313
56		5	0.87400	0.84000	0.93000	0.03507	1.21088	1.15928	1.30303	0.05635
100		5	0.80800	0.80000	0.82000	0.00837	1.11730	1.10715	1.13265	0.01065
180		5	0.19000	0.13000	0.25000	0.04637	0.44876	0.36886	0.52360	0.05962
320		5	0.01800	0.00000	0.06000	0.02683	0.11432	0.05002	0.24747	0.09179

CETIS Analysis Detail



CETIS Analysis Detail

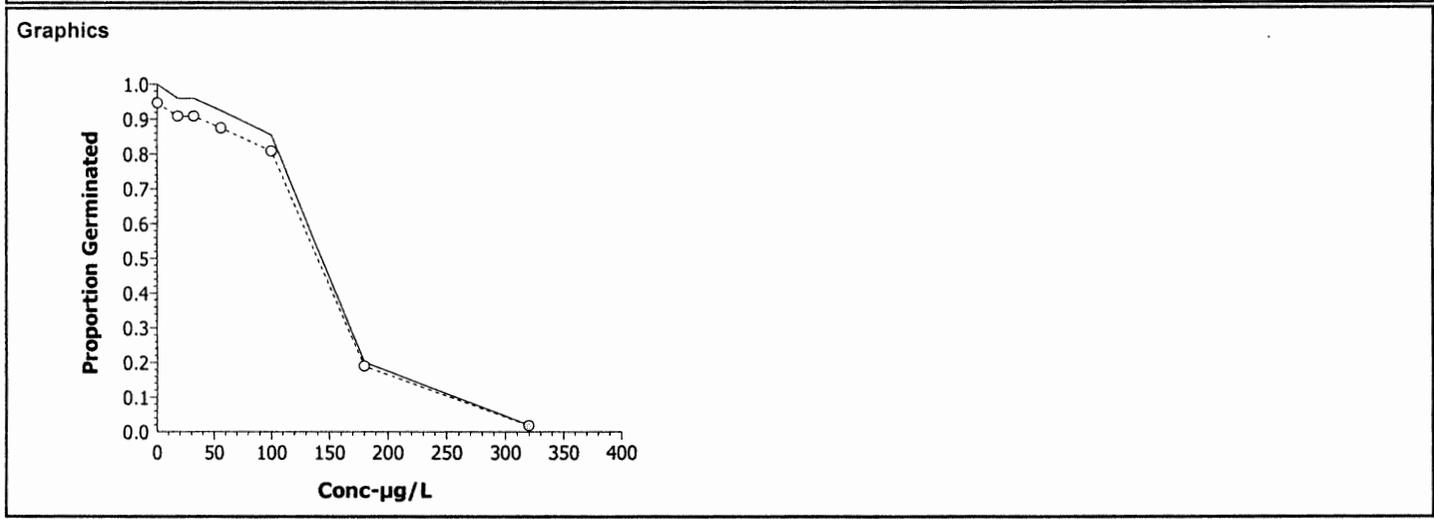
Macrocystis Germination and Germ Tube Growth Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Germinated	Trimmed Spearman-Kärber	14-9538-8730	14-9538-8730	18 Jan-05 4:31 PM	CETISv1.025

Spearman-Kärber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0.054	4.02%	2.130414	0.0074011	135.02490	130.50040	139.70630

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	0.94600	0.7 - 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	5	0.94600	0.92000	0.97000	0.00398	0.01949	473	500
18		5	0.90800	0.85000	0.95000	0.00756	0.03701	454	500
32		5	0.90800	0.87000	0.95000	0.00602	0.02950	454	500
56		5	0.87400	0.84000	0.93000	0.00716	0.03507	437	500
100		5	0.80800	0.80000	0.82000	0.00171	0.00837	404	500
180		5	0.19000	0.13000	0.25000	0.00946	0.04637	95	500
320		5	0.01800	0.00000	0.06000	0.00548	0.02683	9	500

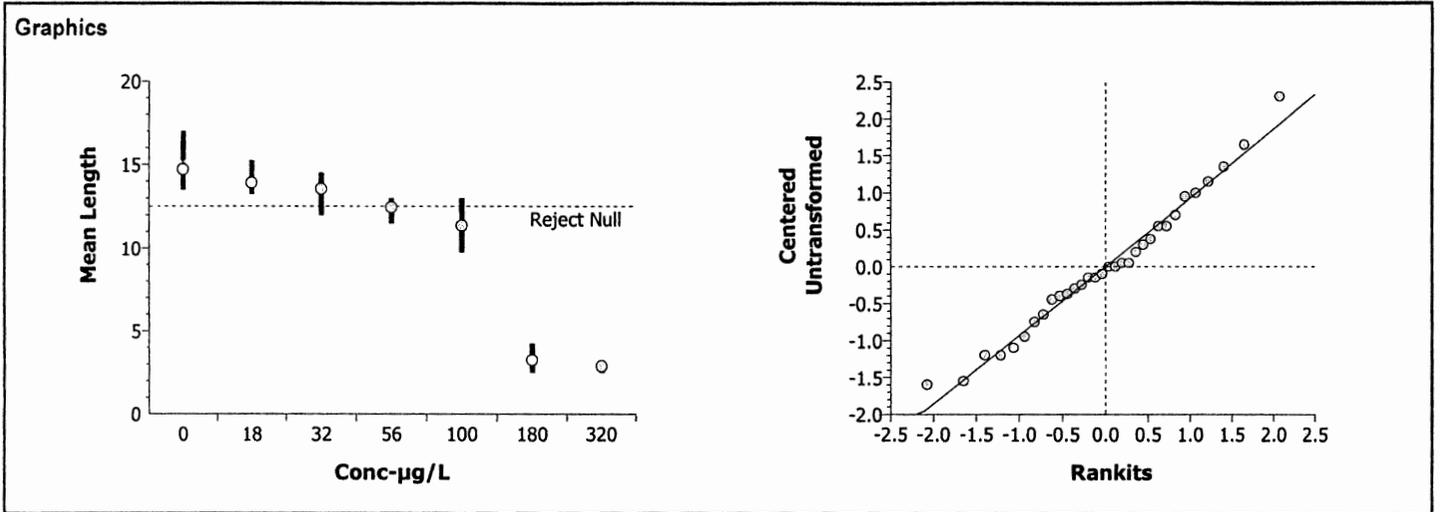


CETIS Analysis Detail

Comparisons: Page 1 of 4
 Report Date: 18 Jan-05 4:31 PM
 Analysis: 06-7156-5676/040928mpt

Macrocystis Germination and Germ Tube Growth Test							Nautilus Environmental (CA)			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Mean Length	Comparison		14-9538-8730	14-9538-8730	18 Jan-05 4:31 PM	CETISv1.025				
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp		
Bonferroni Adj t	C > T	Untransformed		32	56	3.13	42.332	14.92%		
Test Acceptability										
Attribute	Statistic	Acceptable Range	Decision							
Control Response	14.7	10 - N/A	Passes acceptability criteria							
MSDp	0.14917	N/A - 0.2	Passes acceptability criteria							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)					
Variances	Bartlett	4.94207	16.81190	0.55126	Equal Variances					
Distribution	Shapiro-Wilk W	0.97864	0.90435	0.79655	Normal Distribution					
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)				
Between	586.4793	97.74655	6	93.69	0.00000	Significant Effect				
Error	26.08125	1.04325	25							
Total	612.560558	98.789801	31							
Group Comparisons										
Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)			
Lab Control		18	1.23841	2.56598	0.1135	1.65759	Non-Significant Effect			
		32	1.78022	2.56598	0.0436	1.65759	Non-Significant Effect			
		56	3.48304	2.56598	0.0009	1.65759	Significant Effect			
		100	5.18586	2.56598	0.0000	1.65759	Significant Effect			
		180	17.7248	2.56598	0.0000	1.65759	Significant Effect			
		320	13.8375	2.56598	0.0000	2.19279	Significant Effect			
Data Summary										
Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	14.7	13.5	17	1.4296				
18		5	13.9	13.25	15.25	0.7826				
32		5	13.55	12	14.5	0.9906				
56		5	12.45	11.5	13	0.6708				
100		5	11.35	9.75	13	1.3987				
180		5	3.25	2.5	4.25	0.6374				
320		2	2.875	2.5	3.25	0.5303				

CETIS Analysis Detail



CETIS Analysis Detail

Macrocystis Germination and Germ Tube Growth Test					Nautilus Environmental (CA)	
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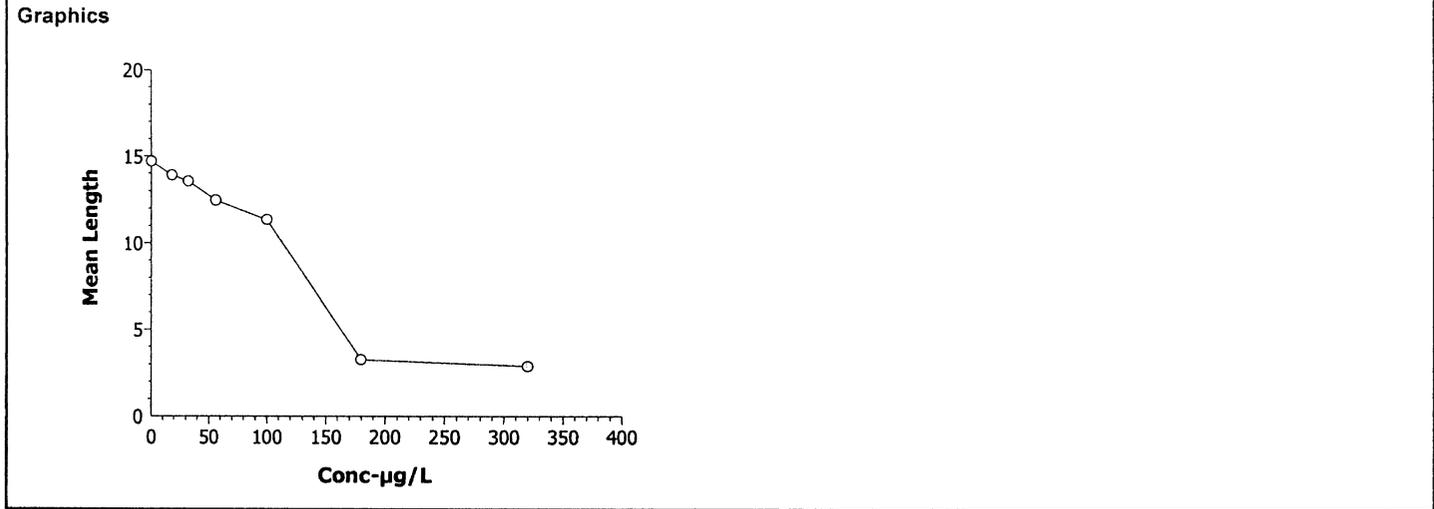
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Mean Length	Linear Interpolation	14-9538-8730	14-9538-8730	18 Jan-05 4:31 PM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	140176	200	Yes	Two-Point Interpolation

Test Acceptability			
Attribute	Statistic	Acceptable Range	Decision
Control Response	14.7	10 - N/A	Passes acceptability criteria

Point Estimates			
% Effect	Conc-µg/L	95% LCL	95% UCL
25	103.20990	52.19506	120.01520
50	139.50620	124.90860	150.30280

Data Summary		Calculated Variate					
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Lab Control	5	14.7	13.5	17	0.29182	1.4296
18		5	13.9	13.25	15.25	0.15975	0.78262
32		5	13.55	12	14.5	0.20220	0.99058
56		5	12.45	11.5	13	0.13693	0.67082
100		5	11.35	9.75	13	0.28550	1.39866
180		5	3.25	2.5	4.25	0.13010	0.63738
320		2	2.875	2.5	3.25	0.10825	0.53033



Macrocyctis Germination and Germ Tube Growth Test

Nautilus Bioassay Laboratory - San Diego

Start Date: 28-Sep-04

Species: *Macrocyctis pyrifera*

Test ID: 040928mprt

End Date: 30-Sep-04

Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Sample Source: Internal

Sampled: 28-Sep-04

Sample Station: CuCl₂

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
1	100	81	4	4	4	3	3	4	6	3	4	4	2.5	9.75
2	100	22	1	1	1	3	1	1	1	1	1	2	2.5	3.25
3	100	87	4	4	5	5	6	4	5	5	6	4	2.5	12
4	100	6	1	1	1	1	1	1	3	1	1	2	2.5	3.25
5	100	18	1	1	2	2	2	1	1	1	1	1	2.5	3.25
6	100	80	3	2	2	4	4	5	5	6	5	5	2.5	10.25
7	100	88	5	4	5	6	6	5	4	7	5	5	2.5	13
8	100	3	1	1	1	1	1	1	1	1	1	1	2.5	2.5
9	100	25	3	2	2	2	1	1	2	2	1	1	2.5	4.25
10	100	92	6	6	5	4	5	5	7	6	5	5	2.5	13.5
11	100	84	5	5	4	5	6	5	5	7	5	5	2.5	13
12	100	80	8	4	4	4	5	3	5	5	3	4	2.5	11.25
13	100	97	6	6	7	7	5	5	6	4	8	5	2.5	14.75
14	100	90	5	5	4	5	5	6	8	6	6	5	2.5	13.75
15	100	81	4	4	5	5	4	6	5	8	5	4	2.5	12.5
16	100	82	4	7	5	5	4	5	6	7	4	5	2.5	13
17	100	92	9	7	6	10	5	6	6	7	7	5	2.5	17
18	100	95	6	5	5	7	6	4	4	5	6	7	2.5	13.75
19	100	94	5	5	7	6	5	4	3	7	6	6	2.5	13.5
20	100	95	5	4	6	10	7	6	5	5	6	4	2.5	14.5
21	100	87	7	5	5	5	6	4	4	5	6	6	2.5	13.25
22	100	96	6	8	9	5	7	4	5	5	6	4	2.5	14.75
23	100	90	6	6	5	5	6	6	7	5	8	7	2.5	15.25
24	100	92	6	5	5	5	7	7	5	5	6	6	2.5	14.25
25	100	85	7	6	5	4	7	5	5	4	6	4	2.5	13.25
26	100	0												
27	100	0												
28	100	93	4	5	5	5	7	6	4	4	5	6	2.5	12.75
29	100	90	3	4	5	6	6	5	5	4	5	5	2.5	12
30	100	92	5	5	5	7	7	6	6	5	5	4	2.5	13.75
31	100	13	1	1	1	1	1	1	1	1	1	1	2.5	2.5
32	100	17	2	1	1	1	1	1	2	1	1	1	2.5	3
33	100	0												
34	100	85	5	5	4	4	3	5	7	5	4	4	2.5	11.5
35	100	94	5	5	6	6	5	5	5	5	7	5	2.5	13.5

QC Check:  1/18/05

Final Review: BCS 2/17/05

Analyst: R6

Macrocyctis Germination and Germ Tube Growth Test

AMEC Bioassay Laboratory - San Diego

Start Date: 28-Sep-04

Species: *Macrocyctis pyrifera*

Test ID: 040928mprt

End Date: 30-Sep-04

Protocol: EPA/600/R-95/136 (1995 West Coast Manual)

Sample Source: Internal

Sampled:

Sample Station: CuCl₂

Random Number	Number Counted	Number Germinated	Tube Length Measurements (micrometer units)										Calibration Factor	Mean Tube Length (µm)
1	100	81	4	4	4	3	3	4	6	3	4	4	2.5	#DIV/0!
2	100	22	1	1	1	3	1	1	1	1	1	2		#DIV/0!
3	100	87	4	4	5	5	6	4	5	5	6	4		#DIV/0!
4	100	6	1	1	1	1	1	1	3	1	1	2		#DIV/0!
5	100	18	1	1	2	2	2	1	1	1	1	1		#DIV/0!
6	100	80	3	2	2	4	4	5	5	6	5	5		#DIV/0!
7	100	88	5	4	5	6	6	5	4	7	5	5		#DIV/0!
8	100	3	1	1	1	1	1	1	1	1	1	1		#DIV/0!
9	100	25	3	2	2	2	1	1	2	2	1	1		#DIV/0!
10	100	42	5	6	5	4	5	5	7	6	5	5		#DIV/0!
11	100	84	5	5	4	5	5	5	5	5	5	5		#DIV/0!
12	100	80	5	5	4	4	5	5	5	5	5	5		#DIV/0!
13	100	97	5	6	7	7	5	5	5	5	5	5		#DIV/0!
14	100	90	5	5	4	5	5	5	5	5	5	5		#DIV/0!
15	100	81	4	4	5	5	4	5	5	5	5	5		#DIV/0!
16	100	82	4	5	5	5	5	5	5	5	5	5		#DIV/0!
17	100	42	9	7	6	10	5	5	5	5	5	5		#DIV/0!
18	100	45	6	5	5	7	6	5	5	5	6	7		#DIV/0!
19	100	94	5	5	5	6	5	5	5	5	5	5		#DIV/0!
20	100	95	5	5	5	6	5	5	5	5	5	5		#DIV/0!
21	100	87	7	5	5	5	5	5	5	5	5	5		#DIV/0!
22	100	96	6	5	5	5	5	5	5	5	5	5		#DIV/0!
23	100	90	6	5	5	5	5	5	5	5	5	5		#DIV/0!
24	100	92	6	5	5	5	5	5	5	5	5	5		#DIV/0!
25	100	85	7	6	5	4	7	5	5	4	6	4		#DIV/0!
26	100	0												#DIV/0!
27	100	0												#DIV/0!
28	100	93	4	5	5	5	7	6	4	4	5	6		#DIV/0!
29	100	90	3	4	5	6	6	5	5	4	5	5		#DIV/0!
30	100	92	5	5	5	7	7	6	5	5	5	4		#DIV/0!
31	100	13	1	1	1	1	1	1	1	1	1	1		#DIV/0!
32	100	17	2	1	1	1	1	1	2	1	1	1		#DIV/0!
33	100	0												#DIV/0!
34	100	85	5	5	4	4	3	5	7	5	4	4		#DIV/0!
35	100	94	5	5	6	6	5	5	5	5	7	5		#DIV/0!

QC Check: 1/18/05

Final Review: Bcs 2/17/05

Analyst: RG

CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 27 Sep-04 3:29 PM
 Link: 14-9538-8730/040928mprt

Macrocyctis Germination and Germ Tube Growth Test **AMEC Bioassay SD**

Start Date: 28 Sep-04 **Species:** Macrocyctis pyrifera **Sample Code:** 040928mprt
End Date: 30 Sep-04 **Protocol:** EPA/600/R-95/136 (1995) **Sample Source:** Reference Toxicant
Sampled: 28 Sep-04 **Material:** Copper chloride **Sample Station:**

Conc-µg/L	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	LC	1	19					
0	LC	2	17					
0	LC	3	35					
0	LC	4	22					
0	LC	5	13					
18		1	30					
18		2	10					
18		3	18					
18		4	25					
18		5	23					
32		1	21					
32		2	24					
32		3	20					
32		4	29					
32		5	14					
56		1	34					
56		2	28					
56		3	3					
56		4	11					
56		5	7					
100		1	16					
100		2	12					
100		3	15					
100		4	1					
100		5	6					
180		1	5					
180		2	2					
180		3	9					
180		4	31					
180		5	32					
320		1	27					
320		2	8					
320		3	33					
320		4	4					
320		5	26					

466

Marine Chronic Bioassay

Kelp Spore Germination & Growth Worksheet

Client: Internal
Test No.: 040928mpRT

Start Date/Time: 9-28-04 1 1145
End Date/Time: 9-30-04 1 1145
Test Species: Macrocystis pyrifera

Date Collected: 9-28-04
Kelp Collector: Dave Guttoff
Collection Location: La Jolla Cove
Conditions (weather, etc.): good conditions, 10' vis
Dilution Water Source (Client I: Internal): Scrapps
Dilution Water Source (Client II: _____): _____
Dilution Water Source (Client III: _____): _____
Dilution Water Source (Reference Toxicant): _____

Time of Initial Rinsing and Dessication: 1000 (keep kelp from each collecting bag separated)
Time of Rinsing and Transfer to Release Beakers: 1100 (keep kelp from each collecting bag separated)
Conditions of Zoospore Density and Motility (beaker 1): Good density, Good motility.
Time of Blade Removal From Release Beaker 1/Beaker 2 (if needed): 1145

Density Counts (target = 90): 96 87 79 74 87 Mean: 85
Mean 85 * 10,000 = 850000 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) = 0.26 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 _____ * $\frac{0.25 \text{ ml}}{1 \text{ container}}$ = _____ $\frac{\text{spores}}{225,000 \text{ spores}}$ = _____ (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)

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: 1200 Amount inoculated: 0.25 ml 24-hour germination check: 89/

Comments: _____

QC Check: [Signature] 11/8/05 Final Review: Bis 21,7105

Marine Chronic Bioassay

Water Quality Measurements

Client : Internal

Test Species: Macrocystis pyrifera

Sample ID: CuCl2

Start Date/Time: 9-28-04 1 1145

Test No: 040928 mprt

End Date/Time: 9-30-04 1 1145

Analyst: RG

Test Type: Kelp Spore Germination and Growth

Concentration <u>(μg/L)</u>	Initial Readings				Final Readings			
	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)
Lab Control	8.8	8.07	33.7	15.0	7.2	7.97	33.5	14.4
18	8.8	8.07	33.4	15.0	7.2	8.00	33.1	14.4
32	8.7	8.07	33.9	15.1	7.3	8.01	33.6	14.4
64	8.7	8.07	33.9	14.9	7.3	8.02	33.5	14.4
100	8.4	8.07	33.7	14.9	7.3	8.00	33.3	14.4
180	8.7	8.07	33.5	15.0	7.3	8.01	33.1	14.4
320	8.4	8.07	32.5	14.9	7.4	8.03	32.4	14.4

Comments: _____

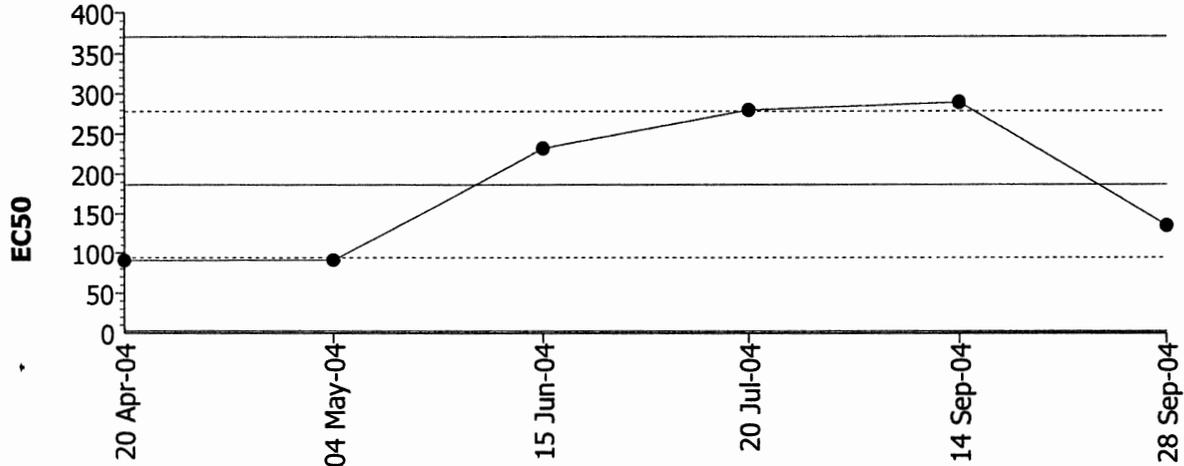
QC Check: ~~RG~~ 1/18/05

Final Review: Bcs 2/17/05

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Growth-Germination Organism: *Macrocystis pyrifera* (Giant Kelp) Material: Copper chloride
 Protocol: EPA/600/R-95/136 (1995) Endpoint: Proportion Germinated Source: Reference Toxicant-REF



Mean: 186.31 Count: 6 -1s Warning Limit: 94.3069 -2s Action Limit: 2.30384
 Sigma: 92.0030 CV: 49.38% +1s Warning Limit: 278.313 +2s Action Limit: 370.316

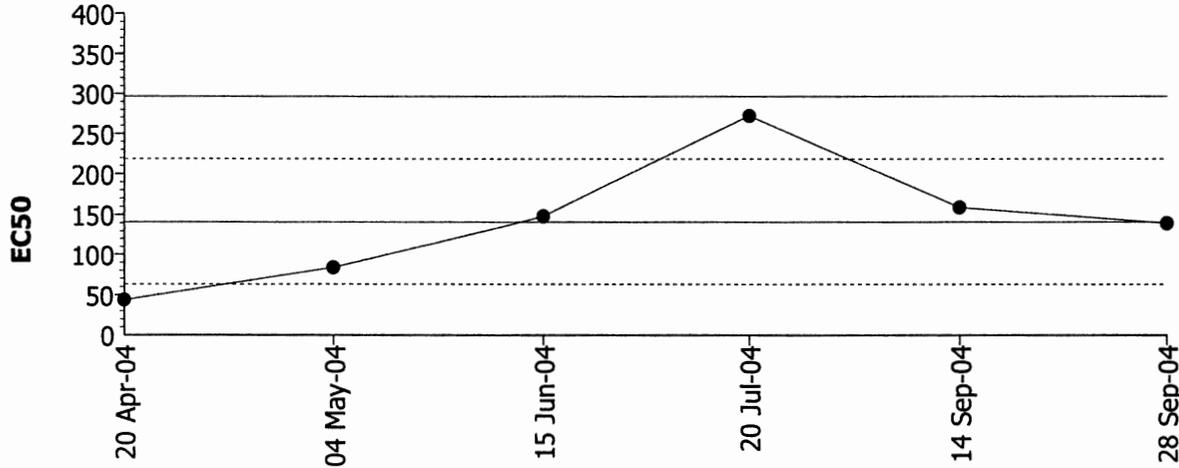
Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Apr	20	90.67673	-95.6331	-1.03946	(-)		09-9230-3313	18-8028-7365
2		May	4	90.92757	-95.3823	-1.03673	(-)		09-6750-3359	18-3325-2147
3		Jun	15	232.1032	45.79333	0.49774			16-6144-9264	12-3527-2896
4		Jul	20	279.8408	93.53093	1.01661	(+)		16-4174-1254	04-1965-4293
5		Sep	14	289.2860	102.9761	1.11927	(+)		10-8312-4875	04-4461-0912
6			28	135.0249	-51.2849	-0.55743			14-9538-8730	05-4617-1680

CETIS QC Chart

Nautilus Environmental (CA)

Test Type: Growth-Germination Organism: *Macrocystis pyrifera* (Giant Kelp) Material: Copper chloride
 Protocol: EPA/600/R-95/136 (1995) Endpoint: Mean Length Source: Reference Toxicant-REF

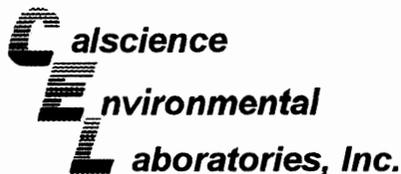


Mean: 141.127 Count: 6 -1s Warning Limit: 63.2487 -2s Action Limit: -14.629
 Sigma: 77.8780 CV: 55.18% +1s Warning Limit: 219.005 +2s Action Limit: 296.883

Quality Control Data

Point	Year	Month	Day	Data	Delta	Sigma	Warning	Action	Link	Analysis
1	2004	Apr	20	43.80952	-97.3172	-1.24961	(-)		09-9230-3313	13-1201-9241
2		May	4	84.13953	-56.9872	-0.73175			09-6750-3359	06-5122-8145
3		Jun	15	148.0000	6.87327	0.08826			16-6144-9264	14-9178-8375
4		Jul	20	272.4359	131.3091	1.68609	(+)		16-4174-1254	13-3196-6978
5		Sep	14	158.8692	17.74247	0.22782			10-8312-4875	06-7384-9813
6			28	139.5062	-1.62053	-0.02081			14-9538-8730	06-0423-0465

APPENDIX D
ANALYTICAL CHEMISTRY DATA



October 08, 2004

Chris Stransky
Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Subject: **Calscience Work Order No.: 04-09-1781**
Client Reference: City of Buenaventura / SCRE

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 09/30/2004 and analyzed in accordance with the attached chain-of-custody.

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

ANALYTICAL REPORT



Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Date Received: 09/30/04
Work Order No.: 04-09-1781
Preparation: EPA 3005A Filt.
Method: EPA 6010B
Units: mg/L

Project: City of Buenaventura / SCRE

Page 1 of 2

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2	04-09-1781-1	09/28/04	Aqueous	09/30/04	10/01/04	040930L06

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	ND	0.00500	1		Selenium	0.00730	0.00500	1	
Nickel	ND	0.00500	1		Zinc	ND	0.00500	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1	04-09-1781-2	09/28/04	Aqueous	09/30/04	10/01/04	040930L06

Parameter	Result	RL	DF	Qual	Units	Parameter	Result	RL	DF	Qual	Units
Copper	0.00838	0.00500	1			Selenium	0.00747	0.00500	1		
Nickel	ND	0.00500	1			Zinc	0.0165	0.00500	1		

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-3	04-09-1781-3	09/28/04	Aqueous	09/30/04	10/01/04	040930L06

Parameter	Result	RL	DF	Qual	Units	Parameter	Result	RL	DF	Qual	Units
Copper	ND	0.00500	1			Selenium	ND	0.00500	1		
Nickel	ND	0.00500	1			Zinc	0.00503	0.00500	1		

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-C-3	04-09-1781-4	09/28/04	Aqueous	09/30/04	10/01/04	040930L06

Parameter	Result	RL	DF	Qual	Units	Parameter	Result	RL	DF	Qual	Units
Copper	ND	0.00500	1			Selenium	ND	0.00500	1		
Nickel	0.00586	0.00500	1			Zinc	ND	0.00500	1		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Date Received: 09/30/04
Work Order No.: 04-09-1781
Preparation: EPA 3010A Total
Method: EPA 6010B
Units: mg/L

Project: City of Buenaventura / SCRE

Page 2 of 2

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2	04-09-1781-1	09/28/04	Aqueous	09/30/04	10/01/04	040930L06

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Copper	ND	0.00500	1		Selenium	ND	0.00500	1	
Nickel	ND	0.00500	1		Zinc	ND	0.00500	1	

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1	04-09-1781-2	09/28/04	Aqueous	09/30/04	10/01/04	040930L06

Parameter	Result	RL	DF	Qual	Units	Parameter	Result	RL	DF	Qual	Units
Copper	ND	0.00500	1			Selenium	0.00999	0.00500	1		
Nickel	ND	0.00500	1			Zinc	0.0174	0.00500	1		

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-3	04-09-1781-3	09/28/04	Aqueous	09/30/04	10/01/04	040930L06

Parameter	Result	RL	DF	Qual	Units	Parameter	Result	RL	DF	Qual	Units
Copper	ND	0.00500	1			Selenium	ND	0.00500	1		
Nickel	ND	0.00500	1			Zinc	ND	0.00500	1		

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-C-3	04-09-1781-4	09/28/04	Aqueous	09/30/04	10/01/04	040930L06

Parameter	Result	RL	DF	Qual	Units	Parameter	Result	RL	DF	Qual	Units
Copper	ND	0.00500	1			Selenium	0.00704	0.00500	1		
Nickel	0.00628	0.00500	1			Zinc	ND	0.00500	1		

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

Date Received: 09/30/04
 Work Order No: 04-09-1781

Project: City of Buenaventura / SCRE

Page 1 of 2

Client Sample Number	Lab Sample Number	Date Collected	Matrix
SCRE-A-2	04-09-1781-1	09/28/04	Aqueous

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Solids, Total Suspended	25	1.0	1		mg/L	N/A	10/01/04	EPA 160.2
Cyanide, Total	ND	0.050	1		mg/L	N/A	10/07/04	EPA 335.2
Carbon, Total Organic	11	5	10	D	mg/L	N/A	10/01/04	EPA 415.1
Carbon, Dissolved Organic	9.6	5.0	10	B,D	mg/L	N/A	10/01/04	EPA 415.1

SCRE-B-1	04-09-1781-2	09/28/04	Aqueous
----------	--------------	----------	---------

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Solids, Total Suspended	17	1.0	1		mg/L	N/A	10/01/04	EPA 160.2
Cyanide, Total	ND	0.050	1		mg/L	N/A	10/07/04	EPA 335.2
Carbon, Total Organic	18	5	10	D	mg/L	N/A	10/01/04	EPA 415.1
Carbon, Dissolved Organic	15	5	10	B,D	mg/L	N/A	10/01/04	EPA 415.1

SCRE-B-3	04-09-1781-3	09/28/04	Aqueous
----------	--------------	----------	---------

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Solids, Total Suspended	15	1.0	1		mg/L	N/A	10/01/04	EPA 160.2
Cyanide, Total	ND	0.050	1		mg/L	N/A	10/07/04	EPA 335.2
Carbon, Total Organic	11	5	10	D	mg/L	N/A	10/01/04	EPA 415.1
Carbon, Dissolved Organic	8.6	5.0	10	B,D	mg/L	N/A	10/01/04	EPA 415.1

SCRE-C-3	04-09-1781-4	09/28/04	Aqueous
----------	--------------	----------	---------

Parameter	Result	RL	DF	Qual	Units	Date Prepared	Date Analyzed	Method
Solids, Total Suspended	12	1.0	1		mg/L	N/A	10/01/04	EPA 160.2
Cyanide, Total	ND	0.050	1		mg/L	N/A	10/07/04	EPA 335.2
Carbon, Total Organic	18	5	10	D	mg/L	N/A	10/01/04	EPA 415.1
Carbon, Dissolved Organic	18	5	10	B,D	mg/L	N/A	10/01/04	EPA 415.1

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

Date Received: 05/25/01
 Work Order No: 04-09-1781

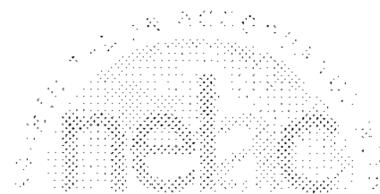
Project: City of Buenaventura / SCRE

Page 2 of 2

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	10/07/04	EPA 335.2
Carbon, Total Organic	ND	0.50	1		mg/L	N/A	10/01/04	EPA 415.1
Carbon, Dissolved Organic	0.81	0.50	1		mg/L	N/A	10/01/04	EPA 415.1

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

Date Received: 09/30/04
 Work Order No: 04-09-1781
 Preparation: EPA 3005A Filt.
 Method: EPA 6010B

Project City of Buenaventura / SCRE

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
04-09-1697-1	Aqueous	ICP 3300	09/30/04	10/01/04	040930S06

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Copper	103	103	80-120	0	0-20	
Nickel	102	100	80-120	2	0-20	
Selenium	99	96	80-120	3	0-20	
Zinc	106	104	80-120	2	0-20	

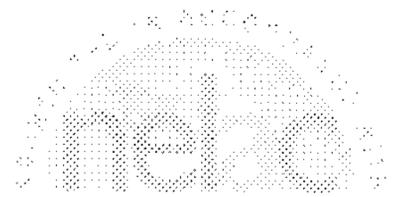
RPD - Relative Percent Difference , CL - Control Limit



Environmental

Laboratories, Inc.

Quality Control - Spike/Spike Duplicate



Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Date Received:
Work Order No:

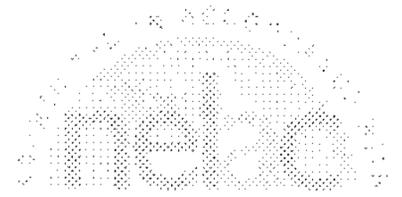
09/30/04
04-09-1781

Project: City of Buenaventura / SCRE

Matrix: Aqueous

<u>Parameter</u>	<u>Method</u>	<u>Quality Control Sample ID</u>	<u>Date Analyzed</u>	<u>Date Extracted</u>	<u>MS% REC</u>	<u>MSD % REC</u>	<u>%REC CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Carbon, Total Organic	EPA 415.1	04-09-1798-1	10/01/04	N/A	98	93	70-130	2	0-25	
Carbon, Dissolved Organic	EPA 415.1	SCRE-A-2	10/01/04	N/A	96	100	70-130	4	0-25	

RPD - Relative Percent Difference , CL - Control Limit



Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

Date Received: 09/30/04
 Work Order No: 04-09-1781

Project: City of Buenaventura / SCRE

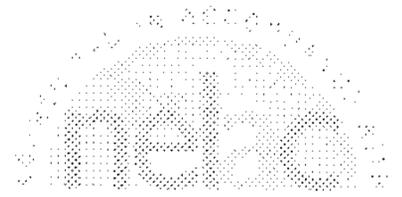
Matrix: Aqueous

<u>Parameter</u>	<u>Method</u>	<u>QC Sample ID</u>	<u>Date Analyzed</u>	<u>Sample Conc</u>	<u>DUP Conc</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Solids, Total Suspended	EPA 160.2	04-09-1754-1	10/01/04	15	13	14	0-25	

RPD - Relative Percent Difference, CL - Control Limit



Environmental Quality Control - Laboratory Control Sample
Laboratories, Inc.



Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

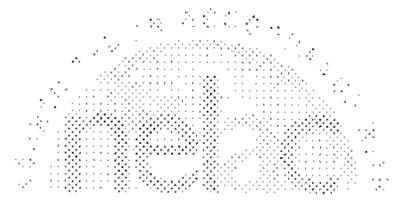
Date Received: N/A
 Work Order No: 04-09-1781
 Preparation: EPA 3010A Total
 Method: EPA 6010B

Project: City of Buena Vista / SCRE

Quality Control Sample ID	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
097-01-003-4,197	Aqueous	ICP 3300	09/30/04	040930-I-6	040930L06

Parameter	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	Qualifiers
Copper	1.00	0.930	93	80-120	
Nickel	1.00	0.978	98	80-120	
Selenium	1.00	0.870	87	80-120	
Zinc	1.00	0.962	96	80-120	

RPD - Relative Percent Difference, CL - Control Limit



Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

Date Received: N/A
 Work Order No: 04-09-1781

Project: City of Buenaventura / SCRE

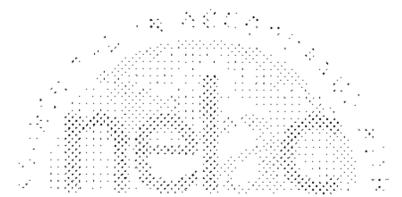
Matrix: Aqueous

<u>Parameter</u>	<u>Method</u>	<u>Quality Control</u> Sample ID	<u>Date</u> <u>Extracted</u>	<u>Date</u> <u>Analyzed</u>	<u>LCS %</u> <u>REC</u>	<u>LCSD %</u> <u>REC</u>	<u>%REC</u> <u>CL</u>	RPD	<u>RPD</u> <u>CL</u>	<u>Qual</u>
Cyanide, Total	EPA 335.2	099-05-061-1,504	N/A	10/07/04	112	112	80-120	0	0-20	

RPD - Relative Percent Difference , CL - Control Limit



Environmental Quality Control - Laboratory Control Sample
laboratories, Inc.



Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

Date Received: N/A
 Work Order No: 04-09-1781

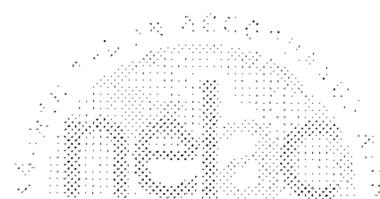
Project: City of Buenaventura / SCRE

Matrix : Aqueous

<u>Parameter</u>	<u>Method</u>	<u>Quality Control Sample ID</u>	<u>Date Analyzed</u>	<u>Date Extracted</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>LCS %Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Carbon, Total Organic	EPA 415.1	099-05-097-1,739	10/01/04	N/A	10	9.3	93	80-120	
Carbon, Dissolved Organic	EPA 415.1	099-05-115-273	10/01/04	N/A	10	9.8	90	80-120	

RPD - Relative Percent Difference , CL - Control Limit

7440 Lincoln Way, Garden Grove, CA 92841-1427 • TEL:(714) 895-5494 • FAX: (714) 894-7501



Work Order Number: 04-09-1781

<u>Qualifier</u>	<u>Definition</u>
*	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.

WORK ORDER #:

04 - 09 - 1781

Cooler 1 of 1

SAMPLE RECEIPT FORM

CLIENT: Nantux

DATE: 9/30/4

TEMPERATURE – SAMPLES RECEIVED BY:

CALSCIENCE COURIER:

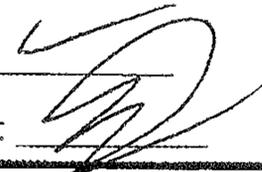
- Chilled, cooler with temperature blank provided.
- Chilled, cooler without temperature blank.
- Chilled and placed in cooler with wet ice.
- Ambient and placed in cooler with wet ice.
- Ambient temperature.
- 4.3 °C Temperature blank.

LABORATORY (Other than Calscience Courier):

- °C Temperature blank.
- °C IR thermometer.
- Ambient temperature.

Initial: 

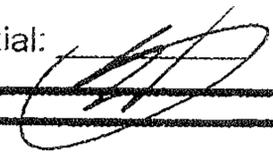
CUSTODY SEAL INTACT:

Sample(s): _____ Cooler: _____ No (Not Intact) : _____ Not Applicable (N/A): 

Initial: _____

SAMPLE CONDITION:

	Yes	No	N/A
Chain-Of-Custody document(s) received with samples.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with custody papers.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and good condition.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Correct containers for analyses requested.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper preservation noted on sample label(s).....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VOA vial(s) free of headspace.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tedlar bag(s) free of condensation.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Initial: 

COMMENTS:

APPENDIX E
FIELD COLLECTION DATA

Appendix Table E-1. Field Sample Collection Summary

City of Beunaventura - Santa Clara River Estuary Wet Weather Sampling Event

Sample Collection Date: September 28, 2004

Site	Collection Time ^a	Latitude 34°...	Longitude 119°...	Water Depth (m)
A-1	0900	13.986	15.894	0.30
A-1 ^b	1015	13.987	15.895	0.30
A-2	1030	13.882	15.843	0.76
A-3	1120	13.770	15.825	1.3
B-1	0926	14.095	15.798	0.46
B-2	NA	NA	NA	NA
B-3	1221	13.916	15.649	0.36
B-4	1200	13.892	15.571	0.46
C-1	NA	14.066	15.395	NA
C-2	NA	14.045	15.392	NA
C-3	1530	14.032	15.394	0.76
D-1	1507	14.068	15.334	0.18

^a Time of start of collection at each site location.

^b Field technicians returned to site A-1 later in the morning during the flood tide to determine whether water conditions at the site had changed or not.

Highlighted sites are those used for toxicity testing.

NA - Not applicable: No water was present at sites B-2, C-1, and C-2.

Appendix Table E-2. Field Water Quality Measurements

City of Buenaventura - Santa Clara River Estuary Wet Weather Sampling Event

Sample Collection Date: September 28, 2004

Sample	Measurement Depth	Temperature (°C)	Salinity (ppt)	Conductivity (umhos/cm)	pH (units)	DO (mg/L)
A-1	Middle 0900	22.2	3.3	2540	7.78	8.1
	Surface 1015	20.1	4.0	NM	8.11	9.6
	Middle 1015	18.8	31.1	NM	8.15	9.9
	Bottom 1015	18.1	32.1	NM	8.13	9.8
A-2	Surface	18.3	22.6 to 31.3 ^a	NM	8.15	8.5
	Middle	18.2	33.2	NM	8.20	8.8
	Bottom	18.1	33.2	NM	8.21	8.9
A-3	Surface	18.6	32.7	NM	8.26	10
	Middle	18.2	34.4	NM	8.29	11
	Bottom	18.2	34.5	NM	NM	NM
B-1	Middle	22.5	3.3	2470	7.74	7.6
B-2	No Water					
B-3	Surface	20.3	24.7	NM	8.06	9.8
	Middle	19.9	31.6	NM	8.43	17
	Bottom	19.9	31.6	NM		
B-4	Surface	20.8	28.3	NM	8.15	10
	Middle					
	Bottom					
C-1	No Water					
C-2	No Water					
C-3	Middle	25.3	4.6	4880	7.89	15
D-1	Middle	25.7	4.1	4020	7.85	14

^a A thin freshwater lens was present at the surface. Low salinity reading was taken with the probe floating on the surface, while the higher reading was taken a few cm below the surface.

Note: Water quality measurements were taken in the middle of the water column only at sites with shallow depths.

NM - Not measured.

APPENDIX F
WATER-EFFECT RATIO RESULTS

DATA SUMMARY

Appendix Table F-1. Water-Effect Ratio Summary Results
City of Buenaventura
Santa Clara River Estuary Dry Sampling Event
Test Initiation Date: September 29, 2004
Test Species: *Mytilus galloprovincialis*

Site ID	Nominal Spiked Copper (µg/L) ^a	Measured Total Copper (µg/L) ^{b,c}	Mean Percent Normal Development ^d	EC ₅₀ (µg/L total copper) ^{e,f}
A-2	Lab Control	NM	92 +/- 1.6	18.2 (18.0-18.5)
	0 (Unspiked Sample)	ND	90 +/- 3.2	
	9.0	12.0	91 +/- 3.0	
	15	15.4	84 +/- 5.4	
	25	20.1	15 +/- 13	
	40	33.5	0.74 +/- 1.7	
	65	NM	0.00 +/- 0.00	
	100	NM	0.00 +/- 0.00	
B-1	Lab Control	NM	92 +/- 1.6	81.3 (79.9-82.8)
	Salt Control	NM	93 +/- 3.5	
	0 (Unspiked Sample)	8.4	93 +/- 3.0	
	9.0	NM	94 +/- 3.1	
	15	NM	91 +/- 6.6	
	25	NM	92 +/- 5.3	
	40	49.8	91 +/- 3.7	
	65	73.4	81 +/- 5.4	
100	104	0.00 +/- 0.00		
B-3	Lab Control	NM	92 +/- 2.0	39.7 (39.3-40.2)
	Salt Control	NM	90 +/- 0.39	
	0 (Unspiked Sample)	ND	94 +/- 2.9	
	9.0	NM	92 +/- 1.7	
	15	NM	91 +/- 2.5	
	25	21.4	91 +/- 4.0	
	40	32.5	83 +/- 4.2	
	65	52.3	0.00 +/- 0.00	
100	NM	0.00 +/- 0.00		
C-3	Lab Control	NM	92 +/- 2.0	>85.1
	Salt Control	NM	90 +/- 0.39	
	0 (Unspiked Sample)	ND	90 +/- 4.8	
	9.0	NM	91 +/- 2.6	
	15	NM	90 +/- 4.0	
	25	NM	88 +/- 5.1	
	40	36.0	91 +/- 4.6	
	65	57.8	88 +/- 8.1	
100	85.1	53 +/- 17		
Laboratory Polished Seawater (PSW)	0 (Lab Control)	NM	89 +/- 5.9	11.5 (11.2-11.9)
	1.8	NM	88 +/- 4.3	
	3.0	NM	87 +/- 5.4	
	5.0	6.44	87 +/- 2.6	
	8.4	9.76	70 +/- 5.3	
	14	16.7	2.8 +/- 0.01	
	23	NM	0.00 +/- 0.00	
39	NM	0.00 +/- 0.00		
Copper Reference Toxicant Test	0 (Lab Control)	NM	89 +/- 1.8	11.1 (10.8-11.5)
	2.5	NM	88 +/- 2.9	
	5.0	NM	86 +/- 2.4	
	10	NM	61 +/- 15	
	20	NM	0.00 +/- 0.00	
40	NM	0.00 +/- 0.00		

^a Nominal spiked concentrations do not include the background concentrations of copper in the field samples.

^b Reported measured total copper values were elevated due to matrix interference. Therefore, reported values here were normalized to the matrix spike recovery value reported by the analytical laboratory.

^c Total measured copper includes spiked plus background concentrations of copper in sample B-1 (the only sample with detectable background copper).

^d Values presented for mean percent normal development in unspiked samples are results from the tests initiated on September 29, 2004 for 100% sample amended with artificial sea salts. All values are presented +/- 1 standard deviation.

^e EC₅₀ values were calculated based on comparison to the salt control. Site A-2 did not need artificial salts added and was compared to the lab control. Development in the unspiked sample was not included in the analysis. 95% confidence intervals are displayed below each value in parentheses.

^f Measured rather than nominal total copper concentrations were used to generate EC₅₀ values.

NM - Not Measured.

ND - Not Detected.

Values in **bold** indicate a significant decrease in normal development was observed in that test concentration relative to the control.

STATISTICAL ANALYSIS SUMMARIES
& RAW BENCH DATASHEETS

CETIS Test Summary

Report Date: 14 Feb-05 4:25 PM

Link: 18-4370-4268/0409-123a

Bivalve Larval Survival and Development Test							Nautilus Environmental (CA)	
Test No:	05-4237-7795	Test Type:	Development-Survival	Duration:	69h	Species:	Mytilus galloprovincialis	
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Source:	Carlsbad Aquafarms			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Artificial Saltwater	Brine:	Forty Fathoms			
Setup Date:	29 Sep-04 02:30 PM							
Sample No:	07-7793-0153	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 10:30 AM	Code:	0409-123a	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	28h (17.9 °C)	Station:	WER (A-2)					
Comments:	Sample spiked with 6 different concentrations of copper. EC50 values are based on measured concentrations of copper in 4 of the 6 samples.							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
07-9685-6431	Proportion Normal	12	15.4	13.594	11.33%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
14-1168-1019	Proportion Normal	50	18.24875	17.97479	18.52688	Trimmed Spearman-Kärber		
Proportion Normal Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.92400	0.91000	0.95000	0.00748	0.01673	1.81%
12		5	0.90800	0.88000	0.96000	0.01356	0.03033	3.34%
15.4		5	0.84000	0.76000	0.90000	0.02429	0.05431	6.47%
20.1		5	0.15000	0.00000	0.32000	0.05857	0.13096	87.31%
33.5		5	0.00800	0.00000	0.04000	0.00800	0.01789	223.61
Proportion Normal Detail								
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.91000	0.91000	0.93000	0.92000	0.95000		
12		0.88000	0.96000	0.90000	0.90000	0.90000		
15.4		0.88000	0.83000	0.83000	0.90000	0.76000		
20.1		0.32000	0.00000	0.09000	0.25000	0.09000		
33.5		0.00000	0.04000	0.00000	0.00000	0.00000		

CETIS Analysis Detail

Bivalve Larval Survival and Development Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	18-4370-4268	18-4370-4268	14 Feb-05 4:25 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		12	15.4	8.33	13.594	11.33%

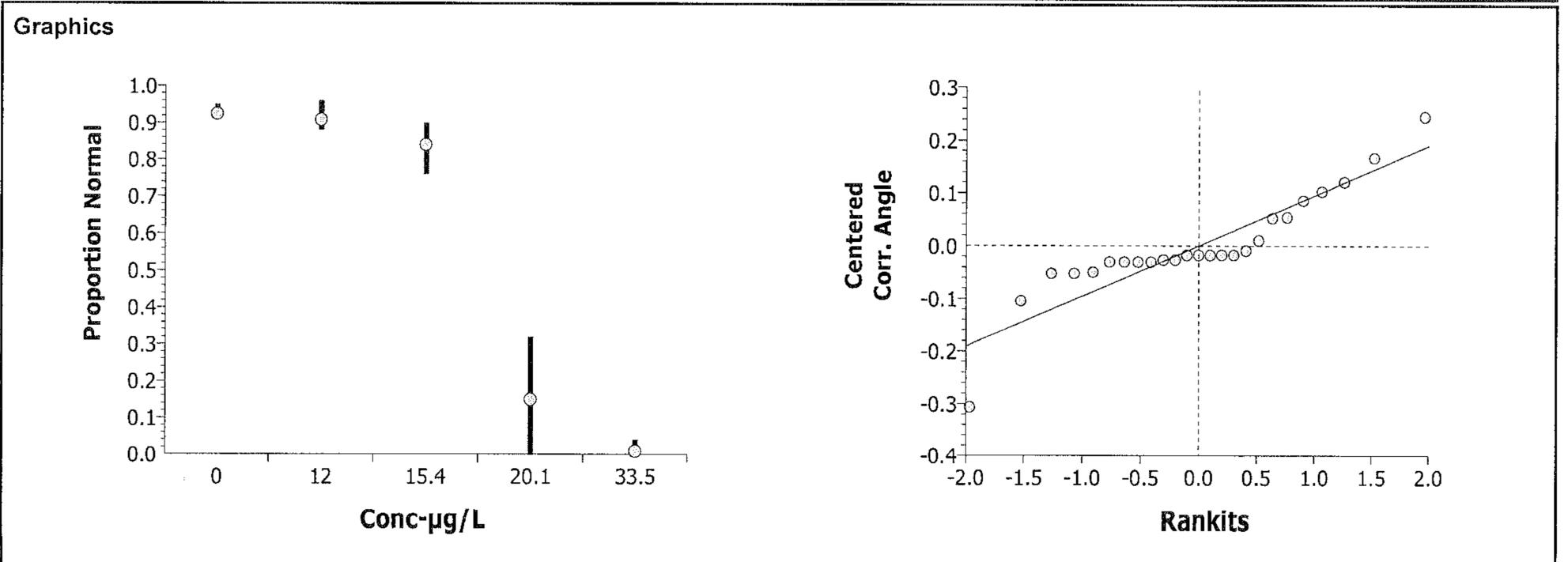
ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	15.05831	13.27671	0.00458	Unequal Variances
Distribution	Shapiro-Wilk W	0.86552	0.88746	0.00325	Non-normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	6.510132	1.627533	4	132.57	0.00000	Significant Effect
Error	0.245536	0.012277	20			
Total	6.75566827	1.6398099	24			

Group Comparisons							
Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		12	20	17	> 0.0500	2	Non-Significant Effect
		15.4	15	17	<= 0.0500	2	Significant Effect
		20.1	15	17	<= 0.0500	2	Significant Effect
		33.5	15	17	<= 0.0500	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	0.92400	0.91000	0.95000	0.01673	1.29291	1.26610	1.34528	0.03302
12		5	0.90800	0.88000	0.96000	0.03033	1.26673	1.21705	1.36944	0.05907
15.4		5	0.84000	0.76000	0.90000	0.05431	1.16331	1.05882	1.24905	0.07377
20.1		5	0.15000	0.00000	0.32000	0.13096	0.35685	0.05002	0.60126	0.21629
33.5		5	0.00800	0.00000	0.04000	0.01789	0.08029	0.05002	0.20136	0.06768

Data Detail											
Conc-µg/L	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	0.91000	0.91000	0.93000	0.92000	0.95000					
12		0.88000	0.96000	0.90000	0.90000	0.90000					
15.4		0.88000	0.83000	0.83000	0.90000	0.76000					
20.1		0.32000	0.00000	0.09000	0.25000	0.09000					
33.5		0.00000	0.04000	0.00000	0.00000	0.00000					



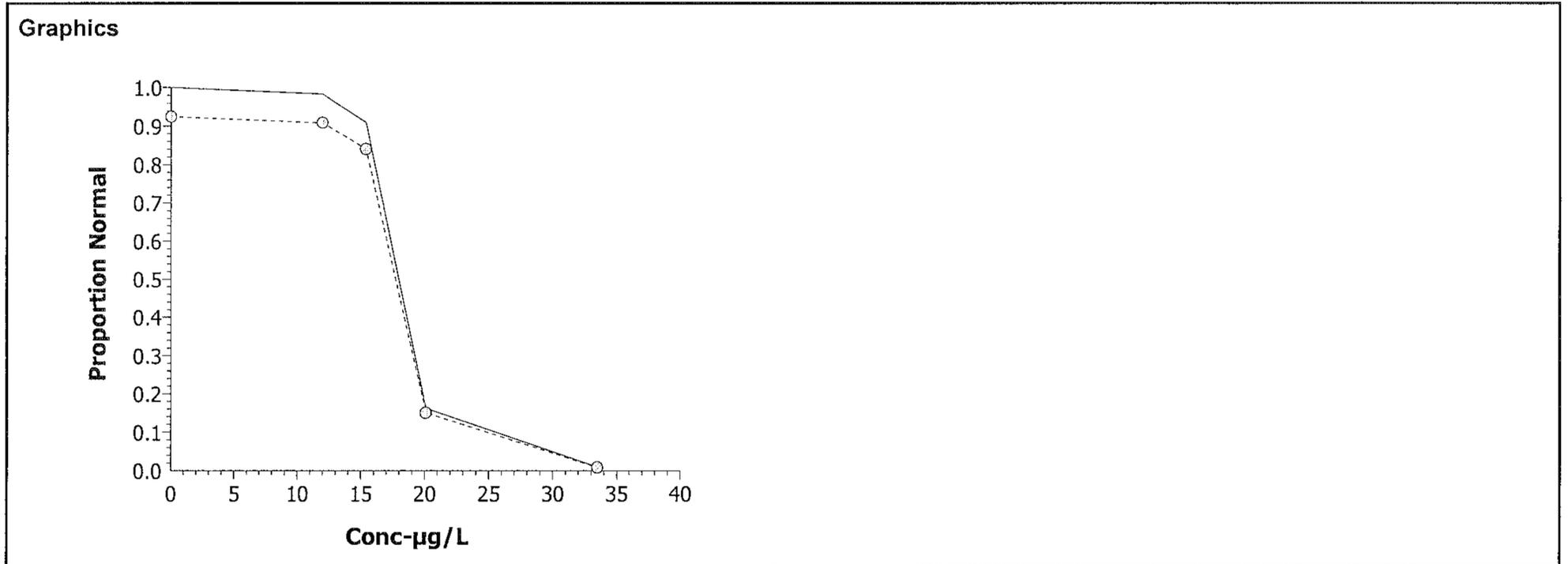
CETIS Analysis Detail

Bivalve Larval Survival and Development Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Trimmed Spearman-Karber	18-4370-4268	18-4370-4268	14 Feb-05 4:25 PM	CETISv1.025

Spearman-Karber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0.076	1.73%	1.261233	0.00328465	18.24875	17.97479	18.52688

Data Summary			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.92400	0.91000	0.95000	0.00342	0.01673	462	500
12		5	0.90800	0.88000	0.96000	0.00619	0.03033	454	500
15.4		5	0.84000	0.76000	0.90000	0.01109	0.05431	420	500
20.1		5	0.15000	0.00000	0.32000	0.02673	0.13096	75	500
33.5		5	0.00800	0.00000	0.04000	0.00365	0.01789	4	500



CETIS Test Summary

Bivalve Larval Survival and Development Test			Nautilus Environmental (CA)			
Test No:	05-4237-7795	Test Type:	Development-Survival	Duration:	69h	
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilus galloprovincialis	
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Artificial Saltwater Scripps seawater	Source:	Carlsbad Aquafarms	
Setup Date:	29 Sep-04 02:30 PM	Brine:	40 Ft Fathoms N/A			
Sample No:	14-5109-0782	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura	
Sample Date:	28 Sep-04 10:30 AM	Code:	0409-123	Project:		
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura			
Sample Age:	28h (17.9 °C)	Station:	WER (A-2)			
Comments:	100% sample spiked with 6 different concentrations of copper.					
Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
10-5185-2684	Proportion Normal	9	15	11.619	11.10%	Steel's Many-One Rank
Point Estimate Summary						
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
09-7178-1726	Proportion Normal	50	20.13062	19.65345	20.61938	Trimmed Spearman-Kärber

note: CETIS would not print raw data/summary on first report page. See analysis detail pages for raw data.

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	09-4646-6356	09-4646-6356	18 Jan-05 11:18 AM	CETISv1.025

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	11.619	11.10%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	15.64403	13.27671	0.00354	Unequal Variances
Distribution	Shapiro-Wilk W	0.86816	0.88746	0.00371	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	6.435402	1.608851	4	136.89	0.00000	Significant Effect
Error	0.2350651	0.011753	20			
Total	6.67046751	1.6206039	24			

Group Comparisons

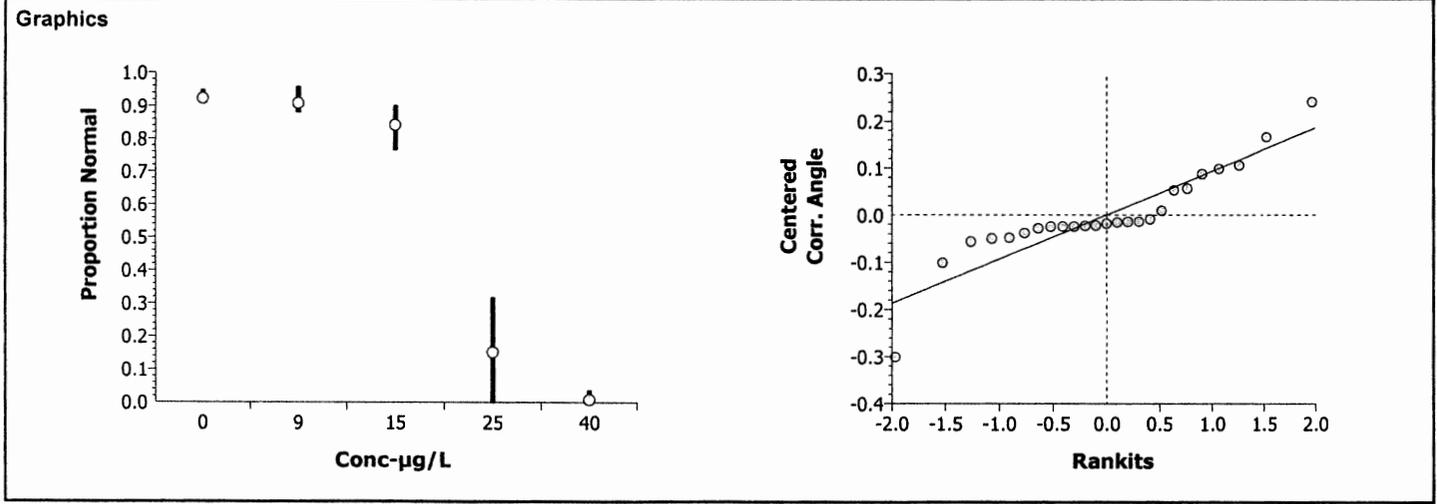
Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		9	20	17	> 0.0500	0	Non-Significant Effect
		15	15	17	<= 0.0500	0	Significant Effect
		25	15	17	<= 0.0500	0	Significant Effect
		40	15	17	<= 0.0500	0	Significant Effect

Data Summary

Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.92308	0.91011	0.94937	0.01641	1.29112	1.26630	1.34384	0.03239
9		5	0.90835	0.88000	0.95833	0.02955	1.26705	1.21705	1.36523	0.05703
15		5	0.84211	0.76531	0.90278	0.05396	1.16631	1.06506	1.25370	0.07418
25		5	0.15155	0.00000	0.32000	0.13105	0.36113	0.05980	0.60126	0.21307
40		5	0.00741	0.00000	0.03704	0.01656	0.08798	0.05002	0.19366	0.05969

Data Detail

Conc-µg/L	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	0.91011	0.91139	0.92857	0.91597	0.94937					
9		0.88000	0.95833	0.90526	0.90123	0.89691					
15		0.88372	0.83158	0.82716	0.90278	0.76531					
25		0.32000	0.00000	0.09459	0.25316	0.09000					
40		0.00000	0.03704	0.00000	0.00000	0.00000					



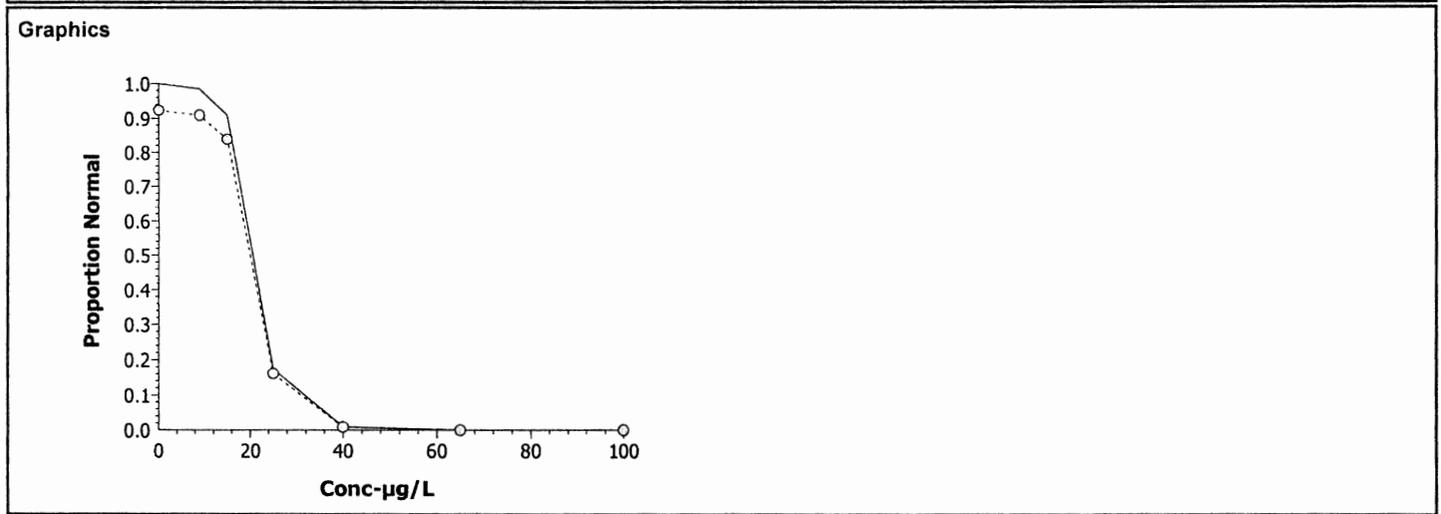
CETIS Analysis Detail

Bivalve Larval Survival and Development Test					Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Trimmed Spearman-Karber	09-4646-6356	09-4646-6356	18 Jan-05 11:18 AM	CETISv1.025

Spearman-Karber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0.0775862	1.53%	1.303857	0.0052092	20.13062	19.65345	20.61938

Data Summary		Calculated Variate(A/B)							
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.92308	0.91011	0.94937	0.00335	0.01641	428	464
9		5	0.90835	0.88000	0.95833	0.00603	0.02955	426	469
15		5	0.84211	0.76531	0.90278	0.01101	0.05396	362	432
25		5	0.15155	0.00000	0.32000	0.02675	0.13105	68	423
40		5	0.00741	0.00000	0.03704	0.00338	0.01656	3	361
65		1	0.00000	0.00000	0.00000			0	15
100		1	0.00000	0.00000	0.00000			0	17



CETIS Worksheet

Bivalve Larval Survival and Development Test *Nautilus Environmental* **AMEC Bioassay SD**

Start Date: 29 Sep-04 Species: *Mytilis galloprovincialis* Sample Code: 0409-123
 End Date: ~~01~~ Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: WER (A-2)

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			41			0	0	RG 01-05-05
			42			100	0	
			43			95	80	
			44			81	73	
			45			81	67	
			46			84	82	
			47			0	0	
			48			79	20	
			49			71	0	
			50			63	0	
			51			72	65	
			52			70	0	
			53			89	81	
			54			74	7	
			55			79	75	
			56			100	93	
			57			76	67	
			58			100	9	
			59			97	91	
			60			96	92	
			61			100	32	
			62			98	91	
			63			16	0	
			64			98	75	
			65			15	0	
			66			93	85	
			67			79	72	
			68			95	79	
			69			86	76	
			70			0	0	
			71			0	0	
			72			0	0	
			73			81	3	
			74			18	0	
			75			119	109	
			76			0	0	
			77			17	0	
			78			46	0	
			79			100	88	
			80			97	87	

CETIS Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental AMEC Bioassay SD

Start Date: 29 Sep-04 Species: Mytilus galloprovincialis Sample Code: 0409-123
 End Date: 01 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: WER (A-2)

Use as SC B-1 for

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC I	1	53					
0	LC I	2	67					
0	LC I	3	62					
0	LC I	4	75					
0	LC I	5	55					
0	SC I	1	66					
0	SC I	2	57					
0	SC I	3	56					
0	SC I	4	59					
0	SC I	5	46					
9		1	79					
9		2	60					
9		3	43					
9		4	44					
9		5	80					
15		1	69					
15		2	68					
15		3	45					
15		4	51					
15		5	64					
25		1	61					
25		2	52					
25		3	54					
25		4	48					
25		5	58					
40		1	42					
40		2	73					
40		3	49					
40		4	78					
40		5	50					
65		1	65					
65		2	76					
65		3	47					
65		4	74					
65		5	63					
100		1	77					
100		2	71					
100		3	72					
100		4	41					
100		5	70					

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura
 Sample ID: A-2 (WER)
 Test No.: 0409-123

Test Species: M. galloprovincialis
 Start Date/Time: 09/29/04 1430
 End Date/Time: 10-2-04 1100

Use as
 2nd SC
 for B-7

Concentration μg/L of Cu	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)			SAL	TO	DO	PH
	0	24	48	0	24	48	0	24	48	0	24	48				
Lab Control #1	29.6	29.5 29.5	30.0	14.3	16.0	13.9	7.0	8.6	8.1	7.89	8.10 8.07	7.90	30.0	14.2	7.8	7.97
Salt Control #1	29.5	29.5	29.8	14.3	15.7	13.9	7.5	8.7 8.72	8.6	8.51	8.49 8.34	8.28	29.9	14.2	7.8	8.21
9	31.8	31.6	32.5	14.3	14.3	14.0	7.2	8.2	8.6	8.10	8.11	8.02	32.7	14.0	8.2	8.25
15	31.9	31.9	32.5	14.3	14.3	14.1	7.3	8.5	9.2	8.10	8.10	8.01	32.7	14.0	8.6	8.15
25	31.9	31.9	32.4	14.3	14.3	14.1	7.4	8.5	9.0	8.10	8.11	8.01	32.4	14.1	8.3	8.2
40	31.9	32.0	32.4	14.3	14.4	14.1	7.4	8.4	9.0	8.10	8.11	8.01	32.4	14.1	8.5	8.2
65	31.8	32.0	32.4	14.3	14.3	14.1	7.4	8.5	8.8	8.10	8.10	8.02	32.5	14.1	8.6	8.2
100	31.8	31.9	32.3	14.3	14.2	14.1	7.4	8.5	8.6	8.10	8.10	8.02	32.5	14.0	8.3	8.2

Technician Initials:

0	24	48	72
RS	RS	RS	RS

Animal Source/Date Received: Carlson Aqua farms

Comments: 0 hrs: _____
 24 hrs: _____
 48 hrs: _____

QC Check: AH 10/20/04 Final Review: AH 1/18/05

CETIS Test Summary

Report Date: 14 Feb-05 4:26 PM

Link: 18-8766-6888/0409-124a

Bivalve Larval Survival and Development Test				Nautilus Environmental (CA)				
Test No:	05-4237-7795	Test Type:	Development-Survival	Duration:	69h			
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilus galloprovincialis			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Artificial Saltwater	Source:	Carlsbad Aquafarms			
Setup Date:	29 Sep-04 02:30 PM	Brine:	Forty Fathoms					
Sample No:	03-1937-5601	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 09:26 AM	Code:	0409-124a	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	29h (16.6 °C)	Station:	WER (B-1)					
Comments:	Sample spiked with 6 different concentrations of copper. EC50 values are based on measured concentrations of copper in 4 of the 6 samples.							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
04-0183-7433	Proportion Normal	49.8	73.4	60.459	4.90%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
09-2884-7281	Proportion Normal	50	81.32021	79.87399	82.79263	Trimmed Spearman-Kärber		
Proportion Normal Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Salt Control	5	0.92800	0.88000	0.98000	0.01655	0.03701	3.99%
8.4		5	0.92800	0.89000	0.96000	0.01281	0.02864	3.09%
49.8		5	0.90800	0.86000	0.95000	0.01562	0.03493	3.85%
73.4		5	0.80600	0.75000	0.88000	0.02358	0.05273	6.54%
104		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	Salt Control	0.91000	0.88000	0.93000	0.94000	0.98000		
8.4		0.89000	0.96000	0.95000	0.91000	0.93000		
49.8		0.86000	0.93000	0.91000	0.89000	0.95000		
73.4		0.82000	0.75000	0.88000	0.82000	0.76000		
104		0.00000	0.00000	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	18-8766-6888	18-8766-6888	14 Feb-05 4:23 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		49.8	73.4	2.01	60.459	4.90%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	7.13250	4.43069	0.00097	Unequal Variances
Distribution	Shapiro-Wilk W	0.95317	0.88746	0.30556	Normal Distribution

ANOVA Table

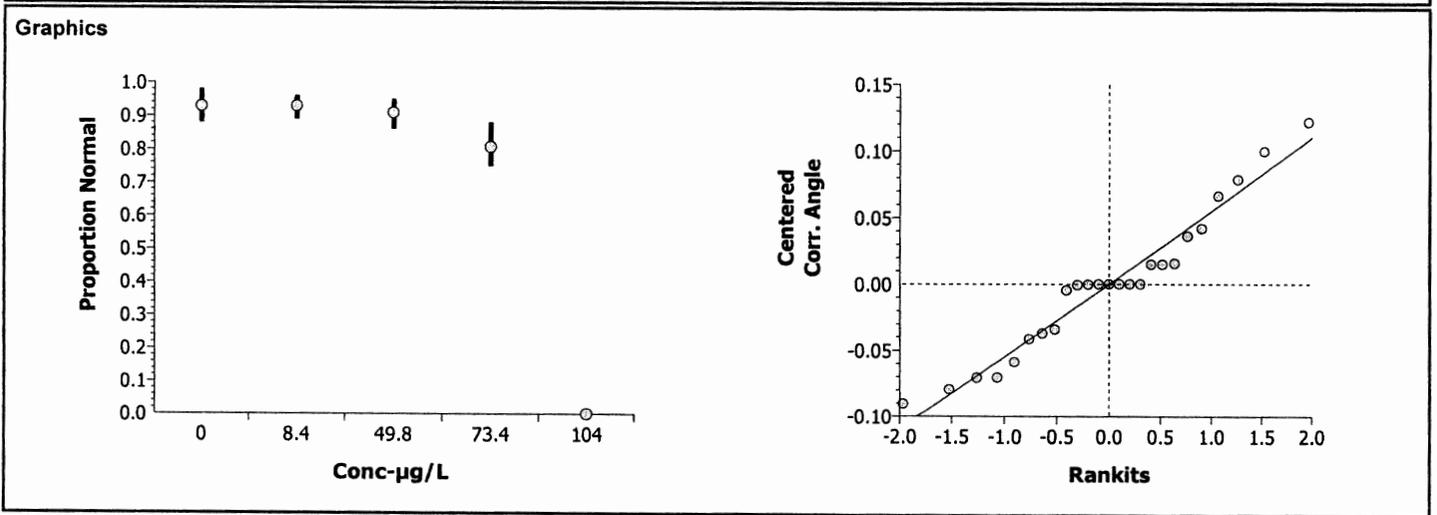
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.868967	1.467242	4	412.66	0.00000	Significant Effect
Error	0.0711117	0.003556	20			
Total	5.9400783	1.4707972	24			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		8.4	28	17	> 0.0500	2	Non-Significant Effect
		49.8	24	17	> 0.0500	2	Non-Significant Effect
		73.4	15.5	17	<= 0.0500	2	Significant Effect
		104	15	17	<= 0.0500	1	Significant Effect

Data Summary

Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.92800	0.88000	0.98000	0.03701	1.30768	1.21705	1.42890	0.07890
8.4		5	0.92800	0.89000	0.96000	0.02864	1.30332	1.23273	1.36944	0.05590
49.8		5	0.90800	0.86000	0.95000	0.03493	1.26689	1.18730	1.34528	0.06114
73.4		5	0.80600	0.75000	0.88000	0.05273	1.11767	1.04720	1.21705	0.06847
104		5	0.00000	0.00000	0.00000	0.00000	0.05002	0.05002	0.05002	0.00001



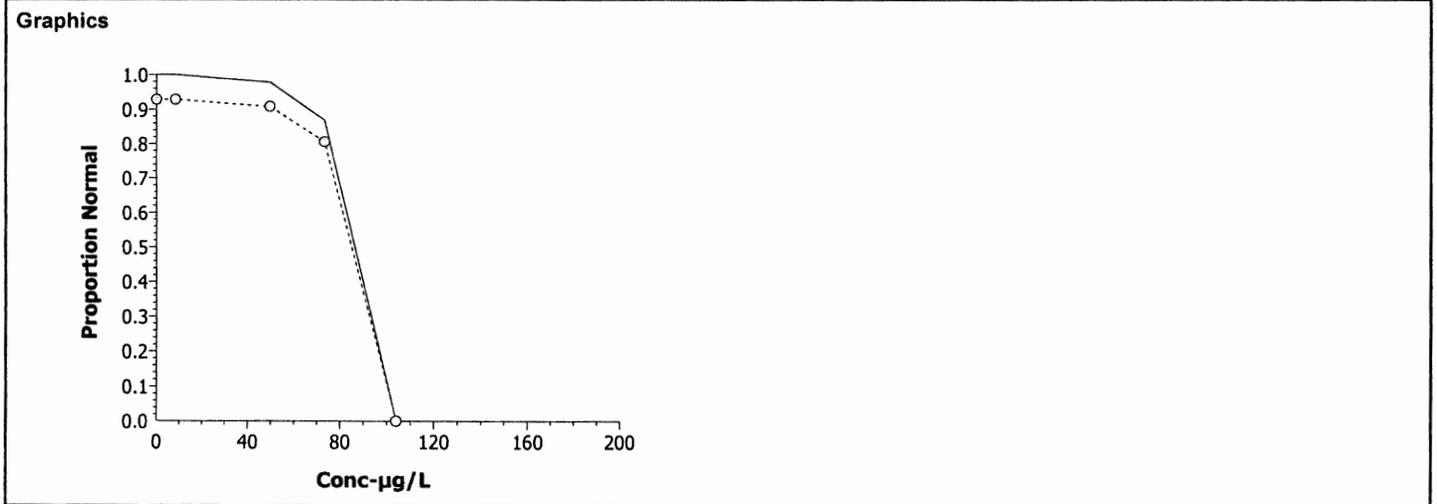
CETIS Analysis Detail

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Trimmed Spearman-Karber	18-8766-6888	18-8766-6888	14 Feb-05 4:23 PM	CETISv1.025

Spearman-Karber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0.072	0.00%	1.910199	0.00389659	81.32021	79.87399	82.79263

Data Summary		Calculated Variate(A/B)							
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.92800	0.88000	0.98000	0.00756	0.03701	464	500
8.4		5	0.92800	0.89000	0.96000	0.00585	0.02864	464	500
49.8		5	0.90800	0.86000	0.95000	0.00713	0.03493	454	500
73.4		5	0.80600	0.75000	0.88000	0.01076	0.05273	403	500
104		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	500



CETIS Test Summary

Report Date: 12 Jan-05 2:06 PM

Link: 00-5031-7345/0409-124

Bivalve Larval Survival and Development Test						Nautilus Environmental (CA)			
Test No:	05-4237-7795	Test Type:	Development-Survival	Duration:	69h	Species:	Mytilis galloprovincialis	Source:	Carlsbad Aquafarms
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Dil Water:	Artificial Saltwater	Brine:	Forty Fathoms		
Ending Date:	02 Oct-04 11:00 AM								
Setup Date:	29 Sep-04 02:30 PM								
Sample No:	17-4561-0851	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura	Project:			
Sample Date:	28 Sep-04 09:26 AM	Code:	0409-124						
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura						
Sample Age:	29h (16.6 °C)	Station:	WER (B-1)						
Comments:	100% sample spiked with 6 different concentrations of copper.								
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method			
09-1138-5252	Proportion Normal	40	65	50.990	7.54%	Dunnett's Multiple Comparison			
Point Estimate Summary									
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method			
09-0635-6855	Proportion Normal	50	73.07181	71.49912	74.67908	Trimmed Spearman-Kärber			
Proportion Normal Summary									
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Lab Control	5	0.92308	0.91011	0.94937	0.00734	0.01641	1.78%	
0	Salt Control	5	0.92798	0.88158	0.97619	0.01546	0.03457	3.73%	
9		5	0.94390	0.89130	0.96721	0.01371	0.03066	3.25%	
15		5	0.90594	0.82456	0.98571	0.02961	0.06621	7.31%	
25		5	0.91776	0.84286	0.97590	0.02375	0.05311	5.79%	
40		5	0.90644	0.85714	0.95000	0.01633	0.03650	4.03%	
65		5	0.80792	0.75000	0.88235	0.02393	0.05350	6.62%	
100		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	0.91011	0.91139	0.92857	0.91597	0.94937			
0	Salt Control	0.91398	0.88158	0.93000	0.93814	0.97619			
9		0.95833	0.94318	0.95946	0.89130	0.96721			
15		0.96154	0.87879	0.82456	0.87912	0.98571			
25		0.91026	0.84286	0.97590	0.89873	0.96104			
40		0.85714	0.93023	0.90909	0.88571	0.95000			
65		0.82278	0.75000	0.88235	0.82258	0.76190			
100		0.00000	0.00000	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	00-5031-7345	09-4646-6356	12 Jan-05 2:05 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		40	65	2.50	50.990	7.54%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	15.45649	16.81190	0.01699	Equal Variances
Distribution	Shapiro-Wilk W	0.98285	0.91004	0.88454	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	6.332897	1.055483	6	165.30	0.00000	Significant Effect
Error	0.1787919	0.006385	28			
Total	6.51168913	1.0618683	34			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Salt Control		9	-0.6172	2.40857	> 0.0500	0.12173	Non-Significant Effect
		15	0.54245	2.40857	> 0.0500	0.12173	Non-Significant Effect
		25	0.26612	2.40857	> 0.0500	0.12173	Non-Significant Effect
		40	0.82528	2.40857	> 0.0500	0.12173	Non-Significant Effect
		65	3.67928	2.40857	<= 0.0500	0.12173	Significant Effect
		100	24.5600	2.40857	<= 0.0500	0.12173	Significant Effect

Data Summary

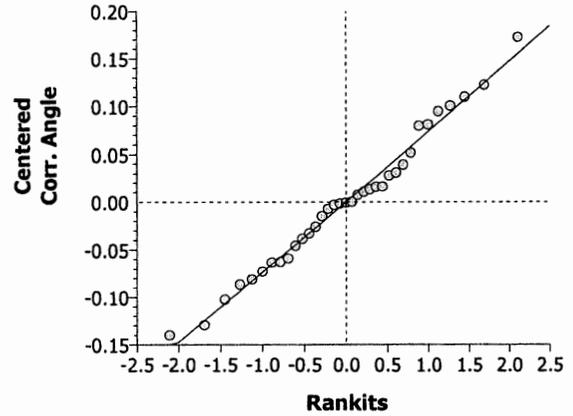
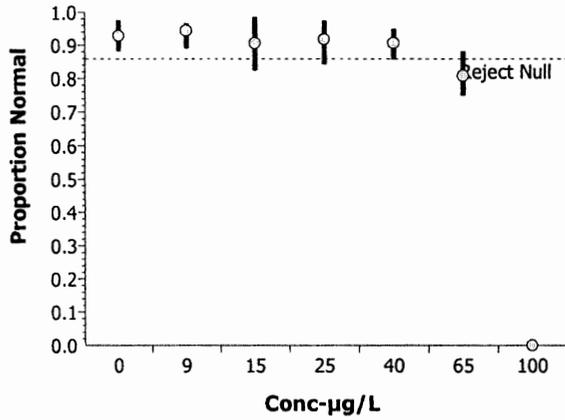
Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.92798	0.88158	0.97619	0.03457	1.30619	1.21949	1.41587	0.07216
9		5	0.94390	0.89130	0.96721	0.03066	1.33739	1.23482	1.38872	0.06108
15		5	0.90594	0.82456	0.98571	0.06621	1.27878	1.13861	1.45099	0.12872
25		5	0.91776	0.84286	0.97590	0.05311	1.29275	1.16319	1.41494	0.10099
40		5	0.90644	0.85714	0.95000	0.03650	1.26449	1.18320	1.34528	0.06353
65		5	0.80792	0.75000	0.88235	0.05350	1.12025	1.04720	1.22069	0.06970
100		5	0.00000	0.00000	0.00000	0.00000	0.06496	0.05002	0.07545	0.00988

Data Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Salt Control	0.91398	0.88158	0.93000	0.93814	0.97619					
9		0.95833	0.94318	0.95946	0.89130	0.96721					
15		0.96154	0.87879	0.82456	0.87912	0.98571					
25		0.91026	0.84286	0.97590	0.89873	0.96104					
40		0.93023	0.90909	0.88571	0.95000	0.85714					
65		0.82278	0.75000	0.88235	0.82258	0.76190					
100		0.00000	0.00000	0.00000	0.00000	0.00000					

CETIS Analysis Detail

Graphics



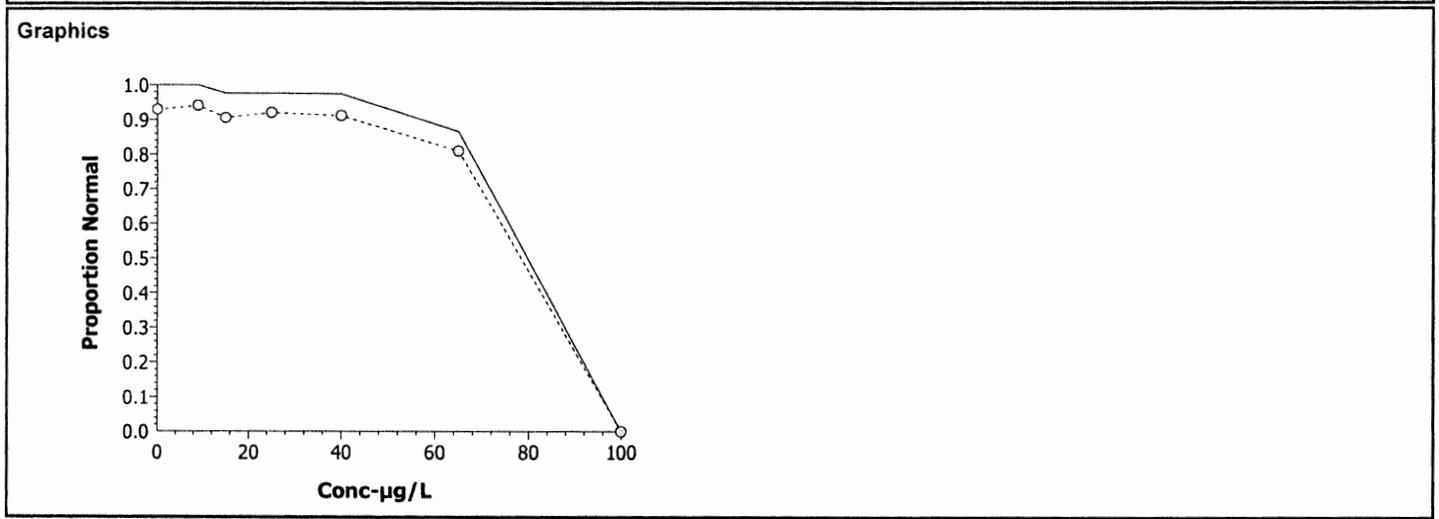
CETIS Analysis Detail

Bivalve Larval Survival and Development Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Trimmed Spearman-Karber	00-5031-7345	09-4646-6356	12 Jan-05 2:06 PM	CETISv1.025

Spearman-Karber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0.07111111	0.00%	1.86375	0.00472455	73.07181	71.49912	74.67908

Data Summary			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.92798	0.88158	0.97619	0.00706	0.03457	418	450
9		5	0.94390	0.89130	0.96721	0.00626	0.03066	364	387
15		5	0.90594	0.82456	0.98571	0.01351	0.06621	304	336
25		5	0.91776	0.84286	0.97590	0.01084	0.05311	356	387
40		5	0.90644	0.85714	0.95000	0.00745	0.03650	367	403
65		5	0.80792	0.75000	0.88235	0.01092	0.05350	278	344
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	316



CETIS Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental

AMEG Bioassay SD

Start Date: 29 Sep-04 Species: *Mytilus galloprovincialis* Sample Code: 0409-124
 End Date: ⁰² Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: WER (B-1)

Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
		76			—		
		77			100	95	
		78			044	00	Rg 1-4-05
		79			79	71	many infect
		80			91	80	
		81			72	69	
		82			63	0	
		83			—		
		84			41	0	
		85			63	48	
		86			77	70	
		87			—		
		88			—		
		89			70	62	
		90			—		
		91			61	59	
		92			—		
		93			74	71	
		94			48	0	
		95			70	59	
		96			92	82	
		97			—		
		98			72	54	
		99			57	47	
		100			70	60	
		101			100	0	
		102			66	58	
		103			77	74	
		104			62	51	
		105			78	71	
		106			83	81	
		107			88	83	
		108			—		
		109			79	65	
		110			70	69	
		111			66	60	
		112			86	80	
		113			—		
		114			—		
		115			52	50	

Lined out replicates are LC1+SC1, share w/A-2.

CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 28 Sep-04 12:01 PM
 Link: 00-5031-7345/0409-124

Bivalve Larval Survival and Development Test

Nautilus Environmental

AMEC Bioassay SD

Start Date: 29 Sep-04 Species: Mytilis galloprovincialis Sample Code: 0409-124
 End Date: 01 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: WER (B-1)

Conc. %	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	114					
0	LC	2	76					
0	LC	3	97					
0	LC	4	90					
0	LC	5	83					
0	SC	1	108					
0	SC	2	113					
0	SC	3	92					
0	SC	4	87					
0	SC	5	88					
9		1	81					
9		2	107					
9		3	93					
9		4	96					
9		5	91					
15		1	115					
15		2	102					
15		3	99					
15		4	80					
15		5	110					
25		1	105					
25		2	95					
25		3	106					
25		4	79					
25		5	103					
40		1	100					
40		2	112					
40		3	86					
40		4	89					
40		5	77					
65		1	109					
65		2	98					
65		3	111					
65		4	104					
65		5	85					
100		1	94					
100		2	78					
100		3	82					
100		4	101					
100		5	84					

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura
 Sample ID: B-1 (WER)
 Test No.: 0409-124

Test Species: M. galloprovincialis
 Start Date/Time: 09/29/04 1430
 End Date/Time: 10-2-04 1600

Concentration μg/L of Cu	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)			SAL	T _v	DO	pH
	0	24	48	0	24	48	0	24	48	0	24	48				
Lab Control #1	29.6	29.8	29.8	14.3	14.2	14.2	7.0	8.6	8.6	7.89	8.04	8.36	72	—	—	→
Salt Control #1	29.5	29.4	29.8	14.3	14.2	13.9	7.5	8.5	8.6	8.51	8.49	8.28	29.9	14.2	7.8	8.28
9	28.6	28.7	29.0	14.3	14.3	14.0	7.5	8.6	8.5	8.38	8.44	8.37	29.0	14.0	8.1	8.64
15	28.8	28.9	29.3	14.3	14.2	14.0	7.5	8.5	8.6	8.38	8.46	8.38	29.4	14.0	8.3	8.31
25	28.8	28.9	29.2	14.3	14.2	14.1	7.5	8.6	8.9	8.39	8.46	8.39	29.4	14.0	8.5	8.53
40	28.7	28.9	29.2	14.3	14.2	13.9	7.5	8.6	8.9	8.39	8.46	8.39	29.2	14.1	8.3	8.55
65	28.7	28.8	29.1	14.3	14.1	14.0	7.5	8.6	8.9	8.39	8.46	8.40	29.2	14.0	8.3	8.45
100	28.6	28.8	29.0	14.3	14.2	14.0	7.5	8.4	8.6	8.39	8.47	8.40	29.2	14.0	8.3	8.55

Technician Initials:

0	24	48	72
RS	RS	B	RS

Animal Source/Date Received: Carlsbad Aquafarms

Comments: 0 hrs: _____
 24 hrs: _____
 48 hrs: _____

QC Check: [Signature] 1/10/05 Final Review: AH 1/18/05

CETIS Test Summary

Report Date: 14 Feb-05 4:26 PM
Link: 00-9466-7421/0409-125a

Bivalve Larval Survival and Development Test				Nautilus Environmental (CA)				
Test No:	05-4237-7795	Test Type:	Development-Survival	Duration:	69h			
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilus galloprovincialis			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Artificial Saltwater	Source:	Carlsbad Aquafarms			
Setup Date:	29 Sep-04 02:30 PM	Brine:	Forty Fathoms					
Sample No:	06-5273-6071	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 12:21 PM	Code:	0409-125a	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	26h (17.2 °C)	Station:	WER (B-3)					
Comments:	Sample spiked with 6 different concentrations of copper. EC50 values are based on measured concentrations of copper in 3 of the 6 samples.							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
01-4965-1647	Proportion Normal	21.4	32.5	26.372	4.67%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
20-2213-0321	Proportion Normal	50	39.72610	39.29038	40.16665	Trimmed Spearman-Kärber		
Proportion Normal Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Salt Control	5	0.89800	0.89000	0.90000	0.00200	0.00447	0.50%
21.4		5	0.90800	0.86000	0.96000	0.01772	0.03962	4.36%
32.5		5	0.82800	0.77000	0.87000	0.01881	0.04207	5.08%
52.3		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	Salt Control	0.90000	0.89000	0.90000	0.90000	0.90000		
21.4		0.91000	0.96000	0.88000	0.93000	0.86000		
32.5		0.77000	0.80000	0.84000	0.86000	0.87000		
52.3		0.00000	0.00000	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	00-9466-7421	00-9466-7421	14 Feb-05 4:22 PM	CETISv1.025

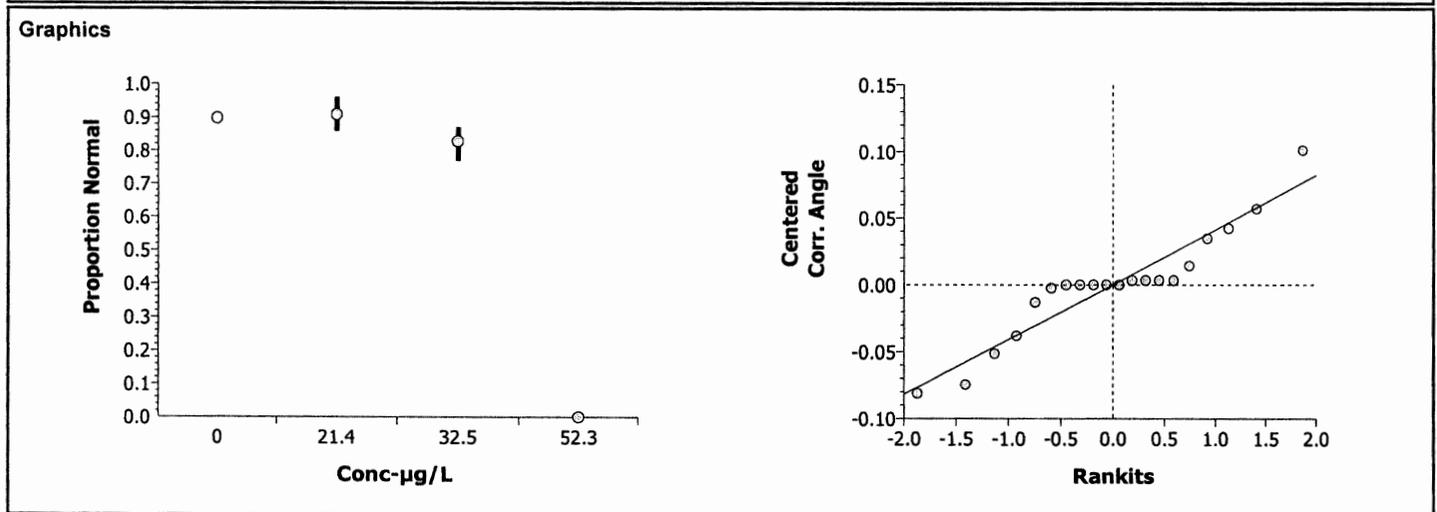
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		21.4	32.5	4.67	26.372	4.67%

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	18.45914	5.29221	0.00002	Unequal Variances
Distribution	Shapiro-Wilk W	0.91163	0.86826	0.06848	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	5.175153	1.725051	3	835.38	0.00000	Significant Effect
Error	0.0330397	0.002065	16			
Total	5.20819248	1.7271159	19			

Group Comparisons							
Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		21.4	30	17	> 0.0500	1	Non-Significant Effect
		32.5	15	17	<= 0.0500	1	Significant Effect
		52.3	15	17	<= 0.0500	2	Significant Effect

Data Summary			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.89800	0.89000	0.90000	0.00447	1.24578	1.23273	1.24905	0.00730
21.4		5	0.90800	0.86000	0.96000	0.03962	1.26859	1.18730	1.36944	0.07181
32.5		5	0.82800	0.77000	0.87000	0.04207	1.14526	1.07062	1.20193	0.05523
52.3		5	0.00000	0.00000	0.00000	0.00000	0.05002	0.05002	0.05002	0.00001



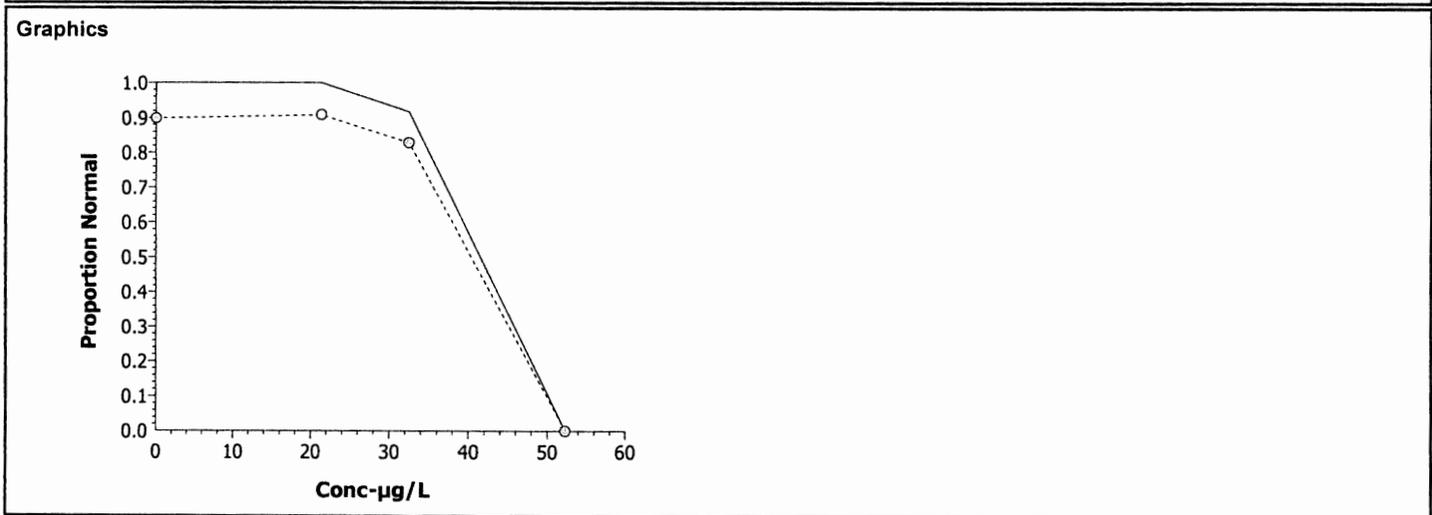
CETIS Analysis Detail

Bivalve Larval Survival and Development Test					Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Trimmed Spearman-Karber	00-9466-7421	00-9466-7421	14 Feb-05 4:22 PM	CETISv1.025

Spearman-Karber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0.102	0.00%	1.599076	0.00239482	39.72610	39.29038	40.16665

Data Summary		Calculated Variate(A/B)							
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.89800	0.89000	0.90000	0.00091	0.00447	449	500
21.4		5	0.90800	0.86000	0.96000	0.00809	0.03962	454	500
32.5		5	0.82800	0.77000	0.87000	0.00859	0.04207	414	500
52.3		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	500



Report Date: 10 Jan-05 2:41 PM

Link: 00-6572-8268/0409-125

CETIS Test Summary

Bivalve Larval Survival and Development Test				Nautilus Environmental (CA)				
Test No:	05-4237-7795	Test Type:	Development-Survival	Duration:	69h			
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Artificial Saltwater	Source:	Carlsbad Aquafarms			
Setup Date:	29 Sep-04 02:30 PM	Brine:	Forty Fathoms					
Sample No:	03-7627-1785	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 12:21 PM	Code:	0409-125	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	26h (17.2 °C)	Station:	WER (B-3)					
Comments:	100% sample spiked with 6 different concentrations of copper.							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
09-0331-9493	Proportion Normal	25	40	31.623	4.39%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
14-0110-5354	Proportion Normal	50	48.67998	48.05692	49.31111	Trimmed Spearman-Kärber		
Proportion Normal Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.91824	0.89000	0.94118	0.00875	0.01958	2.13%
0	Salt Control	5	0.89920	0.89247	0.90244	0.00174	0.00389	0.43%
9		5	0.92228	0.89474	0.94000	0.00782	0.01749	1.90%
15		5	0.90720	0.86598	0.93000	0.01140	0.02549	2.81%
25		5	0.90800	0.86000	0.96000	0.01772	0.03962	4.36%
40		5	0.82844	0.77000	0.87000	0.01866	0.04172	5.04%
65		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
100		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	0.94118	0.91000	0.92000	0.93000	0.89000		
0	Salt Control	0.89247	0.90000	0.90000	0.90110	0.90244		
9		0.94000	0.93000	0.91667	0.89474	0.93000		
15		0.92000	0.90000	0.92000	0.93000	0.86598		
25		0.91000	0.96000	0.88000	0.93000	0.86000		
40		0.77000	0.80220	0.84000	0.86000	0.87000		
65		0.00000	0.00000	0.00000	0.00000	0.00000		
100		0.00000	0.00000	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	00-6572-8268	00-6572-8268	10 Jan-05 2:40 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		25	40	4.00	31.623	4.39%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	38.21418	16.81190	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.94064	0.91004	0.07958	Normal Distribution

ANOVA Table

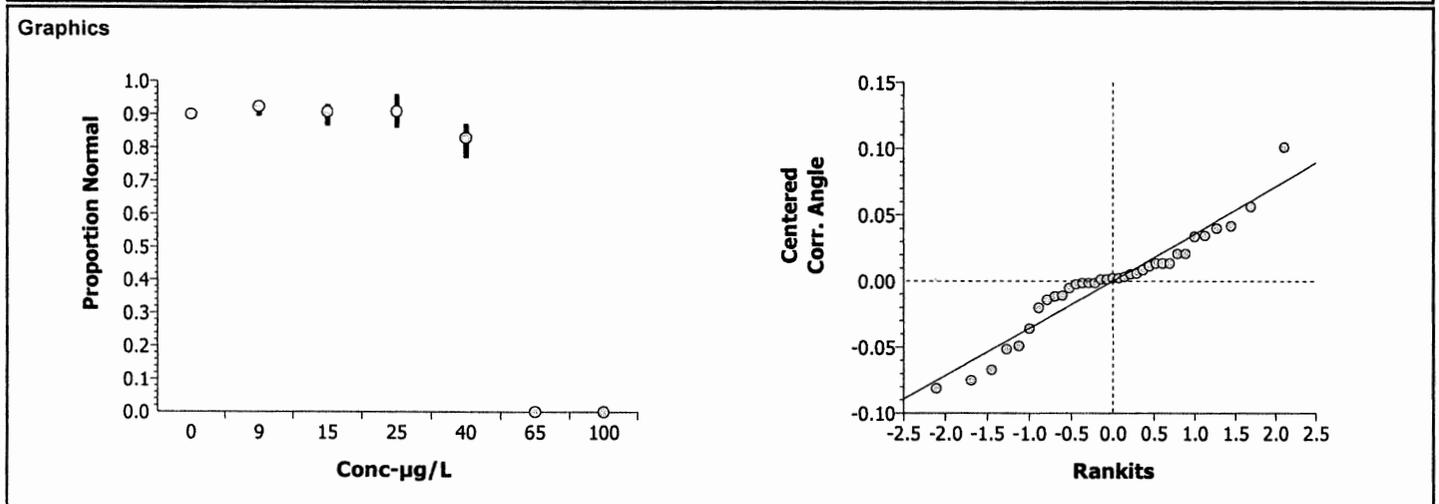
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	9.772348	1.628725	6	1020.20	0.00000	Significant Effect
Error	0.0447013	0.001596	28			
Total	9.81704973	1.6303213	34			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		9	36	16	> 0.0500	2	Non-Significant Effect
		15	32	16	> 0.0500	2	Non-Significant Effect
		25	30	16	> 0.0500	1	Non-Significant Effect
		40	15	16	<= 0.0500	1	Significant Effect
		65	15	16	<= 0.0500	3	Significant Effect
		100	15	16	<= 0.0500	1	Significant Effect

Data Summary

Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.89920	0.89247	0.90244	0.00389	1.24776	1.23670	1.25313	0.00641
9		5	0.92228	0.89474	0.94000	0.01749	1.28954	1.24037	1.32333	0.03185
15		5	0.90720	0.86598	0.93000	0.02549	1.26323	1.19599	1.30303	0.04234
25		5	0.90800	0.86000	0.96000	0.03962	1.26859	1.18730	1.36944	0.07181
40		5	0.82844	0.77000	0.87000	0.04172	1.14581	1.07062	1.20193	0.05476
65		5	0.00000	0.00000	0.00000	0.00000	0.05147	0.05002	0.05363	0.00198
100		5	0.00000	0.00000	0.00000	0.00000	0.10359	0.08343	0.11496	0.01293



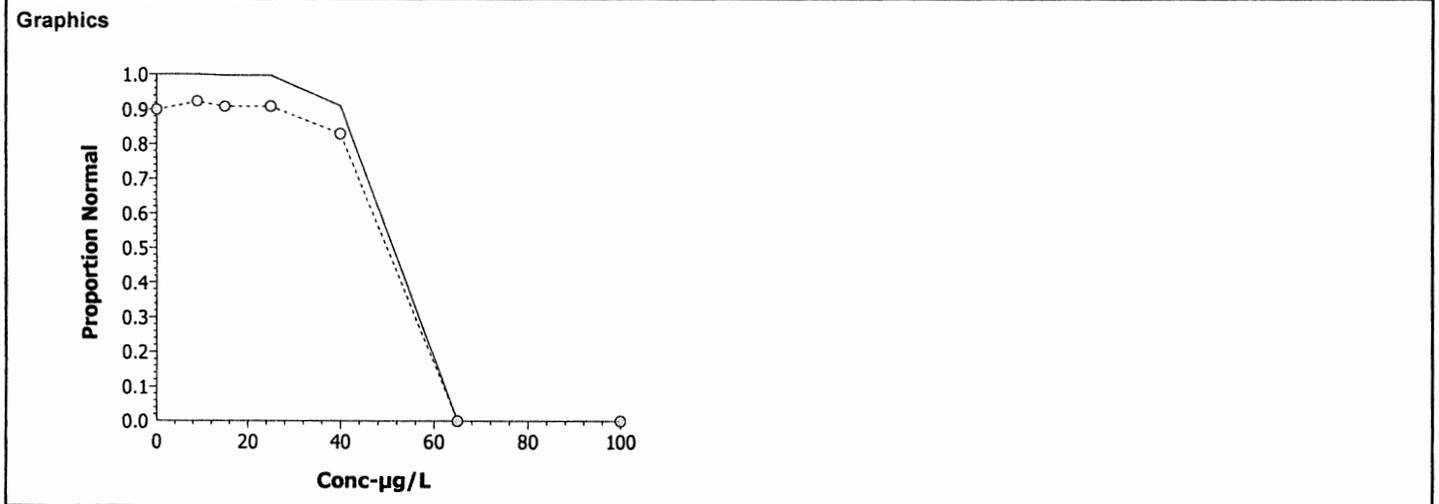
CETIS Analysis Detail

Bivalve Larval Survival and Development Test	Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Trimmed Spearman-Karber	00-6572-8268	00-6572-8268	10 Jan-05 2:40 PM	CETISv1.025

Spearman-Karber Options					Point Estimates		
Threshold Option	Lower Threshold	Trim Level	Mu	Sigma	EC50/LC50	95% LCL	95% UCL
Control Threshold	0.1008584	0.00%	1.68735	0.00279721	48.67998	48.05692	49.31111

Data Summary			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.89920	0.89247	0.90244	0.00079	0.00389	419	466
9		5	0.92228	0.89474	0.94000	0.00357	0.01749	453	491
15		5	0.90720	0.86598	0.93000	0.00520	0.02549	442	487
25		5	0.90800	0.86000	0.96000	0.00809	0.03962	454	500
40		5	0.82844	0.77000	0.87000	0.00852	0.04172	407	491
65		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	474
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	122



CETIS Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental

AMEC Bioassay SD

Start Date: 29 Sep-04 Species: *Mytilus galloprovincialis* Sample Code: 0409-125
 End Date: ~~01~~ Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: WER (B-3)

Conc %	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
<i>with cu</i>			111			100	93	SD 1.4-0.5, 1.7-0.5
			112			100	93	
			113			93	83	
			114			90	81	
			115			36	0	
			116			97	84	
			117			100	88	
			118			100	91	
			119			91	73	
			120			100	84	
			121			100	90	
			122				86	
			123			↓	87	
			124			↓	93	
			125			82	74	
			126			87	0	
			127			100	91	
			128			20	0	
			129			100	0	
			130				77	
		131				92		
		132			↓	0		
		133			↓	93		
		134			21	0		
		135			95	83		
		136			87	0		
		137			100	90		
		138			19	0		
		139			100	92		
		140			85	80		
		141			100	92		
		142				89		
		143			↓	0		
		144			26	0		
		145			100	94		
		146				96		
		147			↓	86		
		148			96	88		
		149			100	93		
		150			91	82		

CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 28 Sep-04 11:59 AM
 Link: 00-6572-8268/0409-125

Bivalve Larval Survival and Development Test

Nautilus Environmental

AMEC Bioassay SD

Start Date: 29 Sep-04 Species: *Mytilus galloprovincialis* Sample Code: 0409-125
 End Date: 01 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: WER (B-3)

Comp %	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC 2	1	140					
0	LC 2	2	127					
0	LC 2	3	131					
0	LC 2	4	111					
0	LC 2	5	142					
0	SC 2	1	113					
0	SC 2	2	121					
0	SC 2	3	137					
0	SC 2	4	150					
0	SC 2	5	125					
9		1	145					
9		2	149					
9		3	148					
9		4	135					
9		5	133					
15		1	139					
15		2	114					
15		3	141					
15		4	112					
15		5	116					
25		1	118					
25		2	146					
25		3	117					
25		4	124					
25		5	147					
40		1	130					
40		2	119					
40		3	120					
40		4	122					
40		5	123					
65		1	126					
65		2	143					
65		3	129					
65		4	136					
65		5	132					
100		1	134					
100		2	128					
100		3	138					
100		4	115					
100		5	144					

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura
 Sample ID: B-3 (WER)
 Test No.: 0409-125

Test Species: M. galloprovincialis
 Start Date/Time: 09/29/04 1430
 End Date/Time: 10-2-04 1600

Concentration µg/L of Cu	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)			SAL	TO	DO	PH
	0	24	48	0	24	48	0	24	48	0	24	48				
Lab Control #2	29.7	29.6	30.1	14.3	14.4	14.2	7.0	8.4	8.5	8.01	8.25	8.00	30.3	14.1	8.2	8.09
Salt Control #2	29.2	29.5	30.1	14.3	14.4	14.1	7.3	8.6	8.4	8.56	8.44	8.17	30.4	14.0	8.4	8.24
9	28.9	29.6	30.0	14.3	14.4	14.0	7.3	8.4	8.6	8.27	8.25	8.18	29.9	14.1	8.3	8.31
15	28.9	29.9	29.8	14.3	14.4	14.1	7.4	8.0	8.9	8.26	8.22	8.22	30.0	14.1	8.4	8.3
25	28.9	30.0	29.7	14.3	14.3	14.1	7.4	8.3	9.2	8.26	8.22	8.22	29.7	14.2	8.3	8.32
40	28.9	30.0	29.7	14.3	14.3	14.2	7.4	8.5	9.3	8.25	8.22	8.22	29.9	14.3	8.3	8.32
65	28.9	29.8	29.6	14.3	14.2	14.2	7.4	8.5	9.2	8.26	8.23	8.22	29.7	14.2	8.4	8.31
100	28.8	29.6	29.5	14.3	14.3	14.2	7.4	8.6	9.1	8.26	8.24	8.23	29.7	14.2	8.3	8.3

Technician Initials:

0	24	48	72
RS	RS	RS	RS

Animal Source/Date Received: Carlsbad Aquafarms

Comments: 0 hrs: _____
 24 hrs: _____
 48 hrs: _____

QC Check: Alt 10/20/04 Final Review: [Signature] 1/10/05



CETIS Test Summary

Report Date: 15 Feb-05 10:02 AM

Link: 08-7426-9183/0409-126a

Bivalve Larval Survival and Development Test				Nautilus Environmental (CA)				
Test No:	05-4237-7795	Test Type:	Development-Survival	Duration:	69h			
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilus galloprovincialis			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Artificial Saltwater	Source:	Carlsbad Aquafarms			
Setup Date:	29 Sep-04 02:30 PM	Brine:	Forty Fathoms					
Sample No:	10-3687-9705	Material:	Estuarine Monitoring Sample	Client:	City of Buenaventura			
Sample Date:	28 Sep-04 03:30 PM	Code:	0409-126a	Project:				
Receive Date:	28 Sep-04 08:30 PM	Source:	City of Buenaventura					
Sample Age:	23h (20.6 °C)	Station:	WER (C-3)					
Comments:	Sample spiked with 6 different concentrations of copper. EC50 values are based on measured concentrations of copper in 3 of the 6 samples.							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
14-5712-2937	Proportion Normal	57.8	85.1	70.134	13.49%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
00-9202-9037	Proportion Normal	25	73.37199	65.88921	88.06339	Linear Interpolation		
		50	> 85.10000	N/A	N/A			
Proportion Normal Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Salt Control	5	0.89800	0.89000	0.90000	0.00200	0.00447	0.50%
36		5	0.91400	0.86000	0.96000	0.02064	0.04615	5.05%
57.8		5	0.87800	0.78000	0.98000	0.03541	0.07918	9.02%
85.1		5	0.53000	0.32000	0.69000	0.07655	0.17117	32.30%
Proportion Normal Detail								
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Salt Control	0.89000	0.90000	0.90000	0.90000	0.90000		
36		0.87000	0.86000	0.93000	0.95000	0.96000		
57.8		0.83000	0.87000	0.93000	0.78000	0.98000		
85.1		0.32000	0.38000	0.58000	0.69000	0.68000		

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	08-7426-9183	08-7426-9183	15 Feb-05 10:01 AM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		57.8	85.1	1.73	70.134	13.49%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	18.92912	11.34487	0.00028	Unequal Variances
Distribution	Shapiro-Wilk W	0.97711	0.86826	0.86730	Normal Distribution

ANOVA Table

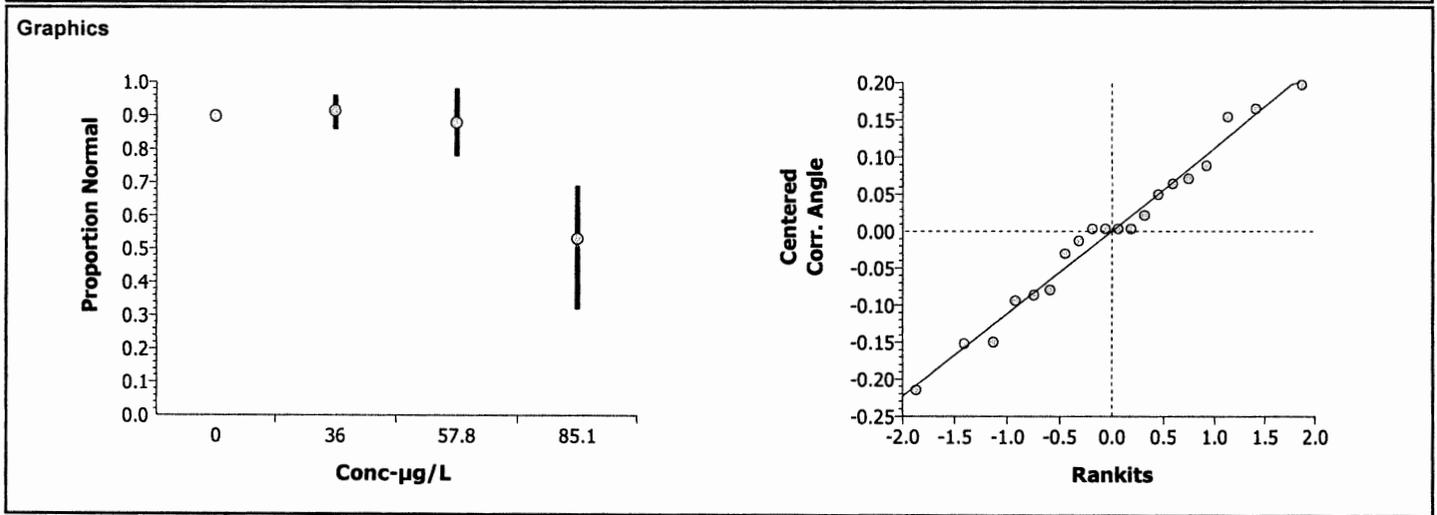
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	0.7225389	0.240846	3	17.18	0.00003	Significant Effect
Error	0.2243424	0.014021	16			
Total	0.94688135	0.2548677	19			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Salt Control		36	30	17	> 0.0500	1	Non-Significant Effect
		57.8	25	17	> 0.0500	1	Non-Significant Effect
		85.1	15	17	<= 0.0500	1	Significant Effect

Data Summary

Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Salt Control	5	0.89800	0.89000	0.90000	0.00447	1.24578	1.23273	1.24905	0.00730
36		5	0.91400	0.86000	0.96000	0.04615	1.28140	1.18730	1.36944	0.08287
57.8		5	0.87800	0.78000	0.98000	0.07918	1.23245	1.08259	1.42890	0.13645
85.1		5	0.53000	0.32000	0.69000	0.17117	0.81621	0.60126	0.98030	0.17478



CETIS Analysis Detail

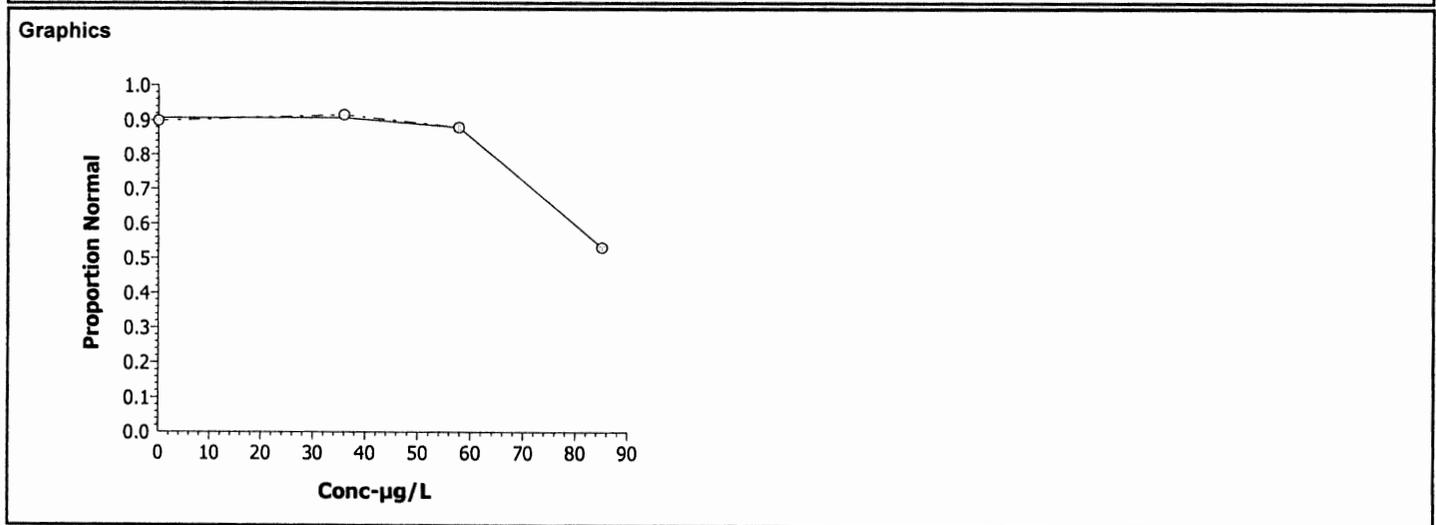
Bivalve Larval Survival and Development Test					Nautilus Environmental (CA)	
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Interpolation	08-7426-9183	08-7426-9183	15 Feb-05 10:01 AM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7055475	200	Yes	Two-Point Interpolation

Point Estimates			
% Effect	Conc-µg/L	95% LCL	95% UCL
25	73.37199	65.88921	88.06339
50	> 85.10000	N/A	N/A

Data Summary		Calculated Variate(A/B)							
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.89800	0.89000	0.90000	0.00091	0.00447	449	500
36		5	0.91400	0.86000	0.96000	0.00942	0.04615	457	500
57.8		5	0.87800	0.78000	0.98000	0.01616	0.07918	439	500
85.1		5	0.53000	0.32000	0.69000	0.03494	0.17117	265	500



CETIS Test Summary

Bivalve Larval Survival and Development Test **Nautilus Environmental (CA)**

Test No: 05-4237-7795	Test Type: Development-Survival	Duration: 69h
Start Date: 29 Sep-04 02:30 PM	Protocol: ASTM E724-98 (1999)	Species: Mytilis galloprovincialis
Ending Date: 02 Oct-04 11:00 AM	Dil Water: Artificial Saltwater	Source: Carlsbad Aquafarms
Setup Date: 29 Sep-04 02:30 PM	Brine: Forty Fathoms	

Sample No: 05-2984-0206	Material: Estuarine Monitoring Sample	Client: City of Buenaventura
Sample Date: 28 Sep-04 03:30 PM	Code: 0409-126	Project:
Receive Date: 28 Sep-04 08:30 PM	Source: City of Buenaventura	
Sample Age: 23h (20.6 °C)	Station: WER (C-3)	

Comments: 100% sample spiked with 6 different concentrations of copper.

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method
10-0692-7166	Proportion Normal	65	100	80.623	12.44%	Steel's Many-One Rank

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
08-5324-2987	Proportion Normal	25	85.04052	75.72440	99.85835	Linear Interpolation
		50	> 100.00000	N/A	N/A	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.91824	0.89000	0.94118	0.00875	0.01958	2.13%
0	Salt Control	5	0.89920	0.89247	0.90244	0.00174	0.00389	0.43%
9		5	0.91043	0.88618	0.95402	0.01184	0.02648	2.91%
15		5	0.89952	0.84848	0.95833	0.01799	0.04024	4.47%
25		5	0.87572	0.83962	0.96000	0.02266	0.05067	5.79%
40		5	0.91375	0.85882	0.95588	0.02053	0.04592	5.02%
65		5	0.87896	0.77660	0.98413	0.03617	0.08089	9.20%
100		5	0.52905	0.31818	0.69048	0.07721	0.17265	32.63%

Proportion Normal Detail

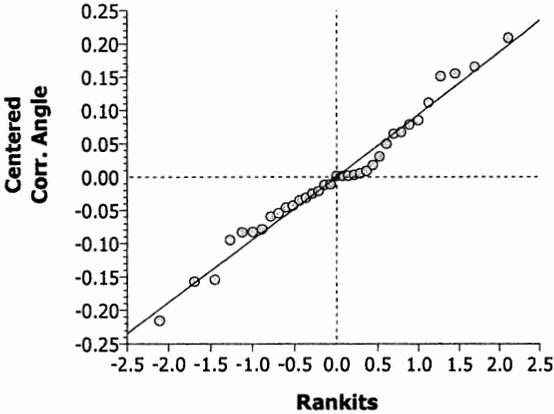
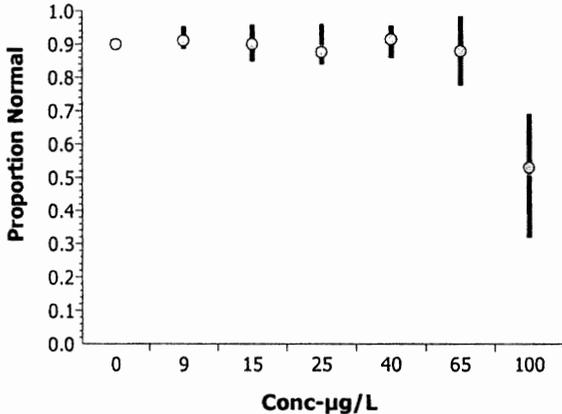
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.94118	0.91000	0.92000	0.93000	0.89000
0	Salt Control	0.89247	0.90000	0.90000	0.90110	0.90244
9		0.91304	0.90526	0.89362	0.95402	0.88618
15		0.91304	0.95833	0.84848	0.89000	0.88776
25		0.88636	0.84314	0.84946	0.83962	0.96000
40		0.87000	0.85882	0.93407	0.95000	0.95588
65		0.83505	0.86905	0.93000	0.77660	0.98413
100		0.31818	0.37681	0.57895	0.69048	0.68085

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	05-2248-1591	00-6572-8268	12 Jan-05 2:14 PM	CETISv1.025						
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp			
Steel's Many-One Rank	C > T	Angular (Corrected)		65	100	1.54	80.623	12.44%			
ANOVA Assumptions											
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)						
Variances	Bartlett	24.41583	16.81190	0.00044	Unequal Variances						
Distribution	Shapiro-Wilk W	0.97855	0.91004	0.76954	Normal Distribution						
ANOVA Table											
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)					
Between	0.8267259	0.137788	6	13.10	0.00000	Significant Effect					
Error	0.2944244	0.010515	28								
Total	1.12115031	0.1483028	34								
Group Comparisons											
Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)				
Salt Control		9	31	16	> 0.0500	1	Non-Significant Effect				
		15	25	16	> 0.0500	1	Non-Significant Effect				
		25	20	16	> 0.0500	1	Non-Significant Effect				
		40	30	16	> 0.0500	1	Non-Significant Effect				
		65	25	16	> 0.0500	1	Non-Significant Effect				
		100	15	16	<= 0.0500	1	Significant Effect				
Data Summary											
Data Summary		Original Data					Transformed Data				
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
0	Salt Control	5	0.89920	0.89247	0.90244	0.00389	1.24776	1.23670	1.25313	0.00641	
9		5	0.91043	0.88618	0.95402	0.02648	1.26986	1.22667	1.35470	0.05047	
15		5	0.89952	0.84848	0.95833	0.04024	1.25391	1.17098	1.36523	0.07183	
25		5	0.87572	0.83962	0.96000	0.05067	1.21822	1.15877	1.36944	0.08884	
40		5	0.91375	0.85882	0.95588	0.04592	1.28062	1.18561	1.35918	0.08140	
65		5	0.87896	0.77660	0.98413	0.08089	1.23582	1.07849	1.44447	0.14229	
100		5	0.52905	0.31818	0.69048	0.17265	0.81524	0.59931	0.98081	0.17634	
Data Detail											
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Salt Control	0.89247	0.90000	0.90000	0.90110	0.90244					
		0.91304	0.90526	0.89362	0.95402	0.88618					
9		0.91304	0.95833	0.84848	0.89000	0.88776					
		0.88636	0.84314	0.84946	0.83962	0.96000					
15		0.87000	0.85882	0.93407	0.95000	0.95588					
		0.83505	0.86905	0.93000	0.77660	0.98413					
40		0.31818	0.37681	0.57895	0.69048	0.68085					

CETIS Analysis Detail

Graphics



CETIS Analysis Detail

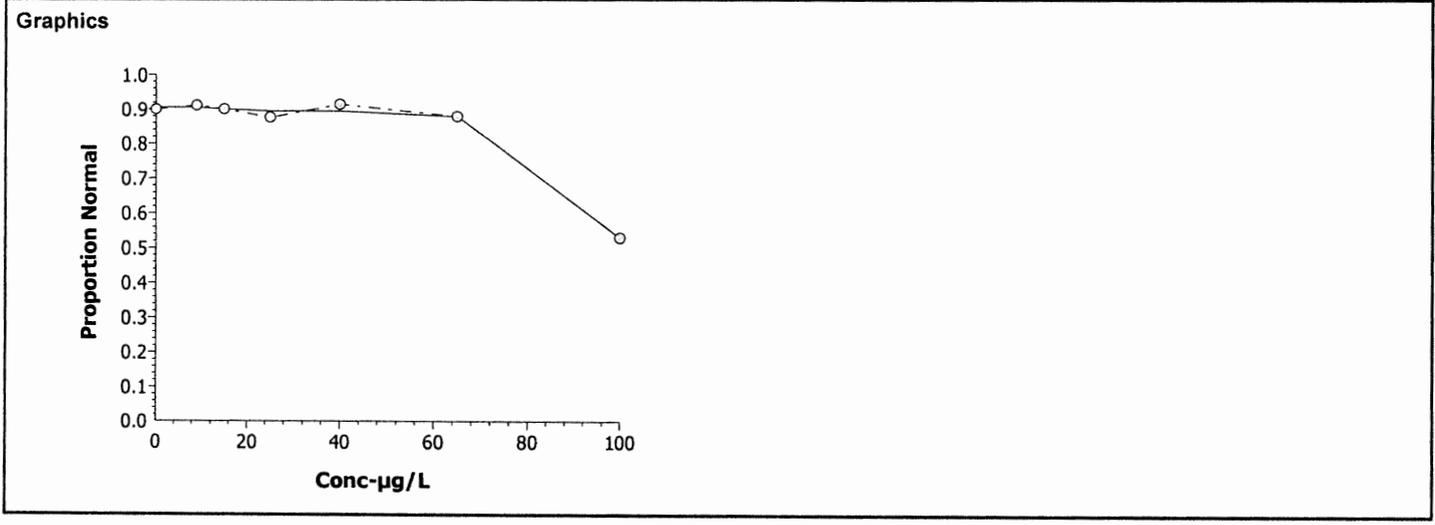
Bivalve Larval Survival and Development Test	Nautilus Environmental (CA)
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Interpolation	05-2248-1591	00-6572-8268	12 Jan-05 2:14 PM	CETISv1.025

Linear Interpolation Options					
X Transform	Y Transform	Seed	Resamples	Expanded CL	Method
Linear	Linear	7055475	200	Yes	Two-Point Interpolation

Point Estimates			
% Effect	Conc-µg/L	95% LCL	95% UCL
25	85.04052	75.72440	99.85835
50	> 100.00000	N/A	N/A

Data Summary		Calculated Variate(A/B)							
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Salt Control	5	0.89920	0.89247	0.90244	0.00079	0.00389	419	466
9		5	0.91043	0.88618	0.95402	0.00541	0.02648	425	468
15		5	0.89952	0.84848	0.95833	0.00821	0.04024	413	461
25		5	0.87572	0.83962	0.96000	0.01034	0.05067	428	489
40		5	0.91375	0.85882	0.95588	0.00937	0.04592	405	444
65		5	0.87896	0.77660	0.98413	0.01651	0.08089	382	438
100		5	0.52905	0.31818	0.69048	0.03524	0.17265	206	367



CETIS Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental

AMEC Bioassay-SD

Start Date: 29 Sep-04 Species: *Mytilis galloprovincialis* Sample Code: 0409-126
 End Date: 01 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: WER (C-2)3

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			146			84	58	MC 1.6.04
			147			100	87	
			148			95	86	
			149			94	64	
			150			-	-	
			151			97	81	
			152			68	65	
			153			100	93	
			154			88	78	
			155			87	83	
			156			-	-	
			157			91	85	
			158			-	-	
			159			94	73	
			160			98	87	
			161			-	-	
			162			-	-	
			163			69	63	
			164			100	95	
			165			-	-	
			166			76	44	
			167			69	26	
			168			63	62	
			169			84	73	
			170			72	69	
			171			100	96	
			172			100	89	
			173			92	84	
			174			123	109	efel
			175			93	79	
			176			99	84	
			177			94	84	
			178			102	86	
			179			44	14	
			180			-	-	
			181			-	-	
			182			85	73	
			183			106	89	
			184			-	-	
			185			-	-	

Lined out replicates are LC2 + SC2, share w/B-3

CETIS Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental — AMEC Bioassay SD

Start Date: 29 Sep-04 Species: Mytilis galloprovincialis Sample Code: 0409-126
 End Date: ~~01~~ Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: City of Buenaventura
 Sampled: 28 Sep-04 Material: Estuarine Monitoring Sample Sample Station: WER (C-7)3

Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	185					
0	LC	2	184					
0	LC	3	165					
0	LC	4	180					
0	LC	5	162					
0	SC	1	181					
0	SC	2	150					
0	SC	3	161					
0	SC	4	158					
0	SC	5	156					
9		1	163					
9		2	148					
9		3	177					
9		4	155					
9		5	174					
15		1	173					
15		2	170					
15		3	176					
15		4	172					
15		5	160					
25		1	154					
25		2	178					
25		3	175					
25		4	183					
25		5	171					
40		1	147					
40		2	182					
40		3	157					
40		4	164					
40		5	152					
65		1	151					
65		2	169					
65		3	153					
65		4	159					
65		5	168					
100		1	179					
100		2	167					
100		3	166					
100		4	146					
100		5	149					

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura
 Sample ID: C-~~3~~(WER)
 Test No.: 0409-126

Test Species: M. galloprovincialis
 Start Date/Time: 09/29/04 1430
 End Date/Time: 10-20-04 WFO

Concentration µg/L of Cu	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)			SAL	T°	DO	pH
	0	24	48	0	24	48	0	24	48	0	24	48				
Lab Control #2	29.7	29.7	30.1	14.3	14.4	14.4	7.0	8.6	8.4	8.01	8.04	8.00	30.3	14.1	8.2	8.00
Salt Control #2	29.2	29.5	30.1	14.3	14.4	14.4	7.3	8.6	8.4	8.56	8.44	8.17	30.4	14.0	8.4	8.21
9	29.4	29.5	30.0	14.3	14.4	14.1	7.8	8.6	8.6	8.27	8.30	8.19	30.0	14.0	8.2	8.39
15	29.6	29.5	30.1	14.3	14.4	14.0	7.8	8.6	8.5	8.17	8.30	8.20	30.7	14.0	8.4	8.31
25	29.4	29.5	30.5	14.3	14.4	14.0	7.8	8.6	8.9	8.17	8.30	8.19	30.7	14.0	8.4	8.32
40	29.6	29.2	30.4	14.3	14.4	14.0	7.8	8.6	9.1	8.18	8.30	8.18	30.5	14.0	8.3	8.33
65	29.6	29.1	30.2	14.3	14.4	14.0	7.4	8.6	9.0	8.18	8.30	8.18	30.3	14.0	8.3	8.35
100	29.5	29.0	30.1	14.3	14.4	14.0	7.4	8.5	9.0	8.18	8.30	8.20	30.3	14.1	8.3	8.35

Technician Initials:

0	24	48	72
RS	RS	RS	RS

Animal Source/Date Received: Curksbad Aquafarms

Comments: 0 hrs: _____
 24 hrs: _____
 48 hrs: _____

QC Check: AH 10/20/04 Final Review: [Signature] 1/10/05

Report Date: 14 Feb-05 4:31 PM

Link: 05-8479-3232/0409-127a

CETIS Test Summary

Bivalve Larval Survival and Development Test						Nautilus Environmental (CA)		
Test No:	04-4126-0995	Test Type:	Development-Survival	Duration:	69h	Species:	Mytilus galloprovincialis	
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Source:	Carlsbad Aquafarms			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Scripps Seawater					
Setup Date:	29 Sep-04 02:30 PM	Brine:	Not Applicable					
Sample No:	06-8868-7410	Material:	Copper chloride	Client:	Internal			
Sample Date:	29 Sep-04	Code:	0409-127a	Project:				
Receive Date:	29 Sep-04	Source:	INTERNAL					
Sample Age:	14h	Station:	Polished Sea Water					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
03-3738-0364	Proportion Normal	6.44	9.76	7.928	6.15%	Dunnett's Multiple Comparison		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
10-7484-4524	Proportion Normal	25	10.07802	9.72508	10.40304	Linear Regression		
		50	11.53252	11.20332	11.86233			
Proportion Normal Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.88600	0.83000	0.96000	0.02657	0.05941	6.71%
6.44		5	0.87000	0.84000	0.90000	0.01140	0.02550	2.93%
9.76		5	0.70200	0.65000	0.79000	0.02354	0.05263	7.50%
16.7		5	0.02800	0.02000	0.04000	0.00374	0.00837	29.88%
Proportion Normal Detail								
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.96000	0.85000	0.83000	0.94000	0.85000		
6.44		0.90000	0.87000	0.84000	0.89000	0.85000		
9.76		0.69000	0.79000	0.70000	0.65000	0.68000		
16.7		0.04000	0.02000	0.03000	0.02000	0.03000		

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	05-8479-3232	05-8479-3232	14 Feb-05 4:30 PM	CETISv1.025

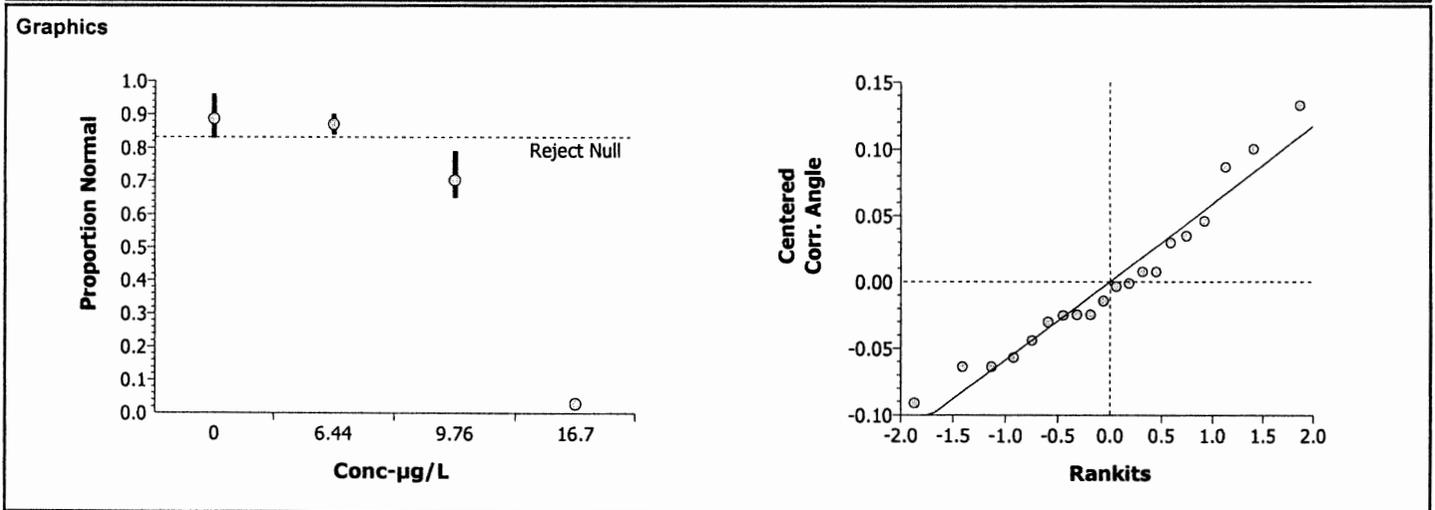
Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		6.44	9.76	15.53	7.928	6.15%

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Bartlett	7.32623	11.34487	0.06220	Equal Variances
Distribution	Shapiro-Wilk W	0.94966	0.86826	0.35403	Normal Distribution

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	3.76114	1.253713	3	313.74	0.00000	Significant Effect
Error	0.0639371	0.003996	16			
Total	3.82507744	1.2577096	19			

Group Comparisons							
Control	vs	Conc-µg/L	Statistic	Critical	P Level	MSD	Decision(0.05)
Lab Control		6.44	0.84383	2.23	> 0.0500	0.08916	Non-Significant Effect
		9.76	6.05936	2.23	<= 0.0500	0.08916	Significant Effect
		16.7	26.7704	2.23	<= 0.0500	0.08916	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	0.88600	0.83000	0.96000	0.05941	1.23695	1.14581	1.36944	0.10183
6.44		5	0.87000	0.84000	0.90000	0.02549	1.20322	1.15928	1.24905	0.03811
9.76		5	0.70200	0.65000	0.79000	0.05263	0.99470	0.93774	1.09476	0.05939
16.7		5	0.02800	0.02000	0.04000	0.00837	0.16666	0.14190	0.20136	0.02520

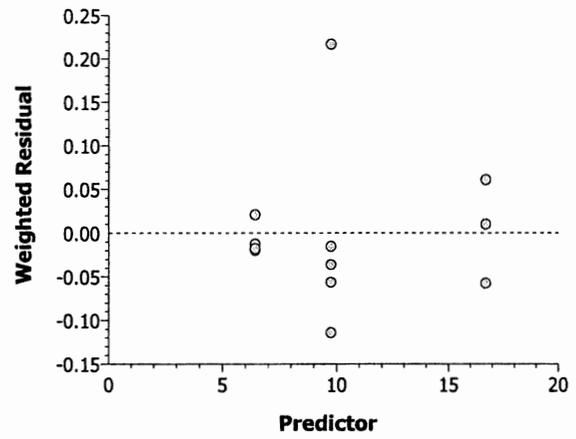
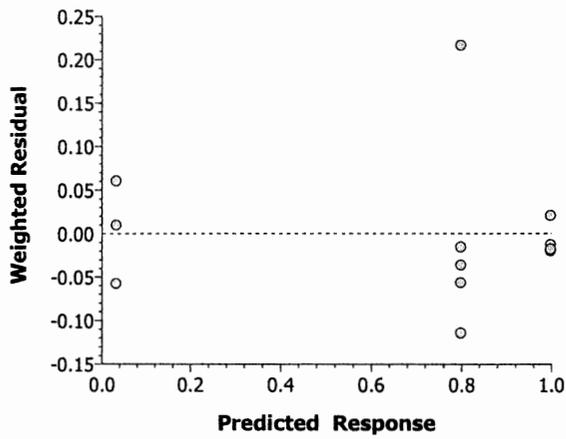
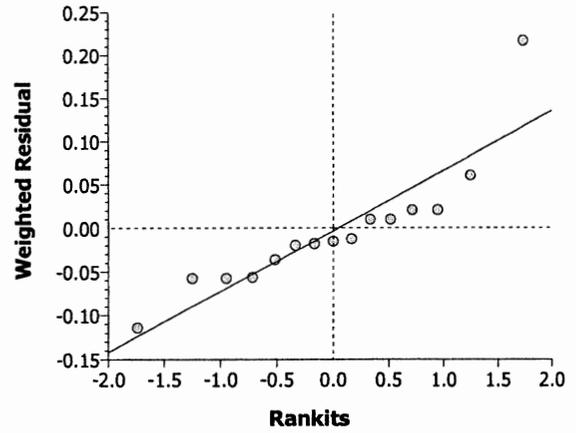
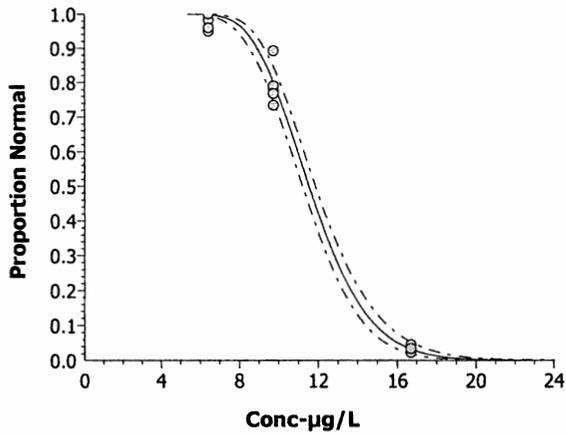


CETIS Analysis Detail

Bivalve Larval Survival and Development Test						Nautilus Environmental (CA)			
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version				
Proportion Normal	Linear Regression	05-8479-3232	05-8479-3232	14 Feb-05 4:31 PM	CETISv1.025				
Linear Regression Options									
Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.			
Log-Normal	Control Threshold	0.114	Yes	Yes	No	No			
Regression Parameters									
Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)		
Threshold	0.12107	0.01050	0.10049	0.14166	11.530	0.05507	Not Significant		
Slope	11.52014	0.63109	10.28321	12.75707	18.254	0.03484	Significant		
Intercept	-7.23351	0.67713	-8.56068	-5.90635	-10.683	0.05942	Not Significant		
Regression Summary									
Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)	
5	-208.93400	-0.62790	0.08680	0.01153	8.98514	22.36203	0.77406	Non-Significant Heterogeneity	
Residual Analysis									
Attribute	Method	Statistic	Critical	P Level	Decision(0.05)				
Variances	Modified Levene	1.62658	3.58743	0.23967	Equal Variances				
Distribution	Shapiro-Wilk W	0.83669	0.88071	0.01052	Non-normal Distribution				
Point Estimates									
% Effect	Conc-µg/L	95% LCL	95% UCL						
25	10.07802	9.72508	10.40304						
50	11.53252	11.20332	11.86233						
Data Summary									
Conc-µg/L	Control Type	Count	Calculated Variate(A/B)						
			Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.88600	0.83000	0.96000	0.01213	0.05941	443	500
6.44		5	0.87000	0.84000	0.90000	0.00520	0.02549	435	500
9.76		5	0.70200	0.65000	0.79000	0.01074	0.05263	351	500
16.7		5	0.02800	0.02000	0.04000	0.00171	0.00837	14	500

CETIS Analysis Detail

Graphics



CETIS Test Summary

Bivalve Larval Survival and Development Test							Nautilus Environmental (CA)	
Test No:	04-4126-0995	Test Type:	Development-Survival	Duration:	69h			
Start Date:	29 Sep-04 02:30 PM	Protocol:	ASTM E724-98 (1999)	Species:	Mytilis galloprovincialis			
Ending Date:	02 Oct-04 11:00 AM	Dil Water:	Scripps Seawater	Source:	Carlsbad Aquafarms			
Setup Date:	29 Sep-04 02:30 PM	Brine:	Not Applicable					
Sample No:	11-8182-7105	Material:	Copper chloride	Client:	Internal			
Sample Date:	29 Sep-04	Code:	0409-127	Project:				
Receive Date:	29 Sep-04	Source:	INTERNAL					
Sample Age:	14h	Station:	Polished Sea Water					
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	MSDp	Method		
02-1754-8311	Proportion Normal	5	8.4	6.481	6.33%	Steel's Many-One Rank		
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method		
14-0072-9798	Proportion Normal	25	8.67494	8.39914	8.92979	Linear Regression		
		50	9.85684	9.59876	10.11714			
Proportion Normal Summary								
Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Control	5	0.88600	0.83000	0.96000	0.02657	0.05941	6.71%
1.8		5	0.88200	0.82000	0.92000	0.01908	0.04266	4.84%
3		5	0.86800	0.81000	0.95000	0.02417	0.05404	6.23%
5		5	0.87000	0.84000	0.90000	0.01140	0.02550	2.93%
8.4		5	0.70200	0.65000	0.79000	0.02354	0.05263	7.50%
14		5	0.02800	0.02000	0.04000	0.00374	0.00837	29.88%
23		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
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	0.96000	0.85000	0.83000	0.94000	0.85000		
1.8		0.92000	0.82000	0.89000	0.86000	0.92000		
3		0.85000	0.81000	0.89000	0.84000	0.95000		
5		0.90000	0.87000	0.84000	0.89000	0.85000		
8.4		0.69000	0.79000	0.70000	0.65000	0.68000		
14		0.04000	0.02000	0.03000	0.02000	0.03000		
23		0.00000	0.00000	0.00000	0.00000	0.00000		
39		0.00000	0.00000	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	11-6463-3986	11-6463-3986	10 Jan-05 2:45 PM	CETISv1.025

Method	Alt H	Data Transform	Z	NOEL	LOEL	Toxic Units	ChV	MSDp
Steel's Many-One Rank	C > T	Angular (Corrected)		5	8.4	20.00	6.481	6.33%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P Level	Decision(0.01)
Variances	Modified Levene	3.89894	3.25834	0.00353	Unequal Variances
Distribution	Shapiro-Wilk W	0.93246	0.91882	0.02821	Normal Distribution

ANOVA Table

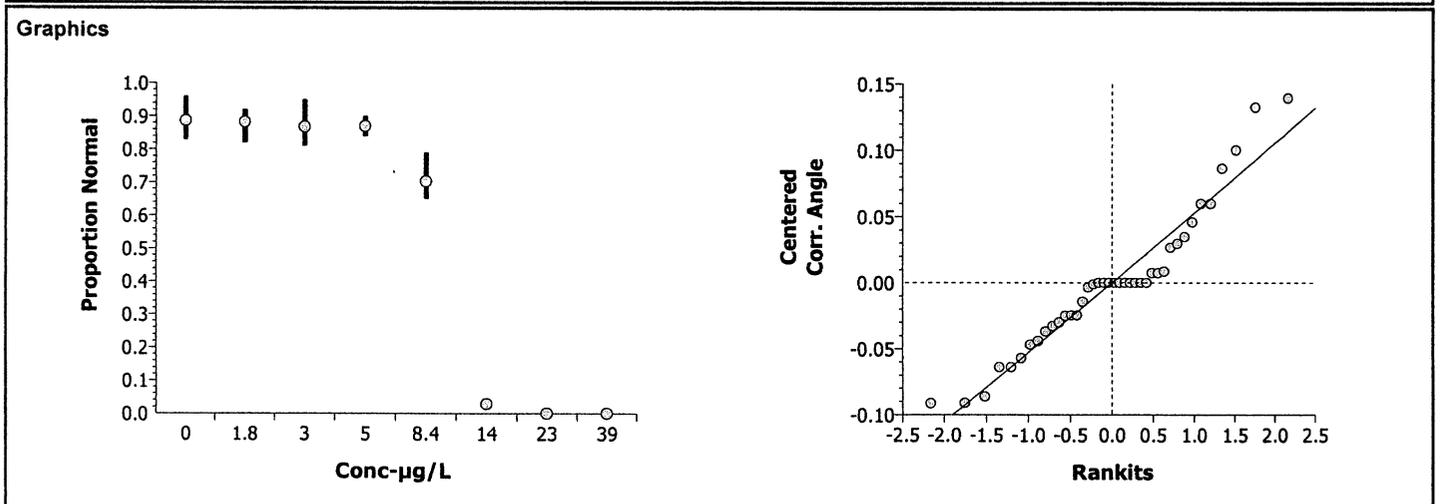
Source	Sum of Squares	Mean Square	DF	F Statistic	P Level	Decision(0.05)
Between	11.26622	1.609461	7	460.96	0.00000	Significant Effect
Error	0.1117304	0.003492	32			
Total	11.3779553	1.6129523	39			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P Level	Ties	Decision(0.05)
Lab Control		1.8	27	16	> 0.0500	2	Non-Significant Effect
		3	25	16	> 0.0500	1	Non-Significant Effect
		5	27	16	> 0.0500	1	Non-Significant Effect
		8.4	15	16	<= 0.0500	1	Significant Effect
		14	15	16	<= 0.0500	3	Significant Effect
		23	15	16	<= 0.0500	2	Significant Effect
		39	15	16	<= 0.0500	2	Significant Effect

Data Summary

Conc-µg/L	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Lab Control	5	0.88600	0.83000	0.96000	0.05941	1.23695	1.14581	1.36944	0.10183
1.8		5	0.88200	0.82000	0.92000	0.04266	1.22415	1.13265	1.28404	0.06515
3		5	0.86800	0.81000	0.95000	0.05404	1.20603	1.11977	1.34528	0.08777
5		5	0.87000	0.84000	0.90000	0.02549	1.20322	1.15928	1.24905	0.03811
8.4		5	0.70200	0.65000	0.79000	0.05263	0.99470	0.93774	1.09476	0.05939
14		5	0.02800	0.02000	0.04000	0.00837	0.16666	0.14190	0.20136	0.02520
23		5	0.00000	0.00000	0.00000	0.00000	0.05002	0.05002	0.05002	0.00001
39		5	0.00000	0.00000	0.00000	0.00000	0.05002	0.05002	0.05002	0.00001

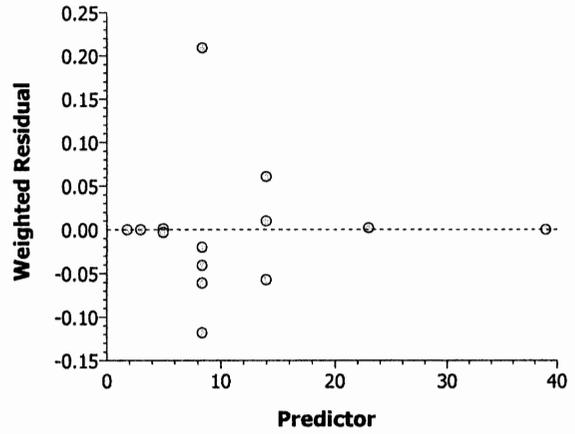
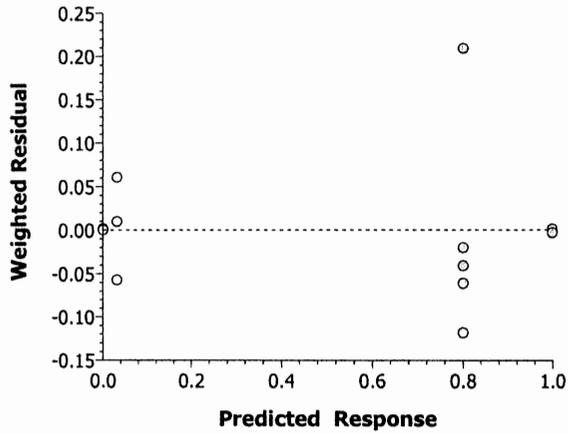
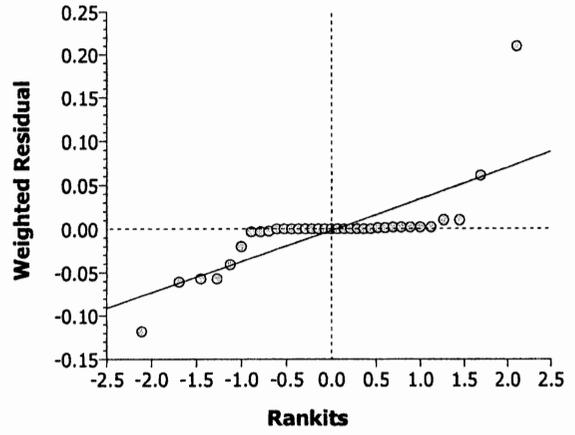
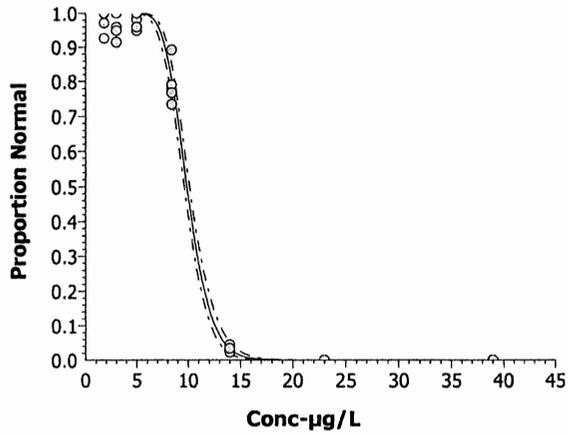


CETIS Analysis Detail

Bivalve Larval Survival and Development Test						Nautilus Environmental (CA)			
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version				
Proportion Normal	Linear Regression	11-6463-3986	11-6463-3986	10 Jan-05 2:45 PM	CETISv1.025				
Linear Regression Options									
Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Heterogeneity Corr.			
Log-Normal	Control Threshold	0.114	Yes	Yes	No	No			
Regression Parameters									
Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P Level	Decision(0.05)		
Threshold	0.12346	0.00736	0.10902	0.13789	16.766	0.00001	Significant		
Slope	12.15921	0.65579	10.87386	13.44455	18.541	0.00001	Significant		
Intercept	-7.08306	0.65883	-8.37436	-5.79176	-10.751	0.00012	Significant		
Regression Summary									
Iters	Log Likelihood	Mu	Sigma	G Stat	Chi-Sq	Critical	P Level	Decision(0.05)	
7	-275.48920	-0.58253	0.08224	0.01117	26.91093	47.39989	0.76356	Non-Significant Heterogeneity	
Residual Analysis									
Attribute	Method	Statistic	Critical	P Level	Decision(0.05)				
Variances	Modified Levene	3.34526	2.37321	0.01068	Unequal Variances				
Distribution	Shapiro-Wilk W	0.59827	0.93382	0.00000	Non-normal Distribution				
Point Estimates									
% Effect	Conc-µg/L	95% LCL	95% UCL						
25	8.67494	8.39914	8.92979						
50	9.85684	9.59876	10.11714						
Data Summary									
Conc-µg/L	Control Type	Count	Calculated Variate(A/B)						
			Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Control	5	0.88600	0.83000	0.96000	0.01213	0.05941	443	500
1.8		5	0.88200	0.82000	0.92000	0.00871	0.04266	441	500
3		5	0.86800	0.81000	0.95000	0.01103	0.05404	434	500
5		5	0.87000	0.84000	0.90000	0.00520	0.02549	435	500
8.4		5	0.70200	0.65000	0.79000	0.01074	0.05263	351	500
14		5	0.02800	0.02000	0.04000	0.00171	0.00837	14	500
23		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	500
39		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	500

CETIS Analysis Detail

Graphics



CETIS Worksheet

Data Worksheet: Page 1 of 1
 Report Date: 28 Sep-04 12:14 PM
 Link: 11-6463-3986/0409-127

Bivalve Larval Survival and Development Test

Nautilus Environmental AMEC Bioassay SD

Start Date: 29 Sep-04 Species: Mytilus galloprovincialis Sample Code: 0409-127
 End Date: 02 Oct-04 Protocol: ASTM E724-98 (1999) Sample Source: INTERNAL
 Sampled: 29 Sep-04 Material: Copper chloride Sample Station: Polished Sea Water

Conc-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			1			100	85	AH 1-6-05
			2			100	0	
			3			100	87	
			4				89	
			5				84	
			6				0	
			7				0	
			8				81	
			9				85	
			10				3	
			11				0	
			12				84	
			13				0	
			14				83	
			15				85	
			16				0	
			17				0	
			18				92	
			19				87	
			20				89	
			21				3	
			22				89	
			23				85	
			24				2	
			25				0	
			26				65	
			27				79	
			28				70	
			29				68	
			30				69	
			31			100	90	AA 1/6/05
			32				76	
			33				0	
			34				96	
			35				95	
			36				2	
			37				4	
			38				94	
			39				92	
			40				0	

CETIS Worksheet

Data Worksheet: Page 1 of 1

Report Date: 28 Sep-04 12:14 PM

Link: 11-6463-3986/0409-127

Bivalve Larval Survival and Development Test

Nautilus Environmental **AMEC Bioassay SD**

Start Date: 29 Sep-04

Species: Mytilis galloprovincialis

Sample Code: 0409-127

End Date: 01 Oct-04

Protocol: ASTM E724-98 (1999)

Sample Source: INTERNAL

Sampled: 29 Sep-04

Material: Copper chloride

Sample Station: Polished Sea Water

Conc-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	LC	1	34					
0	LC	2	15					
0	LC	3	14					
0	LC	4	38					
0	LC	5	1					
1.8		1	39					
1.8		2	3					
1.8		3	20					
1.8		4	32					
1.8		5	18					
3		1	9					
3		2	8					
3		3	4					
3		4	5					
3		5	35					
5		1	31					
5		2	19					
5		3	12					
5		4	22					
5		5	23					
8.4		1	30					
8.4		2	27					
8.4		3	28					
8.4		4	26					
8.4		5	29					
14		1	37					
14		2	36					
14		3	10					
14		4	24					
14		5	21					
23		1	33					
23		2	13					
23		3	2					
23		4	16					
23		5	6					
39		1	25					
39		2	11					
39		3	7					
39		4	40					
39		5	17					

Marine Chronic Bioassay

Water Quality Measurements

Client: City of Buenaventura
 Sample ID: Polished Sea Water CuCl₂
 Test No.: 0409-127

Test Species: M. galloprovincialis
 Start Date/Time: 09/29/2004 1430
 End Date/Time: 10-2-04 1600

Concentration ____µg/L____	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)			SAL	T°	DO	pH
	0	24	48	0	24	48	0	24	48	0	24	48				
Lab Control	33.1	33.2	33.5	14.3	16.0	16.0	7.1	8.4	8.5	8.10	8.07	7.99	33.5	14.7	7.4	8.02
1.8	33.0	33.2	33.4	14.3	15.9	15.8	7.1	8.3	8.6	8.10	8.08	7.99	33.8	14.5	8.5	8.13
3	33.1	33.2	33.9	14.3	15.8	15.8	7.1	8.4	8.7	8.10	8.08	7.99	34.1	14.5	8.6	8.05
5	33.2	33.6	34.1	14.3	15.9	15.7	7.1	8.4	8.6	8.09	8.09	8.00	34.1	14.4	8.6	8.15
8.4	33.3	33.6	34.2	14.3	16.0	15.6	7.1	8.4	8.8	8.10	8.08	8.00	34.3	14.5	8.5	8.02
14	33.3	33.6	34.1	14.3	16.0	15.5	7.1	8.4	8.9	8.09	8.09	8.00	34.3	14.3	8.5	8.01
23	33.1	33.4	33.9	14.3	16.0	15.7	7.1	8.42	8.8	8.10	8.09	8.00	33.7	14.4	8.3	8.18
39	33.2	33.6	34.1	14.3	15.9	15.5	7.1	8.4	8.7	8.09	8.09	8.00	34.3	14.3	8.3	8.19

Technician Initials:

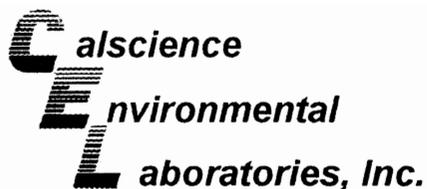
0	24	48	72
SH	RS	RS	RS

Animal Source/Date Received: Carlisbad Aquafarms

Comments: 0 hrs: _____
 24 hrs: _____
 48 hrs: _____

QC Check: AH 10/20/04 Final Review: [Signature] 1/10/05

ANALYTICAL CHEMISTRY DATA



February 02, 2005

Chris Stransky
Nautilus Environmental
5550 Morehouse Drive, Suite 150
San Diego, CA 92121

Subject: **Calscience Work Order No.: 05-01-1232**
Client Reference: **Santa Clara River Estuary WER 2**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 1/25/2005 and analyzed in accordance with the attached chain-of-custody.

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,

QC ✓
2/7/05

Calscience Environmental
Laboratories, Inc.
Robert Stearns
Project Manager





Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

Date Received: 01/25/05
 Work Order No: 05-01-1232
 Preparation: EPA 3010A Total
 Method: EPA 6010B

Project: Santa Clara River Estuary WER 2

Page 1 of 3

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2-9	05-01-1232-1	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	18.2	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2-15	05-01-1232-2	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	23.4	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2-25	05-01-1232-3	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	30.4	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-A-2-40	05-01-1232-4	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	50.7	5.0	1		ug/L

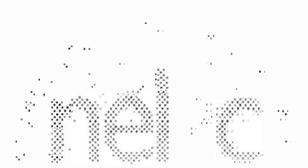
Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1-40	05-01-1232-5	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	62.7	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	05-01-1232-6	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	98.5	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: 01/25/05
 Work Order No: 05-01-1232
 Preparation: EPA 3010A Total
 Method: EPA 6010B

Project: Santa Clara River Estuary WER 2

Page 2 of 3

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-1-100	05-01-1232-7	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	145	5	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-3-25	05-01-1232-8	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	32.4	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-B-3-40	05-01-1232-9	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

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-B-3-65	05-01-1232-10	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	79.2	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-C-3-40	05-01-1232-11	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	54.5	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-C-3-65	05-01-1232-12	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	87.6	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: 01/25/05
 Work Order No: 05-01-1232
 Preparation: EPA 3010A Total
 Method: EPA 6010B

Project: Santa Clara River Estuary WER 2

Page 3 of 3

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-C-3-100	05-01-1232-13	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	129	5	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-PSW-5.0	05-01-1232-14	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	6.44	5.00	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-PSW-8.4	05-01-1232-15	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	9.76	5.00	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
SCRE-PSW-14	05-01-1232-16	09/29/04	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	16.7	5.0	1		ug/L

Client Sample Number	Lab Sample Number	Date Collected	Matrix	Date Prepared	Date Analyzed	QC Batch ID
Method Blank	097-01-003-4,528	N/A	Aqueous	01/26/05	01/27/05	050126L04

Parameter	Result	RL	DF	Qual	Units
Copper	ND	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: 01/25/05
 Work Order No: 05-01-1232
 Preparation: EPA 3010A Total
 Method: EPA 6010B

Project Santa Clara River Estuary WER 2

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
SCORE-A-2-9	Aqueous	ICP 3300	01/26/05	01/27/05	050126904

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Copper	134	136	80-120	1	0-20	3

RPD - Relative Percent Difference , CL - Control Limit



Environmental Quality Control - Laboratory Control Sample
Laboratories, Inc.



Nautilus Environmental
 5550 Morehouse Drive, Suite 150
 San Diego, CA 92121

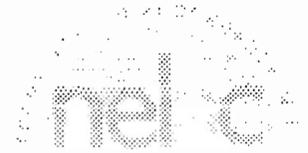
Date Received: N/A
 Work Order No: 05-01-1232
 Preparation: EPA 3010A Total
 Method: EPA 6010B

Project: Santa Clara River Estuary WER 2

Quality Control Sample ID	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
097-01-003-4,528	Aqueous	ICP 3300	01/27/05	050126-I-04	050126L04

Parameter	Conc Added	Conc Recovered	LCS %Rec	%Rec CL	Qualifiers
Copper	1.00	0.996	100	80-120	

RPD - Relative Percent Difference , CL - Control Limit



Work Order Number: 05-01-1232

<u>Qualifier</u>	<u>Definition</u>
*	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.
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.



WORK ORDER #: **05** - -

Cooler 1 of 1

SAMPLE RECEIPT FORM

CLIENT: Mantelco

DATE: 1/25/4

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.
- 4.3 °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.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container label(s) consistent with custody papers.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample container(s) intact and good condition.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Correct containers for analyses requested.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper preservation noted on sample label(s).....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VOA vial(s) free of headspace.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tedlar bag(s) free of condensation.....	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Initial: [Signature]

COMMENTS:

APPENDIX G
CHAIN-OF-CUSTODY FORMS

Client: City of Buena Ventura

Test Initiation Date: 9-29-04

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

Test No.(s): 0409-089 to/28

Test(s) Performed: Kelp/Topsmelt/Mysid/Siraha

	Sample (A, B, C, Receiving Water, etc.)			
	A-2	B-1	B-3	C-3
Alkalinity (mg/L)*	114	153	146	340
Hardness (mg/L)*	-	468	-	>1000
Check-in Temp (°C)	17.9	16.6	17.2	20.6
DO (mg/L)	7.6	9.9	8.9	11.1
pH (units)	8.10	8.00	8.16	8.03
Salinity (ppt)	32.8	0.5	22.7	0.9
Cond. (µmhos-cm)	-	2130	-	4320
Total Chlorine (mg/L)	0.04	0.02	0.01	0.03
Free Chlorine (mg/L)	-	-	-	-
STS added (g)	-	-	-	-
Final Free Chlorine (mg/L)	-	-	-	-

* = mg/L as CaCO₃, * = Measured for freshwater samples only, NA = Not Applicable

Sample Description: A-2 colorless, clear, no odor, no debris
B-1, B-3, C-3 light yellow, clear, no odor, no debris

Dilution Water Source: LAB SW ART SW Other: _____ Alkalinity: 99 Salinity: 30

Additional Control? Y N = Lab SW Alkalinity: 10/13 Salinity: 30/34

Sample Manipulations Required? Y N

Sample Salted w/ artificial salt? Y N If yes, what ppt? 30 - B-1, B-3, C-3

Sample salted w/brine? Y N If yes, what ppt? 30 - B-1, B-3, C-3

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): metals, cyanide, TSS, TOC, DOC

Sample Shipped Via: Hand

Comments: _____

Analysts: AH

QC Check: [Signature] 1/2/05

Client: City of Buena Ventura
 Sample ID: A-2/B-1/B-3/C-3

Test Initiation Date: 9-29-04
 Test No.(s): 0409-089 76-128
 Test(s) Performed: Ceriodaphnia / Fathead / Selenastrum

	Sample (A, B, C, Receiving Water, etc.)			
	A-2	B-1	B-3	C-3
Alkalinity (mg/L)*	114	153		340
Hardness (mg/L)*	-	468		>1000
Check-in Temp (°C)	17.9	16.6		20.6
DO (mg/L)	7.6	9.9		11.1
pH (units)	8.10	8.00		8.03
Cond. (µmhos-cm)	-	2130		4320
Total Chlorine (mg/L)	0.04	0.02		0.03
Free Chlorine (mg/L)	-	-		-
STS added (g)	-	-		-
Final Free Chlorine (mg/L)	-	-		-

* = mg/L as CaCO₃, NA = Not Applicable

Sample Description: A-2 colorless, clear, no odor, no debris
B-1, B-3, C-3 light yellow, clear, no odor, no debris

Dilution Water Source: A 8:2 Culligan Other: ceriodaphnia, fathead Alkalinity: 63 Hardness: 85
 Additional Control? Y N = nutrient-enriched DI Alkalinity: 14 Hardness: 11
Selenastrum

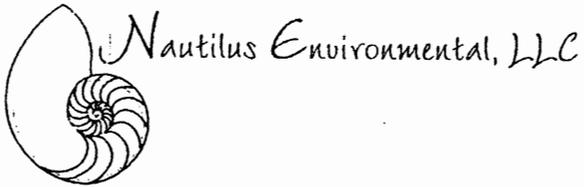
Sample Manipulations Required? Y N
 Filtration? Y N Selenastrum Filter Pore Size: 0.45 µm Organisms: Debris Post-check: [Signature]
 Aeration? Y N Length of Time: _____ Final DO: _____ Final pH: _____
 pH Adjustment? Y N Initial pH: _____ Final pH: _____

Subsamples Collected for Additional Chemistry? Y N Sample Type(s): metals, cyanide, TSS, TOC, DOC

Sample Shipped Via: Hand

Comments: A NA - samples tested @ full strength only

Analysts: AT QC Check: [Signature] 1/28/05



CALIFORNIA
 5550 Morehouse Drive - Suite 150
 San Diego, California 92121
 Phone 858.587.7333
 Fax 858.587.3961

WASHINGTON
 5009 Pacific Highway East - Suite 2
 Tacoma, Washington 98424
 Phone 253.922.4296
 Fax 253.922.5814

Chain of Custody

Date 9/28/04 Page 1 of 1

Sample Collection by: <u>Chris Stransky / John Rudolph</u>							ANALYSES REQUIRED										RECEIPT TEMPERATURE (°C)																				
Report to: Company <u>City of Buena Vista</u> Address _____ City _____ State _____ Zip _____ Contact _____ Phone No. _____				Invoice to: Company <u>City of Buena Vista</u> Address _____ City _____ State _____ Zip _____ Contact _____ Phone No. _____			<table border="1" style="width:100%; border-collapse: collapse; font-size: small;"> <tr> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Topsmelt - chronic</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Mysid - chronic</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Bivalve - chronic</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Bivalve WETZ</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Kelp</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Fathwood Minnow - C</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">C. dubia - chronic</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Selysianstron</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Total Total + Dissolved CN, Cu, Zn, Se, Ni</td> <td style="writing-mode: vertical-rl; text-orientation: mixed;">Toc, Doc, TSS</td> <td></td> </tr> </table>											Topsmelt - chronic	Mysid - chronic	Bivalve - chronic	Bivalve WETZ	Kelp	Fathwood Minnow - C	C. dubia - chronic	Selysianstron	Total Total + Dissolved CN, Cu, Zn, Se, Ni	Toc, Doc, TSS										
Topsmelt - chronic	Mysid - chronic	Bivalve - chronic	Bivalve WETZ	Kelp	Fathwood Minnow - C	C. dubia - chronic	Selysianstron	Total Total + Dissolved CN, Cu, Zn, Se, Ni	Toc, Doc, TSS																												
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS																															
SCRE A-2	9/28/04	1030	AQ	5 gallon bucket	5		X	X	X	X	X						X	X				17.9															
↓ B-1	↓	0900	↓	↓	↓		↓	↓	↓	↓	↓			X	X	X	↓	↓				16.6															
↓ B-3	↓	1221	↓	↓	↓		↓	↓	↓	↓	↓						↓	↓				17.2															
↓ C-3	↓	1530	↓	↓	↓		↓	↓	↓	↓	↓			X	X	X	↓	↓				20.6															
PROJECT INFORMATION			SAMPLE RECEIPT			RELINQUISHED BY (CLIENT)				RELINQUISHED BY (COURIER)																											
CLIENT <u>City of Buena Vista</u>			TOTAL NO. OF CONTAINERS <u>20</u>			(Signature) <u>[Signature]</u> (Time) <u>2030</u>				(Signature) _____ (Time) _____																											
P.O. NO.			REC'D GOOD CONDITION <u>Y</u>			(Printed Name) <u>Chris Stransky</u> (Date) <u>9/28/04</u>				(Printed Name) _____ (Date) _____																											
SHIPPED VIA:			MATCHES TEST SCHEDULE <u>Y</u>			(Company) <u>Nautilus</u>				(Company) _____																											
SPECIAL INSTRUCTIONS/COMMENTS: <u>Dry Western Sampling Event</u>						RECEIVED BY (COURIER)				RECEIVED BY (LABORATORY)																											
						(Signature) _____ (Time) _____				(Signature) <u>[Signature]</u> (Time) <u>2030</u>																											
						(Printed Name) _____ (Date) _____				(Printed Name) <u>Adrienne Huber</u> (Date) <u>9/28/04</u>																											
						(Company) _____				(Company) <u>04-0634-70637</u>																											
						Nautilus Environmental Log-In No.																															

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

LABORATORY CLIENT: <u>Nautilus Environmental</u>		CLIENT PROJECT NAME / NUMBER: <u>City of Buena Ventura / SCRE</u>	P.O. NO.:
ADDRESS: <u>5550 Monchase Dr Suite 150</u>		PROJECT CONTACT: <u>Chris Strachy / Howard Bailey</u>	LAB USE ONLY <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 COOLER RECEIPT TEM: _____
CITY: <u>San Diego</u> STATE: <u>CA</u> ZIP: <u>92121</u>	TEL: <u>858-587-7002</u> FAX: <u>858-587-3961</u> E-MAIL: <u>chris@nautilusenvironmental.com</u>	SAMPLER(S): (SIGNATURE) <u>[Signature]</u> COELT LOG CODE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

TURNAROUND TIME:
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING FORMS COELT EDF

SPECIAL INSTRUCTIONS:
 * Samples A-2 and C-3 are marine. Sample B-1 is Freshwater
 * Metals DL of < 5 if possible
 * Dissolved metals are already filtered & preserved.

REQUESTED ANALYSES

SAMPLE ID	FIELD POINT NAME (FOR COELT EDF)	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) or BTEX/MTBE (8021B) or (8260B)	OXYGENATES (8260B)	VOCs (8260B)	5035 ENCORE PREP	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	CAC, T22 METALS (6010B)	PNAS (8310) or (8270C)	VOCs (TO-14A) or (TO-15)	TPH(G) (TO-3M)	Total CN	TOC, DOC, TSS	Total Cu, Zn, Ni, Se	Dissolved Cu, Zn, Ni, Se	
		DATE	TIME																			
1	SCRE-A-2	SCRE	9/28/04	AQ	4														X	X	X	X
2	B-1				4																	
3	B-3				4																	
4	C-3				4																	

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>9/30/04</u>	Time: <u>1210</u>
Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>9/30/04</u>	Time: <u>1615</u>

CALSCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1427
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 1/24/05
Page 1 of 2

LABORATORY CLIENT: Nautilus Environmental		CLIENT PROJECT NAME / NUMBER: Santa Clara River Estuary WRR		P.O. NO.:	
ADDRESS: 5550 Morehouse Dr, Suite 150		PROJECT CONTACT: Chris Stransky		LAB USE ONLY (1232)	
CITY: San Diego	STATE: CA	ZIP: 92121	SAMPLER(S): (SIGNATURE) JK, BCS		COOLER RECEIPT
TEL: 858-587-7333	FAX: 858-587-3961	E-MAIL: chris@nautilusenvironmental.com	COELT LOG CODE <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		TEMP = _____ °C

TURNAROUND TIME:
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING FORMS COELT EDF

SPECIAL INSTRUCTIONS:

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	FIELD POINT NAME (FOR COELT EDF)	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) or	BTEX/MTBE (8021B) or (8260B)	OXYGENATES (8260B)	VOCs (8260B)	5035 ENCORE PREP	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	CAC, T22 METALS (6010B)	PNAAs (8310) or (8270C)	VOCs (TO-14A) or (TO-15)	TPH(G) (TO-3M)	Total copper	
			DATE	TIME																	
1	SCRE-A-2-9		9/29/04		W	1															X
2	SCRE-A-2-15		↓		↓	↓															↓
3	-A-2-25		↓		↓	↓															↓
4	-A-2-40		↓		↓	↓															↓
5	-B-1-40		↓		↓	↓															↓
6	-B-1-65		↓		↓	↓															↓
7	-B-1-100		↓		↓	↓															↓
8	-B-3-25		↓		↓	↓															↓
9	-B-3-40		↓		↓	↓															↓
10	↓ -B-3-65		↓		↓	↓															↓

Relinquished by: (Signature) <i>[Signature]</i>	Received by: (Signature) <i>[Signature]</i>	Date: 1/25/05	Time: 1130
Relinquished by: (Signature) <i>[Signature]</i>	Received by: (Signature) <i>[Signature]</i>	Date:	Time:
Relinquished by: (Signature) <i>[Signature]</i>	Received for Laboratory by: (Signature) <i>[Signature]</i>	Date: 1/25/05	Time: 1655

