High-Salinity Sensitivity Study: Short-and Long-Term Exposure Assessments

Prepared For:

West Basin Municipal District
17140 South Avalon Blvd, Ste. 210
Carson, CA 90746-1296

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EXECUTIVE SUMMARY

Overview

The West Basin Municipal Water District (WBMWD) High Salinity Sensitivity Study (HSS Study) comprehensively evaluated the potential short-term and long-term exposure effects of high salinity discharges from the WBMWD ocean water desalination demonstration facility (OWDDF) on aquatic organisms representative of communities indigenous to various near shore environments in Southern California. Study parameters are summarized in Table ES-1. Short-term effects were evaluated using Whole Effluent Toxicity (WET) bioassays developed by the U.S. Environmental Protection Agency (USEPA) to quantify the magnitude and threshold of potential biological effects of discharges (e.g. treated wastewater). Both acute toxicity (mortality effects) and chronic toxicity (mortality + sublethal effects) bioassays were performed by a state accredited bioassay laboratory. Long-term effects were evaluated using mesocosm procedures performed at the OWDDF by exposing multiple organisms for eight weeks to ambient seawater and diluted brine flows from the OWDDF in large aquaria constructed to simulate the OWDDF discharge environment.

Short-Term WET Testing

The short-term WET component of the HSS study (Volume I) consisted of a two-phase screening process involving initial acute and chronic toxicity range-finding bioassays followed by definitive bioassays (i.e. a narrower salinity dilution series). The objective of the WET component of the study was to determine which species and early life-stages among those available under USEPA protocols were the most sensitive to hypersaline conditions, and what salinity levels will elicit adverse effects to those organisms. One objective of the WET testing is to provide toxicity data for the most sensitive species expected to reside in the OWDDF discharge environment. Modeling this data in conjunction with other factors such as water depth and ocean mixing conditions will determine the appropriate salinity thresholds for acute and chronic exposures to OWDDF brine discharges.

WET Phase I (i.e. range-finding) chronic toxicity testing using OWDDF brine discharge samples involved a single test episode and was conducted with the following USEPA authorized test organisms: giant kelp spores (*Macrocystis pyrifera*), purple sea urchin embryos (*Strongylocentrotus purpuratus*), red abalone embryos (*Haliotis rufescens*), larval mysid shrimp (*Americamysis bahia*), and larval topsmelt (*Atherinops affinis*). Each bioassay method evaluated sensitive life stages (e.g. growth or embryo development) over a period of 48-hours to seven days. Since the suite of available USEPA *acute* toxicity test methods (i.e. methods that measure mortality only) is significantly more limited (i.e. only available for fish and shrimp species), Phase I acute toxicity testing was conducted with just three species: larval mysid shrimp, larval topsmelt and juvenile sand dabs (*Citharichthys stigmaeus*). The objective of Phase I testing was to determine relative species sensitivities in order to identify a narrower brine dilution range to be used in the Phase II definitive bioassays.

WET Phase II chronic toxicity testing involved two consecutive test episodes using the three species from each trophic level (plant, invertebrate, and vertebrate) most likely to reside within the soft bottom OWDDF discharge environment: giant kelp (kelp spores), mysid shrimp (larvae) and topsmelt (larvae). A purple urchin bioassay was included in Phase II as urchins were more sensitive in Phase I than abalone, the other hard-bottom habitat species, and because a substantial amount of urchin data has been generated with other high

Table ES-1. Study Summary

<table>
<tr><th colspan="4">Short-Term WET Testing</th></tr>
<tr><th>Overview</th><th colspan="2">Chronic Toxicity
Effects on mortality and sub-lethal metrics (e.g. embryo development, growth)</th><th>Acute Toxicity
Evaluation of mortality after acute exposure (typically 96-hours)</th></tr>
<tr><td rowspan="4">• Lab-based biological effects testing (bioassays)
• EPA approved species for monitoring effluents
• Focus on early life-stages (i.e. embryo-larval)
• Mix of species native to both soft-bottom and hard-bottom habitats
• Organisms exposed to multiple brine dilutions
• One range-finder testing episode and two definitive episodes
• Most sensitive species used for definitive episodes
• Statistical analyses performed to identify ‘no observed effect levels’</td><td colspan="2">Range-Finder</td><td></td></tr>
<tr><td colspan="2">• Bioassays
o 7-day mysid shrimp survival & growth
o 96-hr kelp germination & germ-tube growth
o 72-hr purple urchin embryo development
o 48-hr red abalone embryo development
o 7-day topsmelt larval survival & growth
• Dilutions: 33, 42, 51, 60 and 70 ppt</td><td>• Bioassays
o 96-hour mysid shrimp survival
o 96-hour sand dab survival
o 96-hour topsmelt survival
• Dilutions: 33, 42, 51, 60 and 70 ppt</td></tr>
<tr><td colspan="3">Definitive Testing</td></tr>
<tr><td colspan="2">• Bioassays
o 7-day mysid shrimp survival & growth
o 72-hr purple urchin embryo development
o 7-day topsmelt larval survival & growth
• Dilutions
o Purple urchin: 35, 37, 39, 41, 43 ppt
o Episode 1 Fish: 36.5, 39, 41, 45, 50 ppt
o Episode 1 Fish: 36.5, 39, 41, 45, 60 ppt</td><td>• Bioassays
o 96-hour mysid shrimp survival
o 96-hour topsmelt survival
• Dilutions
o Episode 1: 36.5, 39, 41, 45 & 50 ppt
o Episode 2: 36.5, 39, 41, 45 & 60 ppt</td></tr>
<tr><th colspan="4">Long-Term Mesocosm Testing</th></tr>
<tr><th>Overview</th><th>Species</th><th>Exposure Levels</th><th>Parameters Evaluated</th></tr>
<tr><td>• Testing performed on-site
• Expanded variety of Southern California species
• Juvenile & adult life stages
• 1 ambient and 1 elevated salinity test chambers
• Organisms exposed to both salinities under flow through conditions
• Three 8-week trials
• Each trial comprised of 3 successively higher salinity exposure periods in ‘elevated salinity’ chamber
• Mortality, behavior and post-exposure, sub-lethal parameters evaluated</td><td>• Sand dabs
• White sea bass
• Rockfish (multiple species)
• Shiner perch
• 3-spined sticklebacks
• Tube snouts
• Olive snails
• Purple urchins
• Red abalone
• Blue mussels
• Bat stars
• Sand crabs
• Slender crabs
• Kelp crabs</td><td>• Trial 1
o Ambient
o Low salinity: 37 ppt
o Mid salinity: 42.5 ppt
o High salinity: 47 ppt
• Trial 2
o Ambient
o Low salinity: 37 ppt
o Mid salinity: 42.5 ppt
o High salinity: 44.5 ppt
• Trial 3
o Ambient
o Low salinity: 37 ppt
o Mid salinity: 41 ppt
o High salinity: 44.5 ppt</td><td>• Mortality
• Behavior
• Juvenile fish growth after high salinity exposures
o Sand dabs and/or
o White sea bass
• Shellfish embryo development after mid and high salinity exposures
o Blue mussels or
o Purple urchins
• Purple urchin fertilization after mid salinity exposure (Trial 3 only)</td></tr>
</table>

ppt: Parts salt per thousand parts water

salinity studies. The Phase II acute toxicity was performed with the two most sensitive species from Phase I: larval mysid shrimp and larval topsmelt.

Results of Phase II chronic toxicity testing performed under the short-term WET component of the HSS Study showed that the most sensitive organism among the three test species most representative of the organisms indigenous to the OWDDF discharge environment was the mysid shrimp. The highest salinity level that resulted in no statistically significant effects to this species was 41 parts salt per thousand parts water (ppt). As expected, purple urchins, the more sensitive hard-bottom habitat species, were somewhat more susceptible to the chronic toxicity effects of high salinity than the mysid shrimp. The average Phase II no effects concentration calculated for the purple urchin was 36 ppt. The chronic toxicity results for the most sensitive hard-bottom and soft-bottom species are presented in Figure ES-1.

Results of the Phase II *acute* toxicity testing showed that the most sensitive organism tested was also the mysid shrimp. The highest salinity level that resulted in no statistically significant *acute* toxicity (i.e. mortality after acute exposure) to this species was 45 ppt.

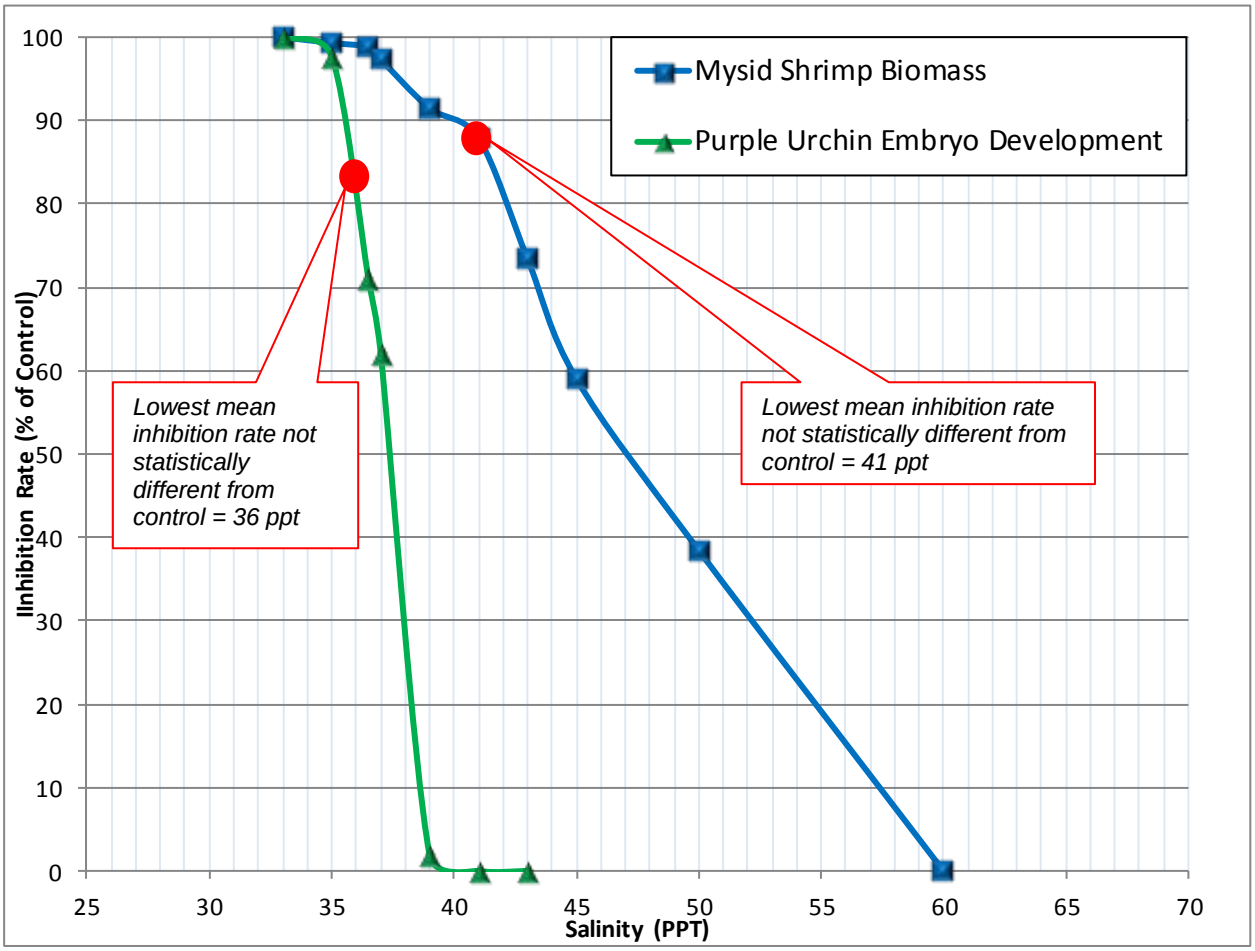


Figure ES-1. Chronic Toxicity Effects of High Salinity on Mysids and Urchins (Phase II Averages)

Long-Term Mesocosm Testing

The objectives for the long-term mesocosm component of the HSS Study were to corroborate the results of the WET component of the study and further inform the overall assessment of potential impacts of the OWDDF brine discharge. The mesocosm component of the study was performed at the OWDDF in Redondo Beach, CA. A mesocosm (i.e. mid-scale habitat simulation) was created with a split-chamber flow-through aquarium of sufficient capacity (300 gallons) to house an assembly of juvenile and adult aquatic organisms representative of the biological community of southern California. Several invertebrate and vertebrate species were acquired from organism providers permitted by the California Department of Fish and Game. Equal numbers of each organism were placed on both sides of the aquarium, and exposed to filtered ambient seawater on one side and high salinity flows on the other. Three 8-week exposure trials were performed. After every two weeks, the salinity level in the high-salinity chamber was reduced to ambient for up to one week and then raised to a higher salinity level. This approach resulted in three different salinity level exposure periods within each trial: low salinity (37 ppt), mid-level salinity (41 or 42.5 ppt), and high salinity (44.5 or 47.5 ppt).

Organisms used in the mesocosm component of the HSS Study in both the ambient and high salinity test chambers were monitored daily throughout each exposure trial for mortalities and variations in behavior. In addition, sub-lethal impacts to select biological endpoints were also assessed at the end of the mid and high salinity exposure periods for each trial. The first post-exposure endpoint measured was mussel (Trial 1) or urchin (Trials 2 and 3) embryo development. Half of the adult invertebrate mussels or urchins were removed after the mid salinity exposure period and used to perform the U.S. EPA chronic toxicity bioassay that assesses embryo fertilization and/or development (fertilization was only measured after the mid-salinity exposure of trial 3). Gametes and/or embryos harvested from adults exposed to both ambient and elevated salinities were placed in test vials containing either ambient seawater or water with an elevated salinity matching that in which the adult organisms had been exposed, and then assessed for fertilization rate and/or embryo development success. This procedure was then repeated after the high salinity exposure period for all three trials. The other sublethal endpoints assessed were weight and length achieved by one or two species of juvenile fish (white sea bass and speckled sanddabs).

Results of the long-term exposure trials (Table ES-2) show that *none* of the vertebrate and invertebrate organisms exposed to the low and mid salinity levels in the elevated salinity chamber exhibited any behavior patterns or mortality rates different from the ambient seawater organisms. The urchins and abalone began showing signs of stress when exposed to the trial 1 high salinity level of 47.5. Most of these urchins and abalone ultimately perished. However, no other species showed any sign of stress throughout the entire 2-week high-salinity exposure period. With the high-salinity level lowered by three ppt in trials 2 and 3, the abalone were not visibly affected, and only three of the 15 urchins suffered mortality. None of the urchins were affected in trial 3.

Table ES-2. Long-Term Mesocosm Results Summary

Salinity Exposure Level	Trial (Salinity)	Post-Exposure Parameters			Mortality
		Urchin Fertilization	Urchin/Mussel Embryo Development	Fish Growth	
Low	Trial 3 (37 ppt)	Not Measured	Not Measured	Not Measured	No significant mortality among 10 different species
	Trial 2 (37 ppt)	Not Measured	Not Measured	Not Measured	No significant mortality among 12 different species
	Trial 1 (37 ppt)	Not Measured	Not Measured	Not Measured	No significant mortality among 9 different species
Mid	Trial 3 (41 ppt)	No significant inhibition for urchin gametes exposed to 41 ppt solution or ambient solutions	Significant inhibition in **urchin** embryos exposed to 41 ppt solution ***but not*** ambient solution	Not Measured	No significant mortality among 10 different species
	Trial 2 (42.5 ppt)	Not Measured	Significant inhibition in **urchin** embryos exposed to ambient and 42.5 ppt solutions	Not Measured	No significant mortality among 12 different species
	Trial 1 (42.5 ppt)	Not Measured	Not Measured	Not Measured	No significant mortality among 9 different species
High	Trial 3 (44.5 ppt)	Not Measured	Significant inhibition in **urchin** embryos exposed to ambient and 44.5 ppt solutions	No significant effect on length or weight measured for 1 fish species: white sea bass	No significant mortality among 10 different species
	Trial 2 (44.5 ppt)	Not Measured	Significant inhibition in **urchin** embryos exposed to ambient and 44.5 ppt solutions	No significant effect on length or weight measured for 2 fish species: sand dabs & white sea bass	Slightly significant mortality among 1 out of 12 different species: 88.5% urchin survival
	Trial 1 (47.5 ppt)	Not Measured	Significant inhibition in **mussel** embryos exposed to ambient and 47.5 ppt solutions	No significant effect on length or weight measured for 1 fish species: sand dabs	Significant mortality among 2 out of 9 different species: 16.7% urchin survival 57.2% abalone survival

No significant effects
Slightly significant effects
Significant effects

Results of the mesocosm sub-lethal endpoint evaluations show that there were no significant differences in weight gain or length between fish exposed to high salinity flows and those exposed to ambient seawater throughout all three exposure periods for all three trials. The post-exposure invertebrate bioassays showed that exposure of adult shellfish to mid or high salinity levels did not result in an increased tolerance of their embryos in elevated salinities. However, embryos from adult urchins exposed at 41 ppt did develop normally in ambient seawater. Additionally, the urchin fertilization bioassay performed after the trial 3 mid-salinity exposure period showed that adults first exposed to 41 ppt resulted in normal fertilization rates for urchin gametes exposed to both ambient *and* 41 ppt salinities.

Summary

The results of the HSS Study are summarized in Table 3-1. In general, the mesocosm component of the study demonstrated that most organisms that have matured past larval stages of development, especially those indigenous to the DDF discharge environment, are tolerant of long-term exposure to salinities at least as high as 47.5 ppt. The only exceptions were purple urchins and red abalone.that showed tolerance of long-term exposures as high as 42.5 ppt. The long-term mesocosm tolerances were greater than those observed with the short-term WET component of the study. The 'no effects levels' established by the WET chronic toxicity bioassays were 41 ppt for the most sensitive soft-bottom organism (mysid shrimp), and 36 ppt for the most sensitive hard-bottom organism (purple urchin).

Long-term exposure of adult purple urchins and mussels above 41 ppt did not result in improved embryo-development sensitivity in elevated *or* ambient salinities. However, embryos developed normally in *ambient* seawater after the adults were exposed at the 41 ppt salinity level. Additionally, the single post-exposure gamete fertilization bioassay performed, showed that purple urchin fertilization rates were not affected for gametes (i.e. pre-embryo eggs and sperm) from adults exposed to ambient or mid-salinity (41 ppt) waters when the gametes were subsequently exposed to ambient *or* 41 ppt salinities.

Table ES-3. High Salinity Sensitivity Study Summary

Study Component	Observed Salinity Thresholds		Other Significant Findings
	Soft-Bottom Organisms	Hard-Bottom Organisms	
Short-Term WET (**chronic** toxicity)	41 ppt	36 ppt	• No significant effect on urchin embryo development rates in ambient seawater when adults are first exposed to 41 ppt salinities. • Fertilization rate not effected at 41 ppt regardless of whether adults are previously exposed to this salinity. • Acute toxicity threshold observed with the WET study component = 45 ppt, which was observed with the mysid shrimp.
Long-Term Mesocosm	47.5 ppt	42.5 ppt*	

* Mortality effect

1.0 SHORT-TERM EXPOSURE ASSESSMENT

1.1 INTRODUCTION

In order to characterize the impacts of high-salinity discharges to marine life residing in the discharge environment of its desalination facility, the West Basin Municipal Water District (WBMWD) initiated a two-phase Whole Effluent Toxicity (WET) screening study. Results of the toxicity screening study are evaluated to determine which U.S. Environmental Protection Agency (USEPA) authorized test organisms are most sensitive to hypersaline conditions under acute and chronic exposure conditions, and what salinity levels are expected to elicit adverse effects to these organisms. The toxicity data from the most sensitive species expected to reside in the discharge environment will then be factored with naturally occurring factors such as water depth and ocean mixing conditions, and used to determine an appropriate salinity threshold for the desalination facility brine discharge.

In April 2011, Weston Solutions, Inc. (WESTON) performed Phase I chronic and acute toxicity testing with a WBMWD brine discharge sample using a select suite of USEPA approved test species. All toxicity testing followed USEPA approved test methods. Phase I chronic toxicity tests included the 48-hour giant kelp, *Macrocystis pyrifera,* germination and germ-tube length test (USEPA, 1995); 72-hour purple sea urchin, *Strongylocentrotus purpuratus,* larval development test (USEPA, 1995); 48-hour red abalone, *Haliotis rufescens,* larval development test (USEPA, 1995); 7-day opossum shrimp, *Americamysis bahia*, survival, growth and fecundity test (USEPA, 2002a); and the 7-day topsmelt, *Atherinops affinis,* larval survival and growth test (USEPA, 1995). Phase I acute toxicity tests included the 96-hr speckled sand dab, *Citharichthys stigmaeus*, acute survival test (USEPA, 2002); and the 96-hr topsmelt, *Atherinops affinis,* acute survival test (USEPA, 2002). The results of Phase I bioassay testing were evaluated to select species for Phase II confirmation testing.

Beginning in August 2011, WESTON performed Phase II testing with WBMWD effluent using the three Phase I species representative of the three different trophic levels (plant, invertebrate, and vertebrate) most likely to reside in the WBMWD discharge environment. These bioassays included the 48-hour *Macrocystis pyrifera* test, the 7-day *Americamysis bahia* test, and the 7-day *Atherinops affinis* test. Due to the significant amount of testing performed by other agencies and researchers using the purple urchin, WBMWD decided to also include the 72-hour *Strongylocentrotus purpuratus* test during Phase II testing. Again, all toxicity testing followed USEPA approved test methods. Phase II acute toxicity testing included bioassays performed with the two most sensitive Phase I species: the 96-hr speckled sand dab, *Citharichthys stigmaeus* test; and the 96-hr topsmelt, *Atherinops affinis* test. The results of all Phase I and Phase II testing are presented and discussed herein.

To determine whether consistent patterns of chronic or acute toxicity exists among the species selected from Phase I, Phase II included two consecutive test episodes using the test methods described above. If evaluation of the data generated from both phases indicates a consistent sensitivity hierarchy among the four methods, the most sensitive will be selected as the WBMWD chronic toxicity endpoint to be used with hydrographic modeling measures to determine the potential for adverse impacts within the brine discharge environment.

Phase I toxicity testing was performed using samples collected on February 7 and February 11, 2011. Phase II, Episode 1 was performed using samples collected on August 3 and August 5, 2011. Phase II, Episode 2 was performed using a sample collected on September 22, 2011. Laboratory benchsheets from the short-term exposure assessment are provided in Appendix A.

This study was conducted by WESTON at the Bioassay Laboratory in Carlsbad, California under the management of Dr. David Moore, Ph.D.

1.2 METHODS

1.2.1 TEST PROTOCOLS

The five chronic toxicity test methods are listed below:

- The 7-day *A. bahia* survival and growth test was performed in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Marine and Estuarine Organisms, Third Edition* (USEPA, 2002a);
- The 48-hour *M. pyrifera* germination and germ-tube length test was performed in accordance with *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, First Edition* (USEPA, 1995);
- The 72-hour *S. purpuratus* larval development test was performed in accordance with *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, First Edition* (USEPA, 1995);
- The 48-hour *H. rufescens* larval development test was performed in accordance with *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, First Edition* (USEPA, 1995);
- The 7-day *A. affinis* larval survival and growth test was performed in accordance with *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, First Edition* (USEPA, 1995).

The three 96-hour acute toxicity test methods using *C. stigmaeus*, *A. affinis* and *A. bahia* were all performed in accordance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition* (USEPA, 2002).

1.2.2 TEST SOLUTION PREPARATION

1.2.2.1 Sample Receipt

Brine discharge samples were collected by WBMWD personnel and delivered on ice (0 – 6°C) under chain-of-custody to the WESTON bioassay laboratory. Standard water quality measurements (i.e. dissolved oxygen [DO], temperature, pH, salinity, total ammonia, and total chlorine) were taken upon sample arrival. Phase I bioassay testing was staggered with testing initiated on February 8, February 11, March 2, and April 1, 2011. Upon receipt, all samples used for Phase I testing met recommended initial water quality objectives for DO and pH. Temperatures exceeded the recommended values (0 – 6°C) by 5.9 – 6.4°C. Phase II, Episode 1 bioassays were also staggered; testing was initiated on August 4, August 10, August 15, and August 23, 2011. Upon receipt, all samples required for Episode 1 of Phase II testing met recommended initial water quality objectives for DO and pH. Temperatures slightly exceeded recommended values (0 – 6°C) by 0.1 – 7.6°C. Phase II, Episode 2 bioassays were staggered as well; testing was initiated on September 27, October 4-5, and October 19, 2011. Upon receipt, all samples required for Episode 2 of Phase II testing met recommended initial water quality objectives for DO and pH. Temperatures exceeded the recommended values by 5.1 – 8.8°C. Copies of chain-of-custody forms, organism receipt forms, and sample receipt forms summarizing initial water quality measurements are provided in Appendix C.

1.2.2.2 Test Dilutions

For all toxicity testing, organisms were exposed to a series of dilutions created by blending the stock WBMWD brine discharge solution with dilution water. The dilution water was filtered, UV-treated seawater collected from the Scripps Institute of Oceanography. The dilution series selected for Phase I testing was chosen to determine the range of biological effects and, therefore, included ambient seawater and straight 70 parts per thousand (ppt) brine discharge. The three dilutions in between were evenly spaced so that organisms were exposed to a laboratory control treatment (Scripps seawater) and five brine effluent dilutions: 33, 42, 51, 60, 70 ppt. During Phase II Episode 1 testing, exposures were modified to attain greater statistical certainty around the toxic thresholds. The more sensitive purple urchin was exposed to lower salinity dilutions (35, 37, 39, 41 and 43 ppt) while the other three Phase II chronic toxicity and the two acute toxicity test organisms were exposed to dilutions ranging somewhat higher (36.5, 39, 41, 45, 50 ppt). The test organisms exhibited higher tolerance in Phase II, Episode I. Thus during Phase II, Episode 2 testing, the highest dilution was increased to 60 ppt. All other dilutions, including all purple urchin dilutions, remained the same.

1.2.3 SUMMARY OF CHRONIC BIOASSAY TEST PROCEDURES

1.2.3.1 *Americamysis bahia* Test

Seven-day old mysid shrimp were obtained from Aquatic BioSystems, Fort Collins, CO. Prior to test initiation, mysids were received and acclimated to test temperature of (26 ± 1°C) and dilution water salinity. The test was run with eight replicates of 400 milliliter (mL) plastic containers containing 150 mL of test solution and five mysids per container under a 16-hour light: 8-hour dark photoperiod. Eighty percent of the test solution was replaced each day of the test. The mysids were fed a concentrated *Artemia* suspension (~750 nauplii) two times daily. Daily temperature, DO, pH, and salinity were measured for final (previous day) and initial (renewal) solutions. Mortality and behavior were recorded daily. Upon test termination, surviving mysids in the control treatment were evaluated for fecundity. If ≥50% of surviving control female mysids were found to be fecund, all replicates were evaluated for this endpoint. Mysids were then dried at 100°C in an oven for at least 6 hours and weighed to determine average weight. Test conditions for the *A. bahia* survival and growth test are summarized in Table 1-1.

Test Acceptability Criteria

The criteria used to determine test acceptability were the following:

1. Control survival to equal or exceed 80%,
2. Average control dry weight of at least 0.20 mg per mysid.

1.2.3.2 *Macrocystis pyrifera* Test

Kelp was obtained from Dave Gutoff of San Diego, CA. Approximately 30 blades were rinsed in seawater and placed in 1 L of 0.2 µm filtered Scripps seawater until the water turned slightly cloudy, indicating the presence of zoospores. Spores were viewed under a microscope to verify motility and to determine zoospore density. Plastic petri dishes (60 mL) containing a one glass microscope slide and 40 mL of test solution were randomly placed in a temperature controlled room at 15 ± 1°C. A quantity of 7,500 spores per mL

was added to each test container. After 48 hours, the slides were removed and examined by a light microscope. At the end of the test, a minimum of 100 spores per replicate were counted and scored as germinated or not germinated to determine the percent germination. Ten of the germinated spores were used to determine growth by measuring germination-tube lengths. Test conditions for the *M. pyrifera* proportion germinated and germination tube growth-length test are summarized in Table 1-1.

Test Acceptability Criteria

The criteria used to determine test acceptability were the following:

1. Mean control germination of at least 70%,
2. Mean germination-tube length in control of at least 10 µm,
3. Reference toxicant no-observed-effect concentration (NOEC) must be less than 110 µg/L for germination and less than 35 µg/L for growth,
4. The analysis of variance (ANOVA) Mean Square Error in the reference toxicant test must not exceed 70% for the germination endpoint and 12 um for the growth endpoint.

1.2.3.3 *Atherinops affinis* Test

Test animals were supplied by Aquatic BioSystems, Fort Collins, CO. Prior to test initiation, animals were received and acclimated to test temperature and dilution water salinity. The test was run at 20 ± 1°C with five replicates of 600 mL plastic containers containing 200 mL of test solution. Five larvae were added to each test chamber under a 16-hour light: 8-hour dark photoperiod. Renewals were performed daily and test organisms were fed a concentrated *Artemia* suspension (~200 nauplii) twice daily. DO, temperature, salinity, and pH were measured daily. All instruments used by WESTON were calibrated daily and calibration curves were documented in equipment calibration logs. Upon test termination, survival counts were performed and the EC_{50} for survival was calculated. Topsmelt larvae were then dried at 100°C in an oven for a minimum of 6 hours and weighed to determine the mean weight. Test conditions for the *A. affinis* survival and growth test are summarized in Table 1-1.

Test Acceptability Criteria

The criteria used to determine test acceptability were the following:

1. Control survival to equal or exceed 80%,
2. Mean weight per larva must exceed 0.85 mg in the reference and brine controls,
3. The LC_{50} must be within two standard deviations of the laboratory control chart mean,
4. Minimum significant difference (%MSD) of less than 25% relative to the control for survival for the reference toxicant test, and less than 50% relative to the control for growth for the reference toxicant test.

1.2.3.4 *Strongylocentrotus purpuratus* Test

Adult test animals were supplied by Dave Gutoff of San Diego, CA. Sea urchins were acclimated to dilution water salinity at a rate not exceeding 1 ppt per hour. Spawning was attempted using urchins from salinities containing surviving adults, and echinoderm development tests were conducted using animals from salinities with successful spawns. Observations during acclimation and spawning were recorded. To initiate the echinoderm development test, fertilized sea urchin eggs from salinities with successful spawns were allowed to begin dividing. Approximately 300 larvae were targeted for addition to each test chamber. The test was run for 96 hours in pre-cleaned 20 mL glass scintillation vials under ambient light with a 16-hour light: 8-hour dark photoperiod. DO, salinity, and hydrogen ion concentration (pH) were measured at test initiation and termination; temperature was monitored daily. All instruments used by WESTON were calibrated daily and calibration curves were documented in equipment calibration logs. At 48 hours, half the replicates from each salinity were preserved for counts. At 96 hours, larvae in the remaining half of the replicates from each salinity were preserved. After counts were performed, statistics were run and the median effects concentration (EC_{50}) for survival and normality were calculated. Test conditions for the *S. purpuratus* proportion alive and proportion normal test are summarized in Table 1-1.

Test Acceptability Criteria

The criteria used to determine test acceptability were the following:

1. Larval normality to equal or exceed 80% in the controls,
2. Minimum significant difference (%MSD) is less than or equal to 20% relative to the controls.

1.2.3.5 *Haliotis rufescens* Test

Test animals were supplied by The Cultured Abalone, Goleta, CA. Adult animals were allowed to acclimate to test conditions for approximately 24 to 48 hours prior to test initiation to minimize stress-related spawning difficulties. Abalone eggs were fertilized and allowed to begin dividing, and the test was run at 15 ± 1°C for 48 hours in 600 mL containers containing 200 mL test solution in five separate replicates. Approximately 5 to 10 larvae per mL test solution were targeted for addition to each test chamber. Testing occurred under ambient laboratory light with a 16-hour light: 8-hour dark photoperiod. DO, salinity, and pH were measured at test initiation and termination, and temperature was monitored constantly. At 48 hours, larvae were preserved to be counted at a later date. After counts were performed, statistics were run and the median effective concentration (EC_{50}) for normality was calculated. Test conditions for the *H. rufescens* development test are summarized in Table 1-1.

Test Acceptability Criteria

The criteria used to determine test acceptability were the following:

1. Mean larval normality to equal or exceed 80% in the controls,
2. Response from 56 µg/L zinc treatment must be significantly different from the control response,
3. Minimum significant difference (%MSD) is less than or equal to 20% relative to the control for the reference toxicant.

1.2.4 SUMMARY OF ACUTE BIOASSAY TEST PROCEDURES

1.2.4.1 *A. affinis* Test

Test animals were supplied by Aquatic BioSystems, Fort Collins, CO. Prior to test initiation, animals were received and acclimated to test temperature and dilution water salinity. Five organisms were added to each test chamber and exposed to 200 mL of test solution in five replicates. The test was run for 96 hours at 20 ± 1°C in 250 mL plastic containers under ambient light with a 16-hour light: 8-hour dark photoperiod. Renewals were performed daily and test organisms were fed newly hatched *Artemia* (~100 nauplii) once daily prior to renewal. DO, temperature, salinity, and pH were measured daily. All instruments used by WESTON were calibrated daily and calibration curves were documented in equipment calibration logs. At 96 hours, mortality counts were performed and statistics were run in which the EC_{50} for survival was calculated. Test conditions for the *A. affinis* acute survival test are summarized in Table 1-2.

Test Acceptability Criteria

The criteria used to determine test acceptability were the following:

1. Control survival to equal or exceed 90%.

1.2.4.2 *Citharichthys stigmaeus* Test

Test animals were supplied by John Brezina, Dillon Beach, CA. Prior to test initiation, mysids were received and acclimated to test temperature and dilution water salinity. Ten organisms were added to each test chamber in four replicates. The test was run for 96 hours in 250 mL plastic containers containing 200 mL test solution under ambient light with a 16-hour light: 8-hour dark photoperiod. Test temperature was maintained at 12 ± 1°C throughout testing. Renewals were performed daily and test organisms were fed newly hatched *Artemia* (~100 nauplii) once daily prior to renewal. DO, temperature, salinity, and pH were measured daily. All instruments used by WESTON were calibrated daily and calibration curves were documented in equipment calibration logs. At 96 hours, mortality counts were performed and statistics were run in which the EC_{50} for survival was calculated. Test conditions for the *C. stigmaeus* acute survival test are summarized in Table 1-2.

Test Acceptability Criteria

The criteria used to determine test acceptability were the following:

1. Control survival to equal or exceed 90%.

1.2.4.3 *A. bahia* Test

Mysid shrimp were obtained from Aquatic BioSystems, Fort Collins, CO. Prior to test initiation, mysids were received and acclimated to test temperature of (25 ± 1°C) and dilution water salinity. The test was run with eight replicates of 250 mL plastic containers containing 200 mL of test solution and five mysids per container under a 16-hour light: 8-hour dark photoperiod. Eighty percent of the test solution was replaced each day of the test. The mysids were fed 0.2 mL of a concentrated newly-hatched *Artemia* suspension (~500 nauplii) once daily. Daily temperature, DO, pH, and salinity were measured for final (previous day) and initial (renewal) solutions. Mortality and behavior were recorded daily. Test conditions for the *A. bahia* acute survival test are summarized in Table 1-2.

Test Acceptability Criteria

The criteria used to determine test acceptability were the following:

1. Control survival to equal or exceed 90%.

1.2.5 STATISTICAL ANALYSIS

At the conclusion of all tests, test species data were evaluated statistically using ToxCalc™ to determine EC_p, NOEC, and Chronic Toxicity Unit (TU_C) values where appropriate. ToxCalc™ is a comprehensive statistical application that follows standard guidelines for acute and chronic toxicity data analysis.

Statistical effects can be measured by the EC_p, the estimated concentration that causes any effect, either lethal (LC) or sublethal (IC), on p% of the test population. The LC_{50} or LC_{25} is the point estimate of the concentration at which a lethal effect is observed in 50 or 25% of the test organisms. The IC_{50} or IC_{25} values are calculated with chronic toxicity bioassays and are point estimates of the concentration at which an inhibitory effect in a sublethal parameter (i.e. growth, reproduction) is observed in 50 or 25% of the organisms. In the case of high salinity testing, the concentration refers to salinity and not percent dilution. EC_p values include 95% confidence limits where available.

The NOEC is the highest tested concentration at which mortality and other sublethal measured effects are not significantly different from the same parameters in the control. TU_C values are defined as 100%/EC_{25} or 100%/NOEC, when an EC_{25} is not calculable.

1.3 RESULTS

1.3.1 PHASE I: SAMPLES COLLECTED FEBRUARY 7 & FEBRUARY 11, 2011

Procedure and organism data for *A. bahia*, *M. pyrifera, S. purpuratus, H. rufescens, A. affinis* and *C. stigmaeus* tests performed during Episode 1 are summarized in Table 1-1 and Table 1-2. Copies of Phase I laboratory benchsheets are provided in Appendix A.

1.3.1.1 *A. bahia* Chronic and Acute Bioassays

Water Quality and Test Acceptability Criteria

For the duration of testing, all water quality parameters were within acceptable limits. All test acceptability criteria were met. Salinity study toxicity test results are presented in Table 1-3 and reference toxicant test results are presented in Table 1-4. Acute toxicity test results are presented in Table 1-5.

Survival

The average 7-day survival rates of *A. bahia* in the laboratory control treatments was 97.5%. Mean survival rates in the 33, 42, 51, 60, and 70 ppt concentrations were 97.5, 87.5, 0.0, 0.0, and 0.0%, respectively. Statistically significant effects on *A. bahia* survival were observed in the 51, 60, and 70 ppt dilutions. Consequently, the NOEC for survival was 42 ppt. The LC_{50} value was 45.3 ppt, and the survival TU_C (100% / NOEC) was 2.38.

Biomass

The mean dry weight of the laboratory control mysids was 0.35 mg. Mean biomass values in the 33, 42, 51, 60, and 70 ppt concentrations were 0.38, 0.34, 0.0, 0.0, and 0.0 mg, respectively. Statistically significant effects on *A. bahia* growth were observed in the 51, 60, and 70 ppt dilutions. Consequently, the biomass NOEC was 42 ppt. The IC_{25} and IC_{50} values were 43.8 ppt and 46.2 ppt, respectively. The TU_C (100% / IC_{25}) for the growth endpoint was 2.29.

Acute Survival

The average 96-hour survival rate for the laboratory control treatment was 100%. Mean survival rates in the 33, 42, 51, 60, 70 ppt concentrations were 100, 92.5, 0.0, 0.0, and 0.0%, respectively. A statistically significant effect on survival was seen in the 51 ppt treatment relative to the laboratory control. Consequently, the NOEC for survival was 42 ppt. The EC_{50} value was 45.5 ppt, and the TU_A (100% / NOEC) for the acute survival endpoint was 2.38.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced a LC_{50} value of 147.1 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (251.1 ± 117.8 ppb $CuSO_4$), indicating normal sensitivity of the test organisms for survival. The IC_{50} for biomass was 156.4 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (229.7 ± 130.6 ppb $CuSO_4$), indicating normal sensitivity for growth.

Table 1-1. Phase I Chronic Bioassays: Procedure and Organism Data

Parameter	Test Species		
	Americamysis bahia	***Macrocystis pyrifera***	***Strongylocentrotus purpuratus***
Sample Properties			
Dates Sampled	February 7 & February 11, 2011	February 7 & February 11, 2011	February 7 & February 11, 2011
Dates Received	February 9 & February 11, 2011	February 9 & February 11, 2011	February 9 & February 11, 2011
Volume Received	~ 20 L per sample (80 L total)	~ 20 L per sample (80 L total)	~ 20 L per sample (80 L total)
Storage Conditions	4°C, dark	4°C, dark	4°C, dark
Test Species Information			
Supplier	Aquatic BioSystems, Fort Collins, CO	Dave Gutoff, San Diego, CA	Dave Gutoff, San Diego, CA
Date Acquired	February 8, 2011	February 8, 2011	February 16, 2011
Acquired Temperature	18.6°C	N/A	N/A
Age Group	7 days old	Mature	Embryos
Test Procedures			
Type/Duration	Chronic/Renewal; 7 days	Chronic/Static; 48 hours	Chronic/Static; 96 hours
Test Dates	February 8 - 15, 2011	February 8 - 10, 2011	February 16 - 20, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	26 ± 1°C / 24.5 – 27.2°C	15 ± 1°C / 14.5 – 16.0°C	15 ± 1°C / 15.4 - 16.1°C
Photoperiod	16-hour light: 8-hour dark	16-hour light: 8-hour dark	Ambient laboratory
Salinity (recommended/actual)	20 – 30 ± 2 ppt / NA	34 ± 2 ppt / NA	30 ± 2 ppt / NA
Test Chamber	400 mL containers	60 mL petri dish	20 mL scintillation vial
Exposure Volume	150 mL	40 mL	5 mL
Animals/Replicate	5	7500 spores / mL	2000 eggs, 5 x 10^6 sperm
Replicates/Treatment	8	5	4
Feeding	Newly hatched *Artemia* nauplii (~750 nauplii, twice daily)	None	None
Deviations From Protocol	None	None	None

Table 1-1. Phase I Chronic Bioassays: Procedure and Organism Data (Continued)

Parameter	Test Species	
	Haliotis rufescens	***Atherinops affinis***
Sample Properties		
Dates Sampled	February 7 & February 11, 2011	February 7 & February 11, 2011
Dates Received	February 9 & February 11, 2011	February 9 & February 11, 2011
Volume Received	~ 20 L per sample (80 L total)	~ 20 L per sample (80 L total)
Storage Conditions	4°C, dark	4°C, dark
Test Species Information		
Supplier	The Cultured Abalone, Goleta, CA	Aquatic BioSystems, Fort Collins, CO
Date Acquired	March 1, 2011	March 30, 2011
Acquired Temperature	N/A	18.4 – 18.7°C
Age Group	Embryos	13 days old
Test Procedures		
Type/Duration	Chronic/Static; 48 hours	Chronic/Renewal; 7 days
Test Dates	March 2 - 4, 2011	April 1 - 8, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	15 ± 1°C / 14.5 – 16.0°C	20 ± 1°C / 18.7 – 20.6°C
Photoperiod	16-hour light: 8-hour dark	16-hour light: 8-hour dark
Salinity (recommended/actual)	34 ± 2 ppt / NA	32 ± 2 ppt / NA
Test Chamber	600 mL containers	600 mL containers
Exposure Volume	200 mL	200 mL
Animals/Replicate	5 – 10 larvae / mL	5
Replicates/Treatment	5	5
Feeding	None	Newly hatched *Artemia* nauplii (~200 nauplii, twice daily)
Deviations From Protocol	None	None

Table 1-2. Phase I Acute Bioassays: Procedure and Organism Data

Parameter	Test Species		
	Atherinops affinis	***Citharichthys stigmaeus***	***Americamysis bahia***
Sample Properties			
Dates Sampled	February 7 & February 11, 2011	February 7 & February 11, 2011	February 7 & February 11, 2011
Dates Received	February 9 & February 11, 2011	February 9 & February 11, 2011	February 9 & February 11, 2011
Volume Received	~ 20 L per sample (80 L total)	~ 20 L per sample (80 L total)	~ 20 L per sample (80 L total)
Storage Conditions	4°C, dark	4°C, dark	4°C, dark
Test Species Information			
Supplier	Aquatic BioSystems, Fort Collins, CO	John Brezina, Dillon Beach, CA	Aquatic BioSystems, Fort Collins, CO
Date Acquired	March 30, 2011	February 9, 2011	February 8, 2011
Acquired Temperature	18.4 – 18.7°C	12.3°C	18.6°C
Age Group	13 days old	Juvenile	7 days old
Test Procedures			
Type/Duration	Acute/Renewal; 96 hours	Acute/Renewal; 96 hours	Acute/Renewal; 96 hours
Test Dates	April 1 - 5, 2011	February10 -14, 2011	February 8 -12, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	20 ± 1°C / 18.7 – 20.6°C	12 ± 1°C / 10.6 – 13.3°C	26 ± 1°C / 24.5 – 27.2°C
Photoperiod	16-hour light: 8-hour dark	16-hour light: 8-hour dark	16-hour light: 8-hour dark
Salinity (recommended/actual)	10 – 30 ppt / NA	32 – 34 ppt / NA	5 – 30 ± 1 ppt / NA
Test Chamber	250 mL containers	250 mL containers	250 mL containers
Exposure Volume	200 mL	200 mL	200 mL
Animals/Replicate	5	10	5
Replicates/Treatment	5	4	8
Feeding	Newly hatched *Artemia* nauplii (~100 nauplii, once prior to renewal)	Newly hatched *Artemia* nauplii (~100 nauplii, once prior to renewal)	Newly hatched *Artemia* nauplii (~100 nauplii, daily)
Deviations From Protocol	None	None	None

Table 1-3. Phase I Test Results: 7-day Chronic Toxicity Bioassay using *Americamysis bahia*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 8 - 15, 2011

Test Parameters
Concentrations (ppt): 33, 42, 51, 60, 70
Species Common Name: Mysid shrimp
Test Endpoints: Survival, Growth
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Concentration (ppt)	(Mean ± SD)	% Survival in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
70	0.0 ± 0.0	0	0	0	0	0	0	0	0
60	0.0 ± 0.0	0	0	0	0	0	0	0	0
51	0.0 ± 0.0	0	0	0	0	0	0	0	0
42	87.5 ± 14.9	60	100	100	80	100	100	80	80
33	97.5 ± 7.1	100	100	100	100	100	80	100	100
Lab Control	97.5 ± 7.1	100	100	100	100	100	100	80	100

Statistical Summary	
Parameter	Saline Concentration (ppt)
LC_{25}	43.5
LC_{50}	45.3
NOEC	42
LOEC	51
TU_C ($100/LC_{25}$)	2.30

BIOMASS ENDPOINT

Concentration (ppt)	Mean Weight (mg)
70	0.00
60	0.00
51	0.00
42	0.34
33	0.38
Laboratory Control	0.35
Statistical Summary	
Parameter	Salinity (ppt)
IC_{15}	42.8
IC_{25}	43.8
IC_{40}	45.2
IC_{50}	46.2
NOEC	42
LOEC	51
TU_C ($100/IC_{25}$)	2.29

Table 1-4. Phase I Reference Toxicant Test Results for the 7-day Chronic Toxicity Bioassay using *A. bahia*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 8 - 15, 2011

Test Parameters
Concentrations (ppb): 62.5, 125, 250, 500, 1000
Species Common Name: Mysid shrimp
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Concentration (ppb $CuSO_4$)	Percent Survival (Mean ± SD)	% Survival in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1000	2.5 ± 7.1	0	0	20	0	0	0	0	0
500	0.0 ± 0.0	0	0	0	0	0	0	0	0
250	2.5 ± 7.1	0	0	0	20	0	0	0	0
125	72.5 ± 26.0	20	60	80	80	100	80	60	100
62.5	100.0 ± 0.0	100	100	100	100	100	100	100	100
Control	100.0 ± 0.0	100	100	100	100	100	100	100	100

Statistical Summary	
Parameter	Concentration (ppb $CuSO_4$)
LC_{25}	122.7
LC_{50}	147.1
NOEC	62.5
LOEC	125

BIOMASS ENDPOINT

Concentration (ppb $CuSO_4$)	Mean Weight (mg)
1000	0.00
500	0.00
250	0.03
125	0.26
62.5	0.43
Control	0.38
Statistical Summary	
Parameter	Concentration (ppb $CuSO_4$)
IC_{15}	88.9
IC_{25}	106.4
IC_{40}	134.6
IC_{50}	156.4
NOEC	62.5
LOEC	125

Table 1-5. Phase I Test Results: 96-hr Acute Toxicity Bioassay using *A. bahia*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 8 - 12, 2011

Test Parameters:
Concentrations (ppt): 33, 42, 51, 60, 70
Common Name: Mysid shrimp
Test Endpoints: Acute survival
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Proportion Alive (Mean ± SD)	Proportion Alive in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
70	0.0 ± 0.0	0	0	0	0	0	0	0	0
60	0.0 ± 0.0	0	0	0	0	0	0	0	0
51	0.0 ± 0.0	0	0	0	0	0	0	0	0
42	92.5 ± 10.4	80	100	100	80	100	100	80	100
33	100.0 ± 0.0	100	100	100	100	100	100	100	100
Laboratory Control	100.0 ± 0.0	100	100	100	100	100	100	100	100

Statistical Summary

Parameter	Saline Concentration (ppt)
EC_{25}	--
EC_{50}	45.5
NOEC	42
LOEC	51
TU_C (100/NOEC)	2.38

1.3.1.2 *M. pyrifera* Chronic Bioassay

Water Quality and Test Acceptability Criteria

All water quality parameters were within test acceptability limits throughout the test, and all test acceptability criteria were met. Salinity toxicity test results are presented in Table 1-6 and reference toxicant test results are presented in Table 1-7.

Proportion Germinated

The mean proportion germinated in the laboratory control treatment was 89.6%. The mean proportions that germinated in the 33, 42, 51, 60 and 70 ppt concentrations were 90.8, 83.8, 73.0, 21.6, and 0.0%, respectively. Statistically significant effects on *M. pyrifera* germination were observed in the 51, 60, and 70 ppt concentrations relative to the laboratory control. Consequently, the NOEC for the proportion germinated endpoint was 42 ppt. The LC_{25} and LC_{50} values were 51.9 ppt and 54.7 ppt, respectively. The TU_C (100% / EC_{25}) for the proportion germinated endpoint was 1.93.

Growth-Length

The mean germination tube length for the laboratory control was 13.0 µm. The mean germination tube length values in the 33, 42, 51, 60, and 70 ppt concentrations were 13.1, 12.7, 9.0, 5.6 and 0.0 µm, respectively. Statistically significant effects were observed in the 51, 60, and 70 ppt concentrations when compared to the laboratory control. Consequently, the growth NOEC was 42 ppt. The IC_{25} and IC_{50} values were 49.1 ppt and 57.5 ppt, respectively. The TU_C (100% / IC_{25}) for the growth endpoint was 2.04.

Reference Toxicant Test (Copper Chloride)

The *M. pyrifera* reference toxicant test produced an EC_{50} value of 102.1 ppb $CuCl_2$ for the proportion germinated endpoint. This value is within two standard deviations of the laboratory mean (96.7 ± 78.6 ppb $CuCl_2$), indicating normal sensitivity of the test organisms based on germination. The EC_{50} for the germination tube length endpoint was 166.8 ppb $CuCl_2$. This value is also within two standard deviations of the laboratory mean (217.0 ± 349.9 ppb $CuCl_2$), indicating normal sensitivity for growth.

Table 1-6. Phase I High Salinity Test Results for the 48-hr Chronic Toxicity Bioassay using *Macrocystis pyrifera*

Sample Information:
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 8 -10, 2011

Test Parameters:
Concentrations (ppt): 33, 42, 51, 60, 70
Common Name: Giant kelp
Test Endpoints: Germination, Growth
Test Protocol: EPA/600/R-95/136

PROPORTION GERMINATED

Concentration (ppt)	Prop. Germinated (Mean ± SD)	Proportion Germinated in Replicates				
		1	*2*	*3*	*4*	*5*
70	0.0 ± 0.0	0	0	0	0	0
60	21.6 ± 5.3	27	25	17	24	15
51	73.0 ± 3.2	75	77	71	69	73
42	83.8 ± 6.1	85	88	87	86	73
33	90.8 ± 2.9	86	92	93	93	90
Control	89.6 ± 2.9	89	88	92	93	86

Statistical Summary

Parameter	Saline Concentration (ppt)
EC_{25}	51.9
EC_{50}	54.7
NOEC	42
LOEC	51
TU_C ($100/EC_{25}$)	1.93

GERM TUBE GROWTH-LENGTH

Concentration (ppt)	Mean Length (µg)
70	0.00
60	5.55
51	9.00
42	12.70
33	13.05
Control	13.00

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{15}	46.0
IC_{25}	49.1
IC_{40}	54.1
IC_{50}	57.5
NOEC	42
LOEC	51
TU_C ($100/IC_{25}$)	2.04

Table 1-7. Phase I Reference Toxicant Test Results 48-hr Chronic Toxicity Bioassay using *M. pyrifera*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 8 -10, 2011

Test Parameters
Concentration (ppb): 5.6, 10, 18, 32, 100, 180
Common Name: Giant kelp
Test Endpoints: Germination, Growth
Test Protocol: EPA/600/R-95/136

PROPORTION GERMINATED

Concentration (ppb $CuCl_2$)	(Mean ± SD)	Proportion Germinated in Replicates				
		1	*2*	*3*	*4*	*5*
180	22.4 ± 9.5	19	20	15	19	39
100	44.0 ± 4.3	44	38	49	47	42
32	79.0 ± 3.1	79	84	77	79	76
18	86.4 ± 2.2	87	86	83	89	87
10	84.8 ± 2.7	83	87	86	81	87
6	85.2 ± 3.3	84	82	83	90	87
Control	89.6 ± 2.9	89	88	92	93	86

Statistical Summary

Parameter	Concentration (ppb $CuCl_2$)
EC_{25}	57.1
EC_{50}	102.1
NOEC	18
LOEC	32
TU_C ($100/EC_{25}$)	1.75

GERM TUBE GROWTH-LENGTH

Concentration (ppb)	Mean Length (µg)
180	6.55
100	7.80
32	11.50
18	12.50
10	12.30
6	13.20
Control	13.00

Statistical Summary

Parameter	Concentration (ppb $CuCl_2$)
EC_{15}	37.1
EC_{25}	62.8
EC_{40}	115.5
EC_{50}	166.8
NOEC	18
LOEC	32
TU_C ($100/EC_{25}$)	1.59

1.3.1.3 *S. purpuratus* Chronic Bioassay

Water Quality and Test Acceptability Criteria

All water quality parameters were within acceptable limits throughout the 96-hour test duration. Upon test termination, the laboratory control met the criteria for test acceptability. Salinity toxicity test results are presented in Table 1-8 and reference toxicant test results are presented in Table 1-9.

Proportion Alive

The average proportion alive for *S. purpuratus* was 62.2% for the laboratory control treatment. Mean survival rates in the 33, 42, 51, 60, and 70 ppt concentrations were 62.0, 76.8, 88.4, 89.8, and 76.2%, respectively. No statistically significant effects on survival were observed relative to the laboratory control treatment. Consequently, the NOEC for survival was 69.1 ppt. The IC_{25} and IC_{50} values were both greater than 69.1 ppt. The TU_C (100% / NOEC) for the proportion alive endpoint was 1.45.

Proportion Normal

The mean proportion normal observed in the laboratory control treatment for the *S. purpuratus* test was 94.8 percent. Mean proportion normal in the 33, 42, 51, 60, and 70 ppt concentrations were 89.2, 0.0, 0.0, 0.0, and 0.0%, respectively. There was not a statistically significant effect observed in the 33 ppt salinity treatment when compared to the laboratory control. Consequently, the NOEC for the proportion normal endpoint was 33 ppt. The IC_{25} value was 34.8 ppt and the IC_{50} value was 36.9 ppt, and the TU_C (100% / IC_{25}) for the proportion normal endpoint was 2.87.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced an EC_{50} value of 7.99 ppb $CuSO_4$ for the proportion normal endpoint. This value is outside two standard deviations from the laboratory mean (16.3 ± 8.04 ppb $CuSO_4$), indicating higher than normal sensitivity of the test organisms.

Table 1-8. Phase I Test Results: 96-hr Chronic Toxicity Bioassay using *Strongylocentrotus. purpuratus*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 16 - 20, 2011

Test Parameters
Concentrations (ppt): 33, 42, 51, 60, 70
Common Name: Purple urchin
Test Endpoints: Survival, Development
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Proportion Alive (Mean ± SD)	Proportion Alive in Replicates			
		1	*2*	*3*	*4*
70	76.2 ± 7.7	76	80	83	66
60	89.8 ± 10.3	89	76	100	94
51	88.4 ± 9.8	100	82	93	78
42	76.8 ± 8.3	80	67	74	86
33	62.0 ± 3.8	67	58	60	62
Laboratory Control	62.2 ± 10.4	77	55	54	62
Statistical Summary					
Parameter	Saline Concentration (ppt)				
IC_{25}	> 70				
IC_{50}	> 70				
NOEC	70				
LOEC	> 70				
TU_c (100/NOEC)	1.45				

DEVELOPMENTAL ENDPOINT

Saline Concentration (ppt)	Proportion Normal (Mean ± SD)	Proportion Normal in Replicates			
		1	*2*	*3*	*4*
70	0.0 ± 0.0	0	0	0	0
60	0.0 ± 0.0	0	0	0	0
51	0.0 ± 0.0	0	0	0	0
42	0.0 ± 0.0	0	0	0	0
33	89.2 ± 5.0	92	86	84	95
Laboratory Control	94.8 ± 2.6	95	97	91	96
Statistical Summary					
Parameter	Saline Concentration (ppt)				
IC_{25}	34.8				
IC_{50}	36.9				
NOEC	32.4				
LOEC	33				
TU_c (100/IC_{25})	2.87				

Table 1-9. Phase I Reference Toxicant Test Results for the 96-hr Chronic Toxicity Bioassay using *S. purpuratus*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 16 - 20, 2011

Test Parameters:
Concentrations (ppb): 3.75, 7.5, 15, 30
Common Name: Purple urchin
Test Endpoints: Developmental
Test Protocol: EPA/600/R-95/136

DEVELOPMENTAL ENDPOINT

Concentration (ppb $CuSO_4$)	Proportion Normal (Mean ± SD)	Proportion Normal in Replicates			
		1	*2*	*3*	*4*
30	0.0 ± 0.0	0	0	0	0
15	4.9 ± 1.5	4	3	7	6
7.5	57.5 ± 5.5	55	65	53	57
3.75	77.3 ± 1.6	79	77	78	75
Laboratory Control	94.4 ± 1.4	96	95	94	93

Statistical Summary

Parameter	Concentration (ppb $CuSO_4$)
EC_{25}	--
EC_{50}	8.0
NOEC	< 3.75
LOEC	3.75
TU_c (100/NOEC)	26.67

1.3.1.4 *H. rufescens* Chronic Bioassay

Water Quality and Test Acceptability Criteria

All water quality parameters were within acceptable limits throughout the 48-hour test duration. Upon test termination, the laboratory control met the criteria for test acceptability. Salinity toxicity test results are presented in Table 1-10 and reference toxicant test results are presented in Table 1-11.

Proportion Normal

The mean proportion normal observed during the *H. rufescens* test was 90.0% for the laboratory control treatment. Mean proportion normal in the 33, 42, 51, 60, and 70 ppt concentrations were 91.0, 0.0, 0.0, 0.0, and 0.0%, respectively. A statistically significant effect on survival was seen in the 42 ppt salinity treatment relative to the laboratory control. Consequently, the NOEC for survival was 33 ppt. The IC_{25} and IC_{50} values were 35.3 ppt and 37.2 ppt, respectively. The TU_C (100% / IC_{25}) for the proportion normal endpoint was 2.84.

Reference Toxicant Test (Zinc Sulfate)

The reference toxicant test produced an IC_{50} value of 60.6 ppb $ZnSO_4$ for the proportion normal endpoint. This value is within two standard deviations from the laboratory mean (32.2 ± 32.0 ppb $ZnSO_4$), indicating normal sensitivity of the test organisms.

Table 1-10. Phase I Test Results: 48-hr Chronic Toxicity Bioassay using *Haliotis rufescens*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: March 2 - 4, 2011

Test Paramenters
Concentrations (ppt): 33, 42, 51, 60, 70
Common Name: Red abalone
Test Endpoints: Developmental
Test Protocol: EPA/600/R-95/136

DEVELOPMENTAL ENDPOINT

Saline Concentration (ppt)	Proportion Normal (Mean ± S.D.)	Proportion Normal in Replicates			
		1	*2*	*3*	*4*
70	90.0 ± 4.5	90	89	85	96
60	91.0 ± 2.8	93	87	91	93
51	0.0 ± 0.0	0	0	0	0
42	0.0 ± 0.0	0	0	0	0
33	0.0 ± 0.0	0	0	0	0
Laboratory Control	0.0 ± 0.0	0	0	0	0

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{25}	35.3
IC_{50}	37.5
NOEC	33
LOEC	--
TU_c ($100/IC_{25}$)	2.84

Table 1-11. Phase I Reference Toxicant Test Results for the 48-hr Chronic Toxicity Bioassay using *H. rufescens*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: March 2 - 4, 2011

Test Parameters:
Concentrations (ppb): 10, 18, 32, 56, 100
Common Name: Red abalone
Test Endpoints: Developmental
Test Protocol: EPA/600/R-95/136

DEVELOPMENTAL ENDPOINT

Concentration (ppb $ZnSO_4$)	Proportion Normal (Mean ± SD)	Proportion Normal in Replicates			
		1	*2*	*3*	*4*
100	0.0 ± 0.0	0	0	0	0
56	57.3 ± 17.0	57	34	74	64
32	92.0 ± 2.4	90	93	95	90
18	92.3 ± 1.7	90	93	92	94
10	89.8 ± 2.2	91	92	89	87
Laboratory Control	90.3 ± 1.0	89	91	91	90

Statistical Summary

Parameter	Concentration (ppb $ZnSO_4$)
IC_{15}	41.7
IC_{25}	48.2
IC_{40}	58.0
IC_{50}	65.0
NOEC	32
LOEC	56
TU_c ($100/IC_{25}$)	2.08

1.3.1.5 *A. affinis* Chronic and Acute Bioassays

Water Quality and Test Acceptability Criteria

All water quality parameters were within acceptable limits throughout the 7-day test duration. Upon test termination, the laboratory control failed to meet the survival criteria for test acceptability, while meeting the growth criteria for test acceptability. Salinity toxicity test results are presented in Table 1-12 and reference toxicant test results are presented in Table 1-13. Acute toxicity test results are presented in Table 1-14.

Survival

The average survival rate observed during testing was 68% for the laboratory control treatment, which falls below the protocol test acceptability criterion of 80%. Mean survival rates in the 33, 42, 51, 60, and 70 ppt concentrations were 76.0, 56.0, 28.0, 0.0, and 0.0%, respectively. A statistically significant effect on survival was seen in the 51 ppt treatment relative to the laboratory control. Consequently, the NOEC for survival was 42 ppt. The LC_{25} and LC_{50} values were 45.1 and 48.5 ppt, respectively. The TU_C (100% / LC_{25}) for the survival endpoint was 2.22.

Biomass

The mean biomass measured for *A. affinis* was 0.833 mg for the laboratory control treatment. Mean biomass in the 33, 42, 51, 60, and 70 ppt concentrations were 0.842, 0.735, 0.453, 0.0, and 0.0 mg, respectively. A statistically significant effect on survival was seen in the 51 ppt treatment relative to the laboratory control. Consequently, the NOEC for biomass was 42 ppt. The IC_{25} and IC_{50} values were 45.4 ppt and 51.7 ppt, respectively. The TU_C (100% / IC_{25}) for the biomass endpoint was 2.20.

Acute Survival

The average 96-hour survival rate for the laboratory control treatment was 68%, which is below the protocol acceptability criterion of 90%. The mean survival rates in the 33, 42, 51, 60, and 70 ppt concentrations were 76.0, 56.0, 28.0, 0.0, and 0.0%, respectively. A statistically significant effect on survival was seen in the 51 ppt treatment relative to the laboratory control. Consequently, the NOEC for survival was 42 ppt. The IC_{25} and IC_{50} values were 45.1 and 48.5 ppt, respectively. The TU_A (100% / IC_{25}) for the survival endpoint was 2.22.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced an IC_{50} value of 93.3 ppb $CuSO_4$ for the survival endpoint. This value is within two standard deviations from the laboratory mean (121.0 ± 50.8 ppb $CuSO_4$), indicating normal sensitivity of the test organisms for the survival endpoint. The IC_{50} for biomass was 97.7 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (132.6 ± 52.7 ppb $CuSO_4$), indicating normal sensitivity for the biomass endpoint.

Table 1-12. Phase I Test Results: 7-day Chronic Toxicity Bioassay using *Atherinops affinis*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: April 1 - 8, 2011

Test Parameters
Concentrations (ppt): 33, 42, 51, 60, 70
Common Name: Topsmelt
Test Endpoints: Survival and Growth
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Concentration (ppt)	Percent Survival (Mean ± SD)	% Survival in Replicates				
		1	*2*	*3*	*4*	*5*
70	0.0 ± 0.0	0	0	0	0	0
60	0.0 ± 0.0	0	0	0	0	0
51	28.0 ± 17.9	40	40	0	20	40
42	56.0 ± 21.9	80	80	40	40	40
33	76.0 ± 21.9	80	40	80	100	80
Control	68.0 ± 22.8	60	60	40	100	80

Statistical Summary

Parameter	Saline Concentration (ppt)
LC_{25}	45.1
LC_{50}	48.5
NOEC	42
LOEC	51
TU_C ($100/LC_{25}$)	2.22

BIOMASS ENDPOINT

Concentration (ppt)	Mean Weight/Individual (mg)
70	0.00
60	0.00
51	0.45
42	0.74
33	0.84
Control	0.83

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{15}	42.7
IC_{25}	45.4
IC_{40}	49.4
IC_{50}	51.7
NOEC	42
LOEC	51
TU_C ($100/IC_{25}$)	2.20

Table 1-13. Phase I Reference Toxicant Test Results for the 7-day Chronic Toxicity Bioassay using *A. affinis*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: April 1 - 8, 2011

Test Paramenters
Concentration (ppb): 25, 50, 100, 200, 400
Common Name: Topsmelt
Test Endpoints: Survival and Growth
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Concentration (ppb $CuSO_4$)	(Mean ± SD)	% Survival in Replicates				
		1	*2*	*3*	*4*	*5*
400	0.0 ± 0.0	0	0	0	0	0
200	4.0 ± 8.9	20	0	0	0	0
100	32.0 ± 17.9	20	20	60	40	20
50	72.0 ± 17.9	80	60	60	100	60
25	76.0 ± 21.9	80	100	40	80	80
Control	76.0 ± 8.9	80	80	80	60	80

Statistical Summary

Parameter	Concentration (ppb $CuSO_4$)
LC_{25}	68.9
LC_{50}	93.3
NOEC	50
LOEC	100
TU_C ($100/LC_{25}$)	1.45

BIOMASS ENDPOINT

Concentration (ppb)	Mean Weight/Individual (mg)
400	0.00
200	0.00
100	0.45
50	0.74
25	0.84
Control	0.83

Statistical Summary

Parameter	Concentration (ppb $CuSO_4$)
IC_{15}	42.7
IC_{25}	45.4
IC_{40}	49.4
IC_{50}	51.7
NOEC	42
LOEC	51
TU_C ($100/IC_{25}$)	2.20

Table 1-14. Phase I Test Results: 96-hr Acute Toxicity Bioassay using *A. affinis*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: April 1 - 4, 2011

Test Parameters
Concentrations (ppt): 33, 42, 51, 60, 70
Test Endpoints: Acute survival
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Percent Survival (Mean ± SD)	% Survival in Replicates				
		1	*2*	*3*	*4*	*5*
70	0.0 ± 0.0	0	0	0	0	0
60	0.0 ± 0.0	0	0	0	0	0
51	28.0 ± 17.9	40	40	0	20	40
42	56.0 ± 21.9	80	80	40	40	40
33	76.0 ± 21.9	80	40	80	100	80
Laboratory Control	68.0 ± 22.8	60	60	40	100	80

Statistical Summary	
Parameter	Saline Concentration (ppt)
IC_{25}	45.1
IC_{50}	48.5
NOEC	42
LOEC	51
TU_A ($100/IC_{25}$)	2.22

1.3.1.6 *C. stigmaeus* Acute Bioassay

Water Quality and Test Acceptability Criteria

All water quality parameters were within acceptable limits throughout the 96-hour test duration. Upon test termination, the laboratory control met the criteria for test acceptability. Salinity acute toxicity test results are presented in Table 1-15 and reference toxicant test results are presented in Table 1-16.

Acute Survival

The average 96-hour survival rate for the laboratory control treatment was 100%, and the mean survival rates in the 33, 42, 51, 60, and 70 ppt concentrations were 100, 100, 100, 0.0, and 0.0%, respectively. A statistically significant effect on survival was seen in the 60 ppt treatment relative to the laboratory control. Consequently, the NOEC for survival was 51 ppt. The IC_{25} and IC_{50} values were 53.3 ppt and 55.5 ppt, respectively. The TU_A (100% / IC_{25}) for the acute survival endpoint was 1.88.

Reference Toxicant Test (Sodium Dodecyl Sulfate)

The reference toxicant test produced an IC_{25} and IC_{50} value of 2.98 and 2.98 mg SDS/L, respectively. Due to a lack of data points, a control chart could not be generated by statistical software package.

Table 1-15. Phase I Test Results: 96-hr Acute Toxicity Bioassay using *Citharichthys stigmaeus*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 11 - 14, 2011

Test Parameters
Concentrations (ppt): 33, 42, 51, 60, 70
Common Name: Sanddab
Test Endpoints: Acute survival
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Percent Survival (Mean ± SD)	% Survival in Replicates		
		1	*2*	*3*
70	0.0 ± 0.0	0	0	0
60	0.0 ± 0.0	0	0	0
51	100.0 ± 0.0	100	100	100
42	100.0 ± 0.0	100	100	100
33	100.0 ± 0.0	100	100	100
Laboratory Control	100.0 ± 0.0	100	100	100

Statistical Summary	
Parameter	Saline Concentration (ppt)
IC_{25}	53.3
IC_{50}	55.5
NOEC	51
LOEC	60
TU_A ($100/IC_{25}$)	1.88

Table 1-16. Phase I Reference Toxicant Test Results for the 96-hr Acute Toxicity Bioassay using *C. stigmaeus*

Sample Information
Sample Collected: February 7 & February 11, 2011
Sample Received: February 9 & February 11, 2011
Test Dates: February 10 - 14, 2011

Test Parameters
Concentrations (ppb): 0.5, 1, 2, 4, 8
Common Name: Sanddab
Test Endpoints: Acute survival
Test Protocol: EPA/821/R-02/012

SURVIVAL ENDPOINT

Concentration (ppb SDS)	Percent Survival (Mean ± SD)	% Survival in Replicates			
		1	*2*		
8	78.0 ± 2.8	76	80		
4	82.4 ± 9.1	89	76		
2	91.2 ± 12.4	100	82		
1	73.6 ± 9.1	80	67		
0.5	62.8 ± 6.2	67	58		
Laboratory Control	66.0 ± 15.3	77	55		

Statistical Summary

Parameter	Concentration (ppb Sodium Dodecyl Sulfate)
IC_{25}	2.5
IC_{50}	3.0
NOEC	2
LOEC	4

1.3.2 PHASE II, EPISODE 1: SAMPLES COLLECTED AUGUST 3 & AUGUST 5, 2011

As discussed in Section 1.1, Phase II chronic toxicity testing was performed with one Phase I species from each trophic level (i.e. plant, invertebrate and vertebrate) most likely to reside in the WBMWD discharge environment. This suite included the 7-day *A. bahia* (mysid shrimp) and *A. affinis* (topsmelt) bioassays, and the 48-hour *M. pyrifera* (giant kelp) bioassay. The 96-hour *S. purpuratus* (purple urchin) test was also included based on the significant volume of high salinity data generated with this species by previous studies.

Phase II acute toxicity testing was performed with the two most sensitive Phase I species: *A. bahia* and *A. affinis*. Phase II procedure and organism data for all tests performed during Phase II, Episodes 1 is summarized in Table 1-17 and Table 1-18. Copies of laboratory benchsheets for all tests are provided in Appendix A.

1.3.2.1 *A. bahia* Chronic and Acute Bioassays

Water Quality and Test Acceptability Criteria

All water quality parameters were consistently within acceptable limits, and all test acceptability criteria were met. Test results are provided in Table 1-19 and reference toxicant test results are presented in Table 1-20. Acute toxicity test results are presented in Table 1-21.

Survival

The mean 7-day survival rate observed for *A. bahia* in the lab control was 97.5%; mean survival rates in the 37, 39, 41, 45, 50 ppt concentrations were 92.5, 92.5, 95.0, 90.0, and 47.5%, respectively. Significant effects on *A. bahia* survival were seen in the 50 ppt treatment compared to the control. Consequently, the NOEC for survival was 45 ppt. The LC_{25} and LC_{50} values were 48 ppt and 50 ppt, and the survival TU_C (100%/EC_{25}) was 2.09.

Biomass

The mean dry weight measured for the control mysids was 0.39 mg. Mean biomass values in the 37, 39, 41, 45, 50 ppt concentrations were 0.39, 0.36, 0.35, 0.27, and 0.17 mg, respectively. Statistically significant effects were observed in the 45 and 50 ppt treatments relative to the lab control. Consequently, the growth NOEC was 41 ppt. The IC_{25} and IC_{50} values were 43.6 ppt and 48.1 ppt, respectively. The growth TU_C (100% / IC_{25}) was 2.29.

Acute Survival

The average 96-hour survival rate for the laboratory control treatment was 97.5%. Mean survival rates in the 37, 39, 41, 45, 50 ppt concentrations were 95.0, 95.0, 97.5, 90.0, and 55.0%, respectively. A statistically significant effect on survival was seen in the 50 ppt treatment relative to the laboratory control. Consequently, the NOEC for survival was 45 ppt. The EC_{25} and EC_{50} values were 48.1 ppt and 50.7 ppt, respectively. The TU_A (100% / EC_{25}) for the survival endpoint was 2.08.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced an LC_{50} value of 209.6 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (255.6 ± 117.7 ppb $CuSO_4$) indicating normal sensitivity of the test organisms based on survival. The IC_{50} for biomass was 209.6 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (235.5 ± 133.1 ppb $CuSO_4$), indicating normal sensitivity for the growth endpoint.

Table 1-17. Phase II, Episode 1 Chronic Bioassays: Procedure and Organism Data

Parameter	Test Species	
	Americamysis bahia	***Macrocystis pyrifera***
Sample Properties		
Dates Sampled	August 3 & August 5, 2011	August 3 & August 5, 2011
Dates Received	August 4 & August 5, 2011	August 4 & August 5, 2011
Volume Received	~ 20 L per sample (160 L total)	~ 20 L per sample (160 L total)
Storage Conditions	4°C, dark	4°C, dark
Test Species Information		
Supplier	Aquatic BioSystems, Fort Collins, CO	Dave Gutoff, San Diego, CA
Date Acquired	August 4, 2011	August 15, 2011
Acquired Temperature	19.2°C	N/A
Age Group	7 days old	Mature
Test Procedures		
Type/Duration	Chronic/Renewal; 7 days	Chronic/Static; 48 hours
Test Dates	August 4 - 11, 2011	August 15 - 17, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	26 ± 1°C / 24.2 – 26.2°C	15 ± 1°C / 15.3 – 16.0°C
Photoperiod	16-hour light: 8-hour dark	16-hour light: 8-hour dark
Salinity (recommended/actual)	20 – 30 ± 2 ppt / NA	34 ± 2 ppt / NA
Test Chamber	400 mL containers	60 mL petri dish
Exposure Volume	150 mL	40 mL
Animals/Replicate	5	7500 spores / mL
Replicates/Treatment	8	5
Feeding	Newly hatched *Artemia* nauplii (~750 nauplii, twice daily)	None
Deviations From Protocol	None	None

Table 1-17. Phase II, Episode 1 Chronic Bioassays: Procedure and Organism Data (Continued)

Parameter	Test Species	
	Strongylocentrotus purpuratus	***Atherinops affinis***
Sample Properties		
Dates Sampled	August 3 & August 5, 2011	August 3 & August 5, 2011
Dates Received	August 4 & August 5, 2011	August 4 & August 5, 2011
Volume Received	~ 20 L per sample (160 L total)	~ 20 L per sample (160 L total)
Storage Conditions	4°C, dark	4°C, dark
Test Species Information		
Supplier	Dave Gutoff, San Diego, CA	Aquatic BioSystems, Fort Collins, CO
Date Acquired	August 23, 2011	August 9, 2011
Acquired Temperature	N/A	19.8°C
Age Group	Adult	12 days old
Test Procedures		
Type/Duration	Chronic/Static; 96 hours	Chronic/Renewal; 7 days
Test Dates	August 23 - 27, 2011	August 10 - 17, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	15 ± 1°C / 14.5 - 16.2°C	20 ± 1°C / 19.4 – 21.4°C
Photoperiod	Ambient laboratory	16-hours light: 8-hours dark
Salinity (recommended/actual)	30 ± 2 ppt / NA	32 ± 2 ppt / NA
Test Chamber	20 mL scintillation vial	600 mL containers
Exposure Volume	5 mL	200 mL
Animals/Replicate	2000 eggs, 5 x 10^6 sperm	5
Replicates/Treatment	4	5
Feeding	None	Newly hatched *Artemia* nauplii (~200 nauplii, twice daily)
Deviations From Protocol	None	None

Table 1-18. Phase II, Episode 1 Acute Bioassays: Procedure and Organism Data

Parameter	Test Species	
	Americamysis bahia	***Atherinops affinis***
Sample Properties		
Dates Sampled	August 3 & August 5, 2011	August 3 & August 5, 2011
Dates Received	August 4 & August 5, 2011	August 4 & August 5, 2011
Volume Received	~ 20 L per sample (160 L total)	~ 20 L per sample (160 L total)
Storage Conditions	4°C, dark	4°C, dark
Test Species Information		
Supplier	Aquatic BioSystems, Fort Collins, CO	Aquatic BioSystems, Fort Collins, CO
Date Acquired	August 4, 2011	August 9, 2011
Acquired Temperature	19.2°C	19.8°C
Age Group	7 days old	12 days old
Test Procedures		
Type/Duration	Acute/Renewal; 96 hours	Acute/Renewal; 96 hours
Test Dates	August 4 - 8, 2011	August 10 - 14, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	26 ± 1°C / 24.2 – 26.2°C	20 ± 1°C / 19.4 – 21.4°C
Photoperiod	16-hour light: 8-hour dark	16-hour light: 8-hour dark
Salinity (recommended/actual)	5 – 30 ± 1 ppt / NA	10 – 30 ppt / NA
Test Chamber	250 mL containers	250 mL containers
Exposure Volume	200 mL	200 mL
Animals/Replicate	5	5
Replicates/Treatment	8	5
Feeding	Newly hatched *Artemia* nauplii (~100 nauplii, daily)	Newly hatched *Artemia* nauplii (~100 nauplii, once prior to renewal)
Deviations From Protocol	None	None

Table 1-19. Phase II, Episode 1 Results: 7-day Chronic Toxicity Bioassay using *A. bahia*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 4 - 11, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 50
Species Common Name: Mysid shrimp
Test Endpoints: Survival, Growth
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Concentration (ppt)	(Mean ± SD)	% Survival in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
50	47.5 ± 26.0	20	40	60	80	80	60	20	20
45	90.0 ± 15.1	100	100	100	100	80	80	60	100
41	95.0 ± 9.3	100	100	80	100	100	100	80	100
39	92.5 ± 14.9	100	80	100	100	60	100	100	100
36.5	92.5 ± 10.4	100	100	80	100	80	100	80	100
Lab Control	97.5 ± 7.1	100	100	100	100	100	100	80	100

Statistical Summary	
Parameter	Saline Concentration (ppt)
LC_{25}	47.9
LC_{50}	50.0
NOEC	45
LOEC	50
TU_C ($100/LC_{25}$)	2.09

BIOMASS ENDPOINT

Saline Concentration (ppt)	Mean Weight (mg)
50	0.15
45	0.27
41	0.35
39	0.36
36.5	0.39
Laboratory Control	0.39
Statistical Summary	
Parameter	Saline Concentration (ppt)
IC_{15}	41.7
IC_{25}	43.7
IC_{40}	46.4
IC_{50}	48.1
NOEC	41
LOEC	45
TU_C ($100/IC_{25}$)	2.29

Table 1-20. Phase II, Episode 1 Reference Toxicant Test Results for the 7-day Chronic Toxicity Bioassay using *A. bahia*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 4 - 11, 2011

Test Parameters
Concentrations (ppb): 62.5, 125, 250, 500, 1000
Species Common Name: Mysid shrimp
Test Endpoints: Survival and Growth
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Concentration (ppb $CuSO_4$)	Percent Survival (Mean ± SD)	% Survival in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1000	0.0 ± 0.0	0	0	0	0	0	0	0	0
500	2.5 ± 7.1	20	0	0	0	0	0	0	0
250	20.0 ± 28.3	0	80	20	20	0	40	0	0
125	85.0 ± 20.7	100	80	80	100	40	100	80	100
62.5	85.0 ± 17.7	100	100	80	60	100	60	80	100
Control	80.0 ± 15.1	80	60	80	80	60	80	100	100

Statistical Summary	
Parameter	Concentration (ppb $CuSO_4$)
LC_{25}	164.2
LC_{50}	209.6
NOEC	125
LOEC	250

BIOMASS ENDPOINT

Concentration (ppb $CuSO_4$)	Mean Weight (mg)
1000	0.00
500	0.01
250	0.07
125	0.30
62.5	0.31
Control	0.30
Statistical Summary	
Parameter	Concentration (ppb $CuSO_4$)
IC_{15}	147.7
IC_{25}	163.7
IC_{40}	187.8
IC_{50}	203.9
NOEC	125
LOEC	250

Table 1-21. Phase II, Episode 1 Results: 96-hr Acute Toxicity Bioassay using *A. bahia*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 4 - 8, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 50
Common Name: Mysid shrimp
Test Endpoints: Acute survival
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Percent Survival (Mean ± SD)	% Survival in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
50	55.0 ± 27.8	40	60	60	100	80	60	20	20
45	90.0 ± 15.1	100	100	100	100	80	80	60	100
41	97.5 ± 7.1	100	100	80	100	100	100	100	100
39	95.0 ± 14.1	100	100	100	100	60	100	100	100
36.5	95.0 ± 9.3	100	100	80	100	80	100	100	100
Laboratory Control	97.5 ± 7.1	100	100	100	100	100	100	80	100

Statistical Summary

Parameter	Saline Concentration (ppt)
EC_{25}	48.1
EC_{50}	50.7
NOEC	45
LOEC	50
TU_A ($100/EC_{25}$)	2.08

1.3.2.2 *M. pyrifera* Chronic Test

Water Quality and Test Acceptability Criteria

All water quality parameters were consistently within acceptable limits, and all test acceptability criteria were met. Salinity toxicity test results are presented in Table 1-22 and reference toxicant test results are presented in Table 1-23.

Proportion Germinated

The mean proportion germinated in the laboratory control treatment was 84.8%. The mean proportion germinated in the 37, 39, 41, 45, 50 ppt concentrations was 85.4, 84.2, 80.0, 72.0 and 70.4%, respectively. Statistically significant effects on *M. pyrifera* germination were observed in the 45 ppt and 50 ppt concentrations relative to the laboratory control. Consequently, the NOEC for the proportion germinated endpoint was 41 ppt. The EC_{25} and EC_{50} values were both greater than 50 ppt, and the TU_C (100% / NOEC) for the proportion germinated endpoint was 2.44.

Growth-Length

The mean germination tube length for the laboratory control was 14.1 µm. Mean germination tube length values in the 37, 39, 41, 45, 50 ppt concentrations were 13.3, 13.1, 9.3, 10.7 and 9.3 µm, respectively. Statistically significant effects were observed in the 41, 45, and 50 ppt concentrations when compared to the laboratory control. Consequently, the growth NOEC was 39 ppt. The IC_{25} and IC_{50} values were 40.6 ppt and greater than 50 ppt, respectively. The TU_C (100% / IC_{25}) for the growth endpoint was 2.46.

Reference Toxicant Test (Copper Chloride)

The *M. pyrifera* reference toxicant test produced an EC_{50} value of 92.8 ppb $CuCl_2$ for the proportion germinated endpoint. This value is within two standard deviations of the laboratory mean (92.7 ± 77.2 ppb $CuCl_2$), indicating normal sensitivity of the test organisms based on germination. The IC_{50} for the germination tube length endpoint was 272.5 ppb $CuCl_2$. This value is also within two standard deviations of the laboratory mean (193.4 ± 181.9 ppb $CuCl_2$), indicating normal sensitivity for growth.

Table 1-22. Phase II, Episode 1 Results: 48-hr Chronic Toxicity Bioassay using *M. pyrifera*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 15 - 17, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 50
Common Name: Giant kelp
Test Endpoints: Germination, Growth
Test Protocol: EPA/600/R-95/136

PROPORTION GERMINATED

Concentration (ppt)	(Mean ± SD)	Proportion Germinated in Replicates				
		1	*2*	*3*	*4*	*5*
50	70.4 ± 4.6	66	72	74	65	75
45	72.0 ± 6.0	63	69	76	78	74
41	80.0 ± 4.8	77	75	83	85	
39	84.2 ± 1.3	84	83	83	85	86
36.5	85.4 ± 4.2	82	85	91	88	81
Control	84.8 ± 4.7	88	83	78	90	85

Statistical Summary

Parameter	Saline Concentration (ppt)
EC_{25}	> 50
EC_{50}	> 50
NOEC	41
LOEC	45
TU_C (100/NOEC)	2.44

GERM TUBE GROWTH-LENGTH

Concentration (ppt)	Mean Length (µg)
50	9.30
45	10.65
41	9.30
39	13.10
36.5	13.25
Control	14.05

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{15}	39.7
IC_{25}	40.6
IC_{40}	> 50
IC_{50}	> 50
NOEC	39
LOEC	41
TU_C (100/IC_{25})	2.46

Table 1-23. Phase II, Episode 1 Reference Toxicant Test Results for the 48-hr Chronic Toxicity Bioassay using *M. pyrifera*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 15 - 17, 2011

Test Parameters
Concentration (ppb): 5.6, 10, 18, 32, 100, 180, 300
Common Name: Giant kelp
Test Endpoints: Germination, Growth
Test Protocol: EPA/600/R-95/136

PROPORTION GERMINATED

Concentration (ppb $CuCl_2$)	(Mean ± SD)	Proportion Germinated in Replicates				
		1	*2*	*3*	*4*	*5*
300	8.2 ± 2.8	7	4	10	11	9
180	29.0 ± 4.1	28	25	28	36	28
100	49.8 ± 2.6	53	51	49	46	50
32	68.0 ± 2.2	68	69	65	70	--
18	73.3 ± 4.1	73	69	71	73	80
10	76.4 ± 3.9	77	76	82	71	76
5.6	88.4 ± 1.9	89	86	91	89	87
Control	84.8 ± 4.7	88	83	78	90	85

Statistical Summary

Parameter	Concentration (ppb $CuCl_2$)
EC_{25}	--
EC_{50}	92.8
NOEC	5.6
LOEC	10
TU_C (100/NOEC)	17.9

GERM TUBE GROWTH-LENGTH

Concentration (ppb)	Mean Length (µg)
300	6.75
180	7.95
100	8.95
32	10.13
18	11.10
10	12.15
6	12.80
Control	14.05

Statistical Summary

Parameter	Concentration (ppb $CuCl_2$)
IC_{15}	11.6
IC_{25}	26.1
IC_{40}	141.6
IC_{50}	272.5
NOEC	5.6
LOEC	10
TU_C (100/IC_{25})	3.83

1.3.2.3 *S. purpuratus* Test

Water Quality and Test Acceptability Criteria

All water quality parameters were within acceptable limits throughout the 96-hour test duration. Upon test termination, the laboratory control met the criteria for test acceptability. Salinity toxicity test results are presented in Table 1-24 and reference toxicant test results are presented in Table 1-25.

Proportion Alive

The average proportion alive for *S. purpuratus* was 90.2% for the laboratory control treatment. The mean proportion alive in the 35, 37, 39, 41, and 43 ppt concentrations were 89.8, 89.0, 91.4, 87.7, and 93.5%, respectively. No statistically significant effects on survival were observed relative to the laboratory control treatment. Consequently, the NOEC for the proportion alive endpoint was 43 ppt. The IC_{25} and IC_{50} values were both greater than 43 ppt. The TU_C (100% / NOEC) for the proportion alive endpoint was 2.33.

Proportion Normal

The mean proportion normal observed in the laboratory control treatment for the *S. purpuratus* test was 94.4%. The mean proportion normal in the 35, 37, 39, 41, and 43 ppt concentrations were 93.3, 27.8, 2.4, 0.0, and 0.0%, respectively. A statistically significant effect was observed in the 37 ppt salinity treatment when compared to the laboratory control. Consequently, the NOEC for the proportion normal endpoint was 35 ppt. The IC_{25} and IC_{50} values were 35.7 ppt and 36.4 ppt, respectively. The TU_C (100% / IC_{25}) for the proportion normal endpoint was 2.80.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced an EC_{50} value of 12.9 ppb $CuSO_4$ for the proportion normal endpoint. This value is within two standard deviations of the laboratory mean (16.0 ± 7.76 ppb $CuSO_4$), indicating normal sensitivity of the test organisms.

Table 1-24. Phase II, Episode 1 Results: 96-hr Chronic Toxicity Bioassay using *S. purpuratus*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 23 - 27, 2011

Test Parameters
Concentrations (ppt): 35, 37, 39, 41, 43
Common Name: Purple urchin
Test Endpoints: Survival, Development
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Proportion Alive (Mean ± SD)	Proportion Alive in Replicates			
		1	*2*	*3*	*4*
43	93.5 ± 5.7	97	100	89	88
41	87.7 ± 5.6	94	86	81	90
39	91.4 ± 3.2	90	88	93	95
37	88.9 ± 6.8	95	82	84	95
35	89.8 ± 6.8	87	100	86	87
Laboratory Control	90.2 ± 6.7	92	87	83	99
Statistical Summary					
Parameter	Saline Concentration (ppt)				
IC_{25}	> 43				
IC_{50}	> 43				
NOEC	43				
LOEC	> 43				
TU_c (100/IC_{25})	2.33				

DEVELOPMENTAL ENDPOINT

Saline Concentration (ppt)	Proportion Normal (Mean ± SD)	Proportion Normal in Replicates			
		1	*2*	*3*	*4*
43	0.0 ± 0.0	0	0	0	0
41	0.0 ± 0.0	0	0	0	0
39	2.4 ± 0.8	3	2	3	2
37	27.8 ± 22.8	28	59	5	19
35	93.3 ± 2.3	91	95	91	95
Laboratory Control	94.4 ± 0.8	95	94	94	94
Statistical Summary					
Parameter	Saline Concentration (ppt)				
IC_{25}	35.7				
IC_{50}	36.4				
NOEC	35				
LOEC	37				
TU_c (100/NOEC)	2.80				

Table 1-25. Phase II, Episode 1 Reference Toxicant Test Results for the 96-hr Chronic Toxicity Bioassay using *S. purpuratus*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 23 - 27, 2011

Test Parameters
Concentrations (ppb): 3.75, 7.5, 15, 30, 60
Common Name: Purple urchin
Test Endpoints: Developmental
Test Protocol: EPA/600/R-95/136

DEVELOPMENTAL ENDPOINT

Concentration (ppb $CuSO_4$)	Proportion Normal (Mean ± SD)	Proportion Normal in Replicates			
		1	*2*	*3*	*4*
60	0.0 ± 0.0	0	0	0	0
30	0.0 ± 0.0	0	0	0	0
15	26.8 ± 35.0	9	78	19	1
7.5	94.3 ± 2.5	95	91	97	94
3.75	95.3 ± 3.3	96	91	95	99
Laboratory Control	97.0 ± 1.8	98	96	99	95

Statistical Summary	
Parameter	Concentration (ppb $CuSO_4$)
EC_{25}	10.9
EC_{50}	12.9
NOEC	7.5
LOEC	15
TU_c (100/EC_{25})	9.21

1.3.2.4 *A. affinis* Chronic and Acute Tests

Water Quality and Test Acceptability Criteria

All water quality parameters were within acceptable limits throughout the 7-day test duration. Salinity toxicity test results are presented in Table 1-26 and reference toxicant test results are presented in Table 1-27. Acute toxicity test results are presented in Table 1-28.

Survival

The average survival rate observed during testing was 96% for the laboratory control treatment. Mean survival rates in the 37, 39, 41, 45, 50 ppt concentrations were 92.0, 88.0, 88.0, 100.0, and 72.0%, respectively. No statistically significant effects on survival were observed when compared to the laboratory control. Consequently, the NOEC for survival was 50 ppt. The LC_{25} and LC_{50} values were both greater than 50 ppt, and the TU_C (100% / NOEC) for the survival endpoint was 2.0.

Biomass

The mean biomass measured for *A. affinis* was 1.02 mg for the laboratory control treatment. Mean biomass in the 37, 39, 41, 45, 50 ppt concentrations were 1.03, 1.03, 1.03, 1.04, and 0.86 mg, respectively. No statistically significant effects on biomass were observed relative to the laboratory control. Consequently, the NOEC for biomass was 50 ppt. The IC_{25} and IC_{50} values were both greater than 50 ppt, and the TU_C (100% / NOEC) for the biomass endpoint was 2.0.

Acute Survival

The average 96-hour survival rate for the laboratory control treatment was 96.0%. The mean survival rates in the 37, 39, 41, 45, 50 ppt concentrations were 92.0, 92.0, 88.0, 100, and 72.0%, respectively. No statistically significant effects on acute survival were observed relative to the laboratory control. Consequently, the NOEC for survival was 50 ppt. The IC_{25} and IC_{50} values were both greater than 50 ppt, and the TU_A (100% / NOEC) for the survival endpoint was 2.0.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced an LC_{50} value of 69.5 ppb $CuSO_4$ for the survival endpoint. This value is within two standard deviations from the laboratory mean (117.9 ± 55.4 ppb $CuSO_4$), indicating normal sensitivity of the test organisms for the survival endpoint. The IC_{50} for biomass was 80.6 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (130.4 ± 57.5 ppb $CuSO_4$), indicating normal sensitivity for the biomass endpoint.

Table 1-26. Phase II, Episode 1 Results: 7-day Chronic Toxicity Bioassay using *A. affinis*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 10 - 17, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 50
Common Name: Topsmelt
Test Endpoints: Survival and Growth
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Concentration (ppt)	(Mean ± SD)	% Survival in Replicates				
		1	*2*	*3*	*4*	*5*
50	72.0 ± 22.8	60	80	100	80	40
45	100.0 ± 0.0	100	100	100	100	100
41	88.0 ± 11.0	80	100	80	80	100
39	88.0 ± 11.0	80	100	80	100	80
36.5	92.0 ± 11.0	100	100	80	100	80
Control	96.0 ± 8.9	80	100	100	100	100

Statistical Summary	
Parameter	Saline Concentration (ppt)
LC_{25}	> 50
LC_{50}	> 50
NOEC	50
LOEC	> 50
TU_C (100/NOEC)	2.00

BIOMASS ENDPOINT

Concentration (ppt)	Mean Weight/Individual (mg)
50	0.86
45	1.04
41	1.03
39	1.03
37	1.03
Control	1.02

Statistical Summary	
Parameter	Saline Concentration (ppt)
IC_{15}	49.5
IC_{25}	> 50
IC_{40}	> 50
IC_{50}	> 50
NOEC	50
LOEC	> 50
TU_C (100/NOEC)	2.00

Table 1-27. Phase II, Episode 1 Reference Toxicant Test Results for the 7-day Chronic Toxicity Bioassay using *A. affinis*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 10 - 17, 2011

Test Parameters
Concentration (ppb): 25, 50, 100, 200, 400
Common Name: Topsmelt
Test Endpoints: Survival and Growth
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Concentration (ppb $CuSO_4$)	(Mean ± SD)	% Survival in Replicates				
		1	*2*	*3*	*4*	*5*
400	0.0 ± 0.0	0	0	0	0	0
200	0.0 ± 0.0	0	0	0	0	0
100	16.0 ± 26.1	20	60	0	0	0
50	88.0 ± 11.0	80	100	80	80	100
25	96.0 ± 8.9	100	100	100	100	80
Control	100.0 ± 0.0	100	100	100	100	100

Statistical Summary

Parameter	Concentration (ppb $CuSO_4$)
LC_{25}	52.4
LC_{50}	69.5
NOEC	50
LOEC	100
TU_C (100/LC_{25})	1.91

BIOMASS ENDPOINT

Concentration (ppb)	Mean Weight/Individual (mg)
400	0.00
200	0.00
100	1.74
50	1.21
25	1.17
Control	1.12

Statistical Summary

Parameter	Concentration (ppb $CuSO_4$)
IC_{15}	> 100
IC_{25}	> 100
IC_{40}	> 100
IC_{50}	> 100
NOEC	100
LOEC	> 100
TU_C (100/NOEC)	1.00

Table 1-28. Phase II, Episode 1 Results: 96-hr Acute Toxicity Bioassay using *A. affinis*

Sample Information
Sample Collected: August 3 & August 5, 2011
Sample Received: August 4 & August 5, 2011
Test Dates: August 10 - 14, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 50
Common Name: Topsmelt
Test Endpoints: Acute survival
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Proportion Alive (Mean ± SD)	Proportion Alive in Replicates				
		1	*2*	*3*	*4*	*5*
50	72.0 ± 22.8	60	80	100	80	40
45	100.0 ± 0.0	100	100	100	100	100
41	88.0 ± 11.0	80	100	80	80	100
39	92.0 ± 11.0	80	100	80	100	100
36.5	92.0 ± 11.0	100	100	80	100	80
Laboratory Control	96.0 ± 8.9	80	100	100	100	100

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{25}	> 50
IC_{50}	> 50
NOEC	50
LOEC	> 50
TU_c (100/NOEC)	2.00

1.3.3 PHASE II, EPISODE 2: SAMPLES COLLECTED SEPTEMBER 22, 2011

Procedure and organism data for *A. bahia*, *M. pyrifera*, *S. purpuratus*, and *A. affinis* tests performed during Phase II, Episode 2 are summarized in Table 1-29 and Table 1-30. Copies of laboratory benchsheets for all tests are provided in Appendix A.

1.3.3.1 *A. bahia* Chronic and Acute Tests

Water Quality and Test Acceptability Criteria

All water quality parameters were consistently within acceptable limits, and all test acceptability criteria were met. Salinity toxicity test results are presented in Table 1-31 and reference toxicant test results are presented in Table 1-32. Acute toxicity test results are presented in Table 1-33.

Survival

The mean 7-day survival rate observed for *A. bahia* in the laboratory control was 97.5%. The mean survival rates in the 37, 39, 41, 45, 60 ppt concentrations were 95.0, 97.5, 97.5, 87.5, and 0.0%, respectively. Statistically significant effects on *A. bahia* survival were seen in the 60 ppt treatment compared to the laboratory control. Consequently, the NOEC for survival was 45 ppt. The LC_{50} value was 51.6 ppt, and the survival TU_C (100% / LC_{25}) was 2.11.

Biomass

The mean dry weight measured for the laboratory control mysids was 0.43 mg. The mean biomass values in the 37, 39, 41, 45, 60 ppt concentrations were 0.42, 0.39, 0.37, 0.21, and 0.0 mg, respectively. Statistically significant effects were observed in the 45 and 60 ppt treatments relative to the laboratory control. Consequently, the biomass NOEC was 41 ppt. The IC_{25} and IC_{50} values were 42.3 ppt and 44.8 ppt, respectively, and the biomass TU_C (100% / IC_{25}) was 2.37.

Acute Survival

The average 96-hour survival rate for the laboratory control treatment was 100%. The mean survival rates in the 37, 39, 41, 45, 50 ppt concentrations were 100, 100, 100, 92.5, and 0.0%, respectively. A statistically significant effect on survival was seen in the 60 ppt treatment relative to the laboratory control. Consequently, the NOEC for survival was 45 ppt. The EC_{50} value was 51.2 ppt, and the TU_A (100% / NOEC) for the acute survival endpoint was 2.22.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced an LC_{50} value of 163.7 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (247.6 ± 119.9 ppb $CuSO_4$) indicating normal sensitivity of the test organisms based on survival. The IC_{50} for biomass was 173.7 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (230.5 ± 134.6 ppb $CuSO_4$), indicating normal sensitivity for the growth endpoint.

Table 1-29. Phase II, Episode 2 Chronic Bioassays: Procedure and Organism Data

Parameter	Test Species	
	Americamysis bahia	***Macrocystis pyrifera***
Sample Properties		
Dates Sampled	September 22, 2011	September 22, 2011
Dates Received	September 23, 2011	September 23, 2011
Volume Received	~ 20 L per sample (80 L total)	~ 20 L per sample (80 L total)
Storage Conditions	4°C, dark	4°C, dark
Test Species Information		
Supplier	Aquatic BioSystems, Fort Collins, CO	Dave Gutoff, San Diego, CA
Date Acquired	October 18, 2011	October 4, 2011
Acquired Temperature	15.6°C	N/A
Age Group	7 days old	Mature
Test Procedures		
Type/Duration	Chronic/Renewal; 7 days	Chronic/Static; 48 hours
Test Dates	October 19 - 26, 2011	October 4 -6, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	26°C ± 1°C / 24.5 – 26.8°C	15°C ± 1°C / 14.8 – 15.6°C
Photoperiod	16-hour light: 8-hour dark	16-hour light: 8-hour dark
Salinity (recommended/actual)	20 – 30 ± 2 ppt / NA	34 ± 2 ppt / NA
Test Chamber	400 mL containers	60 mL petri dish
Exposure Volume	150 mL	40 mL
Animals/Replicate	5	7500 spores / mL
Replicates/Treatment	8	5
Feeding	Newly hatched *Artemia* nauplii (~750 nauplii, twice daily)	None
Deviations From Protocol	None	None

Table 1-29 Phase II, Episode 2 Chronic Bioassays: Procedure and Organism Data (Continued)

Parameter	Test Species	
	Strongylocentrotus purpuratus	***Atherinops affinis***
Sample Properties		
Dates Sampled	September 22, 2011	September 22, 2011
Dates Received	September 23, 2011	September 23, 2011
Volume Received	~ 20 L per sample (80 L total)	~ 20 L per sample (80 L total)
Storage Conditions	4°C, dark	4°C, dark
Test Species Information		
Supplier	Dave Gutoff, San Diego, CA	Aquatic BioSystems, Fort Collins, CO
Date Acquired	October 5, 2011	September 27, 2011
Acquired Temperature	N/A	19.9 – 20.0°C
Age Group	Adult	12 days old
Test Procedures		
Type/Duration	Chronic/Static; 96 hours	Chronic/Renewal; 7 days
Test Dates	October 5 - 9, 2011	September 27 - October 4, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	15 ± 1°C / 14.5 - 16.3°C	20 ± 1°C / 19.2 – 20.6°C
Photoperiod	Ambient laboratory	16-hour light: 8-hour dark
Salinity (recommended/actual)	30 ± 2 ppt / NA	32 ± 2 ppt / NA
Test Chamber	20 mL scintillation vial	600 mL containers
Exposure Volume	5 mL	200 mL
Animals/Replicate	2000 eggs, 5 x 10^6 sperm	5
Replicates/Treatment	4	5
Feeding	None	Newly hatched *Artemia* nauplii (~200 nauplii, twice daily)
Deviations From Protocol	None	None

Table 1-30. Phase II, Episode 2 Acute Bioassays: Procedure and Organism Data

Parameter	Test Species	
	Americamysis bahia	***Atherinops affinis***
Sample Properties		
Dates Sampled	September 22, 2011	September 22, 2011
Dates Received	September 23, 2011	September 23, 2011
Volume Received	~ 20 L per sample (80 L total)	~ 20 L per sample (80 L total)
Storage Conditions	4°C, dark	4°C, dark
Test Species Information		
Supplier	Aquatic BioSystems, Fort Collins, CO	Aquatic BioSystems, Fort Collins, CO
Date Acquired	October 18, 2011	September 27, 2011
Acquired Temperature	15.6°C	19.9 – 20.0°C
Age Group	7 days old	12 days old
Test Procedures		
Type/Duration	Acute/Renewal; 96 hours	Acute/Renewal; 96 hours
Test Dates	October 19 - 23, 2011	September 27 - October 1, 2011
Control/Dilution H_2O	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA	Filtered, UV-treated seawater from Scripps Institute of Oceanography, La Jolla, CA
Temperature (recommended/actual)	26 ± 1°C / 24.5 – 26.8°C	20 ± 1°C / 19.2 – 20.6°C
Photoperiod	16-hour light: 8-hour dark	16-hour light: 8-hour dark
Salinity (recommended/actual)	5 – 30 ± 1 ppt / NA	10 – 30 ppt / NA
Test Chamber	250 mL containers	250 mL containers
Exposure Volume	200 mL	200 mL
Animals/Replicate	5	5
Replicates/Treatment	8	5
Feeding	Newly hatched *Artemia* nauplii (~100 nauplii, daily)	Newly hatched *Artemia* nauplii (~100 nauplii, once prior to renewal)
Deviations From Protocol	None	None

Table 1-31. Phase II, Episode 2 Results: 7-day Chronic Toxicity Bioassay using *A. bahia*

Sample Information
Sample Collected: September 22, 2011
Sample Received: September 23, 2011
Test Dates: October 19 - 26, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 60
Species Common Name: Mysid shrimp
Test Endpoints: Survival, Growth
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Concentration (ppt)	(Mean ± SD)	% Survival in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
60	0.0 ± 0.0	0	0	0	0	0	0	0	0
45	87.5 ± 10.4	80	80	100	80	80	80	100	100
41	97.5 ± 7.1	100	100	80	100	100	100	100	100
39	97.5 ± 7.1	100	100	80	100	100	100	100	100
36.5	95.0 ± 9.3	100	80	100	100	80	100	100	100
Lab Control	97.5 ± 7.1	80	100	100	100	100	100	100	100

Statistical Summary	
Parameter	Saline Concentration (ppt)
LC_{25}	47.5
LC_{50}	51.6
NOEC	45
LOEC	60
TU_C (100/LC_{25})	2.11

BIOMASS ENDPOINT

Concentration (ppt)	Mean Weight (mg)
60	0.00
45	0.21
41	0.37
39	0.39
36.5	0.42
Laboratory Control	0.43
Statistical Summary	
Parameter	Saline Concentration (ppt)
IC_{15}	41.3
IC_{25}	42.3
IC_{40}	43.8
IC_{50}	44.8
NOEC	41
LOEC	45
TU_C (100/IC_{25})	2.37

Table 1-32. Phase II, Episode 2 Reference Toxicant Test Results for the 7-day Chronic Toxicity Bioassay using *A. bahia*

Sample Information
Sample Collected: September 22, 2011
Sample Received: September 23, 2011
Test Dates: October 19 - 26, 2011

Test Parameters
Concentrations (ppb): 62.5, 125, 250, 500, 1000
Species Common Name: Mysid shrimp
Test Endpoints: Survival and Growth
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Concentration (ppb $CuSO_4$)	(Mean ± SD)	% Survival in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1000	0.0 ± 0.0	0	0	0	0	0	0	0	0
500	2.5 ± 7.1	0	0	0	20	0	0	0	0
250	15.0 ± 20.7	20	0	20	0	0	0	60	20
125	72.5 ± 23.8	80	60	100	100	40	80	80	40
62.5	92.5 ± 10.4	80	100	100	100	80	100	80	100
Control	97.5 ± 7.1	100	100	100	100	100	80	100	100

Statistical Summary	
Parameter	Concentration (ppb $CuSO_4$)
LC_{25}	116.4
LC_{50}	163.7
NOEC	62.5
LOEC	125

BIOMASS ENDPOINT

Concentration (ppb $CuSO_4$)	Mean Weight (mg)
1000	0.00
500	0.01
250	0.04
125	0.21
62.5	0.28
Control	0.28
Statistical Summary	
Parameter	Concentration (ppb $CuSO_4$)
IC_{15}	97.1
IC_{25}	120.5
IC_{40}	152.5
IC_{50}	173.7
NOEC	62.5
LOEC	125

Table 1-33. Phase II, Episode 2 Results: 96-hour Acute Toxicity Bioassay using *A. bahia*

Sample Information
Sample Collected: September 22, 2011
Sample Received: September 23, 2011
Test Dates: October 19 - 23, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 60
Common Name: Mysid shrimp
Test Endpoints: Acute survival
Test Protocol: EPA/821/R-02/014

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Proportion Alive (Mean ± SD)	Proportion Alive in Replicates							
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
60	0.0 ± 0.0	0	0	0	0	0	0	0	0
45	92.5 ± 10.4	100	80	100	100	80	80	100	100
41	100.0 ± 0.0	100	100	100	100	100	100	100	100
39	100.0 ± 0.0	100	100	100	100	100	100	100	100
36.5	100.0 ± 0.0	100	100	100	100	100	100	100	100
Laboratory Control	100.0 ± 0.0	100	100	100	100	100	100	100	100

Statistical Summary

Parameter	Saline Concentration (ppt)
EC_{25}	--
EC_{50}	51.2
NOEC	45
LOEC	60
TU_c (100/NOEC)	2.22

1.3.3.2 *M. pyrifera* Chronic Test

Water Quality and Test Acceptability Criteria

All water quality parameters were consistently within acceptable limits, and all test acceptability criteria were met. Salinity toxicity test results are presented in Table 1-34 and reference toxicant test results are presented in Table 1-35.

Proportion Germinated

The mean proportion germinated in the laboratory control treatment was 83.2%. The mean proportion germinated in the 37, 39, 41, 45, and 60 ppt concentration was 81.8, 77.6, 74.8, 72.4 and 31.6%, respectively. Statistically significant effects on *M. pyrifera* germination were observed in the 41, 45, and 60 ppt concentrations relative to the laboratory control. Consequently, the NOEC for the proportion germinated endpoint was 39 ppt. The EC_{25} and EC_{50} values were 48.6 ppt and 56.3 ppt, respectively. The TU_C (100% / EC_{25}) for the proportion germinated endpoint was 2.06.

Growth-Length

The mean germination tube length for the laboratory control was 14.7 µm. The mean germination tube length values in the 37, 39, 41, 45, 60 ppt concentrations were 13.5, 13.5, 13.7, 11.7 and 6.0 µm, respectively. Statistically significant effects were observed in the 45 ppt and 50 ppt concentrations when compared to the laboratory control. Consequently, the growth NOEC was 41 ppt. The IC_{25} and IC_{50} values were 46.9 ppt and 56.5 ppt, respectively. The TU_C (100% / IC_{25}) for the growth endpoint was 2.13.

Reference Toxicant Test (Copper Chloride)

The *M. pyrifera* reference toxicant test produced an EC_{50} value of 321.74 ppb $CuCl_2$ for the proportion germinated endpoint. This value is within two standard deviations of the laboratory mean (102.0 ± 127.5 ppb $CuCl_2$), indicating less than normal sensitivity of the test organisms based on germination. The EC_{50} for the germination tube length endpoint was 244.1 ppb $CuCl_2$. This value is within two standard deviations of the laboratory mean (202.7 ± 171.8 ppb $CuCl_2$), indicating normal sensitivity for growth.

Table 1-34. Phase II, Episode 2 Results: 48-hr Chronic Toxicity Bioassay using *M. pyrifera*

Sample Information
Sample Collected: September 22, 2011
Sample Received: September 23, 2011
Test Dates: October 4 - 6, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 60
Common Name: Giant kelp
Test Endpoints: Germination, Growth
Test Protocol: EPA/600/R-95/136

PROPORTION GERMINATED

Concentration (ppt)	(Mean ± SD)	Proportion Germinated in Replicates				
		1	*2*	*3*	*4*	*5*
60	31.6 ± 7.9	39	37	33	30	19
45	72.4 ± 3.5	76	68	71	71	76
41	74.8 ± 4.1	80	73	78	70	73
39	77.6 ± 2.4	75	81	77	79	76
36.5	81.8 ± 2.0	82	85	80	82	80
Control	83.2 ± 2.6	85	86	81	84	80

Statistical Summary

Parameter	Saline Concentration (ppt)
EC_{25}	48.6
EC_{50}	56.3
NOEC	39
LOEC	41
TU_C ($100/EC_{25}$)	2.06

GERM TUBE GROWTH-LENGTH

Concentration (ppt)	Mean Length (µg)
60	6.00
45	11.70
41	13.65
39	13.50
36.5	13.45
Control	14.65

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{15}	43.4
IC_{25}	46.9
IC_{40}	52.7
IC_{50}	56.5
NOEC	41
LOEC	45
TU_C ($100/IC_{25}$)	2.13

Table 1-35. Phase II, Episode 2 Reference Toxicant Test Results for the 48-hr Chronic Toxicity Bioassay using *M. pyrifera*

Sample Information
Sample Collected: September 22, 2011
Sample Received: September 23, 2011
Test Dates: October 4 - 6, 2011

Test Parameters
Concentration (ppb): 5.6, 10, 18, 32, 100, 180, 300
Common Name: Giant kelp
Test Endpoints: Germination, Growth
Test Protocol: EPA/600/R-95/136

PROPORTION GERMINATED

Concentration (ppb $CuCl_2$)	(Mean ± SD)	Proportion Germinated in Replicates				
		1	*2*	*3*	*4*	*5*
300	39.4 ± 10.2	37	48	42	47	23
180	51.8 ± 7.1	59	54	54	52	40
100	61.4 ± 7.1	63	64	64	67	49
32	73.2 ± 3.1	73	76	74	75	68
18	75.4 ± 3.0	79	78	73	72	75
10	77.0 ± 3.3	76	80	72	77	80
5.6	76.6 ± 2.8	74	79	80	74	76
Control	83.2 ± 2.6	85	86	81	84	80

Statistical Summary

Parameter	Concentration (ppb $CuCl_2$)
EC_{25}	100.1
EC_{50}	321.7
NOEC	< 5.6
LOEC	5.6
TU_C (100/NOEC)	17.9

GERM TUBE GROWTH-LENGTH

Concentration (ppb)	Mean Length (µg)
300	6.30
180	8.50
100	9.80
32	12.65
18	13.10
10	12.90
6	13.00
Control	14.65

Statistical Summary

Parameter	Concentration (ppb $CuCl_2$)
EC_{15}	36.7
EC_{25}	71.7
EC_{40}	162.2
EC_{50}	244.1
NOEC	< 5.6
LOEC	5.6
TU_C (100/EC_{25})	17.86

1.3.3.3 *S. purpuratus* Test

Water Quality and Test Acceptability Criteria

All water quality parameters were within acceptable limits throughout the 96-hour test duration. Upon test termination, the laboratory control met the criteria for test acceptability. Salinity toxicity test results are presented in Table 1-36 and reference toxicant test results are presented in Table 1-37.

Proportion Alive

The average proportion alive for *S. purpuratus* was 88.4% for the laboratory control treatment. The mean proportion alive in the 35, 37, 39, 41, and 43 ppt concentrations were 92.3, 74.8, 99.3, 98.8, and 98.3%, respectively. No statistically significant effects on survival were observed relative to the laboratory control treatment. Consequently, the NOEC for the proportion alive endpoint was 43 ppt. The IC_{25} and IC_{50} values were both greater than 43 ppt. The TU_C (100% / NOEC) for the proportion alive endpoint was 2.33.

Proportion Normal

The mean proportion normal observed in the laboratory control treatment for the *S. purpuratus* test was 94.9%. Mean proportion normal in the 35, 37, 39, 41, and 43 ppt concentrations were 91.7, 90.1, 1.3, 0.0, and 0.0%, respectively. A statistically significant effect was observed in the 39 ppt salinity treatment when compared to the laboratory control. Consequently, the NOEC for the proportion normal endpoint was 37 ppt. The IC_{25} and IC_{50} values were 37.4 ppt and 38.0 ppt, respectively. The TU_C (100% / IC_{25}) for the proportion normal endpoint was 2.67.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced an EC_{50} value of 14.2 ppb $CuSO_4$ for the proportion normal endpoint. This value is within two standard deviations of the laboratory mean (15.9 ± 7.60 ppb $CuSO_4$), indicating normal sensitivity of the test organisms.

Table 1-36. Phase II, Episode 2 Results: 96-hr Chronic Toxicity Bioassay using *S. purpuratus*

Sample Information
Sample Collected: Septmber 22, 2011
Sample Received: September 23, 2011
Test Dates: October 5 - 9, 2011

Test Parameters
Concentrations (ppt): 35, 37, 39, 41, 43
Common Name: Purple urchin
Test Endpoints: Survival, Development
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Proportion Alive (Mean ± SD)	Proportion Alive in Replicates			
		1	*2*	*3*	*4*
43	98.3 ± 2.0	100	97	96	100
41	98.8 ± 2.5	100	95	100	100
39	99.3 ± 0.9	99	98	100	100
37	74.8 ± 9.9	85	67	65	81
35	92.3 ± 10.2	96	100	77	96
Laboratory Control	88.4 ± 8.6	100	79	87	87

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{25}	> 43
IC_{50}	> 43
NOEC	43
LOEC	> 43
TU_c (100/NOEC)	2.33

DEVELOPMENTAL ENDPOINT

Saline Concentration (ppt)	Proportion Normal (Mean ± SD)	Proportion Normal in Replicates			
		1	*2*	*3*	*4*
43	0.0 ± 0.0	0	0	0	0
41	0.0 ± 0.0	0	0	0	0
39	1.2 ± 1.3	0	3	1	1
37	90.1 ± 7.5	83	96	85	98
35	91.7 ± 4.3	95	89	87	96
Laboratory Control	94.9 ± 6.0	99	86	95	99

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{25}	37.4
IC_{50}	38.0
NOEC	37
LOEC	39
TU_c (100/IC_{25})	2.67

Table 1-37. Phase II, Episode 2 Reference Toxicant Test Results for the 96-hr Chronic Toxicity Bioassay using *S. purpuratus*

Sample Information
Sample Collected: Septmber 22, 2011
Sample Received: September 23, 2011
Test Dates: October 5 - 9, 2011

Test Parameters
Concentrations (ppb): 3.75, 7.5, 15, 30
Common Name: Purple urchin
Test Endpoints: Developmental
Test Protocol: EPA/600/R-95/136

DEVELOPMENTAL ENDPOINT

Concentration (ppb $CuSO_4$)	Proportion Normal (Mean ± SD)	Proportion Normal in Replicates			
		1	*2*	*3*	*4*
30	0.0 ± 0.0	0	0	0	0
15	37.3 ± 4.9	37	40	31	42
7.5	88.8 ± 6.4	95	91	89	80
3.75	93.0 ± 5.5	97	94	96	85
Laboratory Control	90.7 ± 3.4	86	90	93	94

Statistical Summary

Parameter	Concentration (ppb $CuSO_4$)
EC_{25}	12.2
EC_{50}	14.2
NOEC	7.5
LOEC	15
TU_c ($100/EC_{25}$)	8.22

1.3.3.4 *A. affinis* Chronic and Acute Tests

Water Quality and Test Acceptability Criteria

All water quality parameters were within acceptable limits throughout the 7-day test duration. Salinity toxicity test results are presented in Table 1-38 and reference toxicant test results are presented in Table 1-39. Acute toxicity test results are presented in Table 1-40.

Survival

The average survival rate observed during testing was 88.0% for the laboratory control treatment. The mean survival rates in the 37, 39, 41, 45, 60 ppt concentrations were 92.0, 84.0, 92.0, 80.0, and 12.0%, respectively. Statistically significant effects on survival were observed in the 60 ppt salinity treatment when compared to the laboratory control. Consequently, the NOEC for survival was 45 ppt. The LC_{25} and LC_{50} values were 48.6 ppt and 52.6 ppt, respectively. The TU_C (100% / LC_{25}) for the survival endpoint was 2.06.

Biomass

The mean biomass measured for *A. affinis* was 0.80 mg for the laboratory control treatment. The mean biomass in the 37, 39, 41, 45, 60 ppt concentrations was 0.79, 0.77, 0.87, 0.85, and 0.21 mg, respectively. Statistically significant effects on biomass were observed in the 60 ppt salinity treatment when compared to the laboratory control. Consequently, the NOEC for biomass was 45 ppt. The IC_{25} and IC_{50} values were 50.0 ppt and 55.1 ppt, and the TU_C (100% / IC_{25}) for the biomass endpoint was 2.0.

Acute Survival

The average 96-hour survival rate for the laboratory control treatment was 88.0%. The mean acute survival rates in the 37, 39, 41, 45, 60 ppt concentrations were 92.0, 84.0, 92.0, 80.0, and 12.0%, respectively. Statistically significant effects on acute survival were observed in the 60 ppt salinity treatment relative to the laboratory control. Consequently, the NOEC for acute survival was 45 ppt. The EC_{25} and EC_{50} values were 48.6 ppt and 52.7 ppt, respectively. The TU_A (100% / EC_{25}) for the acute survival endpoint was 2.06.

Reference Toxicant Test (Copper Sulfate)

The reference toxicant test produced an LC_{50} value of 117.1 ppb $CuSO_4$ for the survival endpoint. This value is within two standard deviations from the laboratory mean (115.8 ± 52.0 ppb $CuSO_4$), indicating normal sensitivity of the test organisms for the survival endpoint. The IC_{50} for biomass was 140.2 ppb $CuSO_4$. This value is within two standard deviations of the laboratory mean (129.1 ± 55.2 ppb $CuSO_4$), indicating normal sensitivity for the biomass endpoint.

Table 1-38. Phase II, Episode 2 Results: 7-day Chronic Toxicity Bioassay using *A. affinis*

Sample Information
Sample Collected: Septmber 22, 2011
Sample Received: September 23, 2011
Test Dates: September 27 - October 4, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 60
Common Name: Topsmelt
Test Endpoints: Survival and Growth
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Concentration (ppt)	(Mean ± SD)	% Survival in Replicates				
		1	*2*	*3*	*4*	*5*
60	12.0 ± 11.0	0	20	0	20	20
45	80.0 ± 14.1	80	80	80	100	60
41	92.0 ± 11.0	100	80	80	100	100
39	84.0 ± 16.7	80	100	100	80	60
36.5	92.0 ± 11.0	80	100	100	100	80
Control	88.0 ± 11.0	80	100	80	80	100

Statistical Summary

Parameter	Saline Concentration (ppt)
LC_{25}	48.6
LC_{50}	52.6
NOEC	45
LOEC	60
TU_C (100/NOEC)	2.06

BIOMASS ENDPOINT

Concentration (ppt)	Mean Weight/Individual (mg)
60	0.21
45	0.85
41	0.86
39	0.77
37	0.79
Control	0.80

Statistical Summary

Parameter	Saline Concentration (ppt)
IC_{15}	48.0
IC_{25}	50.0
IC_{40}	53.1
IC_{50}	55.1
NOEC	45
LOEC	60
TU_C (100/IC_{25})	2.00

Table 1-39. Phase II, Episode 2 Reference Toxicant Test Results for the 7-day Chronic Toxicity Bioassay using *A. affinis*

Sample Information
Sample Collected: Septmber 22, 2011
Sample Received: September 23, 2011
Test Dates: September 27 - October 4, 2011

Test Parameters
Concentration (ppb): 25, 50, 100, 200, 400
Common Name: Topsmelt
Test Endpoints: Survival and Growth
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Concentration (ppb $CuSO_4$)	(Mean ± SD)	% Survival in Replicates				
		1	*2*	*3*	*4*	*5*
400	0.0 ± 0.0	0	0	0	0	0
200	4.0 ± 8.9	0	0	0	0	20
100	64.0 ± 26.1	20	80	80	80	60
50	100.0 ± 0.0	100	100	100	100	100
25	88.0 ± 11.0	80	100	80	100	80
Control	92.0 ± 17.9	60	100	100	100	100

Statistical Summary

Parameter	Concentration (ppb $CuSO_4$)
LC_{25}	95.4
LC_{50}	117.1
NOEC	100
LOEC	200

BIOMASS ENDPOINT

Concentration (ppb)	Mean Weight/Individual (mg)
400	0.00
200	0.06
100	0.76
50	1.04
25	0.96
Control	0.86

Statistical Summary

Parameter	Concentration (ppb $CuSO_4$)
IC_{15}	86.6
IC_{25}	106.1
IC_{40}	126.6
IC_{50}	140.2
NOEC	100
LOEC	200

Table 1-40. Phase II, Episode 2 Results: 96-hour Acute Toxicity Bioassay using *A. affinis*

Sample Information
Sample Collected: Septmber 22, 2011
Sample Received: September 23, 2011
Test Dates: September 27 - October 1, 2011

Test Parameters
Concentrations (ppt): 36.5, 39, 41, 45, 60
Common Name: Topsmelt
Test Endpoints: Acute survival
Test Protocol: EPA/600/R-95/136

SURVIVAL ENDPOINT

Saline Concentration (ppt)	Proportion Alive (Mean ± SD)	Proportion Alive in Replicates				
		1	*2*	*3*	*4*	*5*
60	12.0 ± 11.0	0	20	0	20	20
45	80.0 ± 14.1	80	80	80	100	60
41	92.0 ± 11.0	100	80	80	100	100
39	84.0 ± 16.7	80	100	100	80	60
36.5	92.0 ± 11.0	80	100	100	100	80
Laboratory Control	88.0 ± 11.0	80	100	80	80	100

Statistical Summary

Parameter	Saline Concentration (ppt)
EC_{25}	48.6
EC_{50}	52.6
NOEC	45
LOEC	60
TU_A ($100/EC_{25}$)	2.06

1.4 DISCUSSION

All bioassays conducted adhered to the methods outlined by USEPA protocols. Water quality deviations that occurred during testing were responded to with corrective actions by laboratory technicians, and did not prove to affect test results. Additionally, reference toxicant test results showed that the organisms used for each test were appropriately sensitive. With the exception of the topsmelt tested in Phase I, all bioassays met the protocol acceptance criteria for survival and sublethal response to the laboratory control treatment.

1.4.1 ACUTE TOXICITY RESULTS

Phase I acute toxicity testing was performed to determine what specific range of salinities would elicit both highly significant effects (i.e. 100% mortality) and no significant effects, and to identify the two most sensitive species to expose to salinities within that range during Phase II. As shown in Table 1-41, Phase I acute toxicity testing results indicated that *C. stigmaeus* (sand dab), with an NOEC of 51 ppt, was the least sensitive of the three species tested. The *A. bahia* (mysid shrimp) and *A. affinis* (topsmelt) bioassays resulted in similar statistical endpoint values (e.g. the NOEC for both was 42 ppt) and were, therefore, used for Phase II testing.

As a result of the Phase I testing effects levels, the salinity test dilutions for Phase II were ranged from 36.5 to 50 ppt. The results of Phase II, Episodes 1 and 2, showed that the salinity effects on the two species were consistently similar. The mean LC_{50} values calculated from all three test episodes were 49.2 and 50.7 ppt for *A. bahia* and *A. affinis*, respectively. The *A. affinis* mean LC_{50} however includes a conservative estimate of 51 ppt for the Phase II, Episode 1 bioassay because the LC_{50} was greater than the highest test concentration of 50 ppt, and was therefore not calculable (this why the 50 ppt dilution was substituted with 60 ppt for Episode 2). As a result, the actual difference between the two would have been slightly greater, and since there was a consistent sensitivity hierarchy, *A. bahia* is considered the more sensitive acute toxicity test species. As shown in Figure 1-1, the lowest salinity level to elicit a statistically significant effect on acute survival during the Phase II definitive testing episodes was 50 ppt. The highest salinity level that did not result in toxic effects (NOEC) was 45 ppt. The absence of an effect at this concentration was shown with *A. bahia* in both Phase II episodes and with *A. affinis* in the Episode 2.

1.4.2 CHRONIC TOXICITY RESULTS

Phase I chronic toxicity testing was performed to determine what specific range of salinities would elicit both highly significant effects (i.e. 100% mortality) and no significant effects in order to develop a Phase II dilution range that would provide more definitive results. As a result of the Phase I testing effects levels, the salinity test dilutions for Phase II ranged from 36.5 to 50 ppt for the three species representing trophic levels that would most likely be found in the brine discharge environment: *A. affinis* (topsmelt), *A. bahia* (mysid shrimp), and *M. pyrifera* (giant kelp). The *S. purpuratus* (purple urchin) bioassay, which was the slightly more sensitive of the two other species tested was also promulgated in Phase II in order to compare to the results of several other high salinity studies that have used this bioassay.

Table 1-41. Summary of Acute Toxicity Bioassay Test Results

Test Organism	Endpoint	Phase I				Phase II - Episode 1				Phase II - Episode 2			
		EC_{25}	EC_{50}	NOEC	LOEC	EC_{25}	EC_{50}	NOEC	LOEC	EC_{25}	EC_{50}	NOEC	LOEC
Atherinops affinis	Acute Survival	45.1	48.5	42	51	> 50	> 50	50	>50	48.6	52.6	45	60
Americamysis bahia	Acute Survival	43.8	45.5	42	51	48.1	50.7	45	50	--	51.2	45	60
Citharichthys stigmaeus	Acute Survival	53.3	55.5	51	60								

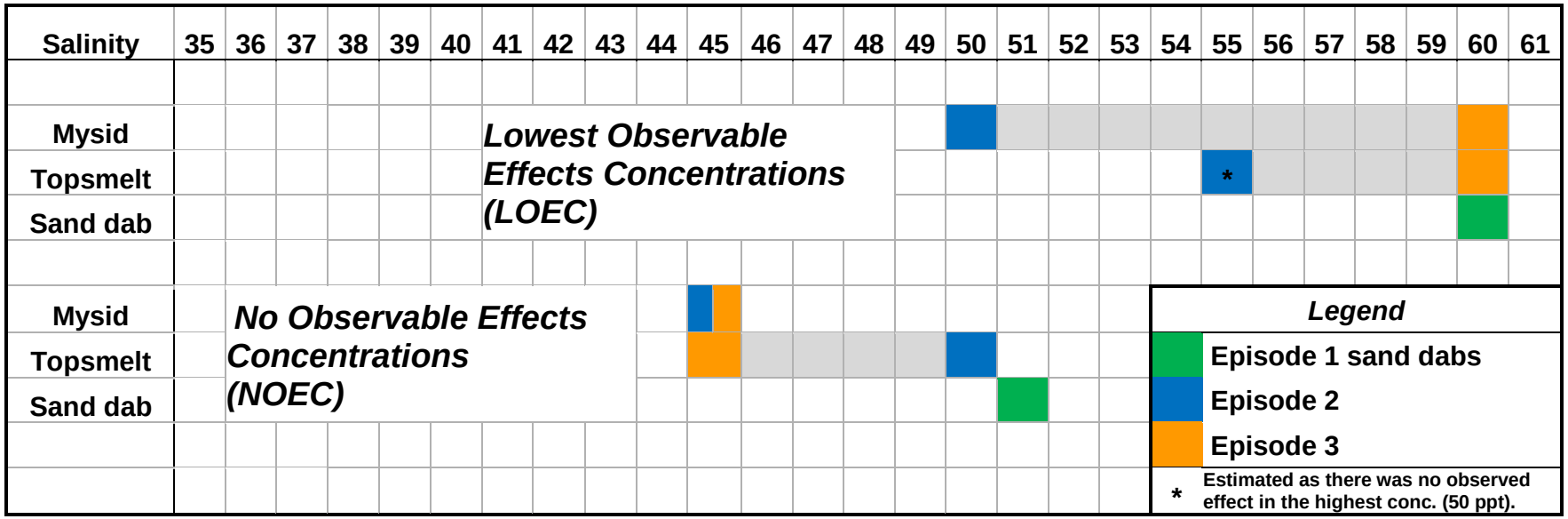


Figure 1-1. Acute Toxicity LOEC and NOEC Species Comparisons

As presented in Table 1-42, the results of Phase II, Episodes 1 and 2, show that the salinity effects were consistently least significant on *A. affinis*. Although the *M. pyrifera* bioassays resulted in NOEC values one dilution lower than the *A. bahia* bioassays, this occurred due to low variations from the mean commonly observed with *M. pyrifera* testing that result in differences from the control group that can be small but still statistically significant. For example, the percent difference in *M. pyrifera* germination rate between the control treatment and the 41 ppt treatment was only 10%, but this was a statistically significant difference (making it the LOEC); whereas the percent difference in *A. bahia* biomass between the control treatment and the 41 ppt treatment was 14%, yet this was *not* a statistically significant difference (making it the NOEC). The more appropriate chronic toxicity endpoint value to use for comparing species sensitivity is the IC_{50}.

The mean IC_{50} values calculated from all three test episodes for *A. bahia* biomass and *M. pyrifera* germ-tube growth (the two more sensitive endpoints for both species) were 46.4 and 55 ppt, respectively. The *A. affinis* mean IC_{50}, however, includes a conservative estimate of 51 ppt for the Phase II, Episode 1 bioassay because the IC_{50} was greater than the highest test concentration of 50 ppt, which was not calculable. As a result, the actual difference between the two would have been even greater. Therefore, *A. bahia* is considered the most sensitive chronic toxicity test organism among the three chosen as representatives of species most likely to reside in the discharge environment. Figure 1-2 shows the results of the most sensitive *A. bahia* test episode (Phase II, Episode 2) and toxicity endpoint (biomass). The lowest salinity level to elicit a significant effect on *A. bahia* biomass was 45 ppt. The highest salinity level that did not result in statistically significant effects (NOEC) was 41 ppt. As expected, the purple urchin was more sensitive to the effects of high salinity than the mysid shrimp. The average Phase II no-effects concentration calculated for the purple urchin was 36 ppt, and the three episode IC_{50} average was 37.1 ppt.

Table 1-42. Summary of Chronic Toxicity Bioassay Test Results

Test Organism	Endpoint	Phase I				Phase II - Episode 1				Phase II - Episode 2			
		EC_{25}	EC_{50}	NOEC	TU_C	EC_{25}	EC_{50}	NOEC	TU_C	EC_{25}	EC_{50}	NOEC	TU_C
Americamysis bahia	Survival	43.5	45.3	42	2.38	47.9	50.0	45	2.09	47.5	51.6	45	2.11
	Biomass	43.8	46.2	42	2.29	43.7	48.1	41	2.29	42.3	44.8	41	2.37
Macrocystis pyrifera	Prop Germ	51.9	54.7	42	1.93	> 50	> 50	41	2.44	48.6	56.3	39	2.06
	Growth	49.1	57.5	42	2.04	40.6	> 50	39	2.46	46.9	56.5	41	2.13
Atherinops affinis	Survival	45.1	48.5	42	2.22	> 50	> 50	50	2.00	48.6	52.6	45	2.06
	Biomass	45.4	51.7	42	2.20	> 50	> 50	50	2.00	50.0	55.1	45	2.00
Strongylocentrotus purpuratus	Prop Alive	> 70	> 70	70	1.45	> 43	> 43	43	2.33	> 43	> 43	43	2.33
	Prop Normal	34.8	36.9	33	2.87	35.7	36.4	35	2.80	37.4	38.0	37	2.67
Haliotis rufescens	Prop Normal	35.3	37.5	33	2.84								

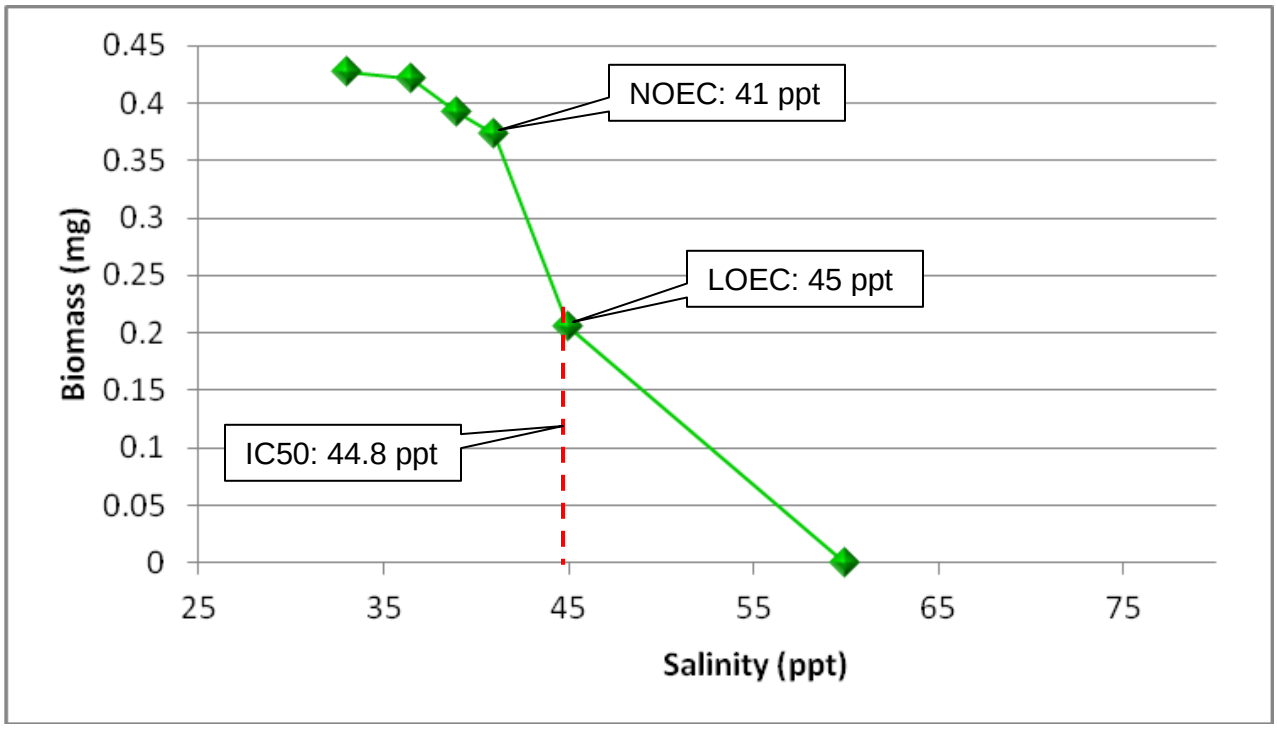


Figure 1-2. Growth Results of Most Sensitive *A. bahia* Bioassay (Phase II, Episode 2)

2.0 LONG-TERM EXPOSURE ASSESSMENT

2.1 INTRODUCTION

Based on a similar but smaller scale study performed in support of the discharge permitting process for the Carlsbad Desalination Plant (Voutchkov, 2007), Weston Solutions, Inc. (WESTON) performed a biometric mesocosm study to assess the potential long-term effects of elevated salinities exhibited by discharges from the West Basin Municipal Water District's desalination demonstration facility (DDF). Test subjects were aquatic organisms representative of faunal communities indigenous to various near-shore environments in Southern California. The study took place at the SeaLab Public Research Aquarium (SeaLab) located near the DDF in Redondo Beach, CA. The mesocosm study was also conducted to corroborate the results of the acute and chronic toxicity testing already completed to assess the "short-term" exposure effects of diluted DDF brine samples on various aquatic organisms. "Long-term" was chosen as the exposure qualifier for the mesocosm component of the study to distinguish it from the Whole Effluent Toxicity component that evaluated acute and chronic toxicity endpoints after "short-term" exposures. SeaLab provided a split-chamber, flow-through aquarium of sufficient size to house an assemblage of aquatic organisms representative of the regional biological community. These organisms were exposed to both ambient and high salinity flows in the two chambers, each with a capacity of 150 gallons.

Several invertebrate and vertebrate species were acquired from organism providers permitted by the California Department of Fish and Wildlife. Equal numbers of each were placed in the high and ambient salinity sides of the research aquarium, and subsequently monitored by SeaLab technicians. The size of the chamber necessary to adequately hold the number of organisms acquired prohibited the use of multiple, simultaneously exposed replicates. Therefore, a temporal replication approach was taken whereby three eight-week exposure Trials were performed in succession. Each exposure Trial involved successive incremental increases in salinity in the elevated salinity exposure chamber, resulting in three two-week exposures to low (37 ppt), mid (41 or 42.5 ppt), and high (44.5 or 47.5 ppt) salinity levels. In an effort to avoid any confounding influence associated with acclimation in between each of three salinity level exposure periods, salinities in the brine exposure chamber were slowly reduced back to ambient salinity before being slowly raised to the next exposure level.

The organisms in both the ambient and high salinity test chambers were monitored daily by SeaLab staff throughout each exposure Trial for mortalities and variations in behavior. In addition, sub-lethal impacts to select biological endpoints were also assessed at the end of the mid and high salinity exposure periods for each Trial. First, half of the adult invertebrate mussels or urchins were removed after the mid salinity exposure period and used to perform the U.S. EPA chronic toxicity bioassay that assesses embryo fertilization and/or development. Gametes and/or embryos harvested from adults exposed to both ambient and elevated salinities were placed in test vials containing either ambient seawater or water with an elevated salinity matching that in which the adult organisms had been exposed and then assessed for fertilization rate and/or embryo development success. This procedure was then repeated after the high salinity exposure period for all three Trials. Sub-lethal endpoints were also assessed using two fish species. Juvenile white sea bass and speckled sanddabs big enough not to be preyed on in the exposure chambers but young enough to exhibit noticeable growth over the eight week exposure Trials were acquired and distributed

equally between the two exposure chambers (10 of each on both sides). The fish were removed after completion of the high salinity exposure period and were measured for weight gain and increases in length relative to the data obtained by measuring a sub-set of the test population prior to study initiation. The mortality, behavior, and sub-lethal endpoint data are reported and discussed in the following sections.

2.2 Methods

2.2.1 TEST EXPOSURE PROCEDURES

All testing was conducted at the SeaLab in a research aquarium partitioned into two 150-gallon test chambers, allowing for housing and monitoring of several test organisms under two simultaneous salinity regimes – ambient salinity and a diluted brine flow (Figure 2-1). The size of the research aquarium, the limited space available at SeaLab, and the number of organisms desired for testing prohibited the use of multiple, simultaneously performed replicates. Therefore, a temporal replication approach was taken, which involved three eight-week exposure Trials performed in succession. Control and test dilution water for the mesocosm exposure Trials was collected through an open ocean, screened intake that sits above the abandoned once through cooling tunnel. During each exposure Trial, the salinity in the diluted brine flow chamber was increased incrementally twice, resulting in three two-week exposures to low (37 ppt), mid (41 or 42.5 ppt), and high (44.5 or 47.5 ppt) salinity levels.

An exposure period of 14 days was chosen for each salinity level tested during all three exposure trials because it was assumed that visible adverse impacts to adult invertebrates and juvenile fish (e.g. behavior, lesions, passivity etc.) would be detectable within this timeframe based on previous experimentation on thermal effects of power plant discharges on aquatic organisms. In addition, like thermal impacts, high salinity/TDS does not exhibit the bioaccumulative or biotransformative properties of chemical contaminants that could elicit adverse impacts after longer exposures. Lastly, it was considered a conservative duration for simulating effects in the discharge zone where fish and mobile invertebrates expected to reside in King's Harbor would not likely be exposed to a salinity plume for an extended period of time.

The specific salinity levels were selected primarily based on results of previous studies and the WET testing component of this study. They were adaptively modified based on the results of each successive trial. The low salinity level was tied to the level shown to elicit chronic toxicity among echinoderms under short-term WET testing. The mid salinity was tied to the level shown to elicit chronic toxicity to the most sensitive species among other WET indicator organisms. The high salinity level was chosen as a high-end bracket in order to determine whether adult and juvenile organisms would demonstrate a higher tolerance. The high salinity level was modified after Trial 1 in an effort to better resolve a No Observable Effects Level (NOEL) after Trial 1 resulted in significant mortalities at 47.5 ppt. The mid salinity level was modified in Trial 3 in an effort to determine whether exposure to a salinity between 37 ppt and the previous mid salinity (42.5 ppt) would result in higher tolerance among gametes/embryos from organisms exposed to that level. The test dates and three exposure salinities for each Trial are displayed in Table 2-1.

Figure 2-1 High Salinity Study Exposure Aquarium

Table 2-1. High Salinity Test Exposures and Duration

Test Trial	Test Dates	Salinity Regime	Test Salinity (ppt)
Trial 1 October 3, 2011 – November 28, 2011	October 3 – October 17, 2011	Low	37
	October 24 – November 7, 2011	Mid	42.5
	November 14 – November 28, 2011	High	47.5
Trial 2 December 15, 2011 – February 6, 2012	December 15 – December 29, 2011	Low	37
	January 2 – January 16, 2012	Mid	42.5
	January 23 – February 6, 2012	High	44.5
Trial 3 May 18, 2012 – July 9, 2012	May 18 – June 1, 2012	Low	37
	June 5 – June 19, 2012	Mid	41
	June 25 – July 9, 2012	High	44.5

In an effort to avoid any confounding influence associated with acclimation in between each of three salinity level exposure periods, salinities in the brine exposure chamber were slowly reduced back to ambient salinity before being slowly raised to the next exposure level. The initial transition from ambient to the low end of the three high-salinity levels was done over a 12-hour period. The transition to and from ambient between low and mid salinity was done over 24 hours, and the transition to and from ambient between mid and high salinities was done over 36 hours. The time spent at ambient during the two transition periods was at least three days.

For all three trials, the water quality parameters of temperature, pH, salinity, and dissolved oxygen (DO) were measured with a multi-probe Point Four monitoring unit fixed to the aquarium so that the probes were submersed in the surface water. Data were collected with the Point Four "P4 Ion Input Output Network" via a real-time digital display.

2.2.2 TEST ORGANISMS

2.2.2.1 Source

The high salinity study, long-term exposure test populations were comprised of the following species that were also tested during the short-term exposure testing phase: blue mussels, purple urchins, red abalone, and Pacific sanddabs. The ambient and high-salinity test populations were supplemented with various other selected species expected to occur in both soft and hard-bottom habitats of Southern California. A well-rounded blend of invertebrate and vertebrate species was achieved for each Trial. The number of individuals placed in each test chamber differed among test species; the number of individuals was dependent upon the size and type of species selected. Some species were provided from culturing facilities (i.e. white sea bass from Hubbs Seaworld Research Institute (HSRI), red abalone from the Monterey Abalone Farm, and blue mussels from the Carlsbad Aquafarm), whereas the rest were wild-caught and provided by suppliers permitted by the California Department of Fish and Game. New organisms were obtained for each of the three eight-week exposure trials, and only adult invertebrates were used for all three trials. Fish were obtained as juveniles of the same age class for all three iterations in order to detect potential impacts on growth. As shown in Table 2-2, the test population make-up varied slightly by testing episode due to seasonality and culture availability. All animals were depurated for 24 hours by the collectors and/or held for at least two days in flow-through acclimation chambers filled with intake water maintained under the same conditions as the control and test chambers prior to use.

2.2.2.2 Feeding

To ensure all organisms were adequately fed throughout each 8-week trial, the feeding regime consisted of several tactics as follows:

- Marine aquarium food pellets provided by HSRI were used to feed the fish on a daily basis.
- Macerated kelp was used to feed the echinoderms four times weekly.
- A mixture of macerated squid, sardines, mackerel, and krill was used to feed the bottom dwelling invertebrates four times daily.
- Micro-algae were used to feed the shellfish four times weekly.

Table 2-2. Test Organism Collection Sources and Use

Test Species	Source	Trial 1	Trial 2	Trial 3
Sanddabs	Brezina and Assoiciates (Dillon Beach, CA)	✓	✓	
White sea bass	Hubbs Seaworld (San Diego, CA)		✓	✓
Rockfish	Marinus Scientific (Newport Beach, CA)	✓	✓	✓
Shiner perch	Marinus Scientific (Newport Beach, CA)			✓
Kelp perch	Brezina and Associates (Dillon Beach, CA)	✓	✓	
Three-spined sticklebacks	Marinus Scientific (Newport Beach, CA)			✓
Tube snouts	Marinus Scientific (Newport Beach, CA)		✓	
Olive snails	Brezina and Associates (Dillon Beach, CA)	✓	✓	✓
Purple urchins	Monterey Abalone Farm (Monterey Bay) or Dave Gutoff (Point Loma, San Diego, CA)	✓	✓	✓
Red abalone	Monterey Abalone Farm (Monterey Bay)	✓	✓	✓
Blue mussels	Carlsbad Aquafarms (Cultured in Carlsbad, CA)	✓	✓	✓
Bat stars	Marinus Scientific (Newport Beach, CA)	✓	✓	✓
Sand crabs	Marinus Scientific (Newport Beach, CA)		✓	
Slender crabs	Sea Lab (Redondo Beach, CA)	✓		
Kelp crabs	Sea Lab (Redondo Beach, CA)		✓	✓

2.2.2.3 Monitoring

The health of the test organisms included in the long-term high salinity exposure assessment was monitored daily by SeaLab staff technicians. The aquarium and salinity levels were maintained and controlled by the West Basin's DDF design contractor, Unified Water. Mortality and qualitative assessments of health (i.e., appearance, feeding, and activity) recorded for the duration of the long-term assessment. Post-exposure endpoint assessments were also performed to assess potential sub-lethal impacts to certain biological endpoints. Either or both of the two fish test species, the speckled sanddab and the white seabass, were exposed as juveniles, so that their growth rates (length and weight) could be measured and compared at the end of each Trial. Additionally, at the completion of the mid and high salinity exposures of each Trial, effects on reproductive health were evaluated with either, the purple urchin or the blue mussel. Embryo development rates were measured for all three Trials. Embryo fertilization rates were also measured after the mid-salinity exposure of Trial 3. There was intent to also measure fertilization rates after the high-salinity exposure treatment of Trial 3; however, the urchins exposed to the high salinity treatment did not produce enough viable gametes to perform the fertilization bioassay.

2.2.3 POST-EXPOSURE ENDPOINT ASSESSMENTS

The sub-lethal endpoints assessed with the fish and invertebrate species are outlined in Table 2-3. Unexpected issues involving organism availability and health prevented achievement of the intended pseudo replication approach for the post-exposure endpoint assessments. The reason for the lack of replication for the fish effects endpoints was organism availability. The provider of juvenile white seabass (Hubbs Seaworld Research Institute) did not have these fish available at the beginning of Trial 1. The sanddabs acquired for Trial 3 suffered significant mortalities soon after placement in the pre-study holding tank. The decision to perform post-exposure embryo development bioassays was not made until after the Trial 1 high-salinity exposure period had begun. Therefore, there were no post-exposure bioassays performed after the Trial 1 mid-salinity exposure period. Purple urchins were chosen as the species of choice for the post-exposure embryo development. However, too many of the urchins succumbed during the Trial 1 high-salinity exposure period, and mussels were used instead. Since there was not adequate replication, results of each post-exposure bioassay were evaluated as individual events.

Table 2-3. Sub-Lethal Biological Endpoints Measured

Biological Endpoint	Trial 1		Trial 2		Trial 3	
	Mid Salinity	High Salinity	Mid Salinity	High Salinity	Mid Salinity	High Salinity
Sanddab growth		✓		✓		
White sea bass growth				✓		✓
Blue mussel embryo development		✓				
Purple urchin embryo development			✓	✓	✓	✓
Purple urchin fertilization					✓	

2.2.3.1 Fish Growth

Sanddabs and white seabass were used to assess high salinity impacts on fish growth. Weight and standard lengths (snout to the end of the vertebra) were measured with ten randomly selected fish of each species batch upon initiation of each Trial. Then another randomly selected ten fish were added to both the ambient and high salinity chambers. Weights and lengths were then measured on all surviving fish at the end of each Trial. White seabass of the appropriate size-class were not available at the initiation of the first Trial, so only the sanddabs were measured at the end of this Trial. The size difference between the two fish species used in Trial 3 was too great, and the sanddabs fell prey to the sea bass in both exposure treatments, leaving only the sea bass to measure at the end of this Trial.

2.2.3.2 Invertebrate embryo development

Invertebrate embryos produced from gametes spawned by adults exposed to the mid and high salinity solutions were subsequently assessed for normal development in high salinity water. Development of these embryos in ambient seawater was also assessed to evaluate the impact to gametes released from adults positioned within a high salinity plume into ambient seawater outside the influence of the plume. The mussel and urchin methods used to assess reproductive success are derived from U.S. EPA protocols for assessing chronic toxicity of effluent samples (USEPA, 2002). Spawning of the adults harvested after the mid and high-salinity exposure periods were induced by temperature manipulation (bivalves) or by injecting adult organisms with 0.5 mL of 0.5M KCl (urchin). Unfertilized eggs were separated from debris by filtering the suspension through an 80-um Nitex mesh screen. Released gametes were then combined in individual containers of filtered seawater and allowed to fertilize for up to one hour (urchin) or two hours (bivalves) under gentle aeration. Embryo stock density was estimated by counting an aliquot of dilute stock concentrate. Equal volumes of stock were then added to each test chamber to achieve a density of 150 - 300 embryos/mL. The tests were run using four or five replicates for each of four treatments:

1. Embryos from adults exposed to ambient seawater tested with ambient seawater
2. Embryos from adults exposed to ambient seawater tested with diluted brine
3. Embryos from adults exposed to elevated salinity tested with ambient seawater
4. Embryos from adults exposed to elevated salinity tested with diluted brine

The tests were performed at 16±1 (bivalves) or 15±1^{o}C (urchin) under a 16-hour light: eight-hour dark photoperiod. Temperature, pH, dissolved oxygen, and salinity were measured at test initiation and termination. After 48 hours (mussel) or 72 hours (urchin), each treatment replicate was preserved using a 0.5-mL formaldehyde solution. All (mussel) or the first 100 (urchin) larvae in each replicate were counted in a Sedgwick-Rafter cell, and the total number of normally and abnormally developed larvae was determined. The test acceptability criterion for the bivalve tests is >70% lab control survival, whereas the acceptability criterion for the urchin test is >80% lab control survival (only normally developed larvae were enumerated as surviving). A reference toxicant test was also conducted using copper sulfate as a positive control Test. Acceptability criteria are presented on the following page.

Blue Mussel Test Acceptability Criteria

1. Control survival must meet or exceed 70%,
2. At least 90% normal shell development in surviving controls,
3. MSD of <25%.

Purple Urchin Test Acceptability Criteria

1. Larval normality to equal or exceed 80% in the controls,
2. Minimum significant difference (%MSD) is less than or equal to 20% relative to the controls.

2.3 Results

2.3.1 MORTALITY

Tables 2-4 through 2-6 summarize the effects of high-salinity exposure on survival of all organisms exposed during the three Trials. Mortality quantified in red font indicates a significant difference between the ambient and elevated salinity results. Significant effects on survival were only observed with the red abalone and the purple urchins during the high-salinity exposure periods. The red abalone survival was affected during the high salinity (47.5 ppt) exposure period of Trial 1, but not the high salinity (44.5 ppt) exposure periods for Trials 2 and 3. Purple urchin survival was affected by the high salinity exposure period of Trial 1, but less affected during the Trial 2 high salinity exposure period, and no significant urchin mortality occurred during the high salinity exposure period of Trial 3. Mortality and other observations were recorded in the benchsheets provided in Appendix B.

Table 2-4. Mortalities Observed During Long-Term Exposure Trial #1

Test Species	Origin al Number of Organisms	Mortalities					
		Low Salinity (37 ppt)		Mid Salinity (42.5 ppt)		High Salinity (47.5 ppt)	
		Ambient	Test	Ambient	Test	Ambient	Test
Sanddabs	10	0	1	0	0	0	0
Rockfish	4	0	0	1	0	0	0
Kelp perch	6	0	0	0	0	1	0
Olive snails	12	0	0	0	0	0	0
Purple urchins	6	1	0	0	0	0	5
Red abalone	7	0	0	0	0	0	3
Blue mussels	30	3	3	1	0	0	0
Bat stars	4	0	0	0	0	0	0
Slender crabs	2	1	0	1	2	0	0

Red text denotes significant difference from the ambient treatment

Table 2-5. Mortalities Observed During Long-Term Exposure Trial #2

Test Species	Original Number of Organisms	Mortalities					
		Low Salinity (37 ppt)		Mid Salinity (42.5 ppt)		High Salinity (44.5 ppt)	
		Ambient	Test	Ambient	Test	Ambient	Test
Sanddabs	10	0	0	0	0	0	0
White seabass	10	0	0	0	0	0	0
Rockfish	4	0	0	0	0	0	0
Kelp perch	9	0	0	0	0	0	0
Olive snails	24	0	0	0	0	0	0
Tube snouts	3	0	1	0	0	1	2
Purple urchins	30	3	3	0	1	0	3
Red abalone	8	0	0	0	0	0	0
Blue mussels	30	12	10	5	5	0	0
Bat stars	4	0	0	0	0	0	0
Sand crabs	10	0	0	0	0	0	0
Slender crabs	1	0	0	0	1	1	-

Red text denotes significant difference from the ambient treatment

Table 2-6. Mortalities Observed During Long-Term Exposure Trial #3

Test Species	Original Number of Organisms	Mortalities					
		Low Salinity (37 ppt)		Mid Salinity (41 ppt)		High Salinity (44.5 ppt)	
		Ambient	Test	Ambient	Test	Ambient	Test
Sanddabs	25	0	0	0	0	0	0
White Sea Bass	10	0	1	0	0	0	0
3-Spined Sticklebacks	3	0	0	0	0	0	0
Rockfish	8	0	0	0	0	0	0
Kelp perch	5	0	0	0	0	0	0
Shiner perch	2	0	0	0	0	1	0
Olive snails	15	0	0	0	0	0	0
Purple urchins	34	10	6	1	1	0	0
Red abalone	8	0	0	0	0	0	0
Blue mussels	50	0	0	0	0	0	0
Bat stars	4	0	0	0	0	0	0
Kelp crabs	4	2	0	0	0	0	0

2.3.2 BEHAVIOR AND APPEARANCE

Health and behavior were monitored qualitatively by biologists looking for signs of impairment (e.g., fish lesions, food avoidance, listlessness, urchin spine flagging, molting, etc.) Appendix B shows the extent of the observations. With the exception of purple urchins, red abalone, and bat stars observed in the elevated salinity chamber during high salinity exposure periods, the behavior patterns and appearance of all organisms was consistent between the elevated salinity and ambient seawater treatments throughout the low and mid-salinity exposure periods of each Trial. The fish looked full-bodied and active during all three exposure periods of each Trial. All invertebrates remained intact throughout the low and mid-level salinity exposure periods. (i.e., no shedding limbs or degradation). During the high salinity exposure periods for all three elevated salinity exposures, some of the invertebrates seemed to be acting lethargic. A few of the purple urchins (n <5) in the elevated salinity chamber during the high salinity exposure periods lost spines and many seemed to rest in place with little spine and/or tube foot movement (see Figure 2-1). The urchins in the ambient seawater chamber consistently showed good tube feet extension and were readily grazing upon supplied kelp. The urchins, abalone and bat stars observed in the ambient seawater treatments during the high salinity exposure periods were able to better adhere to the aquarium walls than the same animals exposed to the high salinity treatments. The crabs and other invertebrates appeared and behaved normally in both the ambient and high salinity chambers throughout all three exposure periods of each Trial.

2.3.3 FISH GROWTH

The results of the fish growth measurements are presented in Table 2-7. Unless otherwise noted in the table, the number of fish in each exposure treatment equaled 10. Significant growth was measured among fish exposed to both the ambient and elevated salinity treatments compared to the baseline measurements for all three trials. Using the two-tailed Student's t-Test, no statistically significant differences (α=0.05) in weights or lengths were observed between the fish exposed to the ambient and elevated salinity treatments.

Table 2-7. Long-Term Exposure Fish Growth Results

Sample Identification	Trial 1		Trial 2		Trial 3	
	Mean Length (mm +/- SD)	Mean Weight (g +/- SD)	Mean Length (mm +/- SD)	Mean Weight (g +/- SD))	Mean Length (mm +/- SD)	Mean Weight (g +/- SD)
Pacific Sanddabs						
Baseline	52 +/- 4.7	2.6 +/- 1.2	61 +/- 9.7	2.5 +/- 1.1	NA	NA
Ambient	80 +/- 7.3	5.6 +/- 1.6	56 +/- 10	5.1 +/- 2.3	NA	NA
High Salinity	75[a] +/- 5.2	4.7[a] +/- 1.1	55[b] +/- 8.6	4.5[b] +/- 1.8	NA	NA
White Seabass						
Baseline	NA	NA	56 +/- 10	2.5 +/- 0.8	101 +/- 4.8	10 +/- 1.5
Ambient	NA	NA	61 +/- 7.1	4.9 +/- 1.1	120[d] +/- 1.6	14[d] +/- 3.5
High Salinity	NA	NA	62[c] +/- 3.3	4.5[c] +/- 1.0	112 +/- 10	12 +/- 3.5

NA: Not Assessed

[a] An extra sanddab (n=11) was recovered for the Trial 1 High Salinity treatment.

[b] Only nine sanddabs were recovered for the Trial 2 High Salinity treatment.

[c] Only nine sanddabs were recovered for the Trial 2 High Salinity treatment.

[d] Only nine white seabass were recovered for the Trial 3 Ambient Salinity treatment.

2.3.4 INVERTEBRATE EMBRYO DEVELOPMENT

All mussels were collected from both chambers following completion of the Trial 1 high salinity exposure period, and at least 12 purple urchins were collected from both the ambient and elevated salinity chambers after the mid-salinity and high salinity exposure periods of Trials 2 and 3. These organisms were transported to a commercial bioassay laboratory, and U.S. EPA approved embryo development bioassays were immediately performed. In addition, purple urchin *fertilization* bioassays were performed with urchins collected from the ambient and elevated salinity chambers after the mid-salinity exposure period of Trial 3. All water quality parameters measured were within acceptable limits throughout the 96-hour test duration of all post-exposure reproduction assessment bioassays. Upon test termination, the laboratory controls met the criteria for test acceptability for all testing. Laboratory benchsheets and statistics worksheets are provided in Appendix B.

2.3.4.1 Trial 1 Post-Exposure Embryo Development

No post-exposure embryo development bioassays were performed after the mid-salinity exposure period of Trial 1. Following completion of high salinity (47.5 ppt) exposure period, mussels from the ambient and elevated salinity chambers were collected and used for assessing embryo development under the four scenarios described in Section 2.2.3.2. Results of these bioassays are presented in Table 2-8. Significant effects were observed with embryos from adult mussels collected from the elevated salinity chamber when exposed to either ambient seawater (33 ppt) or high salinity (47.5 ppt) solutions. However, the effect was less severe in mussels embryos exposed to ambient seawater, indicating the potential for recovery of mussel embryos discharged in ambient seawater after adults are exposed to salinities above 40 ppt.

Table 2-8. Long-Term High Salinity Toxicity Test Results Summary
Blue Mussel Embryo Developmental Endpoint
First Trial – HIGH Salinity

Adult Treatment	Embryo Exposure Salinity (ppt)	Mean Proportion Normal	Proportion Normal per Replicate			
			1	*2*	*3*	*4*
Ambient Exposure	33	91.5	91.6	91.5	91.5	91.5
	47.5	0.0	0.0	0.0	0.0	0.0
47.5 ppt Exposure	33	59.7	75.0	16.0	68.4	79.2
	47.5	0.21	0.42	0.0	0.42	0.0

2.3.4.2 Trial 2 Post-Exposure Embryo Development

Purple urchins from the mid-salinity and high salinity exposure periods were collected and used for assessing embryo development under the four scenarios described in Section 2.2.3.2. Results of these bioassays are presented in Tables 2-9 and 2-10. Significant effects were observed with embryos from adults collected from the elevated salinity chamber after both the mid-salinity (42.5 ppt) and high salinity (44.5 ppt) exposure periods. With normal development rates of 4.4 and 0.8% observed with the ambient salinity bioassays performed with embryos from the adult urchins exposed to the elevated salinities, there may be some potential for recovery of mussel embryos discharged to ambient seawater after adults are exposed to salinities above 40 ppt.

Table 2-9. Long-Term High Salinity Toxicity Test Results Summary
Purple Urchin Embryo Developmental Endpoint
Second Trial – MID Salinity

Adult Treatment	Embryo Exposure Salinity (ppt)	Mean Prop. Normal	Proportion Normal per Replicate			
			1	*2*	*3*	*4*
Ambient Exposure	33	88.7	91.6	91.6	89.9	81.6
	42.5	0.0	0.0	0.0	0.0	0.0
42.5 ppt Exposure	33	4.6	7.5	5.3	2.9	2.9
	42.5	0.0	0.0	0.0	0.0	0.0

Table 2-10. Long-Term High Salinity Toxicity Test Results Summary
Purple Urchin Embryo Developmental Endpoint
Second Trial – HIGH Salinity

Adult Treatment	Embryo Exposure Salinity (ppt)	Mean Prop. Normal	Proportion Normal per Replicate			
			1	*2*	*3*	*4*
Ambient Exposure	33	45.0	45.3	45.0	41.9	47.8
	44.5	0.0	0.0	0.0	0.0	0.0
44.5 ppt Exposure	33	0.8	1.1	1.4	0.9	0.0
	44.5	0.0	0.0	0.0	0.0	0.0

2.3.4.3 Trial 3 Post-Exposure Embryo Development and Fertilization

Purple urchins from the mid-salinity and high salinity exposure periods were collected and used for assessing embryo development under the four scenarios described in Section 2.2.3.2. Results of these bioassays are presented in Tables 2-11 and 2-12. Significant effects were observed with embryos from adults collected from the elevated salinity chamber after both the mid-salinity (41 ppt) and high salinity (44.5 ppt) exposure periods. There was *not* a statistically significant reduction in the normal development rate observed with the ambient salinity bioassays performed with embryos from the adult urchins exposed during the mid-salinity (41 ppt) exposure period. Based on the results observed for embryos from adults exposed to the higher mid-salinity level from Trial 2 (42.5 ppt), it appears that the adult exposure threshold for ensuring recovery of urchin embryos discharged to ambient seawater is 41 or 42 ppt.

Fertilization potential for gametes collected from urchins exposed during the mid-salinity exposure period (41 ppt) was also evaluated. The fertilization results are presented in Table 2-13. Fertilization rates were not affected when tested with either ambient or similarly elevated salinity (41 ppt) levels. This single fertilization assessment bioassay seems to indicate that the purple urchin fertilization process is substantially more tolerant to elevated salinity exposures than the post-fertilization embryo development process. Budget constraints did not allow for additional fertilization testing or for contracting a biologist qualified to perform an evaluation of the possible effects on gametogenesis.

Table 2-11. Long-Term High Salinity Toxicity Test Results Summary
Purple Urchin Developmental Endpoint
Third Trial – MID Salinity

Adult Treatment	Embryo Exposure Salinity (ppt)	Mean Prop. Normal	Proportion Normal per Replicate				
			1	*2*	*3*	*4*	*5*
Ambient Exposure	33	92.8	96.9	92.9	87.7	95.7	90.8
	41	25.6	19.7	15.7	40.0	2.8	49.7
41 ppt Exposure	33	86.9	86.2	91.4	88.4	76.7	91.8
	41	0.0	0.0	0.0	0.0	0.0	0.0

Table 2-12. Long-Term High Salinity Toxicity Test Results Summary
Purple Urchin Embryo Developmental Endpoint
Third Trial – HIGH Salinity

Adult Treatment	Embryo Exposure Salinity (ppt)	Mean Prop. Normal	Proportion Normal per Replicate				
			1	*2*	*3*	*4*	*5*
Ambient Exposure	33	23.2	28.6	18.8	28.1	27.8	12.9
	44.5	0.0	0.0	0.0	0.0	0.0	0.0
44.5 ppt Exposure	33	0.0	0.0	0.0	0.0	0.0	0.0
	44.5	0.0	0.0	0.0	0.0	0.0	0.0

Table 2-13. Long-Term High Salinity Toxicity Test Results Summary
Purple Urchin Fertilization Endpoint
Third Trial – MID Salinity

Adult Treatment	Embryo Exposure Salinity (ppt)	Mean Prop. Normal	Proportion Normal per Replicate				
			1	*2*	*3*	*4*	*5*
Ambient Exposure	33	93.6	97.3	95.1	94.6	84.0	97.0
	41	82.3	81.5	82.9	84.2	76.6	86.4
44.5 ppt Exposure	33	92.0	100	89.6	100	95.7	74.6
	41	88.6	86.5	96.3	90.8	82.6	86.5

3.0 CONCLUSIONS

The results of the HSS Study are summarized in Table 3-1. In general, the mesocosm component of the study demonstrated that most organisms that have matured past larval stages of development, especially those indigenous to the DDF discharge environment, are tolerant of long-term exposure to salinities at least as high as 47.5 ppt. The only exceptions were purple urchins and red abalone.that showed tolerance of long-term exposures as high as 42.5 ppt. The long-term mesocosm tolerances were greater than those observed with the short-term WET component of the study. The 'no effects levels' established by the WET chronic toxicity bioassays were 41 ppt for the most sensitive soft-bottom organism (mysid shrimp), and 36 ppt for the most sensitive hard-bottom organism (purple urchin).

Long-term exposure of adult purple urchins and mussels above 41 ppt did not result in improved embryo-development sensitivity in elevated *or* ambient salinities. However, embryos developed normally in *ambient* seawater after the adults were exposed at the 41 ppt salinity level. Additionally, the single post-exposure gamete fertilization bioassay performed, showed that purple urchin fertilization rates were not affected for gametes (i.e. pre-embryo eggs and sperm) from adults exposed to ambient or mid-salinity (41 ppt) waters when the gametes were subsequently exposed to ambient *or* 41 ppt salinities.

Table 3-1. High Salinity Sensitivity Study Summary

Study Component	Observed Salinity Thresholds		Other Significant Findings
	Soft-Bottom Organisms	Hard-Bottom Organisms	
Short-Term WET (**chronic** toxicity)	41 ppt	36 ppt	• No significant effect on urchin embryo development rates in ambient seawater when adults are first exposed to 41 ppt salinities. • Fertilization rate not effected at 41 ppt regardless of whether adults are previously exposed to this salinity. • Acute toxicity threshold observed with the WET study component = 45 ppt, which was observed with the mysid shrimp.
Long-Term Mesocosm	47.5 ppt	42.5 ppt*	

* Mortality effect

4.0 REFERENCES

USEPA 1995. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, 1st Edition. EPA-600/R-95/136. August 1995.

USEPA 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, 5th Edition. EPA-821/R-02/012. October 2002.

USEPA 2002a. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, 4rd Edition. EPA-821/R-02/013. October 2002.

USEPA 2002b. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, 3rd Edition. EPA-821/R-02/014.October 2002.

Voutchkov, NS 2007. *Novel Method for Assessing Salinity Tolerance of Marine Organisms*. Environmental Engineer: Applied Research and Practice. Vol. 3, Summer 2007.

APPENDIX A

SHORT-TERM EXPOSURE ASSESSMENT: PHASE I

Americamysis bahia Chronic Toxicity Test

Test: MS-Mysid Survival, Growth and Fecundity Test — Test ID: C110207.01
Species: AB-Americamysis bahia — Protocol: EPAMW02-EPA/821/R-02-014
Sample ID: West Basin Brine — Sample Type: EFF2-Industrial
Start Date: 2/8/2011 17:00 — End Date: 2/15/2011 15:06 — Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(g	Wgt Count	Female Co	Females w/ Eggs	Notes
	1	1	Control	5	5	5	5	5	5	5	5	75.52	73.71	5			
	2	2	Control	5	5	5	5	5	5	5	5	78.85	77.01	5			
	3	3	Control	5	5	5	5	5	5	5	5	68.07	66.38	5			
	4	4	Control	5	5	5	5	5	5	5	5	80.22	78.51	5			
	5	5	Control	5	5	5	5	5	5	5	5	66.2	64.58	5			
	6	6	Control	5	5	5	5	5	5	5	5	70.9	69	5			
	7	7	Control	5	5	5	5	5	5	5	4	78.94	77.29	4			
	8	8	Control	5	5	5	5	5	5	5	5	63.09	61.45	5			
	9	1	33	5	5	5	5	5	5	5	5	70.5	68.55	5			
	10	2	33	5	5	5	5	5	5	5	5	97.05	94.86	5			
	11	3	33	5	5	5	5	5	5	5	5	75.27	73.45	5			
	12	4	33	5	5	5	5	5	5	5	5	105.42	103.49	5			
	13	5	33	5	5	5	5	5	5	5	5	68.94	67.29	5			
	14	6	33	5	5	5	5	5	5	5	4	108.55	106.75	4			
	15	7	33	5	5	5	5	5	5	5	5	83	81.01	5			
	16	8	33	5	5	5	5	5	5	5	5	96.33	94.47	5			
	17	1	42	5	5	4	4	4	3	3	3	97.4	95.98	3			
	18	2	42	5	5	5	5	5	5	5	5	79.35	77.55	5			
	19	3	42	5	5	5	5	5	5	5	5	91.07	89.43	5			
	20	4	42	5	5	4	4	4	4	4	4	97.81	96.47	4			
	21	5	42	5	5	5	5	5	5	5	5	99.09	97.19	5			
	22	6	42	5	5	5	5	5	5	5	5	87.8	86.01	5			
	23	7	42	5	5	4	4	4	4	4	4	90.68	88.84	4			
	24	8	42	5	5	5	5	5	5	5	4	87.59	85.76	4			
	25	1	51	5	0	0	0	0	0	0	0	0	0	0			
	26	2	51	5	0	0	0	0	0	0	0	0	0	0			
	27	3	51	5	0	0	0	0	0	0	0	0	0	0			
	28	4	51	5	0	0	0	0	0	0	0	0	0	0			
	29	5	51	5	0	0	0	0	0	0	0	0	0	0			
	30	6	51	5	0	0	0	0	0	0	0	0	0	0			
	31	7	51	5	0	0	0	0	0	0	0	0	0	0			
	32	8	51	5	0	0	0	0	0	0	0	0	0	0			
	33	1	60	5	0	0	0	0	0	0	0	0	0	0			
	34	2	60	5	0	0	0	0	0	0	0	0	0	0			
	35	3	60	5	0	0	0	0	0	0	0	0	0	0			
	36	4	60	5	0	0	0	0	0	0	0	0	0	0			
	37	5	60	5	0	0	0	0	0	0	0	0	0	0			
	38	6	60	5	0	0	0	0	0	0	0	0	0	0			

Test: MS-Mysid Survival, Growth and Fecundity Test — Test ID: C110207.01
Species: AB-Americamysis bahia — Protocol: EPAMW02-EPA/821/R-02-014
Sample ID: West Basin Brine — Sample Type: EFF2-Industrial
Start Date: 2/8/2011 17:00 — End Date: 2/15/2011 15:06 — Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(r	Wgt Count	Female Co	Females w/ Eggs	Notes
	39	7	60	5	0	0	0	0	0	0	0	0	0	0			
	40	8	60	5	0	0	0	0	0	0	0	0	0	0			
	41	1	70	5	0	0	0	0	0	0	0	0	0	0			
	42	2	70	5	0	0	0	0	0	0	0	0	0	0			
	43	3	70	5	0	0	0	0	0	0	0	0	0	0			
	44	4	70	5	0	0	0	0	0	0	0	0	0	0			
	45	5	70	5	0	0	0	0	0	0	0	0	0	0			
	46	6	70	5	0	0	0	0	0	0	0	0	0	0			
	47	7	70	5	0	0	0	0	0	0	0	0	0	0			
	48	8	70	5	0	0	0	0	0	0	0	0	0	0			

Comments:

Mysid Survival, Growth and Fecundity Test-7 Day Survival

Start Date:	2/8/2011 17:00	Test ID:	C110207.0127	Sample ID:	West Basin Brine
End Date:	2/15/2011 15:06	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAMW02-EPA/821/R-02-01	Test Species:	AB-Americamysis bahia
Comments:					

Conc-%	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000
33	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000	1.0000
42	0.6000	1.0000	1.0000	0.8000	1.0000	1.0000	0.8000	0.8000
51	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

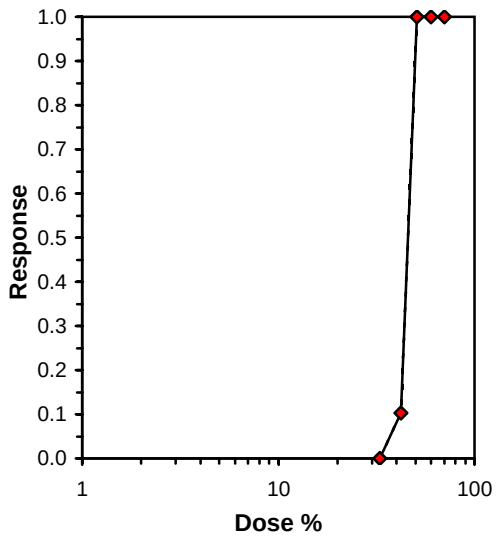
			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8			1	40
33	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8	68.00	49.00	1	40
42	0.8750	0.8974	1.1986	0.8861	1.3453	14.410	8	55.50	49.00	5	40
51	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40
60	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40
70	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.80605	0.916	-1.1599	1.40593
Bartlett's Test indicates equal variances (p = 0.09)	4.90246	9.21035		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test Treatments vs Control	42	51	46.2817	2.38095

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	45.260	44.325	46.215
5.0%	45.621	44.440	46.834
10.0%	45.771	43.989	47.625
20.0%	45.771	45.245	46.303
Auto-0.0%	45.260	44.325	46.215



Mysid Survival, Growth and Fecundity Test-7 Day Survival

Start Date:	2/8/2011 17:00	Test ID:	C110207.0127	Sample ID:	WEST BASIN
End Date:	2/15/2011 15:06	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	2/7/2011 13:00	Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:	For IC25 only				

Conc-ppt	1	2	3	4	5	6	7	8
Control - 32.4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000
33	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000	1.0000
42	0.6000	1.0000	1.0000	0.8000	1.0000	1.0000	0.8000	0.8000
51	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

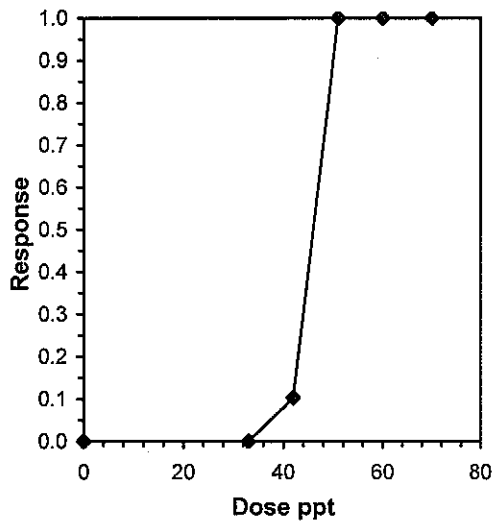
			Transform: Arcsin Square Root					Rank	1-Tailed	Isotonic	
Conc-ppt	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control - 32.4	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8			0.9750	1.0000
33	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8	68.00	49.00	0.9750	1.0000
42	0.8750	0.8974	1.1986	0.8861	1.3453	14.410	8	55.50	49.00	0.8750	0.8974
51	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			0.0000	0.0000
60	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			0.0000	0.0000
70	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.80605	0.884	-1.1599	1.40593
Bartlett's Test indicates equal variances (p = 0.09)	4.90246	9.21034		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	42	51	46.2817	

Linear Interpolation (200 Resamples)

Point	ppt	SD	95% CL		Skew
IC05	37.388	3.409	32.175	42.335	-1.6691
IC10	41.775	1.960	36.854	42.791	-0.9014
IC15	42.476	0.989	39.409	43.247	-1.9678
IC20	42.977	0.540	41.545	43.703	-1.6888
IC25	43.479	0.431	42.449	44.159	-0.6039
IC40	44.983	0.345	44.159	45.527	-0.6039
IC50	45.986	0.287	45.299	46.439	-0.6039



Test: MS-Mysid Survival, Growth and Fecundity Test
Species: AB-Americamysis bahia
Sample ID: WEST BASIN
Start Date: 2/8/2011 17:00 End Date: 2/15/2011 15:06

Test ID: C110207.01
Protocol: EPAM 02-EPA Marine
Sample Type: DMR-Discharge Monitoring Report
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	1	1	Control - 32.4	5							5						
	2	2	Control - 32.4	5							5						
	3	3	Control - 32.4	5							5						
	4	4	Control - 32.4	5							5						
	5	5	Control - 32.4	5							5						
	6	6	Control - 32.4	5							5						
	7	7	Control - 32.4	5							4						
	8	8	Control - 32.4	5							5						
	9	1	33.000	5							5						
	10	2	33.000	5							5						
	11	3	33.000	5							5						
	12	4	33.000	5							5						
	13	5	33.000	5							5						
	14	6	33.000	5							4						
	15	7	33.000	5							5						
	16	8	33.000	5							5						
	17	1	42.000	5							3						
	18	2	42.000	5							5						
	19	3	42.000	5							5						
	20	4	42.000	5							4						
	21	5	42.000	5							5						
	22	6	42.000	5							5						
	23	7	42.000	5							4						
	24	8	42.000	5							4						
	25	1	51.000	5							0						
	26	2	51.000	5							0						
	27	3	51.000	5							0						
	28	4	51.000	5							0						
	29	5	51.000	5							0						
	30	6	51.000	5							0						
	31	7	51.000	5							0						
	32	8	51.000	5							0						
	33	1	60.000	5							0						
	34	2	60.000	5							0						
	35	3	60.000	5							0						
	36	4	60.000	5							0						
	37	5	60.000	5							0						
	38	6	60.000	5							0						

Test: MS-Mysid Survival, Growth and Fecundity Test
Species: AB-Americamysis bahia
Sample ID: WEST BASIN
Start Date: 2/8/2011 17:00 End Date: 2/15/2011 15:06

Test ID: C110207.01
Protocol: EPAM 02-EPA Marine
Sample Type: DMR-Discharge Monitoring Report
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	39	7	60.000	5							0						
	40	8	60.000	5							0						
	41	1	70.000	5							0						
	42	2	70.000	5							0						
	43	3	70.000	5							0						
	44	4	70.000	5							0						
	45	5	70.000	5							0						
	46	6	70.000	5							0						
	47	7	70.000	5							0						
	48	8	70.000	5							0						

Comments:

Mysid Survival, Growth and Fecundity Test-Growth-Weight

Start Date:	2/8/2011 17:00	Test ID:	C110207.0127	Sample ID:	West Basin Brine
End Date:	2/15/2011 15:06	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAMW02-EPA/821/R-02-01	Test Species:	AB-Americamysis bahia
Comments:					

Conc-%	1	2	3	4	5	6	7	8
Control	0.3620	0.3680	0.3380	0.3420	0.3240	0.3800	0.4125	0.3280
33	0.3900	0.4380	0.3640	0.3860	0.3300	0.4500	0.3980	0.3720
42	0.4733	0.3600	0.3280	0.3350	0.3800	0.3580	0.4600	0.4575

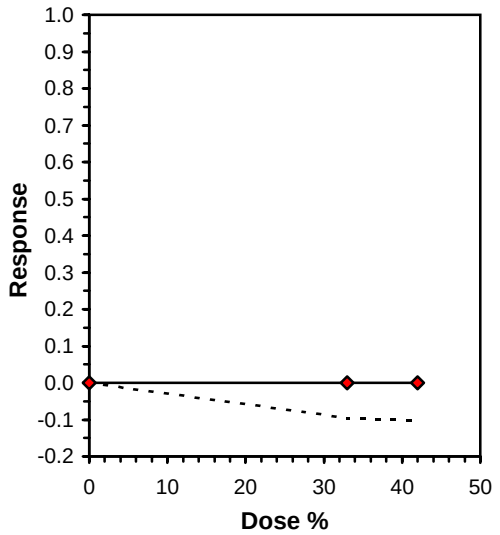
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3568	1.0000	0.3568	0.3240	0.4125	8.388	8				0.3806	1.0000
33	0.3910	1.0958	0.3910	0.3300	0.4500	9.941	8	-1.529	2.024	0.0453	0.3806	1.0000
42	0.3940	1.1042	0.3940	0.3280	0.4733	15.219	8	-1.662	2.024	0.0453	0.3806	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93954	0.916	0.38656	-0.8548
Bartlett's Test indicates equal variances (p = 0.19)	3.27866	9.21035		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	42	>42		2.38095	0.04527	0.12688	0.00341	0.002	0.20591	2, 21

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>42			
IC10	>42			
IC15	>42			
IC20	>42			
IC25	>42			
IC40	>42			
IC50	>42			



Mysid Survival, Growth and Fecundity Test-Biomass

Start Date:	2/8/2011 17:00	Test ID:	C110207.0127	Sample ID:	West Basin Brine
End Date:	2/15/2011 15:06	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAMW02-EPA/821/R-02-01	Test Species:	AB-Americamysis bahia
Comments:					

Conc-%	1	2	3	4	5	6	7	8
Control	0.3620	0.3680	0.3380	0.3420	0.3240	0.3800	0.3300	0.3280
33	0.3900	0.4380	0.3640	0.3860	0.3300	0.3600	0.3980	0.3720
42	0.2840	0.3600	0.3280	0.2680	0.3800	0.3580	0.3680	0.3660
51	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

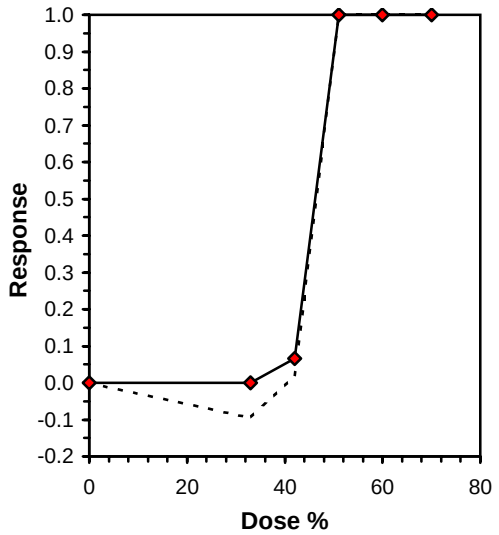
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3465	1.0000	0.3465	0.3240	0.3800	6.012	8				0.3631	1.0000
33	0.3798	1.0960	0.3798	0.3300	0.4380	8.353	8	-2.040	2.024	0.0330	0.3631	1.0000
42	0.3390	0.9784	0.3390	0.2680	0.3800	12.335	8	0.460	2.024	0.0330	0.3390	0.9336
51	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8				0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8				0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96771	0.916	-0.468	0.09779
Bartlett's Test indicates equal variances (p = 0.23)	2.98037	9.21035		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	42	51	46.2817	2.38095	0.033	0.09523	0.00376	0.00106	0.04732	2, 21

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC05	39.773	2.250	35.787	42.450	-0.2128
IC10	42.324	1.070	38.574	42.900	-2.1047
IC15	42.806	0.485	41.361	43.350	-2.4642
IC20	43.288	0.351	42.414	43.800	-0.7127
IC25	43.770	0.328	42.950	44.250	-0.6717
IC40	45.216	0.262	44.560	45.600	-0.6717
IC50	46.180	0.218	45.634	46.500	-0.6717



Test: ABA-Americamysis Acute | Test ID: C110207.01
Species: AB-Americamysis bahia | Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: West Basin Brine | Sample Type: EFF2-Industrial
Start Date: 2/8/2011 17:00 | End Date: 2/15/2011 15:06 | Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5	5	5	5	5	
	2	2	Control	5	5	5	5	5	
	3	3	Control	5	5	5	5	5	
	4	4	Control	5	5	5	5	5	
	5	5	Control	5	5	5	5	5	
	6	6	Control	5	5	5	5	5	
	7	7	Control	5	5	5	5	5	
	8	8	Control	5	5	5	5	5	
	9	1	33	5	5	5	5	5	
	10	2	33	5	5	5	5	5	
	11	3	33	5	5	5	5	5	
	12	4	33	5	5	5	5	5	
	13	5	33	5	5	5	5	5	
	14	6	33	5	5	5	5	5	
	15	7	33	5	5	5	5	5	
	16	8	33	5	5	5	5	5	
	17	1	42	5	5	4	4	4	
	18	2	42	5	5	5	5	5	
	19	3	42	5	5	5	5	5	
	20	4	42	5	5	4	4	4	
	21	5	42	5	5	5	5	5	
	22	6	42	5	5	5	5	5	
	23	7	42	5	5	4	4	4	
	24	8	42	5	5	5	5	5	
	25	1	51	5	0	0	0	0	
	26	2	51	5	0	0	0	0	
	27	3	51	5	0	0	0	0	
	28	4	51	5	0	0	0	0	
	29	5	51	5	0	0	0	0	
	30	6	51	5	0	0	0	0	
	31	7	51	5	0	0	0	0	
	32	8	51	5	0	0	0	0	
	33	1	60	5	0	0	0	0	
	34	2	60	5	0	0	0	0	
	35	3	60	5	0	0	0	0	
	36	4	60	5	0	0	0	0	
	37	5	60	5	0	0	0	0	
	38	6	60	5	0	0	0	0	
	39	7	60	5	0	0	0	0	
	40	8	60	5	0	0	0	0	
	41	1	70	5	0	0	0	0	
	42	2	70	5	0	0	0	0	
	43	3	70	5	0	0	0	0	
	44	4	70	5	0	0	0	0	
	45	5	70	5	0	0	0	0	
	46	6	70	5	0	0	0	0	
	47	7	70	5	0	0	0	0	
	48	8	70	5	0	0	0	0	

Comments:

Americamysis Acute-96 Hr Survival

Start Date:	2/8/2011 17:00	Test ID:	C110207.0127	Sample ID:	West Basin Brine
End Date:	2/15/2011 15:06	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	AB-Americamysis bahia
Comments:					

Conc-%	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
33	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
42	0.8000	1.0000	1.0000	0.8000	1.0000	1.0000	0.8000	1.0000
51	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

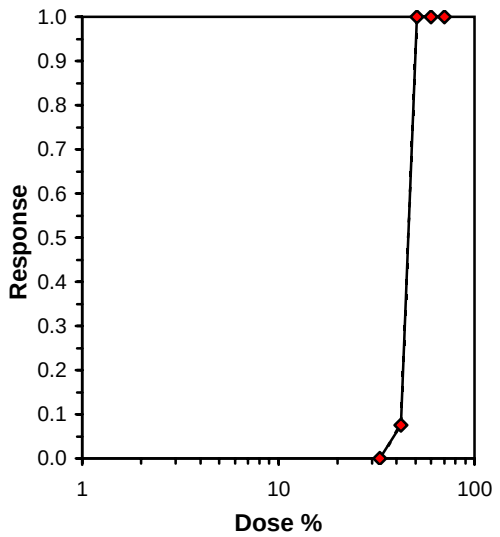
			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8			0	40
33	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	49.00	0	40
42	0.9250	0.9250	1.2560	1.1071	1.3453	9.813	8	56.00	49.00	3	40
51	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40
60	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40
70	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.721	0.916	-0.9552	1.29437
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	42	51	46.2817	2.38095
Treatments vs Control				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	45.532	44.714	46.365
5.0%	45.871	44.735	47.036
10.0%	45.919	45.487	46.355
20.0%	45.919	45.487	46.355
Auto-0.0%	45.532	44.714	46.365



WESTON SOLUTIONS

Americamysis bahia 7-Day Chronic Toxicity Test (with Fecundity)

BIO027

Client:	West Basin MWD
Project:	West Basin Municipal Water District Salinity Study
Client Sample ID:	West Basin Brine
Weston Test ID:	C110207.0127
Species:	*Americamysis bahia*

Date Received:	2/7/11
Date Test Started:	2/8/11
Date Test Ended:	2/15/11
Study Director:	A Margolis
# Organisms per Chamber:	5

	Conc. (ppt)	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 0	Control							1	7.0	1	27.1	6	32.4	2	8.2
Date: 2/8/11	33								7.3		26.9		32.8		8.0
Sample ID: C110207.01	42								7.2		26.2		41.6		7.9
Dilutions (Tech): JH	51								7.3		26.5		50.3		7.9
WQ* Time: 1600	60								7.5		26.5		59.3		7.8
Technician: AM/AA	70								7.6		26.4		69.4		~~7.96~~ 8.0 (1) AA
*performed on stock dilutions															
Day 1	Control	1	5.4	1	24.6	2	8.1	1	6.8	1	26.6	6	32.8	2	8.2
Date: 2/9/11	33		5.2		24.9		8.0		7.4		26.4		33.0		8.0
Sample ID: C110207.01	42		5.2		25.8		8.0		7.3		26.7		41.9		7.9
Dilutions (Tech): JH	51		5.2 AA		25.5		8.0		7.3		26.6		50.5		7.9
WQ Time: 1250/1415 Rep: 1/stock	60		5.2		25.4		8.0		—		—		—		—
Technician: AA/JH	70		5.1		26.0		8.0		—		—		—		—
Day 2	Control	1	5.4	1	25.1	4	8.0	1	6.3	1	26.8	6	32.5	4	8.2
Date: 2/10/11	33		5.6		26.0		7.9		7.5		27.2		33.3		7.9
Sample ID: C110207.01	42		5.2		26.3		7.9		7.5		26.5		41.8		7.9
Dilutions (Tech): AA	51		—		—		—		—		—		—		—
WQ Time: 1030/1345 Rep: 2/stock	60		—		—		—		—		—		—		—
Technician: AA/AA	70		—		—		—		—		—		—		—
Day 3	Control	2	7.0	2	24.5	2	8.2	2	7.3	2	27.1	5	32.8	2	8.2
Date: 2/11/11	33		6.2		24.9		8.1		8.5		27.1		33.2		7.9
Sample ID: C110207.01	42		6.1		26.0		8.1		8.2		26.8		42.1		7.9
Dilutions (Tech): JH															
WQ Time: 1030/1110 Rep: 3/stock															
Technician: AA/JH															

Start Time:	1700	Initials: KS	
End Time:	1506	Initials: SH	
Organism Batch:	ABS8151	Age: 7 days	
Organism Supplier:	Aquatic Biosystems		
Hobo Temp No.:	778892		

Dilution Water Batch:	S100F12811 (3)
Location:	Rm 4
Test Acceptability:	☑ ≥80% Survival in control
	☐ ≥ 0.20 mg mean dry weight / organism in control
	☐ ~~Eggs in ≥50% of Females in Controls~~

(0) IE 2/8/11 AA (2) IE 2/9/11 AA (3) IE 4/15/11 Cam

Americamysis bahia 7-Day Chronic Toxicity Test (with Fecundity)

Weston Test ID:	Client:	Client Sample ID:
C110207.0127	West Basin MWD	West Basin Brine

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 4	Control	2	6.2	2	25.2	4	8.1	2	7.1	2	26.4	6	32.6	4	8.2
Date: 2/12/11	33		6.3		25.8		8.1		7.2		26.4		33.2		8.0
Sample ID: C110207.01	42		6.3		26.1		8.0		7.3		26.0		42.2		7.9
Dilutions (Tech): SH															
WQ Time: 1259/1304 Rep: 4/stock															
Technician: SH/SH															
Day 5	Control	1	6.9	1	26.3	4	8.0	1	8.3	1	24.7	5	32.7	4	8.0
Date: 2/13/11	33		7.4		26.2		7.9		9.5		24.9	①SH 4	33.4		7.8
Sample ID:	42		6.9		26.2		7.9		8.4		24.6		42.4		7.7
Dilutions (Tech): SH ①SH															
WQ Time: 1250/1258 Rep: 4/stock															
Technician: SH/SH 5															
Day 6	Control	2	6.3	2	25.1	2	8.1	2	7.1	2	26.3	6	32.4	2	~~8.8~~ 8.1
Date: 2/14/11	33		6.0		25.9		8.0		8.1		26.1		33.2		①AA 7.9
Sample ID:	42		5.8		26.3		~~8.0~~ 7.9 ①AA		8.1		~~26.2~~ 26.6 ①AA		42.2		7.9
Dilutions (Tech): KC/AA															
WQ Time: 1020/1140 Rep: 6/stock															
Technician: AA/AA															
Day 7	Control	2	6.3	2	25.0	4	7.9					6	32.8		
	33		6.3		25.3		7.9						33.3		
Date: 2/15/11	42		6.2		25.3		7.9						42.5		
WQ Time: 0920 Rep: 7															
Technician: KC															

Feeding Information*	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
AM Feed (Tech):		JH	JH	JH	SH	SH	JH	SH
PM Feed (Tech):	KS	JH	AA	JH	SH	SH	JH	

*Mysids should get fed 150 *Artemia* per mysid per day (375 *Artemia* per test chamber twice daily).

① 2/13/11 IE SH
① 2/13/11 IE SH
① 2/14/11 IE AA
① 2/14/11 1W AA
① 2/14/11 1W AA

WESTON SOLUTIONS

Americamysis bahia 7-Day Chronic Toxicity Test (with Fecundity)

BIO027

Weston Test ID:	Client:	Client Sample ID:
C110207.0127	West Basin MWD	West Basin Brine

Survival Data

Concentration (%)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 2/9/11	Date: 2/10/11	Date: 2/11/11	Date: 2/12/11	Date: 2/13/11	Date: 2/14/11	Date: 2/15/11
		Renewal Time: 1600	Renewal Time: 1317	Renewal Time: 1225	Renewal Time: 1308	Renewal Time: 1404	Renewal Time: 1352	End Time: 1506
		Tech: SH	Tech: SH	Tech: JH	Tech: SH	Tech: SH	Tech: KS	Tech: SH
Control	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	5	4 (INB)
	8	5	5	5	5	5	5	5
33	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	4 (INB)
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
42	1	5	4 (INB)	4	4	3 (INB)	3	3
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	4 (INB)	4	4	4	4	4
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	4 (INB)	4	4	4	4	4
	8	5	5	5	5	5	5	4 (INB)
51	1	0 (5)						
	2	0 (5)						
	3	0 (5)						
	4	0 (5)						
	5	0 (5)						
	6	0 (5)						
	7	0 (5)						
	8	0 (5)						
60	1	0 (5)						
	2	0 (5)						
	3	0 (5)						
	4	0 (5)						
	5	0 (5)						
	6	0 (5)						
	7	0 (5)						
	8	0 (5)						
70	1	0 (5)						
	2	0 (5)						
	3	0 (5)						
	4	0 (5)						
	5	0 (5)						
	6	0 (5)						
	7	0 (5)						
	8	0 (5)						

WESTON SOLUTIONS

Americamysis bahia 7-Day Chronic Toxicity Test (with Fecundity)

BIO027

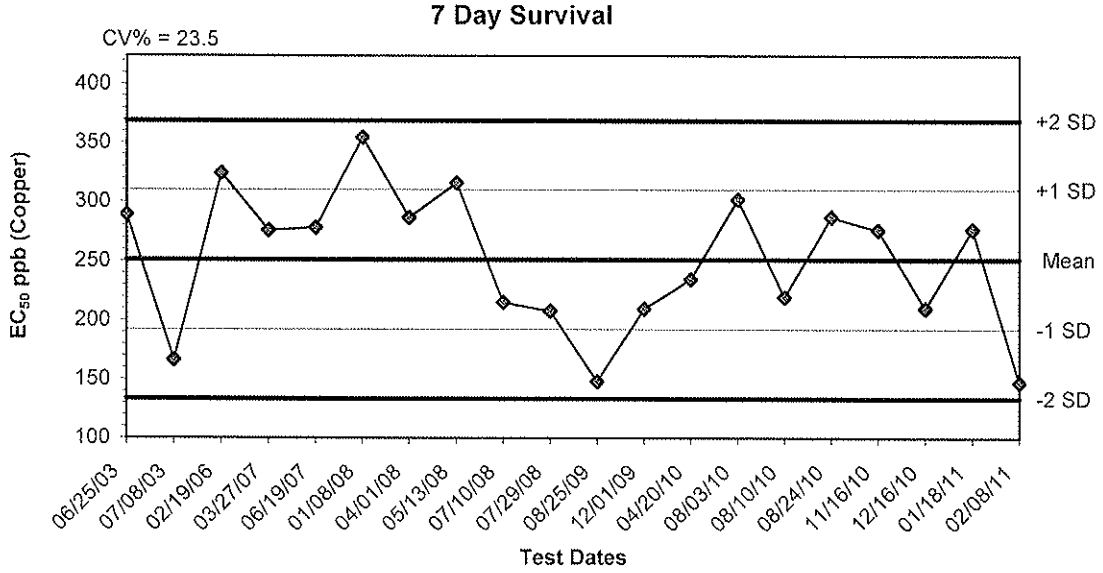
Weston Test ID:	Client:	Client Sample ID:
C110207.0127	West Basin MWD	West Basin Brine

Concentration (%)	Replicate	Boat Number	Weight Empty Boat (mg)	Weight Boat & Animals (mg)
Control	1	1	73.71	75.52
	2	2	77.01	78.85
	3	3	66.38	68.07
	4	4	78.51	80.22
	5	5	64.58	66.20
	6	6	69.00	70.90
	7	7	77.29	78.94
	8	8	61.45	63.09
33	1	9	68.55	70.$50 JH
	2	10	94.86	97.05
	3	11	73.45	75.27
	4	12	103.49	105.42
	5	13	67.29	68.94
	6	14	106.75	108.55
	7	15	81.01	83.00
	8	16	94.47	96.33
42	1	17	95.98	97.40
	2	18	77.55	79.35
	3	19	89.43	91.07
	4	20	96.47	97.81
	5	21	97.19	99.09
	6	22	86.01	87.80
	7	23	88.84	90.68
	8	24	85.76	87.59
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
		Date:	2/15/11	2/16/11
		Time:	1100	1355
		Technician:	KC	JH

Oven temp. (°C) at start of drying:	74 °C	Date/Time:	2/15/11 1540	Tech:	SH
Oven temp. (°C) at end of drying:	76 °C	Date/Time:	2/16/11 1030	Tech:	AM

DMR 2/16/11 JH

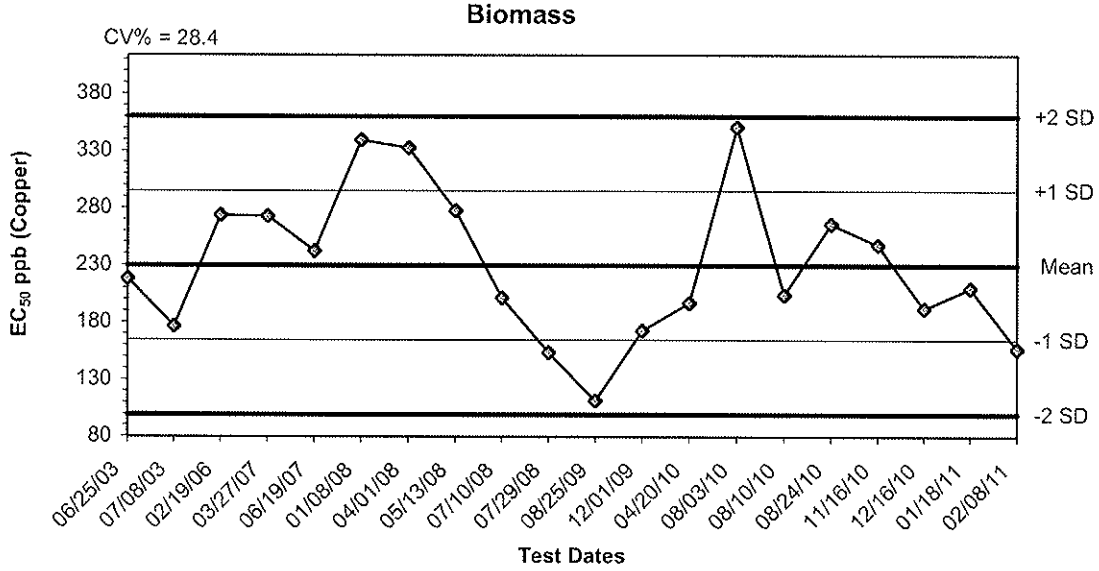
Americamysis bahia Reference Toxicant Control Chart: 7 Day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
06/25/03	289.2800	251.1306	192.2304	133.3302	310.0307	368.9309
07/08/03	166.2670	251.1306	192.2304	133.3302	310.0307	368.9309
02/19/06	324.1760	251.1306	192.2304	133.3302	310.0307	368.9309
03/27/07	275.8930	251.1306	192.2304	133.3302	310.0307	368.9309
06/19/07	278.0670	251.1306	192.2304	133.3302	310.0307	368.9309
01/08/08	354.3570	251.1306	192.2304	133.3302	310.0307	368.9309
04/01/08	286.3690	251.1306	192.2304	133.3302	310.0307	368.9309
05/13/08	315.9490	251.1306	192.2304	133.3302	310.0307	368.9309
07/10/08	215.1120	251.1306	192.2304	133.3302	310.0307	368.9309
07/29/08	207.6650	251.1306	192.2304	133.3302	310.0307	368.9309
08/25/09	147.8750	251.1306	192.2304	133.3302	310.0307	368.9309
12/01/09	209.5570	251.1306	192.2304	133.3302	310.0307	368.9309
04/20/10	234.4900	251.1306	192.2304	133.3302	310.0307	368.9309
08/03/10	301.7830	251.1306	192.2304	133.3302	310.0307	368.9309
08/10/10	219.4300	251.1306	192.2304	133.3302	310.0307	368.9309
08/24/10	286.9300	251.1306	192.2304	133.3302	310.0307	368.9309
11/16/10	275.8600	251.1306	192.2304	133.3302	310.0307	368.9309
12/16/10	209.9400	251.1306	192.2304	133.3302	310.0307	368.9309
01/18/11	276.5280	251.1306	192.2304	133.3302	310.0307	368.9309
02/08/11	147.0830	251.1306	192.2304	133.3302	310.0307	368.9309

Updated 3/30/11 JH

Americamysis bahia Reference Toxicant Control Chart: Biomass



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
06/25/03	218.0500	229.6702	164.3915	99.1128	294.9489	360.2276
07/08/03	176.4800	229.6702	164.3915	99.1128	294.9489	360.2276
02/19/06	273.5800	229.6702	164.3915	99.1128	294.9489	360.2276
03/27/07	272.7600	229.6702	164.3915	99.1128	294.9489	360.2276
06/19/07	242.1800	229.6702	164.3915	99.1128	294.9489	360.2276
01/08/08	339.3600	229.6702	164.3915	99.1128	294.9489	360.2276
04/01/08	332.4600	229.6702	164.3915	99.1128	294.9489	360.2276
05/13/08	277.4300	229.6702	164.3915	99.1128	294.9489	360.2276
07/10/08	201.3000	229.6702	164.3915	99.1128	294.9489	360.2276
07/29/08	153.4400	229.6702	164.3915	99.1128	294.9489	360.2276
08/25/09	111.2400	229.6702	164.3915	99.1128	294.9489	360.2276
12/01/09	172.3700	229.6702	164.3915	99.1128	294.9489	360.2276
04/20/10	196.7400	229.6702	164.3915	99.1128	294.9489	360.2276
08/03/10	350.8100	229.6702	164.3915	99.1128	294.9489	360.2276
08/10/10	203.9600	229.6702	164.3915	99.1128	294.9489	360.2276
08/24/10	265.8200	229.6702	164.3915	99.1128	294.9489	360.2276
11/16/10	247.6400	229.6702	164.3915	99.1128	294.9489	360.2276
12/16/10	191.7500	229.6702	164.3915	99.1128	294.9489	360.2276
01/18/11	209.6140	229.6702	164.3915	99.1128	294.9489	360.2276
02/08/11	156.4200	229.6702	164.3915	99.1128	294.9489	360.2276

Updated 3/30/11 JH

Mysid Survival, Growth and Fecundity Test-7 Day Survival

Start Date:	2/8/2011 17:45	Test ID:	C100316.120	Sample ID:	REF-Ref Toxicant
End Date:	2/15/2011 15:47	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
62.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
125	0.2000	0.6000	0.8000	0.8000	1.0000	0.8000	0.6000	1.0000
250	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8			0	40
62.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8			0	40
*125	0.7250	0.7250	1.0310	0.4636	1.3453	27.892	8	68.00	48.00	0	40
*250	0.0250	0.0250	0.2553	0.2255	0.4636	32.981	8	44.00	48.00	11	40
500	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8	36.00	48.00	39	40
1000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40
										40	40

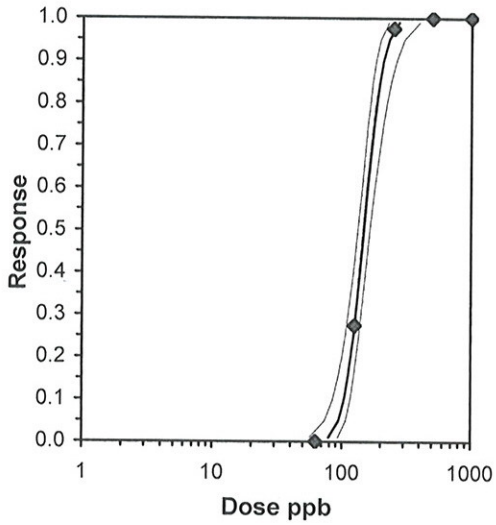
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.7004	0.904	-1.3875	8.68895
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	62.5	125	88.3883	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.58536	1.50671	5.63221	11.5385	0	0.03203	7.81473	1	2.16756	0.11648	3
Intercept	-13.609	3.24755	-19.975	-7.2441							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	78.8128	56.5889	93.7521
EC05	3.355	94.6183	74.1066	108.372
EC10	3.718	104.302	85.302	117.437
EC15	3.964	111.389	93.595	124.244
EC20	4.158	117.364	100.575	130.171
EC25	4.326	122.744	106.793	135.712
EC40	4.747	137.421	123.023	152.211
EC50	5.000	147.083	132.847	164.444
EC60	5.253	157.425	142.544	178.798
EC75	5.674	176.249	158.465	207.802
EC80	5.842	184.329	164.811	221.185
EC85	6.036	194.216	172.298	238.196
EC90	6.282	207.413	181.924	261.872
EC95	6.645	228.64	196.765	302.01
EC99	7.326	274.492	227.026	396.238



Mysid Survival, Growth and Fecundity Test-Biomass

Start Date:	2/8/2011 17:45	Test ID:	C100316.120	Sample ID:	REF-Ref Toxicant
End Date:	2/15/2011 15:47	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	0.3860	0.3200	0.3400	0.4740	0.2920	0.3900	0.4240	0.4060
62.5	0.5320	0.3920	0.4140	0.4300	0.4140	0.4040	0.3580	0.4560
125	0.0660	0.2280	0.3000	0.2800	0.3920	0.3200	0.2160	0.2700
250	0.0000	0.0000	0.0000	0.2260	0.0000	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

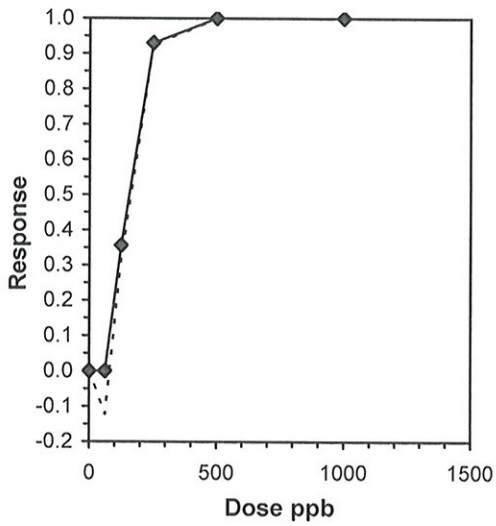
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3790	1.0000	0.3790	0.2920	0.4740	15.616	8				0.4020	1.0000
62.5	0.4250	1.1214	0.4250	0.3580	0.5320	12.160	8	-1.250	2.156	0.0793	0.4020	1.0000
*125	0.2590	0.6834	0.2590	0.0660	0.3920	36.835	8	3.261	2.156	0.0793	0.2590	0.6443
*250	0.0282	0.0745	0.0282	0.0000	0.2260	282.843	8	9.533	2.156	0.0793	0.0282	0.0703
500	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8				0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.92549	0.904	0.39121	2.52413
Bartlett's Test indicates equal variances (p = 0.39)	3.02829	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	62.5	125	88.3883		0.07932	0.20928	0.25184	0.00541	5.3E-11	3, 28

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL		Skew
IC05	71.28	3.55	67.88	76.44	-4.5834
IC10	80.07	4.88	74.72	90.38	2.2328
IC15	88.85	6.68	81.06	104.32	1.5769
IC20	97.64	8.43	87.74	118.26	1.0805
IC25	106.42	9.92	94.05	129.58	0.7489
IC40	134.64	12.63	112.98	157.80	0.0178
IC50	156.42	12.99	126.20	177.29	-0.5754



Mysid Survival, Growth and Fecundity Test-Growth-Weight

Start Date:	2/8/2011 17:45	Test ID:	C100316.120	Sample ID:	REF-Ref Toxicant
End Date:	2/15/2011 15:47	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

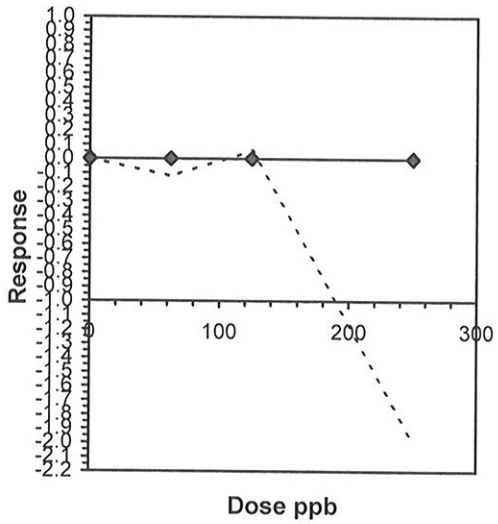
Conc-ppb	1	2	3	4	5	6	7	8
Control	0.3860	0.3200	0.3400	0.4740	0.2920	0.3900	0.4240	0.4060
62.5	0.5320	0.3920	0.4140	0.4300	0.4140	0.4040	0.3580	0.4560
125	0.3300	0.3800	0.3750	0.3500	0.3920	0.4000	0.3600	0.2700
250	1.1300							

			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3790	1.0000	0.3790	0.2920	0.4740	15.616	8				0.5728	1.0000
62.5	0.4250	1.1214	0.4250	0.3580	0.5320	12.160	8	-1.790	2.024	0.0520	0.5728	1.0000
125	0.3571	0.9423	0.3571	0.2700	0.4000	11.730	8	0.851	2.024	0.0520	0.5728	1.0000
250	1.1300	2.9815	1.1300	1.1300	1.1300	0.000	1				0.5728	1.0000

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.97039		0.884		0.16417	0.19947
Bartlett's Test indicates equal variances (p = 0.68)					0.77173		9.21034			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test	125	>125			0.05203	0.13729	0.0096	0.00264	0.04415	2, 21

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)	Skew
IC05	>250			
IC10	>250			
IC15	>250			
IC20	>250			
IC25	>250			
IC40	>250			
IC50	>250			



Test: MS-Mysid Survival, Growth and Fecundity Test
Species: AB-Americamysis bahia
Sample ID: REF-Ref Toxicant
Start Date: 2/8/2011 17:45 End Date: 2/15/2011 15:47

Test ID: C100316.12 D
Protocol: EPAM 02-EPA Marine
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	1	1	Control	5							5	71.88	69.95	5			
	2	2	Control	5							5	77.09	75.49	5			
	3	3	Control	5							5	71.36	69.66	5			
	4	4	Control	5							5	79.32	76.95	5			
	5	5	Control	5							5	73.1	71.64	5			
	6	6	Control	5							5	79.17	77.22	5			
	7	7	Control	5							5	71.14	69.02	5			
	8	8	Control	5							5	76.77	74.74	5			
	9	1	62.500	5							5	80.57	77.91	5			
	10	2	62.500	5							5	83.1	81.14	5			
	11	3	62.500	5							5	76.15	74.08	5			
	12	4	62.500	5							5	78.48	76.33	5			
	13	5	62.500	5							5	79.88	77.81	5			
	14	6	62.500	5							5	64.15	62.13	5			
	15	7	62.500	5							5	70.05	68.26	5			
	16	8	62.500	5							5	76.69	74.41	5			
	17	1	125.000	5							1	61.51	61.18	1			
	18	2	125.000	5							3	71.04	69.9	3			
	19	3	125.000	5							4	64.34	62.84	4			
	20	4	125.000	5							4	67.22	65.82	4			
	21	5	125.000	5							5	71.93	69.97	5			
	22	6	125.000	5							4	77.63	76.03	4			
	23	7	125.000	5							3	82.45	81.37	3			
	24	8	125.000	5							5	75.84	74.49	5			
	25	1	250.000	5							0			0			
	26	2	250.000	5							0			0			
	27	3	250.000	5							0			0			
	28	4	250.000	5							1	75.31	74.18	1			
	29	5	250.000	5							0			0			
	30	6	250.000	5							0			0			
	31	7	250.000	5							0			0			
	32	8	250.000	5							0			0			
	33	1	500.000	5							0			0			
	34	2	500.000	5							0			0			
	35	3	500.000	5							0			0			
	36	4	500.000	5							0			0			
	37	5	500.000	5							0			0			
	38	6	500.000	5							0			0			

Reviewed by:

Test: MS-Mysid Survival, Growth and Fecundity Test
Species: AB-Americamysis bahia
Sample ID: REF-Ref Toxicant
Start Date: 2/8/2011 17:45 End Date: 2/15/2011 15:47

Test ID: C100316.120
Protocol: EPAM 02-EPA Marine
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	39	7	500.000	5							0			0			
	40	8	500.000	5							0			0			
	41	1	1000.000	5							0			0			
	42	2	1000.000	5							0			0			
	43	3	1000.000	5							0			0			
	44	4	1000.000	5							0			0			
	45	5	1000.000	5							0			0			
	46	6	1000.000	5							0			0			
	47	7	1000.000	5							0			0			
	48	8	1000.000	5							0			0			

Comments:

Reviewed by:

WESTON SOLUTIONS

7 - Day *Americamysis bahia* Reference Toxicant Test

BIO027

Test ID: C100316.120	Associated Test(s): West Basin		Study Director: J. Hansen
Organism Batch: ABS 8151	Location: Room 4	Replicates: 8	No. of Organisms: 5
Start Time: 1745	Initials: JS	End Time: 1547	Initials: SH

Day 0 Water Quality Data

Stock

Date: 2/8/11 Time: 1610 Initials: AA

	Control	62.5	125	250	500	1000
D.O. (mg/L)	6.8	6.8	6.0	6.3	6.3	6.3
Temp. (°C)	26.8	26.6	26.6	26.6	26.6	26.6
Salinity (ppt)	32.4	32.3	32.3	32.3	32.3	32.3
pH	8.2	8.2	8.2	8.2	8.2	8.2

Day 7 Water Quality Data

Date: 2/15/11 Time: 0930 Replicate: 4 Initials: JC

	Control	62.5	125	250	500	1000
D.O. (mg/L)	6.1	6.0	6.1	6.4		
Temp. (°C)	24.7	25.0	25.4	25.1		
Salinity (ppt)	32.8	32.8	32.8	32.8		
pH	8.0	8.0	8.0	8.0		

Feeding Information

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
AM Feed (Tech):		JH	JH	JH	SH	SH	JH	SH
PM Feed (Tech):	YB	JH	AA.	JH	SH	SH	JH	

☑ **Pass** ☐ **Fail**

Notes:

Reference Toxicant Dilution Worksheet

Test ID: C100316.120	Toxicant: Copper Sulfate (0.509gCu/LCuSO4)	Toxicant Lot Number: 1907619	Toxicant Stock Preparation Date: ~~JH 10/8/10~~ 2/8/11

Serial Dilute by ½ to obtain concentrations of 1000, 500, 250, 125, and 62.5 ppb.

Date Prepared	Day	Target Conc.	A. Toxicant (target) B. Toxicant (actual)	A. Diluent (target) B. Diluent (actual)	Dilution Water Batch	Tech.
2/8/11	0	1000 ppb	(A) 7.864 mL (B) 7.8640 mL	(A) 4000 mL (B) 4000.0mL	S10012811	JH
2/9/11	1	1000 ppb	(A) 3.932 mL (B) 3.9324 mL	(A) 2000 mL (B) 2000.0 mL	S10012811	JH
2/10/11	2	1000 ppb	(A) 7.864 ml (B) 7.8644 ml	(A) 4000 ml (B) 4000.0	S10012811	SH
2/11/11	3	250 ppb	(A) 0.983 mL (B) 0.9834 mL	(A) 2000 mL (B) 2000.0 mL	S10012811	JH
2/12/11	4	250 ppb	(A) 0.983 ml (B) 0.9833	(A) 2000 ml (B) 2000.0	S10012811	SH
2/13/11	5	250 ppb	(A) 0.983 ml (B) 0.9834 ml	(A) 2000 ml (B) 2000.0 ml	S10012811	SH
2/14/11	6	250 ppb	(A) 0.983 ml (B) 0.9831 ml	(A) 2000 ml (B) 2000.0 ml	S10012811	SH

① Not enough stock left to make dilutions; made up new stock 2/8/11 JH

WESTON SOLUTIONS

7 - Day *Americamysis bahia* Reference Toxicant Test

BIO027

SURVIVAL DATA

Test ID: C100316.120

Conc. (ppb)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 2/9/11	Date: 2/10/11	Date: 2/11/11	Date: 2/12/11	Date: 2/13/11	Date: 2/14/11	Date: 2/15/11
		Renewal Time: 1625	Renewal Time: 1537	Renewal Time: 1235	Renewal Time: 1326	Renewal Time: 1347	Renewal Time: 1415	End Time: 1547
		Tech: SH	Tech: SH	Tech: JH	Tech: SH	Tech: JA	Tech: KS	Tech: SH
Control	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
62.5	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
125	1	2(2)(INB)	2	1(1)	1	1	1	1
	2	4(1)	3(INB)	3	3	3	3	3
	3	5	5	4(INB)	4	4	4	4
	4	4(INB)	4	4	4	4	4	4
	5	5	5	5	5	5	5	5
	6	5	5	5	5	4(INB)	4	4
	7	5	5	3(2)	3	3	3	3
	8	5	5	5	5	5	5	5
250	1	Ø(5)						
	2	Ø(5)						
	3	Ø(5)						
	4	1(4)	1	1	1	1	1	1
	5	Ø(5)						
	6	1(4)	1	1	1	1	Ø(1)	
	7	Ø(5)						
	8	Ø(5)						
500	1	1(4)	Ø(1)					
	2	Ø(5)						
	3	1(4)	Ø(1)					
	4	Ø(5)						
	5	Ø(5)						
	6	2(3)	Ø(2)					
	7	Ø(5)						
	8	Ø(5)						
1000	1	1(4)	Ø(1)					
	2	Ø(5)						
	3	Ø(5)						
	4	Ø(5)						
	5	Ø(5)						
	6	2(3)	Ø(2)					
	7	Ø(6)						
	8	Ø(6)						

WESTON SOLUTIONS

7 - Day *Americamysis bahia* Reference Toxicant Test

BIO027

Test ID: c100316.120

Concentration (ppb)	Rep	Weigh Boat Number	Tare Weight (mg)	Total Weight (mg)
Control	1	1	69.95	71.88
	2	2	75.49	77.09
	3	3	69.66	71.36
	4	4	76.95	79.32
	5	5	71.64	73.10
	6	6	77.22	79.17
	7	7	69.02	71.14
	8	8	74.74	76.77
62.5	1	9	77.91	80.57
	2	10	81.14	83.10
	3	11	74.08	76.15
	4	12	76.33	78.48
	5	13	77.81	79.88
	6	14	62.13	64.15
	7	15	68.26	70.05
	8	16	74.41	76.~~44~~69 ③JH
125	1	17	61.18	61.51
	2	18	69.90	71.04
	3	19	62.84	64.34
	4	20	65.82	67.22
	5	21	KC ②~~70~~. 69.97	71.93
	6	22	76.03	77.63
	7	23	81.37	82.45
	8	24	74.49	75.84
250	1	—	—	—
	2	—	—	—
	3	—	—	—
	4	25	74.18	75.31
	5	—	—	—
	6	~~26~~ KC①	—	—
	7	—	—	—
	8	—	—	—
500	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
1000	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
		Date:	2/15/11	2/16/11
		Time:	1600	1545
		Initials:	KC	JH

① IE 2/15/11 KC
② IE 2/15/11 KC
③ MR 2/16/11 JH

Macrocystis pyrifera Chronic Toxicity Test

Test: MC-Macrocystis Germination and Growth Test | Test ID: C110207.01
Species: MP-Macrocystis pyrifera | Protocol: EPAW 95-EPA/600/R-95/136
Sample ID: West Basin Brine | Sample Type: EFF2-Industrial
Start Date: 2/8/2011 16:00 | End Date: 2/10/2011 14:15 | Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Total Cour	Number G	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	1	1	Control	100	89	7	4	5	5	7	4	5	5	5	5	2.5	
	2	2	Control	100	88	5	5	5	4	5	3	7	4	5	6	2.5	
	3	3	Control	100	92	6	3	6	5	7	5	4	5	5	4	2.5	
	4	4	Control	100	93	5	4	6	7	5	6	5	5	5	6	2.5	
	5	5	Control	100	86	5	7	8	5	4	4	6	5	6	5	2.5	
	6	1	33	100	86	5	4	5	6	5	5	6	8	5	4	2.5	
	7	2	33	100	92	5	6	5	4	5	4	4	5	4	5	2.5	
	8	3	33	100	93	8	6	5	4	4	6	5	3	7	5	2.5	
	9	4	33	100	93	6	4	5	5	7	4	5	6	5	4	2.5	
	10	5	33	100	90	6	5	5	7	5	7	6	5	6	5	2.5	
	11	1	42	100	85	5	4	5	6	7	5	5	4	6	6	2.5	
	12	2	42	100	88	5	5	5	6	5	5	6	5	5	6	2.5	
	13	3	42	100	87	5	5	5	4	6	6	5	6	4	6	2.5	
	14	4	42	100	86	5	4	6	6	5	5	5	5	4	4	2.5	
	15	5	42	100	73	5	4	5	5	4	3	6	5	5	5	2.5	
	16	1	51	100	75	4	5	3	4	3	3	3	5	4	4	2.5	
	17	2	51	100	77	3	4	4	4	3	3	4	4	3	4	2.5	
	18	3	51	100	71	3	3	3	4	4	4	3	4	4	4	2.5	
	19	4	51	100	69	4	4	3	3	3	3	4	3	3	4	2.5	
	20	5	51	100	73	4	4	3	3	3	3	4	4	5	3	2.5	
	21	1	60	100	27	2	2	2	3	2	2	2	3	2	3	2.5	
	22	2	60	100	25	2	2	3	2	2	2	3	2	2	2	2.5	
	23	3	60	100	17	2	2	2	2	2	2	2	2	2	2	2.5	
	24	4	60	100	24	2	2	3	2	3	2	2	3	2	2	2.5	
	25	5	60	100	15	2	3	2	2	2	2	3	2	2	3	2.5	
	26	1	70	100	0	0	0	0	0	0	0	0	0	0	0	2.5	
	27	2	70	100	0	0	0	0	0	0	0	0	0	0	0	2.5	
	28	3	70	100	0	0	0	0	0	0	0	0	0	0	0	2.5	
	29	4	70	100	0	0	0	0	0	0	0	0	0	0	0	2.5	
	30	5	70	100	0	0	0	0	0	0	0	0	0	0	0	2.5	

Comments:

Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	2/8/2011 16:00	Test ID:	C110207.0147	Sample ID:	West Basin Brine
End Date:	2/10/2011 14:15	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA/600/R-95/13(	Test Species:	MP-Macrocystis pyrifera
Comments:					

Conc-%	1	2	3	4	5
Control	0.8900	0.8800	0.9200	0.9300	0.8600
33	0.8600	0.9200	0.9300	0.9300	0.9000
42	0.8500	0.8800	0.8700	0.8600	0.7300
51	0.7500	0.7700	0.7100	0.6900	0.7300
60	0.2700	0.2500	0.1700	0.2400	0.1500
70	0.0000	0.0000	0.0000	0.0000	0.0000

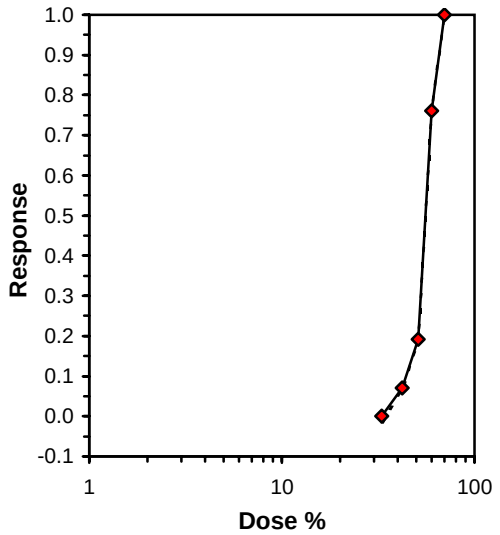
			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.8960	1.0000	1.2448	1.1873	1.3030	3.843	5			52	500
33	0.9080	1.0134	1.2653	1.1873	1.3030	3.861	5	31.00	17.00	46	500
42	0.8380	0.9353	1.1608	1.0244	1.2171	6.717	5	18.00	17.00	81	500
*51	0.7300	0.8147	1.0249	0.9803	1.0706	3.482	5	15.00	17.00	135	500
*60	0.2160	0.2411	0.4809	0.3977	0.5464	13.606	5	15.00	17.00	392	500
70	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5			500	500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.91263	0.918	-0.9412	0.31609
Bartlett's Test indicates equal variances (p = 0.63)	2.59122	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test Treatments vs Control	42	51	46.2817	2.38095

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	54.683	54.137	55.235
5.0%	55.261	54.690	55.838
10.0%	55.564	54.990	56.144
20.0%	55.729	55.280	56.182
Auto-0.0%	54.683	54.137	55.235



Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	2/8/2011 16:00	Test ID:	C110207.0147	Sample ID:	WEST BASIN
End Date:	2/10/2011 14:15	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera
Comments:	For IC25 only				

Conc-ppt	1	2	3	4	5
Control - 32.4	0.8900	0.8800	0.9200	0.9300	0.8600
33	0.8600	0.9200	0.9300	0.9300	0.9000
42	0.8500	0.8800	0.8700	0.8600	0.7300
51	0.7500	0.7700	0.7100	0.6900	0.7300
60	0.2700	0.2500	0.1700	0.2400	0.1500
70	0.0000	0.0000	0.0000	0.0000	0.0000

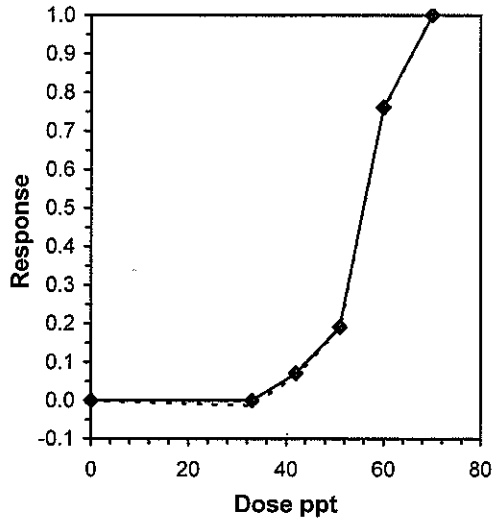
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-ppt	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control - 32.4	0.8960	1.0000	1.2448	1.1873	1.3030	3.843	5				0.9020	1.0000
33	0.9080	1.0134	1.2653	1.1873	1.3030	3.861	5	-0.566	2.300	0.0831	0.9020	1.0000
*42	0.8380	0.9353	1.1608	1.0244	1.2171	6.717	5	2.328	2.300	0.0831	0.8380	0.9290
*51	0.7300	0.8147	1.0249	0.9803	1.0706	3.482	5	6.088	2.300	0.0831	0.7300	0.8093
*60	0.2160	0.2411	0.4809	0.3977	0.5464	13.606	5	21.148	2.300	0.0831	0.2160	0.2395
70	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.91263	0.888	-0.9412	0.31609
Bartlett's Test indicates equal variances (p = 0.63)	2.59122	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	33	42	37.229		0.05565	0.06201	0.52496	0.00326	6.6E-15	4, 20

Linear Interpolation (200 Resamples)

Point	ppt	SD	95% CL(Exp)		Skew
IC05	39.342	2.147	34.935	45.692	0.2660
IC10	44.183	1.665	37.697	47.765	-0.7847
IC15	47.942	1.325	43.870	51.350	-1.0226
IC20	51.147	0.568	48.660	51.833	-1.8196
IC25	51.937	0.233	51.202	52.532	-0.0729
IC40	54.306	0.209	53.664	54.844	-0.1303
IC50	55.885	0.231	55.229	56.463	-0.0065



Test: MC-Macrocystis Germination and Growth Test
Species: MP-Macrocystis pyrifera
Sample ID: WEST BASIN
Start Date: 2/8/2011 16:00 End Date: 2/10/2011 14:15

Test ID: C110207.01
Protocol: EPAW 95-EPA West Coast
Sample Type: DMR-Discharge Monitoring Report
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Total Counted	Number Germ	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	1	1	Control - 32.4	100	89												
	2	2	Control - 32.4	100	88												
	3	3	Control - 32.4	100	92												
	4	4	Control - 32.4	100	93												
	5	5	Control - 32.4	100	86												
	6	1	33.000	100	86												
	7	2	33.000	100	92												
	8	3	33.000	100	93												
	9	4	33.000	100	93												
	10	5	33.000	100	90												
	11	1	42.000	100	85												
	12	2	42.000	100	88												
	13	3	42.000	100	87												
	14	4	42.000	100	86												
	15	5	42.000	100	73												
	16	1	51.000	100	75												
	17	2	51.000	100	77												
	18	3	51.000	100	71												
	19	4	51.000	100	69												
	20	5	51.000	100	73												
	21	1	60.000	100	27												
	22	2	60.000	100	25												
	23	3	60.000	100	17												
	24	4	60.000	100	24												
	25	5	60.000	100	15												
	26	1	70.000	100	0												
	27	2	70.000	100	0												
	28	3	70.000	100	0												
	29	4	70.000	100	0												
	30	5	70.000	100	0												

Comments:

Macrocystis Germination and Growth Test-Growth-Length

Start Date:	2/8/2011 16:00	Test ID:	C110207.0147	Sample ID:	West Basin Brine
End Date:	2/10/2011 14:15	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA/600/R-95/13(	Test Species:	MP-Macrocystis pyrifera
Comments:					

Conc-%	1	2	3	4	5
Control	13.000	12.250	12.500	13.500	13.750
33	13.250	11.750	13.250	12.750	14.250
42	13.250	13.250	13.000	12.250	11.750
51	9.500	9.000	9.000	8.500	9.000
60	5.750	5.500	5.000	5.750	5.750
70	0.000	0.000	0.000	0.000	0.000

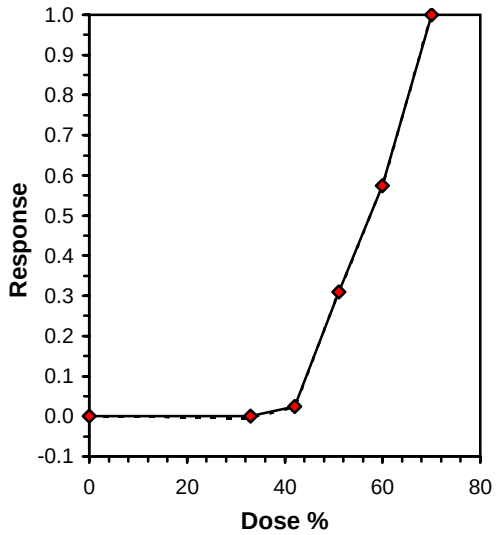
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	13.000	1.0000	13.000	12.250	13.750	4.903	5				13.025	1.0000
33	13.050	1.0038	13.050	11.750	14.250	6.960	5	-0.128	2.300	0.900	13.025	1.0000
42	12.700	0.9769	12.700	11.750	13.250	5.282	5	0.767	2.300	0.900	12.700	0.9750
*51	9.000	0.6923	9.000	8.500	9.500	3.928	5	10.226	2.300	0.900	9.000	0.6910
*60	5.550	0.4269	5.550	5.000	5.750	5.873	5	19.046	2.300	0.900	5.550	0.4261
70	0.000	0.0000	0.000	0.000	0.000	0.000	5				0.000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.97464	0.918	-0.3048	0.25511
Bartlett's Test indicates equal variances (p = 0.28)	5.11976	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	42	51	46.2817	2.38095	0.89965	0.0692	55.2713	0.3825	1.9E-14	4, 20

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	42.794	2.923	24.381	43.850	-3.4725
IC10	44.378	0.628	42.044	45.318	-1.0457
IC15	45.962	0.543	44.035	46.891	-0.7362
IC20	47.546	0.491	45.689	48.468	-0.5493
IC25	49.130	0.467	47.607	50.108	-0.2900
IC40	54.091	0.429	52.467	55.095	-0.1663
IC50	57.489	0.388	56.116	58.478	-0.2111



KELP 48-HOUR CHRONIC TOXICITY TEST

BIO047

CLIENT:	West Basin MWD
PROJECT:	West Basin Municipal Water District Salinity Study
CLIENT SAMPLE ID:	~~Hypersaline~~ West Basin Brine
WESTON TEST ID:	C110207.0147
SPECIES:	*Macrocystis pyrifera*

DATE RECEIVED:	2/7/11
DATE TEST STARTED:	2/8/11
DATE TEST ENDED:	2/10/11
STUDY DIRECTOR:	K. Stanvseth
ORGANISMS/CHAMBER:	300,000

	Concentration	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Salinity (ppt)	Meter #	pH
Day 0 (0 Hours)	CONTROL	1	6.9	1	16.0	6	31.9	4	8.1
Date: 2/8/11	~~BRINE CONTROL~~								
Sample ID: C110207.01	33		7.1		15.7		32.8		8.0
Dilutions (tech): KS	42		6.9		15.4		41.9		7.9
WQ Time: 16:40	51		7.2		15.4		50.6		7.9
Technician: AA	60		7.1		15.8		59.6		7.8
	70		7.1		15.8		69.1		7.9
24 Hours	CONTROL				15.9				
Date: 2/9/11	~~BRINE CONTROL~~								
WQ Time: ~~1505~~	33				15.4				
Technician: SH	42				15.4				
	51				15.3				
	60				15.8				
	70				15.8				
48 Hours	CONTROL	1	7.4	1	15.9	6	32.2	4	8.1
Date: 2/10/11	~~BRINE CONTROL~~		~~7.5~~		~~14.8~~		~~34.1~~		~~8.0~~ ① AA
WQ Time: 1050	33		7.5		14.8		34.1		8.0
Technician: AA	42		7.5		14.6		42.5		8.0
	51		6.8		14.7		51.0		8.0
	60		6.7		14.5		59.9		8.0
	70		6.9		14.7		69.9		8.0

START TIME:	1600 KS
END TIME:	1415 JH
ORGANISM BATCH:	DG020811
TEST ROOM:	Rm 2
TEST SHELF #:	4

DILUTION WATER BATCH:	SIO 012811
BRINE BATCH:	N/A
HOBO TEMP. NO.:	778891
TEST ACCEPTABILITY:	
☐ 70% GERMINATION IN CONTROL	
☐ ≥10 µm GERM-TUBE LENGTH IN THE CONTROLS	

① WC 2/10/11 AA
② IE 2/17/11 KS

KELP 48-HOUR CHRONIC TOXICITY TEST

BIO047

WESTON TEST ID: C110207.0147	CLIENT: West Basin MWB	CLIENT SAMPLE ID: West Basin Brine

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	LENGTH MEASUREMENTS (in ocular micrometer units)										Scope #	Date	Tech
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10			
1	Control	1	89	11	7	4	5	5	7	4	5	5	5	5	Oly. 1	2/20/11	am
2	Control	2	88	12	5	5	5	4	5	3	7	4	5	6	BH2	4/11/11	TVT
3	Control	3	92	8	6	3	6	5	7	5	4	5	5	4			
4	Control	4	93	7	5	4	6	7	5	6	5	5	5	6			
5	Control	5	86	14	5	7	8	5	4	4	6	5	6	5			
6	33	1	86	14	5	4	5	6	5	5	6	8	5	4			
7		2	92	8	5	6	5	4	5	4	4	5	4	5			
8		3	93	7	8	6	5	4	4	6	5	3	7	5			
9		4	93	7	6	4	5	5	7	4	5	6	5	4			
10	↓	5	90	10	6	5	5	7	5	7	6	5	6	5			
11	42	1	85	15	5	4	5	6	7	5	5	4	6	6			
12		2	88	12	5	5	5	6	5	5	6	5	5	6			
13		3	87	13	5	5	5	4	6	6	5	6	4	6			
14		4	86	14	5	4	6	6	5	5	5	5	4	4			
15	↓	5	73	27	5	4	5	5	4	3	6	5	5	5			
16	51	1	75	25	4	5	3	4	3	3	3	5	4	4			
17		2	77	23	3	4	4	4	3	3	4	4	3	4			
18		3	71	29	3	3	3	4	4	4	3	4	4	4			
19		4	69	31	4	4	3	3	3	3	4	3	3	4			
20	↓	5	73	27	4	4	3	3	3	3	4	4	5	3			
21	60	1	27	73	2	2	2	3	2	2	2	3	2	3			
22		2	25	75	2	2	3	2	2	2	3	2	2	2			
23		3	17	83	2	2	2	2	2	2	2	2	2	2			
24		4	24	76	2	2	3	2	3	2	2	3	2	2			
25	↓	5	15	85	2	3	2	2	2	2	3	2	2	3		↓	
26	Salted 70	1	0	100	One —	—	—	—	—	—	—	—	—	—		4/12/11	
27		2	0	100	—	—	—	—	—	—	—	—	—	—			
28		3	0	100	—	—	—	—	—	—	—	—	—	—			
29		4	0	100	—	—	—	—	—	—	—	—	—	—			
30	↓	5	0	100	—	—	—	—	—	—	—	—	—	—	↓	↓	↓

① No germination seen
4/12/11 TVT

KELP 48-HOUR CHRONIC TOXICITY TEST
SPOROPHYLL RELEASE DATA SHEET

BIO047

WESTON TEST ID: C110207.0147	CLIENT: West Basin MWB	CLIENT SAMPLE ID: ~~Hypersaline~~ West Basin Brine ①FS

Date: 2/8/11

Test: Kelp

Investigator: K. Stenvseth

Condition of Majority of Blades Used: Poor (Fair) Good

Number of Blades Used: 22 Weight of Blades: 173 g Volume of Release Water: 1 L

Time blades are placed in release beaker: 1455

Time blades are removed from release beaker: 1550

Temperature of spore solution: 15.8

Check for zoospore motility on microscope: ✓

Fix a 9-mL spore sample with 1 mL formalin.

Determine spore density on the hemacytometer.

Determine density with 5 counts.

1. 72
2. 66
3. 49
4. 50
5. 49

Mean 57.2

Mean x 10,000 x 1.11 = 634,920 spores/mL. This is the density of spore release.

1.11 is the dilution factor for 1 mL formalin + 9 mL spore solution.

Volume of test container: 40 mL

The desired final density of zoospore solution is 7,500 spores/mL of test container.

To determine volume of spores to deliver to test containers:

7,500 spores/mL x 40 mL/test container = 300,000 spores/test container

300,000 spores/test container/density of spore release 634,920 spores/mL = 0.473 mL/test container

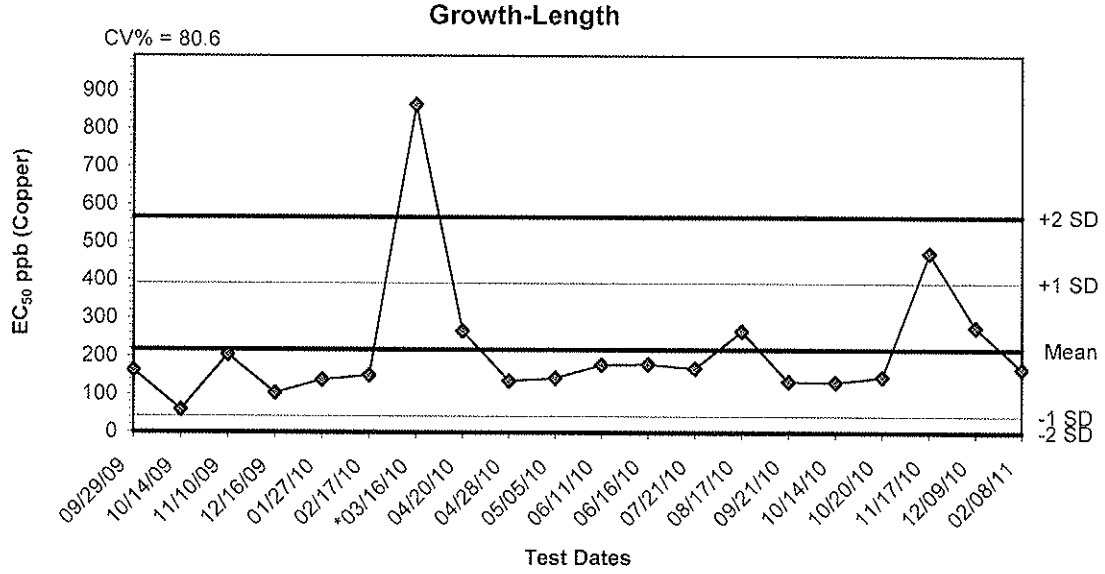
Temperature of control water (stock): 16.0

Light: 205-284 (need 200-300 foot-candles)

Time test containers are inoculated: 1600

① IE 2/17/11 KS

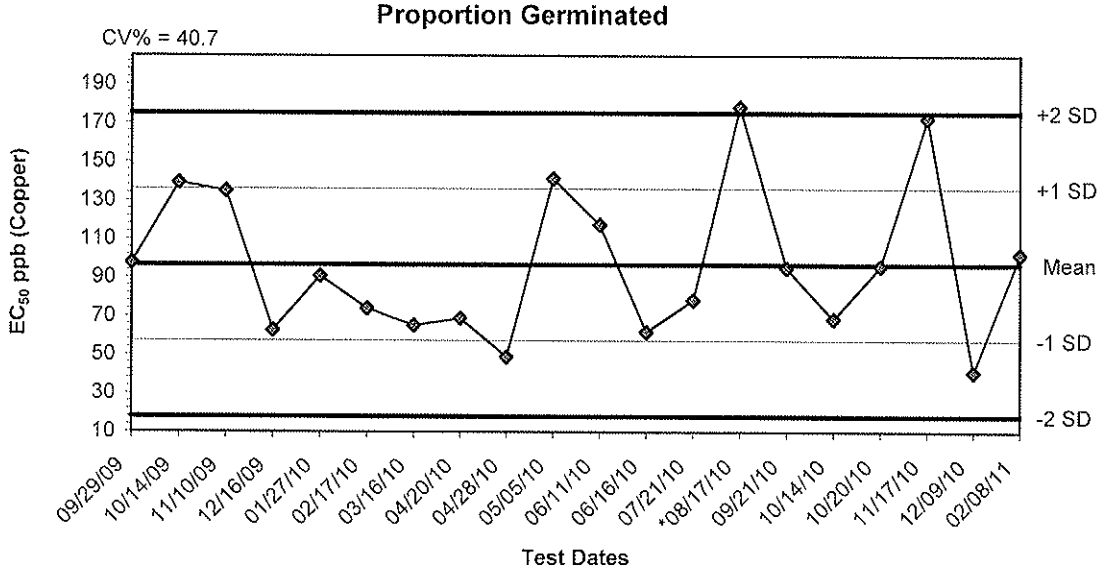
Macrocystis pyrifera Reference Toxicant Control Chart: Growth-Length



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/29/09	162.5500	217.0043	42.0488	0.0000	391.9598	566.9152
10/14/09	59.6250	217.0043	42.0488	0.0000	391.9598	566.9152
11/10/09	203.4760	217.0043	42.0488	0.0000	391.9598	566.9152
12/16/09	102.8140	217.0043	42.0488	0.0000	391.9598	566.9152
01/27/10	137.7800	217.0043	42.0488	0.0000	391.9598	566.9152
02/17/10	149.4100	217.0043	42.0488	0.0000	391.9598	566.9152
*03/16/10	863.2000	217.0043	42.0488	0.0000	391.9598	566.9152
04/20/10	265.9090	217.0043	42.0488	0.0000	391.9598	566.9152
04/28/10	135.5750	217.0043	42.0488	0.0000	391.9598	566.9152
05/05/10	143.0800	217.0043	42.0488	0.0000	391.9598	566.9152
06/11/10	177.8410	217.0043	42.0488	0.0000	391.9598	566.9152
06/16/10	179.3100	217.0043	42.0488	0.0000	391.9598	566.9152
07/21/10	168.3300	217.0043	42.0488	0.0000	391.9598	566.9152
08/17/10	266.0000	217.0043	42.0488	0.0000	391.9598	566.9152
09/21/10	133.3300	217.0043	42.0488	0.0000	391.9598	566.9152
10/14/10	132.0000	217.0043	42.0488	0.0000	391.9598	566.9152
10/20/10	145.7100	217.0043	42.0488	0.0000	391.9598	566.9152
11/17/10	471.3400	217.0043	42.0488	0.0000	391.9598	566.9152
12/09/10	276.0000	217.0043	42.0488	0.0000	391.9598	566.9152
02/08/11	166.8060	217.0043	42.0488	0.0000	391.9598	566.9152

* Value out of 95% CI range at time of testing.
Updated 4/15/11 AM

Macrocystis pyrifera Reference Toxicant Control Chart: Proportion Germinated



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/29/09	97.7783	96.6720	57.3563	18.0405	135.9877	175.3035
10/14/09	139.3000	96.6720	57.3563	18.0405	135.9877	175.3035
11/10/09	134.8900	96.6720	57.3563	18.0405	135.9877	175.3035
12/16/09	62.6240	96.6720	57.3563	18.0405	135.9877	175.3035
01/27/10	90.6670	96.6720	57.3563	18.0405	135.9877	175.3035
02/17/10	73.9700	96.6720	57.3563	18.0405	135.9877	175.3035
03/16/10	65.1820	96.6720	57.3563	18.0405	135.9877	175.3035
04/20/10	68.7180	96.6720	57.3563	18.0405	135.9877	175.3035
04/28/10	48.7968	96.6720	57.3563	18.0405	135.9877	175.3035
05/05/10	141.2800	96.6720	57.3563	18.0405	135.9877	175.3035
06/11/10	117.3800	96.6720	57.3563	18.0405	135.9877	175.3035
06/16/10	61.8367	96.6720	57.3563	18.0405	135.9877	175.3035
07/21/10	78.2158	96.6720	57.3563	18.0405	135.9877	175.3035
*08/17/10	178.3100	96.6720	57.3563	18.0405	135.9877	175.3035
09/21/10	94.9111	96.6720	57.3563	18.0405	135.9877	175.3035
10/14/10	68.4052	96.6720	57.3563	18.0405	135.9877	175.3035
10/20/10	95.8000	96.6720	57.3563	18.0405	135.9877	175.3035
11/17/10	172.4000	96.6720	57.3563	18.0405	135.9877	175.3035
12/09/10	40.9070	96.6720	57.3563	18.0405	135.9877	175.3035
02/08/11	102.0680	96.6720	57.3563	18.0405	135.9877	175.3035

* Value out of 95% CI at time of testing.
Updated 4/15/11 AM

Macrocystis Germination and Growth Test-Growth-Length

Start Date:	2/8/2011 16:00	Test ID:	C080922.31	Sample ID:	REF-Ref Toxicant
End Date:	2/10/2011 14:15	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera
Comments:					

Conc-ppb	1	2	3	4	5
Control	13.000	12.250	12.500	13.500	13.750
5.6	13.500	12.750	13.750	13.250	12.750
10	12.750	12.250	11.500	13.000	12.000
18	13.000	13.250	11.500	11.750	13.000
32	11.750	11.250	11.500	11.750	11.250
100	8.250	7.750	7.750	8.000	7.250
180	6.250	6.500	6.250	7.000	6.750

			Transform: Untransformed					1-Tailed				
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	13.000	1.0000	13.000	12.250	13.750	4.903	5				13.000	0.0000
5.6	13.200	1.0154	13.200	12.750	13.750	3.388	5	-0.603	2.409	0.799	13.200	-0.0154
10	12.300	0.9462	12.300	11.500	13.000	4.853	5	2.111	2.409	0.799	12.300	0.0538
18	12.500	0.9615	12.500	11.500	13.250	6.481	5	1.508	2.409	0.799	12.500	0.0385
*32	11.500	0.8846	11.500	11.250	11.750	2.174	5	4.523	2.409	0.799	11.500	0.1154
*100	7.800	0.6000	7.800	7.250	8.250	4.754	5	15.679	2.409	0.799	7.800	0.4000
*180	6.550	0.5038	6.550	6.250	7.000	4.976	5	19.447	2.409	0.799	6.550	0.4962

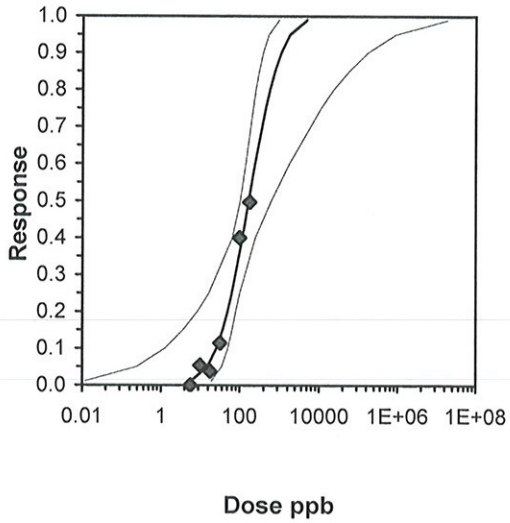
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95816	0.91	-0.2507	-0.8177
Bartlett's Test indicates equal variances (p = 0.32)	7.03172	16.8119		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	18	32	24		0.79883	0.06145	35.8911	0.275	3.8E-19	6, 28

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	1.58882	0.55157	0.50773	2.6699	0	0.40202	9.48773	0.98	2.22221	0.6294	3
Intercept	1.46931	1.121	-0.7279	3.66648							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	5.72811	0.01171	19.4961
EC05	3.355	15.3795	0.25011	36.1429
EC10	3.718	26.0378	1.25835	51.0466
EC15	3.964	37.1434	3.68199	65.5034
EC20	4.158	49.2602	8.46508	81.54
EC25	4.326	62.7608	16.7708	101.442
EC40	4.747	115.546	65.5294	252.074
EC50	5.000	166.806	103.197	628.293
EC60	5.253	240.806	141.805	1794.76
EC75	5.674	443.338	218.734	11297.3
EC80	5.842	564.842	256.499	23745.1
EC85	6.036	749.103	307.474	56690.1
EC90	6.282	1068.61	384.566	170185
EC95	6.645	1809.17	532.864	872740
EC99	7.326	4857.49	973.405	1.9E+07



Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	2/8/2011 16:00	Test ID:	C080922.31	Sample ID:	REF-Ref Toxicant
End Date:	2/10/2011 14:15	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera
Comments:					

Conc-ppb	1	2	3	4	5
Control	0.8900	0.8800	0.9200	0.9300	0.8600
5.6	0.8400	0.8200	0.8300	0.9000	0.8700
10	0.8300	0.8700	0.8600	0.8100	0.8700
18	0.8700	0.8600	0.8300	0.8900	0.8700
32	0.7900	0.8400	0.7700	0.7900	0.7600
100	0.4400	0.3800	0.4900	0.4700	0.4200
180	0.1900	0.2000	0.1500	0.1900	0.3900

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.8960	1.0000	1.2448	1.1873	1.3030	3.843	5				52	500
5.6	0.8520	0.9509	1.1777	1.1326	1.2490	4.042	5	1.898	2.409	0.0852	74	500
10	0.8480	0.9464	1.1713	1.1198	1.2019	3.148	5	2.078	2.409	0.0852	76	500
18	0.8640	0.9643	1.1939	1.1458	1.2327	2.646	5	1.439	2.409	0.0852	68	500
*32	0.7900	0.8817	1.0956	1.0588	1.1593	3.545	5	4.220	2.409	0.0852	105	500
*100	0.4400	0.4911	0.7251	0.6642	0.7754	5.994	5	14.702	2.409	0.0852	280	500
*180	0.2240	0.2500	0.4876	0.3977	0.6745	22.056	5	21.419	2.409	0.0852	388	500

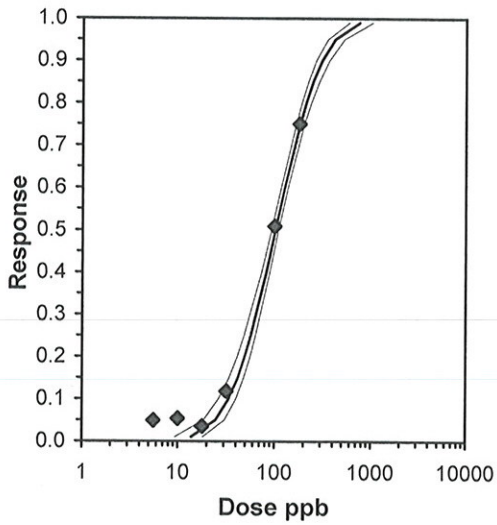
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.9144	0.91	1.42217	4.15238
Bartlett's Test indicates equal variances (p = 0.16)	9.23844	16.8119		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	18	32	24		0.05717	0.0637	0.42042	0.00312	2.5E-19	6, 28

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	2.67228	0.19651	2.28711	3.05744	0.104	3.63102	9.48773	0.46	2.00889	0.37421	5
Intercept	-0.3683	0.40367	-1.1595	0.42289							
TSCR	0.13014	0.00857	0.11334	0.14694							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	13.7511	9.43462	18.2713
EC05	3.355	24.7379	18.6742	30.6282
EC10	3.718	33.831	26.8424	40.3847
EC15	3.964	41.787	34.2589	48.7089
EC20	4.158	49.4245	41.5571	56.576
EC25	4.326	57.0801	49.0054	64.3832
EC40	4.747	82.0506	73.7849	89.7285
EC50	5.000	102.068	93.5981	110.475
EC60	5.253	126.968	117.431	137.526
EC75	5.674	182.512	166.774	203.198
EC80	5.842	210.782	190.496	238.726
EC85	6.036	249.307	221.899	288.753
EC90	6.282	307.936	268.243	367.704
EC95	6.645	421.127	354.362	527.536
EC99	7.326	757.595	594.976	1042.48



Test: MC-Macrocystis Germination and Growth Test
Species: MP-Macrocystis pyrifera
Sample ID: REF-Ref Toxicant
Start Date: 2/8/2011 16:00 End Date: 2/10/2011 14:15

Test ID: C080922.31
Protocol: EPAW 95-EPA West Coast
Sample Type: CUCL-Copper chloride
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Total Counted	Number Germ	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	1	1	Control	100	89	7	4	5	5	7	4	5	5	5	5	2.5	
	2	2	Control	100	88	5	5	5	4	5	3	7	4	5	6	2.5	
	3	3	Control	100	92	6	3	6	5	7	5	4	5	5	4	2.5	
	4	4	Control	100	93	5	4	6	7	5	6	5	5	5	6	2.5	
	5	5	Control	100	86	5	7	8	5	4	4	6	5	6	5	2.5	
	6	1	5.600	100	84	5	5	5	6	5	4	6	7	5	6	2.5	
	7	2	5.600	100	82	6	5	5	7	5	4	5	5	4	5	2.5	
	8	3	5.600	100	83	7	4	5	4	6	5	5	5	8	6	2.5	
	9	4	5.600	100	90	5	5	7	4	5	5	5	6	5	6	2.5	
	10	5	5.600	100	87	6	7	4	5	5	5	5	4	5	5	2.5	
	11	1	10.000	100	83	5	6	5	5	4	5	4	7	4	6	2.5	
	12	2	10.000	100	87	5	6	6	4	5	5	5	4	5	4	2.5	
	13	3	10.000	100	86	4	5	5	3	6	5	5	4	4	5	2.5	
	14	4	10.000	100	81	6	4	4	6	5	5	5	7	4	6	2.5	
	15	5	10.000	100	87	4	4	6	5	5	4	6	5	4	5	2.5	
	16	1	18.000	100	87	5	6	6	4	6	5	5	6	4	5	2.5	
	17	2	18.000	100	86	4	5	5	7	5	6	5	5	5	6	2.5	
	18	3	18.000	100	83	4	3	5	4	5	5	5	6	5	4	2.5	
	19	4	18.000	100	89	6	5	4	4	6	5	3	5	4	5	2.5	
	20	5	18.000	100	87	6	4	5	5	5	6	5	5	4	7	2.5	
	21	1	32.000	100	79	5	5	4	3	5	5	6	5	4	5	2.5	
	22	2	32.000	100	84	4	3	5	4	6	5	4	5	5	4	2.5	
	23	3	32.000	100	77	5	6	4	3	5	4	5	5	3	6	2.5	
	24	4	32.000	100	79	5	5	5	4	4	3	4	8	4	5	2.5	
	25	5	32.000	100	76	4	4	6	5	3	4	4	5	4	6	2.5	
	26	1	100.000	100	44	4	3	3	2	4	4	4	3	3	3	2.5	
	27	2	100.000	100	38	3	3	2	4	3	2	4	4	3	3	2.5	
	28	3	100.000	100	49	2	4	3	4	3	4	3	2	3	3	2.5	
	29	4	100.000	100	47	2	4	3	5	3	3	3	4	2	3	2.5	
	30	5	100.000	100	42	2	2	4	3	3	3	2	3	3	4	2.5	
	31	1	180.000	100	19	2	3	4	2	2	2	2	2	3	3	2.5	
	32	2	180.000	100	20	3	2	2	3	2	2	2	4	3	3	2.5	
	33	3	180.000	100	15	2	3	2	2	3	2	3	2	4	2	2.5	
	34	4	180.000	100	19	2	3	3	2	5	3	3	2	3	2	2.5	
	35	5	180.000	100	39	2	4	2	2	3	3	2	4	2	3	2.5	

Comments:

Reviewed by:

WESTON SOLUTIONS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

REF TOX TEST ID: C080922.3

MICROMETER CONVERSION FACTOR: 2.8

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	LENGTH MEASUREMENTS (in ocular micrometer units)										Scope #	Date	Tech
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10			
1	Control	1	89	11	7	4	5	5	7	4	5	5	5	5	BH2	7/20/11	AM
2	Control	2	88	12	5	5	5	4	5	3	7	4	5	6		4/11/11	TG
3	Control	3	92	8	6	3	6	5	7	5	4	5	5	4			
4	Control	4	93	7	5	4	6	7	5	6	5	5	5	6			
5	Control	5	86	14	5	7	8	5	4	4	6	5	6	5			
31	5.6	1	84	16	5	5	5	6	5	4	6	7	5	6		4/12/11	
32		2	82	18	6	5	5	7	5	4	5	5	4	5			
33		3	83	17	7	4	5	4	6	5	5	5	8	6			
34		4	90	10	5	5	7	4	5	5	5	6	5	6			
35		5	87	13	6	7	4	5	5	5	5	4	5	5			
36	10	1	83	17	5	6	5	5	4	5	4	7	4	6			
37		2	87	13	5	6	6	4	5	5	5	4	5	4			
38		3	86	14	4	5	5	3	6	5	5	4	4	5			
39		4	81	19	6	4	4	6	5	5	5	7	4	6			
40		5	87	13	4	4	6	5	5	4	6	5	4	5			
41	18	1	87	13	5	6	6	4	6	5	5	6	4	5			
42		2	86	14	4	5	5	7	5	6	5	5	5	6			
43		3	83	17	4	3	5	4	5	5	5	6	5	4			
44		4	89	11	6	5	4	4	6	5	3	5	4	5			
45		5	87	13	6	4	5	5	5	6	5	5	4	7			
46	32	1	79	21	5	5	4	3	5	5	6	5	4	5			
47		2	84	16	4	3	5	4	6	5	4	5	5	4			
48		3	77	23	5	6	4	3	5	4	5	5	3	6			
49		4	79	21	5	5	5	4	4	3	4	8	4	5			
50		5	76	24	4	4	6	5	3	4	4	5	4	6			
51	100	1	44	56	4	3	3	2	4	4	4	3	3	3			
52		2	38	62	3	3	2	4	3	2	4	4	3	3			
53		3	49	51	2	4	3	4	3	4	3	2	3	3			
54		4	47	53	2	4	3	5	3	3	3	4	2	3			
55		5	42	58	2	2	4	3	3	3	2	3	3	4			
56	180	1	19	81	2	3	4	2	2	2	2	2	3	3			
57		2	20	80	3	2	2	3	2	2	2	4	3	3			
58		3	15	85	2	3	2	2	3	2	3	2	4	2			
59		4	19	81	2	3	3	2	5	3	3	2	3	2			
60		5	39	61	2	4	2	2	3	3	2	4	2	3	✓	✓	✓

① WC 4/12/11 TG

WESTON SOLUTIONS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

REF TOX TEST ID: C080922.31

MICROMETER CONVERSION FACTOR: 28

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	LENGTH MEASUREMENTS (in ocular micrometer units) L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Scope #	Date	Tech
	Control	1															
	Control	2															
	Control	3															
	Control	4															
	Control	5															
61	300	1	6	44	2	2	2	2	2	3	2	2	4	2	BH2	4/12/11	TNG
62	↓	2	6	94	2	3	2	2	2	2	3	2	2	2	↓	↓	↓
63	↓	3	5	95	2	2	2	2	3	2	2	2	2	2	↓	↓	↓
64	↓	4	7	93	2	3	2	2	2	4	3	2	2	2	↓	↓	↓
65	↓	5	6	94	2	2	3	2	2	2	2	2	2	2	↓	↓	↓
		1															
		2															
		3															
		4															
		5															
		1															
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		2															
		3															
		4															
		5															
		1															
		2															
		3															
		4															
		5															

WESTON SOLUTIONS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

Test ID: C080922.31	Associated Test(s): West Basin		Study Director: J. Hansen
Organism: M pyrifera	Organism Batch: DG020811	Location: rm 2	Replicates: 5
Start Time: 1600	Technician: KS	End Time: 1415	Technician: JH

Toxicant: Copper Chloride (10,000 µg/L Cu) $CuCl_2 2H_2O$	Lot #: 06404BJ Expiration Date: 2/28/11	Date Dilutions Prepared: 2/8/11	Dilution Water Batch: S10012811	Technician: AM
Target Concentrations:	Quantity of Stock Target:	Actual: (mL)	Quantity of Diluent Target:	Actual: (mL)
5.6 ppb	0.280 mL	0.2800	500 mL	500
10 ppb	0.500 mL	0.5000	500 mL	500
18 ppb	0.900 mL	0.8996	500 mL	500
32 ppb	1.60 mL	1.5956	500 mL	500
100 ppb	5.00 mL	5.0003	500 mL	500
180 ppb	9.00 mL	9.0004	500 mL	500
300 ppb	15.00 mL	14.9966	500 mL	500

Day 0 Water Quality Data

Stock

Date: 2/8/11 WQ Time: 17:00 Initials: AA

	Control	5.6	10	18	32	100	180	300
D.O. (mg/L)	6.9	7.0	6.8	6.8	6.9	6.9	6.9	6.9
Temperature	16.0	16.0	15.6	15.8	16.0	15.9	16.0	15.5
Salinity	31.9	31.9	31.9	32.1	32.3	32.0	31.8	31.9
pH	8.1	8.2	8.1	8.2	8.2	8.2	8.2	8.2

48-Hour Water Quality Data

Stock

Date: 2/10/11 WQ Time: 11:05 Initials: AA

	Control	5.6	10	18	32	100	180	300
D.O. (mg/L)	7.9	7.6	7.8	7.9	8.1	8.0	7.8	8.0
Temperature	15.9	14.5	15.1	14.8	14.7	14.7	14.3	14.6
Salinity	32.2	32.6	32.3	32.1	32.3	32.7	32.5	32.2
pH	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1

☐ Pass ☐ Fail

Strongylocentrotus purpuratus Chronic Toxicity Test

Echinoderm Development-Proportion Alive

Start Date:	2/16/2011 16:20	Test ID:	C110207.0146	Sample ID:	West Basin Brine
End Date:	2/20/2011 14:10	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus
Comments:					

Conc-ppt	1	2	3	4
Control - 32.4	0.7680	0.5520	0.5440	0.6240
33	0.6720	0.5840	0.6000	0.6240
41.8	0.8000	0.6720	0.7360	0.8640
50.6	1.0000	0.8240	0.9280	0.7840
59.6	0.8880	0.7600	1.0000	0.9440
69.1	0.7600	0.8000	0.8320	0.6560

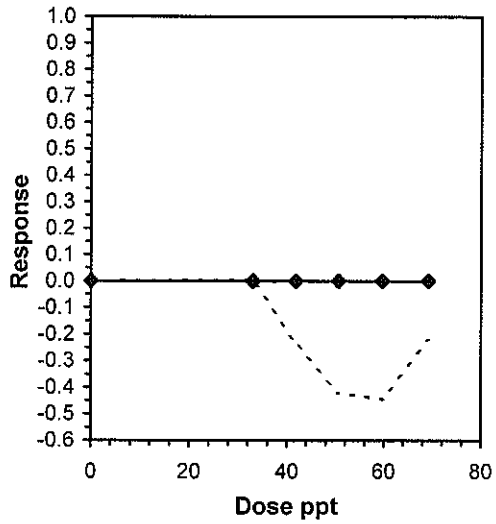
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-ppt	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control - 32.4	0.6220	1.0000	0.9115	0.8295	1.0682	12.148	4				0.7590	1.0000
33	0.6200	0.9968	0.9069	0.8698	0.9610	4.388	4	0.048	2.410	0.2295	0.7590	1.0000
41.8	0.7680	1.2347	1.0731	0.9610	1.1931	9.301	4	-1.698	2.410	0.2295	0.7590	1.0000
50.6	0.8840	1.4212	1.2626	1.0874	1.5261	15.640	4	-3.688	2.410	0.2295	0.7590	1.0000
59.6	0.8980	1.4437	1.2866	1.0588	1.5261	15.187	4	-3.940	2.410	0.2295	0.7590	1.0000
69.1	0.7620	1.2251	1.0646	0.9440	1.1485	8.298	4	-1.609	2.410	0.2295	0.7590	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.97509	0.884	0.42183	0.30098
Bartlett's Test indicates equal variances (p = 0.20)	7.33134	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	69.1	>69.1			0.22739	0.36397	0.10766	0.01813	0.00206	5, 18

Linear Interpolation (200 Resamples)

Point	ppt	SD	95% CL(Exp)	Skew
IC05	>69.1			
IC10	>69.1			
IC15	>69.1			
IC20	>69.1			
IC25	>69.1			
IC40	>69.1			
IC50	>69.1			



Echinoderm Development-Proportion Normal

Start Date:	2/16/2011 16:20	Test ID:	C110207.0146	Sample ID:	West Basin Brine
End Date:	2/20/2011 14:10	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus
Comments:					

Conc-ppt	1	2	3	4
Control - 32.4	0.9479	0.9710	0.9118	0.9615
33	0.9167	0.8630	0.8400	0.9487
41.8	0.0000	0.0000	0.0000	0.0000
50.6	0.0000	0.0000	0.0000	0.0000
59.6	0.0000	0.0000	0.0000	0.0000
69.1	0.0000	0.0000	0.0000	0.0000

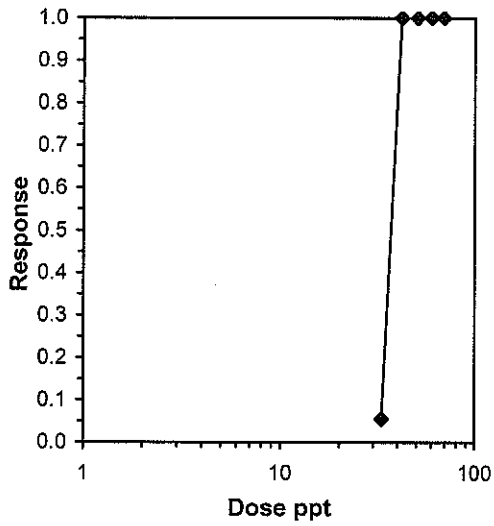
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppt	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control - 32.4	0.9481	1.0000	1.3457	1.2692	1.3997	4.196	4				27	500
*33	0.8921	0.9410	1.2428	1.1593	1.3424	6.690	4	2.048	1.943	0.0976	53	500
41.8	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				500	500
50.6	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				500	500
59.6	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				500	500
69.1	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				500	500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94229	0.749	0.02919	-1.2659
F-Test indicates equal variances (p = 0.54)	2.16857	47.4672		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences	0.05078	0.05344	0.02118	0.00505	0.08651	1, 6

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	36.886	36.786	36.985
20.0%	36.886	36.786	36.985
Auto-5.5%	36.886	36.786	36.985



Test: ED-Echinoderm Development
Test ID: C110207.01
Species: SP-Strongylocentrotus purpuratus
Protocol: EPAW 95-EPA West Coast
Sample ID: West Basin Brine
Sample Type: DMR-Discharge Monitoring Report
Start Date: 2/16/2011 16:20
End Date: 2/20/2011 14
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number normal	Notes
	1	1	Control - 32.4	125	96	96	91	
	2	2	Control - 32.4	125	69	69	67	
	3	3	Control - 32.4	125	68	68	62	
	4	4	Control - 32.4	125	78	78	75	
	5	1	33.000	125	84	84	77	
	6	2	33.000	125	73	73	63	
	7	3	33.000	125	75	75	63	
	8	4	33.000	125	78	78	74	
	9	1	41.800	125	100	100	0	
	10	2	41.800	125	84	84	0	
	11	3	41.800	125	92	92	0	
	12	4	41.800	125	108	108	0	
	13	1	50.600	125	125	125	0	
	14	2	50.600	125	103	103	0	
	15	3	50.600	125	116	116	0	
	16	4	50.600	125	98	98	0	
	17	1	59.600	125	111	111	0	
	18	2	59.600	125	95	95	0	
	19	3	59.600	125	125	125	0	
	20	4	59.600	125	118	118	0	
	21	1	69.100	125	95	95	0	
	22	2	69.100	125	100	100	0	
	23	3	69.100	125	104	104	0	
	24	4	69.100	125	82	82	0	

Comments:

Echinoderm Development CHRONIC TOXICITY TEST

BIO046

CLIENT:	West Basin Municipal Water District
PROJECT:	West Basin MWD Salinity Study
CLIENT SAMPLE ID:	West Basin Brine
WESTON SAMPLE ID:	C110207.0146
SPECIES:	S. purpuratus

DATE RECEIVED:	2/7/11
DATE TEST STARTED:	2/16/11
DATE TEST ENDED:	2/20/11
WESTON SOP NO.:	BIO046
STUDY DIRECTOR:	A. Margolis

	Concentration	DO* (mg/L)	Temp* (°C)	Salinity* (ppt)	pH*
Day 0 (0 Hours)	Control	8.0	15.9	32.4	8.2
Date: 2/16/11	~~Brine Control~~	—	—	—	—
Sample ID: C110207.01	33	8.7	15.9	33.0	8.1
Dilutions (Tech): JH	42	8.0	15.9	41.8	8.0
WQ Time: 1710	51	7.8	16.0	50.6	7.9
Technician: JH	60	8.0	15.9	59.6	7.9
	70	8.0	15.8	69.1	8.0
24 Hours	Control		15.4		
Date: 2/17/11	~~Brine Control~~				
WQ Time: 1225	33		15.2		
Technician: TVT	42		15.5		
	51		15.5		
	60		15.5		
	70		15.4		
48 Hours	Control		15.2		
Date: 2/19/11	~~Brine Control~~		~~15.1~~ ① AA		
WQ Time: 1245	33		15.1		
Technician: AA.	42		15.2		
	51		15.2		
	60		15.2		
	70		15.2		

① WC 2/18/11 AA

Echinoderm Development CHRONIC TOXICITY TEST

BIO046

CLIENT:	West Basin Municipal Water District
PROJECT:	West Basin MWD Salinity Study
CLIENT SAMPLE ID:	West Basin Brine
WESTON SAMPLE ID:	C110207.0146
SPECIES:	S. purpuratus

DATE RECEIVED:	2/7/11
DATE TEST STARTED:	2/16/11
DATE TEST ENDED:	2/20/11
WESTON SOP NO.:	BIO046
STUDY DIRECTOR:	A. Margolis

	Concentration	DO* (mg/L) ① EB	Temp* (°C)	Salinity* (ppt) ① EB	pH* ① EB
72 Hours	Control		16.0		
Date: 2/19/11	~~Brine Control~~				
WQ Time: 0925	33		15.4		
Technician: AM	42		15.5		
	51		15.7		
	66		15.8		
	70	↓	15.6	↓	↓
96 Hours (if needed)	Control	8.1	16.1	34.3	8.1
Date:: 2/20/11	~~Brine Control~~				
WQ Time: 1355	33	7.4	15.5	35.0	8.0
Technician: JH	42	7.9	15.8	42.7	8.1
	51	8.0	15.9	50.6	8.1
	60	7.9	15.9	60.8	8.1
	70	8.0	15.9	70.0	8.1

*Water quality measurements taken in surrogate water quality chambers.

① Test was unable to end at 72hrs, so only temp was needed for WQ data on this day. 5/16/11 EB

START TIME:	1620	Initials:	JH
END TIME:	1410	Initials:	JH
ORGANISM BATCH:	DG021611		
HOBO TEMP. NO.:	119279		
TEST LOCATION:	rm 2		

DILUTION WATER BATCH: S10012811

TEST ACCEPTABILITY:

- ☐ ≥ 80% NORMAL SHELL DEVELOPMENT IN SURVIVING CONTROLS
- ☐ MSD < 25%

Echinoderm Development CHRONIC TOXICITY TEST

BIO046

Weston Test ID:	Client:	Client Sample ID:
CH0207.0116	West Basin MWD	West Basin Brine

SPAWNING DATA

Initial Spawning Time:	Final Spawning Time:	Fertilization Time:	No. of Females: 2	No. of Males: 2
Embryo Density (count/mL):	1.	2.	3.	Average:
Stocking Volume Calculation:				

ZERO TIME COUNTS

1. ~~249~~ 93	2. 103	3. 93	4. 85	5. 249	6. —
Average Count: 125			Technician: am		

LARVAL COUNT DATA

Conc.	Rep 1		Rep 2		Rep 3		Rep 4		Rep 5		Date	Initials
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal		
Control	91	5	67	2	62	6	75	3			4/15/11	am
~~Brine~~												
33	77	7	63	10	63	12	74	4			4/18/11	am
42	0	100	0	84	0	92	0	108			↓	↓
51	0	125	0	103	0	116	0	98				
60	0	111	0	95	0	125	0	118				
70	0	95	0	100	0	104	0	82				

QA COUNT CHECKS

	QA Check #1	QA Check #2	QA Check #3	QA Check #4
Concentration / Replicate	0 / 4	42 / 2	60 / 1	70 / 4
Total #	79	83	118	91
# Normal	73	0	0	0
Date / Initials	4/18/11 / EB	4/18/11 / EB	4/18/11 / EB	4/18/11 / EB

QA Check Acceptability: ☐ <5% difference in means of QA & orig. counts

DWC 4/15/11 am

Echinoderm Development-Proportion Normal

Start Date:	2/16/2011 16:20	Test ID:	C110207.01	Sample ID:	WEST BASIN
End Date:	2/20/2011 14:10	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	For IC25 only				

Conc-ppt	1	2	3	4
Control - 32.4	0.9479	0.9710	0.9118	0.9615
33	0.9167	0.8630	0.8400	0.9487
41.8	0.0000	0.0000	0.0000	0.0000
50.6	0.0000	0.0000	0.0000	0.0000
59.6	0.0000	0.0000	0.0000	0.0000
69.1	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-ppt	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control - 32.4	0.9481	1.0000	1.3457	1.2692	1.3997	4.196	4				0.9460	1.0000
*33	0.8921	0.9410	1.2428	1.1593	1.3424	6.690	4	2.048	1.943	0.0976	0.8940	0.9450
41.8	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				0.0000	0.0000
50.6	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				0.0000	0.0000
59.6	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				0.0000	0.0000
69.1	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				0.0000	0.0000

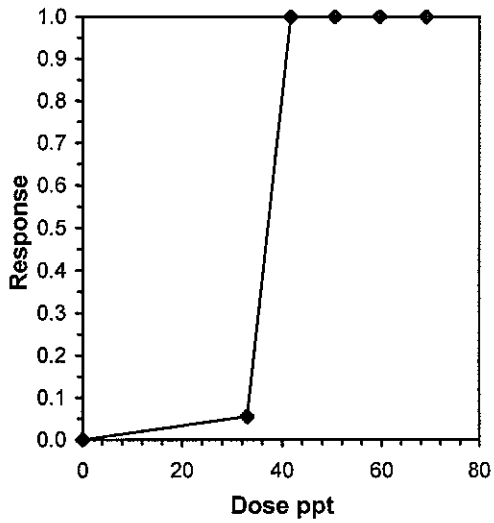
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94229	0.749	0.02919	-1.2659
F-Test indicates equal variances (p = 0.54)	2.16857	47.4672		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences	0.05078	0.05344	0.02118	0.00505	0.08651	1, 6

Linear Interpolation (200 Resamples)

Point	ppt	SD	95% CL(Exp)		Skew
IC05*	30.017	6.084	5.956	35.337	-0.4876
IC10	33.419	0.805	27.881	34.008	-5.1762
IC15	33.885	0.215	33.100	34.441	-0.1230
IC20	34.351	0.202	33.611	34.874	-0.1230
IC25	34.816	0.189	34.123	35.307	-0.1230
IC40	36.213	0.152	35.658	36.605	-0.1230
IC50	37.144	0.126	36.682	37.471	-0.1230

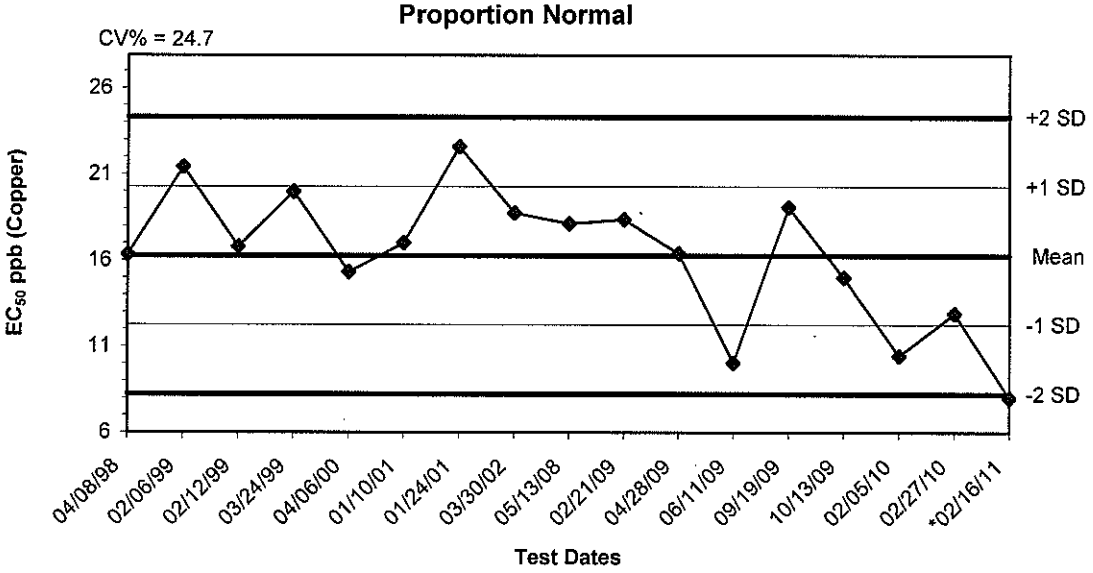
* indicates IC estimate less than the lowest concentration



Test: ED-Echinoderm Development						Test ID: C110207.01		
Species: SP-Strongylocentrotus purpuratus						Protocol: EPAW 95-EPA West Coast		
Sample ID: WEST BASIN						Sample Type: DMR-Discharge Monitoring Report		
Start Date: 2/16/2011 16:20				End Date: 2/20/2011 14		Lab ID: CCA-Weston, Carlsbad		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number normal	Notes
	1	1	Control - 32.4	125	96	96	91	
	2	2	Control - 32.4	125	69	69	67	
	3	3	Control - 32.4	125	68	68	62	
	4	4	Control - 32.4	125	78	78	75	
	5	1	33.000	125	84	84	77	
	6	2	33.000	125	73	73	63	
	7	3	33.000	125	75	75	63	
	8	4	33.000	125	78	78	74	
	9	1	41.800	125	100	100	0	
	10	2	41.800	125	84	84	0	
	11	3	41.800	125	92	92	0	
	12	4	41.800	125	108	108	0	
	13	1	50.600	125	125	125	0	
	14	2	50.600	125	103	103	0	
	15	3	50.600	125	116	116	0	
	16	4	50.600	125	98	98	0	
	17	1	59.600	125	111	111	0	
	18	2	59.600	125	95	95	0	
	19	3	59.600	125	125	125	0	
	20	4	59.600	125	118	118	0	
	21	1	69.100	125	95	95	0	
	22	2	69.100	125	100	100	0	
	23	3	69.100	125	104	104	0	
	24	4	69.100	125	82	82	0	

Comments:

Strongylocentrotus purpuratus Reference Toxicant Control Chart: Proportion Normal



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/08/98	16.3400	16.2609	12.2429	8.2249	20.2789	24.2969
02/06/99	21.4060	16.2609	12.2429	8.2249	20.2789	24.2969
02/12/99	16.7860	16.2609	12.2429	8.2249	20.2789	24.2969
03/24/99	19.9670	16.2609	12.2429	8.2249	20.2789	24.2969
04/06/00	15.3050	16.2609	12.2429	8.2249	20.2789	24.2969
01/10/01	17.0130	16.2609	12.2429	8.2249	20.2789	24.2969
01/24/01	22.5850	16.2609	12.2429	8.2249	20.2789	24.2969
03/30/02	18.7500	16.2609	12.2429	8.2249	20.2789	24.2969
05/13/08	18.1232	16.2609	12.2429	8.2249	20.2789	24.2969
02/21/09	18.3711	16.2609	12.2429	8.2249	20.2789	24.2969
04/28/09	16.3950	16.2609	12.2429	8.2249	20.2789	24.2969
06/11/09	10.0200	16.2609	12.2429	8.2249	20.2789	24.2969
09/19/09	19.0719	16.2609	12.2429	8.2249	20.2789	24.2969
10/13/09	14.9860	16.2609	12.2429	8.2249	20.2789	24.2969
02/05/10	10.4320	16.2609	12.2429	8.2249	20.2789	24.2969
02/27/10	12.8956	16.2609	12.2429	8.2249	20.2789	24.2969
*02/16/11	7.9885	16.2609	12.2429	8.2249	20.2789	24.2969

*Value out of 95% CI range.
Updated 4/15/11 AM

Echinoderm Development-Proportion Normal

Start Date:	2/16/2011 16:20	Test ID:	C100316.121	Sample ID:	REF-Ref Toxicant
End Date:	2/20/2011 14:10	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus
Comments:					

Conc-ppb	1	2	3	4
Control	0.9600	0.9500	0.9400	0.9273
3.75	0.7857	0.7746	0.7800	0.7500
7.5	0.5464	0.6528	0.5294	0.5696
15	0.0435	0.0316	0.0659	0.0568
30	0.0000	0.0000	0.0000	0.0000

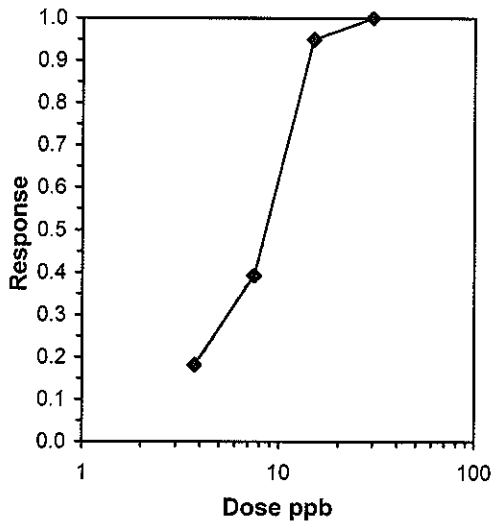
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.9443	1.0000	1.3339	1.2977	1.3694	2.295	4				28	500
*3.75	0.7726	0.8181	1.0739	1.0472	1.0895	1.732	4	9.772	2.290	0.0609	114	500
*7.5	0.5746	0.6084	0.8606	0.8148	0.9407	6.490	4	17.784	2.290	0.0609	213	500
*15	0.0495	0.0524	0.2223	0.1787	0.2597	15.992	4	41.770	2.290	0.0609	476	500
30	0.0000	0.0000	0.0447	0.0447	0.0447	0.000	4				500	500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95323	0.844	0.69669	0.61221
Bartlett's Test indicates equal variances (p = 0.39)	3.02351	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	<3.75	3.75			0.03104	0.03284	0.9019	0.00142	1.7E-13	3, 12

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%	8.0530	7.6453	8.4824
Auto-18.2%	7.9885	7.5961	8.4011



Test: ED-Echinoderm Development						Test ID: C100316.12		
Species: SP-Strongylocentrotus purpuratus						Protocol: EPAW 95-EPA West Coast		
Sample ID: REF-Ref Toxicant						Sample Type: CUSO-Copper sulfate		
Start Date: 2/16/2011 16:20			End Date: 2/20/2011 14			Lab ID: CCA-Weston, Carlsbad		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number normal	Notes
	1	1	Control	125	100	100	96	
	2	2	Control	125	100	100	95	
	3	3	Control	125	100	100	94	
	4	4	Control	125	55	55	51	
	5	1	3.750	125	70	70	55	
	6	2	3.750	125	71	71	55	
	7	3	3.750	125	100	100	78	
	8	4	3.750	125	84	84	63	
	9	1	7.500	125	97	97	53	
	10	2	7.500	125	72	72	47	
	11	3	7.500	125	68	68	36	
	12	4	7.500	125	79	79	45	
	13	1	15.000	125	69	69	3	
	14	2	15.000	125	95	95	3	
	15	3	15.000	125	91	91	6	
	16	4	15.000	125	88	88	5	
	17	1	30.000	125	91	91	0	
	18	2	30.000	125	100	100	0	
	19	3	30.000	125	92	92	0	
	20	4	30.000	125	75	75	0	
	21	1	60.000	125	0	0	0	
	22	2	60.000	125	0	0	0	
	23	3	60.000	125	0	0	0	
	24	4	60.000	125	0	0	0	

Comments:

96 Hour Echinoderm Development
Reference Toxicant Test

Test ID: C100316.121	Replicates: 3 4	Study Director: J. Hansen	Location: Room 2
Dilution Water Batch: S100128I1	Organism Batch: DG02161I	Associated Test(s): West Basin	Organism: S. purpuratus
Toxicant: Copper Sulfate (0.509gCu/LCuSO$_4$)	Lot #: 1907619	Date Prepared: 2/8/11	Initials: JH
Target Concentrations: **60 ppb**		Quantity of Stock: Target: 0.0585 mL ~~0.014 µL~~	Quantity of Diluent: Target: 500 mL ~~120 mL~~
60 ppb		Actual: 0.0585 mL	Actual: 500.0 mL

Serial Dilute by ½ to obtain concentrations of 30, 15, 7.5, and 3.75 ppb.

0 Hours Date: 2/16/11 WQ Time: 1720 JH Start Time: 1620 Initials: JH

STOCK

	Control	3.75	7.5	15	30	60
D.O. (%)	8.2	8.1	8.1	8.0	8.0	8.0
Temperature	15.4	14.7	14.9	14.9	14.7	14.8
Salinity	32.1	32.3	32.4	32.3	32.4	32.4
pH	8.2	8.2	8.2	8.2	8.2	8.2

Final Day Date: 2/20/11 WQ Time: 1401 SH/JH End Time: 1410 Initials: JH

STOCK

	Control	3.75	7.5	15	30	60
D.O. (%)	8.2	8.3	8.2	8.2	8.2	8.0
Temperature	14.8	14.4	14.3	14.5	14.4	14.5
Salinity	32.6	34.1	33.2	32.8	33.2	32.4
pH	8.2	8.1	8.1	8.1	8.1	8.2

☐ Pass ☐ Fail

Notes:

WESTON SOLUTIONS

96 Hour Echinoderm Development
Reference Toxicant Test

C100316.121

Conc.	Rep	Number Normal	Number Abnormal	Date	Initials
Control	1	96	4	4/15/11	am
	2	95	5		
	3	94	6		
	4	51	4		
	5				
3.75	1	55	15		
	2	55 ~~94~~ ① a	16 ~~6~~ ① a		
	3	78	22		
	4	63	21		
	5				
7.5	1	53	44		
	2	47	25		
	3	36	32		
	4	45	34		
	5				
15	1	3	66		
	2	3	92		
	3	6	85		
	4	5	83		
	5				
30	1	0	91		
	2	0	100		
	3	0	92		
	4	0	75		
	5				
60	1	⓪ am			
	2	↓			
	3				
	4				
	5				

QA counts – 93/7 eb 4/18/11 (Control, Rep 1)

QA counts – 3/70 eb 4/18/11 (15, Rep 1)

QA counts – 0/78 eb 4/18/11 (30, Rep 4)

⓪ only pieces of larvae 4/15/11 am ①WC 4/15/11 am

Echino Dev. RT
2/16/11

1	3	
2	10	Ø
3	14	
4	20	
5	11	
6	9	
7	24	3.75
8	5	
9	18	
10	22	7.5
11	12	
12	4	
13	15	
14	16	15
15	13	
16	21	
17	8	
18	17	30
19	2	
20	1	
21	6	
22	19	60
23	7	
24	23	

Haliotis rufescens Chronic Toxicity Test

Test: AB-Abalone Larval Development Test | Test ID: C110207.01

Species: HR-Haliotis rufescens | Protocol: EPAW 95-EPA/600/R-95/136

Sample ID: West Basin Brine | Sample Type: EFF2-Industrial

Start Date: 3/2/2011 14:55 | End Date: 3/4/2011 16:45 | Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Total Counte	Number Normal	Notes
	1	1	Control	100	90	
	2	2	Control	100	89	
	3	3	Control	100	85	
	4	4	Control	100	96	
	5	1	33	100	93	
	6	2	33	100	87	
	7	3	33	100	91	
	8	4	33	100	93	
	9	1	42	100	0	
	10	2	42	100	0	
	11	3	42	100	0	
	12	4	42	100	0	
	13	1	51	100	0	
	14	2	51	100	0	
	15	3	51	100	0	
	16	4	51	100	0	
	17	1	60	100	0	
	18	2	60	100	0	
	19	3	60	100	0	
	20	4	60	100	0	
	21	1	70	100	0	
	22	2	70	100	0	
	23	3	70	100	0	
	24	4	70	100	0	

Comments:

Abalone Larval Development Test-Proportion Normal

Start Date:	3/2/2011 14:55	Test ID:	C110207.0144	Sample ID:	West Basin Brine
End Date:	3/4/2011 16:45	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA/600/R-95/136	Test Species:	HR-Haliotis rufescens
Comments:					

Conc-%	1	2	3	4
Control	0.9000	0.8900	0.8500	0.9600
33	0.9300	0.8700	0.9100	0.9300
42	0.0000	0.0000	0.0000	0.0000
51	0.0000	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000

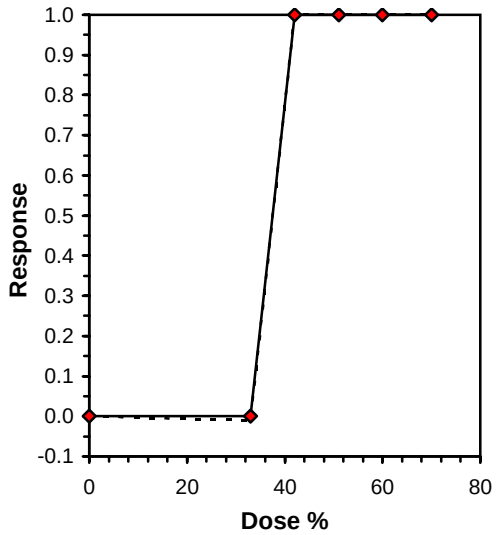
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9000	1.0000	1.2561	1.1731	1.3694	6.554	4				0.9050	1.0000
33	0.9100	1.0111	1.2685	1.2019	1.3030	3.759	4	-0.262	1.943	0.0924	0.9050	1.0000
42	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000
51	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000
60	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000
70	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95649	0.818	0.51968	0.46287
F-Test indicates equal variances (p = 0.39)	2.98024	47.4683		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs Control	0.06099	0.06746	0.00031	0.00453	0.80232	1, 6

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	33.450	0.717	32.781	33.450	-10.8724
IC10	33.900	0.099	33.276	33.900	-2.9241
IC15	34.350	0.093	33.761	34.350	-2.9241
IC20	34.800	0.088	34.245	34.800	-2.9241
IC25	35.250	0.082	34.730	35.250	-2.9241
IC40	36.600	0.066	36.184	36.600	-2.9241
IC50	37.500	0.055	37.153	37.500	-2.9241



Abalone Larval Development Test-Proportion Normal

Start Date:	3/2/2011 14:55	Test ID:	C110207.0144	Sample ID:	West Basin Brine
End Date:	3/4/2011 16:45	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA/600/R-95/13(	Test Species:	HR-Haliotis rufescens
Comments:					

Conc-%	1	2	3	4
Control	0.9000	0.8900	0.8500	0.9600
33	0.9300	0.8700	0.9100	0.9300
42	0.0000	0.0000	0.0000	0.0000
51	0.0000	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000

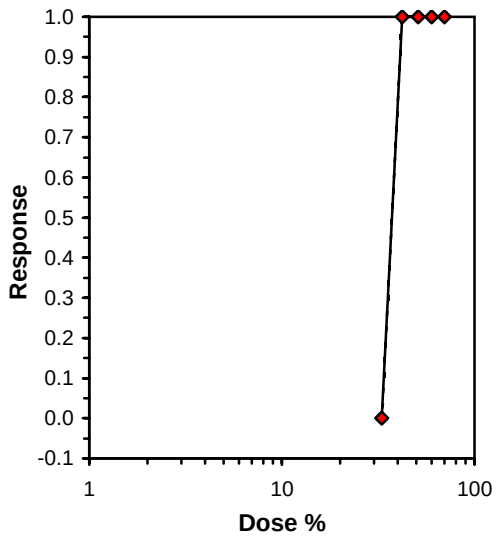
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.9000	1.0000	1.2561	1.1731	1.3694	6.554	4				40	400
33	0.9100	1.0111	1.2685	1.2019	1.3030	3.759	4	-0.262	1.943	0.0924	36	400
42	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400
51	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400
60	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400
70	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95649	0.818	0.51968	0.46287
F-Test indicates equal variances (p = 0.39)	2.98024	47.4683		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences Treatments vs Control	0.06099	0.06746	0.00031	0.00453	0.80232	1, 6

Graphical Method

Trim Level	EC50
0.0%	37.229
	37.229



ABALONE 48-HOUR CHRONIC TOXICITY TEST

BIO044

CLIENT:	West Basin MWD
PROJECT:	W Basin MWD salinity study
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C110207.0144
SPECIES:	H. rufescens

DATE RECEIVED:	2/7/11
DATE TEST STARTED:	3/2/11
DATE TEST ENDED:	3/4/11
WESTON SOP NO.: BIO 044	
STUDY DIRECTOR:	A Margolis

	Concentration	DO* (mg/L)	Temp* (°C)	Salinity* (ppt)	pH*
Day 0 (0 Hours)	Control	7.7 7.7 ① AA	15.6 15.6 ② AA	32 32 ③ AA	8.1 8.1 ④ AA
Date: 3/2/11	~~Brine Control~~				
Sample ID: C110207.01	33	8.9	15.6	33.0	8.0
Dilutions (Tech): KS	42	8.3	15.6	41.9	7.9
WQ Time: 1447	51	8.1	15.6	50.8	7.8
Technician: AA	60	8.1	15.7	59.6	7.8
	70	8.1	16.0	69.1	7.9
24 Hours	Control		15.1		
	~~Brine Control~~				
Date: 3/2/11	33		15.0		
WQ Time: 1156	42		14.6		
Technician: AA	51		15.0		
	60		15.0		
	70		14.8		
48 Hours	Control	7.6	15.4	33.0	8.0
	~~Brine Control~~				
Date: 3/4/11	33	7.8	15.1	53.1	7.9
WQ Time: 1354	42	7.2	14.5	43.6	7.9
Technician: AA	51	7.2	15.2	50.9	7.9
	60	7.1	15.0	60.2	7.9
	70	7.1	15.0	69.3	8.0

*Water quality measurements taken in surrogate water quality chambers.

START TIME:	1455	Initials:	AM
END TIME:	1645	Initials:	JH
ORGANISM BATCH:	TCA 3325		
SUPPLIER:	The Cultured Abalone		
HOBO TEMP. NO. 1:	269090		

DILUTION WATER BATCH:	S10022311
TEST LOCATION:	lm2

TEST ACCEPTABILITY:

- ☐ ≥ 80% NORMAL SHELL DEVELOPMENT IN SURVIVING CONTROLS
- ☐ MSD < 25%

① wp 3.2.11 AA
② wp 3.2.11 AA
③ wp 3.2.11 AA
④ wp 3.2.11 AA
⑤

ABALONE 48-HOUR CHRONIC TOXICITY TEST

BIO044

Weston Test ID:	Client:	Client Sample ID:
CLI0207.0144	West Basin MWD	West Basin Brine

SPAWNING DATA

Initial Spawning Time:	Final Spawning Time:	Fertilization Time:	No. of Females:	No. of Males:
1315	1415	1415	3	3
Embryo Density (count/mL):	1. 1500	2. 1470	3. 1660	Average: 1543
Stocking Volume Calculation:	0.32mL in 20mL			

LARVAL COUNT DATA

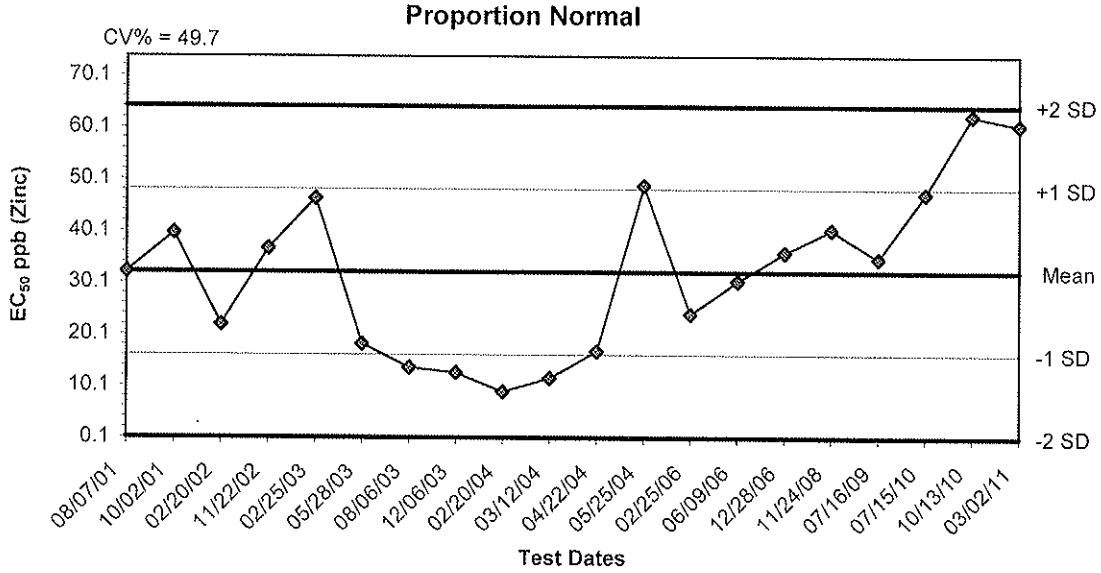
Conc.	Rep 1		Rep 2		Rep 3		Rep 4		Rep 5		Date	Initials
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal		
Control	90	10	89	11	85	15	96	4			4/15/11	AM
~~Brine~~												
33	93	7	87	13	91	9	93	7			4/15/11	AM
42	0	100	0	100	0	100	0	100			↓	↓
51	0	100	0	100	0	100	0	100				
60	0	100	0	100	0	100	0	100				
70	0	100	0	100	0	100	0	100				

QA COUNT CHECKS

	QA Check #1	QA Check #2	QA Check #3	QA Check #4
Concentration / Replicate	/	/	/	/
Total #				
# Normal				
Date / Initials	/	/	/	/

QA Check Acceptability: ☐ <5% difference in means of QA & orig. counts

Haliotis rufescens Reference Toxicant Control Chart: Proportion Normal



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
08/07/01	32.2400	32.2071	16.1963	0.1856	48.2178	64.2286
10/02/01	39.7400	32.2071	16.1963	0.1856	48.2178	64.2286
02/20/02	21.9970	32.2071	16.1963	0.1856	48.2178	64.2286
11/22/02	36.7482	32.2071	16.1963	0.1856	48.2178	64.2286
02/25/03	46.3903	32.2071	16.1963	0.1856	48.2178	64.2286
05/28/03	18.2910	32.2071	16.1963	0.1856	48.2178	64.2286
08/06/03	13.7450	32.2071	16.1963	0.1856	48.2178	64.2286
12/06/03	12.7535	32.2071	16.1963	0.1856	48.2178	64.2286
02/20/04	8.9967	32.2071	16.1963	0.1856	48.2178	64.2286
03/12/04	11.6820	32.2071	16.1963	0.1856	48.2178	64.2286
04/22/04	16.8560	32.2071	16.1963	0.1856	48.2178	64.2286
05/25/04	48.8620	32.2071	16.1963	0.1856	48.2178	64.2286
02/25/06	24.0370	32.2071	16.1963	0.1856	48.2178	64.2286
06/09/06	30.4491	32.2071	16.1963	0.1856	48.2178	64.2286
12/28/06	35.9712	32.2071	16.1963	0.1856	48.2178	64.2286
11/24/08	40.3295	32.2071	16.1963	0.1856	48.2178	64.2286
07/16/09	34.7842	32.2071	16.1963	0.1856	48.2178	64.2286
07/15/10	47.2558	32.2071	16.1963	0.1856	48.2178	64.2286
10/13/10	62.4480	32.2071	16.1963	0.1856	48.2178	64.2286
03/02/11	60.5650	32.2071	16.1963	0.1856	48.2178	64.2286

Updated 4/5/11 AM

Abalone Larval Development Test-Proportion Normal

Start Date:	3/2/2011 14:55	Test ID:	C081124.13	Sample ID:	REF-Ref Toxicant
End Date:	3/4/2011 16:45	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	HR-Haliotis rufescens
Comments:					

Conc-ppb	1	2	3	4
Control	0.8900	0.9100	0.9100	0.9000
10	0.9100	0.9200	0.8900	0.8700
18	0.9000	0.9300	0.9200	0.9400
32	0.9000	0.9300	0.9500	0.9000
56	0.5700	0.3400	0.7400	0.6400
100	0.0000	0.0000	0.0000	0.0000

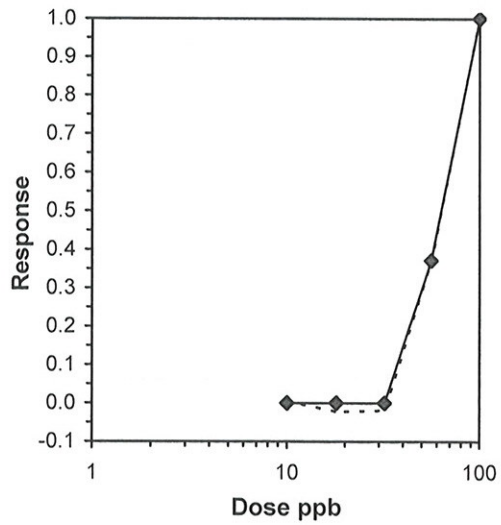
			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.9025	1.0000	1.2535	1.2327	1.2661	1.277	4			39	400
10	0.8975	0.9945	1.2462	1.2019	1.2840	2.919	4	17.50	10.00	41	400
18	0.9225	1.0222	1.2899	1.2490	1.3233	2.449	4	23.50	10.00	31	400
32	0.9200	1.0194	1.2866	1.2490	1.3453	3.627	4	21.00	10.00	32	400
*56	0.5725	0.6343	0.8603	0.6225	1.0357	20.335	4	10.00	10.00	171	400
100	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4			400	400

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.82213	0.868	-1.0795	6.1689
Bartlett's Test indicates unequal variances (p = 1.45E-03)	17.6425	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	32	56	42.332	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	60.565	58.921	62.255
5.0%	60.977	59.130	62.881
10.0%	61.383	59.260	63.581
20.0%	62.161	59.127	65.352
Auto-0.0%	60.565	58.921	62.255



Reviewed by:

Abalone Larval Development Test-Proportion Normal

Start Date:	3/2/2011 14:55	Test ID:	C081124.13	Sample ID:	REF-Ref Toxicant
End Date:	3/4/2011 16:45	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	HR-Haliotis rufescens
Comments:	for IC25 and MSDp only				

Conc-ppb	1	2	3	4
Control	0.8900	0.9100	0.9100	0.9000
10	0.9100	0.9200	0.8900	0.8700
18	0.9000	0.9300	0.9200	0.9400
32	0.9000	0.9300	0.9500	0.9000
56	0.5700	0.3400	0.7400	0.6400
100	0.0000	0.0000	0.0000	0.0000

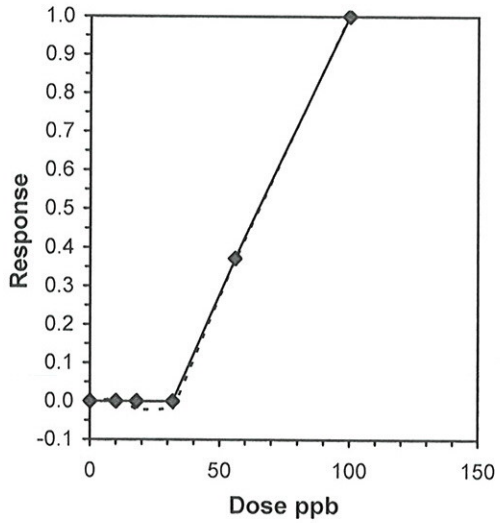
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9025	1.0000	1.2535	1.2327	1.2661	1.277	4				0.9106	1.0000
10	0.8975	0.9945	1.2462	1.2019	1.2840	2.919	4	0.123	2.360	0.1403	0.9106	1.0000
18	0.9225	1.0222	1.2899	1.2490	1.3233	2.449	4	-0.612	2.360	0.1403	0.9106	1.0000
32	0.9200	1.0194	1.2866	1.2490	1.3453	3.627	4	-0.557	2.360	0.1403	0.9106	1.0000
*56	0.5725	0.6343	0.8603	0.6225	1.0357	20.335	4	6.612	2.360	0.1403	0.5725	0.6287
100	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.82213	0.868	-1.0795	6.1689
Bartlett's Test indicates unequal variances (p = 1.45E-03)	17.6425	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	32	56	42.332		0.09787	0.10842	0.13516	0.00707	9.4E-06	4, 15

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	35.232	0.802	33.470	38.211	0.7543
IC10	38.464	1.585	34.976	44.422	0.7443
IC15	41.695	2.375	36.465	50.633	0.7336
IC20	44.927	3.148	37.954	56.845	0.6797
IC25	48.159	3.775	39.451	62.033	0.4391
IC40	58.008	4.595	43.866	69.938	-0.1853
IC50	65.007	4.798	46.550	74.948	-0.6745



Test: AB-Abalone Larval Development Test					Test ID: C081124.13	
Species: HR-Haliotis rufescens					Protocol: EPAW 95-EPA West Coast	
Sample ID: REF-Ref Toxicant					Sample Type: ZNSO-Zinc sulfate	
Start Date: 3/2/2011 14:55			End Date: 3/4/2011 16:4		Lab ID: CCA-Weston, Carlsbad	
Pos	ID	Rep	Group	Total Counted	Number Normal	Notes
	1	1	Control	100	89	
	2	2	Control	100	91	
	3	3	Control	100	91	
	4	4	Control	100	90	
	5	1	10.000	100	91	
	6	2	10.000	100	92	
	7	3	10.000	100	89	
	8	4	10.000	100	87	
	9	1	18.000	100	90	
	10	2	18.000	100	93	
	11	3	18.000	100	92	
	12	4	18.000	100	94	
	13	1	32.000	100	90	
	14	2	32.000	100	93	
	15	3	32.000	100	95	
	16	4	32.000	100	90	
	17	1	56.000	100	57	
	18	2	56.000	100	34	
	19	3	56.000	100	74	
	20	4	56.000	100	64	
	21	1	100.000	100	0	
	22	2	100.000	100	0	
	23	3	100.000	100	0	
	24	4	100.000	100	0	

Comments:

48 Hour Abalone Development
Reference Toxicant Test

Test ID:	Replicates: 5	Study Director:	Location:
C081124.13		J Hansen	rm 2
Dilution Water Batch:	**Organism Batch:**	**Associated Test(s):**	**Organism:**
S10022311	H TCA 3325	ASBS/W Basin	H. rufescens
Toxicant: Zinc Sulfate (10,000µgZn/L) $ZnSO_4 \cdot H_2O$	**Lot #:** 07128CJ	**Date Prepared:** 3/2/11	**Initials:** am

Target Concentrations:	Quantity of Stock: Target:	Actual:	Quantity of Diluent: Target:	Actual:
10 ppb	0.50 mL	0.5012	500 mL	500mL
18 ppb	0.90 mL	0.9001	500 mL	500 mL
32 ppb	1.60 mL	1.6021	500 mL	500mL
56 ppb	2.80 mL	2.8006	500 mL	500mL
100 ppb	5.00 mL	5.0049	500 mL	500 mL

0 Hours Date: 3/2/11 WQ Time: 1507 Start Time: 1455 AM Initials: AA

STOCK

	Control	10	18	32	56	100
D.O. (mg/L)	7.4	7.7	7.6	7.6	7.6	7.7
Temperature	16.0	16.1	16.4	16.4	16.3	16.4
Salinity	32.4	32.4	32.4	32.4	32.3	32.1
pH	8.2	8.2	8.2	8.2	8.2	8.2

48 Hours Date: 3/4/11 WQ Time: 1350 End Time: 1645 JH Initials: AP

STOCK

	Control	10	18	32	56	100
D.O. (mg/L)	7.8	7.9	7.8	7.8	7.9	7.8
Temperature	15.9	15.4	15.3	15.8	15.0	15.6
Salinity	32.9	33.0	33.0	32.8	32.8	32.5
pH	8.0	8.0	8.0	8.0	8.0	8.0

☑ Pass ☐ Fail

Notes: ©WC 3/2/11 am

48 Hour Abalone Development
Reference Toxicant Test

Test ID: C081124.13

4/11/11 JH

QA counts 88 : 12

Conc.	Rep	Number Normal	Number Abnormal	Date	Initials
Control	1	89	11	4/15/11	amm
	2	91	9	↓	↓
	3	91	9		
	4	90	10		
	5	—	—	—	—
10 ppb	1	91	9	4/15/11	amm
	2	92	8	↓	↓
	3	89	11		
	4	87	13		
	5	—	—	—	—
18 ppb	1	90	10	4/15/11	amm
	2	93	7	↓	↓
	3	92	8		
	4	94	6		
	5	—	—	—	—
32 ppb	1	90	10	4/15/11	amm
	2	93	7	↓	↓
	3	95	5		
	4	90	10		
	5	—	—	—	—
56 ppb	1	57	43	4/15/11	amm
	2	34	66	↓	↓
	3	74	26		
	4	64	36		
	5	—	—	—	—
100 ppb	1	0	100	4/15/11	amm
	2	0	100	↓	↓
	3	0	100		
	4	0	100		
	5	—	—	—	—

38 : 62

∅ : 100

Abalone RT
3/2/11

1	11	
2	19	Ø
3	18	
4	1	
5	8	
6	17	10
7	12	
8	3	
9	13	
10	2	18
11	9	
12	10	
13	4	
14	21	32
15	5	
16	14	
17	16	
18	23	56
19	6	
20	15	
21	7	
22	24	100
23	20	
24	22	

Atherinops affinis Chronic Toxicity Test

Test: LF-Larval Fish Growth and Survival Test | Test ID: C110211.01
Species: AT-Atherinops affinis | Protocol: EPAW 95-EPA/600/R-95/136
Sample ID: West Basin Brine | Sample Type: EFF2-Industrial
Start Date: 4/1/2011 13:20 | End Date: 4/8/2011 12:20 | Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(	Wgt Count
	1	1	Control	5	4	4	4	3	3	3	3	65.99	61.78	3
	2	2	Control	5	3	3	3	3	3	3	3	70.55	67.03	3
	3	3	Control	5	5	5	3	2	2	2	2	63.05	60.42	2
	4	4	Control	5	5	5	5	5	5	5	5	123.22	118.02	5
	5	5	Control	5	4	4	4	4	4	4	4	106.21	100.94	4
	6	1	33	5	4	4	4	4	4	4	4	113.65	109.93	4
	7	2	33	5	2	2	2	2	2	2	2	112.23	108.68	2
	8	3	33	5	4	4	4	4	4	4	4	94.82	90.07	4
	9	4	33	5	5	5	5	5	5	5	5	99.57	94.93	5
	10	5	33	5	4	4	4	4	4	4	4	107.21	102.82	4
	11	1	42	5	4	4	4	4	4	4	4	90.82	86.37	4
	12	2	42	5	5	5	5	4	4	4	4	127.86	123.37	4
	13	3	42	5	2	2	2	2	2	2	2	135.16	132.35	2
	14	4	42	5	3	2	2	2	2	2	2	147.69	144.1	2
	15	5	42	5	2	2	2	2	2	2	2	130.47	127.43	2
	16	1	51	5	2	2	2	2	2	2	2	113.18	109.44	2
	17	2	51	5	2	2	2	2	2	2	2	155.39	152.36	2
	18	3	51	5	0	0	0	0	0	0	0	0	0	0
	19	4	51	5	1	1	1	1	1	1	1	123.45	121.94	1
	20	5	51	5	3	3	3	2	2	2	2	110.79	107.75	2
	21	1	60	5	0	0	0	0	0	0	0	0	0	0
	22	2	60	5	0	0	0	0	0	0	0	0	0	0
	23	3	60	5	0	0	0	0	0	0	0	0	0	0
	24	4	60	5	0	0	0	0	0	0	0	0	0	0
	25	5	60	5	0	0	0	0	0	0	0	0	0	0
	26	1	70	5	0	0	0	0	0	0	0	0	0	0
	27	2	70	5	0	0	0	0	0	0	0	0	0	0
	28	3	70	5	0	0	0	0	0	0	0	0	0	0
	29	4	70	5	0	0	0	0	0	0	0	0	0	0
	30	5	70	5	0	0	0	0	0	0	0	0	0	0

Comments:

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	4/1/2011 13:20	Test ID:	C110211.0179	Sample ID:	West Basin Brine
End Date:	4/8/2011 12:20	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA/600/R-95/136	Test Species:	AT-Atherinops affinis
Comments:					

Conc-%	1	2	3	4	5
Control	0.6000	0.6000	0.4000	1.0000	0.8000
33	0.8000	0.4000	0.8000	1.0000	0.8000
42	0.8000	0.8000	0.4000	0.4000	0.4000
51	0.4000	0.4000	0.0000	0.2000	0.4000
60	0.0000	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.6800	1.0000	0.9819	0.6847	1.3453	25.686	5				8	25
33	0.7600	1.1176	1.0703	0.6847	1.3453	22.324	5	-0.602	2.230	0.3278	6	25
42	0.5600	0.8235	0.8537	0.6847	1.1071	27.103	5	0.872	2.230	0.3278	11	25
*51	0.2800	0.4118	0.5487	0.2255	0.6847	37.262	5	2.947	2.230	0.3278	18	25
60	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5				25	25
70	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5				25	25

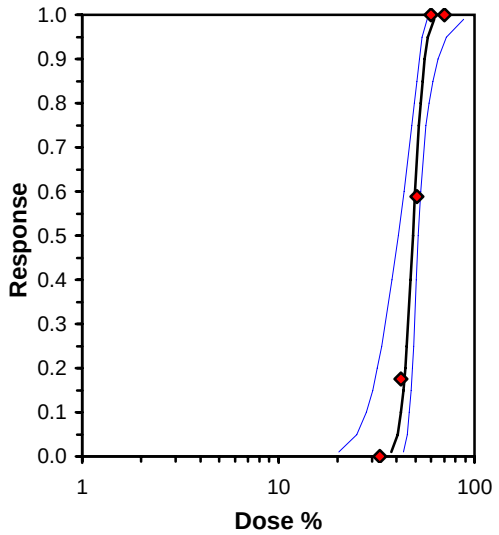
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96342	0.905	-0.1394	-0.8791
Bartlett's Test indicates equal variances (p = 0.98)	0.16647	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	42	51	46.2817	2.38095	0.32124	0.46459	0.25998	0.05401	0.01418	3, 16

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	21.2739	7.04038	7.47472	35.073	0.32	1.93311	7.81472	0.5864	1.68597	0.04701	14
Intercept	-30.867	12.0604	-54.505	-7.2287							
TSCR	0.30253	0.06253	0.17998	0.42508							

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	37.7238	20.4321	43.3089
EC05	3.355	40.6116	25.1387	45.4101
EC10	3.718	42.2404	28.0567	46.6037
EC15	3.964	43.376	30.2009	47.448
EC20	4.158	44.3003	32.0093	48.1481
EC25	4.326	45.109	33.6347	48.7745
EC40	4.747	47.2128	38.0155	50.5091
EC50	5.000	48.5253	40.805	51.729
EC60	5.253	49.8743	43.6229	53.1924
EC75	5.674	52.2003	47.9404	56.6517
EC80	5.842	53.1532	49.3711	58.5553
EC85	6.036	54.2859	50.8029	61.2024
EC90	6.282	55.7454	52.3152	65.1345
EC95	6.645	57.9811	54.1965	72.0161
EC99	7.326	62.4196	57.2563	87.9391



Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	4/1/2011 13:20	Test ID:	C110211.0179	Sample ID:	West Basin Brine
End Date:	4/8/2011 12:20	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA/600/R-95/136	Test Species:	AT-Atherinops affinis
Comments:					

Conc-%	1	2	3	4	5
Control	1.4033	1.1733	1.3150	1.0400	1.3175
33	0.9300	1.7750	1.1875	0.9280	1.0975
42	1.1125	1.1225	1.4050	1.7950	1.5200
51	1.8700	1.5150	1.5100	1.5200	

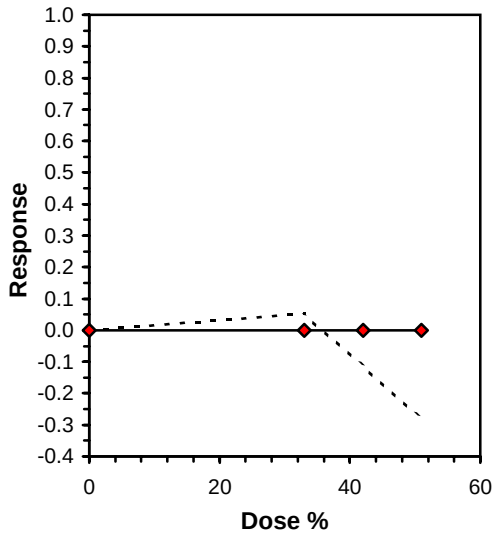
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	1.2498	1.0000	1.2498	1.0400	1.4033	11.475	5				1.3570	1.0000
33	1.1836	0.9470	1.1836	0.9280	1.7750	29.475	5	0.407	2.343	0.3813	1.3570	1.0000
42	1.3910	1.1129	1.3910	1.1125	1.7950	20.640	5	-0.867	2.343	0.3813	1.3570	1.0000
51	1.6038	1.2832	1.6038	1.5100	1.8700	11.071	4	-2.050	2.343	0.4045	1.3570	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.91295	0.901	1.01346	0.92938
Bartlett's Test indicates equal variances (p = 0.36)	3.22989	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test Treatments vs Control	51	>51		1.96078	0.40446	0.32361	0.1513	0.06622	0.12059	3, 15

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>51			
IC10	>51			
IC15	>51			
IC20	>51			
IC25	>51			
IC40	>51			
IC50	>51			



Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	4/1/2011 13:20	Test ID:	C110211.0179	Sample ID:	West Basin Brine
End Date:	4/8/2011 12:20	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA/600/R-95/136	Test Species:	AT-Atherinops affinis
Comments:					

Conc-%	1	2	3	4	5
Control	0.8420	0.7040	0.5260	1.0400	1.0540
33	0.7440	0.7100	0.9500	0.9280	0.8780
42	0.8900	0.8980	0.5620	0.7180	0.6080
51	0.7480	0.6060	0.0000	0.3020	0.6080
60	0.0000	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000

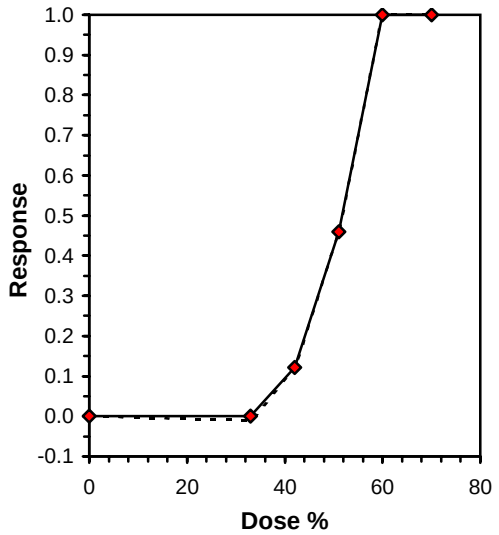
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.8332	1.0000	0.8332	0.5260	1.0540	27.015	5				0.8376	1.0000
33	0.8420	1.0106	0.8420	0.7100	0.9500	12.926	5	-0.066	2.230	0.2970	0.8376	1.0000
42	0.7352	0.8824	0.7352	0.5620	0.8980	21.175	5	0.736	2.230	0.2970	0.7352	0.8777
*51	0.4528	0.5434	0.4528	0.0000	0.7480	66.481	5	2.856	2.230	0.2970	0.4528	0.5406
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5				0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94914	0.905	-0.6101	-0.0318
Bartlett's Test indicates equal variances (p = 0.27)	3.89778	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	42	51	46.2817	2.38095	0.29699	0.35644	0.16542	0.04434	0.03307	3, 16

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	36.681	10.605	0.000	46.432	-1.0549
IC10	40.362	7.282	3.657	47.011	-1.7088
IC15	42.741	5.414	14.386	51.507	-1.8297
IC20	44.075	4.200	25.637	54.877	-1.4084
IC25	45.410	3.529	32.918	55.027	-0.7667
IC40	49.414	2.467	41.479	55.479	-0.1936
IC50	51.676	2.074	44.748	55.984	-0.5733



Test: AC-Acute Fish Test | Test ID: C110211.01
Species: AT-Atherinops affinis | Protocol: EPAW 95-EPA/600/R-95/136
Sample ID: West Basin Brine | Sample Type: EFF2-Industrial
Start Date: 4/1/2011 13:20 | End Date: 4/8/2011 12:20 | Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5	4	4	4	3	
	2	2	Control	5	3	3	3	3	
	3	3	Control	5	5	5	3	2	
	4	4	Control	5	5	5	5	5	
	5	5	Control	5	4	4	4	4	
	6	1	33	5	4	4	4	4	
	7	2	33	5	2	2	2	2	
	8	3	33	5	4	4	4	4	
	9	4	33	5	5	5	5	5	
	10	5	33	5	4	4	4	4	
	11	1	42	5	4	4	4	4	
	12	2	42	5	5	5	5	4	
	13	3	42	5	2	2	2	2	
	14	4	42	5	3	2	2	2	
	15	5	42	5	2	2	2	2	
	16	1	51	5	2	2	2	2	
	17	2	51	5	2	2	2	2	
	18	3	51	5	0	0	0	0	
	19	4	51	5	1	1	1	1	
	20	5	51	5	3	3	3	2	
	21	1	60	5	0	0	0	0	
	22	2	60	5	0	0	0	0	
	23	3	60	5	0	0	0	0	
	24	4	60	5	0	0	0	0	
	25	5	60	5	0	0	0	0	
	26	1	70	5	0	0	0	0	
	27	2	70	5	0	0	0	0	
	28	3	70	5	0	0	0	0	
	29	4	70	5	0	0	0	0	
	30	5	70	5	0	0	0	0	

Comments:

Acute Fish Test-96 Hr Survival

Start Date:	4/1/2011 13:20	Test ID:	C110211.0179	Sample ID:	West Basin Brine
End Date:	4/8/2011 12:20	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAW 95-EPA/600/R-95/136	Test Species:	AT-Atherinops affinis
Comments:					

Conc-%	1	2	3	4	5
Control	0.6000	0.6000	0.4000	1.0000	0.8000
33	0.8000	0.4000	0.8000	1.0000	0.8000
42	0.8000	0.8000	0.4000	0.4000	0.4000
51	0.4000	0.4000	0.0000	0.2000	0.4000
60	0.0000	0.0000	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.6800	1.0000	0.9819	0.6847	1.3453	25.686	5				8	25
33	0.7600	1.1176	1.0703	0.6847	1.3453	22.324	5	-0.602	2.230	0.3278	6	25
42	0.5600	0.8235	0.8537	0.6847	1.1071	27.103	5	0.872	2.230	0.3278	11	25
*51	0.2800	0.4118	0.5487	0.2255	0.6847	37.262	5	2.947	2.230	0.3278	18	25
60	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5				25	25
70	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5				25	25

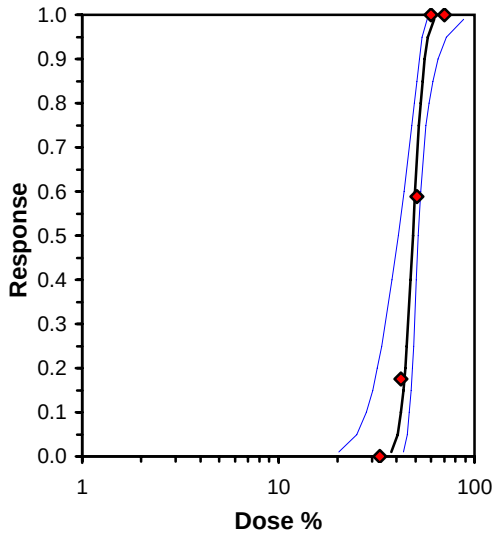
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96342	0.905	-0.1394	-0.8791
Bartlett's Test indicates equal variances (p = 0.98)	0.16647	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	42	51	46.2817	2.38095	0.32124	0.46459	0.25998	0.05401	0.01418	3, 16

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	21.2739	7.04038	7.47472	35.073	0.32	1.93311	7.81472	0.5864	1.68597	0.04701	14
Intercept	-30.867	12.0604	-54.505	-7.2287							
TSCR	0.30253	0.06253	0.17998	0.42508							

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	37.7238	20.4321	43.3089
EC05	3.355	40.6116	25.1387	45.4101
EC10	3.718	42.2404	28.0567	46.6037
EC15	3.964	43.376	30.2009	47.448
EC20	4.158	44.3003	32.0093	48.1481
EC25	4.326	45.109	33.6347	48.7745
EC40	4.747	47.2128	38.0155	50.5091
EC50	5.000	48.5253	40.805	51.729
EC60	5.253	49.8743	43.6229	53.1924
EC75	5.674	52.2003	47.9404	56.6517
EC80	5.842	53.1532	49.3711	58.5553
EC85	6.036	54.2859	50.8029	61.2024
EC90	6.282	55.7454	52.3152	65.1345
EC95	6.645	57.9811	54.1965	72.0161
EC99	7.326	62.4196	57.2563	87.9391



WESTON SOLUTIONS

Topsmelt 7-Day Chronic Toxicity Test

BIO063

Client	West Basin Municipal Water District
Project:	West Basin MWD Salinity Study
Client Sample ID:	⑥ ~~CH~~ West Basin ④ Brine
WESTON Test ID:	~~C110328.0263~~ C110211.0163
Species:	*Atherinops affinis*

Date Received:	① ~~3/28/11~~
Date Test Started:	⑥ ~~3~~ 4/1/11
Date Test Ended:	4/8/11
Study Director:	A Margolis
Organisms/Chamber:	5

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 0	Control							2	6.9	2	20.4	6	32.6	4	8.0
Date: 4/1/11 C110211.01	33								9.8		18.9		33.3		7.7
Sample ID: ~~C110328.02~~ ①	~~42~~ 51								9.8		18.9		42.5		7.7
Dilutions (Tech): SH	~~51~~ 60 ① AA								8.9		19.0		51.4		7.7
WQ* Time: 1043	60								9.0		18.9		60.7		7.6
Technician: AA	70								8.8		18.8		② AA		7.8
*performed on stock dilutions															
Day 1	Control	2	6.4	2	20.4	6 ③ SH	7.7	2	6.4	2	19.4	6	32.7	4	8.1
Date: 4/2/11	33		6.3		20.3		7.6		7.41		19.8		33.3		8.0
Sample ID: C110211.01	42		6.8		20.4		7.7		8.3		20.2		42.5		7.8
Dilutions (Tech): SH	51		6.1		20.9		7.7		8.2		20.2		51.5		7.8
WQ Time: 1150/1507 Rep: 1	60		5.7		19.9		7.6		—		—		—		—
Technician: SH/SH	70		5.3		20.0		7.7		—		—		—		—
Day 2	Control	2	6.3	2	20.8	4	7.9	2	6.7	2	20.5	6	32.6	4	8.1
Date: 4/3/11	33		6.5		20.6		7.8		8.5		19.2		33.2		8.0
Sample ID: C110211.01	42		6.5		20.6		7.8		9.7		19.1		42.5		7.8
Dilutions (Tech): SH	51		6.5		20.6		7.8		9.3		19.2		51.5		7.8
WQ Time: 1202 ~~1501~~ ④ SH /1323 Rep: 2	60		—		—		—		—		—		—		—
Technician: SH/SH	70		—		—		—		—		—		—		—
Day 3	Control	2	6.7	2	20.5	4	9.1	2	7.3	2	19.3	5	32.5	4	9.2
Date: 4/4/11	33		6.8		20.4 ~~20.5~~ ⑤		9.1		8.5		19.3		32.9		9.1
Sample ID: C110211.01	42		6.7		20.6		9.1		8.5		19.6		42.3		9.0
Dilutions (Tech): SH	51		6.7		20.4		9.1		8.6		19.2		51.0		8.9
WQ Time: 1400/1500 Rep: 3/4	60		—		—		—		—		—		—		—
Technician: SL/SL	70		—		—		—		—		—		—		—

Start Time:	1320 SH/KC
End Time:	1220 KC
Supplier:	Aquatic Bio Systems
Organism Batch:	ABS 0486 Age: 15 day
Hobo Temp. No.:	2323

Dilution Water Batch:	S1003141
Test Location:	Room 3
Test Acceptability:	☐ ≥80% Survival in control ☐ Mean > 0.85 mg dry weight / organism in control

① WC 4/1/11 AA
② Cond. meter maxed out, unable to measure 4/1/11 AA
③ IE 4/2/11 SH
④ WT 4/3/11 SH
⑤ WC 4/4/11 SL
⑥ WC 4/7/11 KS
⑦ IE 4/15/11 AM

WESTON SOLUTIONS

Topsmelt 7-Day Chronic Toxicity Test

BIO063

Weston Test ID: C110211.0163 ~~C110328.0263~~	Client: West Basin Municipal Water District	Client Sample ID: West Basin Brine

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 4	Control	2	6.6	2	20.5	4	7.7	2	7.2	2	19.7	5	32.2	4	7.9
Date: 4/5/11	33		6.6		20.5		7.7		9.3		19.4		32.8		7.7
Sample ID: C110211.01	42		6.4		20.5		7.7		9.2		19.7		42.2		7.7
Dilutions (Tech): SL	51		~~6.8~~ (3) SL 6.4		20.4		7.7		9.2		19.6		51.0		7.6
WQ Time: 1105/1320 Rep: 4	60														
Technician: SL/SL	70														
								(6) SL	7.3						
Day 5	Control	2	6.7	2	19.9	2	7.7	2	~~6.7~~	2	19.5	6	32.8	2	8.0
Date: 4/6/11	33		6.7		19.9		7.5		9.3 ~~8.9~~ (9) SL		20.0		33.3		7.9
Sample ID: C110211.01	42		6.2		20.1		7.7		8.7		19.3		42.3		7.7
Dilutions (Tech): SL	51		6.1		20.1		7.8		8.5		19.9	(8) SL	~~51.8~~ 51.6		7.7
WQ Time: (2) SL ~~1050~~ 1055 Rep: 5	60														
Technician: SL/SL	70														
															(8) SL
Day 6 (9) SL	Control	2	6.8	2	20.6	4	8.1	2	7.4	2	19.5	5	32.1	4	~~7.8~~ 7.9
Date: ~~4/6/11~~ 4/7/11	~~33~~		6.7		20.5		7.9		9.1		18.9		32.8		7.8
Sample ID: C110211.01	42	(6) SL	~~6.8~~ 6.4		20.5		7.9		8.8		18.7		41.9		7.8
Dilutions (Tech): KC	51	(6) SL	~~6.5~~ 6.3		20.6		7.9		8.5		18.8		51.0		7.7
WQ Time: 1040/1050 Rep: 1	60														
Technician: SL/SL	70														
Day 7	Control	2	6.7	2	20.6	2	(10) SL ~~32.5~~	7.8				5	32.4		
Date: 4/8/11	33		6.7		20.5		7.8						33.0		
WQ Time: 1040 Rep: 2	42		6.1		20.5		7.9						42.3		
Technician: SL	51		6.1		20.5		7.9						51.2		
	60														
	70														

(1) D.O. was not set to correct salinity 4/5/11 SL
(2) IE 4/6/11 SL
(3) MR 4/6/11 SL
(4) MR 4/6/11 SL
(5) MR 4/6/11 SL
(6)(7) MR 4/7/11 SL
(8) MR 4/7/11 SL
(9) IE 4/8/11 SL
(10) WC 4/8/11 SL
(11) IE 4/15/11

WESTON SOLUTIONS

Topsmelt 7-Day Chronic Toxicity Test

BIO063

Weston Test ID: C110211.0163 ~~C110328.0263~~	Client: West Basin Municipal Water District	Client Sample ID: WestBasin Brine

Survival Data

Concentration (%)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 4/2/11	Date: 4/3/11	Date: 4/4/11	Date: 4/5/11	Date: 4/6/11	Date: 4/7/11	Date: 4/8/11
		Renewal Time: 1515	Renewal Time: 1407	Renewal Time: 1435	Renewal Time: 1305	Renewal Time: 1120	Renewal Time: 1110	End Time: 1220
		Tech.: SH	Tech.: SH	Tech.: SL	Tech.: SL	Tech.: SL	Tech.: SL	Tech.: KC
Control	1	4 (1)	4	4	3 (1)	3	3	3
	2	3 (2)	3	3	3	3	3	3
	3	5	5	3 (2) ③ SL	2 (1)	2	2	2
	4	5	5	5	5	5	5	5
	5	4 (1)	4	4	4	4	4	4
33	1	SH 4 (1)	4	4	4	4	4	4
	2	① ~~3 (3) 2 (3)~~	2	2	2	2	2	2
	3	4 (1)	4	4	4	4	4	4
	4	5	5	5	5	5	5	5
	5	4 (1)	4	4	4	4	4	4
42	1	4 (1)	4	4	4	4	4	4
	2	5	5	5	4 (1)	4	4	4
	3	2 (3) @SH ~~1 2~~		2	2	2	2	2
	4	3 (2)	2 (1)	2	2	2	2	2
	5	2 (3)	2	2	2	2	2	2
51	1	2 (3)	2	2	2	2	2	2
	2	2 (3)	2	2	2 ~~1~~ @SL	2	2	2
	3	∅ (5)						
	4	1 (4)	1	1	1	1	1	1
	5	3 (2)	3	3	2 (1)	2	2	2
60	1	∅ (5)						
	2	∅ (5)						
	3	∅ (5)						
	4	∅ (5)						
	5	∅ (5)						
70	1	∅ (5)						
	2	∅ (5)						
	3	∅ (5)						
	4	∅ (5)						
	5	∅ (5)						
	1							
	2							
	3							
	4							
	5							

Feeding Information:	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
AM Feed (Tech):		SH	SH	SL	SL	SL	KC
PM Feed (Tech):	KC	SH	SH	SL	SL	KC	KC

① IE 4/2/11 SH
② IW 4/3/11 SH
③ one accidently killed. 4/4/11 SL
④ IE 4/5/11 SL
⑤ IE 4/15/11 ca

Topsmelt 7-Day Chronic Toxicity Test

BIO063

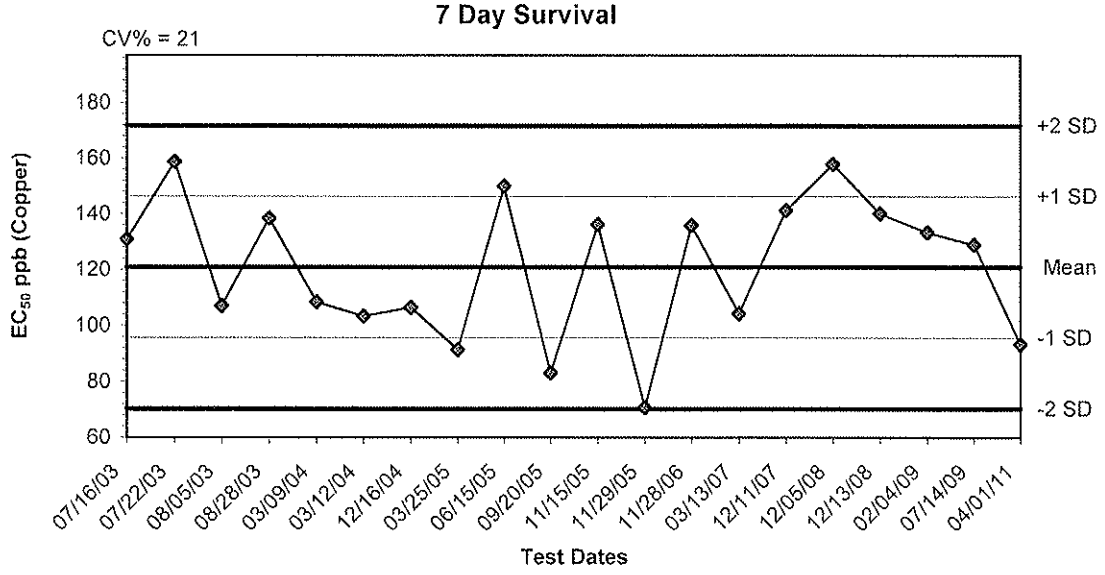
Weston Test ID: C110211.0163 ~~C110328.0263~~	Client: West Basin Municipal Water District	Client Sample ID: West Basin Brine

Concentration (%)	Replicate	Boat Number	Weight Empty Boat (mg)	Weight Boat & Animals (mg)
Control	1	1	61.78	65.99
	2	2	67.03	70.55
	3	3	60.42	63.05
	4	4	118.02	123.22
	5	5	100.94	106.21
33	1	6	109.93	113.65
	2	7	108.68	112.23
	3	8	90.07	94.82
	4	9	94.93	99.57
	5	10	102.82	107.21
42	1	11	86.37	90.82
	2	12	123.37	127.86
	3	13	132.35	135.16
	4	14	144.10	147.69
	5	15	127.43	130.47
51	1	16	109.44	113.18
	2	17	152.36	155.39
	3			
	4	18	121.94	123.45
	5	19	107.75	110.79
	1			
	2			
	3			
	4			
	5			
	1			
	2			
	3			
	4			
	5			
	1			
	2			
	3			
	4			
	5			
		Date:	4/8/11	4/9/11
		Time:	1000	1420
		Technician:	SL	KS

Oven temp. (°C) at start of drying:	70.0°C	Date/Time:	4/8/11 1240	Technician:	SL
Oven temp. (°C) at end of drying:	73.0°C	Date/Time:	4/9/11 1010	Technician:	KS

OIE 4/15/11

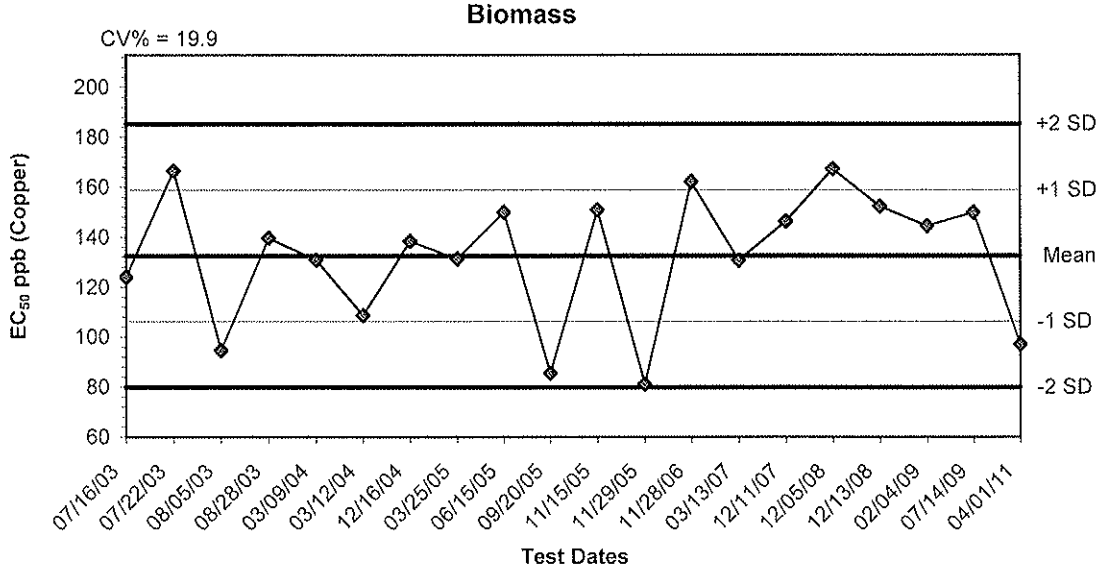
Atherinops affinis Reference Toxicant Control Chart: 7 Day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/16/03	130.7450	120.9606	95.5854	70.2102	146.3358	171.7110
07/22/03	158.7400	120.9606	95.5854	70.2102	146.3358	171.7110
08/05/03	107.0200	120.9606	95.5854	70.2102	146.3358	171.7110
08/28/03	138.3890	120.9606	95.5854	70.2102	146.3358	171.7110
03/09/04	108.4000	120.9606	95.5854	70.2102	146.3358	171.7110
03/12/04	103.3190	120.9606	95.5854	70.2102	146.3358	171.7110
12/16/04	106.4900	120.9606	95.5854	70.2102	146.3358	171.7110
03/25/05	91.3448	120.9606	95.5854	70.2102	146.3358	171.7110
06/15/05	150.0000	120.9606	95.5854	70.2102	146.3358	171.7110
09/20/05	83.1386	120.9606	95.5854	70.2102	146.3358	171.7110
11/15/05	136.1540	120.9606	95.5854	70.2102	146.3358	171.7110
11/29/05	70.7110	120.9606	95.5854	70.2102	146.3358	171.7110
11/28/06	135.8100	120.9606	95.5854	70.2102	146.3358	171.7110
03/13/07	104.2070	120.9606	95.5854	70.2102	146.3358	171.7110
12/11/07	141.2510	120.9606	95.5854	70.2102	146.3358	171.7110
12/05/08	157.9200	120.9606	95.5854	70.2102	146.3358	171.7110
12/13/08	140.0730	120.9606	95.5854	70.2102	146.3358	171.7110
02/04/09	133.3300	120.9606	95.5854	70.2102	146.3358	171.7110
07/14/09	128.9120	120.9606	95.5854	70.2102	146.3358	171.7110
04/01/11	93.2577	120.9606	95.5854	70.2102	146.3358	171.7110

Updated 4/13/11 JH

Atherinops affinis Reference Toxicant Control Chart: Biomass



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/16/03	124.1000	132.5672	106.2421	79.9171	158.8922	185.2173
07/22/03	166.4700	132.5672	106.2421	79.9171	158.8922	185.2173
08/05/03	94.6900	132.5672	106.2421	79.9171	158.8922	185.2173
08/28/03	139.5600	132.5672	106.2421	79.9171	158.8922	185.2173
03/09/04	130.8700	132.5672	106.2421	79.9171	158.8922	185.2173
03/12/04	108.6600	132.5672	106.2421	79.9171	158.8922	185.2173
12/16/04	138.3200	132.5672	106.2421	79.9171	158.8922	185.2173
03/25/05	131.1900	132.5672	106.2421	79.9171	158.8922	185.2173
06/15/05	150.0000	132.5672	106.2421	79.9171	158.8922	185.2173
09/20/05	85.5120	132.5672	106.2421	79.9171	158.8922	185.2173
11/15/05	150.9200	132.5672	106.2421	79.9171	158.8922	185.2173
11/29/05	81.1800	132.5672	106.2421	79.9171	158.8922	185.2173
11/28/06	162.2200	132.5672	106.2421	79.9171	158.8922	185.2173
03/13/07	130.5500	132.5672	106.2421	79.9171	158.8922	185.2173
12/11/07	146.2900	132.5672	106.2421	79.9171	158.8922	185.2173
12/05/08	167.1600	132.5672	106.2421	79.9171	158.8922	185.2173
12/13/08	152.3400	132.5672	106.2421	79.9171	158.8922	185.2173
02/04/09	144.4100	132.5672	106.2421	79.9171	158.8922	185.2173
07/14/09	149.8300	132.5672	106.2421	79.9171	158.8922	185.2173
04/01/11	97.0715	132.5672	106.2421	79.9171	158.8922	185.2173

Updated 4/13/11 JH

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	4/1/2011 13:20	Test ID:	C100316.15	Sample ID:	REF-Ref Toxicant
End Date:	4/8/2011 13:15	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	0.8000	0.8000	0.8000	0.6000	0.8000
25	0.8000	1.0000	0.4000	0.8000	0.8000
50	0.8000	0.6000	0.6000	1.0000	0.6000
100	0.2000	0.2000	0.6000	0.4000	0.2000
200	0.2000	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000	0.0000

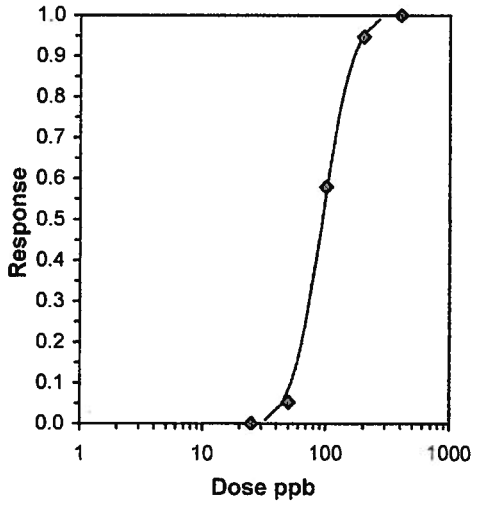
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.7600	1.0000	1.0629	0.8861	1.1071	9.301	5				6	25
25	0.7600	1.0000	1.0703	0.6847	1.3453	22.324	5	-0.066	2.300	0.2570	6	25
50	0.7200	0.9474	1.0221	0.8861	1.3453	20.002	5	0.365	2.300	0.2570	7	25
*100	0.3200	0.4211	0.5923	0.4636	0.8861	32.087	5	4.211	2.300	0.2570	17	25
*200	0.0400	0.0526	0.2731	0.2255	0.4636	38.990	5	7.067	2.300	0.2570	24	25
400	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5				25	25

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.94326		0.888		0.12365	0.57542
Bartlett's Test indicates equal variances (p = 0.39)					4.12184		13.2767			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test	50	100	70.7107		0.24302	0.3183	0.64018	0.03123	7.6E-07	4, 20

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	5.12944	1.49736	2.19462	8.06427	0.24	0.1042	7.81473	0.99	1.96968	0.19495	4
Intercept	-5.1034	3.08024	-11.141	0.93388							
TSCR	0.23448	0.05821	0.12039	0.34856							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	32.8213	5.62415	54.5316
EC05	3.355	44.5672	11.3688	66.9925
EC10	3.718	52.4617	16.4938	74.9919
EC15	3.964	58.5637	21.1575	81.088
EC20	4.158	63.9158	25.7434	86.4334
EC25	4.326	68.8955	30.4112	91.4522
EC40	4.747	83.2327	45.7719	106.598
EC50	5.000	93.2577	57.7779	118.425
EC60	5.253	104.49	71.676	133.871
EC75	5.674	126.235	96.5823	174.295
EC80	5.842	136.07	106.181	198.159
EC85	6.036	148.505	116.917	233.405
EC90	6.282	165.778	129.913	291.353
EC95	6.645	195.143	148.906	412.813
EC99	7.326	264.98	186.686	817.696



Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	4/1/2011 13:20	Test ID:	C100316.151	Sample ID:	REF-Ref Toxicant
End Date:	4/8/2011 13:15	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	1.3150	1.2575	1.2950	1.4300	1.0100
25	1.3275	1.4580	1.2650	1.4050	1.3300
50	1.2000	1.2833	1.3200	1.0880	1.6600
100	1.5200	1.5400	1.0333	1.6300	1.6100
200	1.1700				

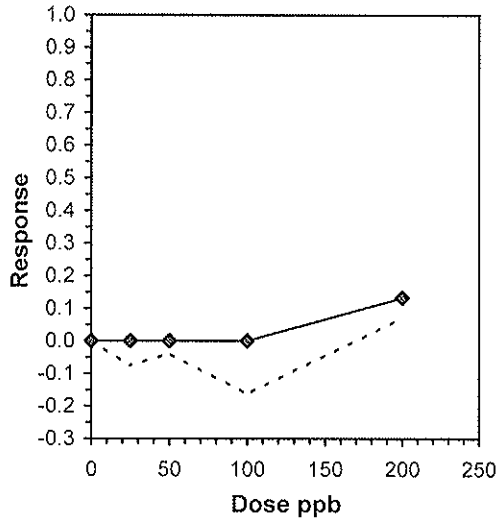
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	1.2615	1.0000	1.2615	1.0100	1.4300	12.258	5				1.3489	1.0000
25	1.3571	1.0758	1.3571	1.2650	1.4580	5.535	5	-0.818	2.230	0.2606	1.3489	1.0000
50	1.3103	1.0387	1.3103	1.0880	1.6600	16.400	5	-0.417	2.230	0.2606	1.3489	1.0000
100	1.4667	1.1626	1.4667	1.0333	1.6300	16.813	5	-1.756	2.230	0.2606	1.3489	1.0000
200	1.1700	0.9275	1.1700	1.1700	1.1700	0.000	1				1.1700	0.8674

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.94926	0.868	-0.6445	1.61769
Bartlett's Test indicates equal variances (p = 0.20)	4.62389	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100			0.26057	0.20655	0.03845	0.03413	0.36797	3, 16

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	137.70	15.16	87.41	162.48	-3.6693
IC10	175.41				
IC15	>200				
IC20	>200				
IC25	>200				
IC40	>200				
IC50	>200				



Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	4/1/2011 13:20	Test ID:	C100316.151	Sample ID:	REF-Ref Toxicant
End Date:	4/8/2011 13:15	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	1.0520	1.0060	1.0360	0.8580	0.8080
25	1.0620	1.4580	0.5060	1.1240	1.0640
50	0.9600	0.7700	0.7920	1.0880	0.9960
100	0.3040	0.3080	0.6200	0.6520	0.3220
200	0.2340	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed					1-Tailed				
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9520	1.0000	0.9520	0.8080	1.0520	11.690	5				0.9520	0.0000
25	1.0428	1.0954	1.0428	0.5060	1.4580	32.800	5	-0.735	2.300	0.2841	1.0428	-0.0954
50	0.9212	0.9676	0.9212	0.7700	1.0880	14.812	5	0.249	2.300	0.2841	0.9212	0.0324
*100	0.4412	0.4634	0.4412	0.3040	0.6520	40.415	5	4.135	2.300	0.2841	0.4412	0.5366
*200	0.0468	0.0492	0.0468	0.0000	0.2340	223.607	5	7.328	2.300	0.2841	0.0468	0.9508
400	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5				0.0000	1.0000

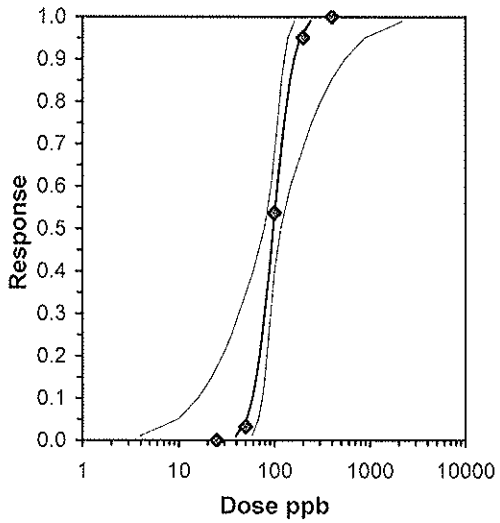
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.92952	0.888	-0.5635	2.95028
Bartlett's Test indicates equal variances (p = 0.10)	7.82466	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.7107		0.28412	0.29844	0.90219	0.03815	2.4E-07	4, 20

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	5.92316	2.15532	1.69873	10.1476	0	1.68003	7.81473	0.64	1.98709	0.16883	4
Intercept	-6.7699	4.30077	-15.199	1.65965							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	39.295	3.93564	58.4699
EC05	3.355	51.2145	9.85509	68.6474
EC10	3.718	58.9833	16.038	74.9553
EC15	3.964	64.8801	22.2326	79.6918
EC20	4.158	69.9845	28.7627	83.8402
EC25	4.326	74.6824	35.7848	87.7888
EC40	4.747	87.9669	60.4296	101.229
EC50	5.000	97.0715	78.2747	116.691
EC60	5.253	107.118	92.5567	147.353
EC75	5.674	126.173	108.151	245.558
EC80	5.842	134.642	113.423	305.027
EC85	6.036	145.235	119.454	394.201
EC90	6.282	159.755	127.099	546.042
EC95	6.645	183.988	138.86	888.093
EC99	7.326	239.798	163.108	2222.78



Test: LF-Larval Fish Growth and Survival Test
Test ID: C100316.15
Species: AA-Atherinops affinis
Protocol: EPAM 02-EPA Marine
Sample ID: REF-Ref Toxicant
Sample Type: CUSO-Copper sulfate
Start Date: 4/1/2011 13:20
End Date: 4/8/2011 13:15
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count
	1	1	Control	5							4	133.34	128.08	4
	2	2	Control	5							4	177.29	172.26	4
	3	3	Control	5							4	185.69	180.51	4
	4	4	Control	5							3	101.89	97.6	3
	5	5	Control	5							4	103.92	99.88	4
	6	1	25.000	5							4	140.49	135.18	4
	7	2	25.000	5							5	91.37	84.08	5
	8	3	25.000	5							2	98.99	96.46	2
	9	4	25.000	5							4	86.63	81.01	4
	10	5	25.000	5							4	94.39	89.07	4
	11	1	50.000	5							4	81.29	76.49	4
	12	2	50.000	5							3	93.69	89.84	3
	13	3	50.000	5							3	71.99	68.03	3
	14	4	50.000	5							5	76.58	71.14	5
	15	5	50.000	5							3	92.02	87.04	3
	16	1	100.000	5							1	90.54	89.02	1
	17	2	100.000	5							1	85.28	83.74	1
	18	3	100.000	5							3	83.26	80.16	3
	19	4	100.000	5							2	89.85	86.59	2
	20	5	100.000	5							1	79.92	78.31	1
	21	1	200.000	5							1	87.94	86.77	1
	22	2	200.000	5							0			0
	23	3	200.000	5							0			0
	24	4	200.000	5							0			0
	25	5	200.000	5							0			0
	26	1	400.000	5							0			0
	27	2	400.000	5							0			0
	28	3	400.000	5							0			0
	29	4	400.000	5							0			0
	30	5	400.000	5							0			0

Comments:

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

Test ID: C100316.151	Associated Test(s): West Basin		Study Director: S. Hansen
Organism Batch: ABS 0486	Location: Rm3	Replicates: 5	No. of Organisms: 5
Start Time: 1320	Initials: SH/KC	End Time: 1315	Initials: KC

Day 0 Water Quality Data						
Stock						
Date: 4/1/11		Time: 1055		Initials: AA		
	Control	25	50	100	200	400
D.O. (mg/L)	6.6	6.8	6.8	6.8	6.8	6.8
Temperature	20.9	20.9	21.0	20.9	20.8	21.0
Salinity	32.7	32.6	32.6	32.6	32.6	32.6
pH	8.0	8.0	8.0	8.0	8.0	8.0

Day 7 Water Quality Data						
Date: 4/8/11		Time: 1100		Replicate: 1		Initials: SL
	Control	25	50	100	200	400
D.O. (mg/L)	6.5	6.6	6.6	6.8	6.9	
Temperature	20.4	21.0	20.4	20.5	20.4	
Salinity	32.4	32.6	32.8	32.5	32.4	
pH	7.9	7.9	7.9	7.9	8.0	

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

Reference Toxicant Dilution Worksheet

Test ID: C100316.151	Toxicant: Copper Sulfate (0.509gCu/LCuSO$_4$)	Toxicant Lot Number: 1907619

Serial Dilute by ½ to obtain concentrations of 400, 200, 100, 50, and 25 ppb.

Date Prepared	Day	Target Conc.	A. Toxicant (target) B. Toxicant (actual)	A. Diluent (target) B. Diluent (actual)	Dilution Water Batch	Tech.
4/1/11	0	400 ppb	(A) 1.965 ml (B) 1.9654	(A) 2500 ml (B) 2500ml	S100314II	SH
4/2/11	1	200ppb	(A) .9825 (B) .9825	(A) 2500 (B) 2501	S100314II	SH
4/3/11	2	200ppb	(A) .9825 (B) .9826	(A) 2500 (B) 2500	S100314II	SH
(1)SH ~~4/3~~ 4/4/11	3	200 ppb	(A) ~~.9825~~ .4913 (B) .4913	(A) ~~2500~~ 1250 (B) 1250	S100314II	SL
~~4~~ 4/5/11	4	200ppb	(A) .4913 (B) .4914	(A) 1250 (B) 1249.9	S100314II	SL
4/6/11	5	200ppb	(A) .4913 (B) .4910	(A) 1250 (B) 1250	S100314II	SL
4/7/11	6	200ppb	(A) .4913 (B) .4913	(A) 1250.0 (B) 1250.1	S100314II	SL

(1) IF 4/4/11

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

SURVIVAL DATA

Test ID: C100316.151

Conc. (ppb)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 4/2/11	Date: 4/3/11	Date: 4/4/11	Date: 4/5/11	Date: 4/6/11	Date: 4/7/11	Date: 4/8/11
		Renewal Time: 1528	Renewal Time: 1357	Renewal Time: 1515	Renewal Time: 1330	Renewal Time: 1135	Renewal Time: 1135	End Time: 1315
		Tech: SH	Tech: SH	Tech: SL	Tech: SL	Tech: SL	Tech: SL	Tech: TK
Control	1	4(1)	4	4	4	4	4	4
	2	4(1)	4	4	4	4	4	4
	3	5	5	4 (1)	4	4	4	4
	4	3(2)	3	3	3	3	3	3
	5	4(1)	4	4	4	4	4	4
25	1	4(1)	4	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	2(3)	2	2	2	2	2	2
	4	4(1)	4	4	4	4	4	4
	5	4(1)	4	4	4	4	4	4
50	1	4(1)	4	4	4	4	4	4
	2	4(1)	3(1)	3	3	3	3	3
	3	3(2)	3	3	3	3	3	3
	4	5	5	5	5	5	5	5
	5	3(2)	3	3	3	3	3	3
100	1	3(2)	1(2)	1	1	1	1	1
	2	3(2)	2(1)	1 (1NB)	1	1	1	1
	3	3(2)	3	3	3	3	3 (1LOE)	3 (1LOE)
	4	2(3)	2	2	2	2	2	2
	5	2(3)	1(1)	1	1	1	1	1
200	1	1(4)	1	1	1	1	1	1
	2	1(4)	0(1)					
	3	0(5)						
	4	0(5)						
	5	0(5)						
400	1	0(5)						
	2	0(5)						
	3	0(5)						
	4	0(5)						
	5	0(5)						

① IE 4/2/11 SH
② IW 4/2/11 SH
③ BW 4/3/11 SH
④ WC 4/3/11 SH
⑤ IE 4/4/11 SL
⑥ ~~NO second baby found SL 4/4/11~~
⑦ SL
⑧ IE 4/7/11 SL

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

Test ID: C100316.151

Concentration (ppb)	Rep	Weigh Boat Number	Tare Weight (mg)	Total Weight (mg)
Control	1	1	128.08	133.34
	2	2	172.26	177.29
	3	3	180.51	185.69
	4	4	97.60	101.89
	5	5	99.88	103.92
25	1	6	135.18	140.49
	2	7	84.08	91.37
	3	8	96.46 ~~96.36~~ ①SL	98.99
	4	9	81.01	86.63
	5	10	①SL ~~88~~ 89.07	94.39
50	1	11	76.49	81.29
	2	12	89.84	93.69
	3	13	68.03	71.99
	4	14	71.14	76.58
	5	15	87.04	92.02
100	1	16	89.02 ~~88.7~~ ③SL	90.54
	2	17	83.74	85.28
	3	18	80.16	83.26
	4	19	86.59	89.85
	5	20	78.31	79.92
200	1	21	86.77	87.94
	2			
	3			
	4			
	5			
400	1			
	2			
	3			
	4			
	5			
		Date:	4/8/11	4/9/11
		Time:	1030	1428
		Initials:	SL	KS

① MR 4/8/11 SL
③ ② MR 4/8/11 SL

Citharicthys stigmaeus Chronic Toxicity Test

Test: AC-Acute Fish Test							Test ID: C110207.01		
Species: CS-Citharichthys stigmaeus							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: West Basin Brine							Sample Type: EFF2-Industrial		
Start Date: 2/11/2011 16:01				End Date: 2/14/2011 16:0			Lab ID: CCA-Carlsbad, Weston		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	10	10	10	10	10	
	2	2	Control	10	10	10	10	10	
	3	3	Control	10	10	10	10	10	
	4	1	33	10	10	10	10	10	
	5	2	33	10	10	10	10	10	
	6	3	33	10	10	10	10	10	
	7	1	42	10	10	10	10	10	
	8	2	42	10	10	10	10	10	
	9	3	42	10	10	10	10	10	
	10	1	51	10	10	10	10	10	
	11	2	51	10	10	10	10	10	
	12	3	51	10	10	10	10	10	
	13	1	60	10	10	10	0	0	
	14	2	60	10	5	5	0	0	
	15	3	60	10	10	10	0	0	
	16	1	70	10	5	0	0	0	
	17	2	70	10	4	0	0	0	
	18	3	70	10	6	0	0	0	

Comments:

Acute Fish Test-96 Hr Survival

Start Date:	2/11/2011 16:01	Test ID:	C110207.0179	Sample ID:	West Basin Brine
End Date:	2/14/2011 16:01	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	2/7/2011 13:00	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	CS-Cithariсthys stigmaeus
Comments:					

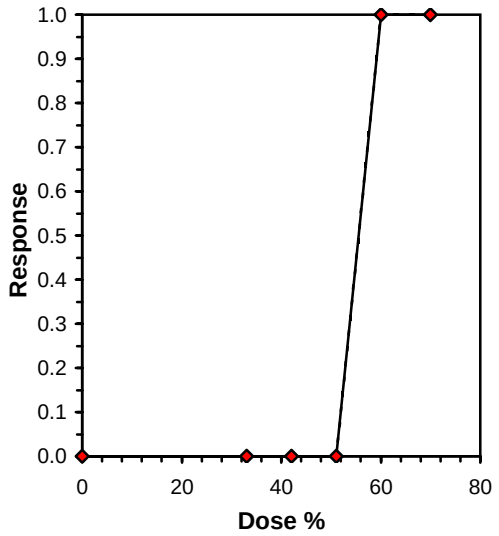
Conc-%	1	2	3
Control	1.0000	1.0000	1.0000
33	1.0000	1.0000	1.0000
42	1.0000	1.0000	1.0000
51	1.0000	1.0000	1.0000
60	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Mean	N-Mean
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3	1.0000	1.0000
33	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3	1.0000	1.0000
42	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3	1.0000	1.0000
51	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	3	1.0000	1.0000
60	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3	0.0000	0.0000
70	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	3	0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	1	0.859		
Equality of variance cannot be confirmed				

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	51.450	0.000	51.450	51.450	-1.0076
IC10	51.900	0.000	51.900	51.900	1.0076
IC15	52.350	0.000	52.350	52.350	-1.0076
IC20	52.800	0.000	52.800	52.800	1.0076
IC25	53.250	0.000	53.250	53.250	#DIV/0!
IC40	54.600	0.000	54.600	54.600	-1.0076
IC50	55.500	0.000	55.500	55.500	#DIV/0!



Citharichthys 96-Hour Acute Toxicity Test

BIO079

Client	West Basin MWD
Project:	West Basin Municipal Water District salinity Study
Client Sample ID:	West Basin Brine
Weston Test ID:	C110207.0179
Species	~~Menidia beryllina~~ Citharichthys stigmaeus

Date Received:	2/7/11
Date Test Started:	2/10/11
Date Test Ended:	2/14/11
Study Director:	K Skriseth
Organisms/Chamber:	10

	Conc.	Meter #	D.O. (mg/L)	Meter #	Temp (°C)	Meter #	Salinity (ppt)	Meter #	pH	Total Chlorine (mg/L)
Day 0 (0 Hours)	Control	1	7.5	1	13.3	6	32.3	4	8.2	
Date: 2/10/11	33		8.3		11.3		32.8		8.1	
Sample ID: C110207.01	42		7.9		11.1		41.8		8.0	
Dilutions (Tech): JH Rep 1	51		7.8		10.6		50.7		7.9	
WQ Time: 1320 ~~(on stock)~~	60		7.9		11.0		59.7		7.9	
Technician: JH	70		8.0		11.6		70.0		8.0	
24 Hours	Control	2	4.9	2	12.2	5	32.5	2	7.7	
Date: 2/11/11	33		5.1		11.6		33.0		7.5	
WQ Time: 937	42		5.1		12.1		41.4		7.6	
Replicate: Rep 2	51		5.2		11.6		50.2		7.7	
Technician: AA	60		5.3		12.1		58.6 ~~58.6~~ 0		7.8	
	70		3.9		12.1		68.4 AA		7.9	
48 Hours (OLD WQ)	Control	2	4.7	2	12.3	6	32.3	4	7.2	
Date: 2/12/11	33		5.1		12.0		32.8		7.1	
WQ Time: 1341	42		5.9		11.4		41.3		7.3	
Replicate: 3	51		4.5		12.3		49.6		7.3	
Technician: SH	60		5.3		12.0		57.8		7.5	
	70		4.7		12.1		67.7		7.8	
48 Hours (Renewal Water)	Control	2	7.6	2	13.4	6	32.3	4	8.2	
Date: 2/12/11 SH	33		7.4		12.5		32.8		8.1	
Sample ID: ~~1350~~	42		7.5		12.2		42.0		7.9	
Dilutions (Tech): SH	51		7.9		12.4		50.9		8.0	
WQ Time: 1350 (on stock)	60		8.0		12.3		60.0		7.9	
Technician: SH	70		8.2		12.6		70.0		8.0	
72 Hours	Control	1	5.6	1	12.6	5	32.5	4	7.1	
Date: 2/13/11	33		5.3		12.4		33.1		7.0	
WQ Time: 1300	42		5.3		12.2		41.9		7.2	
Replicate: 1	51		4.2		12.6		50.3		7.2	
Technician: SH	60		4.0		12.4		59.3		7.3	
	70		—		—		—		—	
96 Hours	Control	2	4.1	2	12.3	6	32.3	2	7.1	
Date: 2/14/11	33		~~DI 7.7~~ 4.5		11.8		32.9		7.0	
WQ Time: 1030	42		5.3		12.5		41.5		7.1	
Replicate: 2	51		4.3		11.8		50.2		7.2	
Technician: AA										

Start Time:	1601	KS/SH
End Time:	1601	KS
Supplier:	~~SB 5267~~ John Brecina (4) KS	
Organism Batch:	SB5267	Age: N/A

control

~~Dilution~~ Water Batch:	S10 012811
Hobo Temp. No.:	778889
Test Location:	Rm 1 Bath 3
Test Acceptablility: ✓ ≥ 90% Survival in Control	

① IW 2/11/11 AA. ② IE 2/12/11 SH ③ IE 2/14/11 AA ④ IE 2/14/11 KS

WESTON SOLUTIONS

Citharichthys 96-Hour Acute Toxicity Test

BIO079

Weston Test ID:	Client:	Client Sample ID:
C110207.0179	West Basin MWD	West Basin Brine

Survival Data

Conc.	Rep	24 Hours		48 Hours		72 Hours		96 Hours	
		Date: 2/11/11		Date: 2/12/11		Date: 2/13/11		Date: 2/14/11	
		Time: 1045		Feed Time*: 1200 Technician: SH		Time: 1310		End Time: 1601	
		Technician: JH		Renewal Time: 1404 Technician: SH		Technician: SH		Technician: YS	
		# Alive	#Dead	# Alive	#Dead	# Alive	#Dead	# Alive	#Dead
Control	1	10	Ø	10	Ø	10	Ø	10	Ø
	2	10	Ø	10	Ø	10	Ø	10	Ø
	3	10	Ø	10	Ø	10	Ø	10	Ø
	4	—	—	—	—	—	—		
33	1	10	Ø	10	Ø	10	Ø	10	Ø
	2	10	Ø	10	Ø	10	Ø	10	Ø
	3	10	Ø	10	Ø	10	Ø	10	Ø
	4	—	—	—	—	—	—		
42	1	10	Ø	10	Ø	10	Ø	10	Ø
	2	10	Ø	10	Ø	10	Ø	2/14 10	Ø
	3	10	Ø	10	Ø	10	Ø	10	Ø
	4	—	—	—	—	—	—		
51	1	10	Ø	10	Ø	10	Ø	10	Ø
	2	10	Ø	10	Ø	10	Ø	10	Ø
	3	10	3	10	Ø	10	Ø	10	Ø
	4	—	—	—	—	—	—		
60	1	10	Ø	10	Ø	Ø	10		
	2	5	Ø (5 NR)	5	Ø	Ø	5		
	3	10	Ø	10	Ø	Ø	10		
	4	—	—	—	—	—	—		
70	1	5	5	Ø	5				
	2	4	6	Ø	4				
	3	6	4	Ø	6				
	4	—	—	—	—				
	1								
	2								
	3								
	4								

*Approximately 2 hours prior to test solution renewal.

① One sand dab jumped out of container and into bath; still counted as alive 2/14/11 SH

Acute Fish Test-96 Hr Survival

Start Date:	2/10/2011 16:40	Test ID:	C110210.01	Sample ID:	REF-Ref Toxicant
End Date:	2/14/2011 16:10	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	SDS-Sodium dodecyl sulfate
Sample Date:		Protocol:	EPAA 02-EPA Acute	Test Species:	CS-Cithariciithys stigmaeus
Comments:					

Conc-mg/L	1	2
Control	1.0000	1.0000
0.5	0.9000	1.0000
1	1.0000	1.0000
2	1.0000	1.0000
4	0.0000	0.0000
8	0.0000	0.0000

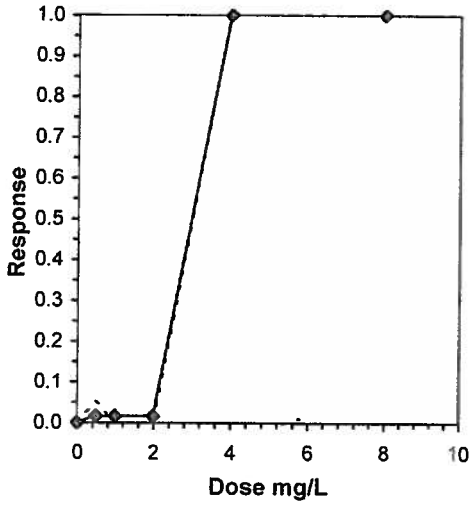
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	2				1.0000	1.0000
0.5	0.9500	0.9500	0.9500	0.9000	1.0000	7.443	2	1.414	3.186	0.1127	0.9833	0.9833
1	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	2	0.000	3.186	0.1127	0.9833	0.9833
2	1.0000	1.0000	1.0000	1.0000	1.0000	0.000	2	0.000	3.186	0.1127	0.9833	0.9833
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	2				0.0000	0.0000
8	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	2				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	2	4	2.82843		0.11265	0.11265	0.00125	0.00125	0.47895	3, 4

Linear Interpolation (200 Resamples)

Point	mg/L	SD	95% CL(Exp)		Skew
IC05	2.0678	0.0229	1.9345	2.1966	-0.0583
IC10	2.1695	0.0217	2.0432	2.2915	-0.0583
IC15	2.2712	0.0205	2.1520	2.3864	-0.0583
IC20	2.3729	0.0193	2.2607	2.4814	-0.0583
IC25	2.4746	0.0180	2.3694	2.5763	-0.0583
IC40	2.7797	0.0144	2.6955	2.8610	-0.0583
IC50	2.9831	0.0120	2.9129	3.0508	-0.0583



Reviewed by: Qm

Test: AC-Acute Fish Test
Species: CS-Citharicthys stigmaeus
Sample ID: REF-Ref Toxicant
Start Date: 2/10/2011 16:40 End Date: 2/14/2011 16:10

Test ID: C110210.01
Protocol: EPAA 02-EPA Acute
Sample Type: SDS-Sodium dodecyl sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	10				10	
	2	2	Control	10				10	
	3	1	0.500	10				9	
	4	2	0.500	10				10	
	5	1	1.000	10				10	
	6	2	1.000	10				10	
	7	1	2.000	10				10	
	8	2	2.000	10				10	
	9	1	4.000	10				0	
	10	2	4.000	10				0	
	11	1	8.000	10				0	
	12	2	8.000	10				0	

Comments:

96 Hour Citharichthys (with Renewal)
Reference Toxicant Test

Test ID: C110210.01	Replicates: 2	Study Director: S. Hansen	Location: Rm 1 bath 3
Dilution Water Batch: S10012811	Organism Batch: JB 5267	Associated Test(s): West Basin	No. of Organisms: 10

Toxicant: ~~Sodium~~ Dodecyl ~~Sulphate~~ Sodium Sulfate (2) EB	Date Prepared: 2/10/11	Initials: KS
Lot Number: MKBF9866V	Quantity of Stock: Target: 128 mg	Quantity of Diluent: Target: 16 L
Target Concentration: **8 mg/L**		

Serial Dilute by ½ to obtain concentrations of 4, 2, 1, and 0.5 mg/L

Day/Date	Target Toxicant:	Actual Toxicant:	Actual Diluent:	Initials:
1/ 2/10/11	128 mg	128.04 mg	16.0 L	JH/KS
2/ 2/12/11	64 mg	64.31 mg	8.0L	SH

0 Hours Date: 2/10/11 WQ Time: 1640 Start Time: 1640 Initials: AA

~~STOCK~~ Rep 1

	Control	.5 ~~22.5~~	1 ~~45~~	2 ~~90~~	4 ~~180~~	8 ~~360~~
D.O. (%)	6.7	7.3	7.1	7.3	7.1	6.8
Temperature	13.8/11.8 @ Ts	12.8	13.7/11.8 @ Ts	12.8	13.7/11.9 @ Ts	14.6/12.0 @ Ts
~~Conductivity~~ salinity	32.3	32.3	32.4	32.3	32.4	33.0
pH	8.2	8.2	8.2	8.2	8.2	8.2

24 Hours Date: 2/11/11 Time: 1025 Initials: JH

	Control	~~22.5~~ 0.5	~~45~~ 1	~~90~~ 2	~~180~~ 4	~~360~~ 8
No. Alive Rep 1	10	10	10	10	10	ϕ (9) (INS)
No. Alive Rep 2	10	10	10	10	8(2)	ϕ (10)

(1) temperature above protocol limit @ test initiation. No action taken due to technician error. temperatures checked and recorded the following day and were within protocol range
2/11/11 KS

(2) Wrong spelling 5/16/11 EB

96 Hour Citharichthys (with Renewal) Reference Toxicant Test

48 Hours Date: 2/12/11 Time: 1437 Initials: SH

	Control	~~22.5~~ 0.5	~~45~~ 1	~~90~~ 2	~~180~~ 4	~~360~~ 8
No. Alive Rep 1	10	10	10	10	ϕ (10)	
No. Alive Rep 2	10	10	10	10	ϕ (8)	

72 Hours Date: 2/13/11 Time: 1319 Initials: SH

	Control	~~22.5~~ 0.5	~~45~~ 1	~~90~~ 2	~~180~~ 4	~~360~~ 8
No. Alive Rep 1	10	10	10	10		
No. Alive Rep 2	10	10	10	10		

96 Hours Date: 2/14/11 WQ Time: 1040 ~~STOCK~~ Replicate: 1 Initials: AA

	Control	~~22.5~~ .5	~~45~~ 1	~~90~~ 2	180	360
D.O. (mg/L)	9.1	5.7	3.7	6.0		
Temperature	12.1	11.9	12.0	12.0		
~~Conductivity~~ salinity	32.3	32.3	32.3	32.3		
pH	7.1	7.2	7.0	7.3		

96 Hour Survival Data End Time: 1610 Initials: KS

	Control	~~22.5~~ 0.5	~~45~~ 1	~~90~~ 2	180	360
No. Alive Rep 1	10	9 ① KS	10	10		
No. Alive Rep 2	10	10	10	10		

☐ Pass ☐ Fail

Notes: ① animal may have jumped out @ test initiation 2/14/11 KS

APPENDIX A

SHORT-TERM EXPOSURE ASSESSMENT: PHASE II, EPISODE 1

Americamysis bahia Chronic Toxicity Test

Test: MS-Mysid Survival, Growth and Fecundity Test — Test ID: C110804.01
Species: AB-Americamysis bahia — Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc — Sample Type: EFF2-Industrial
Start Date: 8/4/2011 16:30 — End Date: 8/11/2011 14:45 — Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(r	Wgt Count	Female Cc	Females w/ Eggs	Notes
	1	1	Control	5	5	5	5	5	5	5	5	74.25	72.5	5			
	2	2	Control	5	5	5	5	5	5	5	5	57.29	55.28	5			
	3	3	Control	5	5	5	5	5	5	5	5	58.12	55.9	5			
	4	4	Control	5	5	5	5	5	5	5	5	59.36	57.56	5			
	5	5	Control	5	5	5	5	5	5	5	5	60.24	58.67	5			
	6	6	Control	5	5	5	5	5	5	5	5	58.98	57	5			
	7	7	Control	5	5	5	4	4	4	4	4	57.94	56.28	4			
	8	8	Control	5	5	5	5	5	5	5	5	59.62	56.86	5			
	9	1	36.5	5	5	5	5	5	5	5	5	59.1	57.56	5			
	10	2	36.5	5	5	5	5	5	5	5	5	58.99	56.87	5			
	11	3	36.5	5	5	5	4	4	4	4	4	59.39	57.32	4			
	12	4	36.5	5	5	5	5	5	5	5	5	57.08	55.16	5			
	13	5	36.5	5	4	4	4	4	4	4	4	66.74	64.7	4			
	14	6	36.5	5	5	5	5	5	5	5	5	67.67	65.41	5			
	15	7	36.5	5	5	5	5	5	5	4	4	59.74	57.69	4			
	16	8	36.5	5	5	5	5	5	5	5	5	67.12	65.39	5			
	17	1	39	5	5	5	5	5	5	5	5	60.05	58.59	5			
	18	2	39	5	5	5	5	5	5	5	4	60.9	59.47	4			
	19	3	39	5	5	5	5	5	5	5	5	61.07	59.23	5			
	20	4	39	5	5	5	5	5	5	5	5	59.71	57.89	5			
	21	5	39	5	5	4	4	3	3	3	3	60.95	58.99	3			
	22	6	39	5	5	5	5	5	5	5	5	60.93	58.54	5			
	23	7	39	5	5	5	5	5	5	5	5	62.34	60.92	5			
	24	8	39	5	5	5	5	5	5	5	5	68.11	65.98	5			
	25	1	41	5	5	5	5	5	5	5	5	60.24	57.87	5			
	26	2	41	5	5	5	5	5	5	5	5	61.79	59.93	5			
	27	3	41	5	5	4	4	4	4	4	4	60.1	58.7	4			
	28	4	41	5	5	5	5	5	5	5	5	78.93	77.11	5			
	29	5	41	5	5	5	5	5	5	5	5	76.9	75.12	5			
	30	6	41	5	5	5	5	5	5	5	5	61.36	59.71	5			
	31	7	41	5	5	5	5	5	5	4	4	60	58.52	4			
	32	8	41	5	5	5	5	5	5	5	5	59.21	57.58	5			
	33	1	45	5	5	5	5	5	5	5	5	59.44	58.31	5			
	34	2	45	5	5	5	5	5	5	5	5	59.58	58.22	5			
	35	3	45	5	5	5	5	5	5	5	5	58.29	57.1	5			
	36	4	45	5	5	5	5	5	5	5	5	75.19	73.56	5			
	37	5	45	5	5	4	4	4	4	4	4	63.43	61.75	4			
	38	6	45	5	4	4	4	4	4	4	4	73.56	72.2	4			

Test: MS-Mysid Survival, Growth and Fecundity Test — Test ID: C110804.01
Species: AB-Americamysis bahia — Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc — Sample Type: EFF2-Industrial
Start Date: 8/4/2011 16:30 — End Date: 8/11/2011 14:45 — Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(r	Wgt Count	Female Cc	Females w/ Eggs	Notes
	39	7	45	5	5	4	3	3	3	3	3	55.94	54.92	3			
	40	8	45	5	5	5	5	5	5	5	5	72.95	71.6	5			
	41	1	50	5	5	3	2	2	1	1	1	71.77	71.48	1			
	42	2	50	5	5	3	3	3	3	2	2	72.63	72.08	2			
	43	3	50	5	4	4	3	3	3	3	3	67.35	66.65	3			
	44	4	50	5	5	4	5	5	4	4	4	68.26	67.35	4			
	45	5	50	5	5	4	4	4	4	4	4	73.19	71.95	4			
	46	6	50	5	4	3	3	3	3	3	3	71.48	70.77	3			
	47	7	50	5	3	1	1	1	1	1	1	65.59	64.29	1			
	48	8	50	5	5	3	2	1	1	1	1	65.03	64.6	1			

Comments: West Basin Municipal Water District - Salinity Study

Mysid Survival, Growth and Fecundity Test-7 Day Survival

Start Date:	8/4/2011 16:30	Test ID:	C110804.0127	Sample ID:	1st Pass RO Conc
End Date:	8/11/2011 14:45	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AB-Americamysis bahia
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000
36.5	1.0000	1.0000	0.8000	1.0000	0.8000	1.0000	0.8000	1.0000
39	1.0000	0.8000	1.0000	1.0000	0.6000	1.0000	1.0000	1.0000
41	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000	0.8000	1.0000
45	1.0000	1.0000	1.0000	1.0000	0.8000	0.8000	0.6000	1.0000
50	0.2000	0.4000	0.6000	0.8000	0.8000	0.6000	0.2000	0.2000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8			1	40
36.5	0.9250	0.9487	1.2560	1.1071	1.3453	9.813	8	60.00	46.00	3	40
39	0.9250	0.9487	1.2581	0.8861	1.3453	13.661	8	63.50	46.00	3	40
41	0.9500	0.9744	1.2857	1.1071	1.3453	8.574	8	64.00	46.00	2	40
45	0.9000	0.9231	1.2283	0.8861	1.3453	14.264	8	59.50	46.00	4	40
*50	0.4750	0.4872	0.7578	0.4636	1.1071	36.718	8	37.00	46.00	21	40

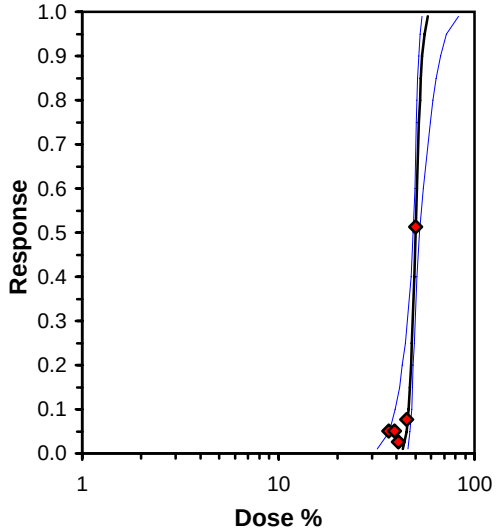
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.88432	0.947	-0.5364	0.24787
Bartlett's Test indicates equal variances (p = 0.04)	11.9479	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	45	50	47.4342	2.22222
Treatments vs Control				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	36.6603	12.9034	11.3696	61.951	0.025	0.57081	7.81472	0.90308	1.69918	0.02728	6
Intercept	-57.293	21.8407	-100.1	-14.485							
TSCR	0.05614	0.01847	0.01995	0.09234							

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	43.2241	32.0006	45.7977
EC05	3.355	45.1144	36.682	47.0424
EC10	3.718	46.1556	39.4236	47.7534
EC15	3.964	46.8717	41.3615	48.2703
EC20	4.158	47.4488	42.938	48.7207
EC25	4.326	47.9495	44.296	49.1573
EC40	4.747	49.2347	47.4226	50.7933
EC50	5.000	50.0245	48.7178	52.5384
EC60	5.253	50.8268	49.5841	54.8522
EC75	5.674	52.1892	50.6473	59.4044
EC80	5.842	52.7399	51.0207	61.38
EC85	6.036	53.3892	51.4412	63.7883
EC90	6.282	54.2175	51.9576	66.9759
EC95	6.645	55.4689	52.7109	72.0253
EC99	7.326	57.8948	54.1171	82.6023



Mysid Survival, Growth and Fecundity Test-Growth-Weight

Start Date:	8/4/2011 16:30	Test ID:	C110804.0127	Sample ID:	1st Pass RO Conc
End Date:	8/11/2011 14:45	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AB-Americamysis bahia
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5	6	7	8
Control	0.3500	0.4020	0.4440	0.3600	0.3140	0.3960	0.4150	0.5520
36.5	0.3080	0.4240	0.5175	0.3840	0.5100	0.4520	0.5125	0.3460
39	0.2920	0.3575	0.3680	0.3640	0.6533	0.4780	0.2840	0.4260
41	0.4740	0.3720	0.3500	0.3640	0.3560	0.3300	0.3700	0.3260
45	0.2260	0.2720	0.2380	0.3260	0.4200	0.3400	0.3400	0.2700
50	0.2900	0.2750	0.2333	0.2275	0.3100	0.2367	1.3000	0.4300

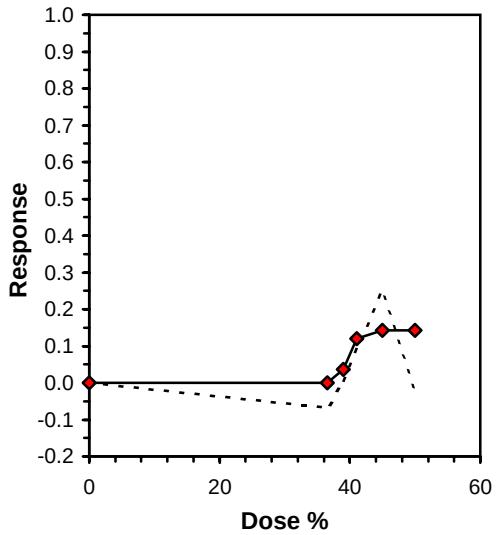
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.4041	1.0000	0.4041	0.3140	0.5520	17.904	8			0.4179	1.0000
36.5	0.4318	1.0684	0.4318	0.3080	0.5175	18.656	8	74.00	46.00	0.4179	1.0000
39	0.4029	0.9969	0.4029	0.2840	0.6533	29.687	8	65.00	46.00	0.4029	0.9639
41	0.3678	0.9100	0.3678	0.3260	0.4740	12.566	8	57.00	46.00	0.3678	0.8799
*45	0.3040	0.7522	0.3040	0.2260	0.4200	21.228	8	45.00	46.00	0.3584	0.8576
50	0.4128	1.0215	0.4128	0.2275	1.3000	88.278	8	50.00	46.00	0.3584	0.8576

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.66487	0.947	3.97934	21.943
Bartlett's Test indicates unequal variances (p = 2.35E-08)	43.9671	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test Treatments vs Control	41	45	42.9535	2.43902

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	39.331			
IC10	40.522			
IC15	>50			
IC20	>50			
IC25	>50			
IC40	>50			
IC50	>50			



Mysid Survival, Growth and Fecundity Test-Biomass

Start Date:	8/4/2011 16:30	Test ID:	C110804.0127	Sample ID:	1st Pass RO Conc
End Date:	8/11/2011 14:45	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AB-Americamysis bahia
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5	6	7	8
Control	0.3500	0.4020	0.4440	0.3600	0.3140	0.3960	0.3320	0.5520
36.5	0.3080	0.4240	0.4140	0.3840	0.4080	0.4520	0.4100	0.3460
39	0.2920	0.2860	0.3680	0.3640	0.3920	0.4780	0.2840	0.4260
41	0.4740	0.3720	0.2800	0.3640	0.3560	0.3300	0.2960	0.3260
45	0.2260	0.2720	0.2380	0.3260	0.3360	0.2720	0.2040	0.2700
50	0.0580	0.1100	0.1400	0.1820	0.2480	0.1420	0.2600	0.0860

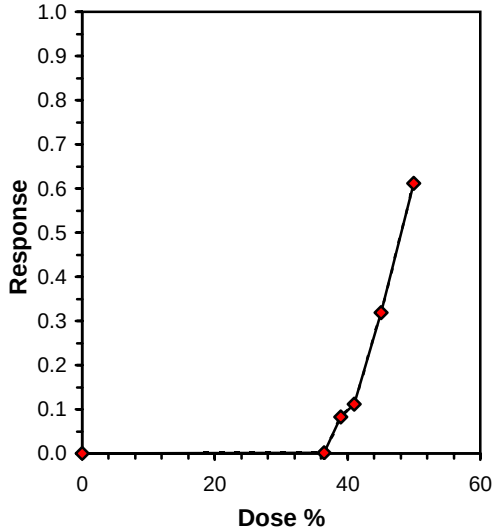
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3938	1.0000	0.3938	0.3140	0.5520	19.405	8				0.3938	1.0000
36.5	0.3933	0.9987	0.3933	0.3080	0.4520	11.737	8	0.016	2.306	0.0728	0.3933	0.9987
39	0.3613	0.9175	0.3613	0.2840	0.4780	19.643	8	1.029	2.306	0.0728	0.3613	0.9175
41	0.3498	0.8883	0.3498	0.2800	0.4740	17.047	8	1.393	2.306	0.0728	0.3498	0.8883
*45	0.2680	0.6806	0.2680	0.2040	0.3360	17.148	8	3.981	2.306	0.0728	0.2680	0.6806
*50	0.1533	0.3892	0.1533	0.0580	0.2600	47.420	8	7.613	2.306	0.0728	0.1533	0.3892

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95298	0.947	0.60673	0.03062
Bartlett's Test indicates equal variances (p = 0.66)	3.23935	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	41	45	42.9535	2.43902	0.07284	0.18499	0.07024	0.00399	2.3E-09	5, 42

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC05	37.999	7.762	14.896	41.325	-1.7371
IC10	40.196	3.562	29.792	42.077	-3.4099
IC15	41.737	2.157	37.074	43.024	-2.7810
IC20	42.700	1.346	38.506	44.231	-1.1802
IC25	43.664	1.213	40.430	45.405	-0.9849
IC40	46.383	0.874	44.380	47.820	-0.5649
IC50	48.099				



Test: ABA-Americamysis Acute | Test ID: C110804.01
Species: AB-Americamysis bahia | Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc | Sample Type: EFF2-Industrial
Start Date: 8/4/2011 16:30 | End Date: 8/11/2011 14:45 | Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5	5	5	5	5	
	2	2	Control	5	5	5	5	5	
	3	3	Control	5	5	5	5	5	
	4	4	Control	5	5	5	5	5	
	5	5	Control	5	5	5	5	5	
	6	6	Control	5	5	5	5	5	
	7	7	Control	5	5	5	4	4	
	8	8	Control	5	5	5	5	5	
	9	1	36.5	5	5	5	5	5	
	10	2	36.5	5	5	5	5	5	
	11	3	36.5	5	5	5	4	4	
	12	4	36.5	5	5	5	5	5	
	13	5	36.5	5	4	4	4	4	
	14	6	36.5	5	5	5	5	5	
	15	7	36.5	5	5	5	5	5	
	16	8	36.5	5	5	5	5	5	
	17	1	39	5	5	5	5	5	
	18	2	39	5	5	5	5	5	
	19	3	39	5	5	5	5	5	
	20	4	39	5	5	5	5	5	
	21	5	39	5	5	4	4	3	
	22	6	39	5	5	5	5	5	
	23	7	39	5	5	5	5	5	
	24	8	39	5	5	5	5	5	
	25	1	41	5	5	5	5	5	
	26	2	41	5	5	5	5	5	
	27	3	41	5	5	4	4	4	
	28	4	41	5	5	5	5	5	
	29	5	41	5	5	5	5	5	
	30	6	41	5	5	5	5	5	
	31	7	41	5	5	5	5	5	
	32	8	41	5	5	5	5	5	
	33	1	45	5	5	5	5	5	
	34	2	45	5	5	5	5	5	
	35	3	45	5	5	5	5	5	
	36	4	45	5	5	5	5	5	
	37	5	45	5	5	4	4	4	
	38	6	45	5	4	4	4	4	
	39	7	45	5	5	4	3	3	
	40	8	45	5	5	5	5	5	
	41	1	50	5	5	3	2	2	
	42	2	50	5	5	3	3	3	
	43	3	50	5	4	4	3	3	
	44	4	50	5	5	4	5	5	
	45	5	50	5	5	4	4	4	
	46	6	50	5	4	3	3	3	
	47	7	50	5	3	1	1	1	
	48	8	50	5	5	3	2	1	

Comments: West Basin Municipal Water District - Salinity Study

Americamysis Acute-96 Hr Survival

Start Date:	8/4/2011 16:30	Test ID:	C110804.0127	Sample ID:	1st Pass RO Conc
End Date:	8/11/2011 14:45	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AB-Americamysis bahia
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000
36.5	1.0000	1.0000	0.8000	1.0000	0.8000	1.0000	1.0000	1.0000
39	1.0000	1.0000	1.0000	1.0000	0.6000	1.0000	1.0000	1.0000
41	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000
45	1.0000	1.0000	1.0000	1.0000	0.8000	0.8000	0.6000	1.0000
50	0.4000	0.6000	0.6000	1.0000	0.8000	0.6000	0.2000	0.2000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8			1	40
36.5	0.9500	0.9744	1.2857	1.1071	1.3453	8.574	8	64.00	46.00	2	40
39	0.9500	0.9744	1.2879	0.8861	1.3453	12.606	8	67.50	46.00	2	40
41	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8	68.00	46.00	1	40
45	0.9000	0.9231	1.2283	0.8861	1.3453	14.264	8	59.50	46.00	4	40
*50	0.5500	0.5641	0.8403	0.4636	1.3453	35.995	8	41.00	46.00	18	40

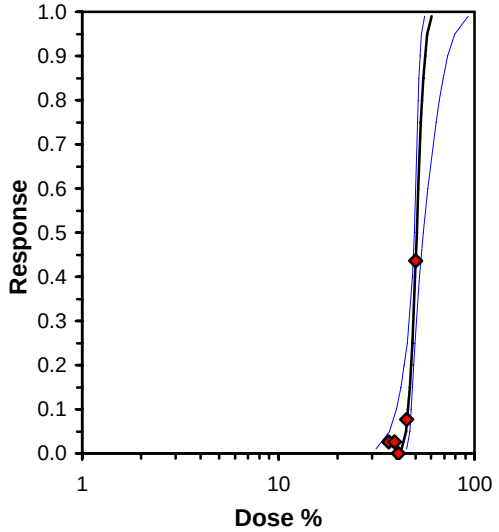
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.81674	0.947	-0.4738	2.43158
Bartlett's Test indicates unequal variances (p = 3.98E-03)	17.2904	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	45	50	47.4342	2.22222
Treatments vs Control				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	29.9659	10.2216	9.93163	50.0002	0.025	0.59258	7.81472	0.89813	1.70483	0.03337	6
Intercept	-46.087	17.266	-79.928	-12.245							
TSCR	0.03731	0.01574	0.00646	0.06817							

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	42.3834	31.4262	45.1284
EC05	3.355	44.662	36.7236	46.6707
EC10	3.718	45.9264	39.8523	47.5755
EC15	3.964	46.7996	42.0564	48.26
EC20	4.158	47.5054	43.8207	48.8935
EC25	4.326	48.1194	45.2857	49.561
EC40	4.747	49.7021	48.1774	52.3703
EC50	5.000	50.6791	49.2393	54.9785
EC60	5.253	51.6754	50.0605	58.0211
EC75	5.674	53.375	51.2375	63.7265
EC80	5.842	54.0648	51.679	66.1857
EC85	6.036	54.8802	52.186	69.1889
EC90	6.282	55.9237	52.818	73.1797
EC95	6.645	57.5069	53.752	79.5471
EC99	7.326	60.5985	55.5178	93.0754



WESTON SOLUTIONS

Americamysis bahia 7-Day Chronic Toxicity Test

BIO027

Client:	West Basin Municipal Water District
Project:	Salinity Study
Client Sample ID:	1st Pass RO conc.
Weston Test ID:	C110804.0127
Species:	*Americamysis bahia*

Date Received:	8/4/11
Date Test Started:	8/4/11
Date Test Ended:	8/11/11
Study Director:	J. Hansen
# Organisms per Chamber:	5

	Conc. (ppt)	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 0	Control							2	6.5	2	25.4	6	33.7	3	7.9
Date: 8/4/11	36.5								6.4		25.5		36.5		7.9
Sample ID: C110804.01	39								6.5		25.6		39.0		7.9
Dilutions (Tech): SH	41								6.5		25.0		41.0		7.9
WQ* Time: 1615	45								6.8		24.9		44.5		7.9
Technician: KE/SH	50								6.9		24.6		49.9		7.8
*performed on stock dilutions															
Day 1	Control	2	6.2	2	25.0	3	7.9	2	7.1	2	24.9	6	33.2	3	7.9
Date: 8/5/11	36.5		6.4		25.0		8.0		6.9		25.3		36.8		7.9
Sample ID: C110804.01	39		6.1		26.0		8.0		7.1		25.4		39.1		7.9
Dilutions (Tech): SH	41		6.2		25.3		8.0		7.2		25.6		41		7.9
WQ Time: 1045/1210	45		6.2		25.6		8.0		7.3		25.5		45.1		7.9
Replicate: 1/Stock	50		6.2		25.6		8.0		7.4		25.6		50.1		7.9
Technician: BG															
Day 2	Control	4	5.7	2	24.7	4	7.9	2	6.6	2	25.1	6	33.0	4	7.9
Date: 8/6/11	36.5		5.7		24.9		7.9		6.5		25.1		36.6		7.9
Sample ID: C110804.01	39		5.7		25.6		7.9		6.6		25.1		39.0		7.9
Dilutions (Tech): KS	41		5.6		25.4		7.9		6.6		25.6		41.0		7.8
WQ Time: 1140/1200	45		5.4		25.0		7.9		6.3		25.4		45.1		7.8
Replicate: 2/stock	50		5.8		25.0		8.0		6.9		24.8		50.0		7.8
Technician: KS															
Day 3	Control	2	6.0	2	24.9	6	7.9								
Date: 8/7/11	36.5		5.9		24.9		7.9								
Sample ID: C110804.01	39		5.8		25.4		7.9								
Dilutions (Tech): ③KS	41		5.6		25.6		7.9						③KS		
WQ Time: 1405	45		5.9		25.3		7.9								
Replicate: 3	50		5.9		25.5		7.9								
Technician: SH															

① IE 8/4/11 KE ② IE 8/7/11 SH ③ only counts, no renewals 8/7/11 KS

Start Time:	1630	Initials: KE/SH
End Time:	1445	Initials: BG/SH
Organism Batch:	ABS 6533	Age: 7 d
Organism Supplier:	Aquatic Bio Systems	

Dilution Water Batch:	SIO 07251 1
Location:	Rm 4
Hobo Temp No.:	71637
Test Acceptability:	☒ ≥80% Survival in control
	☐ ≥ 0.20 mg mean dry weight / organism in control

Weston Test ID:	Client:	Client Sample ID:
C110804.0127	West Basin Municipal Water District	1st pass RO conc.

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 4	Control	2	5.5	2	24.7	4	7.8	2	6.8	2	24.4	6	33.2	4	7.9
Date: 8/8/11	36.5		5.7		25.1		7.9		6.9		24.4		36.7		7.9
Sample ID: C110804.01	39		5.3		25.2		7.9		7.0		24.3		39.1		7.9
Dilutions (Tech): KC	41		5.5		25.3		7.9		7.1		24.3		41.1		7.9
WQ Time: 1220/1235	45		5.2		25.7		7.9		7.3		24.3		45.1		7.9
Replicate: 4, Stock	50		5.4		25.2		8.0		7.3		24.2		50.1		7.8
Technician: BG															
Day 5	Control	2	6.0	2	24.8	3	7.9		(1)BG						
Date: 8/9/11	36.5		5.9		25.3		8.0								
Sample ID: C110804.01	39		5.7		24.9		8.0								
Dilutions (Tech): ~~KC~~ (2) KC	41		5.8		25.3		8.0								
WQ Time: 0920	45		5.8		25.7		8.1								
Replicate: 5	50		5.5		25.3		8.1								
Technician: BG															
Day 6	Control	3	5.3	3	25.9	4	7.7	2	6.9	2	24.7	6	33.1	3	8.0
Date: 8/10/11	36.5		5.6		24.7		7.8		7.2		25.1		36.8		8.0
Sample ID: C110804.01	39		5.2		26.0		7.8		7.3		25.2		39.2		8.0
Dilutions (Tech): KC	41		5.3		25.5		7.8		7.5		24.5		41.1		8.0
WQ Time: 1020/1040	45		5.2		26.0		7.9		7.7		24.5		45.1		8.0
Replicate: 6	50		5.3		25.6		7.9		8.1		24.7		45.9		7.9
Technician: KC/SH															
Day 7	Control	2	5.3	2	25.7	(2)	7.9					6	33.3		
	36.5		5.1		25.5		7.9						36.9		
Date: 8/11/11	39		5.5		25.1		7.9						39.4		
WQ Time: 1215	41		5.0		24.9		7.9						41.4		
Replicate: 7	45		4.8		25.3		7.9						45.5		
Technician: BG	50		4.9		26.2		8.0						50.4		

Feeding Information*	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
AM Feed (Tech):		KC	VS	SH	BG	BG	KC	SH
PM Feed (Tech):	KC	BG	VS	VS	KC	BG	KC	

*Mysids should get fed 150 *Artemia* per mysid per day (375 *Artemia* per test chamber twice daily).

(1) Only counts, no renewals. 8/9/11 BG

(2) WC 8/11/11 BG

(3) IE 8/15/11 ES

Weston Test ID:	Client:	Client Sample ID:
C110804.0127	West Basin Municipal Water District	1st Pass RO conc.

Survival Data

Concentration (%)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 8/5/11	Date: 8/6/11	Date: 8/7/11	Date: 8/8/11	Date: 8/9/11	Date: 8/10/11	Date: 8/11/11
		Renewal Time: 1245	Renewal Time: 1430	~~Renewal~~ KS Time: 1600	Renewal Time: 1240	~~Renewal~~ BG Time: 0930	Renewal Time: 1230	End Time: 1445
		Tech: KC	Tech: KS	Tech: KS	Tech: BG	Tech: BG	Tech: BG	Tech: BG/SH
Control	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	6	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	5	4(1NB)	4	4	4	4
	8	5	5	5	5	5	5	5
36.5	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	4(1NB)	4	4	4	4
	4	5	5	5	5	5	5	5
	5	4(1NB)	4	4	4	4	4	4
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	4(1NB)	4
	8	5	5	5	5	5	5	5
39	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	4(1NB)
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	4(1)	4	3(1NB)	3	3	3
	6	5	5	5	5	5	5	5
	7	5	5	6	5	5	5	5
	8	5	5	5	5	5	5	5
41	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	4(1NB)	4	4	4	4	4
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	4(1NB)	4
	8	5	5	5	5	5	5	5
45	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	4(1)	4	4	4	4	4
	6	4(1)	4	4	4	4	4	4
	7	5	4(1)	3(1NB)	3	3	3	3
	8	5	5	5	5	5	5	5
50	1	5	3(2)	2(1)	2	1(1)	1	1
	2	5	3(2)	3	3	3	2(1)	2
	3	4(1)	4	3(1)	3	3	3	3
	4	5	4(1NB)	5(1EB)	5	4(1)	4	4
	5	5	4(1)	4	4	4	4	~~2(1NB)~~ 4
	6	4(1)	3(1)	3	3	3	3	3
	7	3(2)	1(2)	1	1	1	1	1
	8	5	3(2)	2(1)	1(1)	1	1	1

① counts only
② WC 8/11/11 BG

8/7/11 KS; 8/9/11 BG

WESTON SOLUTIONS

Americamysis bahia 7-Day Chronic Toxicity Test

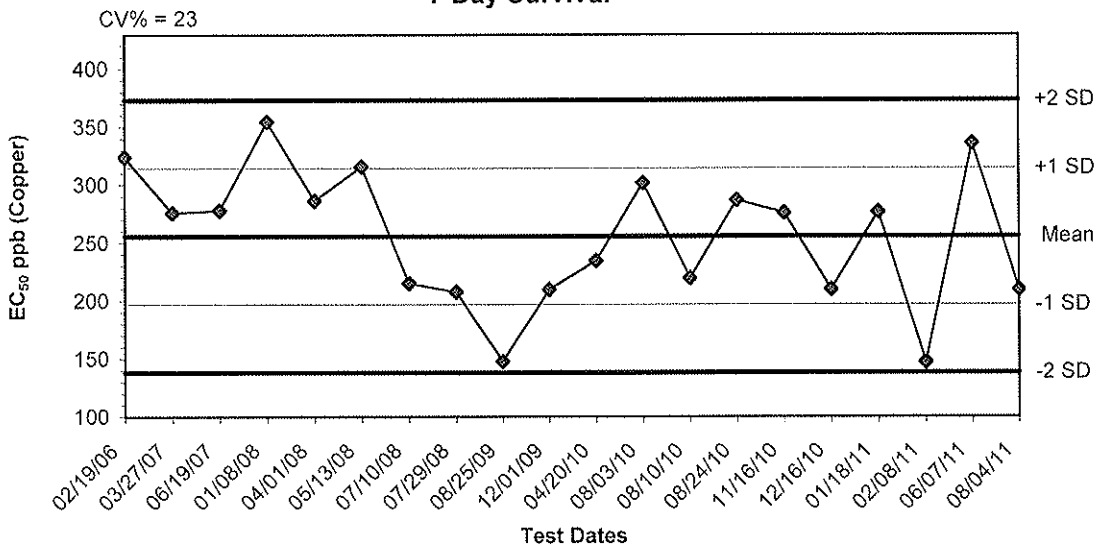
BIO027

Weston Test ID:	Client:	Client Sample ID:
C110804.0127	West Basin	1st pass RO conc.

Concentration (%)	Replicate	Boat Number	Weight Empty Boat (mg)	Weight Boat & Animals (mg)
Control	1	1	72.50	74.25
	2	2	55.28	57.29
	3	3	55.90	58.12
	4	4	57.56	59.36
	5	5	58.67	60.24
	6	6	57.00	58.98
	7	7	56.28	57.94
	8	8	56.80	59.62
36.5	1	9	57.56	59.10
	2	10	56.87	58.99
	3	11	57.32	59.39
	4	12	55.16	57.08
	5	13	64.70	66.74
	6	14	65.41	67.67
	7	15	57.69	59.74
	8	16	65.39	67.12
39	1	17	58.59	60.05
	2	18	59.47	60.90
	3	19	59.23	61.07
	4	20	57.89	59.71
	5	21	58.99	60.95
	6	22	58.54	60.93
	7	23	60.92	62.34
	8	24	65.98	68.11
41	1	25	57.87	60.24
	2	26	59.93	61.79
	3	27	58.70	60.10
	4	28	77.11	78.93
	5	29	75.12	76.90
	6	30	59.71	61.36
	7	31	58.52	60.60
	8	32	57.58	59.21
45	1	33	58.31	59.44
	2	34	58.22	59.58
	3	35	57.10	58.29
	4	36	73.56	75.19
	5	37	61.75	63.43
	6	38	72.20	73.56
	7	39	54.92	55.94
	8	40	71.60	72.95
50	1	41	71.48	71.77
	2	42	72.08	72.63
	3	43	66.65	67.35
	4	44	67.35	68.26
	5	45	71.95	73.19
	6	46	70.77	71.48
	7	47	64.29	65.59
	8	48	64.60	65.03
		Date:	8/11/11	8/12/11
		Time:	10:30	10:45
		Technician:	BG	BG

Oven temp. (°C) at start of drying:	73°C	Date/Time:	8/11/11 1530	Tech:	SH
Oven temp. (°C) at end of drying:	67°C	Date/Time:	8/12/11 0815	Tech:	JH

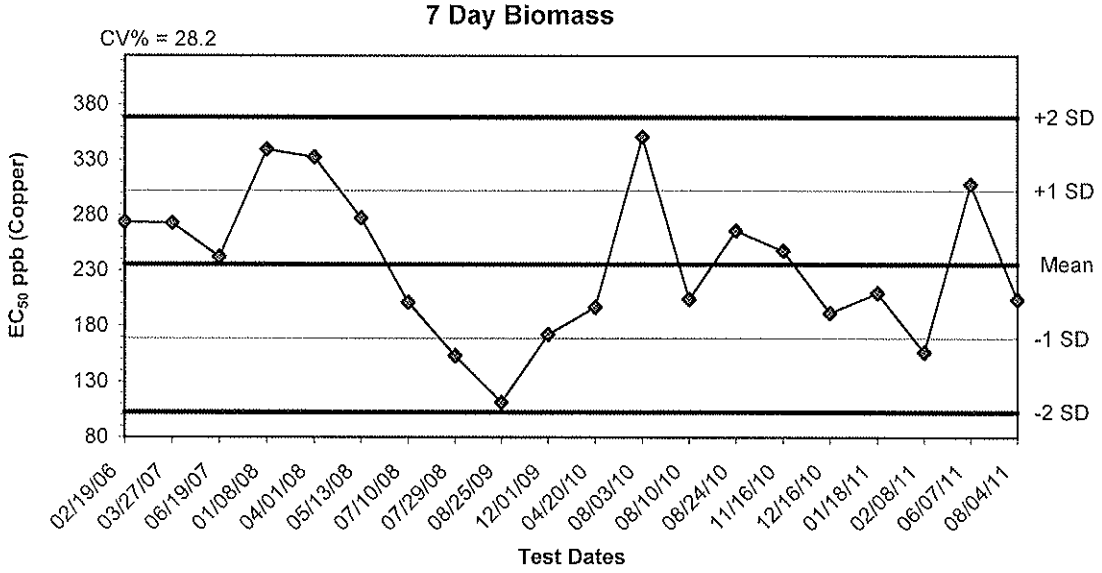
Americamysis bahia Reference Toxicant Control Chart: 7 Day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
02/19/06	324.1760	255.6383	196.7957	137.9532	314.4808	373.3233
03/27/07	275.8930	255.6383	196.7957	137.9532	314.4808	373.3233
06/19/07	278.0670	255.6383	196.7957	137.9532	314.4808	373.3233
01/08/08	354.3570	255.6383	196.7957	137.9532	314.4808	373.3233
04/01/08	286.3690	255.6383	196.7957	137.9532	314.4808	373.3233
05/13/08	315.9490	255.6383	196.7957	137.9532	314.4808	373.3233
07/10/08	215.1120	255.6383	196.7957	137.9532	314.4808	373.3233
07/29/08	207.6650	255.6383	196.7957	137.9532	314.4808	373.3233
08/25/09	147.8750	255.6383	196.7957	137.9532	314.4808	373.3233
12/01/09	209.5570	255.6383	196.7957	137.9532	314.4808	373.3233
04/20/10	234.4900	255.6383	196.7957	137.9532	314.4808	373.3233
08/03/10	301.7830	255.6383	196.7957	137.9532	314.4808	373.3233
08/10/10	219.4300	255.6383	196.7957	137.9532	314.4808	373.3233
08/24/10	286.9300	255.6383	196.7957	137.9532	314.4808	373.3233
11/16/10	275.8600	255.6383	196.7957	137.9532	314.4808	373.3233
12/16/10	209.9400	255.6383	196.7957	137.9532	314.4808	373.3233
01/18/11	276.5280	255.6383	196.7957	137.9532	314.4808	373.3233
02/08/11	147.0830	255.6383	196.7957	137.9532	314.4808	373.3233
06/07/11	336.0610	255.6383	196.7957	137.9532	314.4808	373.3233
08/04/11	209.6400	255.6383	196.7957	137.9532	314.4808	373.3233

Updated 8/18/11 KC

Americamysis bahia Reference Toxicant Control Chart: 7 Day Biomass



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
02/19/06	273.5800	235.5387	169.0003	102.4619	302.0771	368.6155
03/27/07	272.7600	235.5387	169.0003	102.4619	302.0771	368.6155
06/19/07	242.1800	235.5387	169.0003	102.4619	302.0771	368.6155
01/08/08	339.3600	235.5387	169.0003	102.4619	302.0771	368.6155
04/01/08	332.4600	235.5387	169.0003	102.4619	302.0771	368.6155
05/13/08	277.4300	235.5387	169.0003	102.4619	302.0771	368.6155
07/10/08	201.3000	235.5387	169.0003	102.4619	302.0771	368.6155
07/29/08	153.4400	235.5387	169.0003	102.4619	302.0771	368.6155
08/25/09	111.2400	235.5387	169.0003	102.4619	302.0771	368.6155
12/01/09	172.3700	235.5387	169.0003	102.4619	302.0771	368.6155
04/20/10	196.7400	235.5387	169.0003	102.4619	302.0771	368.6155
08/03/10	350.8100	235.5387	169.0003	102.4619	302.0771	368.6155
08/10/10	203.9600	235.5387	169.0003	102.4619	302.0771	368.6155
08/24/10	265.8200	235.5387	169.0003	102.4619	302.0771	368.6155
11/16/10	247.6400	235.5387	169.0003	102.4619	302.0771	368.6155
12/16/10	191.7500	235.5387	169.0003	102.4619	302.0771	368.6155
01/18/11	209.6140	235.5387	169.0003	102.4619	302.0771	368.6155
02/08/11	156.4200	235.5387	169.0003	102.4619	302.0771	368.6155
06/07/11	308.0400	235.5387	169.0003	102.4619	302.0771	368.6155
08/04/11	203.8600	235.5387	169.0003	102.4619	302.0771	368.6155

Updated 8/18/11 KC

Mysid Survival and Growth Test-7 Day Survival

Start Date:	8/4/2011 15:10	Test ID:	C110713.02	Sample ID:	REF-Ref Toxicant
End Date:	8/11/2011 13:52	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	0.8000	0.6000	0.8000	0.8000	0.6000	0.8000	1.0000	1.0000
62.5	1.0000	1.0000	0.8000	0.6000	1.0000	0.6000	0.8000	1.0000
125	1.0000	0.8000	0.8000	1.0000	0.4000	1.0000	0.8000	1.0000
250	0.0000	0.8000	0.2000	0.2000	0.0000	0.4000	0.0000	0.0000
500	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

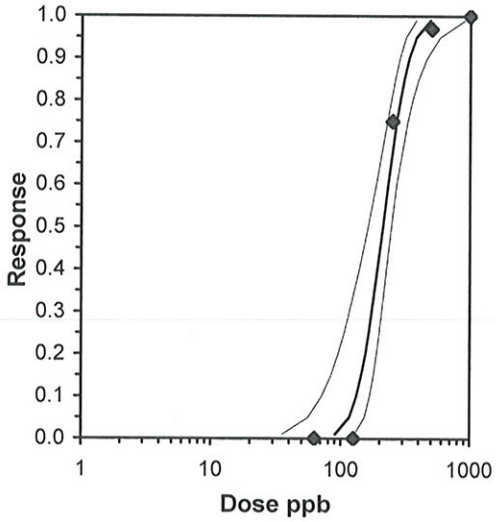
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.8000	1.0000	1.1114	0.8861	1.3453	15.622	8				8	40
62.5	0.8500	1.0625	1.1709	0.8861	1.3453	17.443	8	-0.555	2.239	0.2402	6	40
125	0.8500	1.0625	1.1734	0.6847	1.3453	19.597	8	-0.578	2.239	0.2402	6	40
*250	0.2000	0.2500	0.4527	0.2255	1.1071	69.302	8	6.140	2.239	0.2402	32	40
*500	0.0250	0.0313	0.2553	0.2255	0.4636	32.981	8	7.979	2.239	0.2402	39	40
1000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8				40	40

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.93609		0.919		0.43284	1.79098
Bartlett's Test indicates equal variances (p = 0.04)					9.9046		13.2767			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test	125	250	176.777		0.21799	0.27133	1.57206	0.04605	1.2E-11	4, 35

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.35999	1.52955	3.36207	9.35791	0.2	3.92778	7.81473	0.27	2.32147	0.15723	22
Intercept	-9.7645	3.64838	-16.915	-2.6137							
TSCR	0.15547	0.03963	0.07779	0.23315							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	90.3016	35.4341	128.338
EC05	3.355	115.571	56.1024	152.87
EC10	3.718	131.817	71.5299	168.151
EC15	3.964	144.05	84.1563	179.556
EC20	4.158	154.576	95.654	189.385
EC25	4.326	164.218	106.644	198.464
EC40	4.747	191.267	139.256	224.943
EC50	5.000	209.64	162.128	244.6
EC60	5.253	229.778	186.715	268.882
EC75	5.674	267.625	227.992	325.903
EC80	5.842	284.318	243.643	356.307
EC85	6.036	305.095	261.306	398.284
EC90	6.282	333.408	283.015	461.99
EC95	6.645	380.276	315.228	581.7
EC99	7.326	486.69	379.635	910.93



Mysid Survival and Growth Test-Biomass

Start Date:	8/4/2011 15:10	Test ID:	C110713.02	Sample ID:	REF-Ref Toxicant
End Date:	8/11/2011 13:52	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	0.3000	0.1800	0.2860	0.3580	0.1920	0.3160	0.3720	0.3960
62.5	0.4280	0.3340	0.3200	0.2020	0.2180	0.2680	0.3660	0.3720
125	0.3420	0.2360	0.2680	0.3640	0.1700	0.2960	0.3560	0.4000
250	0.0000	0.2160	0.1360	0.0780	0.0000	0.0920	0.0000	0.0000
500	0.0660	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

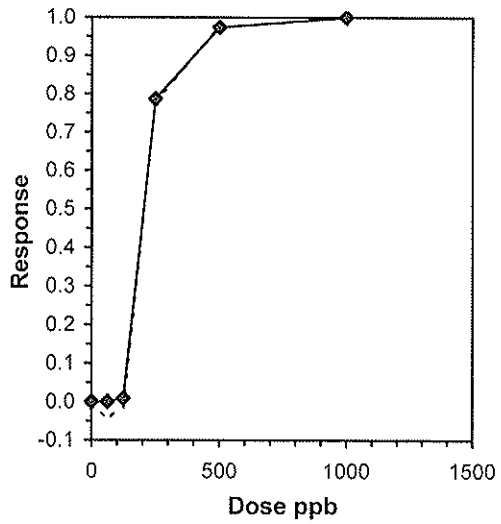
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3000	1.0000	0.3000	0.1800	0.3960	26.511	8				0.3068	1.0000
62.5	0.3135	1.0450	0.3135	0.2020	0.4280	25.109	8	-0.379	2.239	0.0798	0.3068	1.0000
125	0.3040	1.0133	0.3040	0.1700	0.4000	25.146	8	-0.112	2.239	0.0798	0.3040	0.9910
*250	0.0653	0.2175	0.0653	0.0000	0.2160	123.749	8	6.583	2.239	0.0798	0.0653	0.2127
*500	0.0083	0.0275	0.0083	0.0000	0.0660	282.843	8	8.182	2.239	0.0798	0.0083	0.0269
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.97367	0.919	-0.0545	-0.405
Bartlett's Test indicates equal variances (p = 0.05)	9.47927	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	125	250	176.777		0.07982	0.26608	0.17722	0.00509	9.4E-12	4, 35

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL		Skew
IC05	131.59	36.00	23.58	134.78	-1.1126
IC10	139.62	26.63	47.15	144.57	-1.7418
IC15	147.65	14.91	104.83	154.35	-2.3048
IC20	155.68	10.55	125.19	164.13	-0.8094
IC25	163.71	10.27	134.09	173.91	-0.5988
IC40	187.80	10.74	162.45	203.51	0.0505
IC50	203.86	11.75	179.83	224.07	0.4678



Mysid Survival and Growth Test-Growth-Weight

Start Date:	8/4/2011 15:10	Test ID:	C110713.02	Sample ID:	REF-Ref Toxicant
End Date:	8/11/2011 13:52	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	0.3750	0.3000	0.3575	0.4475	0.3200	0.3950	0.3720	0.3960
62.5	0.4280	0.3340	0.4000	0.3367	0.2180	0.4467	0.4575	0.3720
125	0.3420	0.2950	0.3350	0.3640	0.4250	0.2960	0.4450	0.4000
250	0.2700	0.6800	0.3900	0.2300				
500	0.3300							

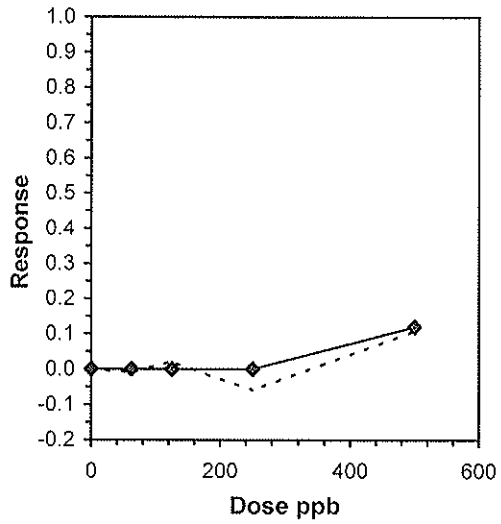
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.3704	1.0000	0.3704	0.3000	0.4475	12.453	8				0.3749	1.0000
62.5	0.3741	1.0101	0.3741	0.2180	0.4575	20.994	8	-0.081	2.170	0.1001	0.3749	1.0000
125	0.3628	0.9794	0.3628	0.2950	0.4450	15.551	8	0.165	2.170	0.1001	0.3749	1.0000
250	0.3925	1.0597	0.3925	0.2300	0.6800	51.813	4	-0.391	2.170	0.1226	0.3749	1.0000
500	0.3300	0.8910	0.3300	0.3300	0.3300	0.000	1				0.3300	0.8802

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.91884	0.896	0.91255	3.58459
Bartlett's Test indicates unequal variances (p = 4.48E-03)	13.0747	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	250	>250			0.12264	0.33112	0.00081	0.00852	0.96229	3, 24

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	354.30	110.89	0.00	383.25	-0.4914
IC10	458.61				
IC15	>500				
IC20	>500				
IC25	>500				
IC40	>500				
IC50	>500				



Test: MG-Mysid Survival and Growth Test
Species: AB-Americamysis bahia
Sample ID: REF-Ref Toxicant
Start Date: 8/4/2011 15:10 End Date: 8/11/2011 13:52

Test ID: C110713.02
Protocol: EPAM 02-EPA Marine
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	1	1	Control	5							4	64.6	63.1	4			
	2	2	Control	5							3	62.95	62.05	3			
	3	3	Control	5							4	66.37	64.94	4			
	4	4	Control	5							4	66.03	64.24	4			
	5	5	Control	5							3	60.9	59.94	3			
	6	6	Control	5							4	61.28	59.7	4			
	7	7	Control	5							5	63.86	62	5			
	8	8	Control	5							5	61.71	59.73	5			
	9	1	62.500	5							5	59.83	57.69	5			
	10	2	62.500	5							5	59.17	57.5	5			
	11	3	62.500	5							4	60.7	59.1	4			
	12	4	62.500	5							3	57.6	56.59	3			
	13	5	62.500	5							5	61.5	60.41	5			
	14	6	62.500	5							3	59.93	58.59	3			
	15	7	62.500	5							4	60.17	58.34	4			
	16	8	62.500	5							5	62.31	60.45	5			
	17	1	125.000	5							5	62.48	60.77	5			
	18	2	125.000	5							4	58.37	57.19	4			
	19	3	125.000	5							4	59.89	58.55	4			
	20	4	125.000	5							5	57.64	55.82	5			
	21	5	125.000	5							2	62.86	62.01	2			
	22	6	125.000	5							5	61.59	60.11	5			
	23	7	125.000	5							4	61.49	59.71	4			
	24	8	125.000	5							5	62.33	60.33	5			
	25	1	250.000	5							0			0			
	26	2	250.000	5							4	61.66	60.58	4			
	27	3	250.000	5							1	59.75	59.07	1			
	28	4	250.000	5							1	60.2	59.81	1			
	29	5	250.000	5							0			0			
	30	6	250.000	5							2	60.04	59.58	2			
	31	7	250.000	5							0			0			
	32	8	250.000	5							0			0			
	33	1	500.000	5							1	57.13	56.8	1			
	34	2	500.000	5							0			0			
	35	3	500.000	5							0			0			
	36	4	500.000	5							0			0			
	37	5	500.000	5							0			0			
	38	6	500.000	5							0			0			

Reviewed by:

Test: MG-Mysid Survival and Growth Test
Species: AB-Americamysis bahia
Sample ID: REF-Ref Toxicant
Start Date: 8/4/2011 15:10 End Date: 8/11/2011 13:52

Test ID: C110713.02
Protocol: EPAM 02-EPA Marine
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	39	7	500.000	5							0			0			
	40	8	500.000	5							0			0			
	41	1	1000.000	5							0			0			
	42	2	1000.000	5							0			0			
	43	3	1000.000	5							0			0			
	44	4	1000.000	5							0			0			
	45	5	1000.000	5							0			0			
	46	6	1000.000	5							0			0			
	47	7	1000.000	5							0			0			
	48	8	1000.000	5							0			0			

Comments:

WESTON SOLUTIONS

7 - Day *Americamysis bahia* Reference Toxicant Test

BIO027

Test ID: C110713.02

Concentration (ppb)	Rep	Weigh Boat Number	Tare Weight (mg)	Total Weight (mg)
Control	1	1	63.10	64.60
	2	2	62.05	62.95
	3	3	64.94	66.37
	4	4	64.24	66.03
	5	5	59.94	60.90
	6	6	59.70	61.28
	7	7	62.00	63.86
	8	8	59.73	61.71
62.5 ① JH	1	9	57.69	59.83
	2	10	57.50	59.17
	3	11	59.10	60.70
	4	12	56.59	57.60
	~~5~~ 7	~~13~~ 14	~~58.59~~ 58.34	60.17 ~~59.93 OBG~~
	~~6~~ 5	~~14~~ 15	~~58.34~~ 60.41	61.50
	~~7~~ 6	~~15~~ 13	~~60.41~~ 58.99	59.93
	8	16	60.45	62.31
125	1	17	60.77	62.48
	2	18	57.19	58.37
	3	19	58.55	59.89
	4	20	55.82	57.64
	5	21	62.01	62.86
	6	22	60.11	61.59
	7	23	59.71	61.49
	8	24	60.33	62.33
250	1	25	59.94	—
	2	26	60.58	61.66
	3	27	59.07	59.75
	4	28	59.81	60.20
	5	29	59.33	—
	6	30	59.58	60.04
	7	—	—	—
	8	31	57.22	—
500	1	32	56.80	57.13
	2			
	3			
	4			
	5			
	6			
	7			
	8			
1000	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
		Date:	8/11/11	8/12/11
		Time:	11:15	12:15
		Initials:	BG	BG

① Due to tech error, incorrect weigh boats used for reps 5-7, but should not affect results ②JH 8/11/11

① IE 8/11/11 JH

③ WC 8/12/11 BG

WESTON SOLUTIONS

7 - Day *Americamysis bahia* Reference Toxicant Test

BIO027

SURVIVAL DATA

Test ID: C110713.02

Conc. (ppb)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7 (SH)
		Date: 8/5/11	Date: 8/6/11	Date: 8/7/11	Date: 8/8/11	Date: 8/9/11	Date: 8/10/11	Date: 8/11/11
		Renewal Time: 1215	Renewal Time: 1500	~~Renewal~~ (KS) Time: 1620	Renewal Time: 1305	~~Renewal~~ (BG) Time: 0945	Renewal Time: 1200	End Time: 1352
		Tech: BC	Tech: KS	Tech: KS	Tech: BG	Tech: BG	Tech: BG	Tech: SH/BG
Control	1	5	5	5	5	4(1NB)	4	4
	2	5	5	3(1)(1NB)	3	3	3	3
	3	5	5	5	5	5	5	4(1NB)
	4	4(1NB)	4	4	4	4	4	4
	5	5	5	4(1)	4	4	3(1NB)	3
	6	5	5	5	5	5	5	4(1)
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
62.5	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	6	5
	3	4(1)	4	4	4	4	4	4
	4	5	5	4(1)	4	4	4	3(1)
	5	5	5	5	5	5	5	5
	6	4(1NB)	3(1)	3	3	3	3	3
	7	5	5	5	5	5	4(1NB)	4
	8	5	5	5	5	5	5	5
125	1	5	5	5	5	5	5	5
	2	5	5	4(1NB)	4	4	4	4
	3	5	5	5	4(1)	4	4	4
	4	5	5	5	5	5	5	5
	5	4(1NB)	3(1NB)	3	3	5	3	2(1NB)
	6	5	5	5	5	5	5	5
	7	5	4(1NB)	4	4	4	4	4
	8	5	5	5	5	5	5	5
250 (1)	1	4(1)	2(2)	1(1)	1	1	Ø(1)	—
	2	~~3(2)~~ 5	5	5	4(1)	4	4	4
	3	5	2(3)	2	2	1(1)	1	1
	4	3(2)	2(1NB)	2	2	2	1(1)	1
	5	4(1)	1(3)	1	1	1	1	Ø(1)
	6	3(2)	3	3	2(1)	2	2	2
	7	5	2(3)	1(1)	Ø(1)	—	—	—
	8	4(1)	2(2)	1(1)	1	1	1	Ø(1)
500	1	1(4)	1	1	1	1	1	1
	2	3(2)	1(2)	Ø(1)	—	—	—	—
	3	5	1(4)	Ø(1)	—	—	—	—
	4	5	1(4)	Ø(1)	—	—	—	—
	5	2(3)	Ø(2)	—	—	—	—	—
	6	2(3)	Ø(2)	—	—	—	—	—
	7	2(3)	Ø(2)	—	—	—	—	—
	8	3(2)	1(2)	Ø(1)	—	—	—	—
1000	1	1(4)	Ø(1)	—				
	2	3(2)	2(1)	Ø(2)				
	3	2(3)	1(1)	Ø(1)				
	4	1(4)	Ø(1)	—				
	5	2(3)	Ø(2)	—				
	6	2(3)	Ø(2)	—				
	7	1(4)	Ø(1)	—				
	8	1(4)	Ø(1)	—				

(1) WC 8/5/11 BC

(2) counts only 8/7/11 KS, 8/9/11 BG

(3) IE 8/11/11 SH

(4) Due to tech error, both reps initially put in one weighboat, realized error and animals separated correctly but number alive but no way to tell if animals are from correct rep 8/11/11 SH

WESTON SOLUTIONS

7 - Day *Americamysis bahia* Reference Toxicant Test

BIO027

Test ID: 110713.02	Associated Test(s): West Basin mysid-c		Study Director: K. Amy
Organism Batch: ABS 6533	Location: Room 4	Replicates: 8	No. of Organisms: 5
Start Time: 1510	Initials: KC	End Time: 1352	Initials: SH

Day 0 Water Quality Data

Stock

Date: 8/4/11 Time: 1253 Initials: SH/SH

	Control	62.5	125	250	500	1000
D.O. (mg/L)	6.7	6.7	6.8	6.7	6.8	6.8
Temp. (°C)	24.5	24.4	24.5	24.6	24.7	24.8
Salinity (ppt)	33.2	33.2	33.1	33.2	33.0	33.2
pH	7.8	7.9	7.9	7.9	7.9	7.8

Day 7 Water Quality Data

Date: 8/11/11 Time: 1130 Replicate: 1, 2 Initials: BG

	Control	62.5	125	250	500	1000
D.O. (mg/L)	6.6	6.6	6.3	6.5	6.6	@BG
Temp. (°C)	25.2	25.1	25.3	25.5	25.4	
Salinity (ppt)	33.7	33.6	33.3	33.8	33.3	
pH	7.9	8.0	7.9	8.0	8.0	

Feeding Information

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
AM Feed (Tech):		KC	KS	SH	KC	BG	KC	SH
PM Feed (Tech):	KC	OSH SH/BG	KS	KS	KC	BG	KC	

☐ **Pass** ☐ **Fail**

Notes: ① IE 8/5/11 SM

② No survival in 1000 concentration 8/11/11 BG

Reference Toxicant Dilution Worksheet

Test ID: C110713.02	Toxicant: Copper Sulfate (0.509gCu/LCuSO4)	Toxicant Lot Number: 2008506	Toxicant Stock Preparation Date: 7/13/11

Serial Dilute by ½ to obtain concentrations of 1000, 500, 250, 125, and 62.5 ppb.

Date Prepared	Day	Target Conc.	A. Toxicant (target) B. Toxicant (actual)	A. Diluent (target) B. Diluent (actual)	Dilution Water Batch	Tech.
8/4/11	0	1000 ppb	(A) 7.864 mL (B) 7.8642 mL	(A) 4000 mL (B) 4000.0 mL	S10072511	KE
8/5/11	1	1000 ppb	(A) 3.932 mL (B) 3.9323 mL	(A) 2000 mL (B) 2000.0 mL	S10072511	KE
8/6/11	2	1000 ppb	(A) 3.932 mL (B) 3.9327	(A) 2000 mL (B) 1999.8	S10072511	KS
	3	①	(A) (B)	(A) (B)		
8/8/11	4	1000 ppb	(A) 3.932 mL (B) 3.9324	(A) 2000 mL (B) 2000.0 mL	S10072511	BG
8/10/11	(2)SH 5/6	500ppb	(A) 1.966 (B) 1.9664	(A) 2000.0 ml (B) 2000.0 ml	S10072511	SH
	~~6~~		(A) (B)	(A) (B)		

① only counts, no renewals 8/7/11 KS

② Renewed day six @ 500ppb on 8/10/11 SH

Macrocystis pyrifera Chronic Toxicity Test

Test: MC-Macrocystis Germination and Growth Test — Test ID: C110805.01
Species: MP-Macrocystis pyrifera — Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc — Sample Type: EFF2-Industrial
Start Date: 8/15/2011 13:30 — End Date: 8/17/2011 13:25 — Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Total Cour	Number G	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	1	1	Control	100	88	5	5	6	6	7	7	6	5	5	7	2.5	
	2	2	Control	100	83	6	5	5	5	5	5	6	8	6	5	2.5	
	3	3	Control	100	78	6	6	7	6	6	7	4	6	5	7	2.5	
	4	4	Control	100	90	5	6	4	3	6	5	5	5	5	5	2.5	
	5	5	Control	100	85	5	5	7	6	6	8	5	5	5	5	2.5	
	6	1	36.5	100	82	4	5	6	5	7	5	5	5	6	4	2.5	
	7	2	36.5	100	85	7	4	6	6	4	5	5	6	5	5	2.5	
	8	3	36.5	100	91	6	6	3	5	6	5	6	5	4	6	2.5	
	9	4	36.5	100	88	8	5	7	5	6	4	6	4	4	5	2.5	
	10	5	36.5	100	81	6	4	7	5	5	6	7	5	4	5	2.5	
	11	1	39	100	84	5	6	6	4	8	8	8	4	7	5	2.5	
	12	2	39	100	83	6	5	5	5	5	4	3	6	6	5	2.5	
	13	3	39	100	83	4	5	5	6	5	5	6	5	4	3	2.5	
	14	4	39	100	85	3	6	5	5	6	4	5	7	4	5	2.5	
	15	5	39	100	86	5	8	5	6	4	6	4	6	4	5	2.5	
	16	1	41	0	0	0	0	0	0	0	0	0	0	0	0	2.5	
	17	2	41	100	77	5	6	6	4	3	3	4	5	4	5	2.5	
	18	3	41	100	75	6	5	4	5	4	5	3	4	4	5	2.5	
	19	4	41	100	83	4	5	5	4	6	5	5	5	6	4	2.5	
	20	5	41	100	85	5	3	6	6	5	4	5	4	4	5	2.5	
	21	1	45	100	63	5	4	5	4	3	5	4	4	6	5	2.5	
	22	2	45	100	69	5	4	4	3	4	3	5	3	5	4	2.5	
	23	3	45	100	76	4	5	3	4	6	5	4	4	3	5	2.5	
	24	4	45	100	78	5	4	4	3	4	3	3	5	4	5	2.5	
	25	5	45	100	74	5	4	4	5	6	3	5	4	4	5	2.5	
	26	1	50	100	66	3	4	5	6	3	3	4	3	4	4	2.5	
	27	2	50	100	72	3	4	3	3	4	5	4	3	4	4	2.5	
	28	3	50	100	74	5	4	3	4	4	3	5	4	3	3	2.5	
	29	4	50	100	65	3	3	4	5	3	3	4	3	3	4	2.5	
	30	5	50	100	75	3	4	3	4	4	4	4	5	3	3	2.5	

Comments: West Basin Municipal Water District - Salinity Study

Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	8/15/2011 13:30	Test ID:	C110805.0147	Sample ID:	1st Pass RO Conc
End Date:	8/17/2011 13:25	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	MP-Macrocystis pyrifera
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.8800	0.8300	0.7800	0.9000	0.8500
36.5	0.8200	0.8500	0.9100	0.8800	0.8100
39	0.8400	0.8300	0.8300	0.8500	0.8600
41	0.7700	0.7500	0.8300	0.8500	
45	0.6300	0.6900	0.7600	0.7800	0.7400
50	0.6600	0.7200	0.7400	0.6500	0.7500

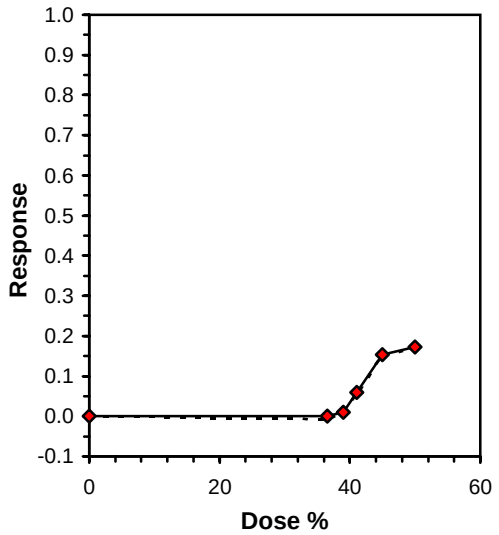
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.8480	1.0000	1.1735	1.0826	1.2490	5.495	5				0.8510	1.0000
36.5	0.8540	1.0071	1.1817	1.1198	1.2661	5.128	5	-0.233	2.500	0.0880	0.8510	1.0000
39	0.8420	0.9929	1.1623	1.1458	1.1873	1.548	5	0.320	2.500	0.0880	0.8420	0.9894
41	0.8000	0.9434	1.1092	1.0472	1.1731	5.398	4	1.723	2.500	0.0934	0.8000	0.9401
*45	0.7200	0.8491	1.0149	0.9169	1.0826	6.563	5	4.506	2.500	0.0880	0.7200	0.8461
*50	0.7040	0.8302	0.9964	0.9377	1.0472	5.060	5	5.030	2.500	0.0880	0.7040	0.8273

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96643	0.926	-0.1921	-0.9011
Bartlett's Test indicates equal variances (p = 0.35)	5.53656	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test Treatments vs Control	41	45	42.9535	2.43902	0.0679	0.07985	0.03378	0.0031	1.8E-05	5, 23

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	40.598	1.940	34.993	43.171	-5.1161
IC10	42.705	1.076	39.517	45.309	0.1040
IC15	44.833				
IC20	>50				
IC25	>50				
IC40	>50				
IC50	>50				



Macrocystis Germination and Growth Test-Growth-Length

Start Date:	8/15/2011 13:30	Test ID:	C110805.0147	Sample ID:	1st Pass RO Conc
End Date:	8/17/2011 13:25	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	MP-Macrocystis pyrifera
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5
Control	14.750	14.000	15.000	12.250	14.250
36.5	13.000	13.250	13.000	13.500	13.500
39	15.250	12.500	12.000	12.500	13.250
41	0.000	11.250	11.250	12.250	11.750
45	11.250	10.000	10.750	10.000	11.250
50	9.750	9.250	9.500	8.750	9.250

			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	14.050	1.0000	14.050	12.250	15.000	7.695	5			14.050	1.0000
36.5	13.250	0.9431	13.250	13.000	13.500	1.887	5	20.00	16.00	13.250	0.9431
39	13.100	0.9324	13.100	12.000	15.250	9.787	5	23.00	16.00	13.100	0.9324
*41	9.300	0.6619	9.300	0.000	12.250	56.079	5	15.50	16.00	9.975	0.7100
*45	10.650	0.7580	10.650	10.000	11.250	5.892	5	15.00	16.00	9.975	0.7100
*50	9.300	0.6619	9.300	8.750	9.750	3.987	5	15.00	16.00	9.300	0.6619

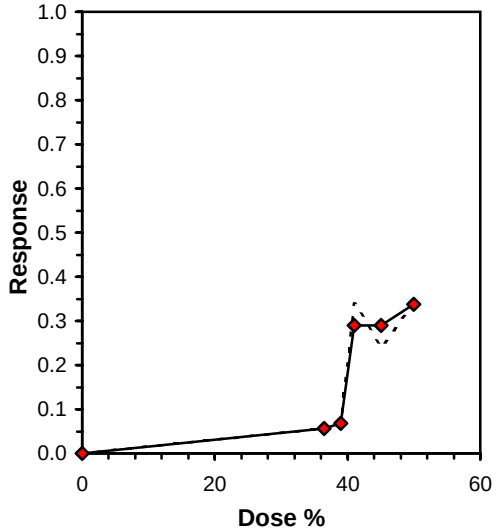
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.67522	0.927	-3.1766	14.8872
Bartlett's Test indicates unequal variances (p = 6.01E-08)	41.9579	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test Treatments vs Control	39	41	39.9875	2.5641

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05*	32.052	7.485	12.600	43.333	-0.3819
IC10	39.291	1.118	35.725	41.076	-2.8316
IC15	39.741	0.829	38.581	43.537	2.1545
IC20	40.190	1.581	39.146	47.879	1.7475
IC25	40.640	2.542	39.531	51.338	0.9351
IC40	>50				
IC50	>50				

* indicates IC estimate less than the lowest concentration



KELP 48-HOUR CHRONIC TOXICITY TEST

BIO047

CLIENT:	West Basin Municipal Water Dist.
PROJECT:	Salinity Study
CLIENT SAMPLE ID:	West Basin @SH Brine
WESTON TEST ID:	C1108~~07~~05.0147
SPECIES:	*Macrocystis pyrifera*

DATE RECEIVED:	8/5/11
DATE TEST STARTED:	8/15/11
DATE TEST ENDED:	8/17/11
STUDY DIRECTOR:	K. SKrivseth
ORGANISMS/CHAMBER:	300,000

	Concentration	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Salinity (ppt)	Meter #	pH
Day 0 (0 Hours)	CONTROL	3	7.6	3	15.5	5	32.0	4	7.8
Date: 8/15/11	~~BRINE CONTROL~~		—		—		—		~~7.7~~ ②JH
Sample ID: C1108015.01	36.5		7.6		16.0		36.3		7.7
Dilutions (tech): KC	39.0		7.4		15.9		38.8		7.~~8~~7 ②JH
WQ Time: 1405	41.0		7.5		15.8		40.8		7.6
Technician: JH	45.0		7.4		15.8		44.7		~~7~~.5
	50.0		7.4		15.9		49.7		7.4
24 Hours	CONTROL			GB	15.3				
Date: 8/16/11	~~BRINE CONTROL~~				—				
WQ Time: 1445	36.5				15.5				
Technician: BG	39.0				15.3				
	41.0				15.3				
	45.0				15.4				
	50.0				15.3				
48 Hours	CONTROL	3	7.2	3	15.8	5	33.4	3	7.9
Date: 8/17/11	~~BRINE CONTROL~~		—		—		—		—
WQ Time: 1015	36.5		7.3		15.7		36.7		7.8
Technician: SH	39.0		7.3		15.6		39.6		7.9
	41.0		7.1		15.4		41.0		7.8
	45.0		6.9		15.6		44.8		7.8
	50.0		7.0		15.7		50.2		7.8

①IE 8/12/11 SH
②WC 8/15/11 JH

START TIME:	1330 JH
END TIME:	1325 KC
ORGANISM BATCH:	DG 080511
TEST ROOM:	Room 2
TEST SHELF #:	2

DILUTION WATER BATCH:	S100725I1
BRINE BATCH:	N/A
HOBO TEMP. NO.:	2296
TEST ACCEPTABILITY:	
☒ 70% GERMINATION IN CONTROL	
☐ ≥10 µm GERM-TUBE LENGTH IN THE CONTROLS	

WESTON SOLUTIONS

KELP 48-HOUR CHRONIC TOXICITY TEST

BIO047

WESTON TEST ID:	CLIENT:	CLIENT SAMPLE ID:
C110805.0147	West Basin	West Basin Brine

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	LENGTH MEASUREMENTS (in ocular micrometer units) L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Scope #	Date	Tech
1	Control	1	88	12	5	5	6	6	7	7	6	5	5	7	BH-2	8/8/11	KS
2	Control	2	83	17	6	5	5	5	5	5	6	8	6	5	"	"	"
3	Control	3	78	22	6	6	7	6	6	7	4	6	5	7	"	"	"
4	Control	4	90	10	5	6	4	3	6	5	5	5	5	5	"	"	"
5	Control	5	85	15	5	5	7	6	6	8	5	5	5	5	"	"	"
6	36.5	1	82	18	~~84~~	5	6	5	7	5	5	5	6	4	#2	9/1/11	KC
7	"	2	85	15	7	4	6	6	4	5	5	6	5	5	BH-2	9/7/11	KC
8	"	3	91	9	6	6	3	5	6	5	6	5	4	6	"	"	"
9	"	4	88	12	8	5	7	5	6	4	6	4	4	5	"	"	"
10	"	5	91	19	6	4	7	5	5	6	7	5	4	5	"	"	"
11	39.0	1	84	16	5	6	6	4	8	8	8	4	7	5	#1	9/1/11	SH
12	"	2	83	17	6	5	5	5	5	4	3	6	6	5	BH-2	9/7/11	KC
13	"	3	83	17	4	5	5	6	5	5	6	5	4	3	"	"	"
14	"	4	85	15	3	6	5	5	6	4	5	7	4	5	"	"	"
15	"	5	86	14	5	8	5	6	4	6	4	6	4	5	"	"	"
16	41.0	1	KC ②														
17	"	2	77	23	5	6	6	4	3	3	4	5	4	5	#1	9/1/11	SH
18	"	3	75	25	6	5	4	5	4	5	3	4	4	5	BH-2	9/7/11	KC
19	"	4	83	17	4	5	5	4	6	5	5	5	6	4	"	"	"
20	"	5	85	15	5	3	6	6	5	4	5	4	4	5	"	"	"
21	45.0	1	63	37	5	4	5	4	3	5	4	4	6	5	#2	9/1/11	KC
22	"	2	69	31	5	4	4	3	4	3	5	3	5	4	BH-2	9/7/11	KC
23	"	3	76	24	4	5	3	4	6	5	4	4	3	5	"	"	"
24	"	4	78	22	5	4	4	3	4	3	3	5	4	5	"	"	"
25	"	5	74	26	5	4	4	5	6	3	5	4	4	5	"	"	"
26	50.0	1	66	34	3	4	5	6	3	3	4	3	4	4	#2	9/1/11	KC
27	"	2	72	28	3	4	3	3	4	5	4	3	4	4	BH-2	9/7/11	KC
28	"	3	74	26	5	4	3	4	4	3	5	4	3	3	"	"	"
29	"	4	65	35	3	3	4	5	3	3	4	3	3	4	"	"	"
30	"	5	75	25	3	4	3	4	4	4	4	5	3	3	"	"	"

① @ 9/1/11 SH

② Due to technician error, rep 1 (41.0 sal) could not be counted. 9/7/11 KC

KELP 48-HOUR CHRONIC TOXICITY TEST
SPOROPHYLL RELEASE DATA SHEET

BIO047

WESTON TEST ID:	CLIENT:	CLIENT SAMPLE ID:
C110805.0147	West Basin Municipal Water District	West Basin Brine

Date: 8/15/11
Test: West Basin
Investigator: JH
Condition of Majority of Blades Used: Poor (Fair) Good
Number of Blades Used: 32 Weight of Blades: 122.5g Volume of Release Water: 1900mL
Time blades are placed in release beaker: 1220
Time blades are removed from release beaker: 1255
Temperature of spore solution: 16°C
Check for zoospore motility on microscope: ✓
Fix a 9-mL spore sample with 1 mL formalin.
Determine spore density on the hemacytometer.
Determine density with 5 counts.

1. 32
2. 30
3. 36
4. 33
5. 36

Mean 33.4

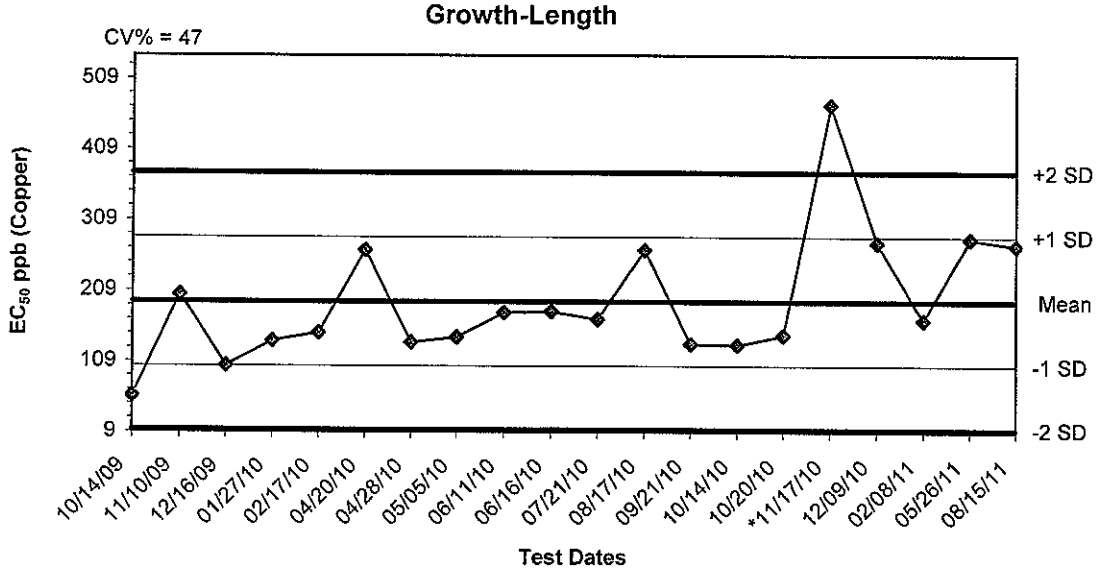
Mean x 10,000 x 1.11 = 370,740 spores/mL. This is the density of spore release.
1.11 is the dilution factor for 1 mL formalin + 9 mL spore solution.

Volume of test container: 40mL
The desired final density of zoospore solution is 7,500 spores/mL of test container.
To determine volume of spores to deliver to test containers:

7,500 spores/mL x 40 mL/test container = 300,000 spores/test container

300,000 spores/test container/density of spore release 370,740 spores/mL = 0.809 mL/test container
Temperature of control water (stock): 15.5°C
Light: 200 - 297 (need 200-300 foot-candles)
Time test containers are inoculated: 1330

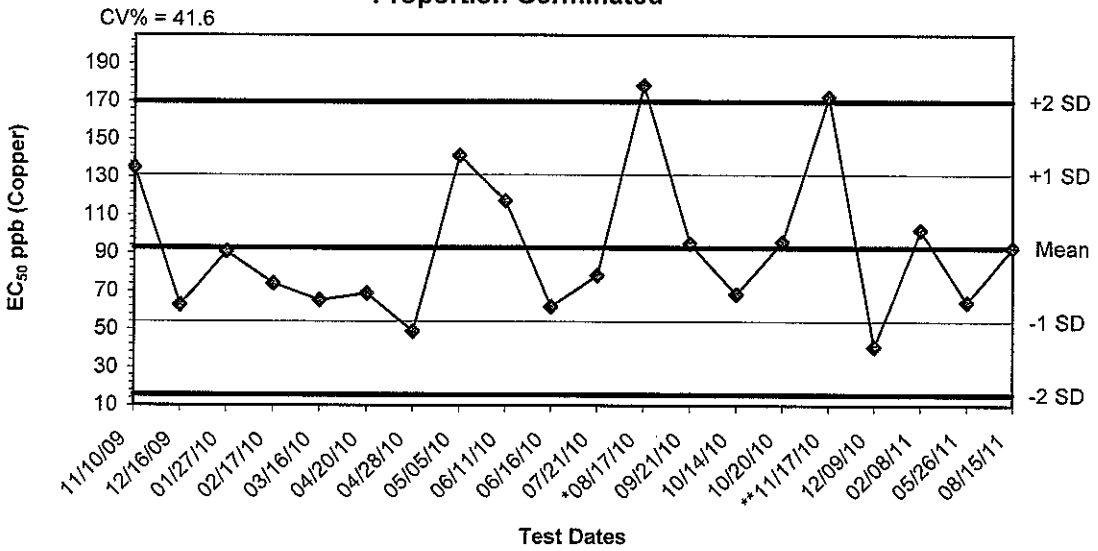
Macrocystis pyrifera Reference Toxicant Control Chart: Growth-Length



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
10/14/09	59.6250	193.4298	102.4692	11.5087	284.3904	375.3509
11/10/09	203.4760	193.4298	102.4692	11.5087	284.3904	375.3509
12/16/09	102.8140	193.4298	102.4692	11.5087	284.3904	375.3509
01/27/10	137.7800	193.4298	102.4692	11.5087	284.3904	375.3509
02/17/10	149.4100	193.4298	102.4692	11.5087	284.3904	375.3509
04/20/10	265.9090	193.4298	102.4692	11.5087	284.3904	375.3509
04/28/10	135.5750	193.4298	102.4692	11.5087	284.3904	375.3509
05/05/10	143.0800	193.4298	102.4692	11.5087	284.3904	375.3509
06/11/10	177.8410	193.4298	102.4692	11.5087	284.3904	375.3509
06/16/10	179.3100	193.4298	102.4692	11.5087	284.3904	375.3509
07/21/10	168.3300	193.4298	102.4692	11.5087	284.3904	375.3509
08/17/10	266.0000	193.4298	102.4692	11.5087	284.3904	375.3509
09/21/10	133.3300	193.4298	102.4692	11.5087	284.3904	375.3509
10/14/10	132.0000	193.4298	102.4692	11.5087	284.3904	375.3509
10/20/10	145.7100	193.4298	102.4692	11.5087	284.3904	375.3509
*11/17/10	471.3400	193.4298	102.4692	11.5087	284.3904	375.3509
12/09/10	276.0000	193.4298	102.4692	11.5087	284.3904	375.3509
02/08/11	166.8060	193.4298	102.4692	11.5087	284.3904	375.3509
05/26/11	281.7600	193.4298	102.4692	11.5087	284.3904	375.3509
08/15/11	272.5000	193.4298	102.4692	11.5087	284.3904	375.3509

*Value out of 95% CI range at time of testing.
Updated 9/16/11 JH

Macrocystis pyrifera Reference Toxicant Control Chart: Proportion Germinated



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/10/09	134.8900	92.6713	54.0810	15.4907	131.2616	169.8519
12/16/09	62.6240	92.6713	54.0810	15.4907	131.2616	169.8519
01/27/10	90.6670	92.6713	54.0810	15.4907	131.2616	169.8519
02/17/10	73.9700	92.6713	54.0810	15.4907	131.2616	169.8519
03/16/10	65.1820	92.6713	54.0810	15.4907	131.2616	169.8519
04/20/10	68.7180	92.6713	54.0810	15.4907	131.2616	169.8519
04/28/10	48.7968	92.6713	54.0810	15.4907	131.2616	169.8519
05/05/10	141.2800	92.6713	54.0810	15.4907	131.2616	169.8519
06/11/10	117.3800	92.6713	54.0810	15.4907	131.2616	169.8519
06/16/10	61.8367	92.6713	54.0810	15.4907	131.2616	169.8519
07/21/10	78.2158	92.6713	54.0810	15.4907	131.2616	169.8519
*08/17/10	178.3100	92.6713	54.0810	15.4907	131.2616	169.8519
09/21/10	94.9111	92.6713	54.0810	15.4907	131.2616	169.8519
10/14/10	68.4052	92.6713	54.0810	15.4907	131.2616	169.8519
10/20/10	95.8000	92.6713	54.0810	15.4907	131.2616	169.8519
**11/17/10	172.4000	92.6713	54.0810	15.4907	131.2616	169.8519
12/09/10	40.9070	92.6713	54.0810	15.4907	131.2616	169.8519
02/08/11	102.0680	92.6713	54.0810	15.4907	131.2616	169.8519
05/26/11	64.2740	92.6713	54.0810	15.4907	131.2616	169.8519
08/15/11	92.7900	92.6713	54.0810	15.4907	131.2616	169.8519

*Value out of 95% CI range at time of testing.
**Value within 95% CI range at time of testing.
Updated 9/16/11 JH

Macrocystis Germination and Growth Test-Growth-Length

Start Date:	8/15/2011 13:30	Test ID:	C101117.11	Sample ID:	REF-Ref Toxicant
End Date:	8/17/2011 13:25	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera

Comments: Rep 3 of 32 ppb was not started with a slide; dropped from stats.

Conc-ppb	1	2	3	4	5
Control	14.750	14.000	15.000	12.250	14.250
5.6	13.250	13.750	13.250	12.250	11.500
10	12.750	14.500	11.750	10.500	11.250
18	11.250	10.750	11.750	11.000	10.750
32	10.250	10.750	10.000	9.500	
100	8.750	8.750	9.250	8.500	9.500
180	7.000	8.500	7.250	8.500	8.500
300	7.250	7.000	6.250	6.750	6.500

			Transform: Untransformed						1-Tailed		Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	14.050	1.0000	14.050	12.250	15.000	7.695	5				14.050	1.0000
5.6	12.800	0.9110	12.800	11.500	13.750	7.096	5	2.312	2.596	1.404	12.800	0.9110
*10	12.150	0.8648	12.150	10.500	14.500	12.734	5	3.514	2.596	1.404	12.150	0.8648
*18	11.100	0.7900	11.100	10.750	11.750	3.769	5	5.455	2.596	1.404	11.100	0.7900
*32	10.125	0.7206	10.125	9.500	10.750	5.140	4	6.843	2.596	1.489	10.125	0.7206
*100	8.950	0.6370	8.950	8.500	9.500	4.590	5	9.431	2.596	1.404	8.950	0.6370
*180	7.950	0.5658	7.950	7.000	8.500	9.538	5	11.280	2.596	1.404	7.950	0.5658
*300	6.750	0.4804	6.750	6.250	7.250	5.856	5	13.500	2.596	1.404	6.750	0.4804

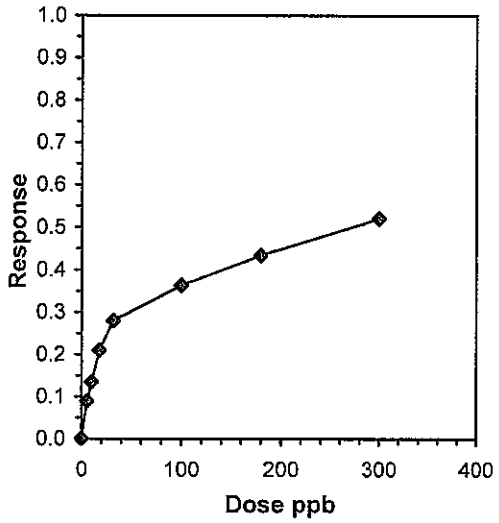
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96271	0.917	0.0926	1.62115
Bartlett's Test indicates equal variances (p = 0.07)	13.2913	18.4753		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	5.6	10	7.48331		1.40385	0.09992	31.4676	0.73105	3.2E-14	7, 31

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05*	3.15	1.89	1.18	10.46	1.9387
IC10	6.65	2.77	2.18	15.90	0.7493
IC15	11.58	3.21	2.47	20.50	0.2115
IC20	16.93	4.46	5.30	31.80	0.5730
IC25	26.08	8.18	12.96	64.49	1.5790
IC40	141.60	26.28	75.78	222.93	0.3386
IC50	272.50				

* indicates IC estimate less than the lowest concentration



Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	8/15/2011 13:30	Test ID:	C101117.11	Sample ID:	REF-Ref Toxicant
End Date:	8/17/2011 13:25	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera

Comments: Rep 3 of 32 ppb was not started with a slide; dropped from stats.

Conc-ppb	1	2	3	4	5
Control	0.8800	0.8300	0.7800	0.9000	0.8500
5.6	0.8900	0.8600	0.9100	0.8900	0.8700
10	0.7700	0.7600	0.8200	0.7100	0.7600
18	0.7300	0.6900	0.7100	0.7327	0.8000
32	0.6800	0.6900	0.6500	0.7000	
100	0.5300	0.5100	0.4900	0.4600	0.5000
180	0.2800	0.2500	0.2800	0.3600	0.2800
300	0.0700	0.0400	0.1000	0.1100	0.0900

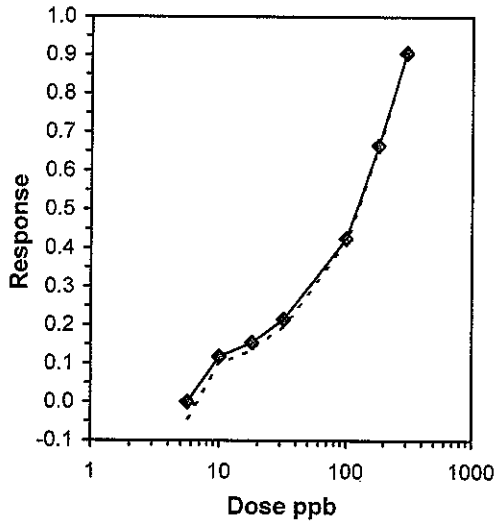
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.8480	1.0000	1.1735	1.0826	1.2490	5.495	5				76	500
5.6	0.8840	1.0425	1.2242	1.1873	1.2661	2.504	5	-1.785	2.596	0.0736	58	500
*10	0.7640	0.9009	1.0646	1.0021	1.1326	4.365	5	3.839	2.596	0.0736	118	500
*18	0.7325	0.8638	1.0283	0.9803	1.1071	4.670	5	5.120	2.596	0.0736	134	501
*32	0.6800	0.8019	0.9697	0.9377	0.9912	2.377	4	6.775	2.596	0.0781	128	400
*100	0.4980	0.5873	0.7834	0.7454	0.8154	3.307	5	13.753	2.596	0.0736	251	500
*180	0.2900	0.3420	0.5680	0.5236	0.6435	7.872	5	21.347	2.596	0.0736	355	500
*300	0.0820	0.0967	0.2867	0.2014	0.3381	18.969	5	31.262	2.596	0.0736	459	500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96961	0.917	0.01672	0.11338
Bartlett's Test indicates equal variances (p = 0.58)	5.62877	18.4753		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	5.6	10	7.48331		0.05615	0.06604	0.51825	0.00201	1.2E-25	7, 31

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	93.51	86.62	100.94
20.0%	105.41	96.64	114.98
Auto-9.5%	92.79	86.03	100.08



Test: MC-Macrocystis Germination and Growth Test
Species: MP-Macrocystis pyrifera
Sample ID: REF-Ref Toxicant
Start Date: 8/15/2011 13:30 End Date: 8/17/2011 13:25

Test ID: C101117.11
Protocol: EPAW 95-EPA West Coast
Sample Type: CUCL-Copper chloride
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Total Counted	Number Germ	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	1	1	Control	100	88	5	5	6	6	7	7	6	5	5	7	2.5	
	2	2	Control	100	83	6	5	5	5	5	5	6	8	6	5	2.5	
	3	3	Control	100	78	6	6	7	6	6	7	4	6	5	7	2.5	
	4	4	Control	100	90	5	6	4	3	6	5	5	5	5	5	2.5	
	5	5	Control	100	85	5	5	7	6	6	8	5	5	5	5	2.5	
	6	1	5.600	100	89	6	4	7	7	5	4	5	6	5	4	2.5	
	7	2	5.600	100	86	9	5	7	6	4	5	6	4	4	5	2.5	
	8	3	5.600	100	91	7	6	4	5	6	6	3	6	4	6	2.5	
	9	4	5.600	100	89	5	6	4	4	4	6	6	5	5	4	2.5	
	10	5	5.600	100	87	4	6	6	6	4	3	4	5	4	4	2.5	
	11	1	10.000	100	77	5	6	6	4	7	6	3	4	5	5	2.5	
	12	2	10.000	100	76	8	6	6	5	4	5	6	6	6	6	2.5	
	13	3	10.000	100	82	3	6	5	5	4	6	4	4	5	5	2.5	
	14	4	10.000	100	71	3	4	3	5	6	4	3	3	6	5	2.5	
	15	5	10.000	100	76	3	3	5	7	4	5	5	6	3	4	2.5	
	16	1	18.000	100	73	4	4	5	4	3	4	5	7	5	4	2.5	
	17	2	18.000	100	69	5	4	4	4	4	5	4	3	6	4	2.5	
	18	3	18.000	100	71	7	4	6	5	4	5	4	4	4	4	2.5	
	19	4	18.000	101	74	3	3	4	7	4	5	4	3	6	5	2.5	
	20	5	18.000	100	80	6	5	3	7	3	3	4	3	5	4	2.5	
	21	1	32.000	100	68	3	3	4	4	5	6	4	4	3	5	2.5	
	22	2	32.000	100	69	5	3	6	4	4	3	4	6	4	4	2.5	
	23	3	32.000	100	65	3	3	3	4	6	3	5	5	4	4	2.5	
	24	4	32.000	100	70	3	4	3	3	3	5	6	4	3	4	2.5	
	25	1	100.000	100	53	5	3	3	4	3	3	3	3	5	3	2.5	
	26	2	100.000	100	51	3	3	3	4	3	3	5	4	3	4	2.5	
	27	3	100.000	100	49	5	5	3	4	3	3	5	3	3	3	2.5	
	28	4	100.000	100	46	3	4	3	3	3	4	4	3	3	4	2.5	
	29	5	100.000	100	50	5	3	4	3	3	6	4	4	3	3	2.5	
	30	1	180.000	100	28	2	5	3	2	2	4	3	2	2	3	2.5	
	31	2	180.000	100	25	4	3	5	5	2	3	4	3	3	2	2.5	
	32	3	180.000	100	28	2	2	3	2	4	3	5	3	2	3	2.5	
	33	4	180.000	100	36	5	4	3	3	5	5	2	3	2	2	2.5	
	34	5	180.000	100	28	2	3	2	2	3	4	3	5	5	5	2.5	
	35	1	300.000	100	7	3	3	4	4	3	3	3	2	2	2	2.5	
	36	2	300.000	100	4	2	5	3	2	3	2	4	2	3	2	2.5	
	37	3	300.000	100	10	4	2	3	3	2	3	2	2	2	2	2.5	
	38	4	300.000	100	11	2	3	3	3	2	3	3	3	2	3	2.5	

Reviewed by: _____

Test: MC-Macrocystis Germination and Growth Test
Species: MP-Macrocystis pyrifera
Sample ID: REF-Ref Toxicant
Start Date: 8/15/2011 13:30 End Date: 8/17/2011 13:25

Test ID: C101117.11
Protocol: EPAW 95-EPA West Coast
Sample Type: CUCL-Copper chloride
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Total Counted	Number Germ	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	39	5	300.000	100	9	2	4	3	2	2	2	3	2	3	3	2.5	

Comments: Rep 3 of 32 ppb was not started with a slide; dropped from stats.

WESTON SOLUTIONS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

REF TOX TEST ID: C101117.11

MICROMETER CONVERSION FACTOR: 2.5

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	LENGTH MEASUREMENTS (in ocular micrometer units)										Scope #	Date	Tech
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10			
1	Control	1	88	12	5	5	6	6	7	7	6	5	5	7	BH-2	8/18/11	KS
2	Control	2	83	17	6	5	5	5	5	5	6	8	6	5			
3	Control	3	78	22	6	6	7	6	6	7	4	6	5	7			
4	Control	4	90	10	5	6	4	3	6	5	5	5	5	5			
5	Control	5	85	15	5	5	7	6	6	8	5	5	5	5			
31	5.6	1	89	11	6	4	7	7	5	4	5	6	5	4	BH-2	9/9/11	KC
32		2	86	14	9	5	7	6	4	5	6	4	4	5			
33		3	91	9	7	6	4	5	6	6	3	6	4	6			
34		4	89	11	5	6	4	4	4	6	6	5	5	4			
35		5	87	13	4	6	6	6	4	3	4	5	4	4			
36	10	1	77	23	5	6	6	4	7	6	3	4	5	5			
37		2	76	24	8	6	6	5	4	5	6	6	6	6			
38		3	82	18	3	6	5	5	4	6	4	4	5	5			
39		4	71	29	3	4	3	5	6	4	3	3	6	5			
40		5	76	24	3	3	5	7	4	5	5	6	3	4			
41	18	1	73	27	4	4	5	4	3	4	5	7	5	4	BH-2	9/12/11	KC
42		2	69	31	5	4	4	4	4	5	4	3	6	4			
43		3	71	29	7	4	6	5	4	5	4	4	4	4			
44		4	74	27	3	3	4	7	4	5	4	3	6	5			
45		5	80	20	6	5	3	7	3	3	4	3	5	4			
46	32	1	68	32	3	3	4	4	5	6	4	4	3	5			
47		2	69	31	5	3	6	4	4	3	4	6	4	4			
48		3	KC①														
49		4	65	35	3	3	3	4	6	3	5	5	4	4	BH-2	9/12/11	KC
50		5	70	30	3	4	3	3	3	5	6	4	3	4			
51	100	1	53	47	5	3	3	4	3	3	3	3	5	3			
52		2	51	49	3	3	3	4	3	3	5	4	3	4			
53		3	49	51	5	5	3	4	3	3	5	3	3	3			
54		4	46	54	3	4	3	3	3	4	4	3	3	4	BH-2	9/15/11	KC
55	2	5	50	50	5	3	4	3	3	6	4	4	3	3			
56	180	1	28	72	2	5	3	2	2	4	3	2	2	3			
57		2	25	75	4	3	5	5	2	3	4	3	3	2			
58		3	KC② 28	72	2	2	3	2	4	3	5	3	2	3			
59		4	36	64	5	4	3	3	5	5	2	3	2	2			
60		5	28	72	2	3	2	2	3	4	3	5	5	5			

① Replicate 3 had no slide in test chamber. Could not be counted. 9/12/11 KC

② IE 9/15/11 KC

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

WESTON SOLUTIONS

BIO047

REF TOX TEST ID: C10117.11

MICROMETER CONVERSION FACTOR: 2.5

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Scope #	Date	Tech
	Control	1															
	Control	2															
	Control	3															
	Control	4															
	Control	5															
KC ① ~~361~~	300	1	~~93~~ ② 7 KC	~~7~~ 93	3	3	4	4	3	3	3	2	2	2	BH-2	9/15/11	KC
62	↓	2	4	96	2	5	3	2	3	2	4	2	3	2	↓	↓	↓
63	↓	3	10	90	4	2	3	3	2	3	2	2	2	2	↓	↓	↓
64	↓	4	11	89	2	3	3	3	2	3	3	3	2	3	↓	↓	↓
65	↓	5	9	91	2	4	3	2	2	2	3	2	3	3	↓	↓	↓
		1															
		2															
		3															
		4															
		5															
		1															
		2															
		3															
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		3															
		4															
		5															

① WP 9/9/11 KC
② IE 9/15/11 KC ~~(93, 7)~~ (7, 93) KC ③
③ IE 9/15/11

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

Test ID: C101117.11	Associated Test(s): West Basin Kelp-C		Study Director: Curry K ~~Skrivseth~~ ① JH
Organism: macrocystis pyrifera	Organism Batch: DG10815/1	Location: Rm. 2	Replicates: 5
Start Time: 1330	Technician: JH	End Time: 1325	Technician: KC

Toxicant: Copper Chloride (10,000 µg/L Cu) $CuCl_2 2H_2O$	Lot #: MKBF0634V Expiration Date: 11/17/12	Date Dilutions Prepared: 8/15/11	Dilution Water Batch: S100725I1	Technician: JH
Target Concentrations:	Quantity of Stock Target:	Actual:	Quantity of Diluent Target:	Actual:
5.6 ppb	0.280 mL	0.2804	500 mL	500.0
10 ppb	0.500 mL	0.5004	500 mL	500.0
18 ppb	0.900 mL	0.9003	500 mL	500.1
32 ppb	1.60 mL	1.6000	500 mL	500.0
100 ppb	5.00 mL	5.0000	500 mL	500.1
180 ppb	9.00 mL	9.0006	500 mL	500.0
300 ppb	15.00 mL	15.0005	500 mL	500.0

Day 0 Water Quality Data

Stock

Date: 8/15/11 WQ Time: 1410 Initials: JH

	Control	5.6	10	18	32	100	180	300
D.O. (mg/L)	7.6	7.3	7.4	7.4	7.5	7.4	7.4	7.5
Temperature	15.5	16.1	16.1	16.0	16.1	16.2	15.8	16.0
Salinity	32.8	32.8	32.9	32.8	32.8	32.5	32.3	32.0
pH	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8

48-Hour Water Quality Data

Stock

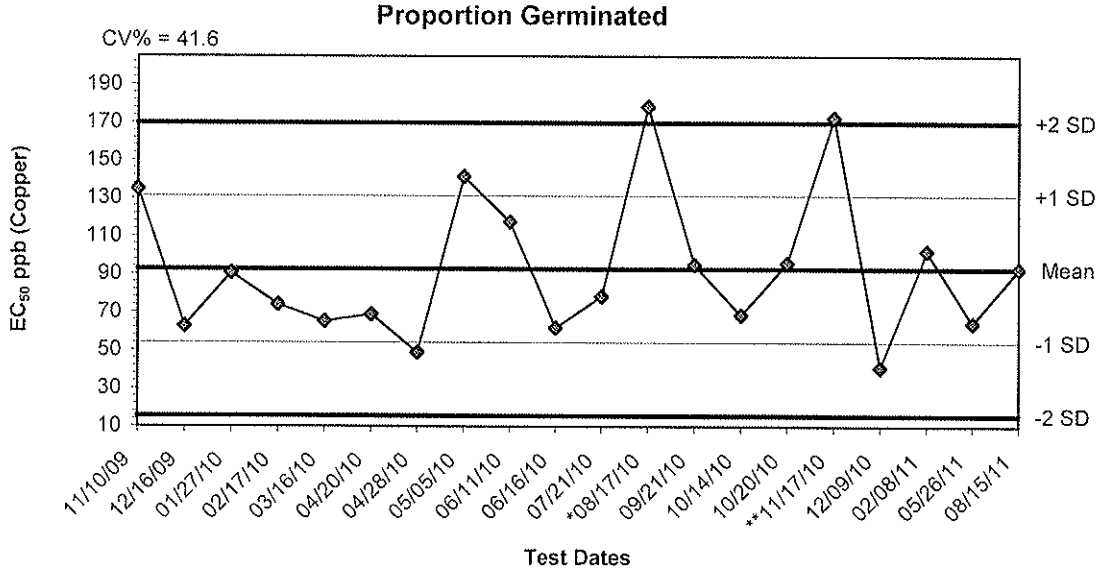
Date: 8/17/11 WQ Time: 1030 Initials: SH

	Control	5.6	10	18	32	100	180	300
D.O. (mg/L)	7.2	7.6	7.5	7.5	7.5	7.4	7.5	7.5
Temperature	15.8	15.7	15.7	15.8	15.6	15.7	15.2	15.2
Salinity	33.4	33.4	33.3	33.2	33.6	32.7	33.2	32.8
pH	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9

① IE 8/15/11 JH

☐ Pass ☐ Fail

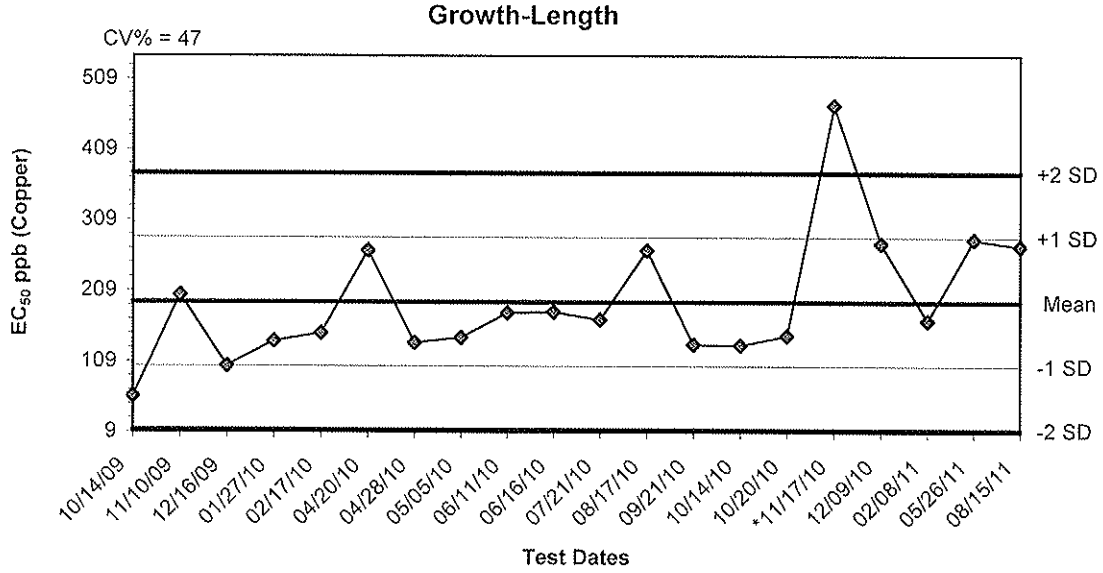
Macrocystis pyrifera Reference Toxicant Control Chart: Proportion Germinated



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/10/09	134.8900	92.6713	54.0810	15.4907	131.2616	169.8519
12/16/09	62.6240	92.6713	54.0810	15.4907	131.2616	169.8519
01/27/10	90.6670	92.6713	54.0810	15.4907	131.2616	169.8519
02/17/10	73.9700	92.6713	54.0810	15.4907	131.2616	169.8519
03/16/10	65.1820	92.6713	54.0810	15.4907	131.2616	169.8519
04/20/10	68.7180	92.6713	54.0810	15.4907	131.2616	169.8519
04/28/10	48.7968	92.6713	54.0810	15.4907	131.2616	169.8519
05/05/10	141.2800	92.6713	54.0810	15.4907	131.2616	169.8519
06/11/10	117.3800	92.6713	54.0810	15.4907	131.2616	169.8519
06/16/10	61.8367	92.6713	54.0810	15.4907	131.2616	169.8519
07/21/10	78.2158	92.6713	54.0810	15.4907	131.2616	169.8519
*08/17/10	178.3100	92.6713	54.0810	15.4907	131.2616	169.8519
09/21/10	94.9111	92.6713	54.0810	15.4907	131.2616	169.8519
10/14/10	68.4052	92.6713	54.0810	15.4907	131.2616	169.8519
10/20/10	95.8000	92.6713	54.0810	15.4907	131.2616	169.8519
**11/17/10	172.4000	92.6713	54.0810	15.4907	131.2616	169.8519
12/09/10	40.9070	92.6713	54.0810	15.4907	131.2616	169.8519
02/08/11	102.0680	92.6713	54.0810	15.4907	131.2616	169.8519
05/26/11	64.2740	92.6713	54.0810	15.4907	131.2616	169.8519
08/15/11	92.7900	92.6713	54.0810	15.4907	131.2616	169.8519

*Value out of 95% CI range at time of testing.
**Value within 95% CI range at time of testing.
Updated 9/16/11 JH

Macrocystis pyrifera Reference Toxicant Control Chart: Growth-Length



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
10/14/09	59.6250	193.4298	102.4692	11.5087	284.3904	375.3509
11/10/09	203.4760	193.4298	102.4692	11.5087	284.3904	375.3509
12/16/09	102.8140	193.4298	102.4692	11.5087	284.3904	375.3509
01/27/10	137.7800	193.4298	102.4692	11.5087	284.3904	375.3509
02/17/10	149.4100	193.4298	102.4692	11.5087	284.3904	375.3509
04/20/10	265.9090	193.4298	102.4692	11.5087	284.3904	375.3509
04/28/10	135.5750	193.4298	102.4692	11.5087	284.3904	375.3509
05/05/10	143.0800	193.4298	102.4692	11.5087	284.3904	375.3509
06/11/10	177.8410	193.4298	102.4692	11.5087	284.3904	375.3509
06/16/10	179.3100	193.4298	102.4692	11.5087	284.3904	375.3509
07/21/10	168.3300	193.4298	102.4692	11.5087	284.3904	375.3509
08/17/10	266.0000	193.4298	102.4692	11.5087	284.3904	375.3509
09/21/10	133.3300	193.4298	102.4692	11.5087	284.3904	375.3509
10/14/10	132.0000	193.4298	102.4692	11.5087	284.3904	375.3509
10/20/10	145.7100	193.4298	102.4692	11.5087	284.3904	375.3509
*11/17/10	471.3400	193.4298	102.4692	11.5087	284.3904	375.3509
12/09/10	276.0000	193.4298	102.4692	11.5087	284.3904	375.3509
02/08/11	166.8060	193.4298	102.4692	11.5087	284.3904	375.3509
05/26/11	281.7600	193.4298	102.4692	11.5087	284.3904	375.3509
08/15/11	272.5000	193.4298	102.4692	11.5087	284.3904	375.3509

*Value out of 95% CI range at time of testing.
Updated 9/16/11 JH

Macrocystis Germination and Growth Test-Growth-Length

Start Date:	8/15/2011 13:30	Test ID:	C101117.11	Sample ID:	REF-Ref Toxicant
End Date:	8/17/2011 13:25	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera

Comments: Rep 3 of 32 ppb was not started with a slide; dropped from stats.

Conc-ppb	1	2	3	4	5
Control	14.750	14.000	15.000	12.250	14.250
5.6	13.250	13.750	13.250	12.250	11.500
10	12.750	14.500	11.750	10.500	11.250
18	11.250	10.750	11.750	11.000	10.750
32	10.250	10.750	10.000	9.500	
100	8.750	8.750	9.250	8.500	9.500
180	7.000	8.500	7.250	8.500	8.500
300	7.250	7.000	6.250	6.750	6.500

			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	14.050	1.0000	14.050	12.250	15.000	7.695	5				14.050	1.0000
5.6	12.800	0.9110	12.800	11.500	13.750	7.096	5	2.312	2.596	1.404	12.800	0.9110
*10	12.150	0.8648	12.150	10.500	14.500	12.734	5	3.514	2.596	1.404	12.150	0.8648
*18	11.100	0.7900	11.100	10.750	11.750	3.769	5	5.455	2.596	1.404	11.100	0.7900
*32	10.125	0.7206	10.125	9.500	10.750	5.140	4	6.843	2.596	1.489	10.125	0.7206
*100	8.950	0.6370	8.950	8.500	9.500	4.590	5	9.431	2.596	1.404	8.950	0.6370
*180	7.950	0.5658	7.950	7.000	8.500	9.538	5	11.280	2.596	1.404	7.950	0.5658
*300	6.750	0.4804	6.750	6.250	7.250	5.856	5	13.500	2.596	1.404	6.750	0.4804

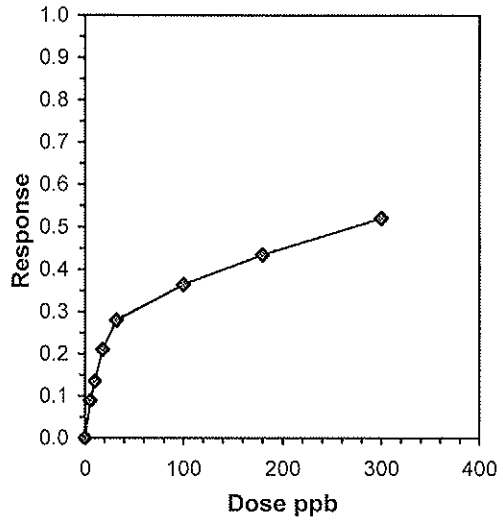
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96271	0.917	0.0926	1.62115
Bartlett's Test indicates equal variances (p = 0.07)	13.2913	18.4753		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	5.6	10	7.48331		1.40385	0.09992	31.4676	0.73105	3.2E-14	7, 31

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05*	3.15	1.89	1.18	10.46	1.9387
IC10	6.65	2.77	2.18	15.90	0.7493
IC15	11.58	3.21	2.47	20.50	0.2115
IC20	16.93	4.46	5.30	31.80	0.5730
IC25	26.08	8.18	12.96	64.49	1.5790
IC40	141.60	26.28	75.78	222.93	0.3386
IC50	272.50				

* indicates IC estimate less than the lowest concentration



Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	8/15/2011 13:30	Test ID:	C101117.11	Sample ID:	REF-Ref Toxicant
End Date:	8/17/2011 13:25	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera

Comments: Rep 3 of 32 ppb was not started with a slide; dropped from stats.

Conc-ppb	1	2	3	4	5
Control	0.8800	0.8300	0.7800	0.9000	0.8500
5.6	0.8900	0.8600	0.9100	0.8900	0.8700
10	0.7700	0.7600	0.8200	0.7100	0.7600
18	0.7300	0.6900	0.7100	0.7327	0.8000
32	0.6800	0.6900	0.6500	0.7000	
100	0.5300	0.5100	0.4900	0.4600	0.5000
180	0.2800	0.2500	0.2800	0.3600	0.2800
300	0.0700	0.0400	0.1000	0.1100	0.0900

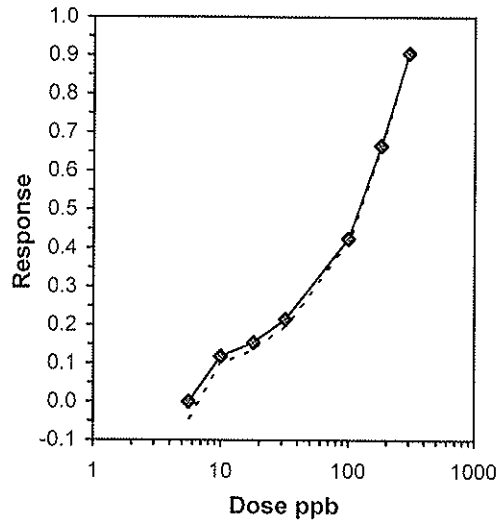
			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.8480	1.0000	1.1735	1.0826	1.2490	5.495	5				76	500
5.6	0.8840	1.0425	1.2242	1.1873	1.2661	2.504	5	-1.785	2.596	0.0736	58	500
*10	0.7640	0.9009	1.0646	1.0021	1.1326	4.365	5	3.839	2.596	0.0736	118	500
*18	0.7325	0.8638	1.0283	0.9803	1.1071	4.670	5	5.120	2.596	0.0736	134	501
*32	0.6800	0.8019	0.9697	0.9377	0.9912	2.377	4	6.775	2.596	0.0781	128	400
*100	0.4980	0.5873	0.7834	0.7454	0.8154	3.307	5	13.753	2.596	0.0736	251	500
*180	0.2900	0.3420	0.5680	0.5236	0.6435	7.872	5	21.347	2.596	0.0736	355	500
*300	0.0820	0.0967	0.2867	0.2014	0.3381	18.969	5	31.262	2.596	0.0736	459	500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96961	0.917	0.01672	0.11338
Bartlett's Test indicates equal variances (p = 0.58)	5.62877	18.4753		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	5.6	10	7.48331		0.05615	0.06604	0.51825	0.00201	1.2E-25	7, 31

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	93.51	86.62	100.94
20.0%	105.41	96.64	114.98
Auto-9.5%	92.79	86.03	100.08



Test: MC-Macrocystis Germination and Growth Test | Test ID: C101117.11
Species: MP-Macrocystis pyrifera | Protocol: EPAW 95-EPA West Coast
Sample ID: REF-Ref Toxicant | Sample Type: CUCL-Copper chloride
Start Date: 8/15/2011 13:30 | End Date: 8/17/2011 13:25 | Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Total Counted	Number Germ	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	1	1	Control	100	88	5	5	6	6	7	7	6	5	5	7	2.5	
	2	2	Control	100	83	6	5	5	5	5	5	6	8	6	5	2.5	
	3	3	Control	100	78	6	6	7	6	6	7	4	6	5	7	2.5	
	4	4	Control	100	90	5	6	4	3	6	5	5	5	5	5	2.5	
	5	5	Control	100	85	5	5	7	6	6	8	5	5	5	5	2.5	
	6	1	5.600	100	89	6	4	7	7	5	4	5	6	5	4	2.5	
	7	2	5.600	100	86	9	5	7	6	4	5	6	4	4	5	2.5	
	8	3	5.600	100	91	7	6	4	5	6	6	3	6	4	6	2.5	
	9	4	5.600	100	89	5	6	4	4	4	6	6	5	5	4	2.5	
	10	5	5.600	100	87	4	6	6	6	4	3	4	5	4	4	2.5	
	11	1	10.000	100	77	5	6	6	4	7	6	3	4	5	5	2.5	
	12	2	10.000	100	76	8	6	6	5	4	5	6	6	6	6	2.5	
	13	3	10.000	100	82	3	6	5	5	4	6	4	4	5	5	2.5	
	14	4	10.000	100	71	3	4	3	5	6	4	3	3	6	5	2.5	
	15	5	10.000	100	76	3	3	5	7	4	5	5	6	3	4	2.5	
	16	1	18.000	100	73	4	4	5	4	3	4	5	7	5	4	2.5	
	17	2	18.000	100	69	5	4	4	4	4	5	4	3	6	4	2.5	
	18	3	18.000	100	71	7	4	6	5	4	5	4	4	4	4	2.5	
	19	4	18.000	101	74	3	3	4	7	4	5	4	3	6	5	2.5	
	20	5	18.000	100	80	6	5	3	7	3	3	4	3	5	4	2.5	
	21	1	32.000	100	68	3	3	4	4	5	6	4	4	3	5	2.5	
	22	2	32.000	100	69	5	3	6	4	4	3	4	6	4	4	2.5	
	23	3	32.000	100	65	3	3	3	4	6	3	5	5	4	4	2.5	
	24	4	32.000	100	70	3	4	3	3	3	5	6	4	3	4	2.5	
	25	1	100.000	100	53	5	3	3	4	3	3	3	3	5	3	2.5	
	26	2	100.000	100	51	3	3	3	4	3	3	5	4	3	4	2.5	
	27	3	100.000	100	49	5	5	3	4	3	3	5	3	3	3	2.5	
	28	4	100.000	100	46	3	4	3	3	3	4	4	3	3	4	2.5	
	29	5	100.000	100	50	5	3	4	3	3	6	4	4	3	3	2.5	
	30	1	180.000	100	28	2	5	3	2	2	4	3	2	2	3	2.5	
	31	2	180.000	100	25	4	3	5	5	2	3	4	3	3	2	2.5	
	32	3	180.000	100	28	2	2	3	2	4	3	5	3	2	3	2.5	
	33	4	180.000	100	36	5	4	3	3	5	5	2	3	2	2	2.5	
	34	5	180.000	100	28	2	3	2	2	3	4	3	5	5	5	2.5	
	35	1	300.000	100	7	3	3	4	4	3	3	3	2	2	2	2.5	
	36	2	300.000	100	4	2	5	3	2	3	2	4	2	3	2	2.5	
	37	3	300.000	100	10	4	2	3	3	2	3	2	2	2	2	2.5	
	38	4	300.000	100	11	2	3	3	3	2	3	3	3	2	3	2.5	

Test: MC-Macrocystis Germination and Growth Test
Species: MP-Macrocystis pyrifera
Sample ID: REF-Ref Toxicant
Start Date: 8/15/2011 13:30 End Date: 8/17/2011 13:25

Test ID: C101117.11
Protocol: EPAW 95-EPA West Coast
Sample Type: CUCL-Copper chloride
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Total Counted	Number Germ	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	39	5	300.000	100	9	2	4	3	2	2	2	3	2	3	3	2.5	

Comments: Rep 3 of 32 ppb was not started with a slide; dropped from stats.

WESTON SOLUTIONS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

REF TOX TEST ID: C101117.11

MICROMETER CONVERSION FACTOR: 2.5

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	LENGTH MEASUREMENTS (in ocular micrometer units)										Scope #	Date	Tech
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10			
1	Control	1	88	12	5	5	6	6	7	7	6	5	5	7	BH-2	8/18/11	KS
2	Control	2	83	17	6	5	5	5	5	5	6	8	6	5			
3	Control	3	78	22	6	6	7	6	6	7	4	6	5	7			
4	Control	4	90	10	5	6	4	3	6	5	5	5	5	5			
5	Control	5	85	15	5	5	7	6	6	8	5	5	5	5			
31	5.6	1	89	11	6	4	7	7	5	4	5	6	5	4	BH-2	9/9/11	KC
32		2	86	14	9	5	7	6	4	5	6	4	4	5			
33		3	91	9	7	6	4	5	6	6	3	6	4	6			
34		4	89	11	5	6	4	4	4	6	6	5	5	4			
35		5	87	13	4	6	6	6	4	3	4	5	4	4			
36	10	1	77	23	5	6	6	4	7	6	3	4	5	5			
37		2	76	24	8	6	6	5	4	5	6	6	6	6			
38		3	82	18	3	6	5	5	4	6	4	4	5	5			
39		4	71	29	3	4	3	5	6	4	3	3	6	5			
40		5	76	24	3	3	5	7	4	5	5	6	3	4			
41	18	1	73	27	4	4	5	4	3	4	5	7	5	4	BH-2	9/12/11	KC
42		2	69	31	5	4	4	4	4	5	4	3	6	4			
43		3	71	29	7	4	6	5	4	5	4	4	4	4			
44		4	74	27	3	3	4	7	4	5	4	3	6	5			
45		5	80	20	6	5	3	7	3	3	4	3	5	4			
46	32	1	68	32	3	3	4	4	5	6	4	4	3	5			
47		2	69	31	5	3	6	4	4	3	4	6	4	4			
48		3	KC ①														KC
49		4	65	35	3	3	3	4	6	3	5	5	4	4	BH-2	9/12/11	KC
50		5	70	30	3	4	3	3	3	5	6	4	3	4			
51	100	1	53	47	5	3	3	4	3	3	3	3	5	3			
52		2	51	49	3	3	3	4	3	3	5	4	3	4			
53		3	49	51	5	5	3	4	3	3	5	3	3	3			
54		4	46	54	3	4	3	3	3	4	4	3	3	4	BH-2	9/15/11	KC
55		5	50	50	5	3	4	3	3	6	4	4	3	3			
56	180	1	28	72	2	5	3	2	2	4	3	2	2	3			
57		2	25	75	4	3	5	5	2	3	4	3	3	2			
58		3	~~22~~ 28 ②	72	2	2	3	2	4	3	5	3	2	3			
59		4	36	64	5	4	3	3	5	5	2	3	2	2			
60		5	28	72	2	3	2	2	3	4	3	5	5	5			

① Replicate 3 had no slide in test chamber. Could not be counted. 9/12/11 KC

② IE 9/15/11 KC

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

WESTON SOLUTIONS

BIO047

REF TOX TEST ID: C1011711

MICROMETER CONVERSION FACTOR: 2.5

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Scope #	Date	Tech
	Control	1															
	Control	2															
	Control	3															
	Control	4															
	Control	5															
KC ① ~~3~~161	300	1	~~93~~ ② 7 KC	~~7~~ 93	3	3	4	4	3	3	3	2	2	2	BH-2	9/15/11	KC
62	↓	2	4	96	2	5	3	2	3	2	4	2	3	2	↓	↓	↓
63	↓	3	10	90	4	2	3	3	2	3	2	2	2	2	↓	↓	↓
64	↓	4	11	89	2	3	3	3	2	3	3	3	2	3	↓	↓	↓
65	↓	5	9	91	2	4	3	2	2	2	3	2	3	3	↓	↓	↓
		1															
		2															
		3															
		4															
		5															
		1															
		2															
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		2															
		3															
		4															
		5															

① WP 9/9/11 KC

② IE 9/15/11 KC ~~(93,7)~~ KC ③ (7,93)

③ IE 9/15/11

WESTON SOLUTIONS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

Test ID: C10117.11	Associated Test(s): West Basin Kelp-C		Study Director: Curry K. Skrivseth ①JH
Organism: Macrocystis pyrifera	Organism Batch: DG081511	Location: Rm. 2	Replicates: 5
Start Time: 1330	Technician: JH	End Time: 1325	Technician: KC

Toxicant: Copper Chloride (10,000 µg/L Cu) $CuCl_2 2H_20$	Lot #: MKBF0634V Expiration Date: 11/17/12		Date Dilutions Prepared: 8/15/11	Dilution Water Batch: SI0072511	Technician: JH
Target Concentrations:		Quantity of Stock Target:	Actual:	Quantity of Diluent Target:	Actual:
5.6 ppb		0.280 mL	0.2804	500 mL	500.0
10 ppb		0.500 mL	0.5004	500 mL	500.0
18 ppb		0.900 mL	0.9003	500 mL	500.1
32 ppb		1.60 mL	1.6000	500 mL	500.0
100 ppb		5.00 mL	5.0000	500 mL	500.1
180 ppb		9.00 mL	9.0006	500 mL	500.0
300 ppb		15.00 mL	15.0005	500 mL	500.0

Day 0 Water Quality Data

Stock

Date: 8/15/11 WQ Time: 1410 Initials: JH

	Control	5.6	10	18	32	100	180	300
D.O. (mg/L)	7.6	7.3	7.4	7.4	7.5	7.4	7.4	7.5
Temperature	15.5	16.1	16.1	16.0	16.1	16.2	15.8	16.0
Salinity	32.8	32.8	32.9	32.8	32.8	32.5	32.3	32.0
pH	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8

48-Hour Water Quality Data

Stock

Date: 8/17/11 WQ Time: 1030 Initials: SH

	Control	5.6	10	18	32	100	180	300
D.O. (mg/L)	7.2	7.6	7.5	7.5	7.5	7.4	7.5	7.5
Temperature	15.8	15.7	15.7	15.8	15.6	15.7	15.2	15.2
Salinity	33.4	33.4	33.3	33.2	33.0	32.7	33.2	32.8
pH	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9

① IE 8/15/11 JH

☐ Pass ☐ Fail

Strongylocentrotus purpuratus Chronic Toxicity Test

Echinoderm Development-Proportion Normal

Start Date:	8/23/2011 18:00	Test ID:	C110805.0146	Sample ID:	West Basin Brine
End Date:	8/27/2011 18:05	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	8/5/2011 13:18	Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	For MSDp only				

Conc-%	1	2	3	4
Control	0.9545	0.9357	0.9414	0.9435
35	0.9116	0.9538	0.9146	0.9518
37	0.2757	0.5915	0.0537	0.1912
39	0.0272	0.0159	0.0336	0.0184
41	0.0000	0.0000	0.0000	0.0000
43	0.0000	0.0000	0.0000	0.0000

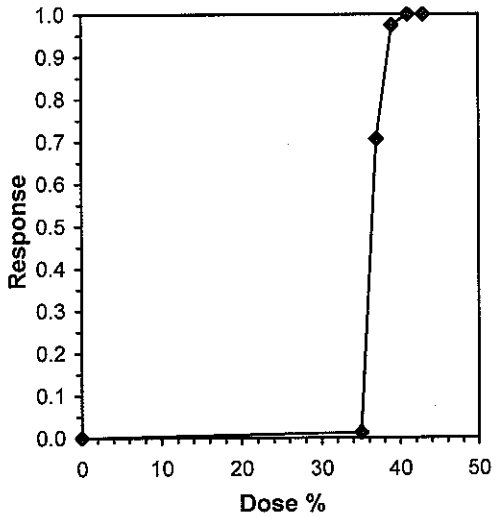
			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9438	1.0000	1.3319	1.3145	1.3559	1.310	4				0.9443	1.0000
35	0.9330	0.9885	1.3117	1.2690	1.3542	3.535	4	0.208	2.290	0.2214	0.9329	0.9880
*37	0.2780	0.2946	0.5292	0.2339	0.8774	50.577	4	8.302	2.290	0.2214	0.2779	0.2943
*39	0.0238	0.0252	0.1531	0.1263	0.1843	17.460	4	12.191	2.290	0.2214	0.0244	0.0258
41	0.0000	0.0000	0.0295	0.0295	0.0295	0.000	4				0.0000	0.0000
43	0.0000	0.0000	0.0295	0.0295	0.0295	0.000	4				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.75446	0.844	0.66909	6.24364
Bartlett's Test indicates unequal variances (p = 7.87E-05)	21.6069	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	35	37	35.9861	2.85714	0.14136	0.14975	1.37683	0.0187	5.4E-08	3, 12

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	35.110	0.036	35.010	35.231	0.8736
IC10	35.254	0.058	35.138	35.465	1.4334
IC15	35.398	0.083	35.252	35.720	1.5198
IC20	35.542	0.109	35.352	36.000	1.5217
IC25	35.686	0.136	35.465	36.262	1.5089
IC40	36.119	0.215	35.758	37.011	1.3710
IC50	36.407	0.260	35.953	37.517	1.1126



Reviewed by:

Echinoderm Development-Proportion Normal

Start Date:	8/23/2011 18:00	Test ID:	C110805.0146
End Date:	8/27/2011 18:05	Lab ID:	CCA-Weston, Carlsbad
Sample Date:	8/5/2011 13:18	Protocol:	EPAW 95-EPA West Coast
Comments:			

Sample ID:	West Basin Brine			
Sample Type:	DMR-Discharge Monitoring Report			
Test Species:	SP-Strongylocentrotus purpuratus			

Conc-%	1	2	3	4
Control	0.9545	0.9357	0.9414	0.9435
35	0.9116	0.9538	0.9146	0.9518
37	0.2757	0.5915	0.0537	0.1912
39	0.0272	0.0159	0.0336	0.0184
41	0.0000	0.0000	0.0000	0.0000
43	0.0000	0.0000	0.0000	0.0000

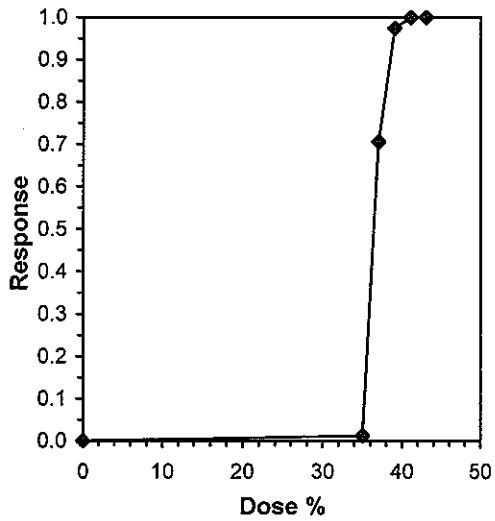
			Transform: Arcsin Square Root					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.9438	1.0000	1.3319	1.3145	1.3559	1.310	4			0.9443	1.0000
35	0.9330	0.9885	1.3117	1.2690	1.3542	3.535	4	16.00	10.00	0.9329	0.9880
*37	0.2780	0.2946	0.5292	0.2339	0.8774	50.577	4	10.00	10.00	0.2779	0.2943
*39	0.0238	0.0252	0.1531	0.1263	0.1843	17.460	4	10.00	10.00	0.0244	0.0258
41	0.0000	0.0000	0.0295	0.0295	0.0295	0.000	4			0.0000	0.0000
43	0.0000	0.0000	0.0295	0.0295	0.0295	0.000	4			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.75446	0.844	0.66909	6.24364
Bartlett's Test indicates unequal variances (p = 7.87E-05)	21.6069	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	35	37	35.9861	2.85714

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	35.110	0.037	35.009	35.231	0.4359
IC10	35.254	0.055	35.127	35.494	0.8729
IC15	35.398	0.078	35.227	35.758	0.9044
IC20	35.542	0.102	35.333	36.006	0.8925
IC25	35.686	0.128	35.428	36.254	0.8799
IC40	36.119	0.205	35.735	36.999	0.8584
IC50	36.407	0.255	35.925	37.494	0.8192



Echinoderm Development-Proportion Alive

Start Date:	8/23/2011 18:00	Test ID:	C110805.0146	Sample ID:	West Basin Brine
End Date:	8/27/2011 18:05	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	8/5/2011 13:18	Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus

Comments:

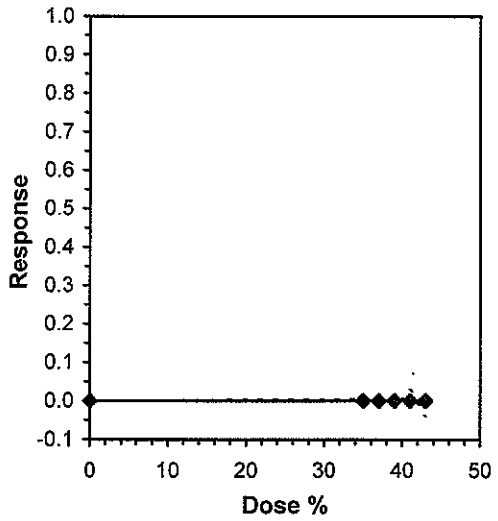
Conc-%	1	2	3	4
Control	0.9199	0.8676	0.8328	0.9861
35	0.8676	1.0000	0.8571	0.8676
37	0.9477	0.8188	0.8432	0.9477
39	0.8955	0.8780	0.9338	0.9477
41	0.9373	0.8606	0.8084	0.9024
43	0.9652	1.0000	0.8920	0.8815

			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9016	1.0000	1.2710	1.1495	1.4525	10.471	4				0.9024	1.0000
35	0.8981	0.9961	1.2803	1.1832	1.5413	13.601	4	-0.105	2.410	0.2132	0.9024	1.0000
37	0.8894	0.9865	1.2438	1.1311	1.3401	9.011	4	0.308	2.410	0.2132	0.9024	1.0000
39	0.9138	1.0135	1.2766	1.2141	1.3401	4.597	4	-0.063	2.410	0.2132	0.9024	1.0000
41	0.8772	0.9729	1.2192	1.1177	1.3177	7.042	4	0.586	2.410	0.2132	0.9024	1.0000
43	0.9347	1.0367	1.3449	1.2194	1.5413	11.165	4	-0.835	2.410	0.2132	0.9024	1.0000

Auxiliary Tests				Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)				0.90034		0.884		0.82809	-0.1877
Bartlett's Test indicates equal variances (p = 0.61)				3.55895		15.0863			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test	43	>43		2.32558	0.15369	0.16837	0.00719	0.01566	0.80113	5, 18

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>43			
IC10	>43			
IC15	>43			
IC20	>43			
IC25	>43			
IC40	>43			
IC50	>43			



Test: ED-Echinoderm Development · Test ID: C110805.0146 ·
Species: SP-Strongylocentrotus purpuratus · Protocol: EPAW 95-EPA West Coast ·
Sample ID: West Basin Brine · Sample Type: DMR-Discharge Monitoring Report ·
Start Date: 8/23/2011 18:00 · End Date: 8/27/2011 18 Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number normal	Notes
	1	1	Control	287	264	264	252	
	2	2	Control	287	249	249	233	
	3	3	Control	287	239	239	225	
	4	4	Control	287	283	283	267	
	5	1	35.000	287	249	249	227	
	6	2	35.000	287	303	303	289	
	7	3	35.000	287	246	246	225	
	8	4	35.000	287	249	249	237	
	9	1	37.000	287	272	272	75	
	10	2	37.000	287	235	235	139	
	11	3	37.000	287	242	242	13	
	12	4	37.000	287	272	272	52	
	13	1	39.000	287	257	257	7	
	14	2	39.000	287	252	252	4	
	15	3	39.000	287	268	268	9	
	16	4	39.000	287	272	272	5	
	17	1	41.000	287	269	269	0	
	18	2	41.000	287	247	247	0	
	19	3	41.000	287	232	232	0	
	20	4	41.000	287	259	259	0	
	21	1	43.000	287	277	277	0	
	22	2	43.000	287	292	292	0	
	23	3	43.000	287	256	256	0	
	24	4	43.000	287	253	253	0	

Comments:

Echinoderm Development
CHRONIC TOXICITY TEST

BIO046

CLIENT:	West Basin Municipal Water District
PROJECT:	Salinity Study
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C110805.01Ae
SPECIES:	S. purpuratus

DATE RECEIVED:	8/5/11
DATE TEST STARTED:	8/23/11
DATE TEST ENDED:	8/27/11
WESTON SOP NO.:	BIO 046
STUDY DIRECTOR:	J. Hanson

	Concentration (ppt)	DO* (mg/L)	Temp* (°C)	Salinity* (ppt)	pH*
Day 0 (0 Hours)	Control	6.9	16.2	33.1	8.0
Date: 8/23/11	~~Brine Control~~	—	—	—	—
Sample ID: C110805.01	35	6.9	16.1	35.1	7.9
Dilutions (Tech): TE	37	6.8	16.1	37.1	7.9
WQ Time: @KS 1713	39	6.7	16.1	39.1	7.8
Technician: KS	41	6.7	16.2	41.2	7.7
	43	6.7	16.2	43.1	7.7
24 Hours	Control		15.1		
Date: 8/24/11	~~Brine Control~~		—		
WQ Time: 1345	35		14.9		
Technician: TE	37		15.0		
	39		14.9		
	41		15.0		
	43		15.0		
48 Hours	Control		14.5		
Date: 8/25/11	~~Brine Control~~		—		
WQ Time: 1415	35		14.7		
Technician: SH	37		15.1		
	39		14.9		
	41		14.9		
	43		15.0		

D IE 8/23/11 KS

Echinoderm Development
CHRONIC TOXICITY TEST

BIO046

CLIENT:	West Basin Municipal Water District
PROJECT:	Salinity Study
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C110805.0146
SPECIES:	Strongylocentrotus purpuratus

DATE RECEIVED:	8/5/11
DATE TEST STARTED:	8/23/11
DATE TEST ENDED:	8/27/11
WESTON SOP NO.:	BIO046
STUDY DIRECTOR:	J. Hansen

	Concentration (ppt)	DO* (mg/L)	Temp* (°C)	Salinity* (ppt)	pH*
72 Hours	Control		15.0		
Date: 8/26/11	Brine Control		—		
WQ Time: 1015	35		15.0		
Technician: JH	37		14.9		
	39		15.1		
	41		15.1		
	43		15.0		
96 Hours (if needed)	Control	7.5	16.4	33.9	7.9
KC ②	Brine Control				
Date:: ~~1735~~ 8/27/11	35	7.7	15.6	36.6	7.8
WQ Time: 1735	37	7.5	15.8	37.7	7.9
Technician: KC	39	7.5	15.5	39.9	7.9
	41	7.3	15.6	41.3	7.9
	43	7.3	15.7	43.7	7.9

*Water quality measurements taken in surrogate water quality chambers.

START TIME: 1800	Initials: KS
END TIME: 1805 KC	Initials: KC
ORGANISM BATCH: DG08231	
HOBO TEMP. NO.: 778890	
TEST LOCATION: Room 2	

① IE 8/27/11 KC

DILUTION WATER BATCH: S100725I1

TEST ACCEPTABILITY:

- ☐ ≥ 80% NORMAL SHELL DEVELOPMENT IN SURVIVING CONTROLS
- ☐ MSD < 25%

Echinoderm Development CHRONIC TOXICITY TEST

BIO046

Weston Test ID:	Client:	Client Sample ID:
C110805.0146	West Basin Municipal Water District	West Basin Brine

SPAWNING DATA

Initial Spawning Time:	Final Spawning Time:	Fertilization Time:	No. of Females:	No. of Males:
1230	1315	1400	2	3
Embryo Density (count/mL):	1.	2.	3.	Average:
Stocking Volume Calculation:				

ZERO TIME COUNTS

1. 262	2. 280	3. 303	4. 296	5 JH ~~304~~ 292	6.
Average Count: 287			Technician: JH		

LARVAL COUNT DATA

Conc.	Rep 1		Rep 2		Rep 3		Rep 4		Rep 5		Date	Initials
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal		
Control	252	12	233	16	225	14	267	16			9/26/11	JH
~~Brine~~	—	—	—	—	—	—	—	—			—	—
35	227	22	289	14	225	21	237	12			9/28/11	JH
37	~~255~~ 197 @ 267		139	96	13	230	52	220			10/13/11	ann
39	7	250	4	248	9	259	5	267			↓	↓
41	ϕ	269	ϕ	247	ϕ	232	ϕ	259			9/28/11	JH
43	ϕ	277	ϕ	292	ϕ	256	ϕ	253			9/26/11	JH

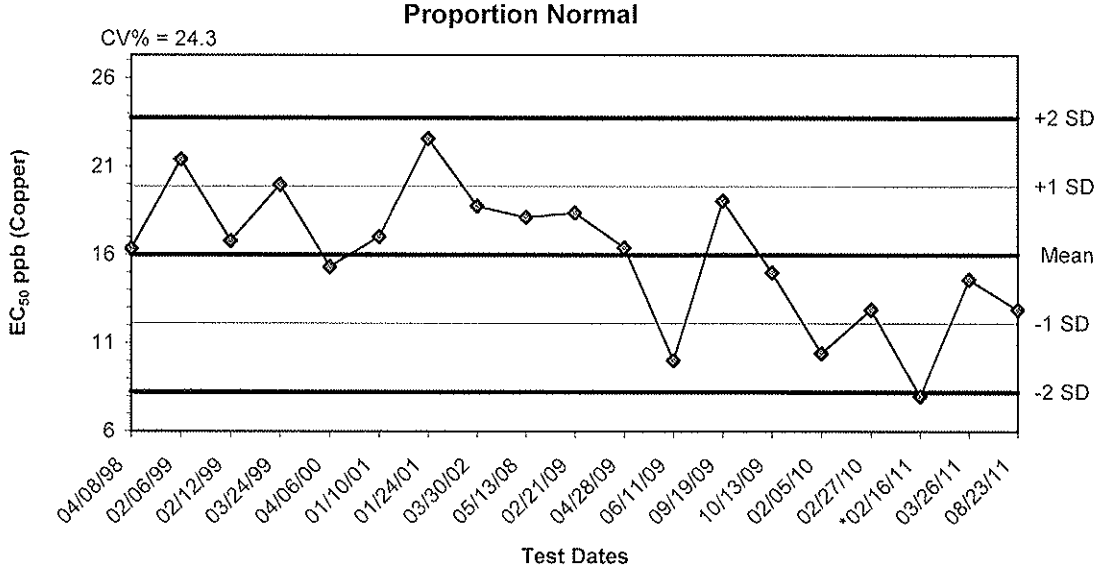
QA COUNT CHECKS

	QA Check #1	QA Check #2	QA Check #3	QA Check #4
Concentration / Replicate	/	/	/	/
Total #				
# Normal				
Date / Initials	/	/	/	/

QA Check Acceptability: ☐ <5% difference in means of QA & orig. counts

DIE 9/23/11 JH @ WC 10/13/11 ann

Strongylocentrotus purpuratus Reference Toxicant Control Chart: Proportion Normal



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/08/98	16.3400	15.9963	12.1158	8.2352	19.8769	23.7575
02/06/99	21.4060	15.9963	12.1158	8.2352	19.8769	23.7575
02/12/99	16.7860	15.9963	12.1158	8.2352	19.8769	23.7575
03/24/99	19.9670	15.9963	12.1158	8.2352	19.8769	23.7575
04/06/00	15.3050	15.9963	12.1158	8.2352	19.8769	23.7575
01/10/01	17.0130	15.9963	12.1158	8.2352	19.8769	23.7575
01/24/01	22.5850	15.9963	12.1158	8.2352	19.8769	23.7575
03/30/02	18.7500	15.9963	12.1158	8.2352	19.8769	23.7575
05/13/08	18.1232	15.9963	12.1158	8.2352	19.8769	23.7575
02/21/09	18.3711	15.9963	12.1158	8.2352	19.8769	23.7575
04/28/09	16.3950	15.9963	12.1158	8.2352	19.8769	23.7575
06/11/09	10.0200	15.9963	12.1158	8.2352	19.8769	23.7575
09/19/09	19.0719	15.9963	12.1158	8.2352	19.8769	23.7575
10/13/09	14.9860	15.9963	12.1158	8.2352	19.8769	23.7575
02/05/10	10.4320	15.9963	12.1158	8.2352	19.8769	23.7575
02/27/10	12.8956	15.9963	12.1158	8.2352	19.8769	23.7575
*02/16/11	7.9885	15.9963	12.1158	8.2352	19.8769	23.7575
03/26/11	14.5986	15.9963	12.1158	8.2352	19.8769	23.7575
08/23/11	12.8967	15.9963	12.1158	8.2352	19.8769	23.7575

* Value out of 95% CI range.
Updated 10/9/11 AM

Echinoderm Development-Proportion Normal

Start Date:	8/23/2011 18:05	Test ID:	C110713.08	Sample ID:	REF-Ref Toxicant
End Date:	8/27/2011 18:15	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus
Comments:					

Conc-ppb	1	2	3	4
Control	0.9800	0.9600	0.9900	0.9500
3.75	0.9600	0.9100	0.9500	0.9900
7.5	0.9500	0.9100	0.9700	0.9400
15	0.0900	0.7800	0.1900	0.0100
30	0.0000	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.9700	1.0000	1.4036	1.3453	1.4706	4.051	4			12	400
3.75	0.9525	0.9820	1.3629	1.2661	1.4706	6.187	4	15.50	10.00	19	400
7.5	0.9425	0.9716	1.3329	1.2661	1.3967	4.059	4	12.50	10.00	23	400
*15	0.2675	0.2758	0.4846	0.1002	1.0826	87.455	4	10.00	10.00	293	400
30	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4			400	400
60	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4			400	400

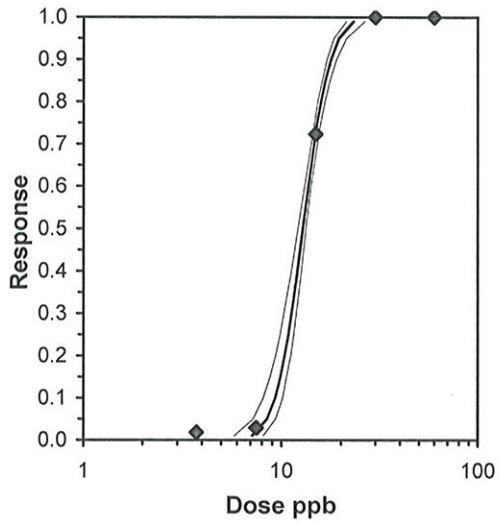
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.79274	0.844	1.52347	6.4026
Bartlett's Test indicates unequal variances (p = 1.09E-03)	16.0782	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	7.5	15	10.6066	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	9.04202	0.99577	7.0903	10.9937	0.03	0.90246	7.81473	0.82	1.11048	0.11059	8
Intercept	-5.041	1.16008	-7.3147	-2.7672							
TSCR	0.03944	0.00673	0.02626	0.05263							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	7.13174	5.81545	8.14515
EC05	3.355	8.4833	7.24814	9.40505
EC10	3.718	9.3056	8.1485	10.1577
EC15	3.964	9.90497	8.81645	10.7016
EC20	4.158	10.4087	9.38442	11.1565
EC25	4.326	10.8613	9.89892	11.5644
EC40	4.747	12.0909	11.3092	12.676
EC50	5.000	12.8967	12.2318	13.4184
EC60	5.253	13.7561	13.1946	14.242
EC75	5.674	15.3134	14.8044	15.8958
EC80	5.842	15.9792	15.4284	16.6773
EC85	6.036	16.792	16.1512	17.6783
EC90	6.282	17.8735	17.0698	19.0669
EC95	6.645	19.606	18.4825	21.3813
EC99	7.326	23.3216	21.3846	26.5951



Echinoderm Development-Proportion Normal

Start Date:	8/23/2011 18:05	Test ID:	C110713.08	Sample ID:	REF-Ref Toxicant
End Date:	8/27/2011 18:15	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	for MSDp only				

Conc-ppb	1	2	3	4
Control	0.9800	0.9600	0.9900	0.9500
3.75	0.9600	0.9100	0.9500	0.9900
7.5	0.9500	0.9100	0.9700	0.9400
15	0.0900	0.7800	0.1900	0.0100
30	0.0000	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.9700	1.0000	1.4036	1.3453	1.4706	4.051	4				12	400
3.75	0.9525	0.9820	1.3629	1.2661	1.4706	6.187	4	0.262	2.290	0.3556	19	400
7.5	0.9425	0.9716	1.3329	1.2661	1.3967	4.059	4	0.455	2.290	0.3556	23	400
*15	0.2675	0.2758	0.4846	0.1002	1.0826	87.455	4	5.918	2.290	0.3556	293	400
30	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400
60	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	4				400	400

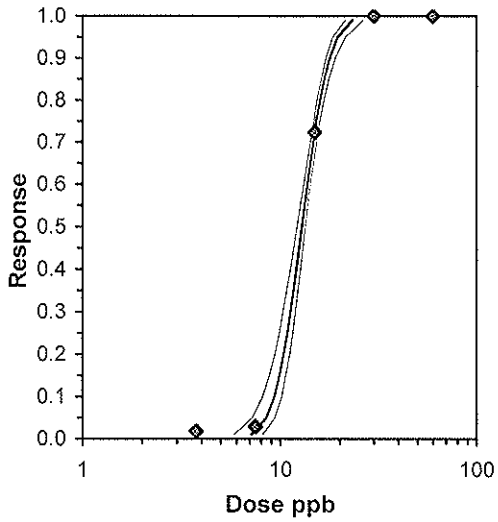
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.79274	0.844	1.52347	6.4026
Bartlett's Test indicates unequal variances (p = 1.09E-03)	16.0782	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	7.5	15	10.6066		0.22162	0.22794	0.78094	0.04822	1.6E-04	3, 12

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	9.04202	0.99577	7.0903	10.9937	0.03	0.90246	7.81473	0.82	1.11048	0.11059	8
Intercept	-5.041	1.16008	-7.3147	-2.7672							
TSCR	0.03944	0.00673	0.02626	0.05263							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	7.13174	5.81545	8.14515
EC05	3.355	8.4833	7.24814	9.40505
EC10	3.718	9.3056	8.1485	10.1577
EC15	3.964	9.90497	8.81645	10.7016
EC20	4.158	10.4087	9.38442	11.1565
EC25	4.326	10.8613	9.89892	11.5644
EC40	4.747	12.0909	11.3092	12.676
EC50	5.000	12.8967	12.2318	13.4184
EC60	5.253	13.7561	13.1946	14.242
EC75	5.674	15.3134	14.8044	15.8958
EC80	5.842	15.9792	15.4284	16.6773
EC85	6.036	16.792	16.1512	17.6783
EC90	6.282	17.8735	17.0698	19.0669
EC95	6.645	19.606	18.4825	21.3813
EC99	7.326	23.3216	21.3846	26.5951



Test: ED-Echinoderm Development
Test ID: C110713.08
Species: SP-Strongylocentrotus purpuratus
Protocol: EPAW 95-EPA West Coast
Sample ID: REF-Ref Toxicant
Sample Type: CUSO-Copper sulfate
Start Date: 8/23/2011 18:05
End Date: 8/27/2011 18
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number normal	Notes
	1	1	Control	100	100	100	98	
	2	2	Control	100	100	100	96	
	3	3	Control	100	100	100	99	
	4	4	Control	100	100	100	95	
	5	1	3.750	100	100	100	96	
	6	2	3.750	100	100	100	91	
	7	3	3.750	100	100	100	95	
	8	4	3.750	100	100	100	99	
	9	1	7.500	100	100	100	95	
	10	2	7.500	100	100	100	91	
	11	3	7.500	100	100	100	97	
	12	4	7.500	100	100	100	94	
	13	1	15.000	100	100	100	9	
	14	2	15.000	100	100	100	78	
	15	3	15.000	100	100	100	19	
	16	4	15.000	100	100	100	1	
	17	1	30.000	100	100	100	0	
	18	2	30.000	100	100	100	0	
	19	3	30.000	100	100	100	0	
	20	4	30.000	100	100	100	0	
	21	1	60.000	100	100	100	0	
	22	2	60.000	100	100	100	0	
	23	3	60.000	100	100	100	0	
	24	4	60.000	100	100	100	0	

Comments:

Reviewed by: JA

WESTON SOLUTIONS

96 Hour Echinoderm Development Reference Toxicant Test

Test ID: C110713.08	Replicates: ~~5~~ 4	Study Director: K. Curry	Location: Room 2
Dilution Water Batch: S10072511	Organism Batch: D0082311 ~~S. purpuratus~~	Associated Test(s): Joint Cannery	Organism: S. purpuratus
Toxicant: Copper Sulfate (0.509gCu/LCuSO$_4$)	Lot #: 2008506	Date Prepared: 7/28/11	Initials: JH
Target Concentrations: **60 ppb**		Quantity of Stock: Target: 0.0585mL ~~0.014 µL~~	Quantity of Diluent: Target: 500 mL ~~120 mL~~
60 ppb		Actual: 0.0584mL	Actual: 500.0 mL

Serial Dilute by ½ to obtain concentrations of 30, 15, 7.5, and 3.75 ppb.

0 Hours Date: 8/23/11 WQ Time: 1707 KS Start Time: 1805 Initials: KS

STOCK

	Control	3.75	7.5	15	30	60
D.O. (%)	7.1	7.0	7.1	7.1	7.1	7.0
Temperature	16.2	16.2	16.0	16.1	16.3	16.3
Salinity	32.9	33.1	33.1	33.2	33.2	33.2
pH	7.9	7.9	7.9	7.9	8.0	8.0

Final Day Date: 8/27/11 WQ Time: 1800 End Time: 1815 Initials: KC

STOCK

	Control	3.75	7.5	15	30	60
D.O. (%)	7.5	7.4	7.5	7.5	7.5	7.5
Temperature	15.6	15.4	15.7	15.6	15.6	15.8
Salinity	33.7	34.0	33.9	33.6	33.4	33.1
pH	7.9	7.9	7.9	7.9	7.9	7.9

☑ Pass ☐ Fail

Notes:

① WC 8/23/11 JH

96 Hour Echinoderm Development
Reference Toxicant Test

Conc.	Rep	Number Normal	Number Abnormal	Date	Initials
Control	1	98	2	9/23/11	JH
	2	96	4	↓	↓
	3	99	1	10/3/11	am
	4	95	5	↓	↓
	5	—	—	—	—
3.75	1	96	4	9/23/11	JH
	2	91	9	↓	↓
	3	95	5	10/3/11	am
	4	99	1	↓	↓
	5	—	—	—	—
7.5	1	95	5	9/23/11	JH
	2	91	9	↓	↓
	3	97	3	10/3/11	am
	4	94	6	↓	↓
	5	—	—	—	—
15	1	9	91	9/23/11	JH
	2	78	22	↓	↓
	3	19	81	10/3/11	am
	4	1	99	↓	am
	5	—	—	—	—
30	1	Ø	100	9/23/11	JH
	2	Ø	100	↓	↓
	3	Ø	100	10/4/11	am
	4	Ø	100	↓	↓
	5	—	—	—	—
60	1	Ø	①JH	9/23/11	JH
	2	Ø	①JH	↓	↓
	3	Ø	①am	10/4/11	am
	4	Ø	①am	↓	↓
	5	—	—	—	—

10/6/11 am QA: 99/1

10/4/11 am QA: 8/92

10/6/11 am QA: 0/100

① Unable to count; only pieces of cellular material visible. 9/23/11 JH 10/4/11 am

Echino Dev RT
(Joint Cannery West Basin)
8/23/11

1	3	
2	15	ϕ
3	12	
4	23	
5	22	
6	5	
7	13	3.75
8	6	
9	8	
10	16	
11	20	7.5
12	2	
13	24	
14	9	
15	18	15
16	4	
17	17	
18	14	30
19	7	
20	19	
21	10	
22	21	
23	1	60
24	11	

Atherinops affinis Chronic Toxicity Test

Test: LF-Larval Fish Growth and Survival Test | Test ID: C110804.01
Species: AT-Atherinops affinis | Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc | Sample Type: EFF2-Industrial
Start Date: 8/10/2011 13:38 | End Date: 8/17/2011 14:30 | Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(	Wgt Count
	1	1	Control	5	4	4	4	4	4	4	4	64.01	59.12	4
	2	2	Control	5	5	5	5	5	5	5	5	71.07	65.99	5
	3	3	Control	5	5	5	5	5	5	5	5	62.88	57.18	5
	4	4	Control	5	5	5	5	5	5	5	5	62.33	57.33	5
	5	5	Control	5	5	5	5	5	5	5	5	63.38	58.54	5
	6	1	36.5	5	5	5	5	5	5	5	5	63.76	58.58	5
	7	2	36.5	5	5	5	5	5	5	5	5	64.9	59.18	5
	8	3	36.5	5	4	4	4	4	4	4	4	63.87	59.19	4
	9	4	36.5	5	5	5	5	5	5	5	5	69.23	63.83	5
	10	5	36.5	5	4	4	4	4	4	4	4	69.71	64.99	4
	11	1	39	5	4	4	4	4	4	4	4	66.4	62.54	4
	12	2	39	5	5	5	5	5	5	5	5	66.61	60.23	5
	13	3	39	5	4	4	4	4	4	4	4	65.99	61.83	4
	14	4	39	5	5	5	5	5	5	5	5	65.5	58.43	5
	15	5	39	5	5	5	5	5	5	5	4	66.41	62.2	4
	16	1	41	5	4	4	4	4	4	4	4	65.86	61.25	4
	17	2	41	5	5	5	5	5	5	5	5	63.79	58.64	5
	18	3	41	5	4	4	4	4	4	4	4	64.98	60.49	4
	19	4	41	5	4	4	4	4	4	4	4	64.02	58.22	4
	20	5	41	5	5	5	5	5	5	5	5	65.92	60.2	5
	21	1	45	5	5	5	5	5	5	5	5	70.25	65.08	5
	22	2	45	5	5	5	5	5	5	5	5	64.88	59.82	5
	23	3	45	5	5	5	5	5	5	5	5	63.8	58.36	5
	24	4	45	5	5	5	5	5	5	5	5	67.86	62.54	5
	25	5	45	5	5	5	5	5	5	5	5	66.23	61.26	5
	26	1	50	5	3	3	3	3	3	3	3	65	61	3
	27	2	50	5	4	4	4	4	4	4	4	66.07	61.37	4
	28	3	50	5	5	5	5	5	5	5	5	66.12	61.01	5
	29	4	50	5	4	4	4	4	4	4	4	122.21	118.02	4
	30	5	50	5	2	2	2	2	2	2	2	68.92	65.47	2

Comments: West Basin Municipal Water District - Salinity Study

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	8/10/2011 13:38	Test ID:	C110804.0163	Sample ID:	1st Pass RO Conc
End Date:	8/17/2011 14:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.8000	1.0000	1.0000	1.0000	1.0000
36.5	1.0000	1.0000	0.8000	1.0000	0.8000
39	0.8000	1.0000	0.8000	1.0000	0.8000
41	0.8000	1.0000	0.8000	0.8000	1.0000
45	1.0000	1.0000	1.0000	1.0000	1.0000
50	0.6000	0.8000	1.0000	0.8000	0.4000

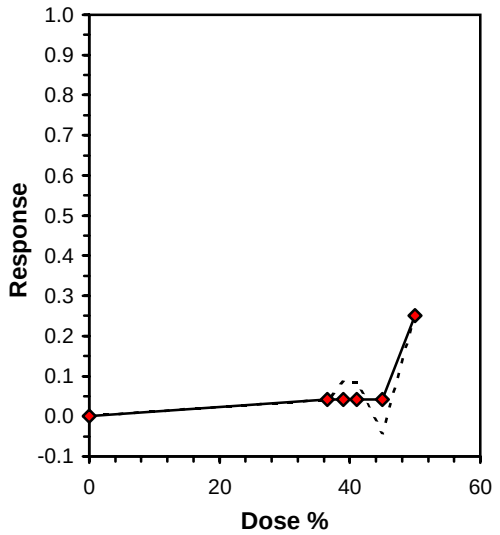
			Transform: Arcsin Square Root					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.9600	1.0000	1.2977	1.1071	1.3453	8.207	5			0.9600	1.0000
36.5	0.9200	0.9583	1.2500	1.1071	1.3453	10.434	5	25.00	16.00	0.9200	0.9583
39	0.8800	0.9167	1.2024	1.1071	1.3453	10.848	5	22.50	16.00	0.9200	0.9583
41	0.8800	0.9167	1.2024	1.1071	1.3453	10.848	5	22.50	16.00	0.9200	0.9583
45	1.0000	1.0417	1.3453	1.3453	1.3453	0.000	5	30.00	16.00	0.9200	0.9583
50	0.7200	0.7500	1.0261	0.6847	1.3453	24.421	5	19.00	16.00	0.7200	0.7500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96367	0.927	-0.1982	0.79118
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	>50		2
Treatments vs Control				

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	45.200			
IC10	46.400			
IC15	47.600			
IC20	48.800			
IC25	>50			
IC40	>50			
IC50	>50			



Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	8/10/2011 13:38	Test ID:	C110804.0163	Sample ID:	1st Pass RO Conc
End Date:	8/17/2011 14:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5
Control	1.2225	1.0160	1.1400	1.0000	0.9680
36.5	1.0360	1.1440	1.1700	1.0800	1.1800
39	0.9650	1.2760	1.0400	1.4140	1.0525
41	1.1525	1.0300	1.1225	1.4500	1.1440
45	1.0340	1.0120	1.0880	1.0640	0.9940
50	1.3333	1.1750	1.0220	1.0475	1.7250

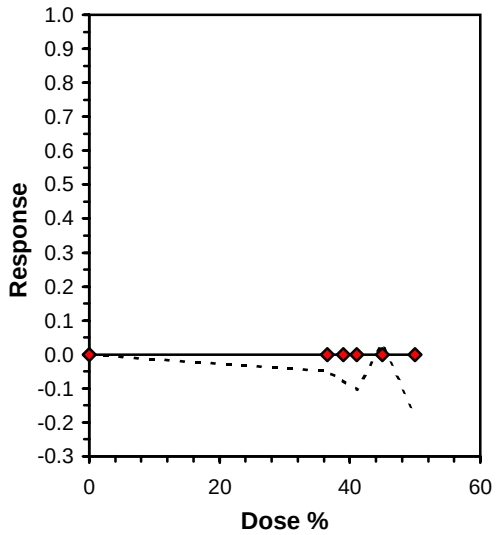
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	1.0693	1.0000	1.0693	0.9680	1.2225	10.069	5			1.1366	1.0000
36.5	1.1220	1.0493	1.1220	1.0360	1.1800	5.514	5	33.00	16.00	1.1366	1.0000
39	1.1495	1.0750	1.1495	0.9650	1.4140	16.356	5	31.00	16.00	1.1366	1.0000
41	1.1798	1.1033	1.1798	1.0300	1.4500	13.452	5	34.00	16.00	1.1366	1.0000
45	1.0384	0.9711	1.0384	0.9940	1.0880	3.668	5	27.00	16.00	1.1366	1.0000
50	1.2606	1.1789	1.2606	1.0220	1.7250	22.807	5	35.00	16.00	1.1366	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.9206	0.927	1.20371	2.32722
Bartlett's Test indicates unequal variances (p = 7.46E-03)	15.7916	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test Treatments vs Control	50	>50		2

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>50			
IC10	>50			
IC15	>50			
IC20	>50			
IC25	>50			
IC40	>50			
IC50	>50			



Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	8/10/2011 13:38	Test ID:	C110804.0163	Sample ID:	1st Pass RO Conc
End Date:	8/17/2011 14:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.9780	1.0160	1.1400	1.0000	0.9680
36.5	1.0360	1.1440	0.9360	1.0800	0.9440
39	0.7720	1.2760	0.8320	1.4140	0.8420
41	0.9220	1.0300	0.8980	1.1600	1.1440
45	1.0340	1.0120	1.0880	1.0640	0.9940
50	0.8000	0.9400	1.0220	0.8380	0.6900

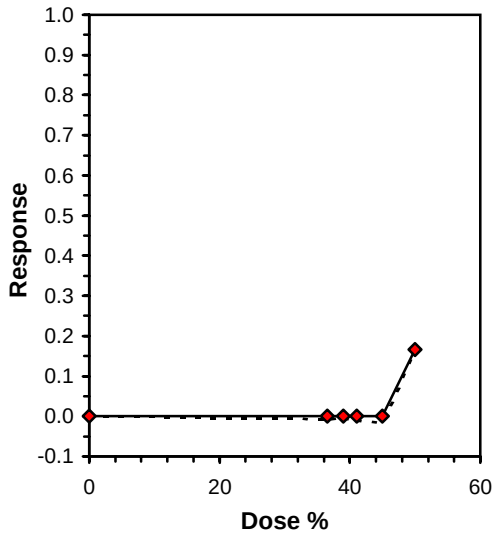
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	1.0204	1.0000	1.0204	0.9680	1.1400	6.804	5			1.0290	1.0000
36.5	1.0280	1.0074	1.0280	0.9360	1.1440	8.666	5	28.00	16.00	1.0290	1.0000
39	1.0272	1.0067	1.0272	0.7720	1.4140	28.758	5	25.00	16.00	1.0290	1.0000
41	1.0308	1.0102	1.0308	0.8980	1.1600	11.780	5	29.00	16.00	1.0290	1.0000
45	1.0384	1.0176	1.0384	0.9940	1.0880	3.668	5	32.00	16.00	1.0290	1.0000
50	0.8580	0.8408	0.8580	0.6900	1.0220	14.927	5	19.00	16.00	0.8580	0.8339

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96872	0.927	0.66758	1.23852
Bartlett's Test indicates unequal variances (p = 4.95E-03)	16.7714	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test Treatments vs Control	50	>50		2

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	46.505	4.244	32.022	48.259	-2.4466
IC10	48.009				
IC15	49.514				
IC20	>50				
IC25	>50				
IC40	>50				
IC50	>50				



Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	8/10/2011 13:38	Test ID:	C110804.0163	Sample ID:	1st Pass RO Conc
End Date:	8/17/2011 14:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal Water District - Salinity Study				** for MSDp Only **

Conc-%	1	2	3	4	5
Control	0.9780	1.0160	1.1400	1.0000	0.9680
36.5	1.0360	1.1440	0.9360	1.0800	0.9440
39	0.7720	1.2760	0.8320	1.4140	0.8420
41	0.9220	1.0300	0.8980	1.1600	1.1440
45	1.0340	1.0120	1.0880	1.0640	0.9940
50	0.8000	0.9400	1.0220	0.8380	0.6900

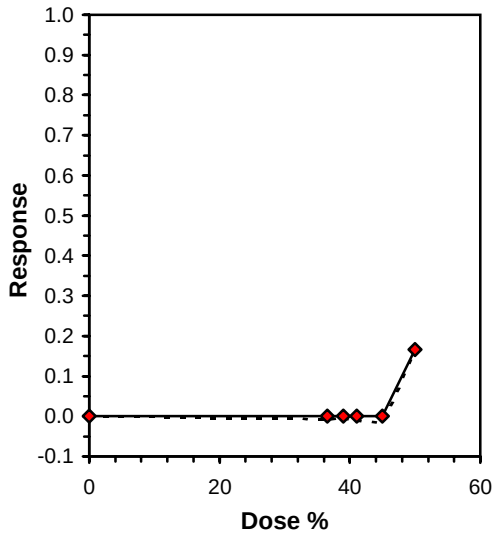
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	1.0204	1.0000	1.0204	0.9680	1.1400	6.804	5				1.0290	1.0000
36.5	1.0280	1.0074	1.0280	0.9360	1.1440	8.666	5	-0.081	2.360	0.2219	1.0290	1.0000
39	1.0272	1.0067	1.0272	0.7720	1.4140	28.758	5	-0.072	2.360	0.2219	1.0290	1.0000
41	1.0308	1.0102	1.0308	0.8980	1.1600	11.780	5	-0.111	2.360	0.2219	1.0290	1.0000
45	1.0384	1.0176	1.0384	0.9940	1.0880	3.668	5	-0.191	2.360	0.2219	1.0290	1.0000
50	0.8580	0.8408	0.8580	0.6900	1.0220	14.927	5	1.727	2.360	0.2219	0.8580	0.8339

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96872	0.927	0.66758	1.23852
Bartlett's Test indicates unequal variances (p = 4.95E-03)	16.7714	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	50	>50		2	0.2219	0.21747	0.02453	0.0221	0.38145	5, 24

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	46.505	4.074	27.734	47.851	-2.3851
IC10	48.009				
IC15	49.514				
IC20	>50				
IC25	>50				
IC40	>50				
IC50	>50				



Test: AC-Acute Fish Test							Test ID: C110804.01		
Species: AT-Atherinops affinis							Protocol: USEPA98-USACE / USEPA 1998		
Sample ID: 1st Pass RO Conc							Sample Type: EFF2-Industrial		
Start Date: 8/10/2011 13:38			End Date: 8/17/2011 14:3(				Lab ID: CCA-Carlsbad, Weston		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5	4	4	4	4	
	2	2	Control	5	5	5	5	5	
	3	3	Control	5	5	5	5	5	
	4	4	Control	5	5	5	5	5	
	5	5	Control	5	5	5	5	5	
	6	1	36.5	5	5	5	5	5	
	7	2	36.5	5	5	5	5	5	
	8	3	36.5	5	4	4	4	4	
	9	4	36.5	5	5	5	5	5	
	10	5	36.5	5	4	4	4	4	
	11	1	39	5	4	4	4	4	
	12	2	39	5	5	5	5	5	
	13	3	39	5	4	4	4	4	
	14	4	39	5	5	5	5	5	
	15	5	39	5	5	5	5	5	
	16	1	41	5	4	4	4	4	
	17	2	41	5	5	5	5	5	
	18	3	41	5	4	4	4	4	
	19	4	41	5	4	4	4	4	
	20	5	41	5	5	5	5	5	
	21	1	45	5	5	5	5	5	
	22	2	45	5	5	5	5	5	
	23	3	45	5	5	5	5	5	
	24	4	45	5	5	5	5	5	
	25	5	45	5	5	5	5	5	
	26	1	50	5	3	3	3	3	
	27	2	50	5	4	4	4	4	
	28	3	50	5	5	5	5	5	
	29	4	50	5	4	4	4	4	
	30	5	50	5	2	2	2	2	

Comments: West Basin Municipal Water District - Salinity Study

Acute Fish Test-96 Hr Survival

Start Date:	8/10/2011 13:38	Test ID:	C110804.0163	Sample ID:	1st Pass RO Conc
End Date:	8/17/2011 14:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	8/3/2011 13:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.8000	1.0000	1.0000	1.0000	1.0000
36.5	1.0000	1.0000	0.8000	1.0000	0.8000
39	0.8000	1.0000	0.8000	1.0000	1.0000
41	0.8000	1.0000	0.8000	0.8000	1.0000
45	1.0000	1.0000	1.0000	1.0000	1.0000
50	0.6000	0.8000	1.0000	0.8000	0.4000

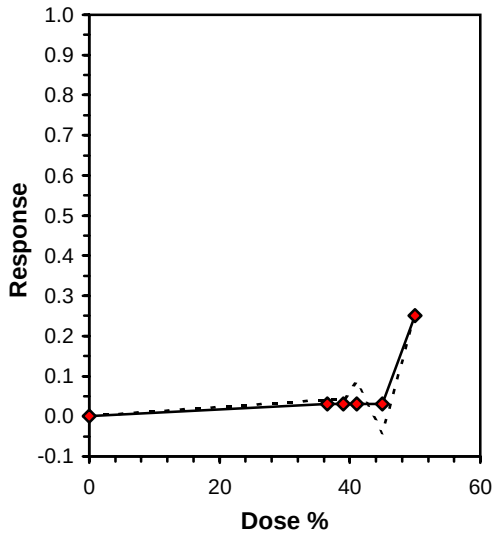
			Transform: Arcsin Square Root					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.9600	1.0000	1.2977	1.1071	1.3453	8.207	5			0.9600	1.0000
36.5	0.9200	0.9583	1.2500	1.1071	1.3453	10.434	5	25.00	16.00	0.9300	0.9688
39	0.9200	0.9583	1.2500	1.1071	1.3453	10.434	5	25.00	16.00	0.9300	0.9688
41	0.8800	0.9167	1.2024	1.1071	1.3453	10.848	5	22.50	16.00	0.9300	0.9688
45	1.0000	1.0417	1.3453	1.3453	1.3453	0.000	5	30.00	16.00	0.9300	0.9688
50	0.7200	0.7500	1.0261	0.6847	1.3453	24.421	5	19.00	16.00	0.7200	0.7500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9444	0.927	-0.3038	0.79118
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	>50		2
Treatments vs Control				

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	45.429			
IC10	46.571			
IC15	47.714			
IC20	48.857			
IC25	>50			
IC40	>50			
IC50	>50			



Topsmelt 7-Day Chronic Toxicity Test

BIO063

Client	West Basin Municipal Water District
Project:	Salinity Study
Client Sample ID:	1st Pass RO Conc.
WESTON Test ID:	C110804.0163
Species:	*Atherinops affinis*

Date Received:	8/4/11
Date Test Started: (1) ~~5~~	8/10/11
Date Test Ended:	8/17/11
Study Director:	J. Hausen
Organisms/Chamber:	5

	Conc. (ppt)	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 0	Control							3	6.8	3	21.1	5	32.8	4	7.7
Date: 8/10/11	36.5								7.1		21.0		36.6		7.9
Sample ID: C110804.01	39								7.2		20.9		39.2		7.9
Dilutions (Tech): SH	41								7.3		21.0		40.9		7.9
WQ* Time: 1205	45								7.6		20.9		45.0		7.9
Technician: TC	50								7.8		20.8		50.2		7.8
*performed on stock dilutions															
Day 1	Control	2	6.3	2	21.3	3	7.8								
Date: 8/11/11	36.5		6.4		20.3		7.9								
Sample ID: C110804.01	39		6.3		20.1		7.9						No renew		
Dilutions (Tech): SH	41		6.2		20.3		7.9								
WQ Time: 0920 Rep: 1	45		6.6		20.2		7.9								
Technician: SH	50		6.3		20.3		7.9								
Day 2	Control	3	6.3	3	20.4	3	7.8	3	6.7	3	19.7	5	32.8	3	7.9
Date: 8/12/11	36.5		6.1		20.4		7.8		7.0		19.5		36.5		7.9
Sample ID: C110804.01	39		6.1		19.9		7.8		6.9		19.7		39.0		7.9
Dilutions (Tech): SH	41		5.8		20.0		7.8		7.1		19.4		41.0		7.9
WQ Time: 0920, 1235 Rep: 2, stock	45		5.8		20.4		7.9		7.3		19.4		45.0		7.9
Technician: JH/BG	50		5.7		19.9		7.9		7.4		19.5		49.8		7.8
Day 3	Control	2	6.7	2	20.3	3	7.8								
Date: 8/13/11	36.5		6.5		20.4		7.8								
Sample ID: C110804.01	39		6.5		20.5		7.8						no renewal		
Dilutions (Tech): N/A	41		6.6		20.6		7.9								
WQ Time: 1125 Rep: 3	45		6.5		20.3		7.9								
Technician: BG	50		6.6		20.6		7.9								

(1) IE/WC 8/9/11 TC

Start Time:	1338 SH
End Time:	1430 TC
Supplier:	Aquatic Bio Systems
Organism Batch:	ABS 7080 Age: 13
Hobo Temp. No.:	778891

Dilution Water Batch:	SIO 072511
Test Location:	Rm3
Test Acceptability:	☒ ≥80% Survival in control
	☐ Mean > 0.85 mg dry weight / organism in control

WESTON SOLUTIONS

Topsmelt 7-Day Chronic Toxicity Test

BIO063

Weston Test ID: C110804.01	Client: West Basin Municipal Water District	Client Sample ID: 1st Pass RO Conc.

Concentration (%)	Replicate	Boat Number	Weight Empty Boat (mg)	Weight Boat & Animals (mg)
Control	1	1	59.12	64.01
	2	2	65.99	71.07
	3	3	57.18	62.88
	4	4	57.33	62.33
	5	5	58.54	63.38
36.5	1	6	58.58	63.76
	2	7	59.18	64.90
	3	8	59.19	63.87
	4	9	63.83	69.23
	5	10	64.99	@SH ~~68.15~~ 69.71
39	1	11	62.54	66.40
	2	12	60.23	66.61
	3	13	61.83	65.99
	4	14	58.43	65.50
	5	15	62.20	66.41
41	1	16	61.75	65.86
	2	17	58.64	63.79
	3	18	60.49	64.98
	4	19	58.22	64.02
	5	20	60.20	65.92
45	1	21	65.08	70.25
	2	22	~~6~~ 59.82 ①	64.88
	3	23	58.36	63.80
	4	24	62.54	67.86
	5	25	61.26	66.23
50	1	26	61.00	65.00
	2	27	61.37	66.07
	3	28	61.01	66.12
	4	29	118.02	122.21
	5	30	65.47	68.92
	1			
	2			
	3			
	4			
	5			
		Date:	8/17/11	8/18/11
		Time:	1350	1418
		Technician:	KC	SH

Oven temp. (°C) at start of drying:	70.0°C	Date/Time:	8/17/11	1500	Technician: KC
Oven temp. (°C) at end of drying:	74°C	Date/Time:	8/19/11	1237	Technician: JH

① IE 8/17/11 KC

② Re-zeroed scale and reweighed for accuracy. 8/18/11 SH

WESTON SOLUTIONS

Topsmelt 7-Day Chronic Toxicity Test

BIO063

Weston Test ID:	Client:	Client Sample ID:
C110804.0163	West Basin Municipal Water District	1st Pass RO Conc.

Survival Data

Concentration (%)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 8/11/11	Date: 8/12/11	Date: 8/13/11	Date: 8/14/11	Date: 8/15/11	Date: 8/16/11	Date: 8/17/11
		Renewal Time: 0938	Renewal Time: 1305	~~Renewal~~ Time: 1130	Renewal Time: 1315	~~Renewal~~ Time: 0945	Renewal Time: 1240	End Time: 1430
		Tech.: SH	Tech.: KC	Tech.: BG	Tech.: BG	Tech.: BG	Tech.: BG	Tech.: KC
Control	1	4(1)	4	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
36.5	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	4(1)	4	4	4	4	4	4
	4	5	5	5	5	5	5	5
	5	4(1)	4	4	4	4	4	4
39	1	4(1)	4	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	4(1)	4	4	4	4	4	4
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	4(1)
41	1	4(1)	4	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	4(1)	4	4	4	4	4	4
	4	4(1)	4	4	4	4	4	4
	5	5	5	5	5	5	5	5
45	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
50	1	3(2)	3	3	3	3	3	3
	2	4(1)	4	4	4	4	4	4
	3	5	5	5	5	5	5	5
	4	4(1)	4	4	4	4	4	4
	5	2(3)	2	2	2	2	2	2
	1							
	2							
	3							
	4							
	5							

Feeding Information:	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
AM Feed (Tech):		SH	KC	BG	BG	BG	BG
PM Feed (Tech):	KC	KC	BG	BG	BG	BG	BG

Topsmelt 7-Day Chronic Toxicity Test

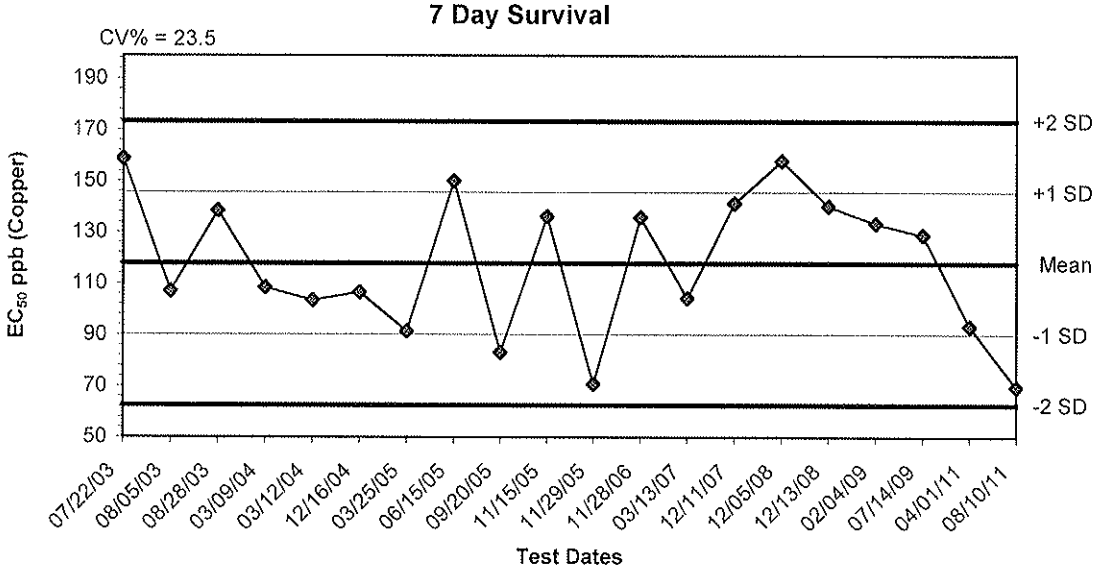
BIO063

Weston Test ID:	Client:	Client Sample ID:
C110804.0163	West Basin Municipal Water District	1st Pass RO Conc.

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 4	Control	2	6.6	2	20.5	3	7.9	2	6.7	2	21.3	6	33.0	3	7.9
Date: 8/14/11	36.5		6.6		20.3		7.9		6.8		21.1		36.5		7.8
Sample ID: C110804.01	39		6.6		20.3		7.9		6.9		20.9		39.0		7.8
Dilutions (Tech): BG	41		6.2		20.7		7.9		7.1		20.7		41.0		7.7
WQ Time: 1150/1205 Rep: 4, stock	45		6.0		20.4		7.9		7.2		20.2		45.0		7.6
Technician: BG	50		6.0		21.4		7.9		7.5		19.7		50.0		7.5
Day 5	Control	2	6.5	2	20.3	3	7.9								
Date: 8/15/11	36.5		6.5		20.3		7.9								
Sample ID:	39		6.0		20.6		7.9								
Dilutions (Tech):	41		5.7		21.4		7.8						no renewal		
WQ Time: 0935 Rep: 5	45		5.6		20.4		7.8								
Technician: BG	50		5.5		20.2		7.9								
Day 6	Control	2	6.3	2	21.4	3	7.8	2	6.8	2	21.4	6	33.1	3	7.9
Date: 8/16/11	36.5		6.3		20.3		7.9		6.8		21.0		36.5		7.8
Sample ID: C110804.01	39		6.4		20.2		7.9		6.6		20.7		39.1		7.8
Dilutions (Tech): BG	41		6.1		20.6		7.9		6.5		20.5		41.0		7.7
WQ Time: 1100/1215 Rep: 1, stock	45		5.7		20.3		7.9		6.6		20.2		45.0		7.6
Technician: BG	50		5.9		20.4		7.9		6.6		19.8		50.0		7.5
Day 7	Control	3	6.4	3	20.5	3	7.9					5	33.0		
Date: 8/17/11	36.5		6.3		20.2		7.9						36.5		
WQ Time: 1045 Rep: ~~2~~ 2 (DSH)	39		6.3		20.1		7.9						39.0		
Technician: JH	41		6.3		20.2		7.9						41.0		
	45		6.0		20.8		7.9						45.0		
	50		6.0		20.7		7.9						49.9		

OTE 8/17/11 SH

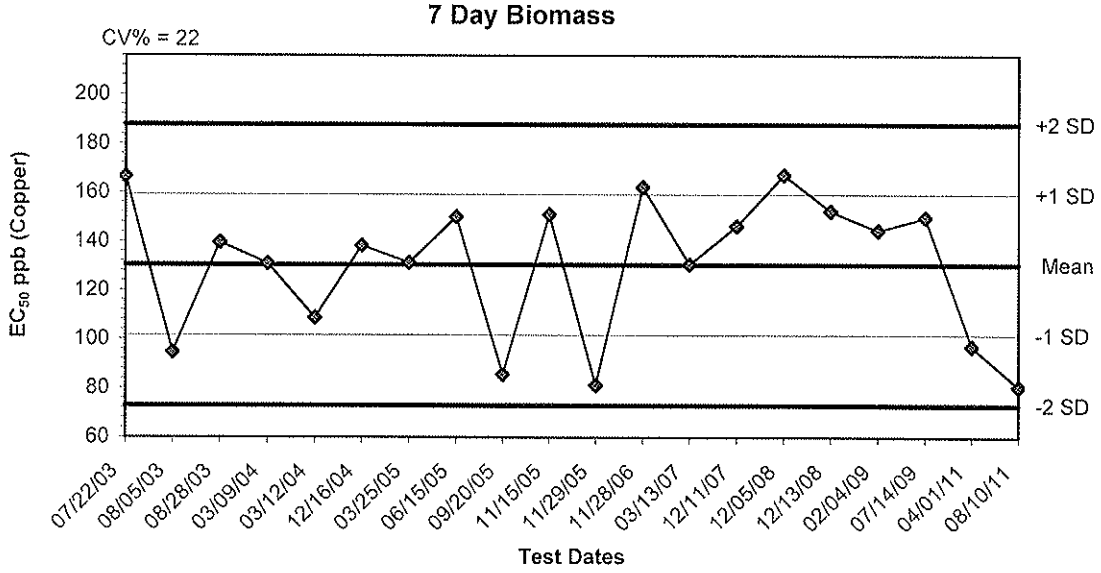
Atherinops affinis Reference Toxicant Control Chart: 7 Day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/22/03	158.7400	117.8995	90.1822	62.4648	145.6169	173.3342
08/05/03	107.0200	117.8995	90.1822	62.4648	145.6169	173.3342
08/28/03	138.3890	117.8995	90.1822	62.4648	145.6169	173.3342
03/09/04	108.4000	117.8995	90.1822	62.4648	145.6169	173.3342
03/12/04	103.3190	117.8995	90.1822	62.4648	145.6169	173.3342
12/16/04	106.4900	117.8995	90.1822	62.4648	145.6169	173.3342
03/25/05	91.3448	117.8995	90.1822	62.4648	145.6169	173.3342
06/15/05	150.0000	117.8995	90.1822	62.4648	145.6169	173.3342
09/20/05	83.1386	117.8995	90.1822	62.4648	145.6169	173.3342
11/15/05	136.1540	117.8995	90.1822	62.4648	145.6169	173.3342
11/29/05	70.7110	117.8995	90.1822	62.4648	145.6169	173.3342
11/28/06	135.8100	117.8995	90.1822	62.4648	145.6169	173.3342
03/13/07	104.2070	117.8995	90.1822	62.4648	145.6169	173.3342
12/11/07	141.2510	117.8995	90.1822	62.4648	145.6169	173.3342
12/05/08	157.9200	117.8995	90.1822	62.4648	145.6169	173.3342
12/13/08	140.0730	117.8995	90.1822	62.4648	145.6169	173.3342
02/04/09	133.3300	117.8995	90.1822	62.4648	145.6169	173.3342
07/14/09	128.9120	117.8995	90.1822	62.4648	145.6169	173.3342
04/01/11	93.2577	117.8995	90.1822	62.4648	145.6169	173.3342
08/10/11	69.5230	117.8995	90.1822	62.4648	145.6169	173.3342

Updated 8/18/11 KC

Atherinops affinis Reference Toxicant Control Chart: 7 Day Biomass



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/22/03	166.4700	130.3923	101.6454	72.8986	159.1391	187.8860
08/05/03	94.6900	130.3923	101.6454	72.8986	159.1391	187.8860
08/28/03	139.5600	130.3923	101.6454	72.8986	159.1391	187.8860
03/09/04	130.8700	130.3923	101.6454	72.8986	159.1391	187.8860
03/12/04	108.6600	130.3923	101.6454	72.8986	159.1391	187.8860
12/16/04	138.3200	130.3923	101.6454	72.8986	159.1391	187.8860
03/25/05	131.1900	130.3923	101.6454	72.8986	159.1391	187.8860
06/15/05	150.0000	130.3923	101.6454	72.8986	159.1391	187.8860
09/20/05	85.5120	130.3923	101.6454	72.8986	159.1391	187.8860
11/15/05	150.9200	130.3923	101.6454	72.8986	159.1391	187.8860
11/29/05	81.1800	130.3923	101.6454	72.8986	159.1391	187.8860
11/28/06	162.2200	130.3923	101.6454	72.8986	159.1391	187.8860
03/13/07	130.5500	130.3923	101.6454	72.8986	159.1391	187.8860
12/11/07	146.2900	130.3923	101.6454	72.8986	159.1391	187.8860
12/05/08	167.1600	130.3923	101.6454	72.8986	159.1391	187.8860
12/13/08	152.3400	130.3923	101.6454	72.8986	159.1391	187.8860
02/04/09	144.4100	130.3923	101.6454	72.8986	159.1391	187.8860
07/14/09	149.8300	130.3923	101.6454	72.8986	159.1391	187.8860
04/01/11	97.0715	130.3923	101.6454	72.8986	159.1391	187.8860
08/10/11	80.6020	130.3923	101.6454	72.8986	159.1391	187.8860

Updated 8/18/11 KC

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	8/10/2011 13:38	Test ID:	C110713.05	Sample ID:	REF-Ref Toxicant
End Date:	8/17/2011 14:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:	For pMSD only.				

Conc-ppb	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000	0.8000
50	0.8000	1.0000	0.8000	0.8000	1.0000
100	0.2000	0.6000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000	0.0000

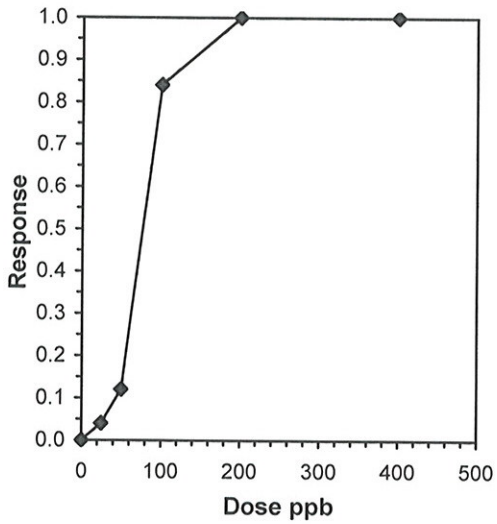
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	5				1.0000	1.0000
25	0.9600	0.9600	1.2977	1.1071	1.3453	8.207	5	0.452	2.230	0.2352	0.9600	0.9600
50	0.8800	0.8800	1.2024	1.1071	1.3453	10.848	5	1.355	2.230	0.2352	0.8800	0.8800
*100	0.1600	0.1600	0.4053	0.2255	0.8861	71.039	5	8.913	2.230	0.2352	0.1600	0.1600
200	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5				0.0000	0.0000
400	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.84955	0.868	1.48012	4.23427
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.7107		0.14765	0.15542	0.97802	0.02781	2.8E-07	3, 16

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	28.125	9.976	1.563	61.979	0.3365
IC10	43.750	8.447	9.375	59.375	-0.4835
IC15	52.083	4.258	37.142	60.417	-0.4898
IC20	55.556	3.017	47.222	64.538	0.4230
IC25	59.028	3.090	50.694	68.264	0.5868
IC40	69.444	3.985	61.111	84.028	0.9613
IC50	76.389	4.925	67.163	96.181	1.0711



Reviewed by: MA

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	8/10/2011 13:38	Test ID:	C110713.05	Sample ID:	REF-Ref Toxicant
End Date:	8/17/2011 14:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	1.0000
25	1.0000	1.0000	1.0000	1.0000	0.8000
50	0.8000	1.0000	0.8000	0.8000	1.0000
100	0.2000	0.6000	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	5			0	25
25	0.9600	0.9600	1.2977	1.1071	1.3453	8.207	5	25.00	17.00	1	25
50	0.8800	0.8800	1.2024	1.1071	1.3453	10.848	5	20.00	17.00	3	25
*100	0.1600	0.1600	0.4053	0.2255	0.8861	71.039	5	15.00	17.00	21	25
200	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5			25	25
400	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5			25	25

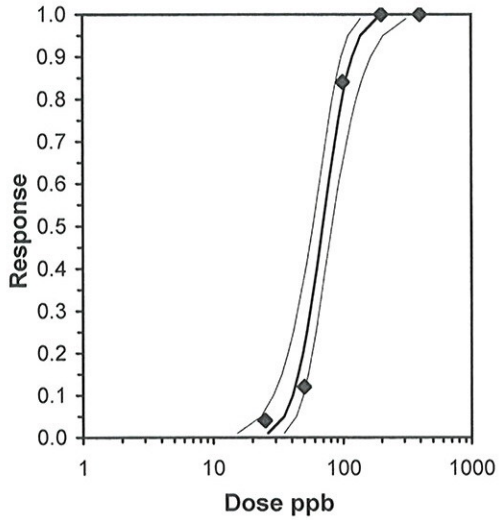
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.84955	0.868	1.48012	4.23427
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	50	100	70.7107	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	5.49647	0.95672	3.62129	7.37165	0	5.34774	7.81473	0.15	1.84213	0.18194	4
Intercept	-5.1252	1.77312	-8.6005	-1.6499							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	26.2352	15.2808	34.8357
EC05	3.355	34.9037	23.272	43.6491
EC10	3.718	40.6415	29.004	49.4264
EC15	3.964	45.0365	33.5562	53.8995
EC20	4.158	48.8661	37.5912	57.8754
EC25	4.326	52.4101	41.3471	61.6538
EC40	4.747	62.5224	51.8976	73.2291
EC50	5.000	69.523	58.816	82.1608
EC60	5.253	77.3074	65.9999	93.0989
EC75	5.674	92.2235	78.4071	116.831
EC80	5.842	98.9119	83.5305	128.497
EC85	6.036	107.323	89.6967	143.942
EC90	6.282	118.929	97.8187	166.525
EC95	6.645	138.479	110.771	207.532
EC99	7.326	184.235	138.802	316.049



Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	8/10/2011 13:38	Test ID:	C110713.05	Sample ID:	REF-Ref Toxicant
End Date:	8/17/2011 14:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	1.1120	1.1880	0.9620	1.2220	1.0920
25	1.2100	1.1640	1.1200	1.2240	1.1325
50	1.2200	1.2740	1.3950	1.1300	1.0100
100	2.1600	1.3267			

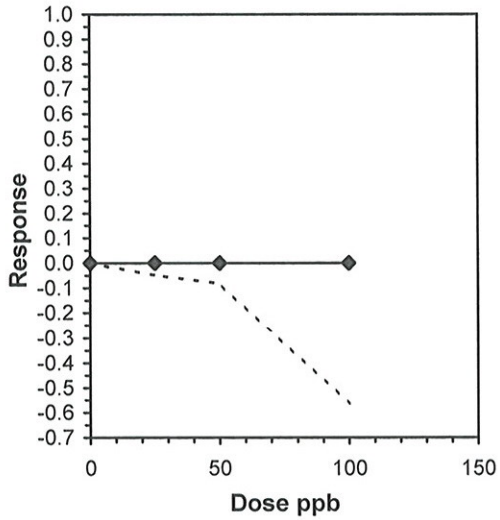
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	1.1152	1.0000	1.1152	0.9620	1.2220	9.048	5				1.3086	1.0000
25	1.1701	1.0492	1.1701	1.1200	1.2240	3.930	5	-0.451	2.270	0.2762	1.3086	1.0000
50	1.2058	1.0812	1.2058	1.0100	1.3950	12.070	5	-0.745	2.270	0.2762	1.3086	1.0000
100	1.7433	1.5632	1.7433	1.3267	2.1600	33.801	2	-3.902	2.270	0.3654	1.3086	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.93041	0.851	-0.0382	2.76993
Bartlett's Test indicates unequal variances (p = 2.90E-03)	14.0023	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100			0.36537	0.32763	0.20457	0.03701	0.01141	3, 13

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Reviewed by:

Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	8/10/2011 13:38	Test ID:	C110713.05	Sample ID:	REF-Ref Toxicant
End Date:	8/17/2011 14:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	1.1120	1.1880	0.9620	1.2220	1.0920
25	1.2100	1.1640	1.1200	1.2240	0.9060
50	0.9760	1.2740	1.1160	0.9040	1.0100
100	0.4320	0.7960	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000	0.0000

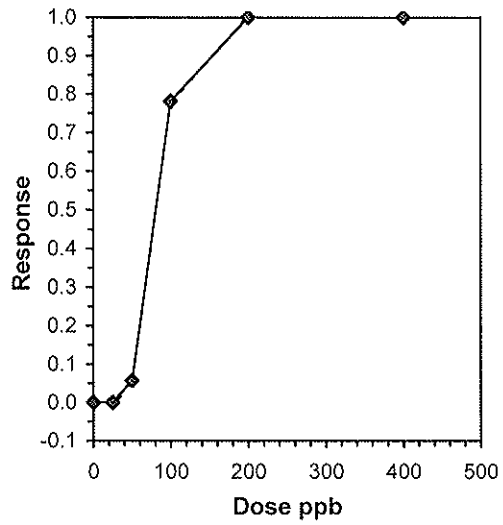
			Transform: Untransformed						1-Tailed		Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	1.1152	1.0000	1.1152	0.9620	1.2220	9.048	5				1.1200	1.0000
25	1.1248	1.0086	1.1248	0.9060	1.2240	11.466	5	-0.072	2.230	0.2968	1.1200	1.0000
50	1.0560	0.9469	1.0560	0.9040	1.2740	13.620	5	0.445	2.230	0.2968	1.0560	0.9429
*100	0.2456	0.2202	0.2456	0.0000	0.7960	146.614	5	6.533	2.230	0.2968	0.2456	0.2193
200	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5				0.0000	0.0000
400	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.91276	0.868	1.01	2.16792
Bartlett's Test indicates equal variances (p = 0.05)	7.74064	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.7107		0.29682	0.26616	0.91428	0.04429	9.5E-06	3, 16

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	46.875	11.405	0.000	57.306	-0.8817
IC10	52.962	6.846	20.010	60.006	-2.1727
IC15	56.417	4.382	39.919	64.022	-2.2662
IC20	59.872	3.522	48.800	68.128	0.1774
IC25	63.327	3.737	52.135	72.735	0.4661
IC40	73.692	5.094	60.424	89.131	1.0335
IC50	80.602	6.455	66.593	99.770	1.4959



Test: LF-Larval Fish Growth and Survival Test | Test ID: C110713.05
Species: AA-Atherinops affinis | Protocol: EPAM 02-EPA Marine
Sample ID: REF-Ref Toxicant | Sample Type: CUSO-Copper sulfate
Start Date: 8/10/2011 13:38 | End Date: 8/17/2011 14:40 | Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count
	1	1	Control	5							5	161.98	156.42	5
	2	2	Control	5							5	140.02	134.08	5
	3	3	Control	5							5	140.28	135.47	5
	4	4	Control	5							5	147.33	141.22	5
	5	5	Control	5							5	144.15	138.69	5
	6	1	25.000	5							5	137.68	131.63	5
	7	2	25.000	5							5	136.69	130.87	5
	8	3	25.000	5							5	131.09	125.49	5
	9	4	25.000	5							5	142.7	136.58	5
	10	5	25.000	5							4	142.24	137.71	4
	11	1	50.000	5							4	144.56	139.68	4
	12	2	50.000	5							5	138.69	132.32	5
	13	3	50.000	5							4	156.11	150.53	4
	14	4	50.000	5							4	144.63	140.11	4
	15	5	50.000	5							5	139.4	134.35	5
	16	1	100.000	5							1	157.21	155.05	1
	17	2	100.000	5							3	133.39	129.41	3
	18	3	100.000	5							0			0
	19	4	100.000	5							0			0
	20	5	100.000	5							0			0
	21	1	200.000	5							0			0
	22	2	200.000	5							0			0
	23	3	200.000	5							0			0
	24	4	200.000	5							0			0
	25	5	200.000	5							0			0
	26	1	400.000	5							0			0
	27	2	400.000	5							0			0
	28	3	400.000	5							0			0
	29	4	400.000	5							0			0
	30	5	400.000	5							0			0

Comments:

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

Test ID: C110713.05	Associated Test(s): West Basin Tops-C		Study Director: J. Hansen
Organism Batch: ABS 7080	Location: Rm 3	Replicates: 5	No. of Organisms: 5
Start Time: 1338	Initials: KC	End Time: 1440	Initials: SH

Day 0 Water Quality Data

Stock

Date: 8/10/11 Time: 1215 Initials: KC

	Control	25	50	100	200	400
D.O. (mg/L)	6.9	7.0	6.9	6.9	6.9	6.9
Temperature	21.0	20.2	20.8	20.8	20.5	20.8
Salinity	32.8	33.2	33.0	33.0	33.1	33.0
pH	7.9	7.9	7.9	7.9	7.9	7.9

Day 7 Water Quality Data

Date: 8/17/11 Time: 1058 Replicate: 1 Initials: SH

	Control	25	50	100	200	400
D.O. (mg/L)	6.3	6.6	6.5	6.8		
Temperature	19.9	20.6	20.0	20.1		
Salinity	33.2	33.2	33.1	33.6		
pH	7.9	7.9	7.9	7.9		

☐ Pass ☐ Fail

Notes:

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

Reference Toxicant Dilution Worksheet

Test ID: C110713.05	Toxicant: Copper Sulfate (0.509gCu/L $CuSO_4$)	Toxicant Lot Number: 2008506

Serial Dilute by ½ to obtain concentrations of 400, 200, 100, 50, and 25 ppb.

Date Prepared	Day	Target Conc.	A. Toxicant (target) B. Toxicant (actual)	A. Diluent (target) B. Diluent (actual)	Dilution Water Batch	Tech.
8/10/11	0	400 ppb	(A) 1.965 ml (B) 1.9656 ml	(A) 2500 ml (B) 2500.0 ml	S10072511	TC
	1	①SH	(A) (B)	(A) (B)		
8/12/11	2	200ppb	(A) 0.9820 (B) 0.9828	(A) ②SH 1250 2500 (B) 2500.0ml	S10072511	SH
	3	①BG	(A) (B)	(A) (B)		
8/14/11	4	200ppb	(A) 0.9828 (B) 0.9824	(A) 2500 (B) 2500	S10072511	BG
	5	①BG	(A) (B)	(A) (B)		
8/16/11	6	100ppb	(A) 0.4914 (B) 0.4914	(A) 2500 (B) 2500	S10072511	BG

① No renewal on 8/11/10 SH; 8/13/11 BG; 8/15/11 BG
② IE 8/12/11 SH

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

SURVIVAL DATA

Test ID: C110713.05

Conc. (ppb)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 8/11/11	Date: 8/12/11	Date: 8/13/11	Date: 8/14/11	Date: 8/15/11	Date: 8/16/11	Date: 8/17/11
		~~Renewal~~ 1050 Time: SH	Renewal Time: 1250	~~Renewal~~ Time: 1140	Renewal Time: 1330	~~Renewal~~ Time: 0940	Renewal Time: 1315	End Time: 1440
		Tech: SH	Tech: KC	Tech: BG	Tech: BG	Tech: KC	Tech: BG	Tech: SH
Control	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
25	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	4(1)	4	4	4	4	4	4
50	1	4(1)	4	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	4(1)	4	4	4	4	4	4
	4	4(1)	4	4	4	4	4	4
	5	5	5	5	5	5	5	5
100	1	5	3(2)	1(2)	1	1	1	1
	2	5	3(2)	3	3	3	3	3
	3	5	1(4)	Ø(1)				
	4	3(2)	3	Ø(3)				
	5	4(1)	3(1)	Ø(3)				
200	1	0(5)						
	2	5	5	2(3)	Ø(2)			
	3	5	3(2)	Ø(3)				
	4	3(2)	3	Ø(3)				
	5	4(1)	4	1(3)	Ø(1)			
400	1	Ø(5)						
	2	Ø(5)						
	3	0(5)						
	4	Ø(5)						
	5	Ø(5)						

① no Renewal test counts 8/11/11 SH

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

Test ID: C110713.05

Concentration (ppb)	Rep	Weigh Boat Number	Tare Weight (mg)	Total Weight (mg)
Control	1	1	156.42	161.98
	2	2	134.08	140.02
	3	3	135.47	140.28
	4	4	141.22	147.33
	5	5	138.69	144.15
25	1	6	131.63	137.68
	2	7	130.87	136.69
	3	8	125.49	131.09
	4	9	136.58	142.70
	5	10	137.71	142.24
50	1	11	139.68	144.56
	2	12	132.32	138.69
	3	13	150.53	156.11
	4	14	140.11	144.63
	5	15	134.35	139.40
100	1	16	155.05	157.21
	2	17	129.41	133.39
	3	—		
	4	—		
	5	—		
200	1			
	2			
	3			
	4			
	5			
400	1			
	2			
	3			
	4			
	5			
		Date:	8/17/11	8/18/11
		Time:	1405	1410
		Initials:	KC	SH

APPENDIX A

SHORT-TERM EXPOSURE ASSESSMENT: PHASE II, EPISODE 2

Americamysis bahia Chronic Toxicity Test

Test: MS-Mysid Survival, Growth and Fecundity Test — Test ID: C110923.01
Species: MY-Mysidopsis bahia — Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc — Sample Type: EFF2-Industrial
Start Date: 10/19/2011 12:13 — End Date: 10/26/2011 11:05 — Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(r	Wgt Count	Female Co	Females w/ Eggs	Notes
	1	1	Control	5	5	5	5	5	5	5	4	111.03	108.96	4			
	2	2	Control	5	5	5	5	5	5	5	5	116.44	114.27	5			
	3	3	Control	5	5	5	5	5	5	5	5	102.24	99.58	5			
	4	4	Control	5	5	5	5	5	5	5	5	127.41	125.49	5			
	5	5	Control	5	5	5	5	5	5	5	5	125.74	123.46	5			
	6	6	Control	5	5	5	5	5	5	5	5	111.99	109.95	5			
	7	7	Control	5	5	5	5	5	5	5	5	133.33	131.34	5			
	8	8	Control	5	5	5	5	5	5	5	5	155.91	153.97	5			
	9	1	36.5	5	5	5	5	5	5	5	5	153.73	152.05	5			
	10	2	36.5	5	5	5	5	5	5	5	4	151.24	148.39	4			
	11	3	36.5	5	5	5	5	5	5	5	5	142.13	140.68	5			
	12	4	36.5	5	5	5	5	5	5	5	5	92.59	90.55	5			
	13	5	36.5	5	5	5	5	5	5	5	4	105.29	103.89	4			
	14	6	36.5	5	5	5	5	5	5	5	5	119.55	117.46	5			
	15	7	36.5	5	5	5	5	5	5	5	5	113.42	110.94	5			
	16	8	36.5	5	5	5	5	5	5	5	5	114.85	111.98	5			
	17	1	39	5	5	5	5	5	5	5	5	111.01	108.35	5			
	18	2	39	5	5	5	5	5	5	5	5	126.13	124.43	5			
	19	3	39	5	5	5	5	5	5	5	4	126.01	124.29	4			
	20	4	39	5	5	5	5	5	5	5	5	120.26	118.45	5			
	21	5	39	5	5	5	5	5	5	5	5	117.37	115.18	5			
	22	6	39	5	5	5	5	5	5	5	5	106.22	104.78	5			
	23	7	39	5	5	5	5	5	5	5	5	102	100.19	5			
	24	8	39	5	5	5	5	5	5	5	5	116.52	114.18	5			
	25	1	41	5	5	5	5	5	5	5	5	125.06	122.83	5			
	26	2	41	5	5	5	5	5	5	5	5	113.1	111.35	5			
	27	3	41	5	5	5	5	5	5	4	4	98.99	97.25	4			
	28	4	41	5	5	5	5	5	5	5	5	102.34	99.95	5			
	29	5	41	5	5	5	5	5	5	5	5	114.19	111.89	5			
	30	6	41	5	5	5	5	5	5	5	5	86.12	84.46	5			
	31	7	41	5	5	5	5	5	5	5	5	129.86	128.24	5			
	32	8	41	5	5	5	5	5	5	5	5	94	92.75	5			
	33	1	45	5	5	5	5	5	5	4	4	100.74	99.69	4			
	34	2	45	5	5	4	4	4	4	4	4	100.78	99.7	4			
	35	3	45	5	5	5	5	5	5	5	5	98.53	97.45	5			
	36	4	45	5	5	5	5	5	5	5	4	92.75	91.79	4			
	37	5	45	5	4	4	4	4	4	4	4	105.61	104.82	4			
	38	6	45	5	4	4	4	4	4	4	4	103.78	102.84	4			

Test: MS-Mysid Survival, Growth and Fecundity Test — Test ID: C110923.01
Species: MY-Mysidopsis bahia — Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc — Sample Type: EFF2-Industrial
Start Date: 10/19/2011 12:13 — End Date: 10/26/2011 11:05 — Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(I	Wgt Count	Female Co	Females w/ Eggs	Notes
	39	7	45	5	5	5	5	5	5	5	5	109.99	108.72	5			
	40	8	45	5	5	5	5	5	5	5	5	114.79	113.76	5			
	41	1	60	5	0	0	0	0	0	0	0	0	0	0			
	42	2	60	5	0	0	0	0	0	0	0	0	0	0			
	43	3	60	5	0	0	0	0	0	0	0	0	0	0			
	44	4	60	5	0	0	0	0	0	0	0	0	0	0			
	45	5	60	5	0	0	0	0	0	0	0	0	0	0			
	46	6	60	5	0	0	0	0	0	0	0	0	0	0			
	47	7	60	5	0	0	0	0	0	0	0	0	0	0			
	48	8	60	5	0	0	0	0	0	0	0	0	0	0			

Comments: West Basin Municipal Water District - Salinity Study

Mysid Survival, Growth and Fecundity Test-7 Day Survival

Start Date:	10/19/2011 12:13	Test ID:	C110923.0127	Sample ID:	1st Pass RO Conc
End Date:	10/26/2011 11:05	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	USEPA98-USACE / USEPA	Test Species:	MY-Mysidopsis bahia
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5	6	7	8
Control	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
36.5	1.0000	0.8000	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000
39	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000
41	1.0000	1.0000	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000
45	0.8000	0.8000	1.0000	0.8000	0.8000	0.8000	1.0000	1.0000
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

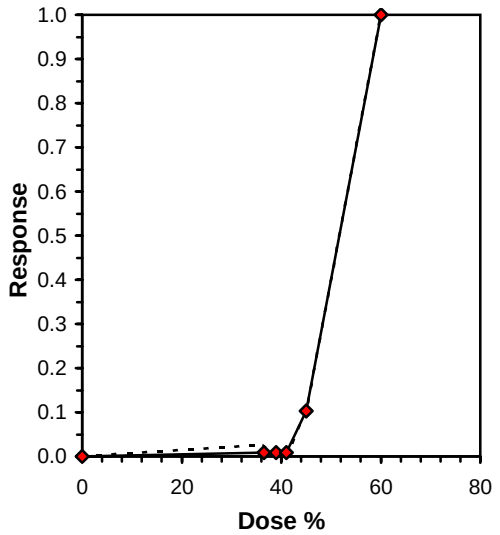
			Transform: Arcsin Square Root					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8			0.9750	1.0000
36.5	0.9500	0.9744	1.2857	1.1071	1.3453	8.574	8	64.00	47.00	0.9667	0.9915
39	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8	68.00	47.00	0.9667	0.9915
41	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8	68.00	47.00	0.9667	0.9915
45	0.8750	0.8974	1.1964	1.1071	1.3453	10.301	8	52.00	47.00	0.8750	0.8974
60	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.79041	0.94	-1.0064	0.5159
Bartlett's Test indicates equal variances (p = 0.76)	1.84166	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test Treatments vs Control	45	60	51.9615	2.22222

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC05	42.764	2.939	31.286	45.109	-3.6850
IC10	44.891	1.006	42.593	45.893	-0.3338
IC15	45.793	0.627	44.293	46.677	-0.2067
IC20	46.629	0.551	45.455	47.460	0.0815
IC25	47.464	0.517	46.364	48.244	0.0815
IC40	49.971	0.413	49.091	50.595	0.0815
IC50	51.643	0.344	50.909	52.163	0.0815



Mysid Survival, Growth and Fecundity Test-Growth-Weight

Start Date:	10/19/2011 12:13	Test ID:	C110923.0127	Sample ID:	1st Pass RO Conc
End Date:	10/26/2011 11:05	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	USEPA98-USACE / USEPA	Test Species:	MY-Mysidopsis bahia
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5	6	7	8
Control	0.5175	0.4340	0.5320	0.3840	0.4560	0.4080	0.3980	0.3880
36.5	0.3360	0.7125	0.2900	0.4080	0.3500	0.4180	0.4960	0.5740
39	0.5320	0.3400	0.4300	0.3620	0.4380	0.2880	0.3620	0.4680
41	0.4460	0.3500	0.4350	0.4780	0.4600	0.3320	0.3240	0.2500
45	0.2625	0.2700	0.2160	0.2400	0.1975	0.2350	0.2540	0.2060

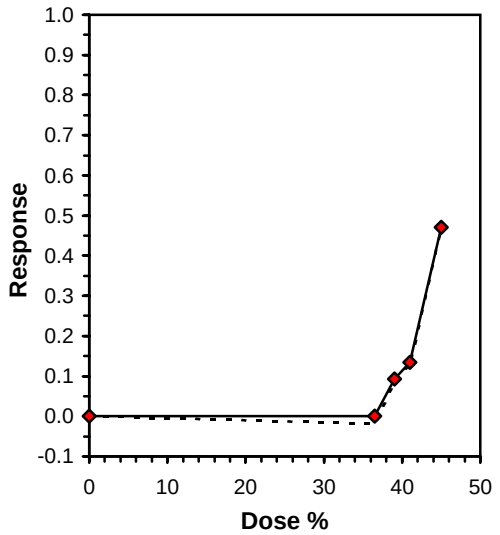
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.4397	1.0000	0.4397	0.3840	0.5320	13.147	8			0.4439	1.0000
36.5	0.4481	1.0190	0.4481	0.2900	0.7125	31.308	8	66.00	47.00	0.4439	1.0000
39	0.4025	0.9154	0.4025	0.2880	0.5320	19.557	8	59.00	47.00	0.4025	0.9068
41	0.3844	0.8742	0.3844	0.2500	0.4780	21.198	8	58.00	47.00	0.3844	0.8660
*45	0.2351	0.5348	0.2351	0.1975	0.2700	11.339	8	36.00	47.00	0.2351	0.5297

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96349	0.94	0.73435	1.70708
Bartlett's Test indicates unequal variances (p = 3.29E-03)	15.806	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test Treatments vs Control	41	45	42.9535	2.43902

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC05	37.841	8.262	13.123	41.175	-1.7805
IC10	39.332	4.042	26.246	41.660	-3.2981
IC15	41.190	2.278	37.192	42.154	-4.4479
IC20	41.785	1.326	38.935	42.606	-4.6172
IC25	42.379	0.771	40.532	43.128	-2.5650
IC40	44.164				
IC50	>45				



Mysid Survival, Growth and Fecundity Test-Biomass

Start Date:	10/19/2011 12:13	Test ID:	C110923.0127	Sample ID:	1st Pass RO Conc
End Date:	10/26/2011 11:05	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	USEPA98-USACE / USEPA	Test Species:	MY-Mysidopsis bahia
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5	6	7	8
Control	0.4140	0.4340	0.5320	0.3840	0.4560	0.4080	0.3980	0.3880
36.5	0.3360	0.5700	0.2900	0.4080	0.2800	0.4180	0.4960	0.5740
39	0.5320	0.3400	0.3440	0.3620	0.4380	0.2880	0.3620	0.4680
41	0.4460	0.3500	0.3480	0.4780	0.4600	0.3320	0.3240	0.2500
45	0.2100	0.2160	0.2160	0.1920	0.1580	0.1880	0.2540	0.2060
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

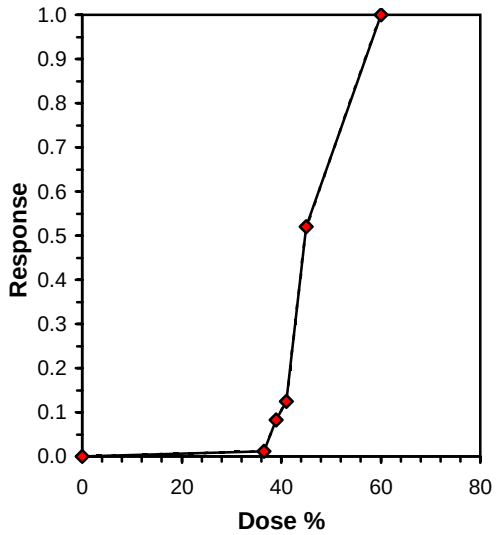
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.4268	1.0000	0.4268	0.3840	0.5320	11.430	8				0.4268	1.0000
36.5	0.4215	0.9877	0.4215	0.2800	0.5740	27.737	8	0.137	2.239	0.0861	0.4215	0.9877
39	0.3918	0.9180	0.3918	0.2880	0.5320	20.493	8	0.910	2.239	0.0861	0.3918	0.9180
41	0.3735	0.8752	0.3735	0.2500	0.4780	21.296	8	1.385	2.239	0.0861	0.3735	0.8752
*45	0.2050	0.4804	0.2050	0.1580	0.2540	13.468	8	5.766	2.239	0.0861	0.2050	0.4804
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95379	0.94	0.31253	-0.1132
Bartlett's Test indicates equal variances (p = 0.01)	13.0447	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	41	45	42.9535	2.43902	0.08609	0.20174	0.06677	0.00592	5.5E-06	4, 35

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL		Skew
IC05	37.852	8.491	13.524	41.288	-1.4675
IC10	39.841	3.583	27.049	41.734	-2.5144
IC15	41.255	1.443	38.001	42.153	-3.0346
IC20	41.762	0.890	38.850	42.539	-1.2620
IC25	42.269	0.616	40.620	42.930	-0.7445
IC40	43.788	0.413	42.738	44.360	-0.4923
IC50	44.801	0.438	44.025	45.777	1.4120



Mysid Survival, Growth and Fecundity Test-96 Hr Survival

Start Date:	10/19/2011 12:13	Test ID:	C110923.01	Sample ID:	Brine
End Date:	10/26/2011 11:05	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	9/23/2011	Protocol:	EPAA 02-EPA Acute	Test Species:	AB-Americamysis bahia
Comments:					

Conc-%	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
36.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
39	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
41	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
45	1.0000	0.8000	1.0000	1.0000	0.8000	0.8000	1.0000	1.0000
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

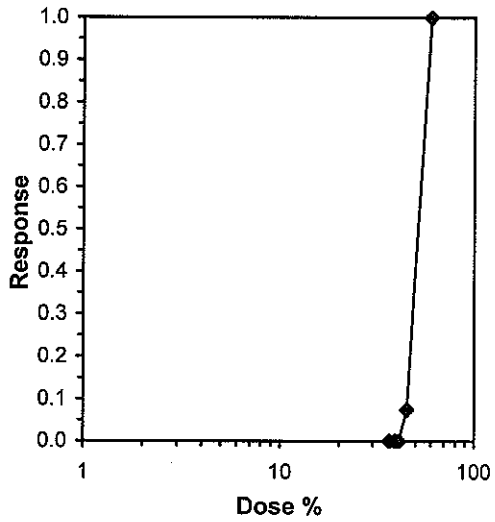
			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8			0	40
36.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	47.00	0	40
39	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	47.00	0	40
41	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	47.00	0	40
45	0.9250	0.9250	1.2560	1.1071	1.3453	9.813	8	56.00	47.00	3	40
60	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.59474	0.919	-1.2002	3.95733
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	45	60	51.9615	2.22222

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	51.225	50.419	52.044
5.0%	51.342	50.351	52.353
10.0%	51.359	50.645	52.083
20.0%	51.359	50.645	52.083
Auto-0.0%	51.225	50.419	52.044



Test: MS-Mysid Survival, Growth and Fecundity Test
Species: AB-Americamysis bahia
Sample ID: Brine
Start Date: 10/19/2011 12:13 End Date: 10/26/2011 11:05

Test ID: C110923.01
Protocol: EPAA 02-EPA Acute
Sample Type: DMR-Discharge Monitoring Report
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	1	1	Control	5				5									
	2	2	Control	5				5									
	3	3	Control	5				5									
	4	4	Control	5				5									
	5	5	Control	5				5									
	6	6	Control	5				5									
	7	7	Control	5				5									
	8	8	Control	5				5									
	9	1	36.500	5				5									
	10	2	36.500	5				5									
	11	3	36.500	5				5									
	12	4	36.500	5				5									
	13	5	36.500	5				5									
	14	6	36.500	5				5									
	15	7	36.500	5				5									
	16	8	36.500	5				5									
	17	1	39.000	5				5									
	18	2	39.000	5				5									
	19	3	39.000	5				5									
	20	4	39.000	5				5									
	21	5	39.000	5				5									
	22	6	39.000	5				5									
	23	7	39.000	5				5									
	24	8	39.000	5				5									
	25	1	41.000	5				5									
	26	2	41.000	5				5									
	27	3	41.000	5				5									
	28	4	41.000	5				5									
	29	5	41.000	5				5									
	30	6	41.000	5				5									
	31	7	41.000	5				5									
	32	8	41.000	5				5									
	33	1	45.000	5				5									
	34	2	45.000	5				4									
	35	3	45.000	5				5									
	36	4	45.000	5				5									
	37	5	45.000	5				4									
	38	6	45.000	5				4									

Test: MS-Mysid Survival, Growth and Fecundity Test												Test ID: C110923.01					
Species: AB-Americamysis bahia												Protocol: EPAA 02-EPA Acute					
Sample ID: Brine												Sample Type: DMR-Discharge Monitoring Report					
Start Date: 10/19/2011 12:13				End Date: 10/26/2011 11:05								Lab ID: CCA-Weston, Carlsbad					
Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	39	7	45.000	5				5									
	40	8	45.000	5				5									
	41	1	60.000	5				0									
	42	2	60.000	5				0									
	43	3	60.000	5				0									
	44	4	60.000	5				0									
	45	5	60.000	5				0									
	46	6	60.000	5				0									
	47	7	60.000	5				0									
	48	8	60.000	5				0									

Comments:

Mysid Survival, Growth and Fecundity Test-96 Hr Survival

Start Date:	10/19/2011 12:13	Test ID:	C110923.01	Sample ID:	Brine
End Date:	10/26/2011 11:05	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	DMR-Discharge Monitoring Report
Sample Date:	9/23/2011	Protocol:	EPAA 02-EPA Acute	Test Species:	AB-Americamysis bahia
Comments:					

Conc-%	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
36.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
39	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
41	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
45	1.0000	0.8000	1.0000	1.0000	0.8000	0.8000	1.0000	1.0000
60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

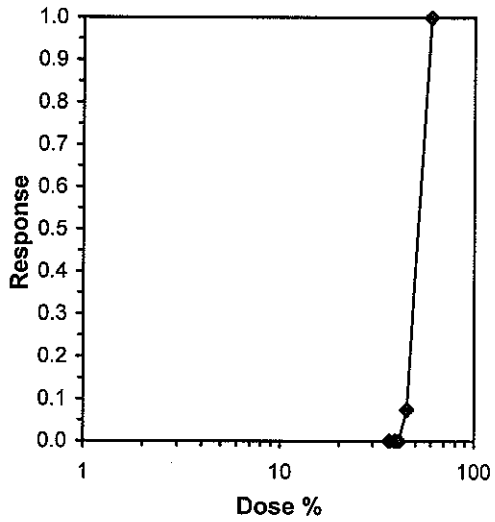
			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8			0	40
36.5	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	47.00	0	40
39	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	47.00	0	40
41	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	8	68.00	47.00	0	40
45	0.9250	0.9250	1.2560	1.1071	1.3453	9.813	8	56.00	47.00	3	40
60	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.59474	0.919	-1.2002	3.95733
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	45	60	51.9615	2.22222

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	51.225	50.419	52.044
5.0%	51.342	50.351	52.353
10.0%	51.359	50.645	52.083
20.0%	51.359	50.645	52.083
Auto-0.0%	51.225	50.419	52.044



Test: MS-Mysid Survival, Growth and Fecundity Test
Species: AB-Americamysis bahia
Sample ID: Brine
Start Date: 10/19/2011 12:13 End Date: 10/26/2011 11:05

Test ID: C110923.01
Protocol: EPAA 02-EPA Acute
Sample Type: DMR-Discharge Monitoring Report
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	1	1	Control	5				5									
	2	2	Control	5				5									
	3	3	Control	5				5									
	4	4	Control	5				5									
	5	5	Control	5				5									
	6	6	Control	5				5									
	7	7	Control	5				5									
	8	8	Control	5				5									
	9	1	36.500	5				5									
	10	2	36.500	5				5									
	11	3	36.500	5				5									
	12	4	36.500	5				5									
	13	5	36.500	5				5									
	14	6	36.500	5				5									
	15	7	36.500	5				5									
	16	8	36.500	5				5									
	17	1	39.000	5				5									
	18	2	39.000	5				5									
	19	3	39.000	5				5									
	20	4	39.000	5				5									
	21	5	39.000	5				5									
	22	6	39.000	5				5									
	23	7	39.000	5				5									
	24	8	39.000	5				5									
	25	1	41.000	5				5									
	26	2	41.000	5				5									
	27	3	41.000	5				5									
	28	4	41.000	5				5									
	29	5	41.000	5				5									
	30	6	41.000	5				5									
	31	7	41.000	5				5									
	32	8	41.000	5				5									
	33	1	45.000	5				5									
	34	2	45.000	5				4									
	35	3	45.000	5				5									
	36	4	45.000	5				5									
	37	5	45.000	5				4									
	38	6	45.000	5				4									

Test: MS-Mysid Survival, Growth and Fecundity Test												Test ID: C110923.01					
Species: AB-Americamysis bahia												Protocol: EPAA 02-EPA Acute					
Sample ID: Brine												Sample Type: DMR-Discharge Monitoring Report					
Start Date: 10/19/2011 12:13				End Date: 10/26/2011 11:05								Lab ID: CCA-Weston, Carlsbad					
Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	39	7	45.000	5				5									
	40	8	45.000	5				5									
	41	1	60.000	5				0									
	42	2	60.000	5				0									
	43	3	60.000	5				0									
	44	4	60.000	5				0									
	45	5	60.000	5				0									
	46	6	60.000	5				0									
	47	7	60.000	5				0									
	48	8	60.000	5				0									

Comments:

WESTON SOLUTIONS

Americamysis bahia 7-Day Chronic Toxicity Test

BIO027

Client:	West Basin Municipal Water District
Project:	Salinity Study - Phase 3
Client Sample ID:	West Basin Brine
Weston Test ID:	C110923.0127
Species:	*Americamysis bahia*

Date Received:	9/23/11
Date Test Started:	10/19/11
Date Test Ended:	10/26/11
Study Director:	J. Hansen
# Organisms per Chamber:	5

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 0	Control							3	6.7	3	25.2	5	33.0	4	8.0
Date: 10/19/11	36.5								6.7		25.4		36.6		8.0
Sample ID: C110923.01b	39								6.7		24.7		39.0		8.0
Dilutions (Tech): KC	41								6.8		25.2		41.0		8.0
WQ* Time: 1110	45								6.8		25.4		45.0		7.9
Technician: BG	60								7.5		24.7		59.8		7.8
*performed on stock dilutions															
Day 1	Control	3	6.2	3	26.1	4	8.1	3	6.9	3	25.2	5	33.0	4	8.0
Date: 10/20/11	36.5		6.2		26.3		8.1		7.0		25.2		36.6		8.0
Sample ID: C110923.01b	39		6.0		25.4		8.1		6.8		25.1		39.1		8.0
Dilutions (Tech): KC	41		5.9		25.7		8.1		6.9		25.3		41.1		8.0
WQ Time: 1055/1110	46		5.9		26.2		8.1		6.8		25.2		45.1		7.9
Replicate: 1/Stock	60		5.7		25.5		8.0		7.4		25.1		59.8		7.8
Technician: BG						OSH									
Day 2	Control	2	6.9	2	25.3	4	8.0	2	8.1	2	25.1	6	33.0	4	8.0
Date: 10/21/11	36.5		6.9		24.9		8.0		8.2		25.0		36.6		8.0
Sample ID: C110923.01b	39.0		6.8		26.8		8.1		8.2		25.1		39.1		8.0
Dilutions (Tech): KS	41.0		6.9		26.2		8.1		8.3		25.0		41.1		8.0
WQ Time: 1420	45.0		7.2		26.1		8.1		8.3		25.0		45.0		8.0
Replicate: 2/Stock															
Technician: SH/KC															
Day 3	Control	2	6.0	2	25.4	4	8.0	2	7.2	2	25.0	6	33.0	4	8.0
Date: 10/22/11	36.5		6.2		24.9		8.0		6.8		25.2		36.7		7.9
Sample ID: C110923.01b	39.0		5.7		24.0		8.0		6.9		24.8		39.1		7.9
Dilutions (Tech): JH	41.0		5.9		25.5		8.0		6.8		25.0		41.2		7.9
WQ Time: 1520/1525	45.0		5.6		25.8		8.0		6.9		24.9		45.1		7.9
Replicate: 3/Stock															
Technician: JH															

DIE 10/21/11 SH

Start Time:	1213	Initials: BG
End Time:	1105	Initials: BG
Organism Batch:	ABS 5906	Age: 8 days
Organism Supplier:	Aquatic BioSystems	

Dilution Water Batch:	S10092311
Location:	Room 4
Hobo Temp No.:	778889
Test Acceptability:	☒ ≥80% Survival in control
	☐ ≥ 0.20 mg mean dry weight / organism in control

Weston Test ID:	Client:	Client Sample ID:
C110923.0127	West Basin Municipal Water District	West Basin Brine

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 4	Control	2	6.3	2	25.4	4	7.9	2	7.2	2	24.6	6	33.2	4	7.9
Date: 10/23/11	36.5		5.9		26.3		7.9		7.2		24.5		36.6		7.9
Sample ID: C110923.016	39.0		5.8		25.7		7.9		7.5		24.5		39.1		7.9
Dilutions (Tech): JH	41.0		6.0		25.1		7.9		7.4		24.6		41.0		7.9
WQ Time: 1215/1220	45.0		5.8		25.6		8.0		7.7		24.5		45.0		7.8
Replicate: A/Stock															
Technician: JH															
Day 5	Control	3	5.5	3	25.5	2	7.8	3	6.8	3	24.8	5	33.2	2	7.9
Date: 10/24/11	36.5		5.0		25.2		7.7		6.7		25.0		36.7		7.9
Sample ID: C110923.016	39.0		5.5		25.2		7.8		6.7		25.0		39.2		7.9
Dilutions (Tech): KC	41.0		5.0		25.6		7.7		6.6		24.8		41.1		7.9
WQ Time: 1018/1200	45.0		5.2		26.3		7.8		6.7		24.8		45.1		7.9
Replicate: B/Stock															
Technician: SH/KC															
Day 6	Control	3	6.1	3	25.4	4	7.9	3	6.6	3	24.8	5	32.8	4	8.1
Date: 10/25/11	36.5		5.9		24.9		7.9		6.6		25.1	②	~~33.5~~ 6.5		8.1
Sample ID: C110923.016	39.0		6.0		24.7		7.9		7.0		24.8		38.9		8.0
Dilutions (Tech): KC	41.0		5.1		25.1		7.9		7.0		24.6		41.0		8.0
WQ Time: 0905	45.0		5.5		25.4		8.0		7.0	② SH	~~44.9~~ 24.7		44.9		8.0
Replicate: C/Stock															
Technician: KC															
Day 7	Control	3	5.7	3	26.0	2	7.9					5	33.1		
	36.5		5.6		26.3		8.0						37.0		
Date: 10/26/11	39.0		5.7		25.6		8.0						39.4		
WQ Time: 1020	41.0		5.5		25.5		8.0						41.4		
Replicate: 7	45.0		5.5		25.6		8.0						45.9		
Technician: BG															

Feeding Information*	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
AM Feed (Tech):		KC	JH	JH	JH	KC	KC	KC
PM Feed (Tech):	BG	KC	KC	JH	JH	KC	KC	

*Mysids should get fed 150 *Artemia* per mysid per day (375 *Artemia* per test chamber twice daily).

① WN 10/25/11 SH

② WC 10/26/11 SH

Weston Test ID:	Client:	Client Sample ID:
C110923.0127	West Basin Municipal Water District	West Basin Brine

Survival Data

Concentration (%)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 10/20/11	Date: 10/21/11	Date: 10/22/11	Date: 10/23/11	Date: 10/24/11	Date: 10/25/11	Date: 10/26/11
		Renewal Time: 1135	Renewal Time: 1435	Renewal Time: 1545	Renewal Time: 1255	Renewal Time: 1210	Renewal Time: 0955	End Time: 1105
		Tech: BG	Tech: SH/KC	Tech: JH	Tech: JH	Tech: SH/KC	Tech: KC	Tech: BG
Control	1	5	5	5	5	5	5	4(INB)
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
36.5	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	(DBG) 5 4(INB)
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	4(1)
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
39.0	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	4(INB)
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
41.0	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	4(INB)	4
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	5	5	5	5
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
45.0	1	5 ~~4(1)~~ (DBG)	5	5	5	5	4(INB)	4
	2	5 4	4(INB)	4	4	4	4	4
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	4(INB)
	5	4(1)	4	4	4	4	4	4
	6	4(1)	4	4	4	4	4	4
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
60.0	1	Ø(4,INB)						
	2	Ø (5)						
	3	Ø (5)						
	4	Ø (5)						
	5	Ø (5)						
	6	Ø(4,INB)						
	7	Ø (5)						
	8	Ø (5)						

(D)NC 10/20/11 BG
(D)IE 10/26/11 BG

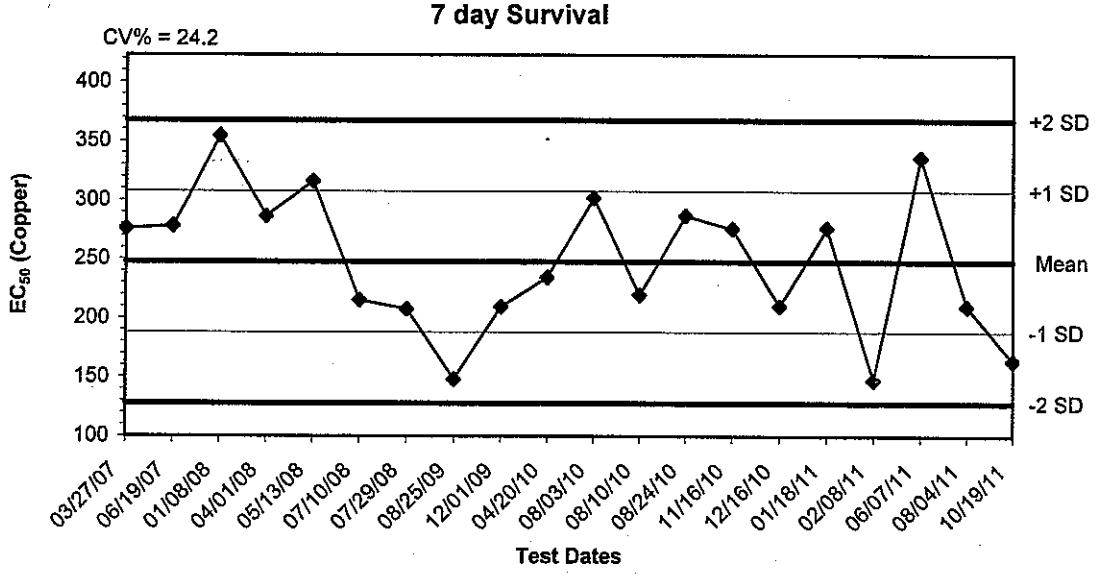
Weston Test ID:	Client:	Client Sample ID:
C110923.0127	West Basin Municipal Water District	West Basin Brine

Concentration (%)	Replicate	Boat Number	Weight Empty Boat (mg)	Weight Boat & Animals (mg)
Control	1	1	108.96	111.03
	2	2	114.27	116.44
	3	3	99.58	102.24
	4	4	125.49	127.41
	5	5	123.46	125.74
	6	6	109.95	111.99
	7	7	131.34	133.33
	8	8	153.97	155.91
36.5	1	9	152.05	153.73
	2	10	148.39	151.24
	3	11	140.68	142.13
	4	12	90.55	92.59
	5	13	103.89	105.29
	6	14	117.46	119.55
	7	15	110.94	113.42
	8	16	111.98	114.85
39.0	1	17	108.35	111.01
	2	18	124.43	126.13
	3	19	124.29	126.01
	4	20	118.45	120.26
	5	21	115.18	117.37
	6	22	104.78	106.22
	7	23	100.19	102.00
	8	24	114.18	116.52
41.0	1	25	122.83	126.06
	2	26	111.35	113.10
	3	27	97.25	98.99
	4	28	99.95	102.34
	5	29	111.89	114.19
	6	30	84.46	86.12
	7	31	128.24	129.86
	8	32	92.75	94.00
45.0	1	33	99.69	100.74
	2	34	99.70	100.78
	3	35	97.45	98.53
	4	36	91.79	92.75
	5	37	104.82	105.61
	6	38	102.84	103.78
	7	39	108.72	109.99
	8	40	113.76	114.79
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
		Date:	10/26/11	10/27/11
		Time:	0940	1215
		Technician:	BG	BG

Oven temp. (°C) at start of drying:	73	Date/Time:	10/26/11 1225	Tech:	BG
Oven temp. (°C) at end of drying:	(1) BG	Date/Time:	10/27/11 1100	Tech:	KS

(1) Temp not taken due to tech error 10/27/11 BG

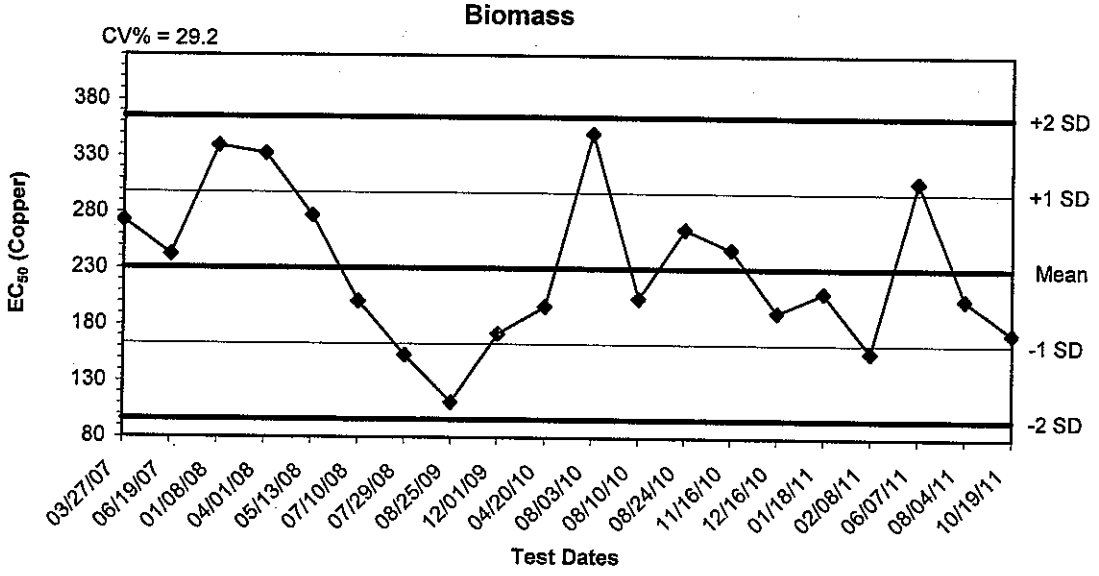
Americamysis bahia Reference Toxicant Control Chart: 7 day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/27/07	275.8930	247.6155	187.6810	127.7465	307.5499	367.4844
06/19/07	278.0670	247.6155	187.6810	127.7465	307.5499	367.4844
01/08/08	354.3570	247.6155	187.6810	127.7465	307.5499	367.4844
04/01/08	286.3690	247.6155	187.6810	127.7465	307.5499	367.4844
05/13/08	315.9490	247.6155	187.6810	127.7465	307.5499	367.4844
07/10/08	215.1120	247.6155	187.6810	127.7465	307.5499	367.4844
07/29/08	207.6650	247.6155	187.6810	127.7465	307.5499	367.4844
08/25/09	147.8750	247.6155	187.6810	127.7465	307.5499	367.4844
12/01/09	209.5570	247.6155	187.6810	127.7465	307.5499	367.4844
04/20/10	234.4900	247.6155	187.6810	127.7465	307.5499	367.4844
08/03/10	301.7830	247.6155	187.6810	127.7465	307.5499	367.4844
08/10/10	219.4300	247.6155	187.6810	127.7465	307.5499	367.4844
08/24/10	286.9300	247.6155	187.6810	127.7465	307.5499	367.4844
11/16/10	275.8600	247.6155	187.6810	127.7465	307.5499	367.4844
12/16/10	209.9400	247.6155	187.6810	127.7465	307.5499	367.4844
01/18/11	276.5280	247.6155	187.6810	127.7465	307.5499	367.4844
02/08/11	147.0830	247.6155	187.6810	127.7465	307.5499	367.4844
06/07/11	336.0610	247.6155	187.6810	127.7465	307.5499	367.4844
08/04/11	209.6400	247.6155	187.6810	127.7465	307.5499	367.4844
10/19/11	163.7200	247.6155	187.6810	127.7465	307.5499	367.4844

Updated 10/27/11 KC

Americamysis bahia Reference Toxicant Control Chart: Biomass



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/27/07	272.7600	230.5422	163.2629	95.9836	297.8215	365.1008
06/19/07	242.1800	230.5422	163.2629	95.9836	297.8215	365.1008
01/08/08	339.3600	230.5422	163.2629	95.9836	297.8215	365.1008
04/01/08	332.4600	230.5422	163.2629	95.9836	297.8215	365.1008
05/13/08	277.4300	230.5422	163.2629	95.9836	297.8215	365.1008
07/10/08	201.3000	230.5422	163.2629	95.9836	297.8215	365.1008
07/29/08	153.4400	230.5422	163.2629	95.9836	297.8215	365.1008
08/25/09	111.2400	230.5422	163.2629	95.9836	297.8215	365.1008
12/01/09	172.3700	230.5422	163.2629	95.9836	297.8215	365.1008
04/20/10	196.7400	230.5422	163.2629	95.9836	297.8215	365.1008
08/03/10	350.8100	230.5422	163.2629	95.9836	297.8215	365.1008
08/10/10	203.9600	230.5422	163.2629	95.9836	297.8215	365.1008
08/24/10	265.8200	230.5422	163.2629	95.9836	297.8215	365.1008
11/16/10	247.6400	230.5422	163.2629	95.9836	297.8215	365.1008
12/16/10	191.7500	230.5422	163.2629	95.9836	297.8215	365.1008
01/18/11	209.6140	230.5422	163.2629	95.9836	297.8215	365.1008
02/08/11	156.4200	230.5422	163.2629	95.9836	297.8215	365.1008
06/07/11	308.0400	230.5422	163.2629	95.9836	297.8215	365.1008
08/04/11	203.8600	230.5422	163.2629	95.9836	297.8215	365.1008
10/19/11	173.6500	230.5422	163.2629	95.9836	297.8215	365.1008

Updated 10/27/11 KC

Mysid Survival and Growth Test-7 Day Survival

Start Date:	10/19/2011 12:20	Test ID:	C110713.26	Sample ID:	REF-Ref Toxicant
End Date:	10/26/2011 12:00	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	1.0000	1.0000	1.0000	1.0000	1.0000	0.8000	1.0000	1.0000
62.5	0.8000	1.0000	1.0000	1.0000	0.8000	1.0000	0.8000	1.0000
125	0.8000	0.6000	1.0000	1.0000	0.4000	0.8000	0.8000	0.4000
250	0.2000	0.0000	0.2000	0.0000	0.0000	0.0000	0.6000	0.2000
500	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.9750	1.0000	1.3155	1.1071	1.3453	6.400	8			1	40
62.5	0.9250	0.9487	1.2560	1.1071	1.3453	9.813	8	60.00	47.00	3	40
*125	0.7250	0.7436	1.0334	0.6847	1.3453	25.226	8	46.50	47.00	11	40
*250	0.1500	0.1538	0.3974	0.2255	0.8861	57.867	8	36.00	47.00	34	40
*500	0.0250	0.0256	0.2553	0.2255	0.4636	32.981	8	36.00	47.00	39	40
1000	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	8			40	40

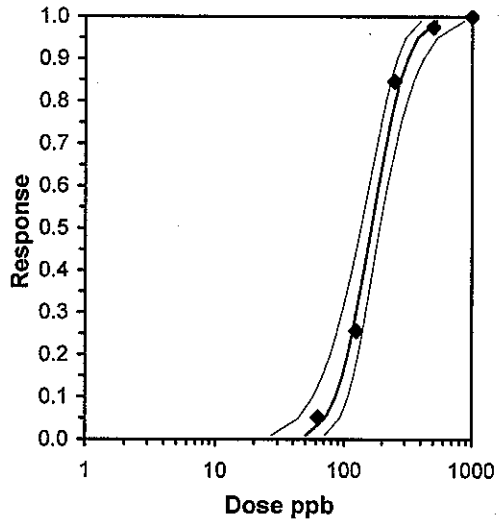
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.93475	0.919	0.395	1.49515
Bartlett's Test indicates unequal variances (p = 5.88E-03)	14.4904	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	62.5	125	88.3883	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	4.55311	0.71561	3.15052	5.9557	0.025	1.50166	7.81473	0.68	2.2141	0.21963	5
Intercept	-5.081	1.6171	-8.2506	-1.9115							
TSCR	0.03089	0.02472	-0.0176	0.07933							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	50.4854	27.2331	70.9235
EC05	3.355	71.2595	44.4067	93.1491
EC10	3.718	85.6317	57.4765	108.007
EC15	3.964	96.9326	68.2819	119.563
EC20	4.158	106.969	78.1832	129.818
EC25	4.326	116.403	87.6877	139.515
EC40	4.747	144.032	116.031	168.799
EC50	5.000	163.72	136.029	191.103
EC60	5.253	186.099	157.866	218.556
EC75	5.674	230.272	197.185	280.133
EC80	5.842	250.581	213.74	311.505
EC85	6.036	276.525	233.841	353.977
EC90	6.282	313.018	260.624	417.676
EC95	6.645	376.151	304.137	537.156
EC99	7.326	530.932	401.876	870.598



Mysid Survival and Growth Test-Growth-Weight

Start Date:	10/19/2011 12:20	Test ID:	C110713.26	Sample ID:	REF-Ref Toxicant
End Date:	10/26/2011 12:00	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	0.2740	0.3360	0.2720	0.2160	0.3260	0.3625	0.2400	0.3020
62.5	0.2825	0.3020	0.2760	0.2660	0.3825	0.2820	0.3950	0.2780
125	0.2525	0.2767	0.2380	0.3000	0.2150	0.2800	0.3550	0.3700
250	0.3600	0.2600	0.2400	0.2200				
500	0.2600							

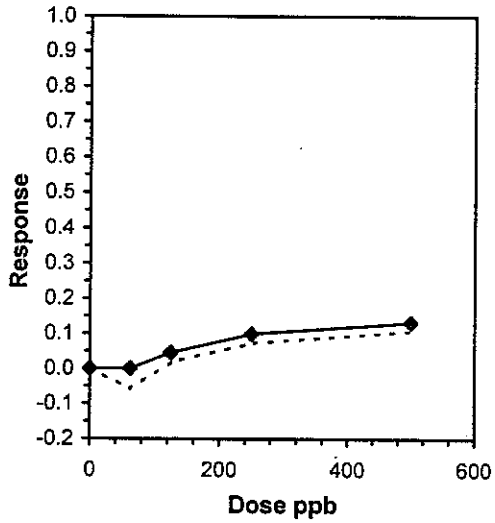
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.2911	1.0000	0.2911	0.2160	0.3625	17.109	8				0.2995	1.0000
62.5	0.3080	1.0582	0.3080	0.2660	0.3950	16.541	8	-0.638	2.170	0.0576	0.2995	1.0000
125	0.2859	0.9822	0.2859	0.2150	0.3700	18.976	8	0.195	2.170	0.0576	0.2859	0.9545
250	0.2700	0.9276	0.2700	0.2200	0.3600	23.031	4	0.647	2.170	0.0706	0.2700	0.9014
500	0.2600	0.8933	0.2600	0.2600	0.2600	0.000	1				0.2600	0.8680

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.90541	0.896	0.58231	-0.8526
Bartlett's Test indicates equal variances (p = 0.97)	0.23316	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	250	>250			0.07059	0.24254	0.00143	0.00282	0.68218	3, 24

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	135.55	97.12	12.84	508.76	1.0850
IC10	260.55				
IC15	>500				
IC20	>500				
IC25	>500				
IC40	>500				
IC50	>500				



Mysid Survival and Growth Test-Biomass

Start Date:	10/19/2011 12:20	Test ID:	C110713.26	Sample ID:	REF-Ref Toxicant
End Date:	10/26/2011 12:00	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AB-Americamysis bahia
Comments:					

Conc-ppb	1	2	3	4	5	6	7	8
Control	0.2740	0.3360	0.2720	0.2160	0.3260	0.2900	0.2400	0.3020
62.5	0.2260	0.3020	0.2760	0.2660	0.3060	0.2820	0.3160	0.2780
125	0.2020	0.1660	0.2380	0.3000	0.0860	0.2240	0.2840	0.1480
250	0.0720	0.0000	0.0520	0.0000	0.0000	0.0000	0.1440	0.0440
500	0.0000	0.0000	0.0000	0.0520	0.0000	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

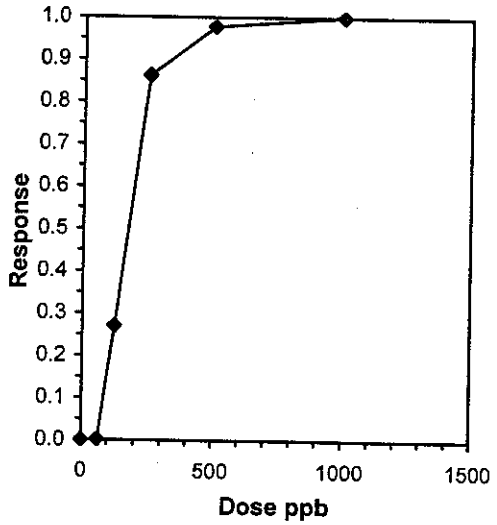
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.2820	1.0000	0.2820	0.2160	0.3360	14.435	8				0.2820	1.0000
62.5	0.2815	0.9982	0.2815	0.2260	0.3160	10.024	8	0.022	2.239	0.0513	0.2815	0.9982
*125	0.2060	0.7305	0.2060	0.0860	0.3000	34.642	8	3.315	2.239	0.0513	0.2060	0.7305
*250	0.0390	0.1383	0.0390	0.0000	0.1440	131.432	8	10.600	2.239	0.0513	0.0390	0.1383
*500	0.0065	0.0230	0.0065	0.0000	0.0520	282.843	8	12.017	2.239	0.0513	0.0065	0.0230
1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	8				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.9674	0.919	0.06093	1.12231
Bartlett's Test indicates equal variances (p = 0.01)	12.7714	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	62.5	125	88.3883		0.05132	0.18199	0.13984	0.0021	7.3E-16	4, 35

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL		Skew
IC05	73.76	15.08	27.30	86.52	-1.0368
IC10	85.43	13.43	54.60	119.31	0.7778
IC15	97.10	13.87	71.85	132.88	0.9090
IC20	108.77	14.41	85.02	142.25	0.5408
IC25	120.45	14.28	96.40	150.24	0.2895
IC40	152.54	13.33	120.53	173.55	-0.3125
IC50	173.65	11.57	146.76	191.97	-0.5554



Test: MG-Mysid Survival and Growth Test
Species: AB-Americamysis bahia
Sample ID: REF-Ref Toxicant
Start Date: 10/19/2011 12:20 End Date: 10/26/2011 12:00

Test ID: C110713.26
Protocol: EPAM 02-EPA Marine
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	1	1	Control	5							5	102.26	100.89	5			
	2	2	Control	5							5	122.42	120.74	5			
	3	3	Control	5							5	100.94	99.58	5			
	4	4	Control	5							5	87.1	86.02	5			
	5	5	Control	5							5	109.67	108.04	5			
	6	6	Control	5							4	100.87	99.42	4			
	7	7	Control	5							5	95.63	94.43	5			
	8	8	Control	5							5	100.42	98.91	5			
	9	1	62.500	5							4	99.04	97.91	4			
	10	2	62.500	5							5	114.08	112.57	5			
	11	3	62.500	5							5	116.27	114.89	5			
	12	4	62.500	5							5	97.95	96.62	5			
	13	5	62.500	5							4	97.37	95.84	4			
	14	6	62.500	5							5	123.56	122.15	5			
	15	7	62.500	5							4	121.73	120.15	4			
	16	8	62.500	5							5	102.84	101.45	5			
	17	1	125.000	5							4	107.22	106.21	4			
	18	2	125.000	5							3	100.22	99.39	3			
	19	3	125.000	5							5	85.29	84.1	5			
	20	4	125.000	5							5	97.95	96.45	5			
	21	5	125.000	5							2	105.33	104.9	2			
	22	6	125.000	5							4	107.56	106.44	4			
	23	7	125.000	5							4	92.09	90.67	4			
	24	8	125.000	5							2	106.81	106.07	2			
	25	1	250.000	5							1	90.31	89.95	1			
	26	2	250.000	5							0			0			
	27	3	250.000	5							1	92.57	92.31	1			
	28	4	250.000	5							0			0			
	29	5	250.000	5							0			0			
	30	6	250.000	5							0			0			
	31	7	250.000	5							3	91.53	90.81	3			
	32	8	250.000	5							1	96.72	96.5	1			
	33	1	500.000	5							0			0			
	34	2	500.000	5							0			0			
	35	3	500.000	5							0			0			
	36	4	500.000	5							1	92.12	91.86	1			
	37	5	500.000	5							0			0			
	38	6	500.000	5							0			0			

Reviewed by:

Test: MG-Mysid Survival and Growth Test
Species: AB-Americamysis bahia
Sample ID: REF-Ref Toxicant
Start Date: 10/19/2011 12:20 End Date: 10/26/2011 12:00

Test ID: C110713.26
Protocol: EPAM 02-EPA Marine
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count	Female Count	Females w/ Eggs	Notes
	39	7	500.000	5							0			0			
	40	8	500.000	5							0			0			
	41	1	1000.000	5							0			0			
	42	2	1000.000	5							0			0			
	43	3	1000.000	5							0			0			
	44	4	1000.000	5							0			0			
	45	5	1000.000	5							0			0			
	46	6	1000.000	5							0			0			
	47	7	1000.000	5							0			0			
	48	8	1000.000	5							0			0			

Comments:

Reviewed by:

WESTON SOLUTIONS

7 - Day *Americamysis bahia* Reference Toxicant Test

BIO027

Test ID: C110713.26

Concentration (ppb)	Rep	Weigh Boat Number	Tare Weight (mg)	Total Weight (mg)
Control	1	1	100.89	102.26
	2	2	120.74	122.42
	3	3	99.58	100.94
	4	4	86.02	87.10
	5	5	108.04	109.67
	6	6	99.42	100.87
	7	7	94.43	95.63
	8	8	98.91	100.42
62.5	1	9	97.91	99.04
	2	10	112.57	114.08
	3	11	114.89	116.27
	4	12	96.62	97.95
	5	13	95.84	97.37
	6	14	122.15	123.56
	7	15	120.51	121.73
	8	16	101.45	102.84
125	1	17	106.21	107.22
	2	18	99.39	100.22
	3	19	84.10	85.29
	4	20	96.45	97.95
	5	21	104.90	105.33
	6	22	106.44	107.56
	7	23	90.67	92.09
	8	24	106.07	106.81
250	1	25	89.95	90.31
	2	—	—	—
	3	26	92.31	92.57
	4	—	—	—
	5	—	—	—
	6	—	—	—
	7	27	90.81	91.53
	8	28	96.50	96.72
500	1	—	—	—
	2	—	—	—
	3	—	—	—
	4	29	91.86	92.12
	5	—	—	—
	6	—	—	—
	7	—	—	—
	8	—	—	—
1000	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
		Date:	10/26/11	10/27/11
		Time:	1100	1145
		Initials:	BG	BG

SURVIVAL DATA

Test ID: C110713.24

Conc. (ppb)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 10/20/11	Date: 10/21/11	Date: 10/22/11	Date: 10/23/11	Date: 10/24/11	Date: 10/25/11	Date: 10/26/11
		Renewal Time: 1300	Renewal Time: 1455	Renewal Time: 1605	Renewal Time: 1310	Renewal Time: 1030	Renewal Time: 1015	End Time: 1155
		Tech: BG	Tech: TC/SH	Tech: JH	Tech: JH	Tech: TC	Tech: TC	Tech: TC
Control	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
	6	5	5	5	4(INB)	4	4	4
	7	5	5	5	5	5	5	5
	8	5	5	5	5	5	5	5
62.5	1	5	4(1)	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	4(INB)
	6	5	5	5	5	5	5	5
	7	4(1)	4	4	4	4	4	4
	8	5	5	5	5	5	5	5
125	1	08@~~4(INB)~~5	4 (INB)	4	4	4	4	4
	2	5	4(1)	4	4	4	4	3(INB)
	3	~~4(INB)~~5	5	5	5	5	5	5
	4	↓ 3(2) 5	5	5	5	5	5	5
	5	4(INB)	3(1)	3	3	3	2(1)	2
	6	5	4(INB)	4	4	4	4	4
	7	4(INB)	4	4	4	4	4	4
	8	3(2)	2(1)	2	2	2	2	2
250	1	4(1)	3(1)	2(1)	1(1)	1	1	1
	2	2(2,INB)	2	1(1)	Ø(1)	—	—	—
	3	4(1)	2(2)	2	2	2	2	1(1)
	4	4(1)	Ø(4)	—	—	—	—	—
	5	4(1)	2(2)	2	2	1(1)	Ø(1)	—
	6	4(1)	3(1)	2(1)	2	Ø(2)	—	—
	7	4(1)	4	3(1)	3	3	3	3
	8	3(2)	3	1(2)	1	1	1	1
500	1	1(4)	Ø(1)	—	—	—		
	2	3(2)	1(2)	Ø(1)	—	—		
	3	3(2)	2(1)	Ø(2)	—	—		
	4	3(2)	2(1)	1(1)	1	1	1	1
	5	4(1)	1(3)	Ø(1)	—	—		
	6	Ø(5)	—	—	—	—		
	7	3(2)	Ø(3)	—	—	—		
	8	2(3)	Ø(2)	—	—	—		
1000	1	2(3)	Ø(2)					
	2	1(4)	Ø(1)					
	3	2(3)	Ø(2)					
	4	2(3)	Ø(2)					
	5	1(4)	Ø(1)					
	6	Ø(5)	—					
	7	Ø(5)	—					
	8	2(3)	Ø(2)					

①WC 10/20/11 BG

WESTON SOLUTIONS

7 - Day *Americamysis bahia* Reference Toxicant Test

BIO027

Test ID: C110713.26	Associated Test(s): West Basin		Study Director: K. Curry
Organism Batch: ABS 5906	Location: Room 4	Replicates: 8	No. of Organisms: 5
Start Time: 1220	Initials: BG/KC	End Time: 1200	Initials: KC

Day 0 Water Quality Data

Stock

Date: 10/19/11 Time: 1115 Initials: BG

	Control	62.5	125	250	500	1000
D.O. (mg/L)	6.7 (DO BG) ~~6.7~~	6.7	6.7	6.8	6.7	6.8
Temp. (°C)	25.0	25.1	24.9	25.2	25.0	24.9
Salinity (ppt)	33.0	33.0	33.0	32.9	32.9	32.9
pH	8.0	8.0	8.0	8.0	8.0	7.9

Day 7 Water Quality Data

Date: 10/26/11 Time: 1030 Replicate: 1, 4 Initials: BG

	Control	62.5	125	250	500	1000
D.O. (mg/L)	6.1	6.5	6.0	6.1	6.3	
Temp. (°C)	25.5	25.6	25.8	25.7	25.4	
Salinity (ppt)	33.0	33.2	33.6	33.1	33.4	
pH	8.0	8.0	8.0	8.0	8.1	

Feeding Information

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
AM Feed (Tech):		KC	JH	JH	JH	KC	~~KC~~	KC
PM Feed (Tech):	BG	KC	KC	JH	JH	KC	KC	

☐ **Pass** ☐ **Fail**

Notes:
DIE 10/19/11 BG

Reference Toxicant Dilution Worksheet

Test ID: C110713.26	Toxicant: Copper Sulfate (0.509gCu/LCuSO4)	Toxicant Lot Number: 20085O6	Toxicant Stock Preparation Date: 07/13/11

Serial Dilute by ½ to obtain concentrations of 1000, 500, 250, 125, and 62.5 ppb.

Date Prepared	Day	Target Conc.	A. Toxicant (target) B. Toxicant (actual)	A. Diluent (target) B. Diluent (actual)	Dilution Water Batch	Tech.
10/19/11	0	1000 ppb	(A) 7.864 mL (B) 7.8642mL	(A) 4000 mL (B) 4000.0mL	S10092311	KC
10/20/11	1	1000 ppb	(A) 3.932mL (B) 3.9324mL	(A) 2000mL (B) 2000.0mL	S10092311	KC
10/21/11	2	1000 ppb	(A) 3.932 mL (B) 3.9323mL	(A) 2000mL (B) 2000.0mL	S10092311	KC
10/22/11	3	500ppb	(A) 1.966 mL (B) 1.9658mL	(A) 2000 mL (B) 2000.0 mL	S10092311	JH
10/23/11	4	500ppb	(A) 1.966 mL (B) 1.9660 mL	(A) 2000 mL (B) 2000.1mL	S10092311	JH
10/24/11	5	500ppb	(A) 1.966mL (B) 1.9661 mL	(A) 2000mL (B) 2000.1mL	S10092311	KC
10/25/11	6	500ppb	(A) 1.966mL (B) 1.9660mL	(A) 2000mL (B) 2000.0mL	S10102411	KC

Macrocystis pyrifera Chronic Toxicity Test

Test: MC-Macrocystis Germination and Growth Test — Test ID: C110923.01
Species: MP-Macrocystis pyrifera — Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc — Sample Type: EFF2-Industrial
Start Date: 10/4/2011 14:30 — End Date: 10/6/2011 15:30 — Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Total Cour	Number G	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	1	1	Control	100	85	5	8	6	4	3	6	5	7	8	6	2.5	
	2	2	Control	100	86	6	3	5	8	7	6	5	6	8	6	2.5	
	3	3	Control	100	81	8	7	4	7	5	5	6	4	5	6	2.5	
	4	4	Control	100	84	6	5	8	8	5	7	5	7	6	5	2.5	
	5	5	Control	100	80	6	7	6	4	8	4	6	7	3	5	2.5	
	6	1	36.5	100	82	7	5	6	5	4	4	4	5	6	4	2.5	
	7	2	36.5	100	85	6	5	6	7	4	5	5	4	4	3	2.5	
	8	3	36.5	100	80	3	6	5	5	5	4	6	5	5	4	2.5	
	9	4	36.5	100	82	7	8	4	5	4	5	6	6	5	6	2.5	
	10	5	36.5	100	80	7	9	7	8	5	7	5	7	6	5	2.5	
	11	1	39	100	75	6	5	5	6	5	4	6	7	5	4	2.5	
	12	2	39	100	81	3	4	6	4	6	5	5	6	5	7	2.5	
	13	3	39	100	77	5	6	3	7	7	4	5	5	6	5	2.5	
	14	4	39	100	79	8	6	5	6	4	7	5	4	6	4	2.5	
	15	5	39	100	76	6	6	5	5	6	6	6	6	5	7	2.5	
	16	1	41	100	80	7	6	6	6	5	4	8	7	6	6	2.5	
	17	2	41	100	73	3	4	6	6	5	5	6	5	4	5	2.5	
	18	3	41	100	78	5	4	6	5	5	6	6	4	5	5	2.5	
	19	4	41	100	70	5	6	6	7	4	5	3	6	4	5	2.5	
	20	5	41	100	73	6	6	5	6	7	6	6	6	8	5	2.5	
	21	1	45	100	76	6	4	4	5	3	5	7	6	4	4	2.5	
	22	2	45	100	68	4	3	4	5	4	6	5	5	4	4	2.5	
	23	3	45	100	71	5	4	4	4	6	5	4	5	5	3	2.5	
	24	4	45	100	71	5	5	5	4	4	5	4	5	6	5	2.5	
	25	5	45	100	76	5	6	4	5	4	5	6	5	5	4	2.5	
	26	1	60	100	39	2	3	3	3	2	2	3	3	3	2	2.5	
	27	2	60	100	37	2	2	2	2	3	2	3	3	3	3	2.5	
	28	3	60	100	33	3	2	2	2	3	2	2	3	3	2	2.5	
	29	4	60	100	30	2	2	2	3	2	2	2	2	2	2	2.5	
	30	5	60	100	19	2	2	2	3	3	2	2	2	3	3	2.5	

Comments: West Basin Municipal Water District - Salinity Study

Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	10/4/2011 14:30	Test ID:	C110923.0147	Sample ID:	1st Pass RO Conc
End Date:	10/6/2011 15:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	USEPA98-USACE / USEPA	Test Species:	MP-Macrocystis pyrifera
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.8500	0.8600	0.8100	0.8400	0.8000
36.5	0.8200	0.8500	0.8000	0.8200	0.8000
39	0.7500	0.8100	0.7700	0.7900	0.7600
41	0.8000	0.7300	0.7800	0.7000	0.7300
45	0.7600	0.6800	0.7100	0.7100	0.7600
60	0.3900	0.3700	0.3300	0.3000	0.1900

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.8320	1.0000	1.1493	1.1071	1.1873	3.001	5				84	500
36.5	0.8180	0.9832	1.1305	1.1071	1.1731	2.388	5	0.608	2.360	0.0729	91	500
39	0.7760	0.9327	1.0782	1.0472	1.1198	2.703	5	2.300	2.360	0.0729	112	500
*41	0.7480	0.8990	1.0459	0.9912	1.1071	4.540	5	3.345	2.360	0.0729	126	500
*45	0.7240	0.8702	1.0183	0.9695	1.0588	3.862	5	4.240	2.360	0.0729	138	500
*60	0.3160	0.3798	0.5942	0.4510	0.6745	14.824	5	17.962	2.360	0.0729	342	500

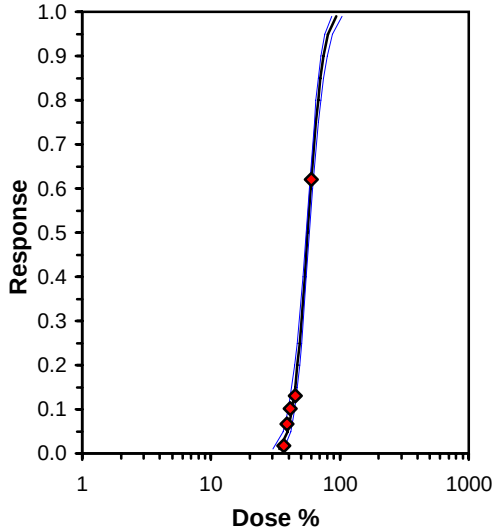
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93619	0.927	-0.858	2.3692
Bartlett's Test indicates equal variances (p = 0.15)	8.13374	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	39	41	39.9875	2.5641	0.0578	0.06941	0.21253	0.00239	1.1E-14	5, 24

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	10.5285	0.93939	8.68726	12.3697	0.168	3.13014	7.81472	0.37199	1.75061	0.09498	3
Intercept	-13.431	1.61668	-16.6	-10.263							
TSCR	0.17216	0.01436	0.14402	0.20031							

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	33.8575	30.2013	36.7295
EC05	3.355	39.2992	36.1274	41.7586
EC10	3.718	42.5491	39.7271	44.739
EC15	3.964	44.8922	42.3394	46.8878
EC20	4.158	46.8462	44.521	48.6871
EC25	4.326	48.5902	46.4638	50.3054
EC40	4.747	53.2782	51.5957	54.7822
EC50	5.000	56.3135	54.7667	57.8604
EC60	5.253	59.5217	57.9292	61.326
EC75	5.674	65.2643	63.1809	67.9955
EC80	5.842	67.694	65.302	70.9398
EC85	6.036	70.6404	67.8253	74.576
EC90	6.282	74.5306	71.0978	79.4632
EC95	6.645	80.694	76.1861	87.365
EC99	7.326	93.6635	86.6315	104.491



Macrocystis Germination and Growth Test-Growth-Length

Start Date:	10/4/2011 14:30	Test ID:	C110923.0147	Sample ID:	1st Pass RO Conc
End Date:	10/6/2011 15:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	USEPA98-USACE / USEPA	Test Species:	MP-Macrocystis pyrifera
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4	5
Control	14.500	15.000	14.250	15.500	14.000
36.5	12.500	12.250	12.000	14.000	16.500
39	13.250	12.750	13.250	13.750	14.500
41	15.250	12.250	12.750	12.750	15.250
45	12.000	11.000	11.250	12.000	12.250
60	6.500	6.250	6.000	5.250	6.000

			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	14.650	1.0000	14.650	14.000	15.500	4.110	5				14.650	1.0000
36.5	13.450	0.9181	13.450	12.000	16.500	13.934	5	1.757	2.360	1.612	13.533	0.9238
39	13.500	0.9215	13.500	12.750	14.500	4.900	5	1.683	2.360	1.612	13.533	0.9238
41	13.650	0.9317	13.650	12.250	15.250	10.804	5	1.464	2.360	1.612	13.533	0.9238
*45	11.700	0.7986	11.700	11.000	12.250	4.632	5	4.318	2.360	1.612	11.700	0.7986
*60	6.000	0.4096	6.000	5.250	6.500	7.795	5	12.662	2.360	1.612	6.000	0.4096

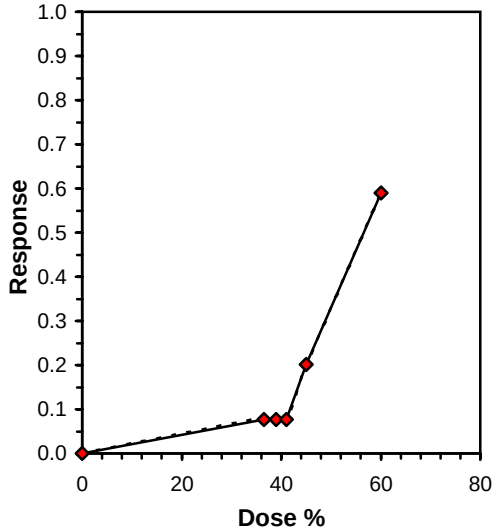
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9349	0.927	1.06226	1.89735
Bartlett's Test indicates equal variances (p = 0.03)	12.6786	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	41	45	42.9535	2.43902	1.61219	0.11005	50.0371	1.16667	3.4E-11	5, 24

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05*	23.943	8.631	9.563	50.083	0.1989
IC10	41.760	3.619	22.189	43.183	-2.0472
IC15	43.358	0.760	40.250	44.714	-0.6518
IC20	44.956	0.645	43.123	46.602	-0.1204
IC25	46.875	0.685	44.508	48.470	-0.5983
IC40	52.658	0.541	50.808	54.045	-0.3401
IC50	56.513	0.514	55.011	57.893	-0.1235

* indicates IC estimate less than the lowest concentration



KELP 48-HOUR CHRONIC TOXICITY TEST

BIO047

CLIENT:	West Basin Municipal Water District
PROJECT:	Salinity Study
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C110923.0147
SPECIES:	*Macrocystis pyrifera*

DATE RECEIVED:	9/23/11
DATE TEST STARTED:	10/4/11
DATE TEST ENDED:	10/6/11
STUDY DIRECTOR:	Y. Skriveseth
ORGANISMS/CHAMBER:	300,000

	Concentration ppt	Meter #	DO (mg/L)	Meter #	Temp (°C)	Meter #	Salinity (ppt)	Meter #	pH
Day 0 (0 Hours)	CONTROL	3	7.0	3	15.5	6	32.5	2	8.1
Date: 10/4/11	~~BRINE CONTROL~~								
Sample ID: C110923.01b	36.5		6.8		15.3		36.4		8.1
Dilutions (tech): KS	39.0		6.8		14.8		38.7		8.0
WQ Time: 1433	41.0		6.8		15.2		41.1		8.0
Technician: JH	45.0		6.7		15.0		45.1		8.0
	60.0		6.8		14.6		59.9		7.8
24 Hours	CONTROL			GB	15.6				
Date: 10/5/11	~~BRINE CONTROL~~								
WQ Time: 1520	36.5				15.4				
Technician: KE	39.0				15.2				
	41.0				15.4				
	45.0				15.4				
	60.0				15.1				
48 Hours	CONTROL	3	7.5	3	15.4	6	32.8	4	8.0
Date: 10/6/11	~~BRINE CONTROL~~								
WQ Time: 1420	36.5		7.6		15.3		36.5		8.0
Technician: KS	39.0		7.7		15.1		39.8		8.0
	41.0		7.7		15.0		41.4		8.0
	45.0		8.0		15.1		45.4		8.0
	60.0		7.0		15.0		60.9		7.9

START TIME:	1430 KS
END TIME:	1530 KS
ORGANISM BATCH:	DG100411
TEST ROOM:	Rm 2
TEST SHELF #:	2

DILUTION WATER BATCH:	S10092311
BRINE BATCH:	N/A
HOBO TEMP. NO.:	94968
TEST ACCEPTABILITY:	
☒ 70% GERMINATION IN CONTROL	
☐ ≥10 µm GERM-TUBE LENGTH IN THE CONTROLS	

KELP 48-HOUR CHRONIC TOXICITY TEST

BIO047

WESTON TEST ID:	CLIENT:	CLIENT SAMPLE ID:
CI0923.0147	West Basin	~~①CI0923.01~~ West Basin Brine

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	LENGTH MEASUREMENTS (in ocular micrometer units)										Scope #	Date	Tech
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10			
1	Control	1	85	15	5	8	6	4	3	6	5	7	8	6	BH-2	10/17/11	KC
2	Control	2	86	14	6	3	5	8	7	6	5	6	8	6			
3	Control	3	81	19	8	7	4	7	5	5	6	4	5	6			
4	Control	4	84	16	6	5	8	8	5	7	5	7	6	5			
5	Control	5	80	20	6	7	6	4	8	4	6	7	3	5			
6	36.5	1	82	18	7	5	6	5	4	4	4	5	6	4			
7	36.5	2	85	15	6	5	6	7	4	5	5	4	4	3			
8	36.5	3	80	20	3	6	5	5	5	4	6	5	5	4			
9	36.5	4	82	18	7	8	4	5	4	5	6	6	5	6			
10	36.5	5	80	20	7	9	7	8	5	7	5	7	6	5	BH 2	10/27/11	KS
11	39.0	1	75	25	6	5	5	6	5	4	6	7	5	4	BH-2	10/19/11	KC
12		2	81	19	3	4	6	4	6	5	5	6	5	7			
13		3	77	23	5	6	3	7	7	4	5	5	6	5			
14		4	79	21	8	6	5	6	4	7	5	4	6	4			
15		5	76	24	6	6	5	5	6	6	6	6	5	7	BH-2	10/27/11	KS
16	41.0	1	80	20	7	6	6	6	5	4	8	7	6	6	BH-2	10/19/11	KC
17		2	73	27	3	4	6	6	5	5	6	5	4	5			
18		3	78	22	5	4	6	5	5	6	6	4	5	5			
19		4	70	30	5	6	6	7	4	5	3	6	4	5			
20		5	73	27	6	6	5	6	7	6	6	6	8	5	BH-2	10/27/11	KS
21	45.0	1	76	24	6	4	4	5	3	5	7	6	4	4	BH-2	10/19/11	KC
22		2	~~4~~ 68	32	4	3	4	5	4	6	5	5	4	4			
23		3	71	29	5	4	4	4	6	5	4	5	5	3			
24		4	71	29	5	5	5	4	4	5	4	5	6	5			
25		5	76	24	5	6	4	5	4	5	6	5	5	4	BH-2	10/27/11	KS
26	60.0	1	39	61	2	3	3	3	2	2	3	3	3	2	BH-2	10/19/11	KC
27		2	37	63	2	2	2	2	3	2	3	3	3	3			
28		3	33	67	3	2	2	2	3	2	2	3	3	2			
29		4	30	70	2	2	2	3	2	2	2	2	2	2			
30		5	19	81	2	2	2	3	3	2	2	2	3	3	BH-2	10/27/11	KS

① IE 10/27/11 KS

KELP 48-HOUR CHRONIC TOXICITY TEST
SPOROPHYLL RELEASE DATA SHEET

BIO047

WESTON TEST ID: C1109 23.0147	CLIENT: West Basin Municipal Water District	CLIENT SAMPLE ID: West Basin Brine

Date: 10/4/11

Test: Kelp

Investigator: K. Strivseth

Condition of Majority of Blades Used: Poor Fair (Good)

Number of Blades Used: 37 Weight of Blades: 121.5 g Volume of Release Water: 1 L

Time blades are placed in release beaker: 12:35

Time blades are removed from release beaker: 1255

Temperature of spore solution: 14.9 °C

Check for zoospore motility on microscope: ✓

Fix a 9-mL spore sample with 1 mL formalin.

Determine spore density on the hemacytometer.

Determine density with 5 counts.

1. 88
2. 99
3. 79
4. 85
5. 93

Mean 88.8

Mean x 10,000 x 1.11 = 985,680 spores/mL. This is the density of spore release.

1.11 is the dilution factor for 1 mL formalin + 9 mL spore solution.

Volume of test container: 40mL

The desired final density of zoospore solution is 7,500 spores/mL of test container.

To determine volume of spores to deliver to test containers:

7,500 spores/mL x 40 mL/test container = 300,000 spores/test container

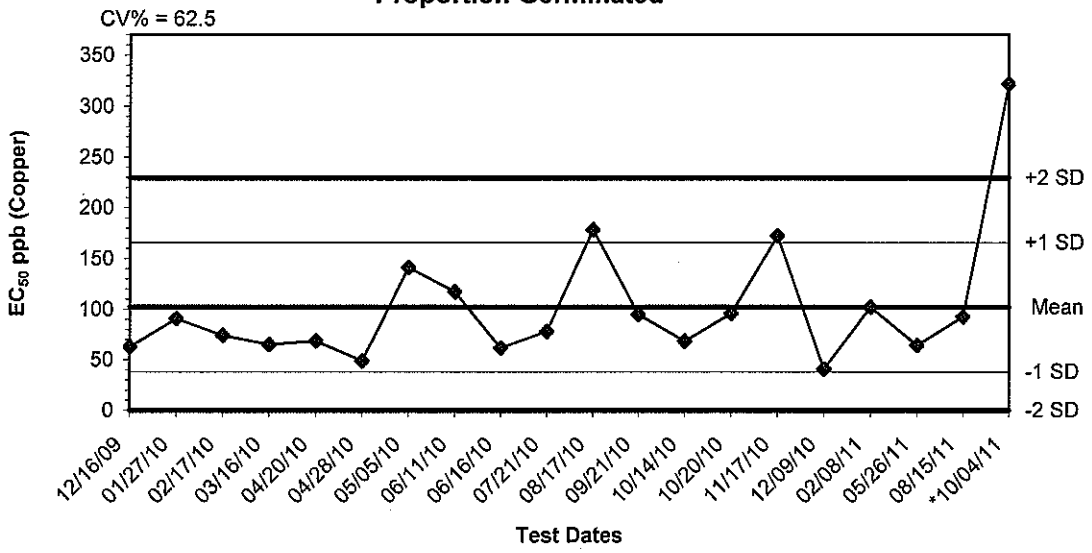
300,000 spores/test container/density of spore release 985,680 spores/mL = 0.30 mL/test container

Temperature of control water (stock): 15.5

Light: 208-299 (need 200-300 foot-candles)

Time test containers are inoculated: 1430

Macrocystis pyrifera Reference Toxicant Control Chart: Proportion Germinated

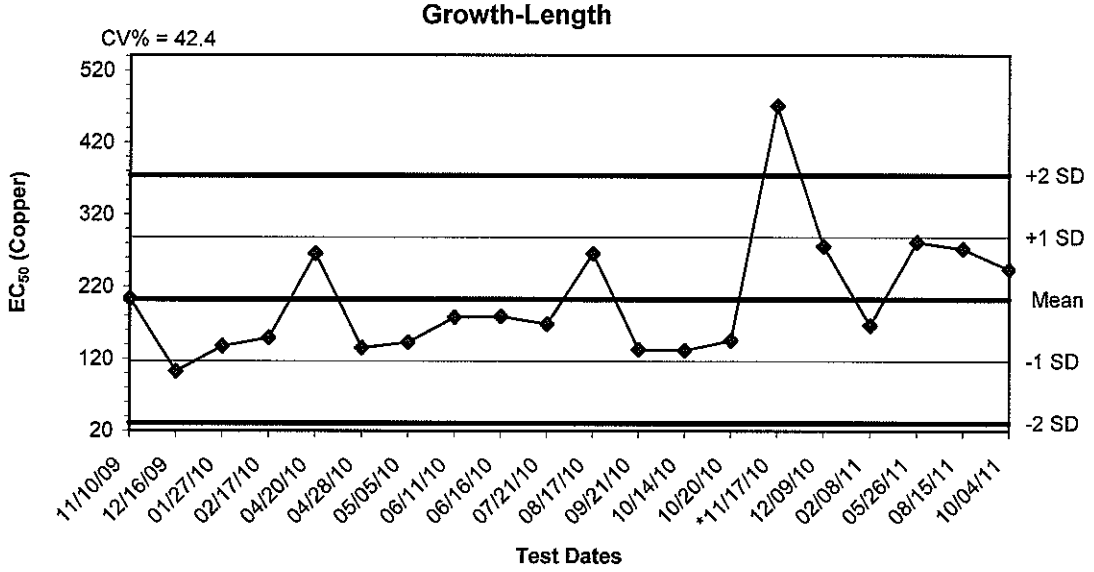


Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
12/16/09	62.6240	102.0139	38.2542	0.0000	165.7737	229.5334
01/27/10	90.6670	102.0139	38.2542	0.0000	165.7737	229.5334
02/17/10	73.9700	102.0139	38.2542	0.0000	165.7737	229.5334
03/16/10	65.1820	102.0139	38.2542	0.0000	165.7737	229.5334
04/20/10	68.7180	102.0139	38.2542	0.0000	165.7737	229.5334
04/28/10	48.7968	102.0139	38.2542	0.0000	165.7737	229.5334
05/05/10	141.2800	102.0139	38.2542	0.0000	165.7737	229.5334
06/11/10	117.3800	102.0139	38.2542	0.0000	165.7737	229.5334
06/16/10	61.8367	102.0139	38.2542	0.0000	165.7737	229.5334
07/21/10	78.2158	102.0139	38.2542	0.0000	165.7737	229.5334
08/17/10	178.3100	102.0139	38.2542	0.0000	165.7737	229.5334
09/21/10	94.9111	102.0139	38.2542	0.0000	165.7737	229.5334
10/14/10	68.4052	102.0139	38.2542	0.0000	165.7737	229.5334
10/20/10	95.8000	102.0139	38.2542	0.0000	165.7737	229.5334
11/17/10	172.4000	102.0139	38.2542	0.0000	165.7737	229.5334
12/09/10	40.9070	102.0139	38.2542	0.0000	165.7737	229.5334
02/08/11	102.0680	102.0139	38.2542	0.0000	165.7737	229.5334
05/26/11	64.2740	102.0139	38.2542	0.0000	165.7737	229.5334
08/15/11	92.7900	102.0139	38.2542	0.0000	165.7737	229.5334
*10/04/11	321.7430	102.0139	38.2542	0.0000	165.7737	229.5334

* Value out of 95% CI range.

Updated 10/27/11 KS

Macrocystis pyrifera Reference Toxicant Control Chart: Growth-Length



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/10/09	203.4760	202.6531	116.7633	30.8735	288.5428	374.4326
12/16/09	102.8140	202.6531	116.7633	30.8735	288.5428	374.4326
01/27/10	137.7800	202.6531	116.7633	30.8735	288.5428	374.4326
02/17/10	149.4100	202.6531	116.7633	30.8735	288.5428	374.4326
04/20/10	265.9090	202.6531	116.7633	30.8735	288.5428	374.4326
04/28/10	135.5750	202.6531	116.7633	30.8735	288.5428	374.4326
05/05/10	143.0800	202.6531	116.7633	30.8735	288.5428	374.4326
06/11/10	177.8410	202.6531	116.7633	30.8735	288.5428	374.4326
06/16/10	179.3100	202.6531	116.7633	30.8735	288.5428	374.4326
07/21/10	168.3300	202.6531	116.7633	30.8735	288.5428	374.4326
08/17/10	266.0000	202.6531	116.7633	30.8735	288.5428	374.4326
09/21/10	133.3300	202.6531	116.7633	30.8735	288.5428	374.4326
10/14/10	132.0000	202.6531	116.7633	30.8735	288.5428	374.4326
10/20/10	145.7100	202.6531	116.7633	30.8735	288.5428	374.4326
*11/17/10	471.3400	202.6531	116.7633	30.8735	288.5428	374.4326
12/09/10	276.0000	202.6531	116.7633	30.8735	288.5428	374.4326
02/08/11	166.8060	202.6531	116.7633	30.8735	288.5428	374.4326
05/26/11	281.7600	202.6531	116.7633	30.8735	288.5428	374.4326
08/15/11	272.5000	202.6531	116.7633	30.8735	288.5428	374.4326
10/04/11	244.0900	202.6531	116.7633	30.8735	288.5428	374.4326

*Value out of 95% CI range at time of testing.
Updated 10/27/11 KC

Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	10/4/2011 14:30	Test ID:	C101117.11	Sample ID:	REF-Ref Toxicant
End Date:	10/6/2011 15:30	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera
Comments:					

Conc-ppb	1	2	3	4	5
Control	0.8500	0.8600	0.8100	0.8400	0.8000
5.6	0.7400	0.7900	0.8000	0.7400	0.7600
10	0.7600	0.8000	0.7200	0.7700	0.8000
18	0.7900	0.7800	0.7300	0.7200	0.7500
32	0.7300	0.7600	0.7400	0.7500	0.6800
100	0.6300	0.6400	0.6400	0.6700	0.4900
180	0.5900	0.5400	0.5400	0.5200	0.4000
300	0.3700	0.4800	0.4200	0.4700	0.2300

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.8320	1.0000	1.1493	1.1071	1.1873	3.001	5			84	500
*5.6	0.7660	0.9207	1.0664	1.0357	1.1071	3.111	5	15.50	16.00	117	500
*10	0.7700	0.9255	1.0714	1.0132	1.1071	3.646	5	16.00	16.00	115	500
*18	0.7540	0.9063	1.0524	1.0132	1.0948	3.378	5	15.00	16.00	123	500
*32	0.7320	0.8798	1.0271	0.9695	1.0588	3.375	5	15.00	16.00	134	500
*100	0.6140	0.7380	0.9012	0.7754	0.9589	7.994	5	15.00	16.00	193	500
*180	0.5180	0.6226	0.8034	0.6847	0.8759	8.871	5	15.00	16.00	241	500
*300	0.3940	0.4736	0.6760	0.5002	0.7654	15.957	5	15.00	16.00	303	500

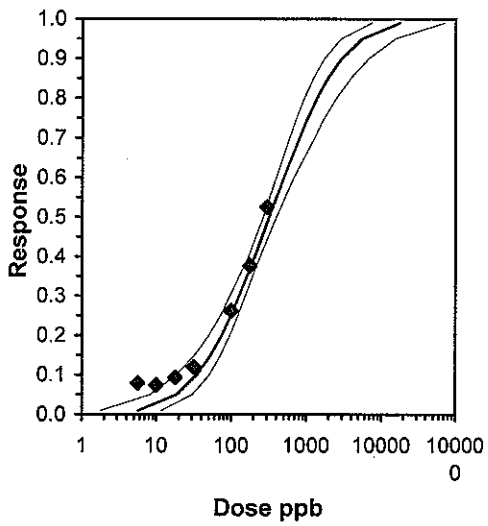
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.90509	0.919	-1.2965	2.45896
Bartlett's Test indicates equal variances (p = 0.11)	11.8459	18.4753		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	<5.6	5.6		

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	1.33012	0.16193	1.01274	1.6475	0.168	4.16947	11.0705	0.53	2.50751	0.75181	11
Intercept	1.66471	0.35714	0.96472	2.3647							
TSCR	0.20028	0.01312	0.17457	0.22599							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	5.73502	1.79898	11.7727
EC05	3.355	18.6591	8.40527	30.7554
EC10	3.718	34.9965	19.0469	51.5107
EC15	3.964	53.4943	32.9609	73.2047
EC20	4.158	74.9496	50.7617	97.1874
EC25	4.326	100.097	73.131	124.6
EC40	4.747	207.511	173.101	247.053
EC50	5.000	321.743	269.059	402.882
EC60	5.253	498.86	398.984	688.663
EC75	5.674	1034.19	738.566	1745.99
EC80	5.842	1381.18	938.128	2538.89
EC85	6.036	1935.14	1237.63	3934.8
EC90	6.282	2957.97	1750.95	6840.02
EC95	6.645	5547.9	2922.3	15554.4
EC99	7.326	18050.3	7612.99	72878.2



Macrocystis Germination and Growth Test-Proportion Germinated

Start Date:	10/4/2011 14:30	Test ID:	C101117.11	Sample ID:	REF-Ref Toxicant
End Date:	10/6/2011 15:30	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera
Comments:	For pMSD only				

Conc-ppb	1	2	3	4	5
Control	0.8500	0.8600	0.8100	0.8400	0.8000
5.6	0.7400	0.7900	0.8000	0.7400	0.7600
10	0.7600	0.8000	0.7200	0.7700	0.8000
18	0.7900	0.7800	0.7300	0.7200	0.7500
32	0.7300	0.7600	0.7400	0.7500	0.6800
100	0.6300	0.6400	0.6400	0.6700	0.4900
180	0.5900	0.5400	0.5400	0.5200	0.4000
300	0.3700	0.4800	0.4200	0.4700	0.2300

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.8320	1.0000	1.1493	1.1071	1.1873	3.001	5				84	500
5.6	0.7660	0.9207	1.0664	1.0357	1.1071	3.111	5	2.208	2.443	0.0917	117	500
10	0.7700	0.9255	1.0714	1.0132	1.1071	3.646	5	2.076	2.443	0.0917	115	500
*18	0.7540	0.9063	1.0524	1.0132	1.0948	3.378	5	2.581	2.443	0.0917	123	500
*32	0.7320	0.8798	1.0271	0.9695	1.0588	3.375	5	3.255	2.443	0.0917	134	500
*100	0.6140	0.7380	0.9012	0.7754	0.9589	7.994	5	6.611	2.443	0.0917	193	500
*180	0.5180	0.6226	0.8034	0.6847	0.8759	8.871	5	9.215	2.443	0.0917	241	500
*300	0.3940	0.4736	0.6760	0.5002	0.7654	15.957	5	12.609	2.443	0.0917	303	500

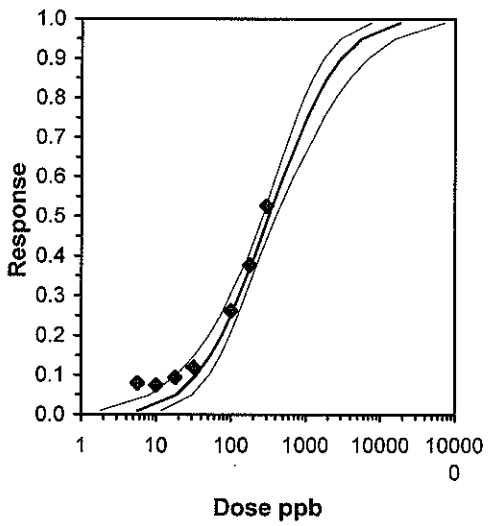
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.90509	0.919	-1.2965	2.45896
Bartlett's Test indicates equal variances (p = 0.11)	11.8459	18.4753		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	10	18	13.4164		0.07365	0.08846	0.12909	0.00352	1.6E-13	7, 32

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	1.33012	0.16193	1.01274	1.6475	0.168	4.16947	11.0705	0.53	2.50751	0.75181	11
Intercept	1.66471	0.35714	0.96472	2.3647							
TSCR	0.20028	0.01312	0.17457	0.22599							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	5.73502	1.79898	11.7727
EC05	3.355	18.6591	8.40527	30.7554
EC10	3.718	34.9965	19.0469	51.5107
EC15	3.964	53.4943	32.9609	73.2047
EC20	4.158	74.9496	50.7617	97.1874
EC25	4.326	100.097	73.131	124.6
EC40	4.747	207.511	173.101	247.053
EC50	5.000	321.743	269.059	402.882
EC60	5.253	498.86	398.984	688.663
EC75	5.674	1034.19	738.566	1745.99
EC80	5.842	1381.18	938.128	2538.89
EC85	6.036	1935.14	1237.63	3934.8
EC90	6.282	2957.97	1750.95	6840.02
EC95	6.645	5547.9	2922.3	15554.4
EC99	7.326	18050.3	7612.99	72878.2



Macrocystis Germination and Growth Test-Growth-Length

Start Date:	10/4/2011 14:30	Test ID:	C101117.11	Sample ID:	REF-Ref Toxicant
End Date:	10/6/2011 15:30	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUCL-Copper chloride
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	MP-Macrocystis pyrifera
Comments:					

Conc-ppb	1	2	3	4	5
Control	14.500	15.000	14.250	15.500	14.000
5.6	12.250	11.500	14.000	12.500	14.750
10	12.000	13.500	12.500	13.000	13.500
18	13.000	14.000	12.250	11.750	14.500
32	13.000	11.750	13.250	11.750	13.500
100	9.000	10.750	9.750	9.000	10.500
180	8.750	8.750	8.750	7.500	8.750
300	5.500	6.250	6.750	6.750	6.250

			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	14.650	1.0000	14.650	14.000	15.500	4.110	5				14.650	1.0000
*5.6	13.000	0.8874	13.000	11.500	14.750	10.266	5	3.051	2.443	1.321	13.000	0.8874
*10	12.900	0.8805	12.900	12.000	13.500	5.054	5	3.236	2.443	1.321	13.000	0.8874
*18	13.100	0.8942	13.100	11.750	14.500	8.808	5	2.866	2.443	1.321	13.000	0.8874
*32	12.650	0.8635	12.650	11.750	13.500	6.643	5	3.698	2.443	1.321	12.650	0.8635
*100	9.800	0.6689	9.800	9.000	10.750	8.345	5	8.968	2.443	1.321	9.800	0.6689
*180	8.500	0.5802	8.500	7.500	8.750	6.577	5	11.371	2.443	1.321	8.500	0.5802
*300	6.300	0.4300	6.300	5.500	6.750	8.133	5	15.439	2.443	1.321	6.300	0.4300

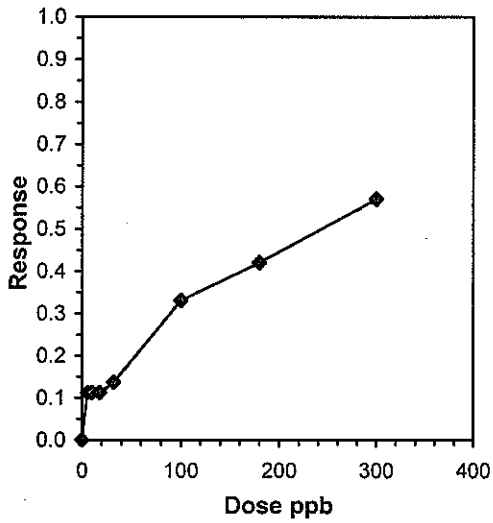
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96977	0.919	0.06468	-0.653
Bartlett's Test indicates equal variances (p = 0.49)	6.41371	18.4753		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	<5.6	5.6			1.32098	0.09017	40.567	0.73125	4.2E-16	7, 32

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05*	2.49	1.53	1.37	8.33	5.6502
IC10*	4.97	9.14	2.74	49.63	1.5261
IC15	36.71	11.58	0.00	57.92	-0.6784
IC20	54.19	8.16	25.76	72.92	-0.2519
IC25	71.67	7.69	46.45	92.65	-0.0227
IC40	162.15	15.77	110.59	200.92	-0.4767
IC50	244.09	10.79	211.09	271.79	-0.3906

* indicates IC estimate less than the lowest concentration



Test: MC-Macrocystis Germination and Growth Test
Test ID: C101117.11
Species: MP-Macrocystis pyrifera
Protocol: EPAW 95-EPA West Coast
Sample ID: REF-Ref Toxicant
Sample Type: CUCL-Copper chloride
Start Date: 10/4/2011 14:30
End Date: 10/6/2011 15:30
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Total Counted	Number Germ	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	1	1	Control	100	85	5	8	6	4	3	6	5	7	8	6	2.5	
	2	2	Control	100	86	6	3	5	8	7	6	5	6	8	6	2.5	
	3	3	Control	100	81	8	7	4	7	5	5	6	4	5	6	2.5	
	4	4	Control	100	84	6	5	8	8	5	7	5	7	6	5	2.5	
	5	5	Control	100	80	6	7	6	4	8	4	6	7	3	5	2.5	
	6	1	5.600	100	74	4	4	6	7	5	4	7	4	3	5	2.5	
	7	2	5.600	100	79	3	6	4	6	5	4	4	3	6	5	2.5	
	8	3	5.600	100	80	7	4	8	5	5	7	5	4	6	5	2.5	
	9	4	5.600	100	74	4	6	4	7	4	5	4	6	5	5	2.5	
	10	5	5.600	100	76	4	5	9	6	7	5	7	6	4	6	2.5	
	11	1	10.000	100	76	6	4	4	5	7	5	3	6	4	4	2.5	
	12	2	10.000	100	80	6	6	8	6	5	4	6	3	5	5	2.5	
	13	3	10.000	100	72	4	3	7	5	5	4	6	4	6	6	2.5	
	14	4	10.000	100	77	6	4	5	5	3	6	6	7	6	4	2.5	
	15	5	10.000	100	80	5	6	5	5	6	6	5	4	5	7	2.5	
	16	1	18.000	100	79	5	6	5	7	4	5	5	5	4	6	2.5	
	17	2	18.000	100	78	3	6	6	7	5	5	6	6	6	6	2.5	
	18	3	18.000	100	73	3	4	6	5	4	7	4	6	5	5	2.5	
	19	4	18.000	100	72	5	5	4	5	6	3	4	5	5	5	2.5	
	20	5	18.000	100	75	5	7	5	5	7	7	5	6	4	7	2.5	
	21	1	32.000	100	73	4	5	6	7	3	4	6	5	5	7	2.5	
	22	2	32.000	100	76	7	5	5	6	4	4	4	4	3	5	2.5	
	23	3	32.000	100	74	4	5	5	6	6	8	6	4	5	4	2.5	
	24	4	32.000	100	75	3	7	5	3	3	6	4	6	5	5	2.5	
	25	5	32.000	100	68	5	5	6	7	5	7	4	5	5	5	2.5	
	26	1	100.000	100	63	2	4	4	3	4	5	4	4	3	3	2.5	
	27	2	100.000	100	64	5	5	3	4	6	2	5	4	4	5	2.5	
	28	3	100.000	100	64	3	4	5	4	6	3	4	4	2	4	2.5	
	29	4	100.000	100	67	4	3	5	5	2	3	4	3	3	4	2.5	
	30	5	100.000	100	49	5	4	6	5	5	3	2	4	4	4	2.5	
	31	1	180.000	100	59	4	4	3	4	3	2	4	3	4	4	2.5	
	32	2	180.000	100	54	3	4	4	4	4	3	2	3	3	5	2.5	
	33	3	180.000	100	54	3	5	3	3	4	3	4	4	3	3	2.5	
	34	4	180.000	100	52	2	2	3	4	3	3	3	3	4	3	2.5	
	35	5	180.000	100	40	2	3	3	3	4	3	5	4	4	4	2.5	
	36	1	300.000	100	37	2	2	3	2	2	2	2	3	2	2	2.5	
	37	2	300.000	100	48	4	2	2	2	3	2	2	2	3	3	2.5	
	38	3	300.000	100	42	3	5	2	2	2	4	3	2	2	2	2.5	

Reviewed by:

Test: MC-Macrocystis Germination and Growth Test
Species: MP-Macrocystis pyrifera
Sample ID: REF-Ref Toxicant
Start Date: 10/4/2011 14:30 End Date: 10/6/2011 15:30

Test ID: C101117.11
Protocol: EPAW 95-EPA West Coast
Sample Type: CUCL-Copper chloride
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Total Counted	Number Germ	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Cal Factor	Notes
	39	4	300.000	100	47	2	2	2	4	2	3	3	5	2	2	2.5	
	40	5	300.000	100	23	2	2	3	2	3	3	3	3	2	2	2.5	

Comments:

Reviewed by:

WESTON SOLUTIONS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

Test ID: 101117.11	Associated Test(s): West Basin		Study Director: K. Curry
Organism: Macrocystis	Organism Batch: DG100411	Location: Rm 2	Replicates: 5
Start Time: 1430	Technician: KS	End Time: 1530	Technician: KS

Toxicant: Copper Chloride (10,000 µg/L Cu) $CuCl_2 2H_2O$	Lot #: MKBF0634V Expiration Date: 11/17/12	Date Dilutions Prepared: 10/4/11	Dilution Water Batch: S10 092311	Technician: KS
Target Concentrations:	Quantity of Stock Target:	Actual:	Quantity of Diluent Target:	Actual:
5.6 ppb	0.280 mL	0.2807	500 mL	500.00
10 ppb	0.500 mL	0.5000	500 mL	500.00
18 ppb	0.900 mL	0.8996	500 mL	499.98
32 ppb	1.60 mL	1.6004	500 mL	500.02
100 ppb	5.00 mL	5.0008	500 mL	500.00
180 ppb	9.00 mL	9.0006	500 mL	500.01
300 ppb	15.00 mL	14.9995	500 mL	500.12

Day 0 Water Quality Data

Stock

Date: 10/4/11 WQ Time: 1440 Initials: JH

	Control	5.6	10	18	32	100	180	300
D.O. (mg/L)	7.0	7.2	7.0	7.0	7.1	7.0	7.0	6.9
Temperature	15.5	15.5	15.6	15.5	15.3	15.3	15.2	15.5
Salinity	32.5	32.6	32.7	32.6	32.5	32.4	32.1	31.9
pH	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1

48-Hour Water Quality Data

Stock

Date: 10/6/11 WQ Time: 1429 Initials: KS

	Control	5.6	10	18	32	100	180	300
D.O. (mg/L)	7.5	7.4	7.5	7.5	7.4	7.5	7.4	7.4
Temperature	15.4	15.1	15.1	14.8	14.9	14.8	14.8	14.7
Salinity	32.8	32.8	32.8	32.9	32.7	32.5	32.3	31.9
pH	8.0	8.1	8.1	8.1	8.1	8.1	8.1	8.0

☐ Pass ☐ Fail

WESTON SOLUTIONS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

REF TOX TEST ID: C101117.11

MICROMETER CONVERSION FACTOR: 2.5

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	LENGTH MEASUREMENTS (in ocular micrometer units)										Scope #	Date	Tech
					L1	L2	L3	L4	L5	L6	L7	L8	L9	L10			
1	Control	1	85	15	5	8	6	4	3	6	5	7	8	6	BH-2	10/17/11	KC
2	Control	2	86	14	6	3	5	8	7	6	5	6	8	6			
3	Control	3	81	19	8	7	4	7	5	5	6	4	5	6			
4	Control	4	84	16	6	5	8	8	5	7	5	7	6	5			
5	Control	5	80	20	6	7	6	4	8	4	6	7	3	5			
31	5.6	1	74	26	4	4	6	7	5	4	7	4	3	5	BH-2	10/20/11	KC
32		2	79	21	3	6	4	6	5	4	4	3	6	5			
33		3	80	20	7	4	8	5	5	7	5	4	6	5			
34		4	74	26	4	6	4	7	4	5	4	6	5	5			
35		5	76	24	4	5	9	6	7	5	7	6	4	6	BH-2	10/27/11	KS
36	10	1	76	24	6	4	4	5	7	5	3	6	4	4	BH-2	10/20/11	KC
37		2	80	20	6	6	8	6	5	4	6	3	5	5			
38		3	72	28	4	3	7	5	5	4	8	4	6	6			
39		4	77	23	6	4	5	5	3	6	8	7	6	4			
40		5	80	20	5	6	5	5	6	6	5	4	5	7	BH-2	10/27/11	KS
41	18	1	79	21	5	6	5	7	4	5	5	5	4	6	BH-2	10/20/11	KC
42		2	78	22	3	6	6	7	5	5	6	6	6	6			
43		3	73	27	3	4	6	5	4	7	4	6	5	5			
44		4	72	28	5	5	4	5	6	3	4	5	5	3	BH-2	10/25/11	KC
45		5	75	25	5	7	5	5	7	7	5	6	4	7	BH-2	10/27/11	KS
46	32	1	73	27	4	5	6	7	3	4	6	5	5	7	BH-2	10/25/11	KC
47		2	76	24	7	5	5	6	4	4	4	4	3	5			
48		3	74	26	4	5	5	6	6	8	6	4	5	4			
49		4	75	25	3	7	5	3	3	6	4	6	5	5			
50		5	68	32	5	5	6	7	5	7	4	5	5	5	BH2	10/27/11	KS
51	100	1	63	37	2	4	4	3	4	5	4	4	3	3	BH-2	10/25/11	KC
52		2	64	36	5	5	3	4	6	2	5	4	4	5			
53		3	64	36	3	4	5	4	6	3	4	4	2	4			
54		4	67	33	4	3	5	5	2	3	4	3	3	4			
55		5	49	51	5	4	6	5	5	3	2	4	4	4	BH-2	10/27/11	KS
56	180	1	59	41	4	4	3	4	3	2	4	3	4	4	BH-2	10/25/11	KC
57		2	54	46	3	4	4	4	4	3	2	3	3	5			
58		3	54	46	3	5	3	3	4	3	4	4	3	3			
59		4	52	48	2	2	3	4	3	3	3	3	4	3			
60		5	40	60	2	3	3	3	4	3	5	4	4	4	BH-2	10/27/11	KS

48-Hour *Macrocystis pyrifera* Reference Toxicant Test

BIO047

REF TOX TEST ID: C101117.11

MICROMETER CONVERSION FACTOR: 2.5

Test Container Number	Conc.	Rep	Number of Spores Germ.	Number of Spores Not Germ.	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	Scope #	Date	Tech
	Control	1															
	Control	2															
	Control	3															
	Control	4															
	Control	5															
61	300	1	~~KO~~ ① 37	63	2	2	3	2	2	2	2	3	2	2	BH-2	10/25/11	KC
62	↓	2	48	52	4	2	2	2	3	2	2	2	3	3	↓	↓	↓
63		3	42	58	3	5	2	2	2	4	3	2	2	2			
64		4	47	53	2	2	2	4	2	3	3	5	2	2			
65		5	23	77	2	2	3	2	3	3	3	3	2	2	BH-2	10/27/11	YS
		1															
		2															
		3															
		4															
		5															
		1															
		2															
		3															
		4															
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		1															
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		3															
		4															
		5															
		1															
		2															
		3															
		4															
		5															

①WC 10/25/11 KC

Strongylocentrotus purpuratus Chronic Toxicity Test

Test: EC-Echinoderm Survival and Development Test Test ID: C110923.01
Species: SP-Strongylocentrotus purpuratus Protocol: EPAW 95-EPA/600/R-95/136
Sample ID: 1st Pass RO Conc Sample Type: EFF2-Industrial
Start Date: 10/5/2011 14:35 End Date: 10/9/2011 13 Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	Control	101	119	119	118	
	2	2	Control	101	80	80	69	
	3	3	Control	101	88	88	84	
	4	4	Control	101	88	88	87	
	5	1	35	101	97	97	92	
	6	2	35	101	116	116	103	
	7	3	35	101	78	78	68	
	8	4	35	101	97	97	93	
	9	1	37	101	86	86	71	
	10	2	37	101	68	68	65	
	11	3	37	101	66	66	56	
	12	4	37	101	82	82	80	
	13	1	39	101	100	100	0	
	14	2	39	101	99	99	3	
	15	3	39	101	103	103	1	
	16	4	39	101	102	102	1	
	17	1	41	101	113	113	0	
	18	2	41	101	96	96	0	
	19	3	41	101	102	102	0	
	20	4	41	101	101	101	0	
	21	1	43	101	101	101	0	
	22	2	43	101	98	98	0	
	23	3	43	101	97	97	0	
	24	4	43	101	102	102	0	

Comments: West Basin Municipal Water District - Salinity Study

Echinoderm Survival and Development Test-Proportion Alive

Start Date:	10/5/2011 14:35	Test ID:	C110923.0146	Sample ID:	1st Pass RO Conc
End Date:	10/9/2011 13:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	EPAW 95-EPA/600/R-95/13(	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4
Control	1.0000	0.7921	0.8713	0.8713
35	0.9604	1.0000	0.7723	0.9604
37	0.8515	0.6733	0.6535	0.8119
39	0.9901	0.9802	1.0000	1.0000
41	1.0000	0.9505	1.0000	1.0000
43	1.0000	0.9703	0.9604	1.0000

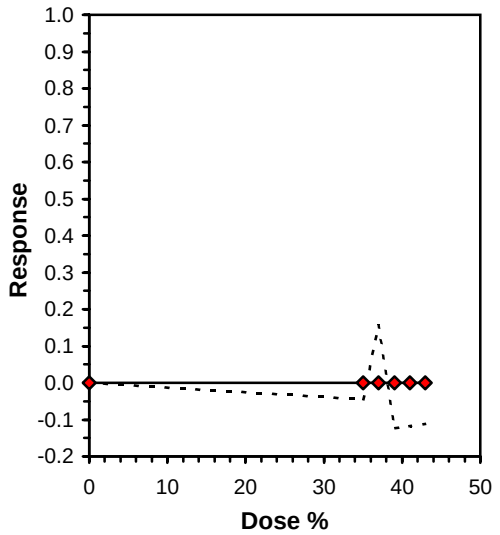
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.8837	1.0000	1.2565	1.0973	1.5210	14.592	4				0.9196	1.0000
35	0.9233	1.0448	1.3338	1.0733	1.5210	14.065	4	-0.854	2.410	0.2180	0.9196	1.0000
37	0.7475	0.8459	1.0503	0.9414	1.1752	11.044	4	2.280	2.410	0.2180	0.9196	1.0000
39	0.9926	1.1232	1.4857	1.4296	1.5210	2.973	4	-2.533	2.410	0.2180	0.9196	1.0000
41	0.9876	1.1176	1.4774	1.3464	1.5210	5.909	4	-2.441	2.410	0.2180	0.9196	1.0000
43	0.9827	1.1120	1.4525	1.3705	1.5210	5.499	4	-2.167	2.410	0.2180	0.9196	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96927	0.916	0.04424	0.78825
Bartlett's Test indicates equal variances (p = 0.24)	6.7584	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	43	>43		2.32558	0.16203	0.17915	0.11494	0.01637	8.4E-04	5, 18

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>43			
IC10	>43			
IC15	>43			
IC20	>43			
IC25	>43			
IC40	>43			
IC50	>43			



Echinoderm Survival and Development Test-Proportion Normal

Start Date:	10/5/2011 14:35	Test ID:	C110923.0146	Sample ID:	1st Pass RO Conc
End Date:	10/9/2011 13:30	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	EPAW 95-EPA/600/R-95/13(	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Municipal Water District - Salinity Study				

Conc-%	1	2	3	4
Control	0.9916	0.8625	0.9545	0.9886
35	0.9485	0.8879	0.8718	0.9588
37	0.8256	0.9559	0.8485	0.9756
39	0.0000	0.0303	0.0097	0.0098
41	0.0000	0.0000	0.0000	0.0000
43	0.0000	0.0000	0.0000	0.0000

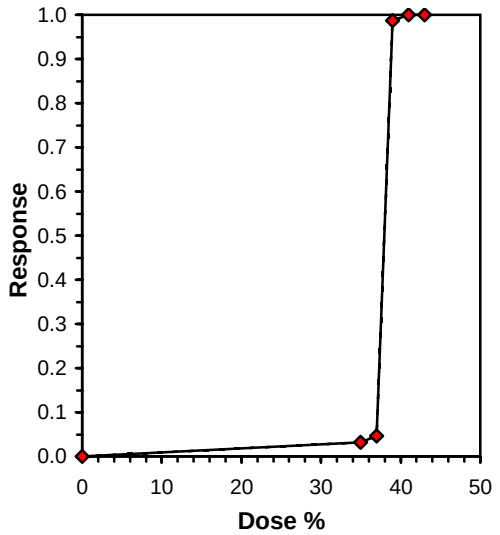
			Transform: Arcsin Square Root					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9493	1.0000	1.3725	1.1909	1.4790	9.681	4				0.9480	1.0000
35	0.9167	0.9657	1.2855	1.2046	1.3663	6.252	4	1.156	2.290	0.1722	0.9183	0.9687
37	0.9014	0.9495	1.2710	1.1400	1.4140	10.691	4	1.349	2.290	0.1722	0.9035	0.9530
*39	0.0125	0.0131	0.1057	0.0498	0.1750	48.931	4	16.844	2.290	0.1722	0.0124	0.0131
41	0.0000	0.0000	0.0498	0.0498	0.0498	0.000	4				0.0000	0.0000
43	0.0000	0.0000	0.0498	0.0498	0.0498	0.000	4				0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95483	0.887	-0.3099	-0.9148
Bartlett's Test indicates equal variances (p = 0.42)	2.81386	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	37	39	37.9868	2.7027	0.09232	0.09605	1.45769	0.01131	2.2E-04	3, 12

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	37.006	5.270	9.648	37.159	-1.4393
IC10	37.113	0.523	34.876	37.259	-6.1442
IC15	37.219	0.074	36.920	37.358	-0.3507
IC20	37.326	0.070	37.045	37.457	-0.3497
IC25	37.432	0.066	37.170	37.556	-0.3482
IC40	37.751	0.053	37.544	37.854	-0.3395
IC50	37.964	0.044	37.791	38.053	-0.3263



FINAL REPORT TRACKING SHEET

Salinity Study

CLIENT NAME: West Basin Municipal Water District	CLIENT SAMPLE ID: West Basin Brine	WESTON TEST ID: C110923.0146
REPORT DUE DATE:	TEST TYPE: Strongylocentrotus purpuratus 96 hr chronic develop.	
STUDY DIRECTOR: ____Margolis ____Mastin ____Skrivseth X Hansen ____Hasan Other_____		
DATE SAMPLE RECEIVED: 9/23/11	DATE TEST STARTED: 10/5/11	DATE TEST ENDED: 10/9/11

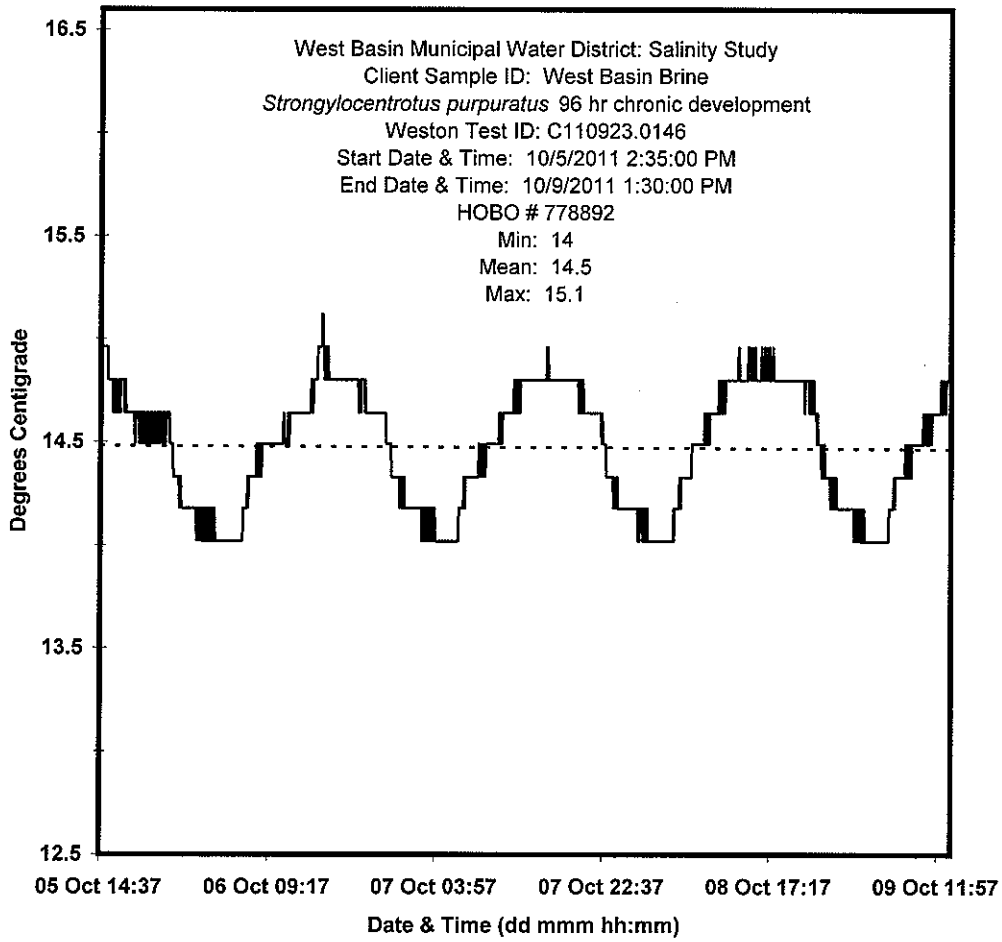
	Initials	Date
Funding Modification or NCR (For New Clients) Submitted and Logged		
Preliminary Results Communicated to Client by Project Manager _e-mail _fax _FedEx _US Mail _Phone		
Hobo Plot # 778892	LC	10/12/11
Data Entry		
Reference Toxicant Data		
First Draft of Report		
Data Entry QA		
QA of First Draft		
Revisions Complete		
QA of Second Draft		
Revisions Complete		
QA of Final Report		
Technical Review of Report (Project Manager)		
Final Report Sent: _US Mail _FedEx _UPS _Airborne _Fax Airbill No.: _____		
Invoice Submitted and Logged		
Report Filed and Logged		

Notes:

WHEN COMPLETE, FILE THIS PAGE WITH FINAL REPORT

Recorded Test Temperature

(Dotted Line Represents Predicted Mean Temperature)



Echinoderm Development
CHRONIC TOXICITY TEST

BIO046

CLIENT:	West Basin Municipal Water District
PROJECT:	Salinity Study
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C110923.0146
SPECIES:	S. purpuratus

DATE RECEIVED:	9/23/11
DATE TEST STARTED:	10/5/11
DATE TEST ENDED:	10/9/11
WESTON SOP NO.:	BIO 046
STUDY DIRECTOR:	J. Hansen

	Concentration	DO* (mg/L)	Temp* (°C)	Salinity* (ppt)	pH*
Day 0 (0 Hours) Date: 10/5/11 Sample ID: C110923.016 Dilutions (Tech): KC WQ Time: 1455 Technician: KC	Control	7.6	16.3	32.4	8.1
	~~Brine Control~~	—	—	—	—
	35	7.5	15.6	~~34.8~~ 34.9 ①	8.0
	37	7.5	15.4	36.9	8.0
	39	7.4	15.6	39.0	8.0
	41	7.4	15.4	41.0	8.0
	43	7.3	15.7	42.9	8.0
24 Hours Date: 10/6/11 WQ Time: 1412 Technician: KS	Control		15.0		
	~~Brine Control~~		—		
	35		15.0		
	37		14.9		
	39		15.1		
	41		15.1		
	43		15.1		
48 Hours Date: 10/7/11 WQ Time: 1240 Technician: KC	Control		15.0		
	~~Brine Control~~		—		
	35		14.8		
	37		14.5		
	39		14.9		
	41		14.8		
	43		14.9		

① IE 10/5/11 KC

Echinoderm Development
CHRONIC TOXICITY TEST

BIO046

CLIENT:	West Basin Municipal Water District
PROJECT:	Salinity Study
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C110923.0146
SPECIES:	S. purpuratus

DATE RECEIVED:	9/23/11
DATE TEST STARTED:	10/5/11
DATE TEST ENDED:	10/9/11
WESTON SOP NO.:	BIO 046
STUDY DIRECTOR:	J. Hansen

	Concentration	DO* (mg/L)	Temp* (°C)	Salinity* (ppt)	pH*
72 Hours	Control		15.9		
Date: 10/8/11	~~Brine Control~~		—		
WQ Time: 1445	35		15.2		
Technician: SH	37		15.0		
	39		15.1		
	41		15.0		
	43		15.0		
96 Hours (if needed)	Control	8.1	15.5	34.0	8.0
Date:: 10/9/11	~~Brine Control~~				
WQ Time: 1300	35	8.0	15.2	35.8	8.0
Technician: YS	37	8.0	15.0	40.3	8.0
	39	8.0	15.1	39.6	8.0
	41	8.0	15.1	42.1	8.0
	43	8.0	15.2	43.8	8.0

*Water quality measurements taken in surrogate water quality chambers.

START TIME:	1435	Initials:	KC
END TIME:	1330	Initials:	YS
ORGANISM BATCH:			
HOBO TEMP. NO.:	778892		
TEST LOCATION:	Room 2		

DILUTION WATER BATCH: S10092311

TEST ACCEPTABILITY:

- [x] ≥ 80% NORMAL SHELL DEVELOPMENT IN SURVIVING CONTROLS
- [ ] MSD < 25%

WESTON SOLUTIONS

Echinoderm Development CHRONIC TOXICITY TEST

BIO046

Weston Test ID:	Client:	Client Sample ID:
C110923.0146	West Basin Municipal Water District	West Basin Brine

SPAWNING DATA

Initial Spawning Time:	Final Spawning Time:	Fertilization Time:	No. of Females:	No. of Males:
0945	1030	1115	2	4
Embryo Density (count/mL):	1.	2.	3.	Average:

Stocking Volume Calculation: 41 x 100 = 4100 2700 ÷ 4100 = 0.6585 x 100 = 65.85 mL

ZERO TIME COUNTS

1.	2.	3. @1H	4.	5.	6.
91	99	~~97~~ 110	108	97	
Average Count: 101			Technician: JH		

LARVAL COUNT DATA

Conc.	Rep 1		Rep 2		Rep 3		Rep 4		Rep 5		Date	Initials
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal		
Control	118	1	69	11	84	4	87	1			10/17/11	JH
~~Brine~~	—	—	—	—	@1H ~~—~~	—	—	—			—	
35	92	5	103	13	~~95~~ 68	~~5~~ 10	93	4			10/18/11	JH
37	71	15	65	3	56	10	80	2			10/19/11	JH
39	Ø	100	3	96	1	102	1	101			10/19/11	JH
41	Ø	113	Ø	96	Ø	102	Ø	101			10/19/11	JH
43	Ø	101	Ø	98	Ø	97	Ø	102			10/18/11	JH

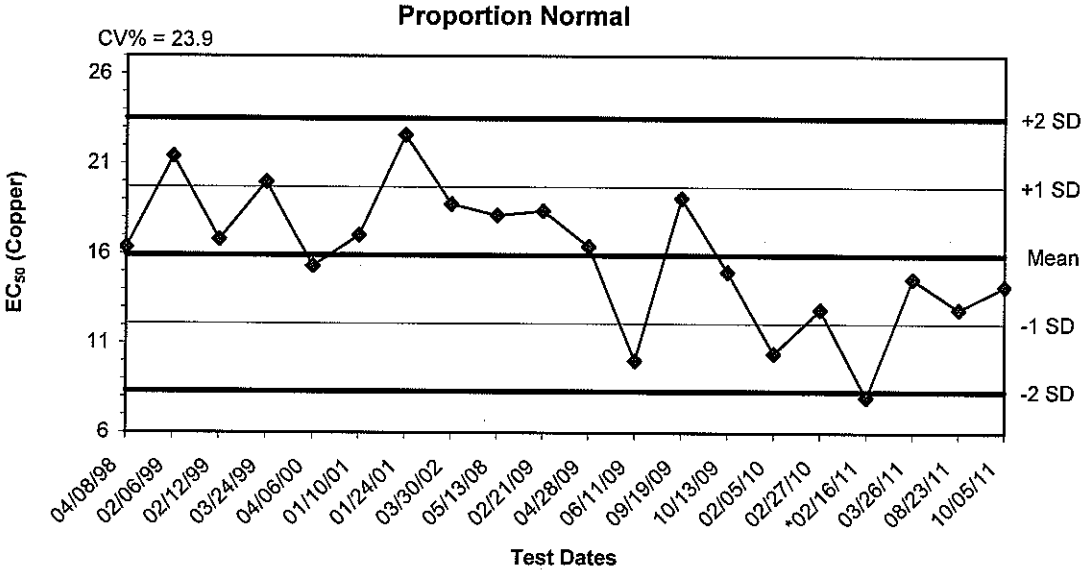
QA COUNT CHECKS

	QA Check #1	QA Check #2	QA Check #3	QA Check #4
Concentration / Replicate	Ø 12	35 14	39 11	41 13
Total #	77	94	94	102
# Normal	71	90	Ø	Ø
Date / Initials	10/27/11 1 am	10/27/11 1 am	10/27/11 1 am	10/27/11 1 am

QA Check Acceptability: ☑ <5% difference in means of QA & orig. counts

①WC 10/17/11 JH
②WC 10/18/11 JH

Strongylocentrotus purpuratus Reference Toxicant Control Chart: Proportion Normal



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/08/98	16.3400	15.9064	12.1079	8.3095	19.7048	23.5033
02/06/99	21.4060	15.9064	12.1079	8.3095	19.7048	23.5033
02/12/99	16.7860	15.9064	12.1079	8.3095	19.7048	23.5033
03/24/99	19.9670	15.9064	12.1079	8.3095	19.7048	23.5033
04/06/00	15.3050	15.9064	12.1079	8.3095	19.7048	23.5033
01/10/01	17.0130	15.9064	12.1079	8.3095	19.7048	23.5033
01/24/01	22.5850	15.9064	12.1079	8.3095	19.7048	23.5033
03/30/02	18.7500	15.9064	12.1079	8.3095	19.7048	23.5033
05/13/08	18.1232	15.9064	12.1079	8.3095	19.7048	23.5033
02/21/09	18.3711	15.9064	12.1079	8.3095	19.7048	23.5033
04/28/09	16.3950	15.9064	12.1079	8.3095	19.7048	23.5033
06/11/09	10.0200	15.9064	12.1079	8.3095	19.7048	23.5033
09/19/09	19.0719	15.9064	12.1079	8.3095	19.7048	23.5033
10/13/09	14.9860	15.9064	12.1079	8.3095	19.7048	23.5033
02/05/10	10.4320	15.9064	12.1079	8.3095	19.7048	23.5033
02/27/10	12.8956	15.9064	12.1079	8.3095	19.7048	23.5033
*02/16/11	7.9885	15.9064	12.1079	8.3095	19.7048	23.5033
03/26/11	14.5986	15.9064	12.1079	8.3095	19.7048	23.5033
08/23/11	12.8967	15.9064	12.1079	8.3095	19.7048	23.5033
10/05/11	14.1971	15.9064	12.1079	8.3095	19.7048	23.5033

*Value out of 95% CI range at time of testing.
Updated 10/28/11 KC

Echinoderm Development-Proportion Normal

Start Date:	10/5/2011 14:35	Test ID:	C110713.21	Sample ID:	REF-Ref Toxicant
End Date:	10/9/2011 13:30	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAW 95-EPA West Coast	Test Species:	SP-Strongylocentrotus purpuratus
Comments:					

Conc-ppb	1	2	3	4
Control	0.8649	0.8974	0.9277	0.9398
3.75	0.9709	0.9368	0.9619	0.8500
7.5	0.9518	0.9072	0.8941	0.8000
15	0.3689	0.3956	0.3063	0.4211
30	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.9074	1.0000	1.2651	1.1944	1.3228	4.534	4				29	318
3.75	0.9299	1.0248	1.3159	1.1731	1.3993	7.696	4	-0.886	2.290	0.1311	25	383
7.5	0.8883	0.9789	1.2393	1.1071	1.3495	8.080	4	0.451	2.290	0.1311	38	345
*15	0.3730	0.4110	0.6564	0.5865	0.7061	7.837	4	10.633	2.290	0.1311	263	419
30	0.0000	0.0000	0.0518	0.0498	0.0552	4.892	4				375	375

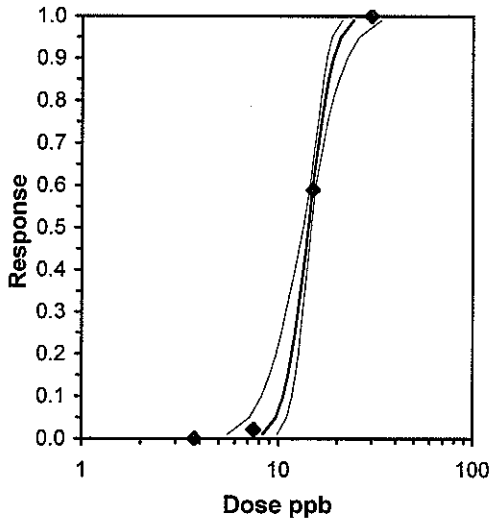
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.93935	0.844	-0.6884	-0.0992
Bartlett's Test indicates equal variances (p = 0.59)	1.90618	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	7.5	15	10.6066		0.08838	0.09718	0.38478	0.00655	1.9E-07	3, 12

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	10.023	2.08404	5.93824	14.1077	0.09119	4.28302	5.99146	0.12	1.1522	0.09977	28
Intercept	-6.5485	2.45786	-11.366	-1.7311							
TSCR	0.08684	0.00893	0.06932	0.10435							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	8.31954	5.50224	9.91175
EC05	3.355	9.72955	7.16174	11.0852
EC10	3.718	10.5764	8.24037	11.7692
EC15	3.964	11.1891	9.05689	12.2565
EC20	4.158	11.7012	9.7615	12.6603
EC25	4.326	12.1592	10.4075	13.0198
EC40	4.747	13.3944	12.2101	13.996
EC50	5.000	14.1971	13.3937	14.6706
EC60	5.253	15.048	14.5394	15.539
EC75	5.674	16.5766	15.9691	17.8427
EC80	5.842	17.2254	16.4571	18.9836
EC85	6.036	18.0139	17.0217	20.4336
EC90	6.282	19.0573	17.7421	22.4385
EC95	6.645	20.7162	18.8493	25.8011
EC99	7.326	24.2272	21.0914	33.5658



Test: ED-Echinoderm Development
Test ID: C110713.21
Species: SP-Strongylocentrotus purpuratus
Protocol: EPAW 95-EPA West Coast
Sample ID: REF-Ref Toxicant
Sample Type: CUSO-Copper sulfate
Start Date: 10/5/2011 14:35
End Date: 10/9/2011 13
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number normal	Notes
	1	1	Control	74	74	74	64	
	2	2	Control	78	78	78	70	
	3	3	Control	83	83	83	77	
	4	4	Control	83	83	83	78	
	5	1	3.750	103	103	103	100	
	6	2	3.750	95	95	95	89	
	7	3	3.750	105	105	105	101	
	8	4	3.750	80	80	80	68	
	9	1	7.500	83	83	83	79	
	10	2	7.500	97	97	97	88	
	11	3	7.500	85	85	85	76	
	12	4	7.500	80	80	80	64	
	13	1	15.000	103	103	103	38	
	14	2	15.000	91	91	91	36	
	15	3	15.000	111	111	111	34	
	16	4	15.000	114	114	114	48	
	17	1	30.000	92	92	92	0	
	18	2	30.000	100	100	100	0	
	19	3	30.000	101	101	101	0	
	20	4	30.000	82	82	82	0	
	21	1	60.000	0	0	0	0	
	22	2	60.000	0	0	0	0	
	23	3	60.000	0	0	0	0	
	24	4	60.000	0	0	0	0	

Comments:

Reviewed by:

96 Hour Echinoderm Development
Reference Toxicant Test

Test ID: C110713.21	Replicates: 5	Study Director: K. Curry	Location: Room 2
Dilution Water Batch: S100923II	Organism Batch: DG 100511	Associated Test(s): West Basin	Organism: S. purpuratus
Toxicant: Copper Sulfate (0.509gCu/LCuSO4)	Lot #: 2008504	Date Prepared: 10/5/11	Initials: KS
Target Concentrations: **60 ppb**		Quantity of Stock: Target: 0.0585 mL ~~0.014 µL~~	Quantity of Diluent: Target: 500 mL ~~120 mL~~
60 ppb		Actual: 0.0587 mL	Actual: 500.0 mL

Serial Dilute by ½ to obtain concentrations of 30, 15, 7.5, and 3.75 ppb.

0 Hours Date: 10/5/11 WQ Time: 1500 KC Start Time: 1435 Initials: KC

STOCK

	Control	3.75	7.5	15	30	60
D.O. (%)	7.5	7.5	7.5	7.5	7.4	7.5
Temperature	15.9	15.9	15.9	16.1	16.0	16.0
Salinity	32.7	32.8	32.8	32.8	32.8	32.8
pH	8.1	8.1	8.1	8.1	8.1	8.1

Final Day Date: 10/9/11 WQ Time: 1310 KS End Time: 1330 Initials: KS

STOCK

	Control	3.75	7.5	15	30	60
D.O. (%)	7.9	8.0	8.0	8.0	8.0	8.0
Temperature	15.2	15.0	15.0	15.0	15.1	15.0
Salinity	33.2	33.7	33.7	33.0	33.6	33.6
pH	8.0	8.0	8.0	8.0	8.0	8.0

☐ Pass ☐ Fail

Notes:

96 Hour Echinoderm Development
Reference Toxicant Test

Conc.	Rep	Number Normal	Number Abnormal	Date	Initials
Control	1	64	10	10/19/11	JH
	2	70	8	↓	↓
	3	77	6		
	4	78	5	↓	↓
	5	/	/	/	/
3.75	1	100	3	10/20/11	JH
	2	89	6	10/27/11	AM
	3	101	4	10/20/11	JH
	4	68	12	↓	↓
	5	/	/	/	/
7.5	1	79	4	10/20/11	JH
	2	88	9	↓	↓
	3	76	9		
	4	64	16	↓	↓
	5	/	/	/	/
15	1	38	65	10/19/11	JH
	2	34	55	10/20/11	JH
	3	34	77	↓	↓
	4	48	66	↓	↓
	5	/	/	/	/
30	1	Ø	92	10/19/11	JH
	2	Ø	100	↓	↓
	3	Ø	101		
	4	Ø	82	↓	↓
	5	/	/	/	/
60	1	Ø	①JH	10/19/11	JH
	2	Ø	↓	↓	↓
	3	Ø			
	4	Ø	↓	↓	↓
	5	/	/	/	/

① Unable to count; only pieces of cellular material visible. 10/19/11 JH

West Basin Echino Dev.

10/5/11

Test			RT
Ø	1	11	
	2	16	Ø
	3	10	
	4	23	
	5	20	
35	6	24	3.75
	7	5	
	8	14	
	9	1	
37	10	2	7.5
	11	22	
	12	18	
	13	17	
39	14	8	15
	15	13	
	16	6	
	17	7	
41	18	3	30
	19	12	
	20	19	
	21	4	
	22	21	
43	23	9	60
	24	15	

Atherinops affinis Chronic Toxicity Test

Test: LF-Larval Fish Growth and Survival Test | Test ID: C110923.01
Species: AT-Atherinops affinis | Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 1st Pass RO Conc | Sample Type: EFF2-Industrial
Start Date: 9/27/2011 14:10 | End Date: 10/4/2011 15:20 | Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(	Wgt Count
	1	1	Control	5	5	4	4	4	4	4	4	112.78	109.23	4
	2	2	Control	5	5	5	5	5	5	5	5	138.17	133.59	5
	3	3	Control	5	4	4	4	4	4	4	4	98.81	95.36	4
	4	4	Control	5	4	4	4	4	4	4	4	102.24	97.98	4
	5	5	Control	5	5	5	5	5	5	5	5	111.59	107.52	5
	6	1	36.5	5	4	4	4	4	4	4	4	117.55	113.58	4
	7	2	36.5	5	5	5	5	5	5	5	5	125.04	120.91	5
	8	3	36.5	5	5	5	5	5	5	5	5	101.01	96.8	5
	9	4	36.5	5	5	5	5	5	5	5	5	126.36	122.6	5
	10	5	36.5	5	4	4	4	4	4	4	4	140.05	136.39	4
	11	1	39	5	5	4	4	4	4	4	4	112.4	108.27	4
	12	2	39	5	5	5	5	5	5	5	5	120.8	116.5	5
	13	3	39	5	5	5	5	5	5	5	5	127.72	123.68	5
	14	4	39	5	4	4	4	4	4	4	4	107.25	103.95	4
	15	5	39	5	3	3	3	3	3	3	3	120.31	116.72	3
	16	1	41	5	5	5	5	5	5	5	5	124.22	119.53	5
	17	2	41	5	4	4	4	4	4	4	4	110.54	106.92	4
	18	3	41	5	4	4	4	4	4	4	4	122.23	118.45	4
	19	4	41	5	5	5	5	5	5	5	5	124.31	119.44	5
	20	5	41	5	5	5	5	5	5	5	5	131.91	127.25	5
	21	1	45	5	4	4	4	4	4	4	4	119.81	115.37	4
	22	2	45	5	4	4	4	4	4	4	4	118.57	114.49	4
	23	3	45	5	4	4	4	4	4	4	4	127.93	124.07	4
	24	4	45	5	5	5	5	5	5	5	5	119.44	114.47	5
	25	5	45	5	3	3	3	3	3	3	3	125.36	121.36	3
	26	1	60	5	0	0	0	0	0	0	0	0	0	0
	27	2	60	5	1	1	1	1	1	1	1	120.22	118.67	1
	28	3	60	5	0	0	0	0	0	0	0	0	0	0
	29	4	60	5	2	2	2	1	1	1	1	119.63	117.96	1
	30	5	60	5	1	1	1	1	1	1	1	133.9	131.89	1

Comments: West Basin Municipal District - Salinity Study

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	9/27/2011 14:10	Test ID:	C110923.0163	Sample ID:	1st Pass RO Conc
End Date:	10/4/2011 15:20	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	USEPA98-USACE / USEPA	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.8000	1.0000	0.8000	0.8000	1.0000
36.5	0.8000	1.0000	1.0000	1.0000	0.8000
39	0.8000	1.0000	1.0000	0.8000	0.6000
41	1.0000	0.8000	0.8000	1.0000	1.0000
45	0.8000	0.8000	0.8000	1.0000	0.6000
60	0.0000	0.2000	0.0000	0.2000	0.2000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.8800	1.0000	1.2024	1.1071	1.3453	10.848	5				3	25
36.5	0.9200	1.0455	1.2500	1.1071	1.3453	10.434	5	-0.508	2.360	0.2212	2	25
39	0.8400	0.9545	1.1582	0.8861	1.3453	16.679	5	0.472	2.360	0.2212	4	25
41	0.9200	1.0455	1.2500	1.1071	1.3453	10.434	5	-0.508	2.360	0.2212	2	25
45	0.8000	0.9091	1.1106	0.8861	1.3453	14.625	5	0.980	2.360	0.2212	5	25
*60	0.1200	0.1364	0.3684	0.2255	0.4636	35.405	5	8.899	2.360	0.2212	22	25

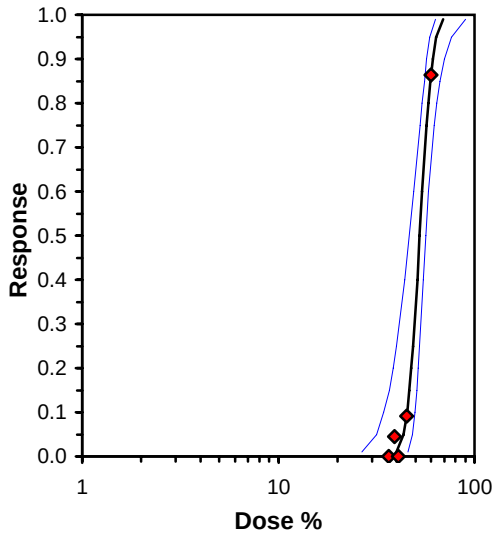
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93063	0.927	-0.1837	-1.0451
Bartlett's Test indicates equal variances (p = 0.95)	1.11877	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	45	60	51.9615	2.22222	0.17945	0.20619	0.58295	0.02196	4.8E-09	5, 24

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	19.5721	5.38586	9.01582	30.1284	0.12	1.22001	7.81472	0.74821	1.72136	0.05109	4
Intercept	-28.691	9.36922	-47.054	-10.327							
TSCR	0.10726	0.03628	0.03615	0.17837							

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	40.0406	26.6144	45.65
EC05	3.355	43.383	31.5581	48.2675
EC10	3.718	45.2775	34.525	49.7721
EC15	3.964	46.6022	36.6598	50.8457
EC20	4.158	47.6826	38.4303	51.7421
EC25	4.326	48.6294	39.9976	52.5494
EC40	4.747	51.0995	44.1018	54.807
EC50	5.000	52.6454	46.6154	56.3991
EC60	5.253	54.2382	49.0762	58.2693
EC75	5.674	56.9931	52.8027	62.2793
EC80	5.842	58.1248	54.1054	64.2458
EC85	6.036	59.4724	55.5011	66.8124
EC90	6.282	61.2123	57.1061	70.4369
EC95	6.645	63.8853	59.2801	76.547
EC99	7.326	69.2183	63.0644	90.2113



Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	9/27/2011 14:10	Test ID:	C110923.0163	Sample ID:	1st Pass RO Conc
End Date:	10/4/2011 15:20	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	USEPA98-USACE / USEPA	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.8875	0.9160	0.8625	1.0650	0.8140
36.5	0.9925	0.8260	0.8420	0.7520	0.9150
39	1.0325	0.8600	0.8080	0.8250	1.1967
41	0.9380	0.9050	0.9450	0.9740	0.9320
45	1.1100	1.0200	0.9650	0.9940	1.3333
60	1.5500	1.6700	2.0100		

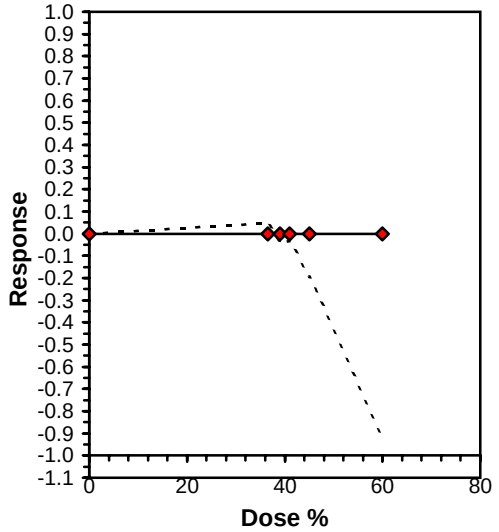
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9090	1.0000	0.9090	0.8140	1.0650	10.442	5				1.0809	1.0000
36.5	0.8655	0.9521	0.8655	0.7520	0.9925	10.585	5	0.519	2.508	0.2103	1.0809	1.0000
39	0.9444	1.0390	0.9444	0.8080	1.1967	17.669	5	-0.423	2.508	0.2103	1.0809	1.0000
41	0.9388	1.0328	0.9388	0.9050	0.9740	2.645	5	-0.355	2.508	0.2103	1.0809	1.0000
45	1.0845	1.1930	1.0845	0.9650	1.3333	13.770	5	-2.093	2.508	0.2103	1.0809	1.0000
60	1.7433	1.9179	1.7433	1.5500	2.0100	13.687	3	-8.619	2.508	0.2428	1.0809	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.91512	0.924	0.91774	0.34509
Bartlett's Test indicates equal variances (p = 0.03)	12.4614	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test Treatments vs Control	60	>60		1.66667	0.24281	0.26711	0.36554	0.01757	1.1E-07	5, 22

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>60			
IC10	>60			
IC15	>60			
IC20	>60			
IC25	>60			
IC40	>60			
IC50	>60			



Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	9/27/2011 14:10	Test ID:	C110923.0163	Sample ID:	1st Pass RO Conc
End Date:	10/4/2011 15:20	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	USEPA98-USACE / USEPA	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.7100	0.9160	0.6900	0.8520	0.8140
36.5	0.7940	0.8260	0.8420	0.7520	0.7320
39	0.8260	0.8600	0.8080	0.6600	0.7180
41	0.9380	0.7240	0.7560	0.9740	0.9320
45	0.8880	0.8160	0.7720	0.9940	0.8000
60	0.0000	0.3100	0.0000	0.3340	0.4020

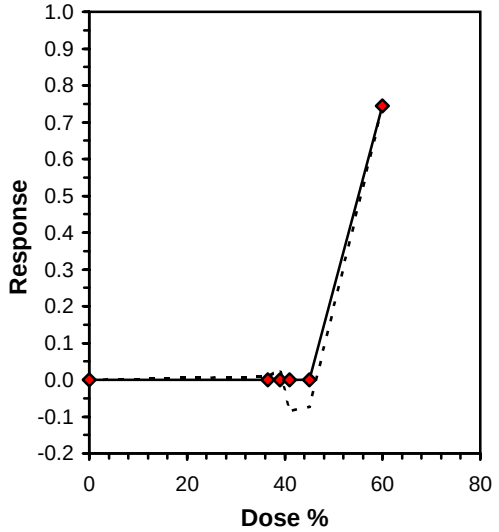
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.7964	1.0000	0.7964	0.6900	0.9160	11.993	5				0.8158	1.0000
36.5	0.7892	0.9910	0.7892	0.7320	0.8420	5.950	5	0.100	2.360	0.1692	0.8158	1.0000
39	0.7744	0.9724	0.7744	0.6600	0.8600	10.685	5	0.307	2.360	0.1692	0.8158	1.0000
41	0.8648	1.0859	0.8648	0.7240	0.9740	13.368	5	-0.954	2.360	0.1692	0.8158	1.0000
45	0.8540	1.0723	0.8540	0.7720	0.9940	10.447	5	-0.803	2.360	0.1692	0.8158	1.0000
*60	0.2092	0.2627	0.2092	0.0000	0.4020	92.701	5	8.190	2.360	0.1692	0.2092	0.2564

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96771	0.927	-0.307	-0.5669
Bartlett's Test indicates equal variances (p = 0.18)	7.6596	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	45	60	51.9615	2.22222	0.16921	0.21247	0.31325	0.01285	1.1E-08	5, 24

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05	46.009	3.000	27.167	46.468	-4.9671
IC10	47.017	0.424	45.048	47.937	-0.7451
IC15	48.026	0.494	46.129	49.405	-0.0442
IC20	49.035	0.582	47.221	50.873	0.3632
IC25	50.043	0.683	48.289	52.342	0.5717
IC40	53.069	1.016	50.747	56.747	0.7443
IC50	55.087	1.251	52.185	59.684	0.7532



Test: AC-Acute Fish Test | Test ID: C110923.01
Species: AT-Atherinops affinis | Protocol: EPAW 95-EPA/600/R-95/136
Sample ID: 1st Pass RO Conc | Sample Type: EFF2-Industrial
Start Date: 9/27/2011 14:10 | End Date: 10/4/2011 15:2(| Lab ID: CCA-Carlsbad, Weston

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	Control	5	5	4	4	4	
	2	2	Control	5	5	5	5	5	
	3	3	Control	5	4	4	4	4	
	4	4	Control	5	4	4	4	4	
	5	5	Control	5	5	5	5	5	
	6	1	36.5	5	4	4	4	4	
	7	2	36.5	5	5	5	5	5	
	8	3	36.5	5	5	5	5	5	
	9	4	36.5	5	5	5	5	5	
	10	5	36.5	5	4	4	4	4	
	11	1	39	5	5	4	4	4	
	12	2	39	5	5	5	5	5	
	13	3	39	5	5	5	5	5	
	14	4	39	5	4	4	4	4	
	15	5	39	5	3	3	3	3	
	16	1	41	5	5	5	5	5	
	17	2	41	5	4	4	4	4	
	18	3	41	5	4	4	4	4	
	19	4	41	5	5	5	5	5	
	20	5	41	5	5	5	5	5	
	21	1	45	5	4	4	4	4	
	22	2	45	5	4	4	4	4	
	23	3	45	5	4	4	4	4	
	24	4	45	5	5	5	5	5	
	25	5	45	5	3	3	3	3	
	26	1	60	5	0	0	0	0	
	27	2	60	5	1	1	1	1	
	28	3	60	5	0	0	0	0	
	29	4	60	5	2	2	2	1	
	30	5	60	5	1	1	1	1	

Comments: West Basin Municipal District - Salinity Study

Acute Fish Test-96 Hr Survival

Start Date:	9/27/2011 14:10	Test ID:	C110923.0163	Sample ID:	1st Pass RO Conc
End Date:	10/4/2011 15:20	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	EPAW 95-EPA/600/R-95/136	Test Species:	AT-Atherinops affinis
Comments:	West Basin Municipal District - Salinity Study				

Conc-%	1	2	3	4	5
Control	0.8000	1.0000	0.8000	0.8000	1.0000
36.5	0.8000	1.0000	1.0000	1.0000	0.8000
39	0.8000	1.0000	1.0000	0.8000	0.6000
41	1.0000	0.8000	0.8000	1.0000	1.0000
45	0.8000	0.8000	0.8000	1.0000	0.6000
60	0.0000	0.2000	0.0000	0.2000	0.2000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.8800	1.0000	1.2024	1.1071	1.3453	10.848	5				3	25
36.5	0.9200	1.0455	1.2500	1.1071	1.3453	10.434	5	-0.508	2.360	0.2212	2	25
39	0.8400	0.9545	1.1582	0.8861	1.3453	16.679	5	0.472	2.360	0.2212	4	25
41	0.9200	1.0455	1.2500	1.1071	1.3453	10.434	5	-0.508	2.360	0.2212	2	25
45	0.8000	0.9091	1.1106	0.8861	1.3453	14.625	5	0.980	2.360	0.2212	5	25
*60	0.1200	0.1364	0.3684	0.2255	0.4636	35.405	5	8.899	2.360	0.2212	22	25

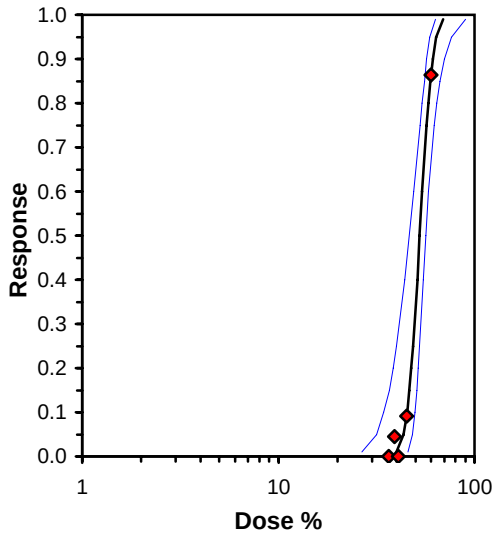
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93063	0.927	-0.1837	-1.0451
Bartlett's Test indicates equal variances (p = 0.95)	1.11877	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs Control	45	60	51.9615	2.22222	0.17945	0.20619	0.58295	0.02196	4.8E-09	5, 24

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	19.5721	5.38586	9.01582	30.1284	0.12	1.22001	7.81472	0.74821	1.72136	0.05109	4
Intercept	-28.691	9.36922	-47.054	-10.327							
TSCR	0.10726	0.03628	0.03615	0.17837							

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	40.0406	26.6144	45.65
EC05	3.355	43.383	31.5581	48.2675
EC10	3.718	45.2775	34.525	49.7721
EC15	3.964	46.6022	36.6598	50.8457
EC20	4.158	47.6826	38.4303	51.7421
EC25	4.326	48.6294	39.9976	52.5494
EC40	4.747	51.0995	44.1018	54.807
EC50	5.000	52.6454	46.6154	56.3991
EC60	5.253	54.2382	49.0762	58.2693
EC75	5.674	56.9931	52.8027	62.2793
EC80	5.842	58.1248	54.1054	64.2458
EC85	6.036	59.4724	55.5011	66.8124
EC90	6.282	61.2123	57.1061	70.4369
EC95	6.645	63.8853	59.2801	76.547
EC99	7.326	69.2183	63.0644	90.2113



FINAL REPORT TRACKING SHEET

Salinity Study

CLIENT NAME: West Basin Municipal Water District	CLIENT SAMPLE ID: West Basin Brine	WESTON TEST ID: C110923.0163
REPORT DUE DATE:	TEST TYPE: Athermops affinis 7 day chronic	
STUDY DIRECTOR: ____Margolis ____Mastin ____Skrivseth __X__Hansen ____Hasan Other_____		
DATE SAMPLE RECEIVED: 9/23/11	DATE TEST STARTED: 9/27/11	DATE TEST ENDED: 10/4/11

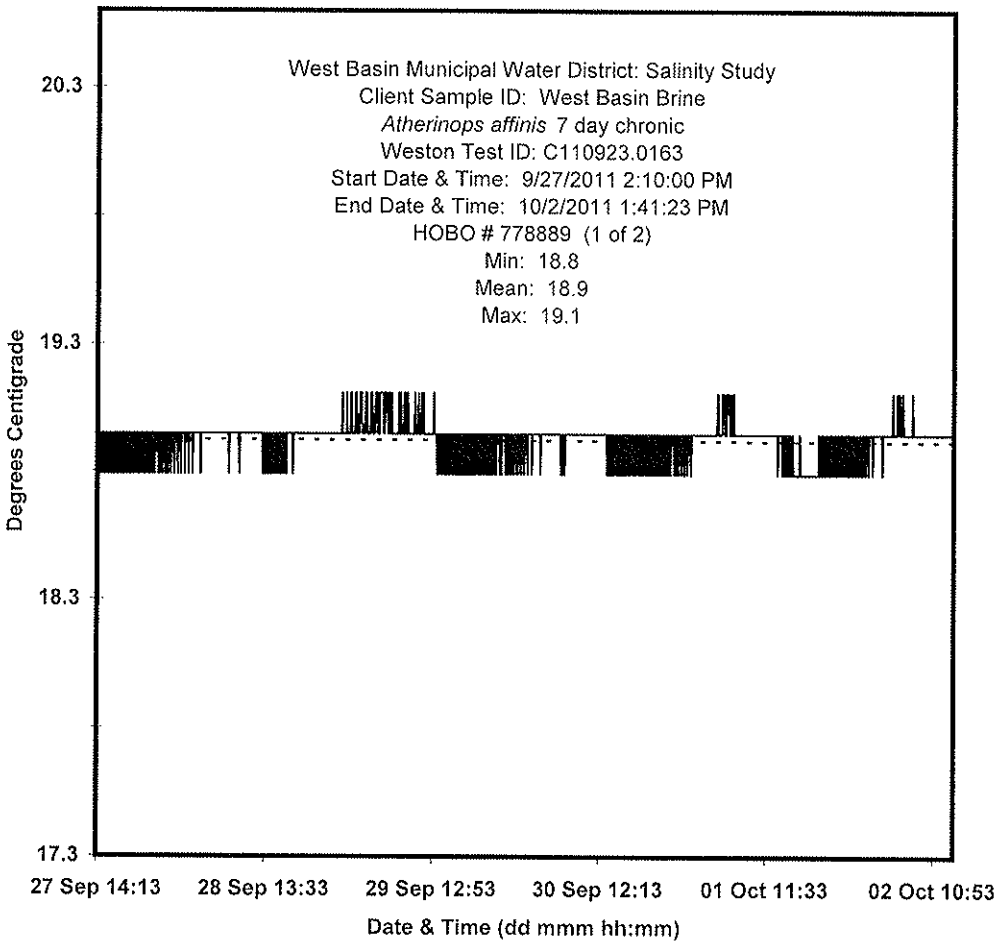
	Initials	Date
Funding Modification or NCR (For New Clients) Submitted and Logged		
Preliminary Results Communicated to Client by Project Manager _e-mail _fax _FedEx _US Mail _Phone		
Hobo Plot 778889 ① 2323 ② ① HOBO stopped blinking 10/2/11 @ 1341 hrs. Tech noticed on 10/3 + started second HOBO # 2323	JL	10/12/11
Data Entry		
Reference Toxicant Data	JH	10/17/11
First Draft of Report		
Data Entry QA		
QA of First Draft		
Revisions Complete		
QA of Second Draft		
Revisions Complete		
QA of Final Report		
Technical Review of Report (Project Manager)		
Final Report Sent: _US Mail _FedEx _UPS _Airborne _Fax Airbill No.: _____	Sent to Oakland	10/17/11
Invoice Submitted and Logged		
Report Filed and Logged		

Notes:

WHEN COMPLETE, FILE THIS PAGE WITH FINAL REPORT

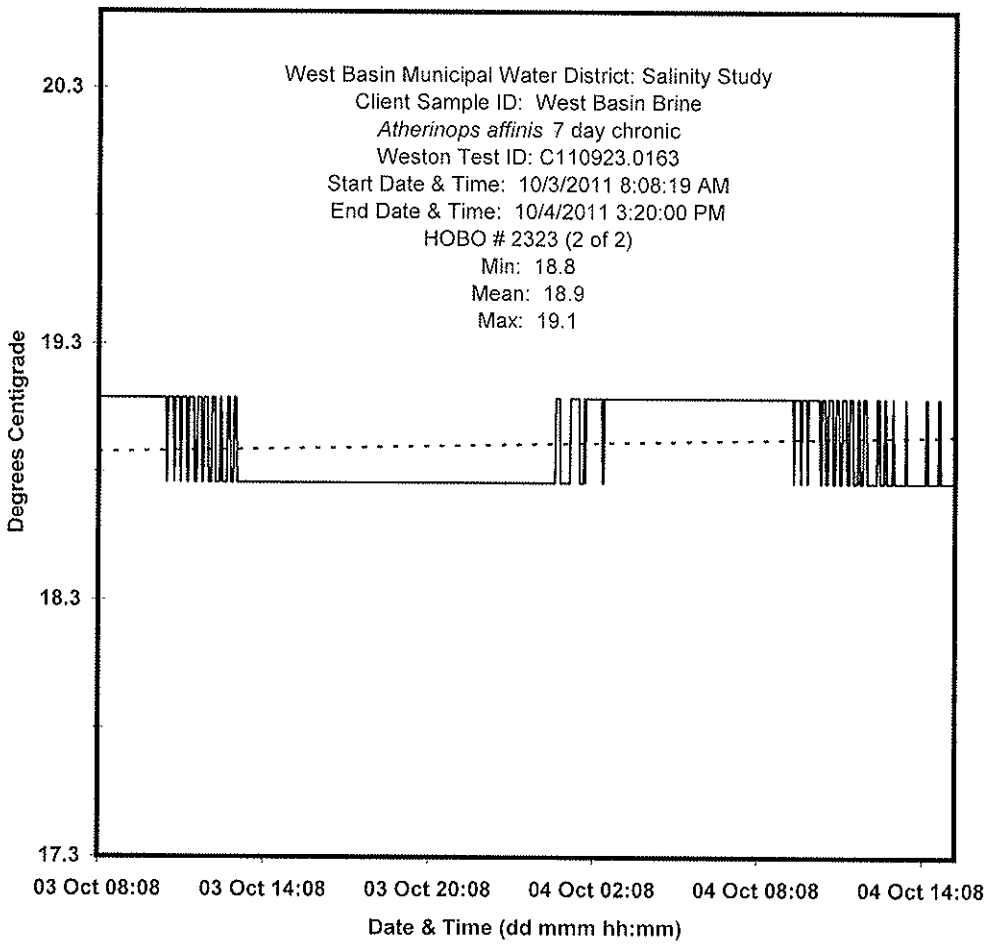
Recorded Test Temperature

(Dotted Line Represents Predicted Mean Temperature)



Recorded Test Temperature

(Dotted Line Represents Predicted Mean Temperature)



Topsmelt 7-Day Chronic Toxicity Test

BIO063

Client	West Basin Municipal Water District
Project:	Salinity Study
Client Sample ID:	West Basin Brine
WESTON Test ID:	C110923.01B3
Species:	*Atherinops affinis*

Date Received:	9/23/11
Date Test Started:	9/27/11
Date Test Ended:	10/4/11
Study Director:	J. Hansen
Organisms/Chamber:	5

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 0	Control							3	6.9	3	20.0	6	32.7	4	8.1
Date: 9/27/11	36.5								6.8		19.9		36.5		8.1
Sample ID: C110923.01a	39.0								7.0		20.0		39.0		8.0
Dilutions (Tech): BG	41.0								7.1		20.0		41.0		8.0
WQ* Time: 1315	45.0								7.2		19.9		45.0		7.9
Technician: BG	60.0								7.9		19.9		60.0		7.7
*performed on stock dilutions															
Day 1	Control	3	6.5	3	20.0	2	7.9	3	6.8	3	20.6	6	32.6	2	8.2
Date: 9/28/11	36.5		6.3		20.0		7.9		6.9		20.2		36.4		8.1
Sample ID: C110923.01a	39.0		6.3		19.5		7.9		6.8		20.1		38.8		8.1
Dilutions (Tech): BG	41.0		6.3		19.4		7.9		6.9		19.8		41.1		8.0
WQ Time: 1025/1055 Rep: 1/surr	45.0		5.7		19.6		7.9		6.9		19.5		44.8		8.0
Technician: JH	60.0		5.4		19.7		7.7		7.8		19.2		59.5		7.8
Day 2	Control	3	6.6	3	19.8	2	8.0	3	6.9	3	19.4	6	32.7	2	8.3
Date: 9/29/11	36.5		6.5		20.4		8.0		7.0		19.4		36.5		8.2
Sample ID: C110923.01a	39.0		6.2		19.6		8.0		7.0		19.7		39.1		8.1
Dilutions (Tech): KE	41.0		6.2		20.5		8.0		6.9		19.5		41.1		8.1
WQ Time: 1125/1130 Rep: 2/surr	45.0		6.1		19.9		8.0		7.2		19.5		45.1		8.0
Technician: BG	60.0		6.1		19.9		7.9		8.0		19.7		59.8		7.8
Day 3	Control	3	6.2	3	19.9	4	7.5	6	7.2	3	19.5	6	32.5	4	8.2
Date: 9/30/11	36.5		6.3		19.9		7.7		6.8		19.3		34.5		8.2
Sample ID: C110923.01a	39.0		6.2		20.0		7.8		6.7		19.4		38.9		8.1
Dilutions (Tech): KE	41.0		6.3		19.9		7.8		6.8		19.4		41.0		8.1
WQ Time: 0930/1250 Rep: 3/surr	45.0		6.3		19.4		7.8		6.6		19.4		45.0		8.1
Technician: BG/JH	60.0		6.1		19.9		7.8		7.6		19.4		59.8		7.9

Start Time:	1410 BG
End Time:	1520 KE
Supplier:	Aquatic Bio Systems
Organism Batch:	ABS 2951 Age: 12
Hobo Temp. No.:	7.78889 / 2323

Dilution Water Batch:	S10092311
Test Location:	Room 3
Test Acceptability:	☒ ≥80% Survival in control
	☐ Mean > 0.85 mg dry weight / organism in control

KE (i)

(i) Hobo was found to be off at 0730 on 10/3/11. This hobo was left in the room and an additional hobo was started at 0820 on 10/3/11 10/3/11 KE

Topsmelt 7-Day Chronic Toxicity Test

BIO063

Weston Test ID:	Client:	Client Sample ID:
C110923.0103	West Basin Municipal Water District	West Basin Brine

	Conc.	meter #	DO (mg/L) (Old)	meter #	Temp (°C) (Old)	meter #	pH (Old)	meter #	DO (mg/L) (New)	meter #	Temp (°C) (New)	meter #	Salinity (ppt) (New)	meter #	pH (New)
Day 4	Control	3	6.3	3	19.7	4	7.7	3	7.0	3	20.1	6	32.6	4	8.2
Date: 10/1/11	36.5		6.3		20.0		7.8		7.0		20.0		36.5		8.1
Sample ID: C110923.01a	39.0		6.2		20.1		7.8		6.8		20.0		39.1		8.2
Dilutions (Tech): KE	41.0		6.4		19.8		7.8		6.8		19.9		41.1		8.1
WQ Time: 1000/1300 Rep: 4/SURR	45.0		6.3		19.8		7.8		6.7		20.1		45.0		8.1
Technician: KE/KE	60.0		6.2		19.9		7.8		6.8		20.1		60.1		8.0
Day 5	Control	3	6.0	3	19.6	4	7.4	3	7.1	3	19.6	6	32.6	4	8.1
Date: 10/2/11	36.5		6.2		19.8		7.6		6.9		19.6		36.5		8.0
Sample ID: C110923.01b	39.0		6.2		20.0		7.7		6.8		19.7		39.0		8.0
Dilutions (Tech): KE	41.0		6.1		19.8		7.6		6.8		19.5		41.1		8.1
WQ Time: 1015/1200 Rep: 5/SURR	45.0		6.1		19.9		7.7		6.9		19.7		45.1		8.0
Technician: KE/KE	60.0		6.0		19.7		7.6		7.4		19.7		60.0		7.9
Day 6	Control	3	6.5	3	19.8	2	8.0	3	7.0	3	19.5	6	32.7	2	8.2
Date: 10/3/11	36.5		6.4		20.0		8.0		7.0		19.5		36.6		8.1
Sample ID: C110923.01b	39.0		6.7		19.3		8.0		7.1		19.5		39.1		8.1
Dilutions (Tech): BG	41.0		6.3		19.2		8.0		7.1		19.8		41.1		8.1
WQ Time: 1300/1325 Rep: 1/2 SURR	45.0		6.6		19.3		8.0		7.1		19.6		45.0		8.0
Technician: KE/KE	60.0		6.6		19.8		8.0		7.5		19.5		59.8		7.9
Day 7	Control	3	6.2	3	19.9	2	7.9					6	32.8		
	36.5		6.5		20.5		8.0						36.8		
Date: 10/4/11	39.0		6.3		19.5		8.0						39.1		
WQ Time: 1010 Rep: 2	41.0		6.6		20.3		8.0						41.3		
Technician: BG	45.0		6.2		19.8		8.0						45.1		
	60.0		6.2		19.9		8.0						60.0		

Weston Test ID:	Client:	Client Sample ID:
C110923.0163	West Basin Municipal Water District	West Basin Brine

Survival Data

Concentration (%)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 9/28/11	Date: 9/29/11	Date: 9/30/11	Date: 10/1/11	Date: 10/2/11	Date: 10/3/11	Date: 10/4/11
		Renewal Time: 1300	Renewal Time: 1300	Renewal Time: 1300	Renewal Time: 1330	Renewal Time: 1250	Renewal Time: 1320	End Time: 1520
		Tech.: BG	Tech.: BG	Tech.: JH	Tech.: KC	Tech.: KC	Tech.: KC	Tech.: KC
Control	1	5	4(1)	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	4(1)	4	4	4	4	4	4
	4	4(1)	4	4	4	4	4	4
	5	5	5	5	5	5	5	5
36.5	1	4(1)	4	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	4(1)	4	4	4	4	4	4
39.0	1	5	4(1)	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	4(1)	4	4	4	4	4	4
	5	3(2)	3	3	3	3	3	3
41.0	1	5	5	5	5	5	5	5
	2	4(1)	4	4	4	4	4	4
	3	4(1)	4	4	4	4	4	4
	4	5	5	5	5	5	5	5
	5	5	5	5	①5	5	5	5
45.0	1	4(1)	4	4	4	4	4	4
	2	4(1)	4	4	4	4	4	4
	3	4(1)	4	4	4	4	4	4
	4	5	5	5	5	5	5	5
	5	3(2)	3	3	3	3	3	3
60.0	1	Ø(5)	—	—	—	—	—	—
	2	1(4)	1	1	1	1	1	1
	3	Ø(5)	—	—	—	—	—	—
	4	2(3)	2	2	1(1)	1	1	1
	5	1(4)	1	1	1	1	1	1
	1							
	2							
	3							
	4							
	5							

Feeding Information:	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
AM Feed (Tech):		JH	KC	KC	KC	KC	KC
PM Feed (Tech):	KC	BG	SH	BG	KC	KC	SH

①DIE 10/1/11 KC

WESTON SOLUTIONS

Topsmelt 7-Day Chronic Toxicity Test

BIO063

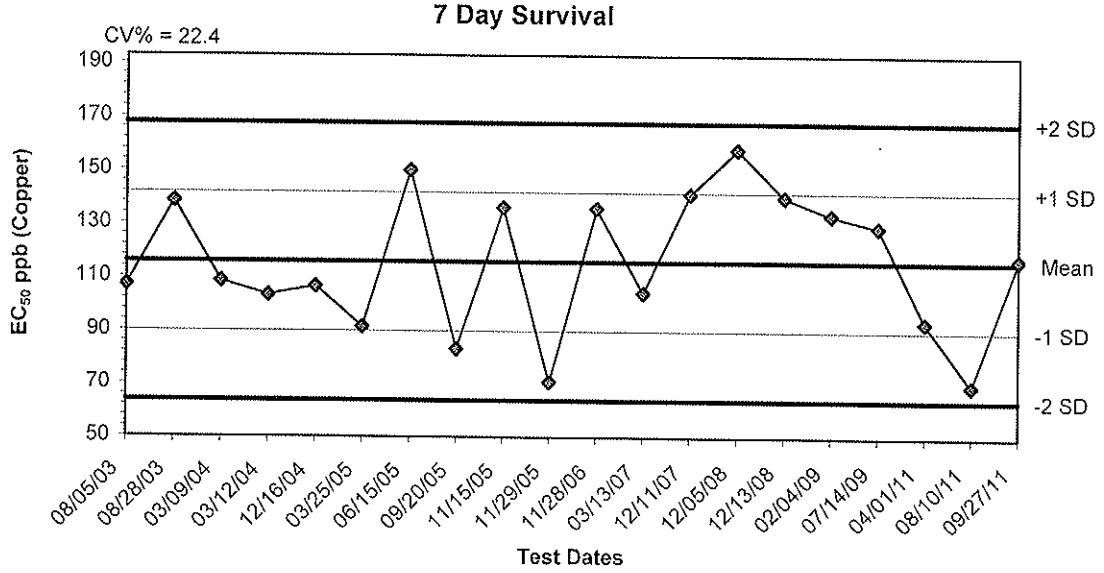
Weston Test ID:	Client:	Client Sample ID:
C|10923.D163	West Basin Municipal Water District	West Basin Brine

Concentration (%)	Replicate	Boat Number	Weight Empty Boat (mg)	Weight Boat & Animals (mg)
Control	1	1	109.23	112.78
	2	2	133.59	138.17
	3	3	95.36	98.81
	4	4	97.98	102.24
	5	5	107.52	111.59
34.5	1	6	113.58	117.55
	2	7	120.91	125.04
	3	8	96.80	101.01
	4	9	122.60	126.36
	5	10	136.39	140.05
39.0	1	11	108.27	112.40
	2	12	116.50	120.80
	3	13	123.68	127.72
	4	14	103.95	107.25
	5	15	116.72	120.31
41.0	1	16	119.53	124.22
	2	17	106.92	110.54
	3	18	118.45	122.23
	4	19	119.44	124.31
	5	20	127.25	131.91
45.0	1	21	115.37	119.81
	2	22	114.49	118.57
	3	23	124.07	127.93
	4	24	114.47	119.44
	5	25	121.36	125.36
60.0	1			
	2	~~KO 27~~ 26	118.67	120.22
	3			
	4	KO ~~28~~ 27	117.96	119.63
	5	28	131.89	133.90
	1			
	2			
	3			
	4			
	5			
		Date:	10/4/11	10/5/11
		Time:	0925	0905
		Technician:	KC	BG

Oven temp. (°C) at start of drying:	73°C	Date/Time:	10/4/11 1615	Technician:	KC
Oven temp. (°C) at end of drying:	79°C	Date/Time:	10/5/11 0835	Technician:	JH

① IE 10/4/11 KC

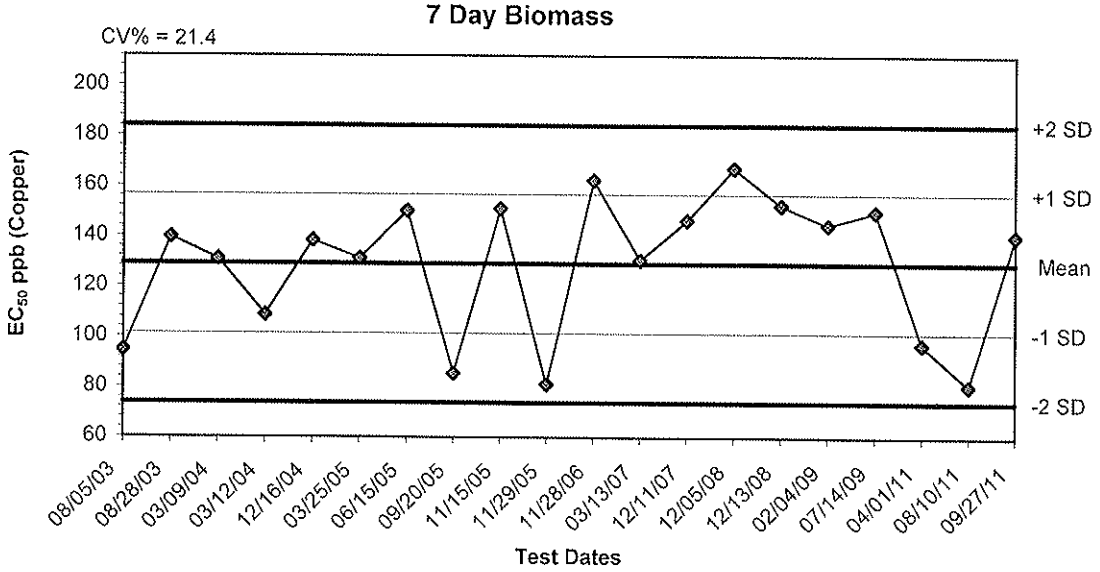
Atherinops affinis Reference Toxicant Control Chart: 7 Day Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
08/05/03	107.0200	115.8166	89.8179	63.8192	141.8153	167.8140
08/28/03	138.3890	115.8166	89.8179	63.8192	141.8153	167.8140
03/09/04	108.4000	115.8166	89.8179	63.8192	141.8153	167.8140
03/12/04	103.3190	115.8166	89.8179	63.8192	141.8153	167.8140
12/16/04	106.4900	115.8166	89.8179	63.8192	141.8153	167.8140
03/25/05	91.3448	115.8166	89.8179	63.8192	141.8153	167.8140
06/15/05	150.0000	115.8166	89.8179	63.8192	141.8153	167.8140
09/20/05	83.1386	115.8166	89.8179	63.8192	141.8153	167.8140
11/15/05	136.1540	115.8166	89.8179	63.8192	141.8153	167.8140
11/29/05	70.7110	115.8166	89.8179	63.8192	141.8153	167.8140
11/28/06	135.8100	115.8166	89.8179	63.8192	141.8153	167.8140
03/13/07	104.2070	115.8166	89.8179	63.8192	141.8153	167.8140
12/11/07	141.2510	115.8166	89.8179	63.8192	141.8153	167.8140
12/05/08	157.9200	115.8166	89.8179	63.8192	141.8153	167.8140
12/13/08	140.0730	115.8166	89.8179	63.8192	141.8153	167.8140
02/04/09	133.3300	115.8166	89.8179	63.8192	141.8153	167.8140
07/14/09	128.9120	115.8166	89.8179	63.8192	141.8153	167.8140
04/01/11	93.2577	115.8166	89.8179	63.8192	141.8153	167.8140
08/10/11	69.5230	115.8166	89.8179	63.8192	141.8153	167.8140
09/27/11	117.0820	115.8166	89.8179	63.8192	141.8153	167.8140

Updated 10/17/11 JH

Atherinops affinis Reference Toxicant Control Chart: 7 Day Biomass



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
08/05/03	94.6900	129.0773	101.4895	73.9016	156.6651	184.2529
08/28/03	139.5600	129.0773	101.4895	73.9016	156.6651	184.2529
03/09/04	130.8700	129.0773	101.4895	73.9016	156.6651	184.2529
03/12/04	108.6600	129.0773	101.4895	73.9016	156.6651	184.2529
12/16/04	138.3200	129.0773	101.4895	73.9016	156.6651	184.2529
03/25/05	131.1900	129.0773	101.4895	73.9016	156.6651	184.2529
06/15/05	150.0000	129.0773	101.4895	73.9016	156.6651	184.2529
09/20/05	85.5120	129.0773	101.4895	73.9016	156.6651	184.2529
11/15/05	150.9200	129.0773	101.4895	73.9016	156.6651	184.2529
11/29/05	81.1800	129.0773	101.4895	73.9016	156.6651	184.2529
11/28/06	162.2200	129.0773	101.4895	73.9016	156.6651	184.2529
03/13/07	130.5500	129.0773	101.4895	73.9016	156.6651	184.2529
12/11/07	146.2900	129.0773	101.4895	73.9016	156.6651	184.2529
12/05/08	167.1600	129.0773	101.4895	73.9016	156.6651	184.2529
12/13/08	152.3400	129.0773	101.4895	73.9016	156.6651	184.2529
02/04/09	144.4100	129.0773	101.4895	73.9016	156.6651	184.2529
07/14/09	149.8300	129.0773	101.4895	73.9016	156.6651	184.2529
04/01/11	97.0715	129.0773	101.4895	73.9016	156.6651	184.2529
08/10/11	80.6020	129.0773	101.4895	73.9016	156.6651	184.2529
09/27/11	140.1700	129.0773	101.4895	73.9016	156.6651	184.2529

Updated 10/17/11 JH

Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	9/27/2011 14:15	Test ID:	C110713.20	Sample ID:	REF-Ref Toxicant
End Date:	10/4/2011 15:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	0.6000	1.0000	1.0000	1.0000	1.0000
25	0.8000	1.0000	0.8000	1.0000	0.8000
50	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.2000	0.8000	0.8000	0.8000	0.6000
200	0.0000	0.0000	0.0000	0.0000	0.2000
400	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.9200	1.0000	1.2534	0.8861	1.3453	16.384	5			2	25
25	0.8800	0.9565	1.2024	1.1071	1.3453	10.848	5	24.00	17.00	3	25
50	1.0000	1.0870	1.3453	1.3453	1.3453	0.000	5	30.00	17.00	0	25
100	0.6400	0.6957	0.9342	0.4636	1.1071	29.965	5	18.50	17.00	9	25
*200	0.0400	0.0435	0.2731	0.2255	0.4636	38.990	5	15.00	17.00	24	25
400	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5			25	25

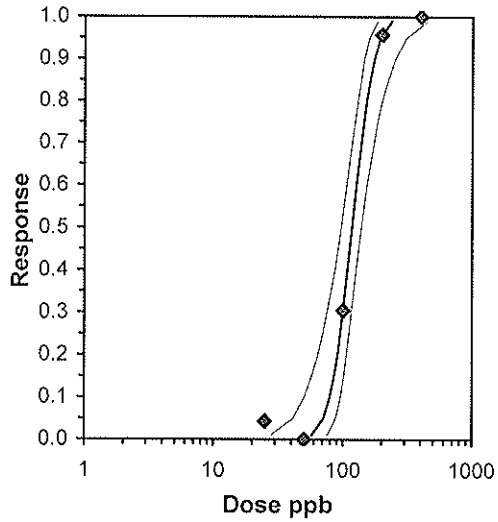
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.84891	0.888	-1.4548	2.89883
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	200	141.421	

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	7.57901	1.85541	3.9424	11.2156	0.08	3.00254	7.81473	0.39	2.06849	0.13194	8
Intercept	-10.677	3.87277	-18.268	-3.0865							
TSCR	0.0673	0.02943	0.00963	0.12498							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	57.7488	28.0452	75.9543
EC05	3.355	71.0332	41.3117	88.3007
EC10	3.718	79.3226	50.614	96.0088
EC15	3.964	85.4552	57.9104	101.825
EC20	4.158	90.6656	64.3223	106.914
EC25	4.326	95.3882	70.2477	111.702
EC40	4.747	108.408	86.6302	126.298
EC50	5.000	117.082	97.0255	137.73
EC60	5.253	126.449	107.304	152.108
EC75	5.674	143.709	123.446	184.359
EC80	5.842	151.194	129.551	200.444
EC85	6.036	160.413	136.556	221.773
EC90	6.282	172.815	145.328	252.872
EC95	6.645	192.982	158.522	308.819
EC99	7.326	237.375	184.848	453.527



Larval Fish Growth and Survival Test-7 Day Survival

Start Date:	9/27/2011 14:15	Test ID:	C110713.20	Sample ID:	REF-Ref Toxicant
End Date:	10/4/2011 15:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:	For pMSD only.				

Conc-ppb	1	2	3	4	5
Control	0.6000	1.0000	1.0000	1.0000	1.0000
25	0.8000	1.0000	0.8000	1.0000	0.8000
50	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.2000	0.8000	0.8000	0.8000	0.6000
200	0.0000	0.0000	0.0000	0.0000	0.2000
400	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.9200	1.0000	1.2534	0.8861	1.3453	16.384	5				2	25
25	0.8800	0.9565	1.2024	1.1071	1.3453	10.848	5	0.468	2.300	0.2510	3	25
50	1.0000	1.0870	1.3453	1.3453	1.3453	0.000	5	-0.841	2.300	0.2510	0	25
*100	0.6400	0.6957	0.9342	0.4636	1.1071	29.965	5	2.925	2.300	0.2510	9	25
*200	0.0400	0.0435	0.2731	0.2255	0.4636	38.990	5	8.982	2.300	0.2510	24	25
400	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	5				25	25

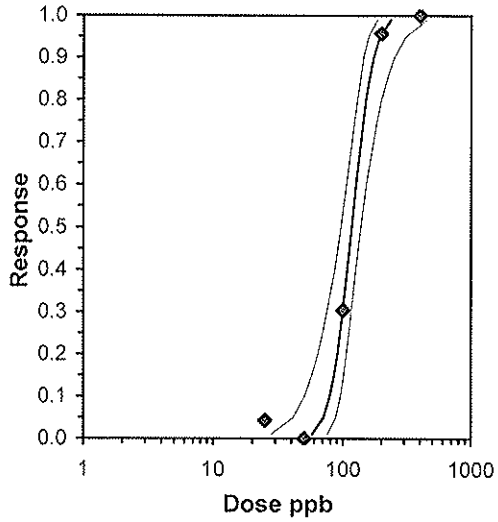
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.84891	0.888	-1.4548	2.89883
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	50	100	70.7107		0.19235	0.2131	0.94632	0.02978	2.1E-08	4, 20

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	7.57901	1.85541	3.9424	11.2156	0.08	3.00254	7.81473	0.39	2.06849	0.13194	8
Intercept	-10.677	3.87277	-18.268	-3.0865							
TSCR	0.0673	0.02943	0.00963	0.12498							

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	57.7488	28.0452	75.9543
EC05	3.355	71.0332	41.3117	88.3007
EC10	3.718	79.3226	50.614	96.0088
EC15	3.964	85.4552	57.9104	101.825
EC20	4.158	90.6656	64.3223	106.914
EC25	4.326	95.3882	70.2477	111.702
EC40	4.747	108.408	86.6302	126.298
EC50	5.000	117.082	97.0255	137.73
EC60	5.253	126.449	107.304	152.108
EC75	5.674	143.709	123.446	184.359
EC80	5.842	151.194	129.551	200.444
EC85	6.036	160.413	136.556	221.773
EC90	6.282	172.815	145.328	252.872
EC95	6.645	192.982	158.522	308.819
EC99	7.326	237.375	184.848	453.527



Larval Fish Growth and Survival Test-7 Day Growth

Start Date:	9/27/2011 14:15	Test ID:	C110713.20	Sample ID:	REF-Ref Toxicant
End Date:	10/4/2011 15:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	1.1633	0.8780	0.9240	0.9260	0.8840
25	1.1400	0.9880	1.1725	1.0240	1.1900
50	1.1320	0.9660	1.0560	1.0120	1.0360
100	1.6100	0.9750	1.1075	1.1575	1.4700
200	1.4500				

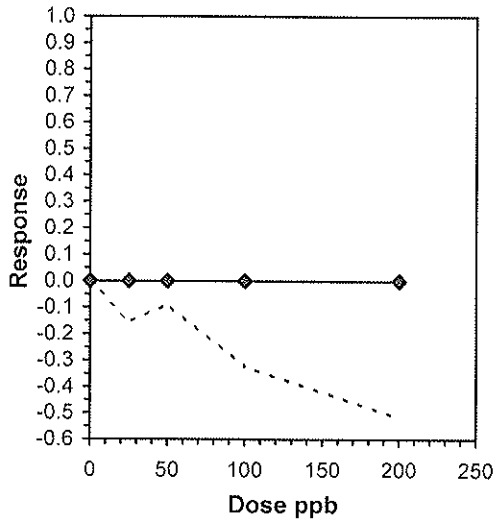
			Transform: Untransformed					1-Tailed			Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9551	1.0000	0.9551	0.8780	1.1633	12.408	5				1.1625	1.0000
25	1.1029	1.1548	1.1029	0.9880	1.1900	8.265	5	-1.505	2.230	0.2190	1.1625	1.0000
50	1.0404	1.0893	1.0404	0.9660	1.1320	5.885	5	-0.869	2.230	0.2190	1.1625	1.0000
100	1.2640	1.3235	1.2640	0.9750	1.6100	20.988	5	-3.145	2.230	0.2190	1.1625	1.0000
200	1.4500	1.5182	1.4500	1.4500	1.4500	0.000	1				1.1625	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95631	0.868	0.57629	1.04485
Bartlett's Test indicates equal variances (p = 0.03)	8.68463	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100			0.21904	0.22934	0.08518	0.02412	0.03901	3, 16

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)	Skew
IC05	>200			
IC10	>200			
IC15	>200			
IC20	>200			
IC25	>200			
IC40	>200			
IC50	>200			



Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	9/27/2011 14:15	Test ID:	C110713.20	Sample ID:	REF-Ref Toxicant
End Date:	10/4/2011 15:40	Lab ID:	CCA-Weston, Carlsbad	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPAM 02-EPA Marine	Test Species:	AA-Atherinops affinis
Comments:					

Conc-ppb	1	2	3	4	5
Control	0.6980	0.8780	0.9240	0.9260	0.8840
25	0.9120	0.9880	0.9380	1.0240	0.9520
50	1.1320	0.9660	1.0560	1.0120	1.0360
100	0.3220	0.7800	0.8860	0.9260	0.8820
200	0.0000	0.0000	0.0000	0.0000	0.2900
400	0.0000	0.0000	0.0000	0.0000	0.0000

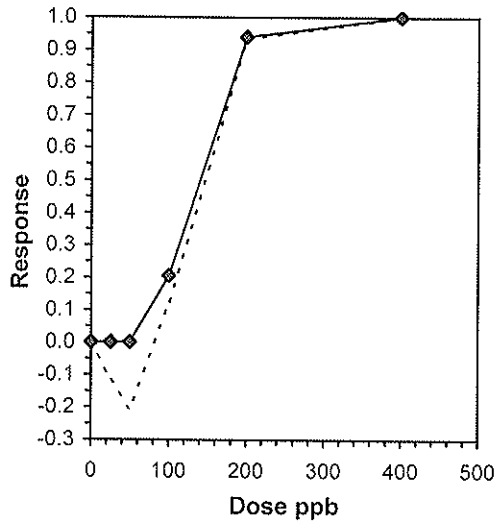
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.8620	1.0000	0.8620	0.6980	0.9260	10.941	5			0.9551	1.0000
25	0.9628	1.1169	0.9628	0.9120	1.0240	4.555	5	38.00	17.00	0.9551	1.0000
50	1.0404	1.2070	1.0404	0.9660	1.1320	5.885	5	40.00	17.00	0.9551	1.0000
100	0.7592	0.8807	0.7592	0.3220	0.9260	32.966	5	26.00	17.00	0.7592	0.7949
*200	0.0580	0.0673	0.0580	0.0000	0.2900	223.607	5	15.00	17.00	0.0580	0.0607
400	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	5			0.0000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.86814	0.888	-1.5418	5.65557
Bartlett's Test indicates equal variances (p = 0.01)	12.9086	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	200	141.421	

Linear Interpolation (200 Resamples)

Point	ppb	SD	95% CL(Exp)		Skew
IC05	62.19	10.98	52.37	119.11	2.0020
IC10	74.38	13.36	54.74	121.50	0.9538
IC15	86.57	13.51	57.11	123.83	0.2971
IC20	98.76	13.32	59.47	125.90	-0.1917
IC25	106.12	12.94	64.26	130.91	-0.3971
IC40	126.55	12.28	79.44	146.41	-0.8464
IC50	140.17	11.25	96.87	160.36	-0.9682



Test: LF-Larval Fish Growth and Survival Test
Species: AA-Atherinops affinis
Sample ID: REF-Ref Toxicant
Start Date: 9/27/2011 14:15 End Date: 10/4/2011 15:40

Test ID: C110713.20
Protocol: EPAM 02-EPA Marine
Sample Type: CUSO-Copper sulfate
Lab ID: CCA-Weston, Carlsbad

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count
	1	1	Control	5							3	170.83	167.34	3
	2	2	Control	5							5	151.26	146.87	5
	3	3	Control	5							5	114.99	110.37	5
	4	4	Control	5							5	115.55	110.92	5
	5	5	Control	5							5	114.26	109.84	5
	6	1	25.000	5							4	115.16	110.6	4
	7	2	25.000	5							5	102.41	97.47	5
	8	3	25.000	5							4	123.95	119.26	4
	9	4	25.000	5							5	110.32	105.2	5
	10	5	25.000	5							4	109.71	104.95	4
	11	1	50.000	5							5	122.39	116.73	5
	12	2	50.000	5							5	117.59	112.76	5
	13	3	50.000	5							5	128.62	123.34	5
	14	4	50.000	5							5	104.94	99.88	5
	15	5	50.000	5							5	117.4	112.22	5
	16	1	100.000	5							1	118.85	117.24	1
	17	2	100.000	5							4	119.52	115.62	4
	18	3	100.000	5							4	126.72	122.29	4
	19	4	100.000	5							4	110.01	105.38	4
	20	5	100.000	5							3	119.2	114.79	3
	21	1	200.000	5							0			0
	22	2	200.000	5							0			0
	23	3	200.000	5							0			0
	24	4	200.000	5							0			0
	25	5	200.000	5							1	104.36	102.91	1
	26	1	400.000	5							0			0
	27	2	400.000	5							0			0
	28	3	400.000	5							0			0
	29	4	400.000	5							0			0
	30	5	400.000	5							0			0

Comments:

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

Test ID: C110713.20	Associated Test(s): West Basin		Study Director: K. Curry
Organism Batch: ABS 2951	Location: Rm. 3	Replicates: 5	No. of Organisms: 5
Start Time: 1415	Initials: BG	End Time: 1540	Initials: BG

Day 0 Water Quality Data						
Stock						
Date: 9/27/11	Time: 1310			Initials: BG		
	Control	25	50	100	200	400
D.O. (mg/L)	7.0	6.9	6.9	6.9	7.0	7.0
Temperature	19.9	19.8	19.9	19.8	19.8	19.9
Salinity	32.8	32.8	32.8	32.8	32.7	32.7
pH	8.1	8.1	8.1	8.1	8.1	8.1

Day 7 Water Quality Data						
Date: 10/4/11	Time: 1020		Replicate: 2		Initials: BG	
	Control	25	50	100	200	400
D.O. (mg/L)	6.7	6.5	6.7	6.6	6.9	DBG
Temperature	20.0	20.3	19.8	19.4	20.0	
Salinity	32.8	32.7	32.9	32.8	32.9	
pH	8.0	8.0	8.0	8.0	8.1	

[X] Pass [ ] Fail

Notes: (1) No survival in concentration 10/4/11 BG

7 - Day Topsmelt
Reference Toxicant Test

Reference Toxicant Dilution Worksheet

Test ID:	Toxicant:	Toxicant Lot Number:
C110713.20	Copper Sulfate ($0.509gCu/LCuSO_4$)	20085C6

Serial Dilute by ½ to obtain concentrations of 400, 200, 100, 50, and 25 ppb.

Date Prepared	Day	Target Conc.	A. Toxicant (target) B. Toxicant (actual)	A. Diluent (target) B. Diluent (actual)	Dilution Water Batch	Tech.
9/27/11	0	400 ppb	(A) 1.965 ml (B) 1.9653ml	(A) 2500 ml (B) 2500.0ml	S10092311	KC
9/28/11	1	400ppb	(A) 0.98265 mL (B) 0.9827 ml	(A) 1250 mL (B) 1250 ml	S10092311	BG
9/29/11	2	200ppb	(A) 0.4913ml (B) 0.4916 ml	(A) 1250 ml (B) 1250.0 ml	S10092311	KC
9/30/11	3	200ppb	(A) 0.4913ml (B) 0.4913ml	(A) 1250 ml (B) 1250.0ml	S10092311	KC
10/1/11	4	200ppb	(A) 0.4913ml (B) 0.4914ml	(A) 1250 ml (B) 1250.0ml	S10092311	KC
10/2/11	5	200ppb	(A) 0.4913ml (B) 0.4915ml	(A) 1250 ml (B) 1250.0ml	S10092311	KC
10/3/11	6	200ppb	(A) 0.4913 ml (B) 0.4915ml	(A) 1250 ml (B) 1250.0 ml	S10092311	KC

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

Test ID: C110713.20

Concentration (ppb)	Rep	Weigh Boat Number	Tare Weight (mg)	Total Weight (mg)
Control	1	1	167.34	170.83
	2	2	146.87	151.26
	3	3	110.37	114.99
	4	4	110.92	115.55
	5	5	109.84	114.26
25	1	6	110.60	115.16
	2	7	97.47	102.41
	3	8	119.26	123.95
	4	9	105.20	110.32
	5	10	104.95	109.71
50	1	11	116.73	122.39
	2	12	112.76	117.59
	3	13	123.34	128.62
	4	14	99.88	104.94
	5	15	112.22	117.40
100	1	16	117.24	118.85
	2	17	115.62	119.52
	3	18	122.29	126.72
	4	19	105.38	110.01
	5	20	114.79	119.20
200	1			
	2	21	102.07	
	3	22	134.19	
	4			
	5	23	102.91	104.36
400	1			
	2			
	3			
	4			
	5			
		Date:	10/4/11	10/5/11
		Time:	0905	0930
		Initials:	KC	BG

7 - Day Topsmelt
Reference Toxicant Test

Bio 063

SURVIVAL DATA

Test ID: C110713.20

Conc. (ppb)	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		Date: 9/28/11	Date: 9/29/11	Date: 9/30/11	Date: 10/1/11	Date: 10/2/11	Date: 10/3/11	Date: 10/4/11
		Renewal Time: 1330	Renewal Time: 1320	Renewal Time: 1310	Renewal Time: 1350	Renewal Time: 1230	Renewal Time: 1345	End Time: 1540
		Tech: BG	Tech: BG	Tech: JH	Tech: TE	Tech: TE	Tech: SH	Tech: BG
Control	1	4(1)	4	3(1)	3	3	3	3
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
25	1	4(1)	4	4	4	4	4	4
	2	5	5	5	5	5	5	5
	3	4(1)	4	4	4	4	4	4
	4	5	5	5	5	5	5	5
	5	4(1)	4	4	4	4	4	4
50	1	5	5	5	5	5	5	5
	2	5	5	5	5	5	5	5
	3	5	5	5	5	5	5	5
	4	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5
100	1	3(2)	3	1(2)	1	1	1	1
	2	5	5	5	5	4(1)	4	4
	3	4(1)	4	4	4	4	4	4
	4	5	4(1)	4	4	4	4	4
	5	4(1)	4	3(1)	3	3	3	3
200	1	4(1)	2(2)	2	1(1)	1	Ø(1)	—
	2	3(2)	3	2(1)	2	1(1)	1	Ø(1)
	3	4(1)	3(1)	2(1)	2	1(1)	1	Ø(1)
	4	3(2)	3	2(1)	Ø(2)	—	—	—
	5	4(1)	3(1)	2(1)	1(1)	1	1	1
400	1	Ø(5)						
	2	Ø(5)						
	3	Ø(5)						
	4	Ø(5)						
	5	Ø(5)						

APPENDIX B

LONG-TERM EXPOSURE ASSESSMENT: TRIAL 1

Water Quality Data

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	Time: 9/29/11
End Date:	Time:

Water Quality Data

Date: 9/29/11 Time: 5:11Apm Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.4	51.23	7.9	
	High Salinity	17.9	6.3	50.91	7.9	

Date: 9/29/11 Time: [illegible] pm Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.8	50.79	8.0	
	High Salinity	19.0	6.5	51.29	7.9	

Date: 9/30/11 Time: 9:35 pm Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.3	51.52	8.0	
	High Salinity	16.7	6.1	51.81	7.9	

Date: 9/30/11 Time: 3:30pm Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.9	52.03	7.9	
	High Salinity	16.7	6.2	51.75	7.8	

Date: 10/1/11 Time: 10:15 Tech: Chris Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.4	51.05	8.0	
	High Salinity	16.7	6.5	51.16	7.9	

Date: 10/1/11 Time: 3:35 Tech: Chris Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.9	6.1	50.99	8.0	
	High Salinity	18.1	5.8	51.10	7.9	

Date: 10/2/11 Time: [illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.1	6.1	50.56	7.9	
	High Salinity	17.3	6.0	50.81	7.9	

Date: [illegible] Time: [illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.1	50.58	8.0	
	High Salinity	17.9	6.0	50.81	7.9	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 3,Oct,2011 Time: 1:45 PM Tech: David Ellis	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.6	6.3	50.60	7.9	
	High Salinity	17.5	6.3	51.12	7.9	

Date: 3, Oct 2011 Time: 3:42 PM Tech: David Ellis	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.6	6.7	50.17	7.8	
	High Salinity	18.9	5.9	53.39	7.8	

Date: 4 Oct, 2011 Time: 8:10 AM Tech: David Ellis	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.4	47.64	7.8	
	High Salinity	17.3	6.3	54.27	7.8	

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.4	47.64	7.8	
	High Salinity	17.3	6.3	54.27	7.8	

Date: 4,Oct,2011 Time: 3:37 Tech: Blanca Cacho	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.5	6.0	50.85	7.8	
	High Salinity	17.0	6.0	54.46	7.8	

Date: 5,Oct,2011 Time: 8:50 Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.8	51.30	[illegible]	
	High Salinity	15.9	7.7	55.10	7.8	

Date: 5,Oct,2011 Time: [illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	[illegible]	6.0	51.56	7.7	
	High Salinity	[illegible]	[illegible]	[illegible]	[illegible]	

Date: 6,Oct,2011 Time: 8:45 Tech: Chris Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.6	51.85	7.9	
	High Salinity	15.8	6.9	55.58	7.8	

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 06-Octa-2011 Time: 3:50 Tech: Chris Bowman	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.3	51.58	7.8	
	High Salinity	16.2	6.8	54.81	7.8	

Date: 7, Oct, 2011 Time: 9:01 AM Tech: David, Chris	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.3	6.4	51.64	7.7	
	High Salinity	16.8	6.1	54.81	7.8	

Date: 7, Oct, 2011 Time: 3:03 pm Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.4	6.4	51.38	7.8	
	High Salinity	17.8	6.8	53.02	7.8	

Date: 8 Oct 2011 Time: 11:57 am Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	6.0	51.6	7.8	
	High Salinity	15.7	6.0	53.8	7.8	

Date: 8 Oct 2011 Time: 4:36 pm Tech: Ernesto A.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.3	51.4	7.8	
	High Salinity	17.3	6.4	52.98	7.8	

Date: 09 Oct 2011 Time: 9:15 am Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.6	51.6	7.7	
	High Salinity	15.8	7.0	53.79	7.8	

Date: 09 Oct 2011 Time: 12:41 pm Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.7	50.25	7.7	
	High Salinity	17.0	6.5	53.64	7.9	

Date: 10-10-11 Time: 9:25 AM Tech: Erika L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.3	50.75	7.9	
	High Salinity	15.9	7.0	54.44	8.0	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 11 Oct 2011 Time: [illegible] Tech: [illegible] Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	6.6	50.73	7.4	
	High Salinity	16.6	6.3	54.64	8.0	

Date: 11 Oct 2011 Time: 3:[illegible] Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	5.9	51.40	7.9	
	High Salinity	16.5	5.7	54.58	7.4	

Date: 10-12-11 Time: 7:53 Tech: Brian L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	5.7	51.11	7.9	
	High Salinity	17.0	6.1	53.75	8.0	

Date: 12-Oct-2011 Time: 3:[illegible] Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.2	6.0	51.07	7.4	
	High Salinity	16.7	6.4	53.62	7.9	

Date: 13-Oct-2011 Time: 7:55 am Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	5.6	50.97	7.4	
	High Salinity	17.0	6.1	53.25	8.0	

Date: 13 Oct 2011 Time: 3:40 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.3	51.34	8.1	
	High Salinity	18.2	6.5	53.98	8.3	

Date: 14 Oct 2011 Time: [illegible] Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.4	51.39	7.9	
	High Salinity	14.7	7.4	49.07	8.0	

Date: 14 Oct 2011 Time: [illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.9	5.1	51.78	7.8	
	High Salinity	15.9	5.2	52.07	7.8	

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 15 Oct 2011 Time: 10:01 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.9	6.1	51.78	7.9	
	High Salinity	16.3	6.0	53.83	7.9	

Date: 15 Oct 2011 Time: 4:25 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.2	6.0	51.17	8.0	
	High Salinity	17.0	6.3	52.60	8.0	

Date: 16 Oct 2011 Time: 10:37 Tech: Camille	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.1	6.0	51.13	7.9	
	High Salinity	16.7	5.7	53.24	8.0	

Date: [illegible] Time: 4:38 Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.4	7.0	50.99	8.0	
	High Salinity	18.1	6.9	53.39	8.1	

Date: [illegible] Time: [illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.1	51.09	7.9	
	High Salinity	17.4	6.2	52.44	8.0	

Date: 10-17-2011 Time: 9:25 AM Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	5.7	50.89	7.9	
	High Salinity	17.0	6.0	[illegible]	7.9	

Date: 10-18-2011 Time: 7:48 AM Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.0	50.99	[illegible]	
	High Salinity	17.2	5.9	[illegible]	7.9	

Date: 18-10-2011 Time: [illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	[illegible]	[illegible]	[illegible]	[illegible]	
	High Salinity	[illegible]	[illegible]	[illegible]	[illegible]	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 10-19-11 Time: 7:35am Tech: Blanca.C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	5.5	50.72	7.4	
	High Salinity	15.2	5.4	47.91	7.4	

Date: 10-19-11 Time: 3:43pm Tech: Blanca .C,	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.9	7.0	51.28	7.8	
	High Salinity	16.3	6.5	52.10	7.9	

Date: 10-20-11 Time: [illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	6.1	50.75	7.7	
	High Salinity	15.1	6.0	52.16	7.8	

Date: 10-20-11 Time: 3'25pm Tech: Blanca_C,	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	6.7	50.99	7.8	
	High Salinity	15.6	6.7	52.64	7.9	

Date: 10-21-11 Time: 8:38 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.7	7.5	51.38	7.7	
	High Salinity	14.7	7.0	52.81	7.8	

Date: 10-21-11 Time: 9:21 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	6.8	51.32	7.7	
	High Salinity	14.6	6.5	60.35	7.8	

Date: 10-22-11 Time: 3:30 Tech: Chris P.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.2	7.7	51.69	7.8	
	High Salinity	16.8	7.4	62.15	7.8	

Date: 23Oct 2011 Time: 10:59 Tech: Errol J.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.4	51.40	7.6	
	High Salinity	15.2	6.1	67.25	7.2	

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 24 OCT 2011 Time: 9:20 AM Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.7	52.87	7.7	
	High Salinity	14.7	7.0	32.02	7.5	

Date: 24 OCT 2011 Time: 2:37PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.6	6.0	50.97	7.5	
	High Salinity	16.3	5.7	39.85	7.5	

Date: 25 OCT 2011 Time: 8:43 Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	6.3	51.07	7.6	
	High Salinity	14.7	6.2	60.69	7.7	

Date: ~~24 48~~ 25 OCT 2011 Time: 3:48 Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.6	6.4	51.13	7.7	
	High Salinity	16.4	6.6	60.81	7.7	

Date: 26 OCT 2011 Time: 9:45 AM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	6.5	50.73	7.7	
	High Salinity	15.9	6.2	61.48	7.8	

Date: 26 OCT 2011 Time: 3:45 PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.9	6.0	50.36	7.7	
	High Salinity	16.4	6.7	59.48	7.9	

Date: 27 OCT 2011 Time: 9:34 AM Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.4	50.50	7.7	
	High Salinity	15.8	6.5	60.46	7.8	

Date: 27 OCT 2011 Time: 3:45 PM Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	6.8	51.49	7.7	
	High Salinity	16.1	6.6	60.27	7.8	

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 1 NOV 2011 Time: 8:30 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	5.9	51.34	7.8	
	High Salinity	15.3	5.8	63.19	7.8	

Date: 1 Nov 2011 Time: 300 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	5.9	51.69	7.7	
	High Salinity	14.9	5.7	63.15	7.7	

Date: 2 Nov 2011 Time: 8:19 am Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	6.0	51.74	7.7	
	High Salinity	15.3	6.0	63.13	7.7	

Date: 2 Nov 2011 Time: 3:45 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	5.7	51.64	7.7	0
	High Salinity	14.8	5.7	63.11	7.6	0

Date: 3 Nov 2011 Time: 750 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.0	51.56	7.6	
	High Salinity	15.0	5.8	63.19	7.7	

Date: 3 Nov 2011 Time: 3:46 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.3	51.52	7.7	
	High Salinity	15.3	6.3	62.90	7.7	

Date: 4 Nov 2011 Time: 7:23 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	6.3	51.52	7.7	
	High Salinity	15.6	6.2	63.04	7.7	

Date: 4 Nov 2011 Time: 3:40 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.1	6.0	51.64	7.5	
	High Salinity	15.7	5.7	62.31	7.6	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 28 Oct 2011 Time: 405 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	6.7	51.09	7.2	
	High Salinity	14.9	6.2	51.14	7.7	

Date: 28 Oct 2011 Time: 355 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.6	51.30	7.9	0
	High Salinity	15.4	6.3	60.60	7.7	0

Date: 29 Oct 2011 Time: [illegible] Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.1	51.52	7.7	
	High Salinity	15.2	6.0	60.44	7.7	

Date: 29 Oct 2011 Time: 4:20 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.3	6.9	50.89	[illegible]	
	High Salinity	16.0	6.9	58.73	7.8	

Date: 30 Oct 2011 Time: 7:47 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	6.1	51.44	7.7	
	High Salinity	15.6	5.9	59.19	7.7	

Date: 30 Oct 2011 Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.8	51.38	7.8	
	High Salinity	15.9	6.7	59.62	7.8	

Date: 31 OCT 2011 Time: [illegible] AM Tech: [illegible] AN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.6	51.34	7.7	
	High Salinity	15.3	6.3	60.27	7.8	

Date: 31 OCT 2011 Time: 3:20pm Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.5	51.07	7.7	
	High Salinity	15.1	7.1	58.21	7.7	

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 5 Nov 2011 Time: 10:11 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.8	6.0	51.79	7.7	
	High Salinity	14.2	6.0	54.27	7.7	

Date: 5 NOV 2011 Time: 5:01 Tech: ~~Chris B~~ Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.9	51.64	7.7	
	High Salinity	15.5	6.6	52.46	7.7	

Date: 6 Nov 2011 Time: 10:45 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	6.2	53.41	7.7	
	High Salinity	13.8	6.3	51.68	7.6	

Date: 6 Nov 2011 Time: 450 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	6.8	51.56	7.7	
	High Salinity	15.1	6.6	52.56	7.7	

Date: 7 NOV 2011 Time: 7:59 AM Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	6.8	31.62	7.7	
	High Salinity	14.4	6.6	53.12	7.7	

Date: 7 Nov 2011 Time: 3:30 Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.8	31.58	7.6	
	High Salinity	14.9	6.6	52.81	7.7	

Date: 8 NOV 2011 Time: 8:02 am Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.0	51.30	7.6	
	High Salinity	14.8	6.7	53.04	7.7	

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Mortality Data

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Survival Data

Treatment	Date: 10-18-11 Time: 3:00pm Tech: Blanco (Control)			Date: 10-24-11 Time: 8:25 Tech: BLANCO (HIGH SALINITY)			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control	Mussels	1	Unknown	~~Brine Shrimp~~	~~1~~	~~Unk~~			
	(empty shell)								
High Salinity				BRINE SHRIMP	1	~~UNKNOWN~~ UNKNOWN			

Treatment	Date: 29 Oct Time: 7:54 Tech: Ernesto (CONTROL)			Date: 14 NOV 2011 Time: 3:55 Tech: BLANC (CONTROL)			Date: 15 NOV 2011 Time: 2:00pm Tech: Rodrigo (HIGH SALINITY)		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control	Crawfish Crab	1	Unknown	~~BRINE~~ BRINE SHRIMP	1	UK	~~UNKNOWN~~	~~1~~	~~UNKNOWN~~
High Salinity							UNKNOWN	3	UNKNOWN

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Acclimation
Start Date:	**Time:**
End Date:	**Time:**

Survival Data

Treatment	Date: 11-17-11 Time: 8:00 am Tech: Blanca C			Date: 11-18-11 Time: 9:20 am Tech: Blanca			Date: 19 Nov 2011 Time: 4:09 Tech: Ernesto		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control 1130	Purple sea urchin	2	0.110	Abalone	1	0.070	C. antennarius	1	0
	crabs (anthropogenic)	1	0.045						
	Purple sea urchin	1	0.061						

Treatment	Date: 11/21/2011 Time: 10 58 Tech: Roberto			Date: Time: Tech:			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
~~HIGH SALINITY~~ Control	Abalone	2							

Treatment	Date: Time: Tech:			Date: Time: Tech:			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control									

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Acclimation
Start Date:	**Time:**
End Date:	**Time:**

Survival Data

Treatment	Date: Time: Tech:			Date: Time: Tech:			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control									

Treatment	Date: 10-04-2011 Time: Tech:			Date: 10-7-2011 Time: 9:40am Tech: ROWENA			Date: 10-10-11 Time: 9:42 AM HIGH SALINITY Tech: RBWN		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control	MINNOWS	1	PREDATOR	GRACILISCARIA	1	UNKNOWN	SAND DAB	1	UK

Treatment	Date: Time: Tech: LEW			Date: 11-1-11 Time: 1:45 CONTROL Tech: CW			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control				MUSSELS	3		MUSSELS	5	
	URCHINS	1	UNKNOWN						

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Acclimation
Start Date:	**Time:**
End Date:	**Time:**

Survival Data

Treatment	Date: 9-20-11 Time: Tech:			Date: 9/20/11 Time: 10:5 AM Tech: David Fi			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control	E. SEA URCHINS	2	0.2 ml	P. Sea Urchins	3	Unknown			

Treatment	Date: Time: Tech:			Date: Time: Tech:			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control									

Treatment	Date: Time: Tech:			Date: Time: Tech:			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control									

** PLACE PICTS IN BAG IN FREEZER LABELED DESAL PICTS STARTING 05 AUG 2011

** PLACE MORTS IN BAG IN FREEZER LABELED DESAL MORTS STARTING 05 AUG 2011

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Acclimation		
Start Date:		**Time:**	
End Date:		**Time:**	

Survival Data

Treatment	Date: 10-19-2011 Time: 1:13 Tech: Chris B			Date: Time: Tech:			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control	Rockfish	1	Unknown						

Treatment	Date: Time: Tech:			Date: Time: Tech:			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control									

Treatment	Date: Time: Tech:			Date: Time: Tech:			Date: Time: Tech:		
	Organism	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**	**Organism**	**No. Dead**	**Cause**
Control									

Statistical Analyses and Laboratory Benchsheets

Test: BV-Bivalve Larval Survival and Development Test						Test ID: C111122.04		
Species: MG-Mytilus galloprovincialis						Protocol: USEPA98-USACE / USEPA 1998		
Sample ID: 33 ppt Batch						Sample Type: EFF2-Industrial		
Start Date: 11/23/2011 15:10				End Date: 11/25/2011		Lab ID: CCA-Carlsbad, Weston		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	33	232	238	238	218	
	2	2	33	232	211	211	193	
	3	3	33	232	200	200	183	
	4	4	33	232	224	224	205	
	5	1	50	232	75	75	0	
	6	2	50	232	78	78	0	
	7	3	50	232	83	83	0	
	8	4	50	232	75	75	0	

Comments: West Basin Long-Term High Salinity Study

Bivalve Larval Survival and Development Test-Proportion Alive

Start Date:	11/23/2011 15:10	Test ID:	C111122.0442	Sample ID:	33 ppt Batch
End Date:	11/25/2011 14:15	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	11/22/2011 11:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	MG-Mytilus galloprovincialis
Comments:	West Basin Long-Term High Salinity Study				

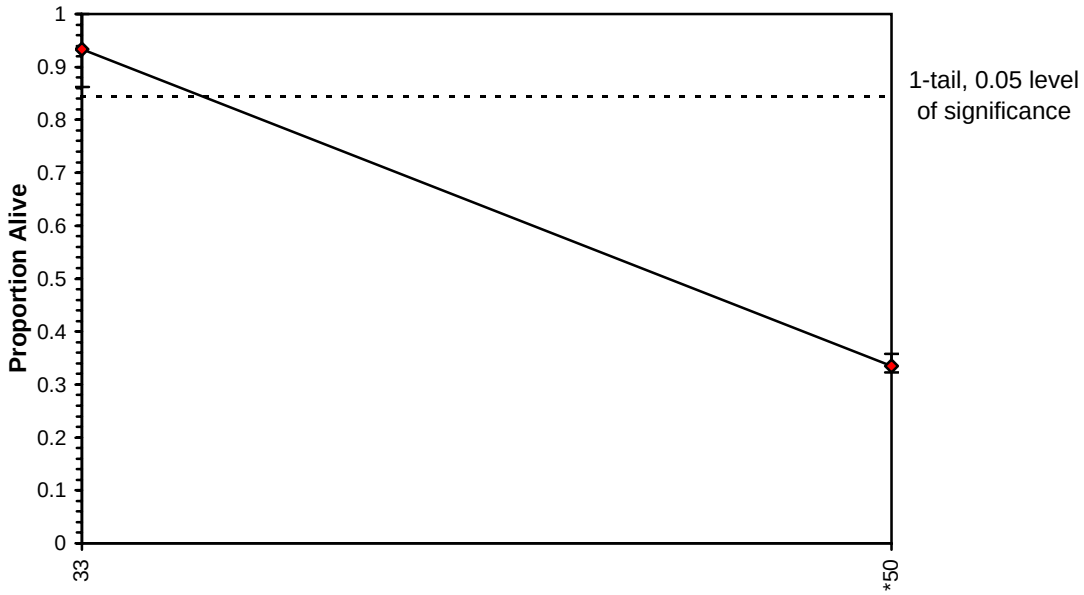
Conc-%	1	2	3	4
33	1.0000	0.9095	0.8621	0.9655
50	0.3233	0.3362	0.3578	0.3233

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.9343	1.0000	1.3444	1.1903	1.5380	11.286	4			
*50	0.3351	0.3587	0.6173	0.6048	0.6412	2.782	4	9.523	2.353	0.1797

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93055	0.818	0.60527	2.00394
F-Test indicates unequal variances (p = 4.81E-03)	78.0337	47.4683		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Heteroscedastic t Test indicates significant differences	0.10565	0.11125	1.05723	0.01166	7.6E-05	1, 6
Treatments vs 33						

Dose-Response Plot



Bivalve Larval Survival and Development Test-Proportion Normal

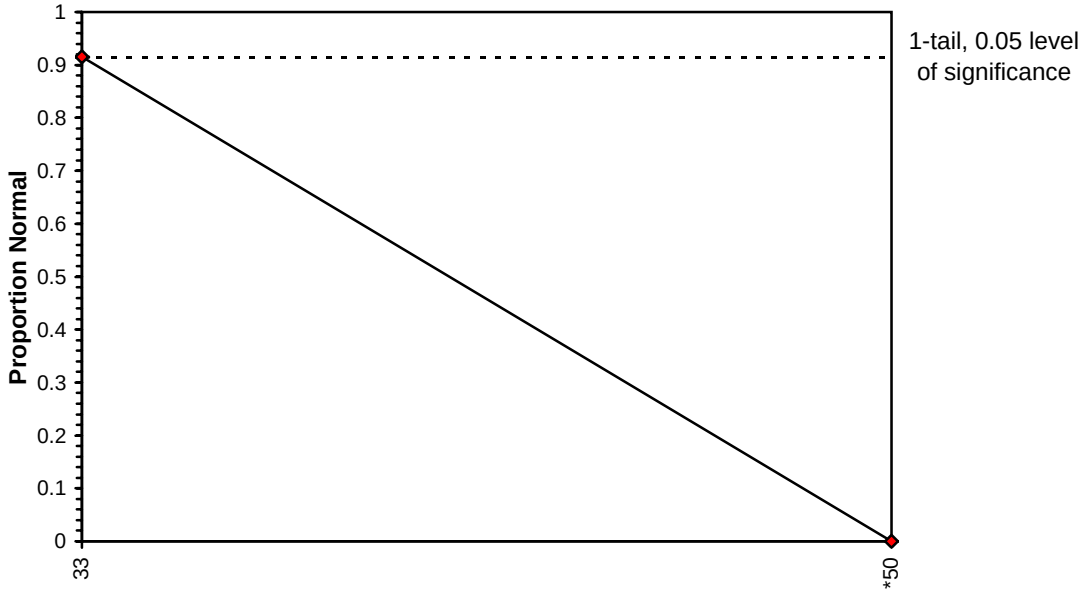
Start Date:	11/23/2011 15:10	Test ID:	C111122.0442	Sample ID:	33 ppt Batch
End Date:	11/25/2011 14:15	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	11/22/2011 11:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	MG-Mytilus galloprovincialis
Comments:	West Basin Long-Term High Salinity Study				

Conc-%	1	2	3	4
33	0.9160	0.9147	0.9150	0.9152
50	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root						1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.9152	1.0000	1.2753	1.2744	1.2767	0.077	4			
*50	0.0000	0.0000	0.0568	0.0549	0.0578	2.377	4	#######	1.943	0.0016

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94345		0.818		-0.4149	-0.4909
F-Test indicates equal variances (p = 0.61)	1.91221		47.4683			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates significant differences Treatments vs 33	0.0009	0.00099	2.96976	1.4E-06	6.9E-18	1, 6

Dose-Response Plot



Test: BV-Bivalve Larval Survival and Development Test						Test ID: C111122.04		
Species: MG-Mytilus galloprovincialis						Protocol: USEPA98-USACE / USEPA 1998		
Sample ID: 50 ppt Batch						Sample Type: EFF2-Industrial		
Start Date: 11/23/2011 15:10				End Date: 11/25/2011		Lab ID: CCA-Carlsbad, Weston		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	33	260	232	232	174	
	2	2	33	260	237	237	38	
	3	3	33	260	247	247	169	
	4	4	33	260	259	259	205	
	5	1	50	260	236	236	1	
	6	2	50	260	219	219	0	
	7	3	50	260	240	240	1	
	8	4	50	260	208	208	0	

Comments: West Basin Long-Term High Salinity Study

Bivalve Larval Survival and Development Test-Proportion Alive

Start Date:	11/23/2011 15:10	Test ID:	C111122.0442	Sample ID:	50 ppt Batch
End Date:	11/25/2011 14:15	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	11/22/2011 11:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	MG-Mytilus galloprovincialis
Comments:	West Basin Long-Term High Salinity Study				

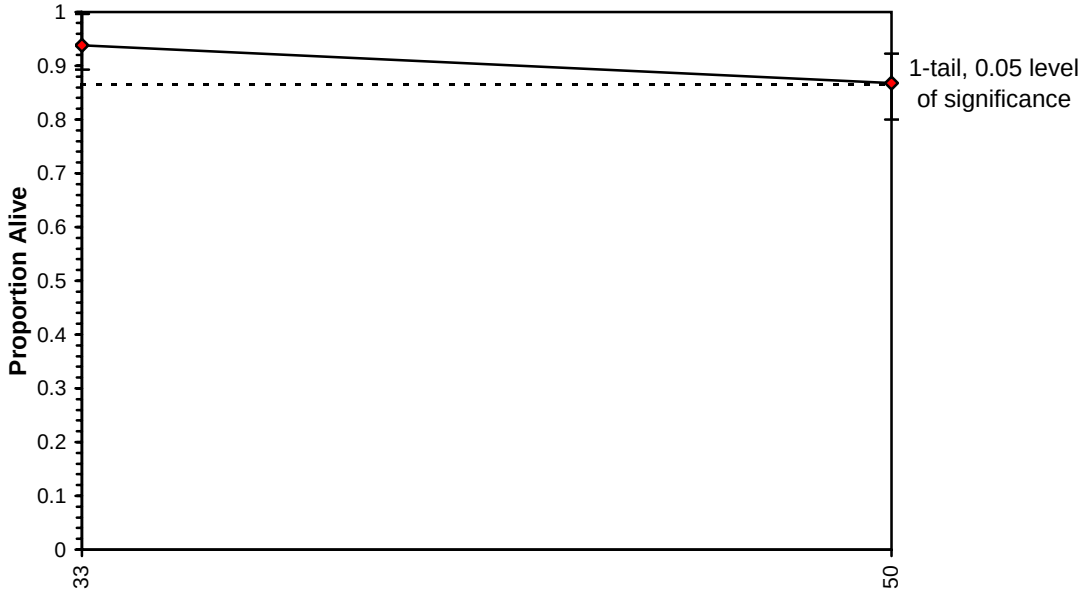
Conc-%	1	2	3	4
33	0.8923	0.9115	0.9500	0.9962
50	0.9077	0.8423	0.9231	0.8000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.9375	1.0000	1.3398	1.2364	1.5087	9.069	4			
50	0.8683	0.9262	1.2054	1.1071	1.2898	7.077	4	1.811	1.943	0.1442

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.92679	0.818	0.64623	-0.6297
F-Test indicates equal variances (p = 0.58)	2.02907	47.4683		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.0819	0.08643	0.03616	0.01102	0.12006	1, 6
Treatments vs 33						

Dose-Response Plot



Bivalve Larval Survival and Development Test-Proportion Normal

Start Date:	11/23/2011 15:10	Test ID:	C111122.0442	Sample ID:	50 ppt Batch
End Date:	11/25/2011 14:15	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	11/22/2011 11:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	MG-Mytilus galloprovincialis
Comments:	West Basin Long-Term High Salinity Study				

Conc-%	1	2	3	4
33	0.7500	0.1603	0.6842	0.7915
50	0.0042	0.0000	0.0042	0.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
33	0.5965	1.0000	0.8825	0.4120	1.0966	35.998	4		
*50	0.0021	0.0035	0.0496	0.0338	0.0651	35.703	4	10.00	11.00

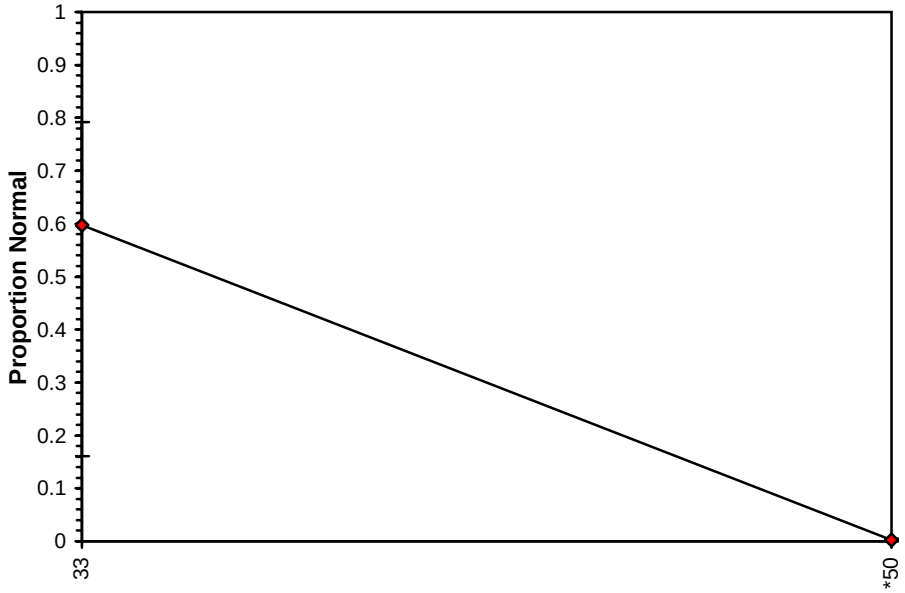
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.79075	0.818	-1.8778	4.55595
F-Test indicates unequal variances (p = 5.83E-04)	322.437	47.4683		

Hypothesis Test (1-tail, 0.05)

Wilcoxon Two-Sample Test indicates significant differences

Treatments vs 33

Dose-Response Plot



BIVALVE 48-HOUR CHRONIC TOXICITY TEST

BIO042

CLIENT:	West Basin Municipal Water District
PROJECT:	Salinity Study
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C111122.0442
SPECIES:	Mytilus galloprovincialis

DATE RECEIVED:	11/22/11
DATE TEST STARTED:	11/23/11
DATE TEST ENDED:	11/25/11
WESTON SOP NO.:	BIO 042
STUDY DIRECTOR:	K. Stenvenberg

	Concentration	meter #	DO* (mg/l)	meter #	Temp* (°C)	meter #	Salinity* (ppt)	meter #	pH*
Day 0 (0 Hours) Date: 11/23/11 Sample ID: C111122.04 Dilutions (Tech): SH WQ Time: 1411 Technician: KS	~~Control~~	3	—	3	—	5	—	2	—
	~~Brine Control~~								
	33 batch 33ppt		7.4		15.2		32.9		8.1
	33 batch 50ppt		6.8		15.2		50.2		7.9
	50 batch 33ppt		7.4		15.1		33.1		8.1
	50 batch 50ppt		6.9		15.3		50.3		7.9
24 Hours Date: 11/24/11 WQ Time: 0725 Technician: BG	~~Control~~			6B	—				
	~~Brine Control~~								
	33 batch 33ppt				14.5				
	33 batch 50ppt				14.5				
	50 batch 33ppt				14.3				
	50 batch 50ppt				14.4				
48 Hours Date: 11/25/11 WQ Time: 1405 Technician: BG	~~Control~~	3	①BG — 8.0	3	— 15.4	5	— 33.2	2	— 8.0
	~~Brine Control~~								
	33 batch 33ppt		8.0		15.4		33.2		8.0
	33 batch 50ppt		8.1		15.4		50.7		8.0
	—		—		—		—		—
	50 batch 33ppt		8.2		15.3		33.6		8.1
	50 batch 50ppt		8.1		15.6		50.2		8.0

*Water quality measurements taken in surrogate water quality chambers.

START TIME:	1510	Initials:	KS
END TIME:	1415	Initials:	BG
ORGANISM BATCH:			
HOBO TEMP. NO.:	778889		
TEST LOCATION:	2		

DILUTION WATER BATCH:	SW 10241
TEST ACCEPTABILITY:	
☐	≥70% SURVIVAL IN CONTROL (oysters) or 50% SURVIVAL FOR MUSSELS
☐	≥ 90% NORMAL SHELL DEVELOPMENT IN SURVIVING CONTROLS
☐	MSD < 25%

① WC 11/25/11 BG

BIVALVE 48-HOUR CHRONIC TOXICITY TEST

BIO042

50 ppt Batch

Weston Test ID:	Client:	Client Sample ID:
C1111 22.0442	West Basin Municipal Water District	West Basin Brine

SPAWNING DATA

Initial Spawning Time:	Final Spawning Time:	Fertilization Time:	No. of Females:	No. of Males:
1050	1145	1145	4	2
Embryo Density (count/mL): ① KS	1. 175 / 172	2. 159 / 160	3. 173 / 163	Average: 167
Stocking Volume Calculation:	2700 ÷ (50 × 167) = 0.32			

ZERO TIME COUNTS

1. 261	2. 271	3. 244	4. 260	5. 256	6. 266
Average Count: 260			Technician: KS		

LARVAL COUNT DATA

Conc.	Rep 1		Rep 2		Rep 3		Rep 4		Rep 5		Date	Initials
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal		
~~Control~~												
~~Brine~~												
33	174	58	38	199	169	78	205	54			11/28/11	KS
50	1	235	∅	219	1	239	∅	208				↓

QA COUNT CHECKS

	QA Check #1	QA Check #2	QA Check #3	QA Check #4
Concentration / Replicate	50 1 2	33 1 1	1	1
Total #	221	233		
# Normal	∅	172		
Date / Initials	12/1/11 1 SH	12/1/11 1 SH	1	1
QA Check Acceptability: ☐ <5% difference in means of QA & orig. counts				

① only ~ 20% cells ~~divided~~ divided 11/23/11 KS

BIVALVE 48-HOUR CHRONIC TOXICITY TEST

BIO042

33 ppt Batch

Weston Test ID:	Client:	Client Sample ID:
111122.0442	West Basin Municipal Water District	West Basin Brine

SPAWNING DATA

Initial Spawning Time:	Final Spawning Time:	Fertilization Time:	No. of Females:	No. of Males:
1030	1145	1145	4	3
Embryo Density (count/mL): ① KS	1. 197 / 152	2. 135 / 136	3. 162 / 168	Average: 158
Stocking Volume Calculation:	2700 ÷ (50 × 158)	0.34		

ZERO TIME COUNTS

1. 225	2. 226	3. 231	4. 250	5. 235	6. 226
Average Count: 232			Technician: KS		

LARVAL COUNT DATA

Conc.	Rep 1		Rep 2		Rep 3		Rep 4		Rep 5		Date	Initials
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal		
Control												
~~Brine~~												
33	218	20	193	18	183	17	205	19			11/28/11	KS
50	Ø	75	Ø	78	Ø	83	Ø	75			↓	↓

QA COUNT CHECKS

	QA Check #1	QA Check #2	QA Check #3	QA Check #4
Concentration / Replicate	50 / 4	33 / 2	1	1
Total #	73	209		
# Normal	Ø	195		
Date / Initials	12/1/11 / SH	12/1/11 / SH	1	1

QA Check Acceptability: ☐ <5% difference in means of QA & orig. counts

① > 90% cells divided 11/23/11 KS

APPENDIX B

LONG-TERM EXPOSURE ASSESSMENT: TRIAL 2

Water Quality Data

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: / Time: / Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.4	2.	7.9	
	High Salinity	17.9	6.3	.	.	

Date: / Time: / Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity		6.5	51.29	7.9	

Date: / Time: / Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control			51.52	5.?	
	High Salinity		.	51.8	7	

Date: 9/ Time: 3' Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	-	6.9	52. 3	7.9	
	High Salinity	6.	6.2	51.75	7.8	

Date: / Time: / Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control			.		
	High Salinity					

Date: 10/1/1 Time: 3:35 Tech: Chris Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.9	6.1	50.99	8.2	
	High Salinity		5.8	51.10	7.9	

Date: 2 Time: / Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control			.	7.	
	High Salinity			.		

Date: 9/12/1 Time: 3:49 Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.1	50.58	8.0	
	High Salinity	17.9	6.0	50.81	7.9	

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 3,Oct,2011 Time: 7:45 AM Tech: David Fries	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.6	6.3	50.50	7.9	
	High Salinity	17.5	6.3	51.17	7.9	

Date: 3,Oct,2011 Time: 2:02 PM Tech: David Fries	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	19.6	6.7	50.17	7.8	
	High Salinity	18.9	5.9	53.39	7.8	

Date: 4 Oct, 2011 Time: 9:15 AM Tech: David Fries	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.4	47.67	7.8	
	High Salinity	17.3	6.3	51.27	7.8	

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.4	47.64	7.8	
	High Salinity	17.3	6.3	51.27	7.8	

Date: 4,Oct,2011 Time: 3:37 Tech: Blanca Cuebas	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.5	6.0	50.85	7.9	
	High Salinity	17.0	6.0	54.46	7.8	

Date: 5,Oct,2011 Time: 8:50 Tech: Chris Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.9	51.30	7.7	
	High Salinity	15.7	7.7	52.60	7.9	

Date: 5,Oct,2011 Time: 2:15 Tech: Chris Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.0	51.56	7.7	
	High Salinity	[illegible]	5.9	53.58	7.8	

Date: 6,Oct,2011 Time: 8:45 Tech: Chris Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.6	51.85	7.9	
	High Salinity	15.8	6.9	55.58	7.8	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 06-Octo-2011 Time: 3:50 Tech: Chris Bautista	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.3	51.58	7.8	
	High Salinity	16.2	6.8	54.81	7.8	

Date: 7,Oct,2011 Time: 4:21 PM Tech: Danic[illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.3	6.4	51.64	7.7	
	High Salinity	16.8	6.1	54.81	7.8	

Date: 7,Oct,2011 Time: 3:03 pm Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.4	6.4	51.38	7.8	
	High Salinity	17.5	6.3	53.02	7.8	

Date: 8 Oct 2011 Time: 11:57 am Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	6.0	51.6	7.8	
	High Salinity	15.7	6.0	53.8	7.8	

Date: 8 Oct 2011 Time: 4:16 pm Tech: Ernesto A.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.3	51.4	7.8	
	High Salinity	17.3	6.4	52.98	7.8	

Date: 09 Oct 2011 Time: 9:15 am Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	7.6	51.6	7.7	
	High Salinity	15.6	7.0	53.74	7.8	

Date: 09 Oct 2011 Time: 4:45 pm Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.7	50.75	7.9	
	High Salinity	17.0	6.5	53.64	7.9	

Date: 10-10-11 Time: 9:35 AM Tech: Bella L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.3	50.75	7.9	
	High Salinity	15.9	7.0	54.44	8.0	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 11 Oct 2011 Time: [illegible] Tech: Chris Pawlisch	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	6.6	50.75	7.[illegible]	
	High Salinity	16.6	6.3	54.64	8.0	

Date: 11 Oct 2011 Time: 3:[illegible] Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	5.9	51.40	7.9	
	High Salinity	16.5	5.7	54.58	7.4	

Date: 12-Oct-11 Time: 7:55 Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	5.7	51.11	7.9	
	High Salinity	17.0	6.1	53.75	8.0	

Date: 12-Oct-2011 Time: 3:48 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.2	6.0	51.07	7.4	
	High Salinity	16.7	6.4	53.62	7.9	

Date: 13-Oct-2011 Time: 7:55 am Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	5.6	50.97	7.9	
	High Salinity	17.0	6.1	53.35	8.0	

Date: 13 Oct 2011 Time: 3:40 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.3	51.34	8.1	
	High Salinity	18.2	6.5	53.92	8.2	

Date: 14 Oct 2011 Time: [illegible] Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.4	51.39	7.9	
	High Salinity	14.7	7.4	54.02	8.2	

Date: 14 Oct 2011 Time: 2:35 Tech: Chris E	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.3	5.1	51.36	7.8	
	High Salinity	15.9	5.2	53.02	7.8	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 15 Oct 2011 Time: 10:01 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.9	6.1	51.78	7.9	
	High Salinity	16.3	6.0	53.83	7.9	

Date: 15 Oct 2011 Time: 4:25 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.2	6.0	51.17	8.0	
	High Salinity	17.0	6.3	53.60	8.0	

Date: 16 Oct 2011 Time: 10:37 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.1	6.0	51.13	7.9	
	High Salinity	16.2	5.7	53.74	8.0	

Date: 16 Oct 2011 Time: 4:38 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.4	7.0	50.99	8.0	
	High Salinity	18.1	6.9	53.39	8.1	

Date: 10/17/2011 Time: 8:00 Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.1	51.09	7.9	
	High Salinity	17.4	6.2	52.44	8.0	

Date: 10-17-2011 Time: 3:25 PM Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	5.7	50.89	7.9	
	High Salinity	17.0	6.0	53.02	7.9	

Date: 10-18-2011 Time: 7:45 am Tech: Brian C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.0	50.99	7.9	
	High Salinity	17.2	5.9	53.52	7.9	

Date: 10-18-2011 Time: 4:00 pm Tech: Brian C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.5	6.3	51.11	7.8	
	High Salinity	17.0	6.5	53.39	7.9	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 10-19-11 Time: 7:35am Tech: B Anca C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	5.3	50.72	7.4	
	High Salinity	15.2	5.4	47.91	7.4	

Date: 10-19-11 Time: 3:43pm Tech: Bianca C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.9	7.0	51.28	7.8	
	High Salinity	16.3	6.5	52.10	7.9	

Date: 10-20-11 Time: 7:07am Tech: Bianca C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	6.1	50.75	7.7	
	High Salinity	15.1	6.0	52.16	7.8	

Date: 10-20-11 Time: 3:25pm Tech: Bianca C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	6.7	50.99	7.8	
	High Salinity	15.6	6.7	52.64	7.9	

Date: 10-21-11 Time: 8:38 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.7	7.5	51.38	7.7	
	High Salinity	14.7	7.0	52.81	7.8	

Date: 10-22-11 Time: 9:21 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	6.6	51.32	7.7	
	High Salinity	14.6	6.5	60.35	7.8	

Date: 10-22-11 Time: 3:22 Tech: Chris P.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.2	7.7	51.69	7.8	
	High Salinity	16.2	7.4	62.15	7.8	

Date: 30 Oct 2011 Time: 12:59 Tech: Crystal	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.4	51.40	7.6	
	High Salinity	15.2	6.1	63.25	7.7	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 24 OCT 2011 Time: 9:20 AM Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.7	[illegible]	7.7	
	High Salinity	14.7	7.0	52.01	7.5	

Date: 24 OCT 2011 Time: 2:37 PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	[illegible]	6.0	50.97	7.5	
	High Salinity	16.3	5.7	59.35	7.5	

Date: 25 OCT 2011 Time: 8:43 Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	6.3	51.07	7.6	
	High Salinity	14.7	6.2	60.69	7.7	

Date: 25 OCT 2011 Time: 3:48 Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.6	6.4	47.13	7.7	
	High Salinity	16.8	6.6	60.31	7.7	

Date: 26 OCT 2011 Time: 9:45 AM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	5.3	51.13	7.7	
	High Salinity	15.9	6.2	61.45	7.9	

Date: 26 OCT 2011 Time: 3:45 PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.9	6.0	50.36	7.7	
	High Salinity	16.4	6.7	59.48	7.9	

Date: 27 OCT 2011 Time: 7:34 AM Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.4	50.50	7.7	
	High Salinity	15.8	6.3	60.46	7.8	

Date: 27 OCT 2011 Time: 3:45 PM Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	6.8	51.11	7.7	
	High Salinity	16.1	6.6	60.27	7.8	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 1 NOV 2011 Time: 8:30 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	5.9	51.34	7.5	
	High Salinity	15.3	5.8	63.14	7.3	

Date: 1 Nov 2011 Time: 3:00 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	5.9	51.69	7.7	
	High Salinity	14.4	5.7	63.15	7.7	

Date: 2 Nov 2011 Time: 8:19 am Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	6.0	51.74	7.7	
	High Salinity	15.3	6.0	63.13	7.7	

Date: 2 Nov 2011 Time: 3:45 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	5.7	51.64	7.7	0
	High Salinity	14.8	5.7	63.44	7.6	0

Date: 3 Nov 2011 Time: 7:50 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.0	51.56	7.6	
	High Salinity	15.0	5.8	63.19	7.7	

Date: 3 Nov 2011 Time: 3:46 Tech: Chris B2	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.3	51.52	7.7	
	High Salinity	15.3	6.3	62.90	7.7	

Date: 4 Nov 2011 Time: 7:33 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	6.3	51.52	7.7	
	High Salinity	15.6	6.2	63.04	7.7	

Date: 4 Nov 2011 Time: 3:40 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.1	6.0	51.64	7.5	
	High Salinity	15.7	5.7	62.31	7.6	

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 28 Oct 2011 / Time: 4:05 / Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	6.7	51.09	7.7	
	High Salinity	14.9	6.2	51.14	7.7	

Date: 28 Oct 2011 / Time: 3 55 / Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.6	51.30	7.9	0
	High Salinity	15.4	6.3	60.60	7.7	0

Date: 29 Oct 2011 / Time: [illegible] / Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.1	51.52	7.7	
	High Salinity	15.2	6.0	60.44	7.7	

Date: 29 Oct 2011 / Time: 4:20 / Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.3	6.0	50.89	7.7	
	High Salinity	16.0	6.4	58.73	7.8	

Date: 30 Oct 2011 / Time: 9:45 / Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	6.1	51.44	7.7	
	High Salinity	15.6	5.9	59.19	7.7	

Date: 30 Oct 2011 / Time: / Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.8	51.38	7.8	
	High Salinity	15.9	6.7	59.02	7.8	

Date: 31 Oct 2011 / Time: [illegible] AM / Tech: JOAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.6	51.34	7.7	
	High Salinity	15.3	6.3	50.27	7.8	

Date: 31 Oct 2011 / Time: 3:20pm / Tech: JOAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.5	51.27	7.7	
	High Salinity	15.1	7.1	58.21	7.7	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 5 Nov 2011 Time: 10:11 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.8	6.0	51.79	7.7	
	High Salinity	14.2	6.0	54.27	7.7	

Date: 5 Nov 2011 Time: 5:01 Tech: ~~Chris B~~ Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.9	51.64	7.7	
	High Salinity	15.5	6.6	52.46	7.7	

Date: 6 Nov 2011 Time: 10:45 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	6.2	53.41	7.7	
	High Salinity	13.8	6.3	51.68	7.6	

Date: 6 Nov 2011 Time: 4:50 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	6.8	51.56	7.7	
	High Salinity	15.1	6.6	52.56	7.7	

Date: 7 NOV 2011 Time: 7:59 AM Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	6.8	31.62	7.7	
	High Salinity	14.4	6.6	52.12	7.7	

Date: 7 NOV 2011 Time: 3:30 Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	6.8	31.58	7.6	
	High Salinity	14.9	6.6	52.81	7.7	

Date: 8 NOV 2011 Time: 8:02 am Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.0	51.30	7.6	
	High Salinity	14.8	6.7	53.04	7.7	

Date: 8 NOV 2011 Time: 3:43 PM Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	6.8	51.77	7.6	
	High Salinity	15.0	6.4	52.58	7.7	

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 9 NOV 2011 Time: 8:04 AM Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.9	7.0	51.97	7.7	
	High Salinity	15.0	6.6	60.71	7.7	

Date: 9 NOV 20 11 Time: 3:18 PM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	7.0	51.46	7.6	
	High Salinity	15.5	6.6	63.29	7.7	

Date: 10 NOV 2011 Time: 8:00AM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.0	51.72	7.6	
	High Salinity	15.4	6.4	65.84	7.7	

Date: 11 NOV 2011 Time: 7:33 am Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.0	51.60	7.7	
	High Salinity	15.6	6.7	67.48	7.7	

Date: 11 NOV 2011 Time: 3:36 PM Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.1	51.56	7.7	
	High Salinity	15.2	6.8	69.61	7.7	

Date: 12 NOV 2011 Time: 10:15 am Tech: DAVID R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	6.8	51.34	7.7	
	High Salinity	14.9	6.6	69.00	7.7	

Date: 12 NOV 2011 Time: 4:00 PM Tech: DAVID R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.0	51.40	7.7	
	High Salinity	15.0	6.8	68.90	7.7	

Date: 13 NOV 2011 Time: 11:10 Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.0	7.0	51.42	7.7	
	High Salinity	15.7	6.9	69.11	7.8	

14 NOV 2011
5:25 PM
BRIAN.

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 13 Nov 11 Time: 3:44 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.1	7.1	57.46	7.8	
	High Salinity	15.9	6.9	68.96	7.6	

Date: 14 Nov 11 Time: 3:55 Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.3	6.9	51.23	7.7	
	High Salinity	16.1	6.7	68.86	7.8	

Date: 15 Nov 11 Time: 7:59am Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	7.0	51.87	7.7	
	High Salinity	16.0	6.7	68.94	7.8	

Date: 15 Nov 11 Time: 3:42pm Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	7.5	51.70	7.7	
	High Salinity	15.5	7.0	57.44	7.8	

Date: 16 Nov 11 Time: ~7:35am Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.7	6.5	51.66	7.7	
	High Salinity	16.2	6.4	68.98	7.7	

Date: 16 Nov 11 Time: 3:48pm Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.6	6.7	51.52	7.7	
	High Salinity	16.3	6.6	68.90	7.8	

Date: 17 Nov 11 Time: 7:46am Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	6.7	51.40	7.7	
	High Salinity	16.1	5.1	69.15	7.2	

Date: 17 Nov 11 Time: 3:46pm Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.8	6.7	51.72	7.7	
	High Salinity	16.3	6.4	67.84	7.8	

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 18 Nov 2011 Time: 7:35am Tech: Bar... C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	6.8	51.60	7.7	
	High Salinity	16.1	6.4	54.44	7.3	

Date: 18 Nov 2011 Time: [illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	[illegible].7	[illegible]	[illegible]	[illegible]	
	High Salinity	16.3	[illegible]	[illegible]	[illegible]	

Date: 19 Nov 20 Time: 9:44 am Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.8	7.7	51.9	7.7	
	High Salinity	14.6	7.1	68.45	7.5	

Date: 19 Nov 2011 Time: 4:15 pm Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.8	6.9	51.26	7.6	
	High Salinity	16.5	6.7	67.41	7.7	

Date: 20 Nov 2011 Time: 9:55 am Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	6.8	51.56	7.8	
	High Salinity	16.1	6.7	67.73	7.8	

Date: 20 Nov 2011 Time: 4:44 pm Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.4	6.8	51.4	7.7	
	High Salinity	16.0	6.8	67.77	7.8	

Date: 21 Nov 2011 Time: 8:30 AM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.9	[illegible]	7.7	
	High Salinity	15.6	6.9	65.48	7.7	

Date: 21 Nov 2011 Time: 3:35 pm Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.9	51.43	7.7	
	High Salinity	15.9	6.8	68.45	7.8	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 12-14-11 Time: 10.00 AM Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.7	7.1	49.25	7.9	
	High Salinity	14.2	7.2	50.14	7.9	

Date: 12-14-11 Time: 3.30 PM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.2	49.62	7.9	
	High Salinity	15.1	7.1	50.29	7.9	

Date: 15 Dec 2011 Time: 8.35 AM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	6.9	49.88	7.9	
	High Salinity	15.0	7.1	50.12	7.9	

Date: 15 Dec 2011 Time: 3:53 PM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	6.9	50.00	7.9	
	High Salinity	15.1	7.1	49.96	7.9	

Date: 16 Dec 2011 Time: 9:10 am Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.1	49.99	7.8	
	High Salinity	15.0	7.0	53.41	7.8	

Date: 17 Dec 2011 Time: 10:12 Tech: Evelo.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	7.1	49.39	7.7	
	High Salinity	15.0	7.1	53.64	7.8	

Date: 17 Dec 2011 Time: 4:19 Tech: Evelo	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	7.0	49.72	7.8	
	High Salinity	15.1	7.1	53.64	7.8	

Date: 18 Dec 2011 Time: 10.20 am Tech: Evelo	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.0	50.06	7.8	
	High Salinity	15.0	7.1	53.64	7.8	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 18 Dec 2011 Time: 4:36 pm Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.9	7.5	50.04	7.8	
	High Salinity	15.7	6.9	53.62	7.7	

Date: 19 DEC 2011 Time: 3:45 pm Tech: EDILENIA	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.3	49.34	7.9	
	High Salinity	15.2	7.2	53.45	7.8	

Date: 19 DEC 2011 Time: 3:45 pm Tech: ADRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.1	49.90	7.9	
	High Salinity	15.1	7.1	52.79	7.8	

Date: 20 Dec 2011 Time: 3:30 pm Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.6	50.31	7.9	
	High Salinity	14.9	6.9	55.97	7.8	

Date: 20 Dec 2011 Time: 3:47 pm Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	6.9	50.17	7.8	
	High Salinity	15.1	6.8	53.29	7.7	

Date: 21 Dec 2011 Time: 3:01 pm Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	7.2	50.33	7.9	
	High Salinity	15.0	7.2	53.14	7.8	

Date: 21 Dec 2011 Time: 3:45 pm Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	7.6	50.02	7.9	
	High Salinity	15.3	7.6	52.02	7.8	

Date: 22 DEC 2011 Time: 3:00 pm Tech: ADRIANA	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	7.4	50.33	7.9	
	High Salinity	15.0	7.3	52.96	7.8	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 22 Dec 2011 Time: 5:17 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.9	50.55	7.8	
	High Salinity	14.5	7.6	50.93	7.8	

Date: 24 Dec 2011 Time: 9:35 am Tech: DAVID	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.4	50.64	7.9	
	High Salinity	14.7	7.3	53.29	7.8	

Date: 24 Dec 2011 Time: 4:20 pm Tech: DAVID	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.7	50.45	7.9	
	High Salinity	14.9	8.3	52.91	7.8	

Date: 27 Dec 2011 Time: 8:11 am Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.5	50.66	7.81	
	High Salinity	14.5	7.5	51.62	7.7	

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.6	50.81	7.8	
	High Salinity	14.5	7.5	53.10	7.7	

Date: 28 Dec 2011 Time: 7:50 am Tech: Bianca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.9	50.51	7.9	0.50
	High Salinity	14.5	7.5	54.04	7.8	0.50

Date: 28 Dec 2011 Time: 3:50pm Tech: Bianca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.5	50.53	7.9	
	High Salinity	14.8	7.5	52.68	7.8	

Date: 29 Dec 2011 Time: 8:00am Tech: Bianca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.7	50.49	7.9	
	High Salinity	14.8	7.3	53.73	7.7	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 29 Dec 11 Time: 3:40pm Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.2	50.51	8.0	
	High Salinity	15.0	7.1	53.33	7.9	

Date: 30 Dec 11 Time: 9:05 Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	[illegible]	[illegible]	[illegible]	[illegible]	
	High Salinity	14.6	7.3	[illegible]	[illegible]	

Date: 30 Dec 11 Time: 2:45 Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.2	50.54	[illegible]	
	High Salinity	14.9	7.4	50.62	7.9	

Date: 31 DEC 11 Time: 1450m Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.4	50.35	7.9	
	High Salinity	14.9	7.4	50.52	7.8	

Date: 01 JAN 12 Time: 1100 Tech: ROLAND	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.4	50.45	7.8	
	High Salinity	14.8	7.5	50.54	7.8	

Date: 02 Jan 12 Time: 9:[illegible] Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.7	50.14	7.9	
	High Salinity	14.5	7.6	50.55	7.9	

Date: 3 JAN 12 Time: 8:30 AM Tech: BRANL.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.3	50.40	7.9	
	High Salinity	14.7	7.5	50.65	7.9	

Date: 3 JAN 12 Time: 3:[illegible] PM Tech: BRANL.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.6	7.7	50.61	7.9	
	High Salinity	15.0	8.0	50.70	7.9	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 4 JAN 12 Time: 8:00AM Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.2	50.02	7.8	
	High Salinity	14.7	7.2	50.24	7.9	

Date: 4 JAN 12 Time: 3:45 PM Tech: BRIAN L	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	7.9	59.47	7.9	
	High Salinity	15.3	7.6	59.12	7.9	

Date: 5 JAN 12 Time: 8:00 AM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.4	50.55	7.8	
	High Salinity	14.7	7.3	51.97	7.9	

Date: 5 JAN 12 Time: 3:45 PM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	7.8	50.65	7.9	
	High Salinity	15.2	7.7	54.68	7.9	

Date: 6 Jan 12 Time: 7:40 am Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.7	50.55	7.8	
	High Salinity	15.0	7.3	55.14	7.9	

Date: 6 Jan 12 Time: 3:30pm Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	7.4	54.41	7.9	
	High Salinity	15.5	7.3	57.14	7.7	

Date: 7 Jan 12 Time: 10:15am Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.2	50.55	7.8	
	High Salinity	15.1	7.1	59.64	7.8	

Date: 7 Jan 12 Time: 4:35 pm Tech: DAVID	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	7.4	50.47	7.9	
	High Salinity	15.5	7.4	59.41	7.9	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 8 Jan 2012 Time: 10:05 am Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.1	50.68	7.8	
	High Salinity	15.0	6.9	59.66	7.8	

Date: 8 Jan 2012 Time: 4:23 pm Tech: Ernesto A.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	7.5	50.41	7.8	
	High Salinity	15.4	7.6	59.52	7.8	

Date: 9 Jan 2012 Time: 10:04 am Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.7	50.04	7.9	
	High Salinity	15.0	7.7	60.56	7.9	

Date: 9 Jan 2012 Time: 3:48 pm Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.6	7.7	50.19	7.8	
	High Salinity	15.2	7.7	60.08	7.8	

Date: 10 Jan 2012 Time: 7:45 am Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.8	7.2	50.57	7.8	
	High Salinity	15.1	7.2	59.35	7.9	

Date: 10 Jan 2012 Time: 3:42 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	7.6	50.92	7.9	
	High Salinity	15.3	7.5	60.06	7.8	

Date: 11 Jan 2012 Time: 7:58 am Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.1	50.47	7.8	
	High Salinity	15.0	7.2	59.85	7.8	

Date: 11 Jan 2012 Time: 3:40 pm Tech: Blanca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	7.0	50.23	7.8	
	High Salinity	15.2	7.1	59.35	7.7	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 12 JAN 2012 Time: 8 AM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.1	50.29	7.8	
	High Salinity	15.1	7.3	59.85	7.8	

Date: 12 JAN 2012 Time: 3:37 PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.4	50.17	7.7	
	High Salinity	15.3	7.5	59.06	7.8	

Date: 13 JAN 2012 Time: 7:10 AM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.9	7.1	50.19	7.8	
	High Salinity	15.1	7.2	59.73	7.8	

Date: 13 JAN 2012 Time: 3:23 PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.0	49.98	7.8	
	High Salinity	15.5	7.3	59.33	7.8	

Date: 14 Jan 2012 Time: 9:30 am Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.8	50.06	7.8	
	High Salinity	15.0	7.2	59.96	7.8	

Date: 14 Jan 2012 Time: 4:15 pm Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.1	50.17	7.8	
	High Salinity	15.2	7.3	59.79	7.8	

Date: 15 Jan 2012 Time: 10:19 Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.2	50.00	7.8	
	High Salinity	15.0	7.3	59.96	7.8	

Date: 15 Jan 2012 Time: 4:43 pm Tech: Ernesto A	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.2	49.98	7.8	
	High Salinity	15.2	7.3	59.81	7.8	

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Acclimation	
Start Date:	**Time:**	
End Date:	**Time:**	

Water Quality Data

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 16 JAN 12 Time: 8:33 AM Tech: BRIAN.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	4	7.0	49.98	7.7	
	High Salinity	5.0	7.1	60.00	7.9	

Date: 6 JAN 12 Time: 3 29 Tech: BRIAN C.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control		7	49 96	8	
	High Salinity			1 0		

Date: 19 JAN 12 Time: 5'5 AM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	1	-	0 1		
	High Salinity	4 5	-	3.		

Date: 17 Jan 12 Time: 9 45 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	4		5 . 7	7.	
	High Salinity	.	- 0	6 .5	7.	

Date: 18 Jan Time: 8 30 AM Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control			5 .		
	High Salinity					

Date: 18 Jan Time: 353 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	1 .	- .	5 . -		
	High Salinity			20.		

Date: 19 Jan Time: 7 5 Tech: Ch	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control		7	5 .		
	High Salinity	-				

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.0	50.31	7.8	
	High Salinity	14.9	7.1	50.34	7.9	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Acclimation	
Start Date:	**Time:**	
End Date:	**Time:**	

Water Quality Data

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 20 Jan 20[illegible] Time: 751 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.1	50.11	7.8	
	High Salinity	14.7	7.2	50.60	7.9	

Date: 20 Jan 2012 Time: 330 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.6	6.8	50.16	7.5	
	High Salinity	14.5	6.9	50.24	7.8	

Date: 21 Jan 2012 Time: 9:37 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.6	7.2	50.35	7.8	
	High Salinity	14.8	7.2	50.51	7.9	

Date: 21 Jan 2012 Time: 4:02 Tech: DAVID	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	6.9	50.04	7.8	
	High Salinity	15.0	7.0	50.18	7.9	

Date: 22 Jan 2012 Time: 9:20 am Tech: Christo	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.4	50.37	7.7	
	High Salinity	14.2	6.4	50.63	7.4	

Date: 22 Jan 2012 Time: 4'40 pm Tech: Cristo	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.1	50.37	7.9	
	High Salinity	14.9	7.2	49.76	7.8	

Date: 23 JAN 2012 Time: 8:35 AM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.1	44.92	7.9	
	High Salinity	14.7	6.9	49.82	7.8	

Date: 23 JAN 2012 Time: 3:20 PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	[illegible]	7.4	46.00	7.8	
	High Salinity	14.7	7.5	49.55	7.8	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase: Acclimation	
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 24 Jan 2012 Time: 7:50 am Tech: Bianca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.8	7.7	45.37	7.9	
	High Salinity	15.2	7.3	42.06	7.4	

Date: 24 JAN 2012 Time: 3:50 pm Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.3	50.23	7.8	
	High Salinity	15.5	6.7	59.88	7.7	

Date: 25 JAN 2012 Time: 8:05 am Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.1	50.41	7.8	
	High Salinity	14.9	6.2	61.52	7.7	

Date: 25 JAN 2012 Time: 3:45 PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.1	50.35	7.9	
	High Salinity	15.1	6.5	60.03	7.7	

Date: 25 JAN 2012 Time: 8:10 AM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.0	50.37	7.9	
	High Salinity	14.9	6.8	61.61	7.8	

Date: 25 JAN 2012 Time: 3:43 PM Tech: BRIAN	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.6	7.0	50.27	7.9	
	High Salinity	15.3	6.0	66.21	7.4	

Date: 27 Jan 2012 Time: 7:45 am Tech: Bianca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	7.0	46.39	7.9	
	High Salinity	14.8	6.6	62.05	7.8	

Date: 27 Jan 2012 Time: 3:27 pm Tech: Bianca	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.9	50.31	7.9	
	High Salinity	15.2	6.9	61.09	7.7	

West Basin High Salinity Sensitivity Study
Long-Term Biometric Evaluation

Project Phase:	Acclimation
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 28 Jan2012 Time: 10:18 am Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	7.1	50.39	7.9	
	High Salinity	14.9	7.6	60.30	7.8	

Date: 28 Jan 2012 Time: 4:18 Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	6.3	50.25	7.8	
	High Salinity	14.6	6.3	59.38	7.7	

Date: 29 Jan 2012 Time: 10:08 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.9	50.33	7.9	
	High Salinity	15.1	7.2	58.15	7.8	

Date: 29 Jan 2012 Time: 4:53 Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.2	50.73	7.9	
	High Salinity	15.3	7.2	58.36	7.8	

Date: 30 JAN2012 Time: 8:07 AM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	7.3	50.41	7.9	
	High Salinity	15.0	7.2	59.03	7.8	

Date: 30 JAN2012 Time: 3:25 PM Tech: BRIAN L.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.2	50.41	7.9	
	High Salinity	15.3	7.1	62.11	7.7	

Date: 31 Jan 2012 Time: 8:00am Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.2	50.43	7.9	
	High Salinity	15.1	7.2	62.53	7.8	

Date: 31 Jan 2012 Time: 3:40 pm Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	6.7	50.27	7.9	
	High Salinity	14.8	6.9	60.30	7.7	

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Acclimation
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase: Test Exposure	
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 6 Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: 7 Feb 2012 Time: am Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: 7 Feb 2012 Time: 3:30pm Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	6.9	50.43	7.8	
	High Salinity	15.0	6.4	60.70	7.7	

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 1 Feb 2012 Time: 7:50 am Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.2	50.4	7.9	
	High Salinity	15.2	7.2	62.55	7.8	

Date: 1 Feb 2012 Time: 3:[illegible] pm Tech: [illegible] C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	7.4	45.55	7.8	
	High Salinity	13.6	7.4	62.57	7.8	

Date: 2 Feb 2012 Time: 7:50 am Tech: Blanca C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.1	50.45	7.9	
	High Salinity	15.1	6.8	62.63	7.7	

Date: 2 Feb 2012 Time: [illegible] Tech: [illegible] C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	7.1	50.35	7.9	
	High Salinity	15.5	6.8	62.58	7.5	

Date: 3 Feb 2012 Time: [illegible] Tech: [illegible] C	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.8	7.3	50.47	7.9	
	High Salinity	15.2	7.0	62.43	7.8	

Date: 4 Feb 2012 Time: 932 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.2	50.39	7.9	
	High Salinity	15.2	7.0	63.09	7.8	

Date: 4 Feb 2012 Time: 4 21 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	7.1	50.33	7.9	
	High Salinity	15.6	7.1	62.57	7.8	

Date: 6 Feb 12 Time: 8 45 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.6	7.2	50.47	7.4	
	High Salinity	15.2	6.9	62.74	7.7	

Behavioral Observations

West Basin High Salinity Sensitivity Study

Start Date: Time:

End Date: Time:

Behavioral Observations

	Date 29 Sep 2011 Time: 8:14 AM Tech David Frias	Date 29 Sep 2011 Time: [illegible] pm Tech David Frias	Date 30 Sep 2011 Time: 9:39 am Tech Blanca Cordova	Date 30 Sep 2011 Time: 3:29 pm Tech Blanca Cordova	Date 1 Oct 2011 Time: 10:10 Tech Chris Bautista
Control	[illegible]	[illegible] abalone in front window [illegible]	Purchins along top left corner. Sea stars [illegible] front window. Abalone all at bottom corners. Sand dabs all in the sand. Kelp perch swimming back against [illegible] windows. [illegible] mussels are closed.	Purchins against back and front window. Sea stars against front window. Abalone eating in every corner of [illegible]. Sand dabs all in the sand. Kelp perch all together swimming [illegible] mussels are closed.	Urchins, back left, front. Sea stars, on glass. Abalone, on front glass. Dabs, in sand. Perch, swimming along [illegible]. Minnows, All at surface.
High Salinity	[illegible] mussels [illegible] Sand dabs [illegible]	Sea stars [illegible] Abalone in front window [illegible] fish [illegible]	Sea stars against front [illegible]. Sand dabs all in sand, some [illegible]. Kelp perch [illegible] against [illegible] window. Abalone [illegible]. Purchins [illegible]. Minnows [illegible] bottom	Sea stars [illegible]. Sand dabs [illegible]. Kelp perch swimming together [illegible] corner. Purchins [illegible] right corner. Minnows all on top of tank.	Urchins, top right. Sea stars, on sand [illegible] right [illegible]. Abalone [illegible]. Dabs, in sand. Perch, swimming along [illegible]. Minnows, at surface.

	Date 1 Oct 2011 Time: 3:20 pm Tech Chris Bautista	Date 2 Oct 2011 Time: 10:39 am Tech Blanca Cordova	Date 2 Oct 2011 Time: [illegible] pm Tech Blanca Cordova	Date 10/3/11 Time: 7:22 AM Tech David Frias	Date 3 Oct, 2011 Time: 3:44 PM Tech David Frias
Control	Urchins, look good. Stars, all [illegible] healthy. Ab, healthy. Dabs, in sand healthy. Perch, swimming [illegible]. Minnows, All at surface.	Purchins [illegible] all on left wall. Sea stars look good [illegible]. Abalone look good [illegible] bottom. Sand dabs [illegible]. Kelp perch [illegible] together on the right wall. [illegible]	Purchins look good [illegible]. Sea stars [illegible]. Abalone [illegible]. Kelp perch [illegible]	Minnows are on top by surface. Ok, good, left; abalone on [illegible] and front windows. [illegible] Purchins on back right [illegible]. Sea stars on left [illegible] sand dabs in sand. Kelp Perches swimming.	Little Minnows [illegible]. [illegible] swimming [illegible]. Abalone around tank. Purchins by mussels. Sand dabs in sand. Bat [illegible] front and left side of windows.
High Salinity	Urchins, top right corner. Stars, all over, healthy. Ab, all good. Dabs, in sand, healthy. Kelp, swimming [illegible]. Minnows, [illegible]	Purchins [illegible]. Sea stars look good [illegible]. Abalone [illegible] of tank. Sand dabs all at the bottom. Kelp perch [illegible] swimming together [illegible] left wall. Minnows [illegible] are good, one open	[illegible]	Little minnows are by surface. Sea stars on windows and sand. Sand dabs in back and sand. Kelp Perches swimming by [illegible] [illegible] on right [illegible] corner. Purchins by screen and on the back wall.	Sand dabs on sand. Kelp Perch swimming around abalone on top right side of window. Sea stars on sand and window. Purchins on screen and back right side. Glass [illegible] chilling.

	Date 4 Oct 2011 Time: 7:50 AM Tech David Frias	Date 4, Oct, 2011 Time: 3:38 pm Tech Blanca Cordova	Date 5 Oct 2011 Time: 8:43 Tech Chris Bautista	Date 5-Oct 2011 Time: 2:00 Tech Chris Bautista	Date 6-Oct-2011 Time: 8:31 Tech Chris Bautista
Control	Swimmings left, on surface, by surface. Purchins by left side, [illegible] mussles opened up. Bat stars on windows, abalone in front of [illegible] glass. Some sand dabs swimming around, and kelp perches by Divider window.	Purchins are good against [illegible] back wall. Sea stars are eating against front wall. Abalone are at [illegible] corners of tank. Sand dabs are swimming at bottom. Kelp perch are swimming together [illegible] side [illegible]	Urchins - good, healthy. Stars - good, healthy, eating. Ab - in good health. Dabs - all in sand, healthy. [illegible]	Urchins - good healthy. Stars - good healthy/done eating. Abalone healthy, eating. Dabs - in sand. Shiners - healthy. Kelp - healthy. [illegible] healthy.	Urchins - healthy. Stars - healthy. Abalone healthy. Dabs - healthy [illegible]. Shiners healthy [illegible]. Kelp - [illegible]
High Salinity	Minnows on [illegible]. Bat stars on front window and sand, mussles opened up. Sand dabs on [illegible]. Kelp Perches [illegible] window. Abalone around tank. Purchins by screen [illegible]	Purchins are good all [illegible]. Sea stars on back and back wall eating. Abalone are [illegible] tank. Sand dabs are in the sand. Kelp perch are all swimming against left side. Shiners are light color, [illegible]	Urchins - good, healthy. Stars - good, healthy. Abalone - good, healthy. Dabs, [illegible]. Shiners [illegible]. Kelp [illegible]	Urchins - healthy. Stars - healthy. Abalone - healthy, eating. Dabs - healthy, in sand. Kelp - healthy. Shiners - healthy.	Urchins healthy. Stars - [illegible]. Abalone - healthy. Dabs - healthy. Shiners - healthy. Kelp - healthy.

West Basin High Salinity Sensitivity Study

Start Date:	Time:	[illegible]
End Date:	Time:	

Behavioral Observations

dont forget to put name →

	Date 6 Oct-2011 Time: Tech Chris R.	Date 7, oct, 2011 Time: 7:53 AM Tech [illegible]	Date 7, October, 2011 Time: 2:57 pm Tech Chris B	Date 8 oct 2011 Time: 11:51 Tech Ernesto A	Date 8 oct 200 Time: 4:09 pm Tech Ernesto A.
Control	urchins-healthy stars-healthy Abs-healthy Dabs-healthy Shiners-healthy kelp-healthy	P. urchins on screens, and wall. Bat stars, stars good. Some sanddabs good. Swimming around. Kelp perch look active. Shiner perches swimming [illegible]	P. urchins - looking good stars - good Abalone - look good dabs - Look healthy Shiners [illegible] [illegible]	P. Urchin on gravel R.L. corner Stars on top Dabs on sand ~9 Shiners healthy Perch active Abalone spread out.	All sea stars close to surface. Sea urchins on Right-Left corner Dabs on sand healthy Shiners & Perch are active Abalone spread out.
High Salinity	urch-healthy stars-healthy Abs-healthy-1 [illegible] Shiners-healthy Dabs-healthy kelp healthy	[illegible] KELP Perch look good, Shiner Perches swimming calmly. Sea stars on floor and back wall. P. urchins on back wall. Abs look fine.	urchins at top right Stars-healthy Abs-healthy Shiners-healthy [illegible] Dabs-[illegible]	Stars at bottom of tank. urchin at R. corner. 4 dabs on sand Shiners & Perch active.	one sea star on top, all other at the bottom. Sea urchins on Left-Right corner. Sandabs on sand look healthy, Shiner & Perches active and well. Abalone spread out.

	Date 9 Oct 2011 Time: 9:07 am Tech Ernesto A.	Date 9 Oct 2011 Time: 4:40 pm Tech Ernesto A	Date [illegible] Time: [illegible] Tech [illegible]	Date 10-10-11 Time: [illegible] Tech Brian L.	Date 11 oct 2011 Time: 7:50 Tech Chris Reutter
Control	Sea Stars at top of tank, Sand dabs on sand, Perches, Shiners are active, Sea urchins spread out. Abalone spread out	Sea Stars at top of tank, Sea urchin spread out, Abalone spread out dabs on sand, Perch & shiners active	KELP AND SHINER PERCH SWIMMING NORMAL, ABALONE ON TOP AND BOTTOM [illegible] SEA URCHINS [illegible] 1 ON [illegible] FEET [illegible] SEA STARS SPREAD OUT AND ON TANK'S, MUSSELS GOOD.	KELP AND SHINER PERCH SWIMMING NORMAL, ABALONE [illegible] GOOD, SEA STARS SPREAD OUT. SEA URCHIN [illegible] [illegible] MICRO BUBBLES	Urchins-healthy [illegible] stars-healthy Abs-healthy [illegible] Dabs-[illegible] Perch [illegible] [illegible]-healthy
High Salinity	Sea stars @ bottom of tank, only one @ the top. Sand dabs on sand one on gravel, Shiners and perches @ lower left, sea-urchins @ top right. Abalone spread out.	Sea stars spread out. dabs on sand one on gravel. sea urchins on top right corner. Abalone spread out [illegible] shiners & Perches active	KELP AND SHINER PERCH SWIMMING NORMAL, ABALONE ON TOP AND BOTTOM TANK, SEA URCHIN SPREAD OUT. SEA STARS SPREAD OUT [illegible] [illegible] GOOD.	KELP AND SHINER PERCH GOOD. ABALONE SPREAD OUT, MUSSELS GOOD, SEA STARS GOOD. URCHIN GOOD. MICRO BUBBLES.	urchins-healthy Stars [illegible] Abs-healthy Dabs-2 swimming, others [illegible] Perch-swimming [illegible] [illegible]-healthy

	Date 11 Oct [illegible] Time: [illegible] Tech [illegible]	Date 10-12-11 Time: 7:15 AM Tech BRIAN L.	Date 12 oct [illegible] Time: [illegible] Tech [illegible]	Date 13 oct 2011 Time: 7:46 am Tech Chris R.	Date 13 oct 2011 Time: 3:46 pm Tech [illegible]
Control	urchins-healthy Stars-healthy Abs-healthy Perch-microbubbles [illegible] Dabs-no microbubbles, healthy [illegible]-healthy	KELP AND SHINER PERCH SWIMMING NORMAL, ABALONE ON TOP AND BOTTOM TANK, SEA URCHIN GOOD, SANDDAB GOOD, MUSSEL IS DOING GOOD.	urchins-healthy stars-healthy Abs-healthy dabs-healthy Perch-still have microbubbles but okay	urchins-healthy Stars-healthy Abs-healthy Perch-[illegible] microbubbles [illegible]	urchins-healthy Stars-healthy Abs-healthy Perch-[illegible] Dabs-[illegible]
Salinity	urchins-healthy stars-healthy Abs-healthy Perch-microbubbles [illegible] Dabs-no microbubbles healthy	KELP AND SHINER PERCH SWIMMING NORMAL, ABALONE ON TOP AND BOTTOM, SEA STARS DOING GOOD, SAND DAB GOOD, MUSSELS GOOD.	urchins-healthy stars-healthy Abs-healthy Dabs-healthy, [illegible] Perch-still microbubbles, but okay	urchins-healthy Stars-healthy Abs-healthy [illegible]	Urchins-healthy Stars-healthy Abs-healthy Dabs-healthy Perch-healthy

West Basin High Salinity Sensitivity Study

Start Date:	Time:
End Date:	Time:

Behavioral Observations

	Date 10-14-11 Time: 11:00 Tech [illegible]	Date 10-14-11 Time: 2:20 PM Tech Chris P.	Date 15 Oct 2011 Time: 9:54 Tech Ernesto A.	Date 15 Oct 2011 Time: 4:15 Tech [illegible]	Date 16 Oct 2011 Time: [illegible]:32 Tech Ernesto
Control	mussels - healthy urchins - healthy stars - healthy Abs - healthy Perch - swimming, healthy Dabs - in sand, healthy	Urchins - top left near mussels stars - Near at surface Abs - Top left/right corner [illegible] Perch - [illegible] mussels - [illegible] closed	Urchin: Spread out. Stars: Spread out on top of tank Abs: spread out on top Dabs: on sand, one on gravel Perch: swimming mussels: close	Urchin: top of tank. stars: top Abs spread out Perch Swimming all around mussels - open [illegible]	Urchin Spread out one on sand. Stars spread out on top. Abs [illegible] [illegible]
High Salinity	Urchins - healthy stars - healthy Abs - healthy [illegible]	Urchins - top right [illegible] stars - [illegible] [illegible] Dabs - [illegible] Perch - [illegible] [illegible]	Urchin spread out Stars on top of tank Abs: spread out on top. Dabs: on sand Perch swimming on left mussels - closed.	Urchin: top stars [illegible] Abs spread out on top Perch swimming Dabs on sand [illegible] gravel [illegible]	Urchin [illegible] on top right Stars [illegible] Dabs: on sand Perch swimming [illegible]

	Date 16 Oct 2011 Time: 4:32 Tech Ernesto	Date [illegible] Time: [illegible] Tech [illegible]	Date [illegible] Time: [illegible] Tech [illegible]	Date 10-18-11 Time: [illegible] am Tech Blanca C. [illegible]	Date [illegible] Time: [illegible] Tech [illegible]
Control	Stars: top of tank Urchin left side Perch: swimming on right mussels: open Abs: spread around Dabs: on sand, one on gravel	[illegible]	Sea stars [illegible] [illegible] [illegible]	[illegible] most left top wall [illegible]	[illegible]
High Salinity	Stars 2 on top, 2 on bottom Urchin: top right corner Perch: Swimming on left Dabs: on sand, one on gravel mussels: open	[illegible]	Sea stars [illegible] top, urchins are [illegible] [illegible] all together except abalone [illegible] [illegible]	[illegible] good [illegible] the [illegible]	[illegible]

10/20/2011 [illegible]

	Date 10-19-11 Time: 7:44 am Tech Blanca C.	Date 10-19-11 Time: 3:44 pm Tech Blanca C. (Got 3 split no tail fish, 1 tree fish on each side)	Date 10-20-11 Time: 7:07 am Tech Blanca C.	Date 10-20-11 Time: 3:27 pm Tech Blanca C.	Date 10-21-11 Time: 8:26 Tech Chris P. Tanks off
Control	sea stars - good on top back wall urchins - good on left side wall Abalone - good, [illegible] on each corner of tank dabs - most are in sand, some are [illegible] really high Perch - swimming on right side mussels - are good, opened	sea stars - good, on back and right wall urchins - good, most of them at bottom left side wall Abalone - good, on top corners dabs - all are on sand, some swimming perch - good, swimming on right mussels - good, split nose - good, swimming top and top, on the [illegible]	Sea stars - good, back wall, urchins - good on back wall, abalone - good, top front wall, dabs - [illegible] swimming, perch - good swimming in the middle, mussels - good, some are opened, split nose - [illegible], tree fish - good swimming [illegible] (white stuff on sand)	Sea Stars - good, eating, all against front wall, urchins - good, most are on back wall, Abalone - good, on every corners, dabs - on sand, some swimming on rocks, Perch - good, swimming middle, mussels - good, some opened, split nose - good, swimming on top, tree fish - good swimming top	Urchin - Top left corner Stars - front glass Abs - Top & bottom corners Perch - [illegible] [illegible], staying close to each Tree [illegible]
High Salinity	sea stars - good [illegible] wall [illegible] on right side, Abalone - [illegible] dabs - swimming really high perch - swimming [illegible] left [illegible] opened	sea stars - on corners, with stomach out, urchins - all on right wall, Abalone - good, most on top back wall, dabs - on sand, some swimming real high, perch - swimming on left wall, mussels - good, split nose swimming on top, tree - at corner	Sea stars - [illegible] wall, [illegible] good [illegible] swimming, [illegible] good, [illegible] split nose - good, swimming really high, tree fish - good, swimming really high	sea stars - eating against front wall, urchins - good, at bottom & top right wall, Abalone - good, under corner, dabs - good, all on sand, perch - good, swimming in the middle, mussels - good, some open, split nose good, swimming at top, tree [illegible]	Urchins top right corner [illegible] [illegible] - Top [illegible] [illegible]

West Basin High Salinity Sensitivity Study

Start Date: Time:
End Date: Time:

Behavioral Observations

	Date 21 OCT 2011 Time: Tech CHRIS B	Date 21 OCT 2011 Time: 9:17 Tech Chris B	Date 22 OCT 2011 Time: [illegible] Tech Chris B	Date [illegible] Time: [illegible] Tech [illegible]
Control		urchins - top left wall, healthy Stars - front and back near [illegible] Abs - Top front corners & back [illegible] Perch swimming around normally Splitnose - Top right under [illegible] Tree - with [illegible]	urchins - Top left corner Stars - Top front and back glass Abs - Top corners Perch - swimming around [illegible] Tree [illegible] Splitnose - still with [illegible]	[illegible]
High Salinity		urchins - Top right [illegible] Stars - [illegible] Abs - Top corners Perch - swimming around normal Splitnose - All together top left Tree - in the rocks	Stars / Abs } All along [illegible] / urchins Perch swimming around Splitnose - [illegible] Tree next to [illegible]	urchin top right Abs [illegible] Perch swimming [illegible] [illegible]

	Date 24 OCT 2011 Time: [illegible] Tech BRIAN	Date 24 OCT 2011 Time: 2:13 Tech BRIAN	Date 25 OCT 2011 Time: [illegible] Tech BRIAN	Date [illegible] Time: Tech
Control	ABALONE ON TOP AND SPREAD OUT IN CORNERS, TWO ON BOTTOM CORNER. SEA [illegible] NORMAL [illegible] TOP AND [illegible] SWIMMING NORMAL [illegible] UP. PERCH DOING THE SAME. URCHIN ALL TOGETHER.	~~ADDED [illegible] SANDDABS AND ANTENNARIUS [illegible]~~ IN CENTER. ADDED TWO ANTENNARIUS. PERCH AND SANDDABS SWIMMING AROUND IN CENTER. SUM ABALONE ON TOP CORNERS AND SUM FROM BOTTOM CORNERS. SEA URCHINS ALL TOGETHER IN THE CORNER NEXT TO MUSSELS. SEA STARS ON TOP AND SPREAD OUT. MUSSELS ARE GOOD.	ALL SANDDABS SWIMMING ON [illegible] WITH SAND. SPLITNOSE AND [illegible] SWIMMING ON TOP ~~RIGHT~~ CORNER NEXT TO 2 ABALONE. ANOTHER 3 ABALONE ON TOP RIGHT CORNER [illegible] ALL SEA STARS NEXT TO EACH OTHER ON BACK GLASS ON TOP LEFT CORNER.	SEA URCHINS ARE ON BACK GLASS TOP LEFT CORNER ALL TOGETHER. MUSSELS ARE GOOD. SHINER AND KELP SWIMMING AROUND NORMALLY. CRABS [illegible] A TOP WHITE STUFF ON SAND.
High Salinity	ABALONE ON TOP AND SPREAD [illegible] CORNERS. [illegible] SEA STARS ARE NOT FULLY ATTACH TO GLASS [illegible] TOP OF URCHINS, URCHINS ARE ALL TOGETHER. SANDDABS SWIMMING AROUND AND CLOSE [illegible]	ADDED 3 CRABS, 2 ANTENNARIUS, 1 ANTENNARIUS, 4 LITTLE FISHES SWIMMING ON ~~RIGHT~~ LEFT TOP CORNER. 1 A BROWN AND SILVER FISH KEEPS SWIMMING AND TOUCHING A ABALONE. ABALONE ARE SPREAD OUT AND SEA URCHINS ARE SPREAD OUT ON RIGHT GLASS. SEA STARS ON TOP AND SPREAD OUT. MUSSELS GOOD. PERCH N DABS SWIMMING AROUND NORMALLY.	1 SANDDABS SWIMMING AROUND AT THE BOTTOM WITH THE KELP AND SHINER. DABS TRYING TO SWIM UP. ABALONE ARE SPREAD OUT IN EVERY CORNER. 1 DABS KEEP SWIMMING UP BEHIND A ABALONE. CRABS AND [illegible]	[illegible] SPLITNOSE CLOSE TO TOP LEFT CORNER SWIM UP. SEA STARS ARE SPREAD OUT ON TOP [illegible] GLASS. URCHINS SPREAD OUT ON RIGHT SIDE GLASS. MUSSELS OK. CRABS GOOD.

[illegible] ~~[illegible]~~ TANK OFF

	Date 25 OCT 2011 Time: 3:35 Tech BRIAN	Date [illegible] Time: [illegible] Tech BRIAN	Date Time: Tech	Date 26 OCT 2011 Time: 3:30 Tech BRIAN
Control	[illegible] DABS ON BOTTOM [illegible]. SEA STARS ARE SPREAD OUT ON GLASS. URCHINS ARE ON [illegible] SPREAD. FLAG AND SPLITNOSE ARE SWIMMING UP. MUSSELS ARE GOOD. PERCH ARE [illegible] GOOD. CRABS ARE GOOD.	SEA URCHINS ON GLASS SPREAD OUT. SEA STARS ON GLASS SPREAD OUT. ABALONE ON GLASS SPREAD OUT 1 ON BOTTOM RIGHT CORNER. 1 SHINER 2 KELP SWIMMING ON THE BACK LEFT CORNER. THE REST SWIMMING NORMAL. FLAG AND SPLITNOSE GOOD.	~~SEA~~ ~~SEA~~. CRABS DOING GOOD.	SEA STARS ARE SPREAD OUT ON GLASS. URCHINS BACK LEFT CORNER WALL [illegible] SWIMMING FROM LEFT TO RIGHT IN [illegible] [illegible] ON LEFT SIDE [illegible]. ABALONE [illegible] SPREAD OUT. FLAT AND SPLITNOSE [illegible]
High Salinity	ABALONE SPREAD OUT ON GLASS. SEA STARS ARE SPREAD OUT ON GLASS RIGHT SIDE. ALL PERCH ARE ON THE BOTTOM LEFT CORNER. URCHIN RIGHT GLASS TOGETHER. CRABS DOING GOOD.	3 SEA STARS ON BOTTOM RIGHT 1 ON THE BACK GLASS NORMAL BEHAVIOR. 1 ABALONE ON BOTTOM LEFT CORNER GLASS 4 ON RIGHT GLASS [illegible] KELP. SEA URCHINS ON RIGHT GLASS SPREAD OUT. SOME [illegible] KELP. MUSSELS [illegible] OK GOOD. 2 SPLITNOSE AND A FLAT FISH SWIMMING ON TOP LEFT CORNER. 1 KELP PERCH	SWIMMING ON BACK LEFT CORNER. ALL SANDDABS SWIMMING ON BOTTOM. 1 SHINER PERCH SWIMMING CLOSE TO LEFT BOTTOM CORNER. 1 SHINER AND 1 KELP FISH SWIMMING ON BOTTOM RIGHT CORNER. 1 KELP FISH [illegible] ABALONE REST SWIMMING NORMAL. CRABS DOING GOOD.	SEA STARS SPREAD OUT ON GLASS. URCHINS RIGHT SIDE GLASS SPREAD OUT. ALL PERCH SWIMMING ON RIGHT SIDE. ABALONE SPREAD [illegible] GLASS. DABS ARE GOOD SWIMMING AND [illegible]. MUSSELS GOOD. CRABS ARE STILL GOOD.

West Basin High Salinity Sensitivity Study

Start Date: Time:

End Date: Time:

Behavioral Observations

	Date 27 Oct 2011 Time: 8:20 Tech BRIAN L. (BUBBLE LIKE STUFF ON TOP OF WATER)	Date 27 OCT 2011 Time: 3:30 Tech BRIAN L.	Date Time: Tech	Date 28 Oct 2011 Time: 8:41 Tech Chris B
Control	SEA STARS ARE SPREAD OUT DOING GOOD ON GLASS. SEA URCHINS ALL TOGETHER ON TOP LEFT CORNER GLASS BEHIND MUSSELS. MUSSELS DOING GOOD. ABALONE SPREAD OUT AND ON GLASS. ALL PERCH ARE SWIMMING AROUND NORMALLY. SAND-DABS SWIMMING AROUND NORMALLY. SPLITNOSE AND FLAG FISH SWIMMING NORMAL	FED TODAY; SEA STARS SPREAD OUT ON TOP GLASS. ABALONE SPREAD OUT ON GLASS. URCHINS ARE TOGETHER ON THE CORNER OF LEFT SIDE GLASS. MUSSELS LOOK GOOD. 1 SPLITNOSE FACING UP THE OTHERS SWIMMING AROUND. FLAG FISH SWIMMING IN THE MIDDLE. DABS SWIMMING ALONG SAND. DABS IS STILL IN FRONT RIGHT CORNER.	ALL PERCH SWIMMING AROUND NORMALLY. CRABS BEHAVING NORMALLY 1 IS ON THE WALL. Crabs - Normally relaxing Dabs good	Stars, spread out on glass urchins together top left corner Abs - spread out on glass mussels - all alive, look good Perch - all swimming around slowly splitnose - swimming vertically Tree - swimming vertically
High Salinity	SEA STARS SPREAD OUT DOING GOOD ON GLASS. URCHINS SPREAD OUT ON RIGHT SIDE GLASS. MUSSELS LOOK NORMAL BEHAVIOR. ABALONE SPREAD OUT ON GLASS. SHINERS ON LEFT SIDE TANK [illegible] KEEP SWIMMING ON RIGHT SIDE TANK. SPLITNOSE KEEP FACING UP BUT SWIMMING GOOD. DABS SWIMMING NORMAL, CRABS GOOD.	FED TODAY. SEA STARS ON GLASS SPREAD OUT ON RIGHT SIDE. URCHINS ALL TOGETHER ON RIGHT SIDE GLASS. 4 ABALONE TOGETHER ON RIGHT SIDE GLASS 1 IS ON BOTTOM LEFT CORNER. ALL SPLITNOSE FACING UP AND 3 SANDDABS. ALL KELP PERCH ON RIGHT SIDE SWIMMING. SILVER PERCH SWIMMING AROUND NORMALLY. DABS SWIMMING UP THEN DOWN LIKE A CIRCLE.	CRABS DOING NORMAL BEHAVIOR. MUSSELS LOOK GOOD. crabs - all alive dabs - swimming along sand	Stars spread out on upper glass Abs - spread out on glass urchins - spread out on upper glass 1 splitnose swimming vertical 2 swimming up and down Tree - swimming into glass

	Date 28 Oct 2011 Time: 3:15 Tech Chris B	Date 29 Oct 2011 Time: 11:12 am Tech Ernesto	Date [illegible] Time: [illegible] Tech Ernesto	Date 30 Oct 2011 Time: 7:30 am Tech Ernesto
Control	stars - spread along upper glass Abs - spread out in corners urchins - top left back corner Perch - swimming around healthy splitnose - top left corner in place Tree - top left corner Dabs - healthy in sand	Stars: [illegible] on back top left corner close [illegible] mostly at the top wall [illegible] on the bottom close to [illegible] to the bottom. [illegible]	[illegible] urchins on back top left corner [illegible] spread out [illegible]	[illegible] close to surface [illegible] Perch swimming and [illegible] in gravel [illegible]
High Salinity	stars - spread along upper glass Abs - spread out all over walls urchins - top right corner perch - swimming along walls Tree - vertical along right wall splitnose - swimming vertically [illegible] Dabs - along sand	Stars [illegible] close to surface [illegible] mussels open and [illegible] at top right corner [illegible] same behavior as control. Tree [illegible] swimming vertically. Perch [illegible] normal [illegible] same behavior as control. Crabs breathing normal.	Swimming together vertically on upper left [illegible] Tree swimming [illegible] Stars spread at top. Abalone spread out [illegible] on right side with extended [illegible]. Tree fish is swimming vertically [illegible] close to [illegible] same behavior as control [illegible] mussels are open [illegible] Crabs are moving [illegible] crabs in control.) [illegible] open.	Stars close to surface [illegible] top right [illegible] extended [illegible] mussels are open [illegible] same behavior as control [illegible] and others on gravel [illegible] swimming, but do not [illegible] [illegible] Tree [illegible] crabs breathing normally [illegible]

	Date [illegible] Time: [illegible] Tech Ernesto	Date 31 OCT 2011 Time: 8:20 AM Tech BRIAN L. (1 CRAB DIED)	Date 31 OCT 2011 Time: 3:22 pm Tech BRIAN L.	Date 1 Nov 2011 Time: 8:14 Tech Chris B
Control	[illegible]	SEA STARS ARE ALL SPREAD OUT ON GLASS TOP. ALL URCHINS TOGETHER ON BACK RIGHT CORNER WALL. ABALONE ALL SPREAD OUT ON GLASS. ALL PERCH SWIMMING AROUND NORMALLY. ALL DABS SWIMMING AROUND NORMALLY. MUSSELS LOOK GOOD, 2 CRABS ARE STILL LOOKING LIKE NORMAL. SPLITNOSE, FLAG AND SILVER [illegible]	SEA STARS SPREAD OUT ON TOP GLASS. URCHINS ARE ON LEFT SIDE BACK CORNER. ABALONE SPREAD OUT ON GLASS. ALL DABS SWIMMING [illegible]. ALL PERCH SPREAD OUT SWIMMING NORMALLY. MUSSELS LOOK GOOD. SPLITNOSE SWIMMING ON LEFT TOP CORNER. CRABS NORMAL BEHAVIOR. FLAG FISH NORMAL.	Stars - spread out around surface urchins - top left corner behind mussels Abs - in corners of tank, top & bottom Perch - searching for food in rocks and walls, and by mussels Dabs - [illegible] Splitnose - staying in position Tree - swimming [illegible] crabs - both still healthy
High Salinity	[illegible]	SEA STARS ARE SPREAD OUT ON GLASS. URCHINS ARE ON RIGHT SIDE GLASS. ABALONE ARE SPREAD OUT ON GLASS. MUSSELS LOOK GOOD. ALL PERCH SWIMMING NORMALLY. ALL DABS SWIMMING NORMALLY. SPLITNOSE SWIMMING ON FRONT TOP RIGHT CORNER. FLAG FISH SWIMMING AROUND. 1 CRAB DIED AND WAS REMOVED.	SEA STARS SPREAD OUT ON TOP GLASS. URCHINS ARE ON RIGHT SIDE GLASS. MUSSELS LOOK GOOD. SHINER SWIMMING AROUND ON LEFT SIDE. KELP PERCH ALL SWIMMING AROUND NORMALLY. DABS ALL SWIMMING NORMALLY. ABALONE SPREAD OUT ON GLASS. FLAG FISH FACING UP. SPLITNOSE SWIMMING IN THE CENTER. CRABS SHOW NORMAL BEHAVIOR.	Stars - spread along back wall along top urchins - right [illegible] surface Abs - [illegible], 2 along bottom [illegible] Perch - swimming around [illegible] Splitnose & tree - top left near surface Dabs - 3 swimming up and down [illegible] along sand crabs - alive, normal - [illegible]

* [illegible]

West Basin High Salinity Sensitivity Study

Start Date: Time:

End Date: Time:

Behavioral Observations

	Date 1 NOV 2011 Feeding day Time: 3:01 Tech Chris B 0.020	Date 2 NOV 2011 Time: 8:21 am Tech [illegible]	Date 2 Nov 2011 Time: 3:41 Tech Chris B	Date 3 Nov 2011 Time: 7:45 Tech Chris B
Everyone ate Control A little left over	Stars - still at top, finished eating Urchins - Top left, Eating kelp Abs - In all corners eating kelp Perch - swiming around, normal Dabs - in sand, all really fat Splitnose - in relating in territories Tree - Swiming around / Crabs - [illegible]	Sea stars at top spread out on back wall Urchins all together [illegible] left side Abalone look good in every corner [illegible] Perch swimming around [illegible] tank Dabs are good all [illegible] sand Splitnose swimming [illegible] [illegible], treefish are swimming [illegible] crabs look good	Stars - spread out left top Urchins - top left, around urchins Abs - In corners, normal Perch - swiming around, picking at rock Split nose - [illegible] chiller coil Tree - by rocks, swimming Crab - normal, alive	Stars - spread out near surface Urchins - Top left corner, by mussels Abs - spread out in corners Perch - swiming around, norm activity Tree - inside mussel bag, normal Split - in designate territories Crab - normal, still alive
Everyone ate High Salinity No left over	Stars - near surface, back wall Urchins - surface on right wall Abs - spread out, Eating kelp. Perch - swiming around, normal Dabs - swimming up and down wall [illegible] Splitnose - staying in center of tank Tree - swimming around Crabs - all healthy, normal	Sea stars spread out on back wall Urchins [illegible] right side of tank [illegible] [illegible]. Abalone look good [illegible] right side [illegible] Perch [illegible], swimming around, Dabs are all on the sand, splitnose swimming fast [illegible], treefish swimming faster on top, crabs look normal	Stars - Top, back wall Urchins - right wall, near surface Abs - spread out on front/right wall Perch - swiming a lil frantic Split - Top left corner Tree - middle corner, [illegible] Crabs - normal, alive	Stars - spread out back glass Urchins - Top right wall, Together Abs - spread out all over glass Perch - swimming, breathing normal Split - Top left corner Tree - center of tank, normal Crab - normal, still alive

	Date 3 Nov 2011 Feeding day Time: 3:36 Tech Chris B 0.027 kg	Date 4 Nov 2011 Time: 7:25 Tech Chris B	Date 4 Nov 2011 Time: 3:41 Tech Chris B	Date 5 Nov 2011 Time: 10:00 Tech Chris B
Everyone ate Control none left over	stars - spread out among upper wall urchins - Top left corner, by mussels Abs - spread out, eating kelp Perch - swiming around, normal Tree - swiming around, normal Split - All near rocks Crab - healthy	Stars - spread out among glass Urchins - top left by mussels Abs - in corners, normal Shiners - swiming around normal kelp, swiming around in pairs, weird Tree - by mussels - normal Split - all around chiller coil Crab, healthy still alive	Stars - Top of left wall, together Urchins - top left corner by mussel Abs - in corners still Perch - swiming normal now Split - chasing each other Tree - swiming around Crab - normal, both alive	Stars - spread out on back glass Urchins - Top left corner Abs - in corners, normal Perch - swiming around, normal activity Split - by cooling coil, normal Tree - in mussels bag Dabs - swiming to surface, weird
Everyone ate High Salinity none left over	Stars - spread out among glass Urchins - right wall, spread out Abs - spread out, eating kelp Perch - swiming around [illegible] Split - Top left, [illegible] with Tree Dabs - 2 swiming franticly Crabs - normal, healthy	Stars - spread out all over Urchins - right wall Abs - spread out on window Shiners - swiming around kelp - swiming in pairs, weird Tree / Split > Top left corner, all together Crab - still alive acting normal	Stars - spread out. Abs - Top right corner/bottom L Perch - swiming around near Tree / split - Top left corner Dabs - 1 swiming at surface Crabs - healthy still alive Urchins - Top right wall	Stars / Urchins / Abs > spread out among glass, in same areas as yesterday Perch - swiming around, kelp swiming vertical Split / tree - near surface Dabs - swiming along sand

	Date 5 Nov 2011 Time: 4:40 pm Tech Ernesto	Date 6 Nov 2011 Time: 10:33 am Tech Ernesto A.	Date 6 Nov 2011 Time: 4:45 Tech Ernesto	Date 7 NOV 2011 Time: 8:00 Tech Brian
Control	Stars close to surface spread out urchins @ top back left corner Abalone spread out, mussels open, well [illegible] breathing normally [illegible] on screen ≈ 30cm high. Dabs swimming [illegible] 3 are close to surface one resting [illegible] screen. Perch, splitnose, [illegible] swimming [illegible] tree [illegible]	Stars spread on top touching H2O line. Urchins remain at same corner with tube feet extended. Mussels look ok open. Abalone are spread out. Perch are swimming and active searching for food on gravel. Split nose & Tree fish are swimming together to front right corner. Dabs are together on sand & swimming upward breathing at surface Crabs breathing normally are on screen @ top	Stars' same as this morning. Urchins on same spot. Abs spread out. Mussels are open wider than usual. Perch swimming around. Split nose & Tree swimming on the screen spot. Dabs show same behavior as this morning. Crabs alive and well.	SEA URCHINS LOOK GOOD ON TOP RIGHT CORNER 1 IS ON MIDDLE FRONT GLASS ABALONE ARE SPREAD OUT ON GLASS 3 SEA STARS TOGETHER ON BACK TO GLASS 1 IS ON LEFT SIDE. MUSSELS LOOK GOOD SPLIT LOOK GOOD 3 DABS ON LEFT SIDE [illegible] SWIMMING UP THE REST SWIMMING AROUND. SPLITNOSE AND TREE FISH SWIMMING [illegible] RIGHT CORNER. ALL PERCH [illegible] TWO CRABS LOOK NORMAL THEY ARE STILL [illegible] SCREEN ON GLASS N SAND
High Salinity	Stars at bottom of tank around gravel on on gray pipe. Abalone spread out and well. Urchins on top front left corner. Dabs swimming upwards to surface, [illegible] on sand [illegible]. Abalone spread out and are eating kelp mussels open. Perch, splitnose & Tree fish swimming together at top right Crabs [illegible] and are [illegible]	It seems like there's more algae growing in tank Sea stars are spread out on top & bottom. Abalone spread out. Sea urchin on same spot as yesterday. Perch show same behavior as control. Split nose & Tree fish swimming at top front left corner, mussels look good Crabs all alive and breathing normally.	All animals show same behavior and on the same areas as this morning.	URCHINS ON FRONT RIGHT [illegible] TUBE FEET OUT. 2 SEA STARS ON GLASS 1 ON THE ROCKS. MUSSELS LOOK GOOD SHRIMP LOOK [illegible] ABALONE ARE SPREAD OUT ON GLASS. [illegible] N SPLITNOSE SWIMMING ON TOP LEFT [illegible] ALL DABS AND PERCH SWIMMING AROUND NORMALLY. BROWN STUFF ON GLASS [illegible] SAND. CRABS ARE STILL NORMAL [illegible]

West Basin High Salinity Sensitivity Study

Start Date: Time:

End Date. Time:

Behavioral Observations

	Date 7 NOV 2011 Time: 3:15 Tech BRIAN L.	Date 8 NOV 2011 Time: 8:04am Tech Blanca	Date 8 NOV 2011 Time: 8:41am Tech BRIAN	Date 9 NOV 2011 Time: 7:51 AM Tech BRIAN L. CRABS NORMAL
Control	3 SEA STARS ARE ON BACK TOP GLASS 1 IS ON THE LEFT TOP GLASS, MUSSELS LOOK GOOD OPEN. URCHINS ARE TOGETHER ON BACK LEFT CORNER WALL ON TOP. ALL ABALONE SPREAD OUT ON GLASS, CRABS SHOW NORMAL BEHAVIOR. ALL PERCH ARE SWIMMING AROUND NORMALLY. DABS ARE SWIMMING AROUND NORMALLY. FLAG AND 1 SPLITNOSE SWIMMING AROUND, 2 SPLITNOSE SWIM ON TOP RIGHT CORNER.	Sea stars look good, are back top glass. Mussels look good, they are open. Urchins are together on the top left corner. Abalone are good, most in every corner. Perch swimming, some high. Dabs are good, some swimming [illegible] really high. Tree fish is good, swimming around the muscle. Splitnose good, swimming together.	SEA STARS ARE TOGETHER ON BACK TOP GLASS. ABALONE ARE ALL SPREAD OUT ON GLASS. URCHINS ARE ALL TOGETHER ON TOP CORNER OF LEFT GLASS BEHIND MUSSELS. MUSSELS LOOK GOOD. DABS SWIMMING ALONG THE SAND. ALL PERCH SWIMMING AROUND NORMALLY MAINLY IN THE CENTER. SPLITNOSE SWIMMING AROUND THE CENTER. FLAG FISH SWIMMING [illegible] UP. CRABS ON CLIMBING IN [illegible]	SEA STARS ARE ON TOP GLASS 3 IN THE BACK 1 IN THE FRONT. ABALONE ARE ALL SPREAD OUT ON GLASS. URCHINS ARE TOGETHER ON BACK LEFT SIDE GLASS. SPLITNOSE AND FLAG FISH AROUND IN THE CENTER. SILVER PERCH SWIMMING ON THE LEFT SIDE. 1 KEEPS GOING UP AND DOWN. KELP PERCH SWIMMING AROUND. DABS ARE ON THE SAND 1 IS JUST [illegible] IN THE RIGHT CORNER. MUSSELS ARE OPEN.
High Salinity	SEA STARS ARE SPREAD OUT 1 IS ON THE ROCKS. URCHINS ARE TOGETHER ON RIGHT MIDDLE CORNER GLASS. ABALONE ARE SPREAD OUT ON GLASS. MUSSELS LOOK GOOD. SPLITNOSE AND FLAG FISH SWIMMING ON TOP LEFT CORNER. DABS SWIMMING ALONG THE SAND SOME FACING UP. 1 SILVER PERCH SWIMMING TOWARDS THE LEFT GLASS PERCH AND THE REST OF PERCH SWIMMING NORMAL. CRABS SHOW NORMAL BEHAVIOR.	Sea stars look good, on every glass. Urchins are all together on right side wall. Abalone are good, some are at the bottom corner, and rest are on right wall. Mussels are good, they are open. Splitnose are good swimming around the middle of tank. Dabs are good, some are on sand, and some are swimming really high. Perch swimming towards left, all.	SEA STARS SPREAD OUT ON GLASS. 2 URCHINS ON FRONT GLASS AND THE REST ON MIDDLE RIGHT CORNER. TUBE FEET EXTENDED LONG AND DROOPING. ABALONE SPREAD OUT ON GLASS. PERCH SWIMMING AROUND MAINLY IN CENTER. DABS SWIMMING ALONG THE SAND. FLAG FISH SWIMMING UP AND DOWN. SPLITNOSE SWIMMING AROUND. CRABS SHOW NORMAL BEHAVIOR.	SEA STARS SPREAD OUT 3 ON BACK GLASS 1 IS ON SAND. ABALONE ARE SPREAD OUT ON BACK GLASS. URCHINS ARE SPREAD OUT. SPLITNOSE AND ~~FLAG~~ SWIMMING IN THE CENTER. PERCH SWIMMING AROUND SPREAD OUT. 3 SAND DABS ON LEFT SIDE KEEPS SWIMMING UP THE REST ARE ALONG THE SAND. CRABS SHOW NORMAL BEHAVIOR.

	Date 9 NOV 2011 Time: 3:00 PM Tech BRIAN L.	Date 10 NOV 2011 Time: 7:49 AM Tech BRIAN L. CRABS NORMAL.	Date 10 NOV 2011 Time: 4:05 PM Tech BRIAN	Date 11 Nov 2011 Time: 7:45am Tech Blanca
Control	SEA STARS TOGETHER ON BACK GLASS. ALL URCHINS TOGETHER ON BACK TOP LEFT CORNER. ABALONE ARE SPREAD OUT ON GLASS. MUSSELS LOOK CLOSE. SPLITNOSE AND FLAG SWIMMING IN THE MIDDLE. PERCH SWIMMING AROUND 2 OF THEM MAINLY IN CENTER. SAND DABS ARE ON THE SAND 1 KEEPS SWIMMING UP AND DOWN. CRABS ARE STILL	SEA STARS ARE SPREAD OUT ON BACK GLASS. ABALONE ARE SPREAD OUT ON TOP GLASS 2 ON RIGHT BOTTOM CORNERS. MUSSELS ARE OPEN. URCHINS ARE TOGETHER ON TOP LEFT CORNER. SPLITNOSE SWIMMING IN THE CENTER. FLAG FISH SWIMMING AROUND THE LEFT SIDE OF THE TANK. SILVER PERCH SWIMMING FROM LEFT TO RIGHT. KELP PERCH MAINLY IN CENTER. DABS ALONG THE SAND.	SEA STARS ON FRONT GLASS. URCHINS ON BACK LEFT CORNER GLASS. PERCH SWIMMING AROUND. FLAG SPLITNOSE IN THE CENTER. MUSSELS ARE OPEN. ABALONE ON GLASS. DABS ON THE SAND. CRABS SHOW NORMAL BEHAVIOR	Sea stars are in front glass, urchins on back top left corner. Abalone look good, most are on top front glass. Perch look good, swimming up and down. Dabs some are on sand, others are swimming up and down [illegible]. Splitnose are hanging out [illegible] corner. Tree fish [illegible]. Crabs look good. Mussels are open.
High Salinity	SEA STARS ARE SPREAD OUT ON GLASS 1 IS ON THE ROCKS. URCHINS ARE SPREAD OUT ON RIGHT SIDE GLASS. MUSSELS LOOK OPEN. ABALONE ARE SPREAD OUT ON GLASS. 1 SAND DABS WAS JUMPING OUT OF THE WATER. THE REST SWIMMING AROUND. FLAG IS ON THE CENTER. SPLITNOSE ALSO SWIMMING AROUND. PERCH SWIMMING AROUND MOST OF THEM MAINLY IN THE CENTER. CRABS ARE STILL.	3 SEA STARS TOGETHER ON BACK RIGHT CORNER 1 ON THE BOTTOM. URCHINS TOGETHER ON THE RIGHT CORNER GLASS. ABALONE ARE ALL SPREAD OUT ON GLASS. A SPLITNOSE AND FLAG FISH FACING UP IN THE CENTER. 2 SPLITNOSE SWIMMING ON THE LEFT SIDE. SILVER PERCH SWIMMING ON THE LEFT SIDE. 1 KELP PERCH SWIMMING ON THE RIGHT. THE OTHERS SWIMMING AROUND. DABS ALONG THE SAND. CRABS SHOW NORMAL BEHAVIOR.	URCHINS ON RIGHT SIDE GLASS. SEA STARS SPREAD OUT ON GLASS.	Sea stars are front and side glass, one [illegible] stomach out. Urchins are all on right wall. Abalone are in every corner, look good. Perch look good, swimming around & some are swimming towards left glass. Splitnose are swimming upwards up and down. [illegible] is hanging out around [illegible]. Dabs are swimming really low. Mussels are open.

	Date 11 NOV 2011 Time: 340 Tech Chris B	Date 12 NOV 2011 Time: 10:00 am Tech DavidR mussles slightly open	Date 12 Nov 2011 Time: 3:56pm Tech David R	Date 13 Nov 2011 Time: 11:50 Tech Ernesto
Control	Stars spread out among glass, urchins in top left corner by mussels. Abs spread out on glass, normally. Perch swiming around normally. Splitnose/flag both posted in territories. Dabs swiming along sand. Crabs healthy, breathing normal	Sea stars are spread around top of tank. One urchin on rocks, one urchin on mussels, two urchins together top of tank. Abalone toward the right back corner of tank. All perch are swimming normally. Sandabs are swimming normally. All fish look and are swim normally. Crabs look good	All sea stars towards rear top of tank. 3 abalone top of tank, two in bottom right back corner. One abalone top left. Two urchins in bottom sand and two urchins on top of tank. Sandabs swimming normally, all fish swimming normally and look healthy. Claws are slightly open	Sea Stars spread all over tank. Sea urchins and abalone spread all over. Mussels open and appear normal. Crabs alive and breathing normally. Dabs swimming up and down, most are resting on sand. Splitnose swimming in middle of tank. Tree swimming vertically. Perch. Perches swimming around.
High Salinity	* Stars spread out, along glass and sand. Urchins - spines are a bit down, sign of stress. Perch swiming around, a little bit jittery. Flag - posted. Splitnose - posted like flag. Dabs swimming around. Crabs - still healthy	Sea stars are spread out through the tank. All urchins on the right side of tank. One urchin is upside down. 3 abalone on the left side, others on the right side. Sandabs look normal. All fish swimming normally. Crabs look good. Mussels slightly open	All urchins together bottom back right corner. One sea star on top of rocks, two sea stars on top right corner. One sea star on left back side of tank. All fish swimming in lower water column. Two [illegible] out of rocks. All fish look & swim normal	Stars are spread out, one on gravel. Abalone are spread out. Urchins are on bottom right on sand, they look stressed out w/ spines pointing downwards. Mussels open & look normal. Crabs alive. Dabs swimming up and down. Perches swimming around [illegible] for food. Tree swimming [illegible]. Splitnose swimming [illegible]

Urchins are alive.

West Basin High Salinity Sensitivity Study

Start Date: Time:

End Date: Time:

Behavioral Observations

	Date 13 Nov 2011 Time: 3:35 Tech Ernesto	Date 14 Nov 2011 Time: [illegible]:00 Tech BRIAN L.	Date 14 Nov 2011 Time: 3:[illegible] pm Tech BRIAN	Date 15 Nov 2011 Time: [illegible] Tech Blanca C	Date 15 Nov 2011 Time: [illegible] pm Tech Blanca
Control	ALL Animals are doing the same thing as this morning. All look healthy and active.	SEA STARS LOOK [illegible] SPREAD OUT ON TOP GLASS. ABALONE SPREAD OUT ON GLASS [illegible] ON TOP [illegible] SPREAD OUT ON BACK AND CORNER OF THE LEFT SIDE. MUSSELS ARE OPEN. CRABS SHOW NORMAL BEHAVIOR [illegible] THE BOTTOM. DABS SWIMMING AROUND ALONG THE SAND. [illegible] PERCH KEEPS LEANING TO THE SIDE. THE REST OF [illegible]	SEA STARS SPREAD OUT ON TOP [illegible] ABALONE SPREAD OUT ON GLASS. URCHINS ON TOP BACK LEFT CORNER. MUSSELS ARE OPEN. 2 DABS ON RIGHT SIDE FACING UP THE REST ALONG THE SAND. SPREAD OUT. SPLITNOSE AND FLAG FISH FACING UP IN THE CENTER. 2 SPLITNOSE SWIMMING AROUND. CRABS ARE ON BOTTOM [illegible] PERCH SWIMMING AROUND SILVER [illegible]	[illegible]	[illegible]
High Salinity	A perch is moving too fast against the glass. Dabs are swimming actively ~10 cm from sand. all other are showing same behavior as this morning. Urchins continue stressed	SEA STARS SPREAD OUT 3 ON TOP 1 ON GRAVEL. ABALONE SPREAD OUT ON GLASS. MUSSELS ARE OPEN. DABS SWIMMING ~~[illegible]~~ ALONG THE SAND. PERCH SWIMMING AROUND NORMALLY AND ACTIVE. SPLITNOSE SWIMMING AROUND. FLAG FACING UP IN THE CENTER. CRABS SHOW NORMAL BEHAVIOR. 1 ON TOP 2 ON BOTTOM. URCHINS LOOK STRESSED ALL [illegible] BOTTOM RIGHT SIDE. SPINES ARE [illegible]	SEA STARS SPREAD OUT ON GLASS 1 ON GRAVEL. ABALONE SPREAD OUT ON GLASS. MUSSELS ARE [illegible] STILL ON RIGHT SIDE ON THE SAND STRESSING. 4 DABS SWIMMING TOWARD THE LEFT GLASS THE REST ALONG THE SAND. FLAG FISH FACING UP. KELP PERCH MAINLY SWIMMING ON RIGHT SIDE. SILVER MAINLY SWIMMING ON LEFT. 1 CRAB UP 2 DOWN.	[illegible]	[illegible]

	Date [illegible] Nov 2011 Time: [illegible] Tech Blanca C	Date [illegible] Nov 2011 Time: [illegible] pm Tech Blanca C	Date [illegible] Time: [illegible] Tech Blanca C	Date 17 Nov 2011 Time: 7:47 pm Tech Blanca C	Date 18 Nov 2011 Time: 7:36 am Tech Blanca C
Control	[illegible]	Sea stars spread around [illegible] wall. Abalone [illegible] [illegible]	[illegible]	[illegible] look good [illegible] all on the [illegible]	Sea stars look good, spread out [illegible] wall. Abalone look good, some are [illegible] algae off [illegible]. Dabs [illegible] [illegible]
High Salinity	[illegible]	[illegible] at the bottom [illegible] Dabs [illegible] [illegible]	[illegible] 2 dead ones. [illegible] mussels open.	Stars did not eat again. Abalone [illegible] look ok, 1 hasn't move much [illegible] [illegible] all dead. Splitnose [illegible] eat other. [illegible]	Sea stars look good, most are [illegible] at the bottom. Abalone look ok, 1 may be dead. Dabs are all [illegible] down and side to side. [illegible] Splitnose are swimming together [illegible] [illegible] All abalone [illegible]

	Date [illegible] Nov 2011 Time: [illegible] Tech Blanca	Date 19 Nov 2011 Time: 930am Tech Ernesto	Date 19 Nov 2011 Time: 4:09 Tech Ernesto	Date 20 Nov 2011 Time: 9:45 am Tech Ernesto	Date 20 Nov 2011 Time: 4:38pm Tech Ernesto A.
Control	Sea stars look good, spread around [illegible]	Stars all well at water line. Abalone spread out. Urchins spread out w/ tube feet extended. Mussels open & well. Crabs alive. Splitnose & tree swimming around. Dabs swimming up & down as usual & Perch active and foraging for food.	Stars are on top of tank. Abalone spread out. urchins on top back left corner. Mussels open and well. Fish are doing same thing as this morning. Crabs alive	Stars, Abalone are spread out. Urchins remain on same spot as yesterday. Mussels are open and look well. Crabs are alive on screen. Fish show same behavior as usual. Perch foraging for food. ~~[illegible]~~ dabs swimming. Splitnose & tree swimming.	Stars & Abalone are spread out. Stars all at top by water line. Mussels open and well. Urchins on same spot as this morning. ALL fish are showing same behavior as this morning. crabs are alive
High Salinity	Sea stars are at bottom, look good [illegible] [illegible]	Stars at bottom one upside down look stressed. Abalone spread out 2 upside down but alive. Stressed out. mussels closed. Dabs swimming up & down like always. Perch swimming around. Splitnose & Tree swimming [illegible]. Crabs motionless but alive.	Sea Stars & Abalone are on sand. They look stressed. Mussels open and appear to be alive. all fish show same behavior as this morning. Crabs one dead the other w/ mouth parts wide open.	Abalone and Stars are alive, but are stressed. Coloration on abalones mantle is fading. Mussels are open. ALL fish seem normal and show same behavior as control. Crab is breathing slowly.	Stars at bottom of tank on sand. Abalone need to be checked tomorrow, they do look good. barely moving. Mussels open and look ok. Crab is alive with mouth parts open. ALL fish show same behavior as [illegible]

Start Date: Time:

End Date: Time:

Behavioral Observations

	Date 21 NOV 2011 Time: 8:15AM Tech BRIAN L.	Date 4 NOV 2011 Time: 3:30 Tech BRIAN L	Date 22 NOV 2011 Time: 2:50 Tech Chris B	Date 22 Nov 2011 Time: 3:54 pm Tech Bianca C feeding day
Control	SEA STARS ON GLASS SPREAD OUT. URCHINS ARE ON BACK LEFT CORNER 1 IS ON THE GRAVEL GLASS. MUSSELS ARE OPEN. ABALONE ARE SPREAD OUT ON GLASS. FLAG AND SPLITNOSE ON THE CENTER FACING UP. PERCH SWIMMING AROUND. SILVERPERCH ON LEFT CORNER SWIMMING UP AND DOWN IN A FAST PACE. DABS ALONG THE SAND.	SEA STARS SPREAD OUT ON GLASS. URCHINS ARE ON BACK LEFT CORNER. MUSSELS ARE OPEN. ABALONE ARE SPREAD OUT. FLAG AND SPLITNOSE SWIMMING AROUND. PERCH SWIMMING AROUND. DABS ARE SPREAD OUT SOME ARE SWIMMING AROUND SOME ARE ALONG THE SAND. CRABS SHOW NORMAL BEHAVIOR.	stars - spread along surface of [illegible]; urchins - top left, behind mussels; Abs - along glass, everywhere; Perch - swimming around/breathing normal; split - rested in chosen terrain; flag - searching for food in rocks; Dabs - [illegible] normal; Crabs - seem healthy.	Stars spread on back wall [illegible] eating. urchins on left corner, Abs along front wall, perch [illegible] swimming, being active eating. splitnose [illegible] mouth wide. flag
High Salinity	SEA STARS SPREAD OUT ON SAND 1 ON RIGHT SIDE GLASS. ABALONE SPREAD OUT ON SAND 2 ON TOP GLASS. MUSSELS ARE OPEN. SPLITNOSE IN THE CENTER. FLAG FISH IN RIGHT CORNER FACING UP. PERCH SWIMMING AROUND ACTIVE. DABS SOME SWIMMING AROUND SOME ALONG THE SAND. CRAB SEEMS TO SHOW NORMAL BEHAVIOR.	SEA STARS SPREAD OUT ON THE SAND. ABALONE SPREAD OUT ON GLASS. MUSSELS ARE OPEN. FLAG AND SPLITNOSE SWIMMING AROUND THE CENTER. PERCH SWIMMING AROUND. DABS ARE SWIMMING AROUND SOME ARE ALONG THE SAND. CRAB SEEMS NORMAL.	stars - 3 along sand, one on wall; Abs - discoloration of body. Perch - One kelp is immobile but still breathing, others seem normal. split/flag - swimming against current vertically; Dabs - swim along sand; Crabs - seem healthy	stars - same as before; Abs - still looking unhealthy; perch - 1 dead, kelp; split nose - normal, swimming; tree - normal, near rocks; Dabs - healthy

	Date 14 DEC 2011 Time: 10:00AM Tech BRIAN L.	Date Time: Tech	Date Time: Tech	Date Time: Tech
Control	THERE ARE			
High Salinity				

	Date Time: Tech	Date Time: Tech	Date Time: Tech	Date Time: Tech
Control				
High Salinity				

West Basin High Salinity Sensitivity Study

Start Date: Time:

End Date: Time:

Behavioral Observations

	Date 14 DEC 2014 Time: 10:15 AM Tech	Date Time: Tech	Date Time: Tech	Date Time: Tech
Control				
High Salinity				

	Date Time: Tech	Date Time: Tech	Date Time: Tech	Date Time: Tech
Control				
High Salinity				

	Date Time: Tech	Date Time: Tech	Date Time: Tech	Date Time: Tech
Control				
High Salinity				

est Basin High Salinity Sensitivity Study

rt Date | Time

d Date | Time

Behavioral Observations

DEC 15th – [illegible]

tentative FEB 7th

Date 14 Dec 2011 · Time 10:00 AM · Tech [illegible]

Control: Urchins are grouping. The urchins are on the left side at the bottom eating kelp that was given to them. Several are on top glass and 1 is on the right side on glass. The sea stars are spread out each side of the glass and 1 is on the gravel. 1 sea star is eating. Abalone: 1 is on top back right corner and 1 on the bottom center glass, not eating kelp. The other [illegible]

High Salinity: Urchins are all on the left side of the tank. The bottom urchins are eating kelp, 9 on the top corners, some are grouping. Sea stars are on top, 2 on back glass and 2 on top right corner. Abalone on the left side tank at the bottom. They are like 2 groups of abalone where 1 is on top of the other. Tube snouts on the center. There were seven mussels [illegible]

Date: Olive snail not visible. 2 visible mole crabs buried in sand. · Time · Tech: Kelp fish was shaking.

Control: 2 are eating. 1 is on top of another. 4 kelp perch in the kelp that the urchins are eating. The others are on the right side facing the [illegible] ... All [illegible] swimming [illegible] ... spearnose [illegible] ... center, mussels [illegible]

High Salinity: Didn't eat. [illegible] 2 of them [illegible] bass are [illegible] swimming [illegible] left side [illegible] visible. Under [illegible] swimming on [illegible] are eating. [illegible] dabs swimming [illegible] kelp crab at top left [illegible]

Date 14 Dec 2011 · Time 3:20 PM · Tech [illegible]

Control: Urchins are on the left side at the bottom eating kelp. 1 abalone on the front center glass. 1 is eating kelp. 1 is on the top right corner. [illegible] stars spread out each side of glass. 1 star is still eating. [illegible] swimming around. Front right. 1 mole crab visible. [illegible] not visible. Bass at the [illegible]

High Salinity: [illegible] are all on the left side of tank. The bottom urchins are eating kelp at the top corner left. 1 sea star is at the [illegible] of the urchins on top. [illegible] are spread out on glass. [illegible] spread out. 2 on the bottom. [illegible] 1 is on top of the other. [illegible] center glass. 1 on back glass.

Date · Time · Tech

Control: Bottom right corner swimming in place. Spearnose at the top right corner swimming in place. Kelp crabs trying to climb up. Tube snout swimming on the left side swimming around. Dabs swimming along the sand.

High Salinity: Tube snouts swimming around in the center. Bass on the right side swimming in place. 4 mole crabs visible, moving to diff places then burying themselves. All kelp fish swimming on the left bottom side. 3 of them [illegible]. Olive snail not visible. Dabs swimming along the sand. Kelp crab in each bottom corner.

Date 15 Dec 2011 · Time 9:00 AM · Tech [illegible]

Control: Sea stars are on the glass [illegible] ... urchins are all on the left side. [illegible] on the back [illegible] ... corner. [illegible] at the bottom. [illegible] are [illegible] top [illegible] are grouping. Tube snouts [illegible] on the top left side swimming around. Abalone [illegible]

High Salinity: Sea stars are on the right side, front, back, and side. Urchins are in 3 groups. Group 1 are on gravel glass eating kelp. Group 2 are on the top right corner glass and group 3 are on the left corner glass. All on the left side. Abalone are all on the glass, 5 on the back, 3 in the front. 2 of them eating kelp. Tube snouts swimming in place facing up in the center. All kelp fish [illegible]

Date · Time: Kelp crab on the bottom · Tech: in each corner.

Control: [illegible] on the front center glass and 1 is on the top right corner. 1 is eating kelp. 1 is on top of another. All bass at the bottom right side. [illegible] are swimming in place. Kelp fish are on the right side as well. They seem like they are trying to swim to the other side. Mole crabs [illegible] spearnose on top right swimming in place facing up. Dabs swim [illegible] the sand. Mole crab not visible and olive snail

High Salinity: are on the left side. Still swimming in place. Still trying to swim to the other side. 4 bass swimming in place on the right corner. The other bass are on the left. Trying to go to the other side. 4 mole crabs visible and buried on the right side. Dabs swim along the sand. Spearnose at the top left swim in place facing up. Olive snail not visible. To me looks like urchins tube feet are extended. The kelp crab is the bottom corner.

Date 15 Dec 2011 · Time 3:30 PM · Tech [illegible]

Control: Tubesnouts didn't eat. Everyone else ate. Spearnose at the top right corner swimming in place facing up. Kelp fish on the right side swimming around. 1 is shaking. Dabs [illegible] along the sand. Bass on the right side swimming in place. Tube snouts swimming around.

High Salinity: Kelp fish on the left side swimming around. Spearnose in the right bottom corner swimming in place facing up. 2 mole crabs visible half way buried. Tube snouts swimming in the center. 2 sea stars on back glass and 1 in front eating. Abalone spread over 2 in front glass, 5 in back.

Date · Time · Tech

Control: In the center, abalone on the front center glass eating kelp. 1 is on top of another. All urchins are on the left side eating kelp. [illegible] are on top right corner. All on glass. Sea stars are spread out on each side of glass. 1 mole crab visible. Olive snail not visible. Mussels are open. Kelp crabs at the bottom [illegible]

High Salinity: Urchins spread out on the left side of tank. 1 group are on the gravel glass facing kelp. 2nd group on top right corner glass. 3rd group on top left corner glass. Mussels are open. Dabs swimming along the sand. Olive snail not visible. Kelp crab eating. Tube snout [illegible]

Date 16 Dec 2011 · Time 9:12 pm · Tech [illegible]

Control: Tubesnouts swimming together [illegible] ... Splitnose swimming vertically near right corner. Sand dabs posted in sand. Kelp perch all looking into [illegible] corner glass. WSB - swimming along sand staying together, mole crab, olive snail out

High Salinity: Tubesnouts swimming together near [illegible] splitnose [illegible] ... [illegible] mole crab, olive snails

Date · Time · Tech

Control: not visible, urchins spread out on glass in groups 2-6, abs spread [illegible] ... kelp crab, climbing up pipe.

High Salinity: not visible. Urchins mainly on glass, [illegible] buried [illegible] ... spread out [illegible] mainly in back left corner [illegible] ... spread [illegible]

Date 17 Dec 2011 · Time [illegible] · Tech [illegible]

Control:
Kelp Perch: swimming together [illegible] ... to be [illegible] food.
Olive snail: did not [illegible]
Tube snout: swimming together in middle of tank.
Sand crab: [illegible] in the sand.
Split nose: swimming [illegible] close to [illegible]

High Salinity:
Kelp Perch: swimming together [illegible] left corner
Olive snail: not found
Tube snout: swimming around [illegible]
Sand crab: not found.
Split nose: swimming [illegible] ... right (5) another on lower left (3)

Date · Time · Tech

Control:
Kelp Crab: Alive [illegible] on stone.
Sea Stars: Spread out on top on tank.
Urchins: Spread out some are covered [illegible] kelp blades.
Abalone: Spread out on lower section of tank.
Mussels: open & well.

High Salinity:
Kelp Crab: Alive one on bottom, the other on overflow screen.
Sea Star: Spread out one on the sand.
Urchins: Spreaded mostly on top right.
Abalone: Spread out on left side of [illegible]
Mussels: look ok.

fish — 0.015
sea star — 0.009
crab — 0.007

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 17 Dec 2011 Time: 4:30pm Tech Ernesto	Date ~~Time:~~ Tech	Date 12 Dec 2011 Time: 10:09 Tech Ernesto	Date Time: Tech
Control	Kelp Perch: Swimming on same spot as this morning. Olive Snails: Not found. Tube Snouts: Swimming ~~[illegible]~~ in the same as this morning. Sand crabs: not found, one molt. Sand dabs: Spread out on Sand. not moving	Splitnose: on same spot as this morning, but not active. Not resting. Kelp crabs: Alive and well on screen and air tube. Sea Stars: Spread out one on mussel bed. Urchins: spread out. Some feeding on kelp. Abalone: Spread out. Flock spread.	Kelp Perch: Swimming close together in back, lower right corner. White Sea bass: Swimming together lower on the sand right side of tank. Olive Snails not found. Tube Snouts: Swimming together in the middle. Sand crabs not found. Sand dabs [illegible]	Split nose: Swimming together on top right. Kelp crabs: alive and well, both on screen. Sea Stars: Spread out, 3 on the mussel bed. Urchins: Spread out mostly on left side of tank. Abalone: Spread out on bottom.
High Salinity	Kelp Perch: Swimming in a group lower left corner active. Olive snails not found. Tube Snouts: Same behavior as morning. Sand crabs not found. Sand dabs: on sand not moving. Splitnose: Swimming in 2 groups as this morning.	Kelp crabs: Alive same as this morning. Sea Stars: Spread out on top. Urchins: spread out mostly on top right. Abalone: Spread out mostly at bottom. White Sea bass: Swimming all [illegible]	Kelp Perch: Swimming together on back, lower left side of tank. White Sea bass: Swimming in 2 groups one right (6) center left (3). Olive snails not found. Tube Snout: Swimming together in the middle. Sand crabs: one molt	on sand to the right. 2 sand crabs are out of the sand. [illegible] sand dabs [illegible] not [illegible] Splitnose: [illegible] Kelp crabs: alive, one on overflow screen, the other at bottom. Urchins: Sea stars spread out on top. top right

	Date 12 Dec 2011 Time: 4:25 Tech Ernesto	Date ~~Time:~~ Tech	Date [illegible] Time: [illegible] Tech [illegible]	Date [illegible] Dec 2011 Time: 3:45 Tech [illegible]
Control	Kelp Perch: in school front lower right corner with WSBs. (4) WSB (5) Swimming on top right. Olive snail not found. Tube Snouts: Swimming in middle of tank. Sand crabs not found. Sand dabs on sand [illegible] Splitnose spread out [illegible]	Kelp crabs: alive on screen. Sea Stars: spread out. Urchins spread out, abalone spread out on bottom of tank. Mussels open and look ok.	[illegible]	[illegible]
High Salinity	Kelp Perch: Schooling front lower [illegible] WSBs (7) schooling [illegible] others spread out [illegible] sand crabs (3) in sand with antennae out, on the right side of tank.	Sand Dabs on sand swimming slowly. Splitnose swimming together on right side of tank. Kelp crab in same spot as this morning. Sea Stars spread out. Abalone on lower back left corner, Urchins on top right.	[illegible]	[illegible]

	Date [illegible] Dec 2011 turn off: fish — 0.015, sea star — 0.009, crab — 0.007 Time: [illegible] 3:00pm Tech [illegible] Feeding Day	Date [illegible] Dec 2011 Time: [illegible] Tech [illegible]	Date [illegible] Time: [illegible] Tech [illegible]	Date 21 Dec 2011 Time: 3:22pm Tech Blanca
Control	[illegible]	[illegible]	[illegible]	Kelp perch all together [illegible] No sign of olive snails [illegible] middle of tank [illegible] sand crabs [illegible] laying on sand [illegible] Urchins are spread [illegible]
High Salinity	[illegible]	[illegible]	[illegible]	Kelp perch all together [illegible] no sign of sand crabs [illegible]

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 22 Dec 2011 Time: 8 am Tech [illegible]	Date 23 Dec 2011 Time: 8:00 am Tech Chris B Feeding Tank off 10:1 [illegible]	Date 24 Dec 2011 Time: 9:15 am Tech DAVID sea urchin in sand looks like spines are going to fall. Spines pointed down (Control tank)	Date 24 Dec 2011 Time: 4:05 pm Tech DAVID
Control	[illegible]	Kelp Perch swimming tightly back right corner. No sign of olive snails or sand crabs. Tubesnout schooling left side. Sand dabs in or on sand. Spitnose top right front corner. (1) kelp crab on air tube, the other on [illegible]. Stars on all four walls, urchins spread among the corners. Abalone [illegible] along bottom of tank [illegible]. WSB schooling [illegible] bottom [illegible]	All fish swimming [illegible] the tank. They look normal. Most of purple sea urchins [illegible] of the tank (left and right). (1) urchin on the sand. (2) urchins by the rocks. (1) bat star on top of rocks. (1) star on the back wall. (1) star on front top glass. (4) abalone [illegible] bottom of tank [illegible] left back [illegible]. Dabs are hiding in sand. Kelp crabs [illegible] on right side wall (1) [illegible] normal. (1) abalone by air stone left side	Urchin on sand has droopy spines, all other urchins look healthy. Most fish are stationary on right side of tank. All fish look normal. Bat star on top of rocks (1) bat star on back panel (1) bat star front middle glass towards top. (1) kelp crab on air sock (1) kelp crab on right side panel, holding on to [illegible]. The remaining (1) abalone in the left back corner
High Salinity	Both kelp perch & [illegible] are in lower left side. All are [illegible] activity. There is [illegible] No sign of olive snail or [illegible]. [illegible] left corner [illegible] top of [illegible] near bottom substrate	Kelp perch swimming tightly in bottom left back corner. No sign of snails or sand crabs. Tubesnout schooling on right side. Spitnose schooling at top left. WSB schooling at bottom left. Urchins [illegible] on [illegible] wall near surface.	All fish swimming on the left side of the tank. All fish look normal. Dabs hiding under sand. All abalone on left side of the tank [illegible] bottom. (1) star on upper right front side. (1) star upper left back wall. (2) stars middle back bottom. All but (2) urchins on right upper half side of tank (right wall). (1) urchin dead, upside down, no spines on bottom right side of tank. (1) kelp crab on air sock (1) crab on left side panel.	All other abalone are at the bottom side of the [illegible]. All fish stationary on left side of tank. All urchins lined up on the right side panel. (2) stars on back panel (1) star on front glass. (1) star on the rock glass in the back. Sanddabs hiding under the sand. Sand crab in sand on the right side of tank. (1) kelp crab on air sock, (1) kelp crab top left side of tank
	Date 25 Dec 2011 Time: Tech Chris B	Date 26 Dec 2011 Time: 9:47 Tech Chris B	Date 27 Dec 2011 Time: 7:47 am Tech Chris B Feeding day	Date 27 Dec 2011 Time: [illegible] Tech Chris B
Control	CHRISTMAS HOLIDAY	[illegible] urchin [illegible] on rocks, [illegible] at surface on back wall [illegible] front and back left corners [illegible] Spitnose schooling at center of tank. Tubesnouts schooling near surface. WSB schooling near sand on left & right. Kelp perch [illegible] glass	WSB schooling near sand on right & left side. Tubesnouts schooling at center near surface. Kelp perch swimming [illegible]. Spitnose schooling at top right [illegible]. Sanddabs in or on sand [illegible]. Urchins mostly at top left [illegible]. Stars along back wall near surface [illegible]. Abs four along front wall bottom	Frequent rate urchins mainly top [illegible] corners [illegible] rocks. Stars 3 near [illegible]. Abs [illegible] back near sand. Perch schooling [illegible]
High Salinity	[illegible]	Urchins – Right wall, 1 on back wall. Stars – front & back wall near surface. Abs – along [illegible] on glass. Perch schooling back left corner. WSB schooling [illegible]	[illegible] swimming around [illegible] sand. Tubesnouts schooling near surface. Kelp perch schooling in back [illegible]. Spitnose [illegible] center [illegible] surface. Dabs [illegible] sand [illegible] on right wall. Abs, back wall and left corner.	Everyone [illegible] urchins – most on left wall, 5 others spread [illegible] sand. Stars – two front top [illegible] the back left corner & [illegible]. WSB – schooling on left side [illegible]. Tube – schooling top [illegible]. Sanddabs – stay near sand or in sand
	Date 28 Dec 2011 Time: [illegible] Tech Blanca Tank off [illegible]	Date 28 Dec 2011 Time: 3:43 pm Tech Blanca turn back on at 3:00	Date 29 Dec 2011 Time: [illegible] am Tech Blanca Turn off 7:37 am feeding Day	Date 29 Dec 2011 Time: 3:40 pm Tech Blanca [illegible]
Control	Kelp perch [illegible]	Kelp perch [illegible] swimming together. Abs hiding in back of [illegible] the center, [illegible] sand crabs. Tube snout [illegible] of tank. Sand dabs [illegible] on sand [illegible] Spitnose [illegible] right front corner [illegible] tube feet [illegible] urchins [illegible]	Kelp perch swimming [illegible] back wall [illegible] Tube snout [illegible] of tank [illegible] Spitnose [illegible] sand dabs [illegible] on surface of sand [illegible]	Kelp perch swimming together at [illegible]. Tubesnout swimming together [illegible] of tank. Sea bass [illegible] right corner [illegible] Spitnose together at bottom right corner [illegible] against wall. Sand dabs [illegible] sand crabs, kelp crabs [illegible]
High Salinity	Kelp perch [illegible] together, [illegible] no sign of [illegible] snails [illegible]	Kelp perch all together [illegible] Spitnose [illegible] together [illegible] sand dabs [illegible] urchins [illegible] wall. Abs all against back wall [illegible] together	Kelp perch [illegible] together [illegible] Spitnose [illegible] Sand dabs [illegible] back wall [illegible]	Kelp perch swimming together, flapping fins [illegible]. Tubesnout [illegible] together [illegible] Spitnose [illegible] sand dabs [illegible] against [illegible] wall [illegible] with kelp [illegible]

Behavioral Observations

TUBE SNOUTS [illegible]

	Date 30 Dec 2011 Time: 7:53 Tech Chris B	Date 30 Dec 2011 Time: 2:31 pm Tech Chris B	Date 31 Dec 2011 [illegible] Time: 9:45 am Tech Chris B	Date [illegible] [illegible] Time: 11 [illegible] Tech Rowena
Control	Urchins most on top left wall, 2 bottom back right corner. Stars - 2 on back wall, one on left wall, one [illegible] front wall. Abs, four on bottom front glass, one in back back corner, tubesnouts - schooling in center of tank near surface. WSB all schooling bottom right of tank near sand. Dabs, in or on sand. Perch - swimming around all over tank. Splitnose bottom right corner	Urchins - most top left corner, two on right wall. Stars - 3 top back wall, one top front wall. Abs - 4 front wall, other on back wall. WSB - schooling bottom right on sand. Kelp - 2 looking in rocks, others bottom right. Splitnose - schooling near bottom right wall. Tubesnouts - schooling near surface. Dabs - in or on sand. No sight of sand crabs or olive snails	Urchins - top left near surface. Stars - two near surface on back wall. Abs - [illegible] near sand, one near surface. WSB - schooling bottom left. Tubesnouts schooling near surface. Perch swimming around, looking for food. Splitnose schooling top right corner. Dabs - hiding in or on sand.	[illegible]
High Salinity	Abs - back wall, near sand and up corner. Urchins - top right wall, one [illegible] center. Stars - one back, one front, two right walls. Tubesnouts - schooling in center. WSB - most schooling bottom left, some near surface. Perch - swimming around bottom left. Splitnose - [illegible] right corner. Dabs - [illegible] on top of sand. [illegible]	Urchins all top right wall. Stars - near surface on walls. Abs - back left corner [illegible]. One sand crab [illegible]. WSB - schooling bottom left. Kelp - bottom left corner [illegible]. Tube snout - schooling center. Dabs, in or on sand	Urchins - all top right wall. Stars - all near surface, back wall. Abs - back wall, making L shape. WSB - schooling near sand bottom left. Tubesnouts schooling near surface. Splitnose - schooling top right. Perch - most schooling, others [illegible]. Dabs - hiding in or on sand.	[illegible]

	Date 2 Jan 12 SEA Lab closed Time: 9:20 [illegible] Tech Chris B	Date 3 JAN 12 Time: 8:05 AM Tech BRIAN L.	Date 3 JAN 12 Time: [illegible] pm Tech BRIAN L.	Date 4 JAN 12 Time: 7:49 AM Tech BRIAN
Control	Kelp, perch - swimming around whole tank. No sight of sand crabs/olive snails. WSB - schooling bottom right of tank. Tubesnouts schooling near surface. [illegible] swimming in [illegible]. Dabs [illegible] in or on sand. Urchins - top left. Stars [illegible] back wall. [illegible]	ALL URCHINS ON THE TOP LEFT CORNER. SEA STARS ARE SPREAD OUT EACH ON EVERY SIDE OF THE GLASS. ABALONE ARE SPREAD OUT ON THE GLASS IN FOUR SIDE. TUBE SNOUTS SWIMMING ON THE CENTER. ALL KELP PERCH SWIM AROUND. SPLITNOSE IN THE CENTER SWIM IN PLACE FACING UP. BASS SWIM IN PLACE ON RIGHT SIDE OF TANK. DABS ALONG THE SAND. NO SIGN OF SNAIL AND SAND CRAB. 1 KELP CRAB ON THE STONE OTHER ON PLATE.	ALL URCHINS ARE [illegible] AND MOST OF THEM ARE [illegible]. ALL ON THE LEFT SIDE TOP GLASS. [illegible] STARS ON TOP GLASS [illegible]. ABALONE ALL SPREAD OUT ON GLASS. ALL BASS SWIM ON RIGHT SIDE. PERCH SWIM AROUND ALL OVER TANK. ROCK FISH ON [illegible] SWIM IN PLACE. DABS SWIM ALONG THE SAND. TUBE SNOUT SWIM AROUND IN THE CENTER. SNAIL OR CRAB NOT VISIBLE. KELP CRAB ON AIR STONE [illegible]	ALL URCHINS ARE TOGETHER ON THE LEFT SIDE TANK ON THE PLACE. [illegible] STARS ON TOP GLASS SPREAD OUT [illegible]. ABALONE ARE SPREAD OUT ON GLASS. SNOUTS SWIM AROUND MAINLY ON CENTER. BASS ARE ALL ON THE RIGHT SIDE BOTTOM SWIM IN PLACE. ROCK FISH IN THE CENTER FACING UP SWIM IN PLACE. PERCH SWIM AROUND EVERYWHERE. DABS SWIM ALONG THE SAND. SNAIL AND SAND CRABS NOT VISIBLE. KEEP CRABS ON AIR STONE AND PLATE.
High Salinity	Kelp, perch - swimming around, whole [illegible]. [illegible] olive snails. [illegible] bottom of tank [illegible]. [illegible] sand. Urchins - on top right wall. Stars - spread on [illegible] surface. [illegible] sand crabs [illegible]	ALL URCHINS ON THE RIGHT SIDE GLASS AND PLATE. ABALONE SPREAD OUT ON THE BACK LEFT CORNER GLASS. 1 SEA STAR EATING ON TOP GLASS [illegible] THE GRAVEL. OTHERS ON OPPOSITE GLASS. TUBE SNOUT SWIM IN THE CENTER. BASS SWIM AROUND THE LEFT SIDE OF TANK. PERCH SWIM AROUND THE WHOLE TANK. DABS SWIM ALONG THE SAND. NO SNAIL OR SAND CRAB VISIBLE. 2 SPLITNOSE SWIMMING ON THE BACK RIGHT CORNER. 1 SWIMS IN PLACE. 1 CRAB ON AIR STONE OTHER ON PLATE.	URCHINS MOSTLY ON RIGHT SIDE TANK. ABALONE ON BACK GLASS TOGETHER. BASS AND KELP SWIMMING AROUND ON THE LEFT SIDE TOGETHER. SNOUT SWIM MAINLY IN CENTER. STARS SPREAD OUT ON GLASS. DABS SWIM ALONG THE SAND. SNAIL AND CRAB NOT VISIBLE. KELP CRAB ON STONE N PLACE.	ALL URCHINS ON THE RIGHT SIDE TOGETHER. SOME ON PLATE MOST ON FRONT GLASS. STARS ARE SPREAD OUT ON GLASS. 2 EATING. ABALONE ARE TOGETHER ON THE LEFT SIDE CORNER BACK GLASS SEPARATE. BASS [illegible] ON THE LEFT SIDE BOTTOM SWIM IN PLACE. ROCK FISH ON THE BOTTOM RIGHT CORNER IN PLACE. SNOUTS SWIM ON TOP. PERCH SWIM AROUND MAINLY ON THE LEFT SIDE. DABS SWIM ALONG THE SAND. 2 SAND CRAB ON THE [illegible]

	Date 4 JAN 12 HAD MICRO BUBBLES. LIKE AT 1:30 ON BOTH TANKS THERE SEEMS TO BE BUBBLES ON SOME ANIMALS. Time: 3:15 PM Tech BRIAN L.	Date 5 JAN 12 HIGH SALINITY. SNAIL NOT VISIBLE MICRO BUBBLES NOT VISIBLE CRABS ON STONE. Time: 7:51 AM Tech BRIAN L.	Date 5 JAN 12 Time: 3:30 pm Tech BRIAN L.	Date 6 Jan 12 Time: 7:42 am Tech Blanca
Control	ALL URCHINS ON [illegible] THE ON THE LEFT SIDE ON PLACE AND GLASS FACING KELP. ABALONE SPREAD OUT ON GLASS THEY HAVE BUBBLES ON THE SHELL. SEA STARS SPREAD OUT ON GLASS 1 ON SAND 1 EATING. ALL PERCH ON THE BACK RIGHT CORNER IN A BUNCH SWIMMING AROUND. BASS ARE NEXT TO PERCH SWIM IN PLACE. SNOUTS SWIM TO THE CENTER. ROCK FISH TOP RIGHT CORNER IN THE CENTER SWIM IN PLACE. DABS SWIM ALONG THE SAND. SNAIL AND CRAB NOT VISIBLE.	[illegible] MOST OF THEM ON THE LEFT SIDE GLASS AND SOME ON THE RIGHT ON TOP. STARS ARE SPREAD OUT ON [illegible] 1 IS BEHIND [illegible]. ABALONE ARE SPREAD OUT IN EACH CORNER GLASS. SNOUTS SEEM TO BE SWIMMING IN THE CENTER WITH A FEW BASS. BASS SWIM AROUND MAINLY ON THE RIGHT SIDE. PERCH SWIM AROUND MAINLY ON THE BACK RIGHT CORNER. DABS SWIM ALONG THE SAND. SNAIL AND SAND CRAB NOT VISIBLE. NO MICRO BUBBLES VISIBLE. 2 KELP CRABS ARE ON THE PLATE. ROCK FISH SWIMS [illegible] AT THE BOTTOM	URCHINS ARE SPREAD OUT ON GLASS. STARS ARE SPREAD OUT ON GLASS AND ABALONE. SNOUTS ARE SWIM MAINLY IN THE CENTER. PERCH ARE SPREAD OUT SWIM. ROCK FISH SWIM AROUND. BASS SWIM IN PLACE ON THE BOTTOM RIGHT SIDE. DABS SWIM ALONG THE SAND. SNAILS AND SAND CRABS NOT VISIBLE. MUSSELS LOOK OPEN. KELP CRABS ON STONE AND PLATE.	Urchins spread out on glass, one left back corner. Stars spread out on back wall and [illegible]. [illegible] swimming in center on tank [illegible]. [illegible] spread out swimming on right side of tank. [illegible] on rocks. [illegible] spread out on [illegible] on left top wall. Bass swimming together [illegible]. Dabs all laying on the sand [illegible] sticking up. Kelp crabs [illegible]. Sign of olive snails or sand crabs. [illegible] are open.
High Salinity	ALL URCHINS ON THE RIGHT SIDE FACING KELP SWIM ON PLACE SWIM ON GLASS. STARS SPREAD OUT ON GLASS 1 IS EATING. ABALONE ON THE BACK LEFT CORNER GLASS. ALL PERCH ON THE BACK LEFT CORNER SWIM IN PLACE. BASS ON THE LEFT SIDE SWIM IN PLACE. SNOUTS SWIM AROUND IN THE CENTER. DABS SWIM ALONG THE SAND. ROCK FISH SWIM ON THE TOP LEFT CORNER AND 1 ON BOTTOM RIGHT CORNER SWIM IN PLACE KIND OF SIDEWAYS. 1 SAND CRAB VISIBLE ON BOTTOM RIGHT CORNER. SNAIL NOT VISIBLE. KELP CRABS ON AIR STONE AND PLATE.	ALL URCHINS TOGETHER ON THE RIGHT SIDE GLASS 1 IS ON THE BACK LEFT GLASS. STARS ARE SPREAD OUT ON GLASS 1 IS ON THE FRONT AND EATING. ABALONE ARE SPREAD OUT MAINLY ON THE BACK LEFT CORNER GLASS. SNOUTS SWIM UP N DOWN MAINLY IN THE CENTER. ALL BASS SWIM IN PLACE ON THE LEFT SIDE AT THE BOTTOM. THEY SEEM TO BE MOVING FAST. PERCH SWIM AROUND MAINLY IN THE BACK LEFT CORNER. DABS SWIM ALONG THE SAND. ROCK FISH SWIM AROUND THE BOTTOM. 1 SAND CRAB VISIBLE AT THE FRONT RIGHT CORNER.	URCHINS ARE TOGETHER ON THE RIGHT SIDE GLASS AND PLATE. STAR UNDER URCHINS [illegible] OTHER STARS ARE SPREAD OUT ON GLASS. ABALONE ARE SPREAD OUT ON THE BACK LEFT CORNER GLASS. SNOUTS SWIM MAINLY IN CENTER. 1 SAND CRAB. SWIM ROCK FISH SWIM IN PLACE ON THE CENTER. BASS SWIM IN PLACE ON THE BOTTOM LEFT SIDE. PERCH SWIM IN THE LEFT SIDE. DABS SWIM ALONG THE SAND. SNAIL NOT VISIBLE. KELP CRABS ON STONE N PLACE.	Urchins spread out on front & right wall, and [illegible]. Stars are spread out again, back & front wall. Tubesnout [illegible] on left [illegible]. Perch together on back corner, swimming [illegible]. Abalone are spread out on back wall and top back corner. Bass swimming all together at the bottom of tank [illegible]. Kelp crabs are on [illegible]. No snail and 4 sand crabs [illegible]. Mussels are open.

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 6 Jan 12 Time: [illegible] pm Tech Blanca [illegible] & Abalone [illegible] feed	Date 7 Jan 12 Time: 10:05 am Tech David (1) crab on wall and (1) crab on air sock, mussels slightly open	Date 7 Jan 12 Time: 4:[illegible] pm Tech David mussels slightly open	Date 8 Jan 2012 Time: 9:52am Tech Ernesto A
Control	[illegible] on back, left, [illegible] eating kelp. Abalone spread out [illegible] back wall, eating kelp. Stars spread out [illegible] left wall, (1) was trying to [illegible] [illegible] of tank [illegible] perch [illegible] on right back corner, [illegible] bass [illegible] together [illegible] kelp crabs [illegible]	Most of the urchins are on the left side of the tank towards the top; two urchins close to mussels (1) urchin on right bottom back side of tank. (1) bat star on the left wall with one arm attached to mussels (1) bat star on the back panel, (1) bat star on the (2) bat stars on the back panel. (2) urchins on front glass toward right wall. All fish look normal, swimming normal [illegible] on the right side of tank, abalone on each	All fish look normal, Most urchins in left side of tank. (1) urchin on block. "ID 1" → loosing spines. (3) urchins on right side of tank wall (1) crab on right side wall towards the top. (1) crab on air sock (1) urchin on muscles. Abalones are on each corner of tank. (1) bat star behind rock container. (2) bat stars on back wall upper right. (1) star on right [illegible]	Kelp Perch swimming actively at bottom of tank, W.S. Bass swimming on right side, Splitnose on left side swimming together, Tube snout schooling in center of tank. Sand dabs on sand. Urchins on left side of tank, abalone spread out. Sea stars spread out, mussels look ok. no sign of olive snail, sand crabs. Kelp crabs are on air stone, the other on screen.
High Salinity	[illegible] in sand. [illegible] [illegible] spread out on front and back [illegible] eating kelp, [illegible] spread out [illegible] swimming in center. [illegible] close to abalone, [illegible] at bottom left corner. Splitnose [illegible] in center of tank [illegible] sand surface, mussels are [illegible]	corner. Sand dabs hiding under sand. Most urchins towards right side of tank eating kelp. 6 abalone on left back side of tank. (2) abalone on front glass. (1) star on left side of tank. (2) stars on back wall top. All fish swimming normally on left side of tank. [illegible] crab on side wall and (1) crab on air sock. Sand dabs hiding under sand. Mussles slightly open!	All fish look normal. Swimming on left side of tank. Most urchins on the right side of tank eating kelp. (1) urchin on bottom right corner on sand. (3) stars on back wall (1) crab on left side wall, (1) crab bottom [illegible] by air sock. (6) abalone on left [illegible] side. (2) abalone on front bottom glass.	Kelp Perch swimming actively on left side, WS Bass swimming actively on left side, Splitnose spread out, Sand dabs on sand, long snout swimming close to the surface. Sea Stars spread out against back wall, Abs spread out on left side, urchins on right side, 2 on sand alive look a little stressed, no sign of olive snail, one sand crab in sand

	Date 8 Jan 2012 Time: 4:16pm Tech Ernesto	Date 9 Jan 2012 Time: 10:06 am Tech Blanca Tank off	Date 9 Jan 2012 Time: 3:[illegible] pm Tech Blanca Mussels slightly open; (kelp crab molted) [illegible]	Date 10 Jan 2012 Time: [illegible] am Tech Blanca (Kelp on [illegible]) [illegible]
Control	Kelp Perch swimming on right side of tank with white seabass, Splitnose on left side, Sand dabs on sand one swimming close to surface. Tube snouts in center of tank. Stars one on sand, one on gravel 2 on mussel bag, Abs spread out urchins spread on left side, no sign of snail or sand crabs. Kelp crabs [illegible]	Urchins all [illegible] on left wall, one on back wall near surface. Abalone spread out on front & back & side walls, [illegible] on back wall, [illegible] mussels, Tube snout [illegible] to center of tank, Perch 3 swimming together near left wall, [illegible] bass swimming together [illegible] [illegible] swimming near back [illegible] surface [illegible] mussels are open. No sign of olive snails [illegible]	Urchins spread on front & left wall. Abalone spread on front & back wall. Stars spread [illegible] front & back walls [illegible] surface. [illegible] swimming together on right back corner. Tube snout swimming [illegible] swimming together [illegible] Dabs are on sand surface [illegible] Mussels are close, looks like 1 is dead. No sign of olive snails [illegible] sand crabs. Kelp crab on air stone	Urchins [illegible] to each other, stars [illegible] perch [illegible] together at center of tank, [illegible] at bottom right, Dabs [illegible] on sand [illegible] Splitnose swimming together [illegible] Abalone [illegible] kelp crabs [illegible] No sign of olive snails [illegible]
High Salinity	Kelp Perch with WSB on left side. Splitnose on right side swimming vertically. Dabs on sand some swimming up and down. Tube snout swimming in middle, urchins spread out on right side, Abs on left, sand crabs in sand. Sea stars spread [illegible] Kelp crabs 2 on air stone.	Urchins spread out [illegible] right wall [illegible] Abalone [illegible] stars [illegible] back wall near surface. [illegible] swimming together near the surface at the center. Perch [illegible] abalone on back [illegible] splitnose [illegible] left side [illegible] Dabs [illegible] on sand [illegible] swimming slowly on sand surface. Mussels are little open. No sign of olive snails. 1 sand crab [illegible]	Urchins spread on front & right wall [illegible] kelp. 2 on floor with spines down. Abalone spread around front & all back wall. Perch swimming together on left back wall. Tube snout swimming at center near chiller. Dabs [illegible] on sand, 2 swimming on left side [illegible] each other. Bass swimming together [illegible] near surface [illegible] Mussels are close. No sign of olive snails [illegible] kelp crab on floor	Urchins [illegible] on right wall and right [illegible] [illegible] Dabs [illegible] Abalone [illegible] Mussels are [illegible] open. No sign of olive snail [illegible] kelp crab on air stone

	Date 10 Jan 2012 Time: [illegible] Tech [illegible] Animals [illegible]; Tank still off	Date 11 Jan 2012 Time: 8:00 am Tech Blanca	Date 11 Jan 2012 Time: 3:40 pm Tech Blanca (mussels) [illegible]	Date 12 Jan 2012 Time: 7:55 am Tech Blanca Tank off [illegible]
Control	Tube snouts look [illegible] schooling [illegible] bottom right. Splitnose schooling [illegible] urchins spread all over tank [illegible] sand [illegible]	[illegible]	Urchins spread out [illegible] kelp [illegible]	Urchins [illegible] on left wall [illegible]
High Salinity	mussels [illegible] [illegible] eating kelp	[illegible]	[illegible]	Urchins spread on front [illegible] kelp. Stars [illegible]

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 12 Jan 2012 Time: [illegible] pm Tech [illegible] Feeding Day [illegible]	Date 13 JAN 2012 Time: 7:50 AM Tech BRIAN L.	Date 13 JAN 2012 Time: 3:0[illegible] PM Tech BRIAN	Date Time: Tech
Control	Urchins [illegible] on left wall, with kelp, stars spread on [illegible] back wall [illegible], abalone [illegible] [illegible] center [illegible] mussels [illegible] all other [illegible] moving [illegible]	MOST URCHINS ARE ON THE LEFT BACK CORNER GLASS AND 6 URCHINS ON THE RIGHT SIDE. ABALONE IS SPREAD OUT ON GLASS. 2 STARS ARE ON THE SIDE GLASS ON THE RIGHT N CORNERS ON THE GLASS. ALL BASS SWIM IN PLACE ON THE RIGHT SIDE. ALL PERCH SWIM AROUND ON THE LEFT BACK CORNER. SNOUTS SWIM AROUND MAINLY IN THE CENTER. ROCK FISH SWIM IN PLACE BY THE GRAVEL. DABS SWIM ALONG THE SAND. SNAIL AND CRABS NOT VISIBLE. MUSSELS ARE OPEN. KELP CRABS ARE ON THE PLACE	ALL URCHINS ARE ON THE LEFT SIDE TANK MAINLY IN THE BACK CORNER GLASS. ABALONE ARE SPREAD OUT ON GLASS. STARS ARE SPREAD OUT. BASS SWIM IN PLACE ON THE RIGHT SIDE. PERCH SWIM AROUND MAINLY ON THE RIGHT SIDE. SNOUTS SWIM MAINLY IN THE CENTER. ROCK FISH SWIM AROUND ON THE LEFT SIDE. DABS SWIM ALONG THE SAND. MUSSELS ARE OPEN. SNAIL AND CRABS NOT VISIBLE	
High Salinity	Urchins spread on front wall [illegible] wall and kelp [illegible] stars spread on front & back wall [illegible] [illegible] [illegible] kelp on [illegible] [illegible]	ALL URCHINS ARE ON THE RIGHT SIDE GLASS EATING KELP. ABALONE IS SPREAD OUT ON GLASS. 2 STARS ON THE FRONT GLASS EATING. OTHER 2 STARS ARE ON THE BACK GLASS. SNOUTS SWIM AROUND THE CENTER. BASS STARTING TO SWIM AROUND ALL OF THEM ON THE LEFT SIDE. PERCH SWIM AROUND ACTIVE. ROCK FISH SWIM IN PLACE IN THE CENTER FACING UP. DABS SWIM ALONG THE SAND. SNAIL AND CRABS NOT VISIBLE. MUSSELS ARE OPEN. KELP CRAB IS ON THE PLATE	URCHINS ARE ALL TOGETHER ON THE RIGHT SIDE EATING KELP. 3 STARS ON THE RIGHT SIDE 1 IS EATING THE 4th STAR IS ON THE LEFT. ABALONE ARE SPREAD OUT. 1 ABALONE IS ON THE GLASS AND ITS LIKE BOBBING IN CIRCLES. BASS SWIM ACTIVE ON THE LEFT SIDE. PERCH AND ROCK FISH SWIM AROUND ACTIVE. DABS SWIM ALONG THE SAND. SNAIL AND CRABS NOT VISIBLE. SNOUTS SWIM IN THE CENTER	

	Date 14 Jan 2012 Time: 9:09 Tech Ernesto A	Date 14 Jan 2012 Time: 4:00pm Tech Ernesto A	Date 15 Jan 2012 Time: 10:02 Tech Ernesto A	Date 15 Jan 2012 Time: 4:33 Tech Ernesto A
Control	Kelp Perch are actively searching for food swimming around. WSB are swimming together on right side. Splitnose are together swimming vertically on left side of tank. Sand dabs on sand slowly moving along the bottom. Tube snouts are together on top left corner. Abs and stars are spread out. Urchins on left side. Kelp crabs on screen.	Kelp Perch swimming all over. WSB on right side close to sand. Splitnose and pipe fish on left side swimming together. Sand dabs on sand. Sea stars and Abs are spread out. Urchins are on left side 3 on right. No signs of olive snail or sand crabs. Mussels ok. Kelp crabs on screen.	Urchins on left side, one on the right. Stars and Abalone spread out. No sign of olive snail or sand crabs. Bass active swimming on right side. Kelp Perch actively swimming and searching for food. Sand dabs on sand lying on gravel. [illegible] [illegible] kelp crabs on screen.	Urchins on left side, Abalone and stars spread out. Kelp crab on [illegible]. WSB swimming in place [illegible] right. Kelp Perch active swimming around. Splitnose swimming in place on left side. Sand dabs on sand still. Tube snout swimming close to surface. No sign of olive snail or sand crabs
High Salinity	Kelp Perch & WSB are actively swimming on left side of tank. Splitnose schooling by the chiller. Tube snout spread out swimming vertically. Sand dabs on sand. Urchins on right side 4 on sand. Abalone spread out. Stars spread out. Kelp crab on air stone.	Kelp Perch on right swimming together. WSB on left side. Splitnose in the middle close to the bottom. Sand dabs on sand. Tube snout on right side swimming vertically. No olive snail. Sand crab in sand to the right. Abalone & stars spread out. Urchins on right side. Mussels open. Kelp crab on airstone.	Urchins spread out on right side. 4 on sand, one not looking good. Looks stressed out. Bass swimming on left side. Kelp Perch swimming and actively searching for food. Sand dabs on sand, 2 on gravel. Splitnose in the middle of tank swimming together. Tubesnouts on right side swimming vertically. Sand crabs on right. Kelp crabs on airstone	Urchins on right side, 3 on sand, 2 on grey pipe. One on the sand is losing its spines but still alive. Abalone & stars alive and spread out. Bass and Kelp Perch swimming actively around. Dabs on sand. Splitnose swimming in middle. Tube snouts swimming on the right. Olive snail on right side of tank on sand. Sand crabs in sand. Kelp [illegible]

	Date 16 JAN 2012 Time: [illegible]:15 AM Tech BRIAN L.	Date 16 JAN 2012 Time: 3:15 PM Tech BRIAN L.	Date 17 JAN 12 Time: 7:51 AM Tech BRIAN L. (URCHIN IS FACING + SWAIL)	Date 17 Jan 12 Time: 3:40 Tech Chris B Everything ok
Control	MUSSELS ARE OPEN. ALL URCHINS ARE ON THE LEFT SIDE ALL ON GLASS. STARS ARE SPREAD OUT ON GLASS. ABALONE ON RIGHT SIDE GLASS. SNOUTS SWIM IN THE CENTER. BASS SWIM AROUND ACTIVELY MAINLY ON THE RIGHT SIDE. PERCH SWIM AROUND FROM LEFT TO RIGHT OF TANK. ROCK FISH SWIM AROUND MAINLY IN THE CENTER FACING UP. DABS SWIM ALONG THE SAND. 1 SAND CRAB VISIBLE IN THE FRONT CORNER OF THE LEFT SIDE. SNAIL NOT VISIBLE. KELP CRABS ARE ON THE PLACE.	MUSSELS LOOK OPEN. ALL URCHINS TUBE FEET EATING MOSTLY ON THE LEFT SIDE 2 ON GRAVEL. STARS ARE SPREAD OUT ON GLASS. ABALONE ARE SPREAD OUT ON GLASS. ROCK FISH SWIM ACTIVELY MAINLY IN THE CENTER FACING UP. SNOUTS SWIM IN THE CENTER. BASS SWIM AROUND ACTIVELY MAINLY ON THE RIGHT SIDE. PERCH SWIM AROUND ACTIVELY. DABS SWIM ALONG THE SAND. SNAIL OR CRABS NOT VISIBLE. MY FIRST TIME I SEE ALL FISH SWIM AROUND ACTIVE. KELP CRAB ON PLACE.	MUSSELS LOOK OPEN. ALL URCHINS ON LEFT GLASS. ABALONE ALL SPREAD OUT ON GLASS. STARS ARE SPREAD OUT ON GLASS. BASS SWIM ACTIVELY ON THE RIGHT SIDE. PERCH SWIM IN THE BACK RIGHT CORNER. ROCK FISH SWIM IN THE CENTER FACING UP. SNOUTS SWIM ON TOP MAINLY ON THE RIGHT SIDE. 1 SNAIL VISIBLE ON THE LEFT SIDE. CRABS ON ON THE BACK LEFT SIDE BURIED. 2 KELP CRABS ON PLACE. DABS SWIM ALONG THE SAND	WSB - schooling bottom right near sand Urchins - top left wall, bunched together Abs - 3 near sand, other near surface Stars - stomachs out eating on glass Perch - swimming around Rockfish swimming [illegible] center Sanddabs - hiding in/near sand
High Salinity	MUSSELS LOOK OPEN. ALL URCHINS ON THE RIGHT SIDE ALL ON GLASS. STARS ARE SPREAD OUT ON GLASS. 1 STAR IS EATING. ABALONE ARE SPREAD OUT ON GLASS. SNOUTS SWIM MAINLY IN THE CENTER. BASS SWIM MAINLY IN PLACE ON THE LEFT SIDE. ROCK FISH SWIM MAINLY IN THE CENTER FACING UP. PERCH SWIM AROUND ACTIVELY. DABS SWIM ALONG THE SAND. SNAIL AND CRABS NOT VISIBLE. KELP CRAB ON AIR STONE. 3 URCHINS AT THE BOTTOM RIGHT SIDE TANK LOOKS STRESSED AND LIKE THEY ARE DYING	MUSSELS LOOK OPEN. MOSTLY ALL URCHINS ARE ON THE RIGHT SIDE GLASS. SOME IN SAND AND ARE. 2 OF THE LOOK LIKE THEY R DYING. ABALONE ARE SPREAD OUT ON GLASS. STARS ARE SPREAD OUT ON GLASS. BASS SWIM AROUND ACTIVE MAINLY ON THE LEFT SIDE. ROCK FISH SWIM ON THE RIGHT SIDE. SNOUTS MAINLY SWIM IN THE CENTER. PERCH SWIM AROUND ACTIVE. DABS SWIM ALONG THE SAND. SNAIL OR CRABS NOT VISIBLE. KELP CRAB ON PLACE.	MUSSELS LOOK OPEN. URCHINS ALL ON RIGHT SIDE GLASS. 1 LOOK DEAD. STARS ARE SPREAD OUT. 1 STAR ON TOP OF URCHINS. ABALONE SPREAD OUT ON GLASS. BASS SWIM ACTIVE ON THE LEFT SIDE. PERCH SWIM ACTIVE ON THE BACK CORNER OF THE LEFT SIDE. SNOUTS SWIM IN THE CENTER. SNAIL AND CRAB NOT VISIBLE. DABS SWIM ALONG THE SAND. KELP CRAB ON STONE.	WSB - slowly bottom left Perch swimming around whole [illegible] Splitnose - schooling middle, [illegible] Tubesnouts - swimming [illegible] Stars - on back/front walls [illegible] Urchins - close to right side [illegible]

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 18 Jan 2012 Time: 8:15 Tech Chris B	Date 19 Jan 2012 Time: 3:55 pm Tech Chris B	Date 19 Jan 2012 Time: 7:30 Tech Chris B	Date 19 Jan 2012 Animals fed Time: Tech Chris B Everything ok
Control	[illegible] schooling bottom [illegible] sand [illegible] around tank, all [illegible] on walls, still eating. Urchins spread out [illegible] 2 near surface the rest [illegible] Dabs all hiding under sand [illegible] near surface [illegible] close to sand [illegible]	WSP – schooling bottom right Tubesnouts [illegible] near surface Dabs – hiding [illegible] Perch [illegible] Urchins [illegible] Stars on front [illegible] Abs [illegible]	WSP schooling bottom right normal Tubesnouts swimming near surface Perch [illegible] around back of tank Dabs mainly in sand 2 swimming [illegible] Urchins spread out around entire tank Stars – 1 on all four walls near surface	WSP [illegible] bottom right Tubesnouts swimming near surface Perch swimming around tank Urchins spread out around tank Stars are on walls [illegible] Dabs are hiding in or on sand No sign of olives or sand crabs
High Salinity	[illegible] swimming around whole tank Dabs hiding in or on sand Urchins spread out [illegible] right Splitnose schooling mid right tank Stars – front and back walls	WSP schooling bottom left side Tubesnout's – swimming near surface Dabs hiding in or around sand Perch swimming around left of tank Urchins top right [illegible] Stars – back [illegible] near surface Abs on [illegible] near surface	WSP – schooling on left side of tank Tubesnouts [illegible] Perch swimming [illegible] Urchins [illegible] Stars – near surface on front & back Dabs [illegible] sand [illegible]	WSP schooling bottom left [illegible] Perch swimming around left side Tubesnouts swimming near surface Dabs hiding [illegible] on sand [illegible] Urchins spread out [illegible] right side Stars – [illegible] near surface No sign of sand crabs or snails

	Date 20 Jan 2012 Time: 7:50 Tech Chris B	Date 20 Jan 2012 Time: 7:[illegible] Tech Chris B	Date 21 Jan 2012 Time: 7:25 am Tech David	Date 21 Jan 2012 Time: 3:50 Tech David
Control	WSP swimming together bottom right Splitnose [illegible] above rocks [illegible] Kelp [illegible] swimming together near surface Perch swimming around back of tank Dabs hiding in or on sand as usual [illegible] spread out [illegible] back & front wall Urchins spread out all over tank [illegible] spread out [illegible] left, near sand right Stars – 2 near surface left [illegible] one sand crab out. No sign of sand [illegible]	WSP [illegible] right [illegible] sand Perch [illegible] along back side of tank Splitnose swimming near rocks in place Tubesnouts [illegible] sand Urchins spread out [illegible] Abs – spread out near sand [illegible] one sand crab [illegible] out, no sign of [illegible]	All fish swimming normally in front middle of tank (5) Stars on back wall. (1) Star on left upper top panel. All Dabs are hiding under sand. Most urchins on left panel near mussels (3) urchins behind rocks on back panel. (6) abalone on right panel (2) abalone on left panel. (1) crab on air sock. Some mussels are slightly open	All fish swimming normal in the right side of tank. Sanddabs [illegible] the sand (3) Stars on [illegible] panel [illegible] on left panel. Most urchins on left [illegible] near mussels (2) urchins behind rocks (5) [illegible] on right [illegible] of tank in corners (3) [illegible] side of tank, mussels are closed (1) crab on right panel.
High Salinity	WSP – schooling bottom [illegible] sand Perch swimming around back of tank [illegible] swimming along sand [illegible] Tubesnouts swimming all around tank Splitnose – All swimming top right corner Urchins – spread [illegible] right side of tank Stars – close to surface, as usual No sign of sand crabs or snails	WSP schooling bottom left Tubesnouts, near sand, swim back of tank Splitnose – schooling front bottom right Perch, swimming back of tank, normal Urchins – spread out on right side of tank Stars near surface, Abs – near sand No sign of crabs or snails	All fish swimming in left side of tank. Sanddabs hiding under the sand. (3) Stars on back panel (1) star on right panel. Most urchins on right [illegible] urchin on front window [illegible] the top [illegible] abalone on front [illegible] middle (3) abalone back left bottom [illegible] Some mussels are slightly open (1) crab on gray pipe.	All fish swimming normal. All fish swimming on left side of tank (3) Stars on back panel (1) star on sand bottom right. (1) Sanddab is actively swimming around. All other are hiding under the sand. (1) urchin [illegible] top. All other urchins on right side of tank Mussels slightly open. (1) crab on air sock

	Date 22 Jan 2012 Time: 9:09 am Tech Ernesto A	Date 22 Jan 2012 Time: 4:33 pm Tech Ernesto A	Date 23 Jan 12 Time: [illegible] Tech Brian L.	Date 24 Jan 2012 Time: 3:[illegible] pm Tech Brian L.
Control	Kelp Perch and Bass swimming actively on right side. Dabs on sand one swimming up and down. Split nose on left side [illegible] in place. Tubesnouts swimming [illegible] middle. Abalone and [illegible] spread out, urchins on left side. Olive snail and sand crab on left side in sand. Kelp crab on screen, mussels ok.	Perch swimming actively on right side Bass swimming in place on lower right side. Splitnose swimming in place on lower left side. [illegible] front swimming in middle. Stars and Abalone spread out, urchins on top left corner. Dabs on sand. Sand crab in sand left. No sign of olive snail. Kelp crab on screen. Mussels ok.	ALL URCHINS ON THE LEFT SIDE BACK CORNER, STARS ARE SPREAD OUT ON GLASS ABALONE SPREAD OUT ON GLASS. SNOUTS SWIM AROUND [illegible] BASS SWIM AROUND ACTIVE ON THE RIGHT SIDE. ROCKFISH SWIM AROUND ACTIVE IN THE CENTER. PERCH SWIM AROUND ACTIVE [illegible] DABS SWIM AROUND THE SAND. [illegible] SNAILS AND CRABS NOT VISIBLE. MUSSELS LOOK OPEN. KELP CRAB [illegible] IN PLACE.	URCHINS ALL [illegible] STARS ARE SPREAD OUT [illegible] ABALONE ARE ON GLASS [illegible] BASS SWIM ACTIVE AROUND THE [illegible] FISH SWIM ACTIVE AROUND THE WHOLE TANK. [illegible] DABS SWIM AROUND THE SAND. [illegible] OR CRABS NOT VISIBLE. KELP CRAB ON PLACE.
High Salinity	Kelp Perch & Bass swimming actively on left side of tank. Dabs on sand. Split nose swimming in place on top right corner, one swimming on left top corner. Stars spread out, abalone on right with urchins. No signs of olive snails or sand crabs. Kelp crab on gravel. Mussels ok.	Perch and Bass swimming in place on lower left side. Split nose top right swimming in place, one on top left corner. Dabs on sand. Tubesnout swimming vertically against back wall. Abalone & stars spread out, urchins on right side 3 on sand. No sign of sand crab & olive snail. Kelp crab on screen. Mussels ok.	ALL URCHINS ON THE RIGHT SIDE ON PLACE. 2 STARS ON PLATE AND THE OTHER TWO STARS ON GLASS. ABALONE SPREAD OUT ON GLASS. BASS SWIM AROUND ACTIVE ON THE LEFT SIDE. SNOUTS SWIM IN THE CENTER. ROCKFISH SWIM [illegible] THE FRONT RIGHT CORNER. PERCH SWIM AROUND ACTIVE [illegible]. DABS SWIM AROUND THE SAND. SNAILS NOT VISIBLE. [illegible] CRAB VISIBLE [illegible] ON THE LEFT SIDE. MUSSELS LOOK [illegible].	ALL [illegible] ON RIGHT [illegible] PLACE. ABALONE ARE [illegible] PERCH SWIM AROUND ACTIVE [illegible] ON THE LEFT SIDE. ROCK FISH SWIM ON PLACE ON THE FRONT RIGHT CORNER. DABS [illegible] THE [illegible] ON GLASS. SNAIL AND CRAB NOT VISIBLE. KELP CRAB ON PLACE.

Behavioral Observations

	Date 24 Jan 2012 (tank off) Time: 7:50am Tech Blanca C.	Date 24 JAN 12 Time: 2:[illegible]pm Tech BRIAN C.	Date 25 JAN 2012 Time: [illegible] Tech 7:45am [STARS STILL EATING.]	Date 25 JAN 2012 Time: 3:28pm Tech BRIAN
Control	[illegible]	ALL URCHINS ON LEFT SIDE EATING KELP, SOME ON GLASS SOME ON PLATE. STARS SPREAD OUT ON GLASS EATING. ABALONE SPREAD OUT ON GLASS EATING KELP. MUSSELS LOOK OPEN. BASS ON THE RIGHT SIDE SWIM IN PLACE. PERCH ARE SWIM AROUND. SNOUTS SWIM AROUND MAINLY IN THE CENTER. ROCK FISH SWIM AROUND ACTIVE. DABS SWIM ALONG THE SAND. SNAIL AND SAND CRABS NOT VISIBLE. KELP CRAB ON PLATE EATING.	MOST URCHINS ON THE LEFT SIDE, [illegible] RIGHT ALL ON GLASS. ABALONE IS SPREAD OUT [illegible] SPREAD OUT ON GLASS. PERCH [illegible] ON THE BACK CORNER OF THE RIGHT SIDE. BASS SWIM AROUND [illegible] RIGHT SIDE [illegible] BOTTOM. ROCK FISH SWIM [illegible] IN THE CENTER. [illegible] SNAILS AND CRABS NOT VISIBLE.	URCHINS ARE SPREAD OUT ON BACK GLASS AND ON PLATE. STARS ARE SPREAD OUT. 3 ON GLASS 1 ON SAND, FINISHED EATING. ABALONE ARE SPREAD OUT ON GLASS. 1 ABALONE IS TWISTING ITS SHELL. PERCH SWIM AROUND ACTIVE. BASS SWIMS AROUND ON THE BOTTOM RIGHT SIDE. ROCK FISH SWIMS IN THE CENTER. SNOUTS SWIM ON TOP AROUND. SAND DABS SWIMS ALONG THE SAND. MUSSELS LOOK OPEN. SNAILS AND CRABS NOT VISIBLE. KELP CRAB ON PLATE.
High Salinity	Urchins [illegible] together on right wall [illegible]	ALL URCHINS ON THE RIGHT SIDE ON PLATE EATING KELP. STARS SPREAD OUT ON THE RIGHT SIDE ON GLASS EATING. ABALONE ARE SPREAD OUT ON THE RIGHT SIDE EATING KELP. BASS SWIM AROUND ON THE LEFT SIDE. PERCH SWIM AROUND ON THE RIGHT SIDE. ROCKFISH SWIM AROUND ON THE RIGHT SIDE. DABS SWIM ALONG THE SAND. SNAILS AND SAND CRABS NOT VISIBLE. KELP CRAB [illegible]	URCHINS ON THE RIGHT SIDE ON PLATE. SOME EATING KELP. STARS SPREAD OUT ON GLASS [illegible] EATING. ABALONE [illegible] GLASS. ROCK FISH SWIM ON THE RIGHT SIDE [illegible] BASS SWIM AROUND ON THE LEFT SIDE. 1 BASS [illegible] PERCH SWIMS AROUND THE [illegible] ON THE BACK. DABS SWIM [illegible] CRAB NOT [illegible]	URCHINS ON PLATE AND 2 ON TOP LEFT SIDE. SOME EATING KELP. STARS ARE SPREAD OUT. 1 IS EATING. ABALONE ARE SPREAD OUT ON GLASS. BASS SWIMS ACTIVELY ON THE LEFT SIDE. ROCK FISH SWIMS AROUND IN THE CENTER FACING UP. SNOUTS SWIM IN CENTER ALSO FACING UP. MOST PERCH SWIMS ON THE BACK CORNER OF THE RIGHT SIDE. DABS SWIM ALONG THE SAND. 2 KEEPS SWIM UP. MUSSELS LOOK OPEN.
	Date 26 JAN 2012 Time: 7:50AM Tech BRIAN C.	Date 26 JAN 2012 Time: 2:00 PM Tech BRIAN C.	Date [IT'S SEEMS LIKE THE TANK WAS [illegible]] 27 Jan 2012 Time: 7:46am Tech Blanca	Date 27 Jan 2012 Time: 3:28pm (tube snout died) Tech Blanca
Control	URCHINS ON BACK GLASS AND ON PLATE. 3 STARS SPREAD OUT ON GLASS 1 IS ON SAND. ABALONE ARE SPREAD OUT ON GLASS. ROCK FISH SWIM IN THE CENTER FACING UP. BASS SWIM AROUND ACTIVELY. SNOUTS SWIM ON TOP. PERCH SWIM ON THE RIGHT SIDE. DABS SWIM ALONG THE SAND. SOME CHASING EACH OTHER. PERCH MAINLY SWIM ON THE BACK CORNER. ALL FISH IS SWIMMING AROUND ACTIVELY. SNAILS AND SAND CRABS IS NOT VISIBLE. KELP CRAB ON PLATE. MUSSELS LOOK OPEN.	URCHINS ON THE LEFT SIDE ON PLATE SOME EATING KELP. STARS SPREAD OUT ON PLATE IN BACK GLASS EATING. ABALONE ARE SPREAD OUT ON THE GLASS EATING KELP. BASS ON THE BOTTOM RIGHT MOST OF THEM SWIM IN PLACE. PERCH SWIM ON THE BACK FROM LEFT TO RIGHT. ROCK FISH SWIM AROUND ACTIVELY. SNOUTS SWIM IN THE CENTER. MUSSELS LOOK OPEN. DABS SWIM ALONG THE SAND. SNAILS AND CRABS NOT VISIBLE. KELP CRAB ON [illegible]	Urchins all together on left side [illegible] [illegible] on back wall near water surface. Stars spread out on left & back [illegible] with tube feet sticking out. Abalone on every corner of tank [illegible] Bass swimming together at bottom [illegible] Perch swimming [illegible] [illegible] Dabs [illegible] on sand	Urchins spread out on left wall & back [illegible] sticking out. Stars spread out on every [illegible] [illegible] with tube feet out. Abalone [illegible] [illegible] Bass all together [illegible] [illegible] bottom. Perch [illegible] [illegible] on right corner. [illegible] [illegible] on sand. [illegible]
High Salinity	MOST URCHINS ARE ON THE PLATE. 2 ON THE LEFT SIDE BACK GLASS. SOME STILL EATING KELP. 4 STARS ON ARE ON THE PLATE. ABALONE IS SPREAD OUT ALL ON GLASS. SNOUTS SWIMS AT THE BOTTOM [illegible] ON THE RIGHT. PERCH SWIMS AROUND IN THE BACK FROM LEFT TO RIGHT. ROCK FISH SWIMS IN THE CENTER. BASS SWIMS AROUND ACTIVELY ON THE LEFT SIDE. 1 BASS KEEPS HIS MOUTH OPEN. DABS SWIM ALONG THE SAND 1 IS ON TOP. MUSSELS LOOK OPEN. SNAILS AND CRAB NOT VISIBLE.	URCHINS ON THE RIGHT SIDE ON PLATE EATING KELP. STARS SPREAD OUT ON PLACE EATING. ABALONE ARE SPREAD OUT EATING KELP ALSO MOST OF THEM ON THE RIGHT SIDE. ROCKFISH SWIM ON THE BOTTOM RIGHT SIDE. BASS SWIMS AROUND ON THE BOTTOM LEFT SIDE. [illegible] OPEN. PERCH SWIM AROUND ON THE BACK. SNOUTS SWIM IN THE CENTER. DABS SWIM ALONG THE SAND. SNAILS AND SAND CRAB NOT VISIBLE.	[illegible] Urchins all together on right wall & bottom [illegible] Stars spread out [illegible] Abalone on back [illegible] Bass swimming together at bottom [illegible] right [illegible] Perch swimming slowly [illegible] Snouts swimming together [illegible] Split nose together on right side not [illegible] Dabs [illegible] no sign	Urchins spread out on back & right wall [illegible] Kelp [illegible] on rocks [illegible] wall near surface. Abalone on left [illegible] Bass on left side wall [illegible] Perch swimming slowly on back wall [illegible] Tubesnout swimming slowly [illegible] on right corner [illegible] slowly. Dabs [illegible] no sign of olive snails or sand crabs.
	Date 28 Jan 2012 Time: 10:07 Tech Ernesto A.	Date [MUSSELS LOOK OPEN] 28 Jan 2012 Time: 4:07pm Tech DAVID R	Date 29 Jan 2012 Time: 9:51am Tech Ernesto	Date 29 Jan 2012 Time: 4:43 Tech Ernesto
Control	Kelp Perch and Bass swimming actively on right side. Split nose swimming in place over gravel. Sand dabs on sand. No sign of olive snail or sand crab. Tube snout swimming close to surface. Abalone and Seastars spread out. Urchins are spread out in groups one against back glass, the other group on back top corner. Mussels look ok. Kelp crab on screen.	All fish look normal. Sanddabs are hiding in sand. (2) stars on left panel. (2) stars on back panel. (2) urchins on back left top corner. (4) urchins behind rocks. (5) urchins on upper top back panel. (3) abalone towards right top. (1) abalone front lower right side. Mussels are slightly open. Crab on right panel. No sign of sand crabs.	Perch & Bass swimming actively on right side. Split nose swimming in place close to surface, tube snout swimming vertically on right side of tank. Dabs on sand, stars on left side of tank one on right side. Urchins (5) on top left corner (4) on right against back glass (3) on sand behind gravel. Abalone spread out no sign of olive snails and sand crabs. Mussels look ok, kelp crab on screen.	Perch & Bass swimming on right side. (6) Bass swimming in place. Split nose swimming on left side. Tube snout swimming vertically close to surface. Dabs on sand. Urchins continue on the same spot as this morning. Stars and Abalone spread out, no sign of snails or sand crabs. Kelp Crab on screen, mussels look [illegible] open.
High Salinity	Kelp Perch swimming actively at bottom. Bass swimming in place on lower left corner. Split nose swimming in place along bottom of tank. Tubesnout swimming vertically on right side. Dabs on sand, no sign of olive snails or sand crabs. Abalone & sea stars spread out. Urchins on right side two on left. Mussels ok, kelp crab on screen.	All fish are swimming normally most of the urchins are on the right side panel. (2) urchin on back panel (1) star on front glass. (1) star on gray tube coming out of rocks (left). (4) abalone on bottom right panel (3) abalone on left side of tank. (1) abalone on front glass. Sanddabs are hiding in sand. Sand crab hiding in sand at right front corner. Mussels slightly open. Crab on left panel on top of [illegible]	Perch & Bass swimming actively on left side of tank. One Bass swimming with its mouth open close to sand. Split nose on left side swimming in place. Tube snout swimming vertically on right side. Dabs on sand one swimming upwards close to water surface. Stars spread out one on grey pipe. Abalone spread out. Urchins on right side 1 on left. Mussels look ok. No sign of sand crabs or snails. Kelp crab on screen.	Perch and Bass swimming on left side of tank, one bass continues to swim with mouth open. Split nose swimming in place on left side close to surface. Stars and abalone are spread out one [illegible] on right side, 2 on left. Pipe fish swimming vertically close to surface. No sign of olive snails or sand crabs. Kelp crab on screen.

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Behavioral Observations

	Date 30 JAN 2012 Time: 7:50 AM Tech BRIAN L.	Date 30 JAN 2012 Time: 3:07 PM Tech BRIAN L. (1S) SNOUT ATE BY URCHIN / SNOUT SWAM ON TOP MAINLY IN THE CENTER	Date 31 Jan 2012 Time: 8:00 am Tech Blanca C Feeding Day (1S Snout dead)	Date 31 Jan 2012 Time: [illegible] Tech Blanca C
Control	URCHINS ALL ON THE LEFT SIDE ON PLATE. 3 STARS ON PLATE 1 ON BACK GLASS. ABALONE ARE SPREAD OUT ON GLASS. BASS ARE ON THE RIGHT SIDE. SWIM AROUND ROCK FISH ON RIGHT SIDE ON TOP SWIM IN PLACE FACING UP, PERCH SWIM AROUND ACTIVELY. TUBE SNOUT SWIM IN THE CENTER. DABS SWIM ALONG THE SAND. 1 SNAIL VISIBLE ON THE BACK OF THE RIGHT SIDE SAND CRABS NOT VISIBLE MUSSELS ARE OPEN. KELP CRAB ON PLATE	URCHINS ARE SPREAD OUT ON THE LEFT SIDE. SOME ON GLASS SOME ON GRAVEL. STARS ARE SPREAD OUT ON GLASS. ABALONE SPREAD OUT ON GLASS. BASS SWIMS AROUND ACTIVELY. PERCH SWIMS AROUND ACTIVELY MAINLY IN THE BACK. ROCK FISH SWIMS AROUND ACTIVELY MAINLY IN THE CENTER. DABS SWIM ALONG THE SAND. 1 DAB KEEP SWIMMING UP. SNAIL AND SAND CRAB NOT VISIBLE. MUSSELS ARE OPEN. KELP CRAB ON PLATE.	Urchins spread out on left side [illegible] near surface some on back wall [illegible]. Abalone [illegible] [illegible]	Urchins all together on left [illegible] [illegible] Stars [illegible] some eating. Perch swimming together near rocks. Bass all [illegible] [illegible] [illegible]
High Salinity	URCHINS ON THE RIGHT SIDE ON PLATE, SPREAD OUT. 2 STARS ON PLATE 1 ON GRAVEL 1 ON FRONT GLASS. ABALONE ARE SPREAD OUT ON GLASS. 2 ROCK FISH IN THE TOP LEFT CORNER SWIM IN PLACE THE OTHER 2 ON THE RIGHT CORNER SWIM IN PLACE. BASS SWIMS AROUND ACTIVELY MAINLY ON THE LEFT SIDE PERCH SWIMS AROUND ACTIVELY MAINLY IN THE BACK. TUBE SNOUTS SWIM IN THE CENTER. MUSSELS LOOK OPEN. DABS SWIM ABOVE THE SAND. KELP CRABS ON PLATE.	URCHINS MOST ON THE RIGHT SIDE AT THE BOTTOM. STARS ARE SPREAD OUT 3 ON BACK GLASS 1 ON GRAVEL. ABALONE ARE SPREAD OUT. BASS SWIMS AROUND ACTIVELY. 1 BASS MOUTH [illegible]. PERCH SWIMS AROUND ACTIVELY MAINLY IN THE BACK. ROCKFISH 1 ON THE LEFT CORNER IS [illegible] 1 ON THE RIGHT CORNER IN PLACE OTHERS SWIM AROUND. SNOUT SWIMS ABOVE PLATE. DABS SWIM ALONG SAND. SNAIL AND SAND CRAB NOT VISIBLE. KELP CRAB ON [illegible].	Urchins spread out on back wall [illegible] right bottom [illegible] on sand. Abalone on every corner [illegible] [illegible] Dabs swimming [illegible] Mussels are open [illegible]	Urchins spread out on right wall [illegible] with kelp. Abalone on left [illegible] right corner [illegible] kelp. Stars [illegible] [illegible] Dabs all on sand [illegible] No sign of [illegible] snails, [illegible] sand crab.
	Date 1 Feb 2012 Time: 7:55 am Tech Blanca C	Date 1 Feb 2012 Time: 3:10 pm Tech Blanca C Tank off	Date 2 Feb 2012 Time: 7:53 am Tech Blanca C	Date 2 Feb 2012 Time: 3:05 [illegible] Tech [illegible]
Control	Urchins spread out on every wall, all with [illegible] [illegible]	Urchins [illegible] rocks, [illegible] on left [illegible] corner, [illegible] Abalone on every corner [illegible] Bass [illegible] swimming on bottom [illegible]	Urchins spread around back wall [illegible] [illegible]	Urchins spread out on back wall [illegible] [illegible]
High Salinity	[illegible] snails & sand crabs. Mussels [illegible]	Urchins on back & [illegible] with kelp [illegible] [illegible] Perch [illegible] on left [illegible] no sign of [illegible] snails & sand crabs [illegible] Mussels [illegible]	[illegible]	[illegible] [illegible]
	Date 3 Feb 2012 Time: 7:41 am Tech Blanca C	Date 4 Feb 2012 Time: 9:20 Tech David	Date 4 Feb 2012 Time: 4:12 Tech DAVID	Date 5 FEB 2012 Time: Tech [illegible]
Control	Urchins spread out on back & left wall, 1 on [illegible] [illegible] Mussels slightly open [illegible]	All fish are swimming normally. Sanddabs are active swimming around the tank. (1) star on sand left side next to rocks (2) star on back panel towards the top (1) star on left panel towards the bottom. Most urchins on back left side of tank. (1) urchin [illegible] [illegible] on right side of tank towards the bottom. Mussels [illegible] abalones look [illegible] corner of tank. [illegible] slightly open. Crab on right panel	All fish are swimming normally - Sanddabs hiding on sand (1) star on sand next to rocks (left side) (1) star on left panel. (2) stars on back panel. Most [illegible] on left side panel of tank. (1) urchin on right glass towards the bottom (3) urchin on back glass. (1) urchin on left [illegible]. Abalones [illegible] corner of tank. Mussels slightly open. Crab on right panel of tank	Ambient animals behaving normally and not showing signs of stress
High Salinity	Urchins spread out on back wall [illegible] [illegible] Mussels [illegible] [illegible] Crab on wall.	All fish swimming on left side of tank. Sanddabs are active swimming around the tank - (1) sanddab [illegible] towards top of tank on left side. Most [illegible] on the right side of tank. (5) urchins on sand (1) urchin has droopy spines (on sand). (1) star on top of rocks (1) star on right panel. (1) star on front glass (1) star on back panel. (4) abalones on left bottom back side of tank. 1 abalone on right bottom panel. Mussels slightly open. Crab on air stone	All fish look normal. (1) star on top of rocks (1) star on front glass. (2) star on back panel. Most urchins on right side of tank. (4) urchins on sand. (1) urchin has droopy spines on sand. (2) urchins on back panel. Sanddabs hiding in sand. Abalones look normal. Mussels slightly open. Crab on left panel (1) sanddab active, swimming to top of tank	Fish normal in fact all animals look normal except 2 urchins have dropped spines and are droopy

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 6 Feb 2012 Time: 8:30 am Tech Chris B.	Date 6 FEB 2012 Time: 839 Tech Chris B.	Date 7 Feb 2012 Time: [illegible] Tech	Date 7 Feb 2012 Time: 5:21 pm Tech Blanca
Control	WSB schooling around bottom right Tubesnouts swimming in center of tank Splitnose – swimming top left near wall Perch – swimming around back of tank Stars – all on walls, 2 surface, 2 sand Urchins – spread out, mainly top left Dabs – on top of sand olive snail out and closed not dead	WSB schooling bottom right Perch along back wall, near sand Splitnose – in center near [illegible] Dabs – hiding on sand Tubesnout – still really skinny Stars – near surface back & [illegible] Urchins – top left wall		Two urchins. Stars spread out back & side wall, some with tubefeet sticking out. Abalone spread out on front & back right corner near surface, with kelp. Perch swimming from side to other side of tank. Splitnose near rocks. Dabs laying on sand some going slow. Tubesnout near [illegible]. Mussels close. Snails on wall.
High Salinity	WSB – swimming around bottom left Splitnose swimming the substrate Perch – swimming around back right Dabs – one in rocks, others in sand Urchins are at the bottom right Stars – 1 in sand, 3 near surface no sight of sand crabs/olive snails	WSB – schooling bottom right near sand Splitnose right side near surface Perch swimming along back wall Dabs – in sand, one swimming up Stars – near surface Urchins – one has spines down no sight of snails; one sandcrab		Two urchins, stars spread out on back wall and others on rock, Abalone spread on each corner, with kelp. Perch all on right corner swimming slow. Dabs laying on sand some swimming slow. Bass all on the left side, not moving much, mussels close. Crab on wall, two olive snails.
	Date Time: Tech	Date Time: Tech	Date Time: Tech	Date Time: Tech
Control				
High Salinity				
	Date Time: Tech	Date Time: Tech	Date Time: Tech	Date Time: Tech
Control				
High Salinity				

Mortality Data

West Basin High Salinity Sensitivity Study

Survival Data

Date	Time	Tech	Control or Exposure	PPS Salinity	Species	No. Morts	Cause/notes
12/15/11	2:30pm	Blanca	Exposure	50.14	Tubesnout	1	unknown
12/19/11	10:27am	ROWENA	AMBIENT	[illegible]	[illegible]	[illegible]	UNKNOWN
12/20/11	[illegible]	Blanca	Exposure	55.93	purple urchin	1	unknown
12/20/11	9:54am	Blanca	Ambient	50.19	Mussels	5	unknown
12/20/11	9:50am	Blanca	Exposure	55.25	Mussels	10	unknown
12/21/11	8:50am	Blanca	Ambient	50.53	Purple urchin	1	unknown
12/21/11	10:50am	BRIAN	AMBIENT	[illegible]	MUSSELS	7	UNKNOWN
12/21/11	11:20am	BRIAN	EXPOSURE	58.61	PURPLE URCHINS	1	UNKNOWN
12/24/11	9:15am	Davin	Exposure	53.29	Purple urchin	1	Unknown
12/26/11	9:[illegible]0am	Chris B	Ambient	50.59	Purple urchin	1	Unknown
1/10/12	8:15am	Blanca	Exposure	58.43	Kelp crab	1	unknown (molted earlier)
1/11/12	9:50am	Blanca	[illegible]	50.47	Mussels	5	unknown
1/1/12	[illegible]	Blanca	Exposure	58.06	Mussels	5	unknown
1/17/12	1:14pm	Blanca	Exposure	61.37	[illegible]	1	unknown
1/24/12	[illegible]	Chris B	Ambient	50.59	[illegible]	1	[illegible] out
1/27/12	2:30pm	Blanca	Ambient	50.31	Tube snout	1	[illegible]
1/30/12	[illegible]	BRIAN	~~EXPOSURE~~	62.09	TUBE SNOUT	1	EAT BY URCHIN.
1-31-12	12:56pm	BRIAN	EXPOSURE	62.84	TUBE SNOUT	1	UNKNOWN
2-6-12	8:28pm	Chris B	Exposure	62.80	Urchins	2	UNKNOWN
2-7-12	8:10	Chris B	Exposure	62	Urchins	1	UNKNOWN

Statistical Analyses and Laboratory Benchsheets

Test: EC-Echinoderm Survival and Development Test						Test ID: C120118.01		
Species: SP-Strongylocentrotus purpuratus						Protocol: USEPA98-USACE / USEPA 1998		
Sample ID: 33 ppt Batch						Sample Type: EFF2-Industrial		
Start Date: 1/19/2012 15:12				End Date: 1/23/2012 14		Lab ID: CCA-Carlsbad, Weston		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	33	168	154	154	141	
	2	2	33	168	167	167	153	
	3	3	33	168	149	149	134	
	4	4	33	168	158	158	129	
	5	1	40	168	152	152	0	
	6	2	40	168	128	128	0	
	7	3	40	168	143	143	0	
	8	4	40	168	131	131	0	

Comments: West Basin Long-Term High Salinity Study

Echinoderm Survival and Development Test-Proportion Alive

Start Date:	1/19/2012 15:12	Test ID:	C120118.0146	Sample ID:	33 ppt Batch
End Date:	1/23/2012 14:40	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	1/18/2012 10:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

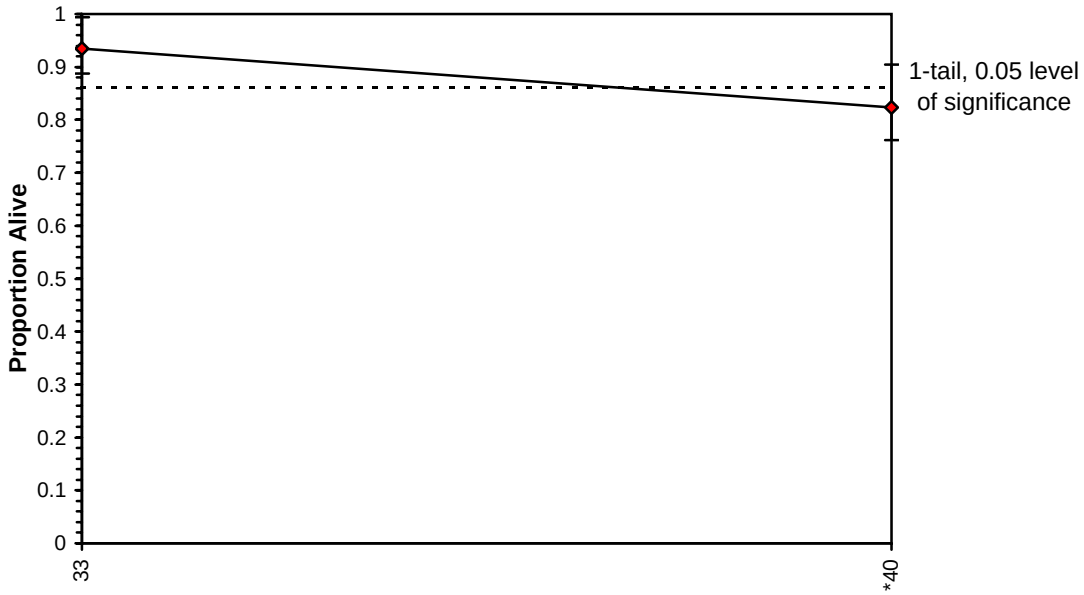
Conc-%	1	2	3	4
33	0.9167	0.9940	0.8869	0.9405
40	0.9048	0.7619	0.8512	0.7798

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.9345	1.0000	1.3309	1.2278	1.4936	8.669	4			
*40	0.8244	0.8822	1.1438	1.0611	1.2571	7.887	4	2.555	1.943	0.1423

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.90684	0.818	0.80865	-0.6505
F-Test indicates equal variances (p = 0.70)	1.6355	47.4683		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs 33	0.08264	0.08758	0.07003	0.01073	0.04318	1, 6

Dose-Response Plot



Echinoderm Survival and Development Test-Proportion Normal

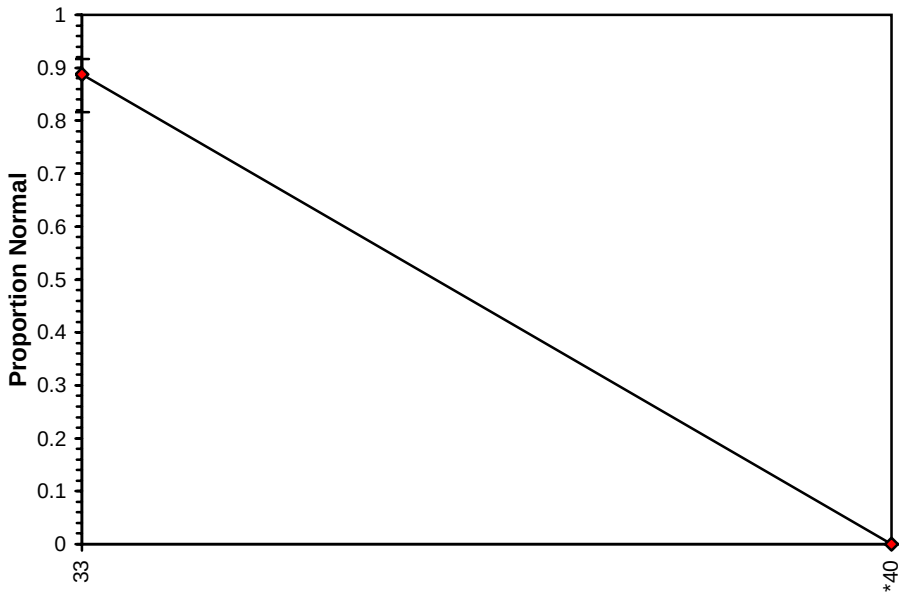
Start Date:	1/19/2012 15:12	Test ID:	C120118.0146	Sample ID:	33 ppt Batch
End Date:	1/23/2012 14:40	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	1/18/2012 10:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

Conc-%	1	2	3	4
33	0.9156	0.9162	0.8993	0.8165
40	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root				
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N
33	0.8869	1.0000	1.2323	1.1281	1.2771	5.743	4
40	0.0000	0.0000	0.0386	0.0386	0.0386	0.000	4

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.75842	0.818	-1.8277	4.4525
Equality of variance cannot be confirmed				

Dose-Response Plot



Test: EC-Echinoderm Survival and Development Test						Test ID: C120118.02		
Species: SP-Strongylocentrotus purpuratus						Protocol: USEPA98-USACE / USEPA 1998		
Sample ID: 40 ppt Batch						Sample Type: EFF2-Industrial		
Start Date: 1/19/2012 15:12				End Date: 1/23/2012 14		Lab ID: CCA-Carlsbad, Weston		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	33	212	147	147	11	
	2	2	33	212	114	114	6	
	3	3	33	212	137	137	4	
	4	4	33	212	105	105	3	
	5	1	40	212	101	101	0	
	6	2	40	212	70	70	0	
	7	3	40	212	96	96	0	
	8	4	40	212	103	103	0	

Comments: West Basin Long-Term High Salinity Study

Echinoderm Survival and Development Test-Proportion Alive

Start Date:	1/19/2012 15:12	Test ID:	C120118.0246	Sample ID:	40 ppt Batch
End Date:	1/23/2012 14:40	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	1/18/2012 10:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

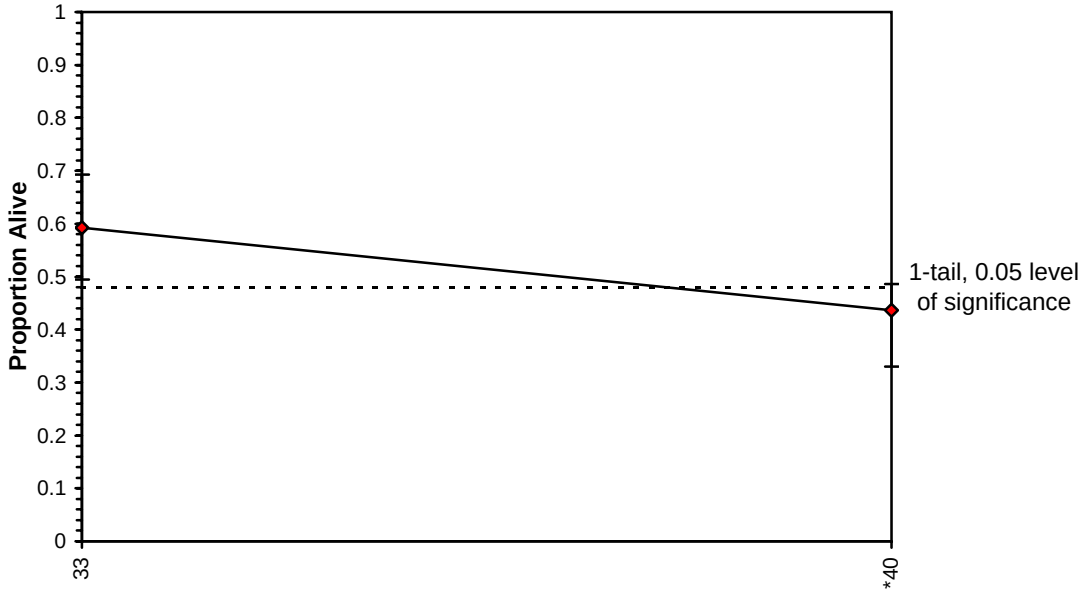
Conc-%	1	2	3	4
33	0.6934	0.5377	0.6462	0.4953
40	0.4764	0.3302	0.4528	0.4858

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.5932	1.0000	0.8804	0.7807	0.9840	10.735	4			
*40	0.4363	0.7356	0.7208	0.6121	0.7712	10.237	4	2.662	1.943	0.1165

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.89975	0.818	-0.3931	-1.4524
F-Test indicates equal variances (p = 0.69)	1.64056	47.4683		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs 33	0.11592	0.19501	0.05092	0.00719	0.03745	1, 6

Dose-Response Plot



Echinoderm Survival and Development Test-Proportion Normal

Start Date:	1/19/2012 15:12	Test ID:	C120118.0246	Sample ID:	40 ppt Batch
End Date:	1/23/2012 14:40	Lab ID:	CCA-Carlsbad, Weston	Sample Type:	EFF2-Industrial
Sample Date:	1/18/2012 10:00	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

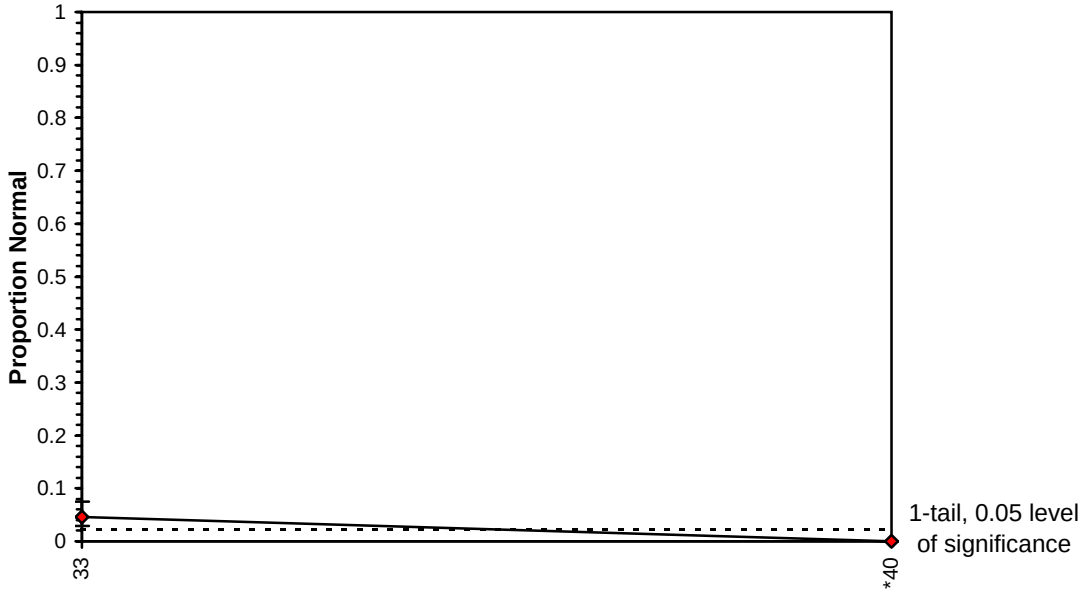
Conc-%	1	2	3	4
33	0.0748	0.0526	0.0292	0.0286
40	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.0463	1.0000	0.2125	0.1698	0.2771	24.319	4			
*40	0.0000	0.0000	0.0343	0.0343	0.0343	0.000	4	6.895	2.353	0.0608

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.87646	0.818	0.6394	1.27034
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Heteroscedastic t Test indicates significant differences	0.02165	0.48664	0.0635	0.00134	4.6E-04	1, 6
Treatments vs 33						

Dose-Response Plot



33 batch

Echinoderm Development CHRONIC TOXICITY TEST

BIO046

Weston Test ID:	Client:	Client Sample ID:
C120118.0146	West Basin Municipal Water District	West Basin Brine

SPAWNING DATA

Initial Spawning Time:	Final Spawning Time:	Fertilization Time:	No. of Females:	No. of Males:
0900	1015	1145	2	3
Embryo Density (count/mL):	1.	2.	3.	Average:

Stocking Volume Calculation: 52 x 100 = 5200 2700 ÷ 5200 = 0.52 x 100 = 52 mL 192 stock + 48 mL $C\text{-}H_2O$

ZERO TIME COUNTS

1. 167	2. 156	3. 186	4. 159	5. 173	6. —
Average Count: 168			Technician: JH		

LARVAL COUNT DATA

Conc.	Rep 1		Rep 2		Rep 3		Rep 4		Rep 5		Date	Initials
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal		
~~Control~~	—	—	—	—	—	—	—	—			—	—
~~Brine~~	—	—	—	—	—	—	—	—			—	—
33 batch 33 ppt	141	13	153	14	134	15	129	29			1/25/12	JH/KC
① JH 33 batch 60.3 ms/cm ~40 ppt	Ø	152	Ø	128	Ø ② KC 1143		Ø	131			↓	↓

QA COUNT CHECKS

	QA Check #1	QA Check #2	QA Check #3	QA Check #4
Concentration / Replicate	33 batch 33 ppt / 4	33 batch 60.3 ms/cm / 3	/	/
Total #	157	~40 ppt 143		
# Normal	134	Ø		
Date / Initials	1/25/12 / JH	1/25/12 / JH	/	/

QA Check Acceptability: ☒ <5% difference in means of QA & orig. counts

① Some pieces of cellular material visible in vials; not counted. 1/25/12 JH

② Some cells were faint. Vial recounted. 1/25/12 KC

40 batch

Echinoderm Development CHRONIC TOXICITY TEST

60.3 ms/cm BIO046

Weston Test ID:	Client:	Client Sample ID:
C120118.0146	West Basin Municipal Water District	West Basin Brine

SPAWNING DATA

Initial Spawning Time:	Final Spawning Time:	Fertilization Time:	No. of Females:	No. of Males:
0900	1030	1145	2	4
Embryo Density (count/mL):	1.	2.	3.	Average:

Stocking Volume Calculation: 30 × 100 = 3000 2700 ÷ 3000 = .9 × 100 = 90 mL 30g stock + 10 mL C-H20

ZERO TIME COUNTS

1. 214	2. 200	3. 217	4. 214	5. 217	6. —
Average Count: 212			Technician: JH		

LARVAL COUNT DATA

Conc.	Rep 1		Rep 2		Rep 3		Rep 4		Rep 5		Date	Initials
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal		
~~Control~~	—	—	—	—	—	—	—	—			—	—
~~Brine~~	—	—	—	—	—	—	—	—			—	—
③ JH ~~40 batch 33 ppt~~	11	136	6	108	4	133	3	102			1/25/12	JH/KC
① JH 40 batch 60.3 ms/cm ~40 ppt	Ø	101	Ø	70	Ø	96	Ø	103			↓	↓
② JH												

QA COUNT CHECKS

	QA Check #1	QA Check #2	QA Check #3	QA Check #4
Concentration / Replicate	40 batch 33 ppt / 3	40 batch 60.3 ms/cm ~40 ppt / 4	/	/
Total #	134	102		
# Normal	8	Ø		
Date / Initials	1/25/12 / JH	1/25/12 / JH	/	/

QA Check Acceptability: ☒ <5% difference in means of QA & orig. counts

① A lot of pieces of cellular material visible in vials; not counted 1/25/12 JH

② 4-6 cells in each vial showed almost full development but were missing stomach or arms so were counted as abnormal. 1/25/12 JH

③ More than half appeared almost fully developed but were missing full stomach or arms; also a lot of pieces of cellular material were visible 1/25/12 JH

Echinoderm Development CHRONIC TOXICITY TEST

BIO046

CLIENT:	West Basin Municipal Water District
PROJECT:	Salinity Study - Long Term Module
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C120118.01Ale
SPECIES:	Strongylocentrotus purpuratus

DATE RECEIVED:	1/18/12
DATE TEST STARTED:	1/19/12
DATE TEST ENDED:	1/23/12
WESTON SOP NO.:	BIO 01Ale
STUDY DIRECTOR:	J. Hansen

① JH

	Concentration	DO* (mg/L)	Temp* (°C)	Salinity* (ppt) / (cond. mS/cm)	pH*
Day 0 (0 Hours) Date: 1/19/12 Sample ID: C120118.01a Dilutions (Tech): JH WQ Time: 1310 Technician: JH	~~Control~~				
	~~Brine Control~~				
	33 batch 33 ppt	8.3	15.8	32.3 / 50.0	8.1
	33 batch 60.3 mS/cm ~40 ppt	8.3	15.8	39.4 / 60.0	8.0
	40 batch 33 ppt	8.5	15.6	32.3 / 50.0	8.1
	40 batch 60.3 mS/cm ~40 ppt	8.3	16.0	39.4 / 60.1	8.0
24 Hours Date: 1/20/12 WQ Time: 0955 Technician: JH	~~Control~~				
	~~Brine Control~~				
	33 batch 33 ppt		15.5		
	33 batch 60.3 mS/cm ~40 ppt		15.0		
	40 batch 33 ppt		15.2		
	40 batch 60.3 mS/cm ~40 ppt		15.0		
48 Hours Date: 1/21/11 WQ Time: 0945 Technician: SH	~~Control~~				
	~~Brine Control~~				
	33 batch 33 ppt		15.2		
	33 batch 60.3 mS/cm ~40 ppt		14.9		
	40 batch 33 ppt		15.1		
	40 batch 60.3 mS/cm ~40 ppt		15.0		

① Salinity & conductivity both set at TRef 25 on meter during readings. 1/19/12 JH

Echinoderm Development CHRONIC TOXICITY TEST

BIO046

CLIENT:	West Basin Municipal Water District
PROJECT:	Salinity study - Long Term Module
CLIENT SAMPLE ID:	West Basin Brine
WESTON TEST ID:	C120118.0146
SPECIES:	~~Strongylocentrotus~~ purpuratus

9yl DJH

DATE RECEIVED:	1/18/12
DATE TEST STARTED:	1/19/12
DATE TEST ENDED:	1/23/12
WESTON SOP NO.:	BIO046
STUDY DIRECTOR:	J. Hansen

	Concentration	DO* (mg/L)	Temp* (°C)	Salinity* (ppt) / cond mS/cm	pH*
72 Hours	~~Control~~				
Date: 1/22/12	~~Brine Control~~				
WQ Time: 1215	33 batch 33ppt		15.1		
Technician: SH	33 batch 60.3 mS/cm ~40ppt		15.0		
	40 batch 33ppt		14.9		
	40 batch 60.3 mS/cm ~40ppt		14.8		
96 Hours (if needed)	~~Control~~				
Date:: 1/23/12	~~Brine Control~~				
WQ Time: 1430	33 batch 33ppt	8.1	15.5	33.5/51.8	8.2
Technician: KC	33 batch 60.3 mS/cm ~40ppt	8.0	15.1	40.6/61.4	8.2
	40 batch 33ppt	8.1	15.0	33.4/51.7	8.2
	40 batch 60.3 mS/cm ~40ppt	8.0	15.0	40.8/61.8	8.2

*Water quality measurements taken in surrogate water quality chambers.

START TIME:	1512	Initials:	KC
END TIME:	1440	Initials:	KC
ORGANISM BATCH:			
HOBO TEMP. NO.:	119279		
TEST LOCATION:	Room 2		

DILUTION WATER BATCH: S100111812

TEST ACCEPTABILITY:

- ☐ ≥ 80% NORMAL SHELL DEVELOPMENT IN SURVIVING CONTROLS
- ☐ MSD < 25%

① IE 1/25/12 JH

TEST COMMENTS

CLIENT	PROJECT	WESTON JOB NUMBER	TEST	WESTON LABORATORY
West Basin Municipal Water District	Salinity Study - Long Term Module	14760-001.001.0003	Echino Dev.	

NUMBER/CODE	DATE	COMMENT BY	COMMENT
1	1/19/12	KC/JH	During spawning, the Ambient batch produced twice as many males & females as the Exposure batch & spawned about 15 min earlier (both batches were spawned at same time but kept separate). The Ambient batch also produced more sperm & eggs per urchin than the exposure batch.
2			
3			
4			
5			During initial fertilization & early signs of development the Ambient batch starting dividing quicker & showed about 80-90% division before test initiation. The exposure batch fertilized at about the same time but did not begin to divide for about 45 min after the Ambient batch. Even then, they did not have as much division although they were fertilized.
6			
7			
8			
9			
10			
11			*See counts pages for comments about results of the batches.
12			
13			
14			
15			
16			
17			
18			
19			
20			

APPENDIX B

LONG-TERM EXPOSURE ASSESSMENT: TRIAL 3

Water Quality Data

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 06 MAY 2011 Time: 3:55 PM Tech: Chris R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.1	6.0	52.03	8.1	
	High Salinity	16.6	5.8	54.31	8.0	

Date: 07 MAY 2011 Time: 10:22 am Tech: A. Nagano	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	7.3	52.09	8.1	
	High Salinity	16.0	7.1	54.58	8.0	

Date: 07 MAY 2011 Time: 4:26 pm Tech: A. Nagano	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.0	7.9	51.95	8.1	
	High Salinity	15.5	7.6	54.63	8.1	

Date: 08 MAY 2011 Time: 10:03 am Tech: A. Nagano	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.7	6.1	51.99	8.1	
	High Salinity	16.8	5.4	54.19	8.0	

Date: 08 MAY 2011 Time: 4:23 pm Tech: A. Nagano	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.9	6.5	51.97	8.1	
	High Salinity	16.5	5.5	54.13	8.1	

Date: 09 May 2011 Time: 7:53 a.m Tech: Juan	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	6.3	52.03	8.2	
	High Salinity	16.5	5.2	54.27	8.1	

Date: 09 May 2011 Time: 3:32 p.m Tech: Juan	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	5.7	52.09	8.2	
	High Salinity	14.9	5.3	53.94	8.1	

Date: 10 MAY 2011 Time: 8:10 AM Tech: Chris R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	6.0	52.05	8.2	
	High Salinity	15.8	5.1	53.48	8.1	

15 MAY 2011 4:15 PM Alissa	Control	17.1	7.1	51.30	8.3	
	High Salinity	17.2	6.4	53.29	8.3	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 10 MAY 2011 Time: 3:06 PM Tech: Chris R.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	5.9	51.93	8.2	
	High Salinity	15.3	5.6	54.02	8.1	

Date: 11 MAY 2011 Time: 8:30 am Tech: A. Nagano	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	5.7	51.99	8.1	0
	High Salinity	14.7	5.2	54.29	8.1	0

Date: 11 MAY 2011 Time: 3:34 pm Tech: A. Nagano	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	7.6	51.87	8.2	
	High Salinity	15.9	7.5	53.71	8.1	

Date: 12 MAY 2011 Time: 8:05 AM Tech: Chris R.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.6	6.5	52.01	8.2	
	High Salinity	15.9	5.8	53.88	8.1	

Date: 12 MAY 2011 Time: 3:30 PM Tech: Chris R.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	6.5	51.70	8.2	
	High Salinity	16.3	6.2	53.50	8.1	

Date: 13 May 2011 Time: 8:30 A.M Tech: Juan	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.1	5.9	51.74	8.1	0
	High Salinity	15.7	5.7	53.96	8.1	0

Date: 13 May 2011 Time: 3:29 p.m Tech: Juan	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.2	7.4	51.54	8.2	
	High Salinity	17.7	6.9	53.24	8.3	

Date: 14 MAY 2011 Time: 10:38 am Tech: Alissa	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.4	5.3	51.95	8.1	
	High Salinity	14.8	5.0	53.96	8.0	
* 14 MAY 2011 3:37 pm Alissa	Control	17.0	7.1	51.52	8.2	
	High Salinity	17.1	6.3	53.33	8.2	
15 MAY 2011 10:13 am Alissa	Control	15.9	7.0	51.21	8.2	15 MAY 2011 PM →
	High Salinity	16.5	6.3	53.27	8.2	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: May 16, 2011 Time: 8:45 AM Tech: David F	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	5.8	51.97	8.2	
	High Salinity	16.5	5.6	53.60	8.2	

Date: May 16, 2011 Time: 4:10 PM Tech: David F	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.8	51.85	8.3	
	High Salinity	17.1	6.2	53.29	8.2	

Date: 17 MAY 2011 Time: 8:25 AM Tech: Chris R.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	6.7	52.05	8.2	
	High Salinity	16.3	5.9	53.48	8.3	

Date: 17 MAY 2011 Time: 3:31 PM Tech: Chris R.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	12.0	3.9	51.64	8.0	0
	High Salinity	12.5	4.4	54.40	8.0	0

Date: 18 May 2011 Time: 8:00 am Tech: Alissa N	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	5.9	43.09	8.1	
	High Salinity	15.3	5.7	53.23	8.1	

Date: 18 May 2011 Time: 3:39 pm Tech: Alissa N.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.1	6.0	50.75	8.1	
	High Salinity	16.5	5.6	53.42	8.1	

Date: 19 MAY 2011 Time: 8:45 AM Tech: Chris R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	8.2	51.68	8.1	
	High Salinity	14.4	7.3	54.00	8.1	

Date: 19 MAY 2011 Time: 3:10 PM Tech: Chris R.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.1	6.5	51.99	8.2	
	High Salinity	15.2	5.3	54.02	8.1	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 20 MAY 2011 Time: 7:43 AM Tech: Chris R.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.6	5.6	52.32	8.0	0
	High Salinity	14.2	5.2	53.96	8.1	0

Date: 20 MAY 2011 Time: 3:29 PM Tech: Chris R.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	5.3	52.11	8.1	
	High Salinity	15.0	5.5	53.67	8.1	

Date: 21 MAY 2011 Time: 11:22 AM Tech: Alissa	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	5.7	52.07	8.1	
	High Salinity	15.8	5.9	53.69	8.1	

Date: 21 MAY 2011 Time: 4:25 pm Tech: Alissa	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	5.6	52.17	8.1	
	High Salinity	14.5	5.6	53.88	8.1	

Date: 22 MAY 2011 Time: 10:33am Tech: Alissa	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.4	51.99	8.1	
	High Salinity	15.7	6.4	53.38	8.1	

Date: 22 MAY 2011 Time: 4:23 pm Tech: Alissa	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	6.5	51.97	8.2	
	High Salinity	15.2	10.3	53.60	8.1	

Date: 23 May 2011 Time: 7:45AM Tech: David F/Ang	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	6.4	51.93	8.1	
	High Salinity	15.3	6.4	53.75	8.1	

Date: 23 May 2011 Time: 3:40PM Tech: David.F	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.2	7.1	51.71	8.2	
	High Salinity	16.6	7.0	51.83	8.1	

24 May 2011 8:02 a.m Tom	Concentration	Temp (°C)	DO (mg/L)	Sal.	pH	Ammonia
	Control	15.0	6.2	51.95	8.1	
	High salinity	15.3	6.2	53.71	8.1	

1-3 Control
5-7 high Sal

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 18 May 2012 Time: 900 am Tech: Rowena	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18	6.2	50.6	8.0	
	High Salinity	17.9	6.2	50.7	8.0	

Date: 18 MAY 2012 Time: 350 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.8	6.2	50.43	8.0	
	High Salinity	18.1	6.2	53.07	8.0	

Date: 21 May 2012 Time: 9:48 am Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.7	6.5	56.53	8.1	
	High Salinity	15.3	6.3	53.49	8.1	

Date: 19 May 2012 Time: 4:14 pm Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.4	6.2	50.97	8.0	
	High Salinity	18.2	6.1	52.69	8.0	

Date: 20 May 2012 Time: 9:17 Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.4	50.45	8.1	
	High Salinity	16.1	6.3	53.30	8.1	

Date: 20 May 2012 Time: 4:30 pm Tech: Jessa N	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.2	6.3	50.47	8.1	
	High Salinity	18.2	6.3	52.74	8.1	

Date: 21 MAY 2012 Time: 753 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.1	50.45	8.1	
	High Salinity	17.2	6.2	53.11	8.0	

Date: 21 May 2012 Time: 3:36pm Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	6.5	50.70	8.0	
	High Salinity	14.4	6.4	53.65	8.0	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 22 MAY 12 Time: 750 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.5	6.3	50.49	8.0	
	High Salinity	17.5	6.2	52.42	8.0	

Date: 22 MAY 12 Time: 348 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.4	6.3	50.48	8	
	High Salinity	17.5	6.2	53.22	8	

Date: 23 MAY Time: 745 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.8	6.4	50.51	8.1	
	High Salinity	16.2	6.2	53.09	8.1	

Date: 23 Time: 3:50 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.8	6.1	50.41	8.1	
	High Salinity	17.7	6.2	52.60	8.0	

Date: 24 MAY 2012 Time: 745 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.6	6.1	50.39	8.1	
	High Salinity	16.0	6.1	53.13	8.1	

Date: 24 Time: 350 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.0	50.49	8.0	
	High Salinity	17.6	5.7	52.11	8.0	

Date: 25 MAY 2012 Time: 835 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.3	6.0	50.37	8.0	
	High Salinity	17.8	6.0	53.05	8.0	

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 26 May 2012 Time: 12:30 pm Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.3	49.86	8.1	
	High Salinity	17.4	6.2	53.15	8.1	

Date: 26 May 2012 Time: 4:40 pm Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.1	49.82	8.1	
	High Salinity	18.1	6.1	53.09	8.0	

Date: 27 May 2012 Time: 9:18 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	7.2	49.62	8.0	
	High Salinity	15.4	6.8	53.55	8.0	

Date: 27 May 2012 Time: 430 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	6.4	49.80	8.1	
	High Salinity	15.1	6.2	53.55	8.0	

Date: 28 MAY 2012 Time: 9:10 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.6	6.4	49.81	8.0	
	High Salinity	15.0	6.2	53.55	8.0	

Date: 29 MAY 2012 Time: 9:10 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.5	6.7	49.70	8.0	
	High Salinity	17.0	6.5	53.11	8.0	

Date: 29 May 2012 Time: 3:59 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.2	49.80	8.1	
	High Salinity	17.0	5.5	53.03	7.9	

Date: 30 May 2012 Time: 7:41 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.1	5.6	49.72	8.1	
	High Salinity	16.6	5.8	52.99	8.1	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 30 MAY 2012 Time: ~~2~~ 3:30 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	5.3	49.43	8.1	
	High Salinity	18.3	5.5	52.69	8.1	

Date: 31 MAY 2012 Time: 7:47 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.8	5.7	49.76	8.1	
	High Salinity	17.2	5.7	53.05	8.1	

Date: 31 MAY 2012 Time: 3:35 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.5	49.64	8.0	
	High Salinity	17.2	6.4	51.34	8.1	

Date: 1 June 2012 Time: 7:50 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.8	49.60	8.1	
	High Salinity	16.8	6.8	52.71	8.1	

Date: 1 June 2012 Time: 3:50 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.8	6.7	49.53	8.0	
	High Salinity	16.6	6.8	53.31	8.1	

Date: 2 June 2012 Time: 10:15 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.3	5.8	49.80	8.0	
	High Salinity	17.0	5.7	49.26	8.0	

Date: 2 June 2012 Time: 4:40 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.1	5.8	49.06	8.0	
	High Salinity	16.3	5.7	49.13	8.0	

Date: 3 June 2012 Time: 9:10 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.1	6.3	50.35	8.1	
	High Salinity	16.1	6.6	49.86	8.0	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 3 June 2012 Time: Tech: Edlyn Palafox	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.5	6.1	52.25	8.0	
	High Salinity	17.5	6.4	49.56	8.0	

Date: 4 June 2012 Time: 7:40 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	6.6	50.37	8.0	
	High Salinity	16.8	6.7	49.86	8.0	

Date: 4 June 2012 Time: 3:40 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	6.5	49.64	8.0	
	High Salinity	14.4	6.5	57.51	8.1	

Date: 5 June 2012 Time: 8:00 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.1	6.6	49.78	8.1	
	High Salinity	17.4	6.8	53.19	8.1	

Date: 5 June 2012 Time: 8:00 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.2	6.6	49.68	8.0	
	High Salinity	18.6	6.7	55.72	8.0	

Date: 6 June 2012 Time: 7:36 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	7.3	49.62	8.0	
	High Salinity	15.4	7.2	42.40	8.1	

Date: 6 Jun 2012 Time: 3:50 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	13.7	7.1	50.55	8.1	
	High Salinity	14.5	6.8	56.53	8.1	

Date: 7 Jun 2012 Time: 7:40 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	6.6	50.29	8.1	
	High Salinity	17.2	6.9	56.40	8.1	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 7 June 2012 Time: 3:47 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	7.0	50.43	8.1	
	High Salinity	14.7	6.7	56.90	8.1	

Date: 8 June 2012 Time: 7:35 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.2	6.9	50.43	8.1	
	High Salinity	14.8	6.8	56.81	8.0	

Date: 8 June 2012 Time: 4:09 pm Tech: Edlyn P.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	6.8	50.3	8.1	
	High Salinity	15.5	6.6	56.5	8.0	

Date: 09 June 2012 Time: 10:35 am Tech: Edlyn P.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.9	50.0	8.1	
	High Salinity	17.4	6.7	40.64	8.1	

Date: 10 June 2012 Time: 1P Tech: Edlyn P.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.5	6.6	50.11	8.1	
	High Salinity	18.7	6.5	57.27	8.	

Date: 11 June 2012 Time: 7:40 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.6	6.6	50.19	8.1	
	High Salinity	18.6	6.5	57.30	8.1	

Date: 11 June 2012 Time: 3:55 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.8	6.5	50.00	8.1	
	High Salinity	19.3	6.3	57.21	8.0	

Date: 12 June 2012 Time: 7:42 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.9	6.5	50.11	8.1	
	High Salinity	19.5	6.3	57.42	8.1	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 12 June 2012 Time: 3:50 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	19.1	6.4	50.00	8.1	
	High Salinity	19.6	6.3	57.21	8.1	

Date: 13 June 2012 Time: 7:47 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.8	6.5	50.02	8.2	
	High Salinity	19.4	6.3	57.27	8.1	

Date: 13 June 2012 Time: 3:55 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	19.4	6.4	49.94	8.2	
	High Salinity	19.8	6.3	57.32	8.1	

Date: 14 June 2012 Time: 7:39 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.4	6.9	50.17	8.2	
	High Salinity	16.9	6.7	57.94	8.1	

Date: 14 June 2012 Time: 3:29 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	19.3	6.2	49.84	8.1	
	High Salinity	19.7	6.1	57.48	8.1	

Date: 15 Jun 2012 Time: 821 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.7	6.5	49.88	8.1	
	High Salinity	19.1	6.2	57.90	8.1	

Date: 16 June 2012 Time: 938 Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	19.0	6.3	49.80	8.2	
	High Salinity	19.5	6.2	57.42	8.1	

Date: 17 June 2012 Time: 11:05 am Tech: Sdlyn	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.6	49.96	8.2	
	High Salinity	17.4	6.4	58.13	8.1	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 17 June 2012 Time: Tech: Edlyn Palafox	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control					
	High Salinity					

Date: 18 June 2012 Time: 7:42 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.9	6.6	49.92	8.1	
	High Salinity	17.4	6.3	58.15	8.1	

Date: 18 June 2012 Time: 3:41 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.4	6.6	49.82	8.1	
	High Salinity	18.7	6.2	58.07	8.1	

Date: 19 June 2012 Time: 740 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.6	6.6	49.86	8.1	
	High Salinity	17.9	6.3	57.88	8.1	

Date: 19 Jun 2012 Time: 345 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.2	6.6	49.90	8.1	
	High Salinity	16.9	6.4	58.01	8	

Date: 20 Jun 2012 Time: 826 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.1	6.7	49.92	8.1	
	High Salinity	16.6	6.4	58.05	8.0	

Date: 20 Jun 2012 Time: 3:34 Tech: Chris B	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	6.7	49.74	8.1	
	High Salinity	16.6	6.5	56.10	8.0	

Date: 21 Jun 2012 Time: 7:48 Tech: Chris B.	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.2	6.6	49.88	8.1	
	High Salinity	17.3	6.4	51.36	8.1	

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 21 June 2012 Time: 340 Tech: Chris R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.4	50.00	8.1	
	High Salinity	16.9	6.3	57.24	8.1	

Date: 23 June 2012 Time: 4:00pm Tech: DAVID	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.3	6.9	50.32	8.1	
	High Salinity	15.9	6.6	55.82	8.1	

Date: 24 June 2012 Time: 930 Tech: David	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	7.0	49.92	8.2	
	High Salinity	16.0	6.7	53.23	8.1	

Date: 24 June 2012 Time: 420 Tech: DAVID R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.3	7.1	50.35	8.2	
	High Salinity	16.0	6.7	59.28	8.1	

Date: 25 June 2012 Time: 7:45 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.3	7.6	50.45	8.2	
	High Salinity	16.1	6.7	60.73	8.1	

Date: 25 June 2012 Time: 3:57 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	7.0	50.31	8.2	
	High Salinity	16.9	6.7	62.75	8.1	

Date: 26 June 2012 Time: 7:39 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.0	6.9	50.41	8.1	
	High Salinity	16.4	6.7	63.13	8.1	

Date: 26 June 2012 Time: 3:46 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	7.0	50.45	8.1	
	High Salinity	15.3	6.5	63.21	8.0	

Project Phase:	Test Exposure
Start Date:	Time:
End Date:	Time:

Water Quality Data

Date: 27 June 2012 Time: 7:41 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.5	6.9	50.57	8.1	
	High Salinity	15.3	6.2	63.96	8.0	

Date: 27 June 2012 Time: 3:20 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.7	7.0	50.47	8.1	
	High Salinity	15.7	6.5	63.99	8.1	

Date: 28 June 2012 Time: 7:38 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	7.0	50.57	8.1	
	High Salinity	14.7	6.6	63.38	8.0	

Date: Time: Tech:	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.0	6.9	49.64	8.1	
	High Salinity	14.9	6.6	63.32	8.0	

Date: 30 June 2012 Time: 9:55 am Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.5	7.2	50.11	8.2	
	High Salinity	16.2	6.4	55.15	8.2	

Date: 30, June 2012 Time: 11:30 Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.7	7.1	52.80	8.2	
	High Salinity	16.3	6.4	54.21	8.2	

Date: 30 June 2012 Time: 4:29 pm Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	7.1	49.97	8.2	
	High Salinity	17.4	7.0	63.13	8.1	

Date: 01 July 2012 Time: 9:30 am Tech: Edlin Palafox	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.3	7.2	50.45	8.2	
	High Salinity	16.0	7.0	63.88	8.1	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 1 JULY 2012 Time: 4:55 Tech: Edlyn Rabfox	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.3	6.5	50.13	8.2	
	High Salinity	19.0	6.4	62.55	8.1	

Date: 2 JULY 2012 Time: 7:45 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.1	6.8	50.33	8.2	
	High Salinity	17.8	6.6	63.49	8.1	

Date: 2 JULY 2012 Time: 3:41 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.7	6.5	50.19	8.1	
	High Salinity	19.4	6.4	63.38	8.2	

Date: 3 JULY 2012 Time: 7:24 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.3	6.6	50.31	8.2	
	High Salinity	18.0	6.4	63.34	8.1	

Date: 3 JULY 2012 Time: 3:18 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.4	6.6	49.94	8.2	
	High Salinity	17.6	6.3	62.52	8.1	

Date: 4 July 2012 Time: 9:19 am Tech: [illegible]	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.3	6.6	49.96	8.2	
	High Salinity	17.9	6.3	63.17	8.1	

Date: 5 JULY 2012 Time: 7:20 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.8	6.5	50.19	8.2	
	High Salinity	18.2	6.3	63.07	8.1	

Date: 5 JULY 2012 Time: 3:35 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.4	6.4	49.66	8.1	
	High Salinity	18.0	6.2	62.96	8.1	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 06 July 2012 Time: 7:45 am Tech: Edlyn Palafox	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.2	6.6	50.31	8.1	
	High Salinity	17.8	6.5	62.73	8.1	

Date: 06 July 2012 Time: 3:30 pm Tech: Edlyn Palafox	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.8	6.7	50.70	8.1	
	High Salinity	15.6	6.7	63.80	8.1	

Date: 07 July 2012 Time: 10:05 Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.9	6.3	50.27	8.2	
	High Salinity	18.4	6.2	63.15	8.1	

Date: 07 July 2012 Time: 4:34 Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.6	6.5	50.39	8.0	
	High Salinity	17.0	6.4	63.42	8.0	

Date: 08 July 2012 Time: 9:15 Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.1	6.4	50.27	8.1	
	High Salinity	17.7	6.3	63.38	8.1	

Date: 08 July 2012 Time: 4:15 Tech: David R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.3	6.4	49.82	8.2	
	High Salinity	15.1	6.6	64.40	8.1	

Date: 9 July 2012 Time: 7:17 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.7	6.4	50.17	8.2	
	High Salinity	18.2	6.4	63.26	8.2	

Date: 9 July 2012 Time: 3:20 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	6.4	50.45	8.2	
	High Salinity	14.4	6.6	64.49	8.1	

WESTON SOLUTIONS

West Basin High Salinity Sensitivity Study

Long-Term Biometric Evaluation

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 10 July 2012 Time: 3:47 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.9	6.5	50.51	8.2	
	High Salinity	15.7	6.5	64.07	8.1	

Date: 11 July 2012 Time: 7:16 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.6	50.39	8.1	
	High Salinity	16.0	6.6	64.07	8.1	

Date: 12 July 2012 Time: 7:05 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.0	6.4	50.15	8.2	
	High Salinity	17.4	6.2	59.36	8.1	

Date: 13 July Time: 3:45 pm Tech: Edlyn	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.6	6.4	50.13	8.3	
	High Salinity	17.8	6.3	51.06	8.2	

Date: 14 July 2012 Time: 3:39 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.5	6.6	50.19	8.4	
	High Salinity	17.7	6.4	51.36	8.3	

Date: 15 July 2012 Time: 4:00pm Tech: DAVID R	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.4	6.6	50.11	8.4	
	High Salinity	18.6	6.4	51.11	8.3	

Date: 16 July 2012 Time: 3:45 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.1	6.4	50.04	8.4	
	High Salinity	18.3	6.2	51.04	8.4	

Date: 18 July 2012 Time: 7:40 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.3	6.5	50.29	8.3	
	High Salinity	16.5	6.3	51.38	8.3	

Project Phase:	Test Exposure
Start Date:	**Time:**
End Date:	**Time:**

Water Quality Data

Date: 19 July 2012 Time: 3:50 pm Tech: Edlyn Palafox	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	18.0	6.4	50.15	8.3	
	High Salinity	19.2	6.1	50.90	8.2	

Date: 20 July 2012 Time: 8:35 am Tech: Edlyn Palafox	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.6	6.3	50.02	8.3	
	High Salinity	17.6	6.0	51.11	8.2	

Date: 21 July 2012 Time: 4:21 pm Tech: ~~Ernesto~~	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.6	6.3	~~50.08~~	8.2	
	High Salinity	17.4	5.8	~~50.00~~	8.1	

Date: 22 July 2012 Time: 5:00 pm Tech: Ernesto	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	17.8	6.3	50.79	8.2	
	High Salinity	18.0	5.8	~~49.65~~	8.1	

Date: 23 July 2012 Time: 3:47 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	16.5	6.3	50.41	8.1	
	High Salinity	16.8	6.0	50.44	8.1	

Date: 24 July Time: 7:37 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.3	50.43	8.1	
	High Salinity	15.5	5.8	51.77	8.0	

Date: 25 JULY Time: 3:38 Tech: Edlyn	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	14.1	6.8	50.41	8.1	
	High Salinity	14.7	6.3	50.23	8.1	

Date: 26 July 2012 Time: 7:39 Tech: Langston	Concentration	Temp (°C)	DO (mg/L)	Salinity (ppt)	pH	Ammonia (mg NH_3/L)
	Control	15.2	6.9	50.37	8.1	
	High Salinity	15.3	~~50.04~~	50.09	8.1	

Behavioral Observations

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 24 MAY 12 Time: 750 Tech Chris B	Date 24 Time: 758 Tech Chris B All fish ate	Date 25 MAY Time: 828 Tech Chris B	Date 26 May 2012 Time: 12:33 Tech David
Control	2 dead urchins, the rest look healthy, ~~Abalone~~ Abs, healthy in bottom left corner, mussels look healthy, WSB, Perch swiming on right side, Rockfish short spine spread out among tank. Dabs hiding in sand.	Urchins look healthy. Abs look healthy mussels look healthy. All fish ate, Rock fish still hungry dabs look normal in sand	All fish acting as usual, swim in same spots. All breathing healthy. 1 dead urchin; the rest are healthy. Abs look good. in corner still	All fish swimming normal. Most fish on left side of tank. Sea urchins look healthy, most on left side of tank. Musles are slightly open. dabs hiding in sand. Rock crab on the bottom by the air sack. Abalone look normal!
High Salinity	One urchin looks unhealthy, the rest look fine. mussels look healthy, Abs look healthy in ~~left~~ corners. All fish swiming against current, all fish look/behaving norm.	Urchins look good, One looks sick. most abs are near surface. Perch, schooling around tank, WSB bottom right Rockfish look hungry, dabs still near sand	All fish acting as usual. Swim in same spots and breathing normal. All urchins near mussle bag Abs in same spot, Need food	All fish swimming normal (1) urchin inside of mussle bag. All other urchins look good. white sea bass swimming in place at bottom of tank. Abalone look normal - Rock crab looks normal. (1) dab on top of rocks. (1) urchin looks sick, missing spikes
	Date 26 May 2012 Time: 4:41 Tech Daniel R	Date 27 May 2012 Time: 9:1 am Tech Daniel	Date 27 May 2012 Time: 4:31 Tech David	Date MAY 28 2012 Time: 815 Tech Chris B Holiday NO PM
Control	fish look normal. urchins left side look healthy. Abalone look healthy. fish on right bottom of tank. Crab bottom of tank. muscles slightly open	All fish look normal. Swimming bottom of tank. Urchins look normal, on left side of tank. (2) urchins in pot. dabs on sand, normal. muscles slightly open. Green abalone look normal. crab looks normal!	All fish look normal, fish swimming on the Right bottom side of tank (1) sanddab swimming upwards on glass. most urchins on left side, they look good. (1) urchin in pot has droopy spines; Abalone look Healthy, crab is healthy.	All fish look good. still swiming in same spots. fish breathing normal ~~and~~ urchins look healthy, no droopy spines Abalone in same corner. Crab looks healthy there is [illegible], one sanddab swiming [illegible]
High Salinity	(1) urchin lost spines in Rock area. other urchins on Right side by muscles (1) urchin inside mussle bag. All fish swimming bottom of tank. abalone look healthy. crab bottom of tank muscles slightly open	(1) urchin loosing spines [illegible] look good by in Rocks. all other urchins on Right side of tank. white seabass swimming in place in bottom all fish look normal. (1) abalone in top left front corner of tank, its body is half way out of the water. all other abalone look good. Crab looks healthy muscle's slightly open.	(1) urchin in Rocks has ~~little~~ to no spines All other urchins on Right side of tank near the muscles. WSB swimming in place Bottom Right. (1) urchin inside of muscle netting. crab looks healthy.	All fish swiming Normal & breathing normal. One urchin has droopy spines, others are near mussle bag. Crab looks good. Abs look good
	Date 29 May 2012 Time: 9:00 Tech Langston	Date 29 May 2012 Time: 3:59 Tech Langston	Date 30 May 2012 Time: 7:45 Tech Langston	Date 30 MAY 2012 Time: 3:35 Tech Langston
Control	white seabass are looking good in lower right corner. Shiner Perch are looking good in lower right corner. Rock fish looks good in lower right corner. flag fish looks good. sand dabs looks good in sand on the left side of tank. Urchins all looks good. Clams look good, Abalones are doing good. kelp Perch doing well, Rock crab are doing good.	Rock fish, looks good in center of tank. flage Rock fish on left and right side of the tank. white seabass are looking good in lower right of the tank. shiner perch look good in bottom of tank on the center and right side. sand dabs are looking good on left side in sand. clams are doing well. Abalones are doing good, as well as the urchins. Crabs look good.	white seabass are looking good in right lowe corner of tank as well as shiner perch and flage Rock fish. Abalone looks good. Others are doing good. clams look good, Rockfish looks good in center bottom of tank, Crab looks good.	Flage rock fish in top left of tank looking good. white seabass, Shiner Perch all in right bottom of tank look good. Kelp perch all over tank doing well. Urchins look good. Abalone looks good, clams look good. Crab is doing good. Rock fish doing good doing good in center of tank.
High Salinity	white seabass, shiner perch, Rock fish and flage rock fish are all doing good, swiming on the lower left and right in the tank. Sand dabs are good. Clam are great, Abalones are doing Good Crab looks good	Shiner perch, falge Rock fish, Rock fish and white seabass are all over the tank swimming and looking good. Crab looks good. Abalones are looking and doing good. calm look good, urchins look great, sand dabes in right lower of tank doing good in the sand	Flage rock fish, shiner perch, white sea bass and Rock fish are all looking good swimming all over the tank, sand dabes look good Crab look good. clam looks good urchins are doing good.	Abalones, urchins, mussels and Crab are all doing good. Rock fish, kelp Perch, ~~crab~~ flage Rock fish, and shinner Perch all look good swiming all around in tank. white seabass are doing good in right lowe corner and the [illegible]

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 18 MAY 2012 Time: 1:00 AM Tech Chris B	Date 18 MAY 2012 Time: 345 Tech Chris B	Date 19 May 2012 Time: 9:50 am Tech David R ↗ (2) rock crabs look normal. (1) on right panel top	Date 19 May 2012 Time: 4:16 Pm Tech David Rodriguez
Control	mussles-all alive, urchins- most bottom left, under muscles Abs- most near surface WSB- some near surface others in mid split nose- swiming near botton Sand dabs hiding near sand Flag swimg ins corner	Abs-all Front glass by sand dabs- swimming near sand WSB- schooling bottom right splitnose- schooling bottom right region kelp- schooling back right corner	Muscles are slightly open. Urchins are on the bottom left back corner of tank. (1) Star on Rocks. (2) urchins inside pot. (2) urchins with fallen spikes. (1) sanddab on Rocks others hiding in sand. frogfish on left side of tank on the left panel in place. star with stomach out - does not look normal. Most fish swimming on right side of tank near the bottom in one spot.	urchins on left bottom end of tank. (1) urchin fliped over. (1) star on top of Rocks looks normal. (1) Star is melting. Sandabs hiding under sand. All fish swimming on Right side of the tank. mussels are slightly open. (2) crabs on side panel. Abalone look normal.
High Salinity	Splitnose swiming vertically (current) Abs. Top left corner Sanddabs swiming near sand Splitnose WSB Kelppearch tree fish	Splitnose - schooling mid left WSB schooling bottom right Rockfis resting in seperate areas, splitnose schooling in top left	abalone near SE mussles - look normal SEA Urchins are on left side of tank top & bottom. (1) Star on front glass with stomach out, look abnormal. white sea bass all swimming on Right bottom side of tank in one spot. tree fish near abalone, bottom left corner. muscles are slightly open dabs are hiding in sand. Other urchins in middle back, towards the top of the tank - (1) Rock crab near air souls.	most sea urchins on the left side of the tank, others toward the upper right side (1) urchin has droopy spines. all WSB swimming bottom Right of tank in one spot. (2) Stars are melting. Sandabs hiding under the sand. abalone look normal

	Date 20 May 2012 Time: 9:20 Tech David R	Date 20 May 2012 Time: 4:32 pm Tech Alissa N	Date 21 MAY 2012 Time: 745 AM Tech Chris B 2 WSB Jumped	Date 21 May 2012 Time: 3:41 pm Tech Longston
Control	(3) stars are melting. (1) Star on Rocks looks normal. All urchins towards the left side of the tank. Muscles are slightly open, All fish Swimming on the Right side of tank towards bottom. Sandabs are hiding in sand. Abalone look normal (1) Rock crab in the bottom of tank (1) Crab on Right Panel.	3 Bat stars are dying. (1) on rocks is healthy, Urchins are attached to mussels and inside pot. Most abalone are in south east corner. fish are against west side of the tank. Sandabs are more [illegible]	SEASTARS, All are dying 1 dead urchin the rest are near muscles. WSB, Perch, 3 rockfish, swiming up [illegible] side of tank. shortspined are near muscles, and sanddabs are in sand Abalone are in SE corner	Bat Star signs of stress, white seabass normal in right corner, shinerfish, fish right corner berthing normal. Saddabs left ~~corner~~ botton corner swiming and breathing normal. Flag rock fish swimming and breathing normal in the center. Abalone bottom left corner, normal clams normal
High Salinity	stars are melting. Most urchins are in the back right top corner of tank. other urchins are on the bottom back left corner of tank. (1) urchin has droopy spines, white Sea bass swimming in the bottom Right, together. All other fish are on the left bottom side of the tank. dabs are hiding in sand, muscles look normal. Crab on top Left Panel.	3 stars show signs of stress (1) star on north east corner looks healthy half of the fish are on the east side the other half on the west side Urchins are in the south west corner more the mussels, sandabs hiding in the sand abalone are spread out all over the tank	Stars, all, but one, are dying 1 WSB Jumped, survived, 2 Jumped, died 8 in tank. Rockfis Perch WSB, Swiming against current Abs in corners, Urchins spread out along wall	Bat Star stres all fishes are breathing and swimming normal. Abalone normal clam normal.

	Date 22 MAY Time: 755 Tech Chris B Besides the deaths every one looks healthy	Date 22 MAY Time: 3:45 Tech Chris B No more SEASTARS!	Date 23 MAY Time: 7:40 Tech Chris B	Date 23 May 2012 Time: 3:65 Tech Langston
Control	WSB & Perch schooling in bottom right bottom. Rockfish swiming together in top left Corner. Urchins near muscles Abs along back wall, star is near surface on grating.	WSB, Perch, schooling bottom right normal conditions. Rockfish, some schooled top [illegible] others spread out in substrate most urchin behind mussles [illegible] healthy. Abs bottom left.	1 urchin looks unhealthy, back right corner, others healthy, Abs in back left corner, WSB/perch on right side of tank, bigger rockfish on top right, smaller ones near chiller. Dabs near sand.	Shiner Perch looks good swimming ~~in the~~ on the botton right. Rock fish looks good swimming on the botton center. Sanddabs look good on left botton sand. Urchins look good. Mussele look good. Abalone look good, Sea bass looks good swimming on bottom right.
High Salinity	WSB schooling against current on bottom right, Perch swiming up & down the east side of tank. urchins behind muscles bag and back left corner. Abs spread out on back tank	All fish still swim hard against water flow current urchins, top left, bottom right of back wall, mussles look healthy. Abs, top left of tank	Urchins healthy on back wall Abs on the four left corners. WSB, perch, Rocfish, shortspined swiming against current. look healthy. dabs hiding in sand.	sea bass look good swimming on bottom right of the tank where water current is, shiner look good swiming on left and right side of tank. urchins look good, abalone look good. Mussels look good. Sand dabs look good in sand. Rock fish looks good.

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 31 MAY 2012 Time: 7:50 Tech Langston	Date 31 MAY 2012 Time: 3:40 Tech Langston	Date 31 MAY 2012 Time: Tech	Date 1 June 2012 Time: 7:52 Tech Chris B
Control	Urchins, Abalones, Mussele and Crab are all looking and doing good. Splitnose Rockfish are doing good in center of tank. Flag Rockfish are all over the tank looking good. Shinner Perch, white seabass and Kelp fish are looking good in bottom of tank	Splitnoses, white bass, shinners, flag Rockfish and Kelp fish are all looking good and doing good swimming. Urchins, Abalones, Mussele and Crab are all looking good in tank. Sand dabs are doing good in sand. All fish are all over the tank.	* 2:00PM PREP Female kelp fish [illegible] from [illegible]	Urchins look healthy. Mussels look healthy. abs look healthy. Mussles look healthy
High Salinity	Shinner perch, Rockfishes, white seabass and Kelp fish are all eating and looking good in the bottom of the tank. Crab is doing good. Urchins, Abalone, mussele are doing good. Sand dabs are doing good in sand.	Musseles, Abalone, Urchins and Crab are all eating and doing well. Splitnose, white bass, shinners, Flag Rockfish and Kelp fish is eating and doing good. Sand are look good. All fish are swimming everywhere in tank.		Sea urchins look healthy. [illegible] look healthy. Perch schooling [illegible]. dabs [illegible]. Mussles look healthy
	Date 1 June 2012 Time: [illegible] Tech Chris B	Date 2 June 2012 Time: 10:17 Tech David	Date 2 June 2012 Time: 4:41 Tech David	Date 3 June 2012 Time: 9:11 Tech David
Control	Urchins look healthy. [illegible] look healthy. [illegible] swimming [illegible]. Mussles look healthy	Sea urchins are eating kelp. WSB swimming in the right bottom corner together. Perch finally feed, they look hungry. Mussles slightly open. (two) out of bag. [illegible] are [illegible] left back corner.	Most urchins near kelp, feeding. All fish on right side of the tank. Abalone look well. Mussles are slightly open. Sand dabs on sand. Crab looks well.	All fish look well. All urchins look well. abalones look well. Mussles came slightly open. Rock crab looks well. WSB swimming in one place [illegible] right of tank
High Salinity	Mussles look healthy. Urchins look healthy. dabs [illegible], sand [illegible]. Perch [illegible] of tank. Schooling [illegible] look healthy	Urchins on the right panel look well. WSB bottom right of tank schooling. Abalone look well. dabs on sand and are still. Rock crabs is well. abalone eating kelp.	Most urchins on right side of tank. WSB schooling on right bottom side. Abalone near kelp they look well. dabs on top of sand. Mussles slightly open. Crab looks well.	Most urchins on the right panel. Urchins look well. fish swimming towards bottom. fish look well. abs on back panel, abs look well, muscles slightly open. Crab looks well
	Date 3 June 2012 Time: 4:30pm Tech Edwin Palafox	Date 04 June 2012 Time: 7:58 Tech Langston	Date 04 June 2012 Time: 3:37 Tech Langston	Date Time: Tech
Control	Urchins are at the back they look pretty healthy. Sanddabs are on the sand. perch/rock fish are huddled (schooling) at the right. The abalone look in good condition. All are swimming. Crab looks big and healthy.	Shinner perch, Rockfishes, white seabass and kelp fish are all swimming and looking good in the bottom of the tank. Crab is doing good. Mussele, Abalone, Urchins are doing good. Sand dabs are doing good in sand.	Splitnoses, white bass, Shinners, flag rockfish and Kelp fish are all looking and doing good, also eat well. Urchins, Abalones, mussele and Crab are all looking good in tank. Sand dabs are looking good in sand. Batstars are doing good. Fishes are swimming all over tank	
High Salinity	Crab looks healthy. Abalones in the back look healthy, growing algae on shell. 2 groups of fish at on side of tank (rock fish, shinner, white sea bass). Urchins on the back look good. One mussel looks open.	Urchins, Abalone, Rock Crab and musseles are all doing good. Splitnose, white seabass, shinner perch, flage rockfish, Rockfish and kelp fish are doing good all over tank	Shinner perch, Rockfishes, White seabass and Kelp fish are all doing doing good swimming in the bottom of the tank. Crab, Batstar, Urchins, Abalones, mussele and sand dabs are doing good. All fish eat good and looks good.	

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Behavioral Observations

	Date 5 Jun 2012 Time: 8:05 Tech Chris B	Date 5 Jun 2012 Time: 341 Tech Chris B	Date 6 June 2012 Time: 7:40 Tech Langston	Date 6 June 2012 Time: Tech Chris B
Control	All fish look normal and [illegible] swiming like normal [illegible]. Perch are [illegible] [illegible], all urchins look healthy [illegible] [illegible] Abs/stars look [illegible]	All fish look normal, swimming as usual	Seabass in left bottom of tank looking good. Rock fish, flag rockfish shinner perch and kelp fish are all over the bottom of the tank. looking and doing good. Abalones, urchins, Batstars and crab is doing good. sand dabs are looking good, mussles are looking good	.All fish swiming and acting normal SEA Stars look healthy staying near surface, urchins look healthy as well. Abs still in same corner. WSB chasing flags [illegible]
High Salinity	One CWSB has a little bump coming out of his stomach other than that, all fish look good. Swiming [illegible] urchins, stars, Abs and mussles look healthy as well		Seabass looking good in lower right of tank as well as shinners and kelpfish. All Rockfishes are looking good swimming at the top of tank. Abalone, Batstar mussles, urchins and crab looks good	All fish swiming as usual, rockfish in corners, SEAstars look healthy urchins are healthy

	Date 7 Jun 2012 Time: 700 Tech Chris B	Date 7 June 12 Time: 350 Tech Chris B	Date 08 June 2012 Time: 4:07 pm Tech Edlyn P.	Date 09 June 2012 Time: 10:25 am Tech Edlyn P
Control	All fish swiming normal, the 3 spined jumped to other side, urchins look healthy, not eating fish Abs/should eat more stars, healthy	fish swiming as usual, kelp perch have a little dis coleration urchins look healthy stars look healthy, Abs need food, mussles fed, ate a little	fish look good All swimming perfectly fine (schooling). Purple Sea urchins on back look good. Kelp perch & rockfish look good. Abs look good. the crab looks good.	Crab looks healthy. Sea urchins look healthy. All the fish look good. kelp perch look a bit lighter but they are okay. All fish are schooling in 2 groups. two diff corners. Sea Stars look perfectly fine. Abalone look good and healthy.
High Salinity	The fish look all the same swiming, breathing and acting normal, urchins look healthy Abs need to be fed crab looks good, mussles look good.	fish swiming the same WSB [illegible]	Stars look good in in back other on front. All fish swimming perfectly fine. Abalones look good. Sea Urchins look good, Crab looks good too. Nothing unusual. few clams are open	Crab looks bigger than before, good. Sea stars are posted on the back and front look good. White Sea Bass, kelp perch & flag rock fish all schooling to the left of tank. all fish ok. Sea urchins look good. Mussels look good. close exam abs shell looks smaller than the foot. good

	Date 10 June 2012 Time: Tech [illegible]	Date 11 June 2012 Time: 7:43 Tech Langston	Date 11 June 2012 Time: 3:50 Tech Langston	Date 12 June 2012 Time: 7:50 Tech Langston
Control	All the fish seem to be breathing normal. Urchins, snails, seem to be down [illegible]	Rock fish, flag Rock fish, seabass, shinner perch and kelp fish are all doing good swimming in the bottom half of the tank. Abalones, Urchins musscles, bat Stars and Crab are looking and doing good.	Rockfish, flag Rock fish, seabass, shinners and Kelp fish is all looking and doing good in the bottom of tank. Abalones, Urchins, musscles, bat stars and crab is doing Great.	white seabass, flag Rock fis Shinner, spltte nose and kelp perch are all doing good in the lower right of tank. Urchins Abalone, mussle and crab all looks good.
High Salinity	Abalone is active. Fish are active. Sea star might have [illegible] [illegible] seem to be [illegible].	white seabass, Shinner, Rock fishes and kelp fish all looks good swimming, most fish is at the bottom and half are at the center right of the tank. Mussles, batstars crab, Abalones and urchin are looking good	Rock fish, flag fish, white bass and kelp fish are all doing good swimming all over and around the tank. BatStars, musscles, Crab, Abalones and urchins look good in tank	Rock fish, white bass, shinners, kelp fish and flage rock fiss are all doing good on the left side of the tank. Batstars, urchins, abalone, mussels and crab all looks good too.

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Behavioral Observations

	Date 12 June 2012 Time: 3:39 Tech Langston	Date 13 June 2012 Time: 7:48 Tech Langston	Date 13 June 2012 Time: 3:48 Tech Langston	Date 14 June 2012 Time: 7:41 Tech Langston
Control	Flag Rock fish, Shinner perch, SP Rockfish, Kelp fish and white seabass are doing good in lower & center of tank. All fish eat. Mussels, Bat stars, Urchins, Abalone and Crab looks good on all eat.	Shinner, flag Rockfish, SP Rockfish, Kelp fish and white seabass looks good swimming in the lower level of tank. mussels Batstars, Urchins, Abalones and the crab looks good all over tank looking healthy	Kelp fish, SP Rockfish, Shinner, flag Rockfish and white seabass are all doing good all over the tank. Batstar, urchins, Abalone and Rock Crab is doing great in tank	New Batstar added and it is doin good with the others. Mussels, urchins, Abalone and crab is looking and doing good. Shinner, Kelp fish, SP Rockfish, flag rock fish and white seabass are all over the bottom of the tank doing and looking good.
High Salinity	Flag Rock fish, Shinner perch, SP Rock fish, Kelp fish and white seabass are looking and doing ~~well~~ good all eat good. fish are in the bottom and center on the left side of the tank. Mussels, Batstars, urchins, Abalones and crab look good. They eat good	white seabass, shinners, flag rockfish, SP Rockfish, Kelp fish are all looking and doing good on the left side of the tank: bottom and center. mussels, Batstars, Urchins, Abalones and the crab looks good and healthy.	Shinner, SP Rockfish, Kelp fish, white seabass and flag Rockfish is looking and doing good in tank on the left and right side of tank swimming at the bottom and center. mussles, batstars, Urchins, Abalones and the crab look great.	Batstar, Urchins, Abalones and Rock Crab looks good and maybe good in tank. white seabass, Kelpfish and Shinner are on the left and right side of tank doing good, SP Rockfish and flag Rockfish are doing good on the left side of tank.

	Date 14 June 2012 Time: 3:19 Tech Langston	Date 15 Jun 2012 Time: 8:22 Tech Chris B	Date 16 June 2012 Time: 740 Tech David R	Date 17 June 2012 Time: 11:15 Tech Edwin
Control	Flag Rockfish and white seabass are all at the bottom of tank left on the left side and the others on the right side. All are doing good. SP Rockfish, kelpfish and Shinner are all at the bottom of tank looking good. Abalons, mussels, Urchins Batstars and Crab looks great. All fish eat good.	Rockfish swiming along walls, normal and healthy. WSB and Perch swiming around sand. both look healthy and normal. Urchins hanging on wall most near surface, four near sand. Abs look healthy, stars near surface	All fish look normal. Most urchins are on the left side of tank (4) urchins on the right side. (2) urchins in pot. Sea stars look normal. Abalone loosing shell coloration. mussles are slightly open. Crab looks normal.	All the fish are swimming. They all look good. Sea Stars on the back look okay. Abalone look good too. Sea urchins look healthy. nothing out of the ordinary. Crab looks pretty big. Mussels are closed.
High Salinity	Kelp fish, Shinners, Flag Rockfish, SP Rockfish and white seabass are all at bottom of tank on the left and right side looking good. Abalons, mussels, Urchins and Batstar looks good. All fish eat good	All fish swiming near sand, a little different but not a concern, all fish still breathing and swimming normal. all Urchins, abs and stars look healthy	All fish look normal swimming on left side of tank, Most urchins are on the right side of the tank, normal. Sea stars look normal, (1) star on top of rocks. Abalone losing shell coloration. muscles are slightly open. Crab normal	Sea stars look okay. a bit discolored but might be just ~~like~~ that. Urchins on right look good. Abalone looks good too. All fish look healthy swimming on the left side of the tank. Some mussels opened. crab is healthy.

	Date 18 June 2012 Time: 7:45 Tech Langston	Date 18 June 2012 Time: 3:34 Tech Langston	Date 19 Jun 2012 Time: 7:41 Tech Chris B	Date 19 Jun 2012 Time: 3:48 Tech Chris B 14 Urchins out taken out both tanks
Control	SP Rockfish, flag Rockfish, Shinner and white seabass are all doing good in the bottom center of tank. Kelpfish are looking good in center of tank. Abalones, mussels, Urchins, Batstars and Crab look good.	Flag Rockfish, shinner, SP Rockfish, Kelpfish and white seabass are looking and doing good, also eat good. All fish are all over tank swimming. Batstars, Abalones mussels, Urchins and Crab looks good.	fish look good, healthy, no skinny fish. WSB swimming in school, Perch and rockfis are spread out among tank stars, urchins and Abs look healthy	All fish look healthy, breathing normal, swimming around tank, urchins look good. Abs look health and stars look healthy
High Salinity	white seabass, shinners and flag Rockfish are doing and looking good on the left side of tank in center. Kelpfish SP Rockfish ~~and~~ looking good on the bottom and right side of tank. ~~Batstar~~ Abalones, mussels, urchins and crab are doing good.	Shinners, Flag Rockfish, SP Rockfish, Kelp fish and white seabass looks ~~and~~ good swimming all around tank. They all eat good as well. Batstars, Abalones, mussels, Urchins and Crab are looking and doing good.	All fish look healthy no skinny fish, A few do look hungry though. A couple WSB swimming near surface, nothing to worry about. other fish swimming around. Inverts look healthy as well	All fish swiming at usual same activity as before, breathing looks healthy. Urchins, Abs, Stars, and crab look healthy mainly near surface

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 20 Jun 2012 Time: 8:26 Tech Chris B	Date 20 Jun 2012 Time: 3:38 Tech Chris B Fed Today	Date 21 June 2012 Time: 7:45 Tech Chris B	Date 21 June 2012 Time: 345 Tech Chris B
Control	Fish look healthy, breathing [illegible] no discoloration, swimming [illegible] tank. urchins, stars [illegible] and crab look healthy [illegible] day today	Fish acting the same as morning. All fish ate. All fish are breathing normally. Abalone fed today as well all are still eating. urchins eating some kelp. Stars ate, look healthy	Fish look normal/healthy. All fish swiming and breathing normal. Abalone still munching on kelp. stars look healthy urchins look healthy crab looks healthy	Fish look healthy swimming as usual no marks. Abs, Stars, urchins, and crabs all look healthy
High Salinity	[illegible] ole healthy, not swimming hard or anything. [illegible] looks healthy. [illegible] stars and crab [illegible] healthy	All fish are acting the same same breathing patterns all look healthy, and all ate correctly. Abs still eating urchins eating also stars ate all look healthy	All fish look good, swimming and breathing normally Abalone still munching away urchins stars & crab look healthy as well	All fish look healthy swimming normal and breathing norm stars, urchins and abs in same spots looking healthy 1 crab looks unhealthy

	Date 22 June 2012 Time: 725 Tech Chris B	Date 22 June Time: 345 Tech Chris	Date 23 June 2012 Time: 355 Tech David	Date 24 June 2012 Time: 925 Tech David R
Control	All fish look fine, swimming. Breathing and acting normal		All fish look normal. Sea stars look healthy, urchins look healthy. Abalone eating kelp. mussels slightly open. (1) star on sand, (1) star on Rocks. Crab looks good	All fish look healthy. Sea stars look healthy. urchins look healthy. Abalone look healthy mussels slightly open. Crab looks healthy
High Salinity	One dead crab		Urchins look healthy. (3) stars on sand, (1) star on rocks, abalone look good. Crab looks good All fish swimming normal	All fish look healthy. (2) stars on sand look healthy. (1) star on rocks looks healthy. urchins look healthy. abalones look healthy. mussels slightly open. Crab looks healthy

	Date 24 June 2012 Time: 4:15 pm Tech David R	Date 25 June 2012 Time: 7:37 Tech Langston	Date 25 June 2012 Time: 3:59 Tech Langston	Date 26 June 2012 Time: 7:41 Tech Langston
Control	All fish look normal. (1) Batstar on mussels, bottom of bag. (1) star on top of rocks, (1) star on sand urchins look healthy abalone look healthy, crab look healthy.	Rock fish, SP Rockfish, shinner, Kelp fish and white seabass are swimming all around tank looking and doing good. Batstar, Abalones, musscles, Urchins and Crab looks good.	Shinner, Rockfish, Kelp fish and white seabass are looking good swimming all around tank. Abalones, musscles, Urchins and crab looks good.	Kelpfish, Rockfish, SP Rock fish, Shinner and white seabass, are all looking good swimming all around tank. Abalones, musscles, Urchins, batStars and crab looks good.
High Salinity	All fish swimming normal. fish look healthy. (2) stars on rocks. (1) star on pot (1) star on sand. Stars look healthy urchins look healthy. Abalone look healthy. crab looks healthy. muscles slightly open.	Shinners, SP Rockfish, Kelp fish Flag Rockfish and white seabass are looking good swimming in the bottom of tank. Abalons, musscles, urchins. BatStars and Crab looks good.	white seabass, Rockfish, SP Rockfish, Kelp fish and shinner looks good swimming all around in the bottom of tank. Abalons, musselos, Urchins BatStars and Crab looks good	SP Rockfish, Flag Rockfish, Kelp fish white seabass and shinners all are looking good swimming below water level. Mussels, Urchins batstar Abalons are good.

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 26 June 2012 Time: 3:55 Tech Langston	Date 27 June 2012 Time: 7:39 Tech Langston	Date 27 June 2012 Time: 3:25 Tech Langston	Date 28 June 2012 Time: 7:38 Tech Langston
Control	White seabass, shinner, kelp fish, SP Rock fish, Flag Rockfish are all looks good swimming around tank. Abalones, Urchins, mussles, bat stars and Crab looks good. All animal ate well.	Shinner, kelp fish, white seabass, flag rock fish and SP Rock fish all looking and doing good in the bottom and left side of tank. Abalones, Urchins, mussles, batstar and crab looks good in tank	Kelp fish, shinner, Flag Rockfish, SP Rockfish and white seabass are swimming all over tank looking and doing good. Urchins, mussles Abalone, batstar and crab looks good in tank	Flag Rockfish, SP Rockfish, shinners, Kelp fishe and white seabass are swiming all around tank looking and doing good. Abalones, Urchins, mussles, Batstar and Rock crab looks awsome.
High Salinity	White Seabass, Kelp fish, Shinner, Flag Rockfish and SP Rockfish all looks good in bottom of tank. Urchins, Abalones, mussles, batstar and Crab looks good. All animal ate good	Kelp fish, White seabass, shinner, Flag Rock fish and SP Rock fish are looking and doing good. Abalones, batstars, mussles, Urchins and crab look good in tank. All fish are swimming in the bottom ~~of tank~~ and center of tank	white seabass, shinnes, kelp fish, flag rock fish and SP fish looks good ~~X~~ swimming in the center and bottom of tank. Abalones, Urchins, batstar, mussles and crab are doing good	SP Rock fish, Flag Rockfish, Kelp fish shinners, and white seabass are doing good on the bottom and left side of tank. Abalones, Urchins, batstar mussles and Rock crab looks great.
	Date 28 June 2012 Time: 3:55 Tech Langston	Date 29 June 2012 Time: 830 Tech Chris B	Date 29 June Time: ~~Chris~~ 340 Tech Chris	Date 30 June Time: 9:46 am Tech Ernesto
Control	Shinners, white seabass, Flag Rockfish, SP Rockfish and kelp fish all looks good on the bottom and center on the right side of the tank. Abalones, mussles, Urchins, batstar and crab looks good	All fish look healthy, ~~swim~~ swimming normally and breathing normally, inverts look healthy too. Abs munching on kelp. Sea stars have stomachs out. Everything good.	fish look good, swiming around the same and breathing the same inverts look the same	all fish swimming near bottom, Tree fish at top with 2 white sea bass. Sea stars spread out, Abalone are together along the back left corner. Urchins are spread out (back) Crab doing good. mussels open
High Salinity	Kelpfish, SP Rockfish, flag Rockfish white seabass and shinners all looks good, swimming on the bottom and center of tank. Abalones, mussles, Batstars, and Rock crab looks good.	Fish look healthy. All fish are swiming like normal and breathing like normal Inverts healthy as well Abs and urchins eating kelp	" "	all fish seem to ~~have~~ have same behavior as control, swimming around tank. Sea stars are spread out most are at the bottom. Sea urchins look a bit stressed, spines are not straight and up like the ones in control. Some have their spines pointing down. abalone are spread out along bottom. Crab is ok.
	Date 30 June 2012 Time: 11:35 Am Tech Evelyn	Date 30 June 2012 Time: 4:25 pm Tech Ernesto	Date 01 July 2012 Time: 9 25 Tech Edlyn Palafox	Date 01 July 2012 Time: 4:45 Tech Edlyn Palafox
Control	organisms Look healthy, the are swimming actively, a bit dispersed From top to bottom (good!)	All animas seem to be the same since this morning (see observations @ 9:46 30 June) Sea stars and sea urchins spread out. Fish swimming normal.	WSB are looking good and healthy swimming mostly in the middle. Sea stars look pretty good. Urchins are covered w/ giant kelp. the are in Two. Rock looks good. rock (flag) fish look good. Shinnors are schooling as well. Crab looks healthy Abalone looks healthy.	All fish look good and healthy swimming in a school of fish. Stars look healthy. So does Abalone. Sea urchins look good.
High Salinity	all Sea stars are at the bottom instead of on the glass. Fish are swimming below not as [illegible] but they are normal	all sea urchins are at the bottom, with spines pointing downward. one tree fish is resting on sand. breathing slowly. Abalone and all other animals show normal behavior.	Abalones look good. Urchins are to the right and a few are on the bottom. All fish are in good condition swimming perfectly fine. Sea stars look good a bit thin but okay. Mussels are open Crab looks healthy.	Crab looks good. Sea Stars, Abalone and urchins look good and healthy. All fish are healthy swimming together.

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 2 July 2012 Time: 7:22 Tech Langston	Date 2 July 2012 Time: 3:40 Tech Langston	Date 3 July 2012 Time: 7:20 Tech Langston	Date 3 July 2012 Time: 3:10 Tech Langston
Control	Flag Rockfish, SP Rockfish, White seabass, Kelpfish and shinner fish looks good on the left and bottom side of tank Batstars, Abalones, mussels, urchins and crab looks good in tank.	Kelp fish, Flag Rockfish, SP Rockfish, white seabass and shinners are looking and doing good swimming all over tank. Batstars, Abalones, mussels, Urchins and Crab looks good in tank.	SP Rockfish, Flag Rockfish, Kelp fish, shinners and white seabass all looks good at the bottom left side of tank. Batstars, Abones, Urchins, mussels and Rock crab looks good.	Shinners, Kelp fishes, Flag Rockfishes, white seabass and SP Rockfish are all over tank swimming around, mostly on bottom and all are good. Batstar, abalones Urchins, mussels and Rock crab looks good in tank.
High Salinity	White Seabass, Flag Rockfish, SP Rockfish Kelp fish, shinners all looks good on the left and right side of tank. Batstars, mussels, Urchins, Abalones and crab look great in tank	Shinners, SP Rockfish, Flag Rockfish, white seabass and Kelp fish looks good at bottom of tank. Batstar Abalones, mussels. Urchins and crab are doing real good.	White seabass, Kelp fish, Flag Rockfish, SP Rockfish, ~~White~~ Shiners ~~seabass~~ all looks good on the center and bottom of tank Batstars, Urchins, mussels, Abalones and Rock Crab looks good.	Shinners, Flag Rockfishes, SP Rockfishes, Kelp fish and white seabass are on the bottom of tank swimming around looking and doing good. Urchins, Batstars, mussels, Abalones and Rock crab looks good in tank.
	Date 4 July 2012 Time: Tech	Date 5 July 2012 Time: 7:22 Tech Langston	Date 5 July 2012 Time: 3:33 Tech Langston	Date 6 July 2012 Time: 7:35 Tech Edlyn Peterson
Control	Shiners kelp fish [illegible] am eating kelp	Kelp fish, Flag Rockfishes, SP Rockfish, Shinners and white seabass are all doing good swimming all over tank happy. Abalones, batstars, Urchins, mussels and Rockcrab looks Awsome.	Shiners, Kelpfishes, SP Rockfish, Flag Rockfishes and white seabass all are at the bottom of tank swimming, they all eat good. Urchins Abalones, mussels, batstars and Rock eat good and they all look awsome.	Shinners, WSB, flag rock fish, SP rock fish are all dispersed swimming everywhere sea stars look healthy, 2 sea stars have stomach out. The Abalone seem healthy. Crab is healthy. Mussels are open (few). No urchins seen, might be behind kelp hiding.
High Salinity	All fish look good and swimming and all inverts look healthy and eating kelp	Flag Rockfish, SP Rockfish, Kelp fish, white seabass and Shinners are swimming all over tank looking and doing good. Urchins, mussels, Abalones, batstar and Rock crab looks great!	White seabass, Flag Rockfishes, SP Rockfishes, Kelp fish and shinners are all at the bottom of tank swimming around. They all ate good. Urchins, batstar, Abalones mussels and Rock crab ate good and they look good	Sea stars look healthy. WSBass looks healthy swimming on one side of the tank along with shinners. WSBass seem to be paying attention to the other fish in the other tank. Abalone and urchins look good. Few spikes down of Urchin. The crab looks healthy.
	Date 06 July 2012 Time: 3:45 Tech Edlyn Peterson	Date 07 July 2012 Time: Tech [illegible]	Date 07 July 2012 Time: 4.35 Tech David R	Date 08 July 2012 Time: 9.16 Tech David R
Control	Shiners, kelp fish, Flag rock fish and white sea bass look healthy and swimming around. The Sea Stars look healthy. The Bat Stars are all on the wall. Urchins and Abalone look good along with mussels and crab	All fish swimming normal, stars look healthy. Urchins look healthy. Shrimp is by the mussels. mussels are slightly open. Abalones look healthy. Crab looks healthy	All fish look healthy & normal. Stars look healthy. Urchins look healthy. Abalones look healthy. mussels are slightly open. Crab looks healthy	All fish swimming normal & look healthy. Urchins look healthy. Stars look healthy. Abalones look healthy. Mussels slightly open. Crab look healthy.
High Salinity	Sea Stars look big and healthy. Mussels look open. Shiners, flag rock fish, kelp fish, look healthy. The urchins and Abalone are healthy too. Crab looks big and healthy.	Stars look healthy. (1) urchin with droopy spines. Fish look healthy and swimming normal. mussels are slightly open. Abalone looks healthy. Crab look healthy	All fish swimming normal, Stars look healthy. (1) urchin with droopy spines. Abalones look healthy. Crab looks healthy. Some empty mussels & slightly	All fish look healthy & swimming normal. (1) urchin has droopy spines other urchins look healthy. Stars look healthy. Abalones look healthy. Mussels slightly open. Crab looks healthy

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 07/19/2012 Time: 3:45 Tech Edwyn Palafox	Date 20 July 2012 Time: Tech	Date 07/21/2012 Time: 4:16 pm Tech Ernesto	Date 07/22/2012 Time: 5:09 Tech Ernesto
Control	All fish, WSB, Flag rock, Perch and swimming everywhere together All are perfectly healthy. The Sea Stars look big and healthy. Two on top of rocks. Abalone seem big and healthy. The urchin inside the pot seems to be doing okay. Crab looks healthy	All fish look big and healthy. They are roaming. All are scattered in the tank The sea stars seem to be doing okay The last urchin seems to be doing good as well. Its still in the pot. The abalone look healthy stuck to the back wall. Crab is big and healthy. Mussels are okay	Fish are scattered in the tank look healthy. Seastars doing good Scattered in tank Urchin in pot healthy looking Abalone spread in tank mussels and crab doing well.	Fish swiming scattered in tank. Stars on sand looking healthy Urchin in pot Abalone scattered. muscles look good. crab looks healthy.
High Salinity	All the fish are looking at the open tank. A couple are swimming below. Abalone seem to be doing good. Sea Stars look big and healthy laying on floor. No urchins in sight and crab looks big and healthy as well	The fishes are swimming on the bottom. They are growing too. Big and healthy fish. Both sea stars are doing good. No urchins. Mussels are doing fine. The crab is getting bigger too.	All animals look normal. No urchins, abalones on right side of tank stars spread in tank mussels look good, Crab is doing well too.	All fish scattered in tank Abalone on right side. muscles look ok. Stars scattered mostly on sand. Crab looks healthy
	Date 25 July 2012 Time: 3:50 Tech Langston	Date 24 July 2012 Time: 7:39 Tech Langston	Date 25 July 2012 Time: 3:30 Tech Edwyn	Date Time: Tech
Control	Flag Rock Fish, SP Rock Fish,	White Sea bass, SP Rock fish, Flag Rock fish, Kelp fish, Shinners all looks good in tank swimming around happy. Abalones, batstar, mussels and Rock Crab looks good and happy.	Fish are all swimming on the bottom WSB, Flag rock, Shinners are schooling They all look healthy. Sea stars on the bottom look big and healthy. The urchin in the pot is healthy. Therefore looks okay. Abalone are big and crab looks healthy.	white seabass, Shinners, SP Rock fish, Flag Rock fishes and Kelp fish. Also all at the bottom of tank. doing and looking good. Abalones, batstars mussels are doing and looking good
High Salinity		Shinners, White Seabass, SP Rock fish, Flag Rock fish Kelp fish looks great in tank. Abalones, batstars, mussels and crab looks real good.	Fishes are swimming on the left side of the tank and on the bottom, all look healthy. They swim perfectly. Sea Stars look healthy. Abalone stuck to the back does too. Crab looks big and healthy.	Flag rock fish, Shinners, Kelp fish, white seabass and SP Rock fish. Abalones, batstar and mussels are doing and looking good.
	Date 29 July 2012 Time: 4:35 Tech DAVID	Date 30 July 2012 Time: 8:50 Tech Langston	Date 31 July 2012 Time: 3:52 Tech Langston	Date 1 Aug 2012 Time: 8:16 Tech Langston
Control	Stars look healthy. fish look healthy. Abalone look healthy. Urchin inside not looks healthy.		Fish are all swimming together. Swimming White sea bass, SP Rock fish, Flag rock fish in tank look good. Abalones look big and healthy. Mussels look big. Sea stars look healthy. The only urchin looks big and healthy.	White seabass, Flag Rock fish, SP Rock fish, Kelp fish and Shinners all look good and happy. Batstar, Abalone and mussels look good.
High Salinity	Fish are active, swimming rapidly Fish look healthy. Stars look healthy Urchin looks healthy - Abalone look healthy		All sea stars look big and healthy. White Sea Bass is jumping. All fishes are swimming at the bottom and looking healthy. Mussels look open. The abalone looks good too.	SP Rock fish, Flag Rock fish White Seabass, Kelp fish and Shinners look good and happy. Batstar, Abalone and mussels look good

West Basin High Salinity Sensitivity Study

Behavioral Observations

	Date 08 July 2012 Time: 4:18 Tech David R	Date 9 July 2012 Time: 7:18 Tech Langston END OF STUDY	Date 9 July 2012 Time: 3:22 Tech Langston	Date 10 July 2012 Time: 3:49 Tech Langston
Control	All fish look normal abalone look healthy. Stars are healthy urchins are healthy. mussles slightly open crab looks healthy	Bat stars, mussles, abalones, urchins and Rock crab looks good. White Seabass, SP Rock fishes, Flag Rock fish Shinners and Kelp fishes are looking and doing good at the center and bottom of tank.	All fish are eating, doing and looking good swimming around. Abalones, batstars, mussles and Rock Crab ate good and they look good. No More Urchins!	White seabass, SP Rock fishes, Kelp fishes, Flag Rock fishes and shinners are swimming all over tank doing and looking good. Abalones, ~~urchins~~, batstars, mussels and Rock crab.
High Salinity	All fish look healthy (1) urchin has drooping spines! Stars look healthy abalone look healthy mussles slightly open. Crab looks healthy	Abalone, mussles, batstars, urchins and Rock crab looks good. Shinners, white seabass, SP Rock fishes, Kelp fish Flag Rock fishes are all looking and doing good on the left and right side of tank in the center.	All fish are eating and doing and looking good swimming around in tank. Abalones batstars, mussles and Rock crab ate good and looks good No more urchins!	Shinners, white seabass, SP Rockfish Flag Rock fish and kelp fishes are all swimming all around tank and looking good. Abalone, batstars, mussles, and Rock crab looks good.

	Date 11 July 2012 Time: 7:15 Tech Langston	Date 12 July 2012 Time: 7:07 Tech Langston	Date 13 July 2012 Time: 4:50 Tech Edlyn P.	Date 14 July 2012 Time: 7:42 Tech Langston
Control	Batstars, Abalones, mussles and Rock crab looks good. Shinners, SP Rock fishes, Flag Rock fishes, White seabass, and Kelp fishes are all at the bottom of tank looking good.	All fishes in tank looks good and happy. They all ate good yesterday. Fish are swimming all over tank. Batstars, mussles, abalones and Rock crab eat good and looks good	All fishes are swimming together. They are trying to go the other tank they keep swimming despite the wall. Sea Stars look good and healthy. Abalone are in great condition. Mussels are open. Fish ate today. Sea Urchins look healthy. Crab is big and healthy	SP Rock fishes, Flag Rock fishes, Shinners, white seabass, and Kelp fishes are all at the bottom of tank looking good. Abalones batstars, mussles and Rock crab looks good.
High Salinity	Flag Rock fishes, SP Rock fishes Kelp fishes, white seabass and shinners are all at the bottom and left side of tank. looking good. Abalones, batstars, mussles and Rock crab looks good.	All fishes are on left side of tank, they are happy and looking good! Fishes ate good yesterday. Batstars, Abalones, mussles and Rock Crab looks good and ate good	All the sea stars look in good condition fishes keep swimming where the other tank is. Abalone are big and healthy. Mussels are opened. No urchins are seeing. All fish ate Crab looks healthy and big.	White seabass, Flag Rock fishes, Shinners, ~~white~~ SP Rock fishes, and Kelp fishes are on the left side of tank looking good. Batstars, Abalones, mussles and Rock Crab looks good.

	Date 15 July 2012 Time: 4:02 pm Tech David R	Date 16 July 2012 Time: 3:47 Tech Langston	Date 17 July 2012 Time: 7:20 Tech Langston	Date 18 July 2012 Time: 7:45 Tech Langston
Control	Fish are active and look healthy. Urchin in pot look healthy. Sea Stars look healthy. abalones look healthy. crab looks healthy	White seabass, Kelp fishes, SP Rock fishes, Flag Rock fishes and shinners are swimming all over tank doing good and eating good. Abalones, batstars mussles and rock crab looks good and ate good.	Shinners, Flag Rock fishes, SP Rock fishes Kelp fishes and white seabass are all at bottom of tank resting, looking good. Batstars, Abalones, mussles and Rock crab looks good	Flag Rock fishes, SP Rock fishes, white seabass, Kelp fishes and shinners are on the left and right side of tank swimming looking good. Abalones, crab, mussle and batstars look awsome.
High Salinity	Fish are active look healthy. Stars look healthy. (1) urchin side panel look healthy. Abalone looks healthy. Crab looks healthy.	Flag Rock fishes, Kelp fishes, Shinners, SP Rock fishes and white seabass are all over tank doing good and eating good. Abalones, mussles batstars looks good. also crab	SP Rock fishes, Flag Rock fishes, Kelp-fishes, and shinners are looking good resting at the bottom of tank. Mussles, batstars, Abalones and crab looks good.	White seabass, shinners, Flag Rock fishes Kelp fishes and SP Rock fishes are mostly on the left side of tank and the rest is at the bottom looking good. Batstars, mussles Abalone and crab look good.

Mortality Data

West Basin High Salinity Sensitivity Study

Survival Data

Date	Time	Tech	Control or Exposure	Salinity	Species	No. Morts	Cause/notes
5/19/12	4:21	David R	Control	50.37	Purple SEA urchin	(2)	dropped spines
5/21/12	7:55	Chris B	High sal.	53.11	White SEA Bass	(1)	Jumped
5/21	7:55	Chris B	Control	50.45	Urchin	(1)	dropped spines
5/21	7:55	Chris B	Control	50.45	SEAStar	(1)	melting
5/21/12	336	Brian Langston	Control	50.45	SEA STAR	(2)	"
5/21/12	750	Chris B	Control	50.45	Urchin	(3)	"
" "	" "	" "	" "	" "	Crab	(1)	
" "	" "	" "	high salinity	52.92	Urchin	3	dropped spines / melting
							" " "
5-22-12	123	Chris B	high sal	53.01	Bat star	1	" " "
5-22-12	230	Chris B	high sal	53.01	Star	2	" "
5-22-12	230	Chris B	Control	50.45	Star	1	" "
5-24-12	7:35	Chris B	Control	50.45	Urchin	2	" "
5-25-12	826	Chris B	control	50.46	URCHIN	1	" "
" "	" "	" "	High sal.	53.11	Urchin	2	" "
5/29/12	9:17	Langston	High sal.	52.90	Urchin	1	" "
5/30/12	9:20	Langston	control	49.80	Urchin	1	" "
5/30/12	8:13	Langston	control	49.72	Crab	1	
6/10/12	1p	Evelyn	Control	50.08	Sea urchin	(1)	" "
6/10/12	1p	Evelyn	Salinity	57.23	Sea urchin	(1)	" "
7/25/12	11:46	Langston	Control	50.41	shinner	(1)	stuck in mussels net
8/14/2012	10:30	Edlyn	Control	50.21	shinner	(1)	found dead, unknown

Statistical Analyses and Laboratory Benchsheets

Test: EC-Echinoderm Survival and Development Test Test ID: C120521.01
Species: SP-Strongylocentrotus purpuratus Protocol: USEPA98-USACE / USEPA 1998
Sample ID: 33 ppt Batch (Ambient) Sample Type: EFF2-Industrial
Start Date: 6/19/2012 14:35 End Date: 6/19/2012 15 Lab ID: NAU-Nautilus Environmental

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	33	368	358	358	347	
	2	2	33	368	350	350	325	
	3	3	33	368	348	348	333	
	4	4	33	368	309	309	271	
	5	5	33	368	357	357	324	
	6	1	40	368	300	300	59	
	7	2	40	368	305	305	48	
	8	3	40	368	310	310	124	
	9	4	40	368	282	282	8	
	10	5	40	368	318	318	158	

Comments: West Basin Long-Term High Salinity Study

Echinoderm Survival and Development Test-Proportion Alive

Start Date:	6/19/2012 14:35	Test ID:	C120521.01	Sample ID:	33 ppt Batch (Ambient)
End Date:	6/19/2012 15:15	Lab ID:	NAU-Nautilus Environmental	Sample Type:	EFF2-Industrial
Sample Date:	6/19/2012 10:15	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

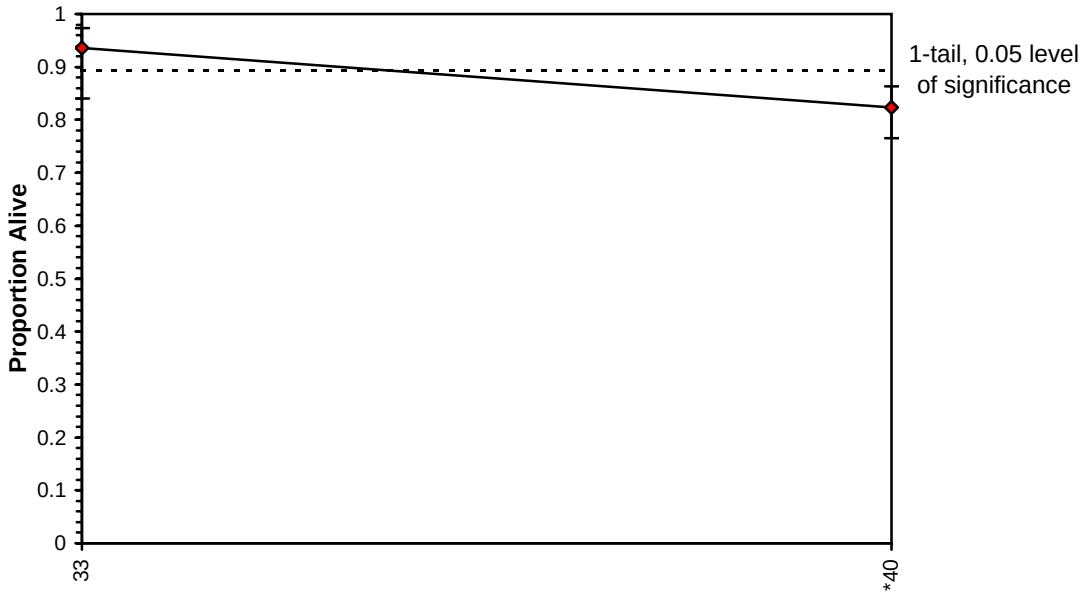
Conc-%	1	2	3	4	5
33	0.9728	0.9511	0.9457	0.8397	0.9701
40	0.8152	0.8288	0.8424	0.7663	0.8641

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.9359	1.0000	1.3289	1.1588	1.4052	7.505	5			
*40	0.8234	0.8798	1.1386	1.0662	1.1933	4.162	5	3.854	1.860	0.0918

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.85892	0.842	-1.5147	2.56137
F-Test indicates equal variances (p = 0.18)	4.43057	23.1539		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs 33	0.04992	0.05296	0.09056	0.0061	0.00485	1, 8

Dose-Response Plot



Echinoderm Survival and Development Test-Proportion Normal

Start Date:	6/19/2012 14:35	Test ID:	C120521.01	Sample ID:	33 ppt Batch (Ambient)
End Date:	6/19/2012 15:15	Lab ID:	NAU-Nautilus Environmental	Sample Type:	EFF2-Industrial
Sample Date:	6/19/2012 10:15	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

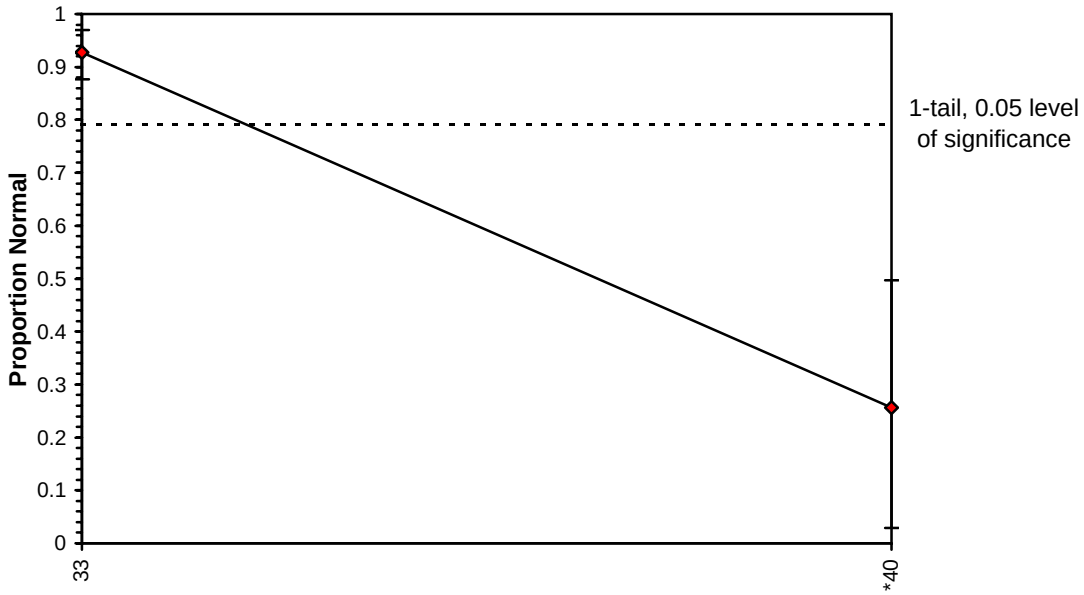
Conc-%	1	2	3	4	5
33	0.9693	0.9286	0.9569	0.8770	0.9076
40	0.1967	0.1574	0.4000	0.0284	0.4969

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.9279	1.0000	1.3062	1.2125	1.3946	5.635	5			
*40	0.2559	0.2757	0.5007	0.1692	0.7823	48.233	5	7.133	1.860	0.2100

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.96335	0.842	-0.2562	1.02584
F-Test indicates equal variances (p = 0.04)	10.7662	23.1539		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates significant differences Treatments vs 33	0.14042	0.15073	1.62189	0.03187	9.9E-05	1, 8

Dose-Response Plot



Test: EC-Echinoderm Survival and Development Test						Test ID: C120521.02		
Species: SP-Strongylocentrotus purpuratus						Protocol: USEPA98-USACE / USEPA 1998		
Sample ID: 40 ppt Batch (Exposure)						Sample Type: EFF2-Industrial		
Start Date: 6/19/2012 14:35				End Date: 6/19/2012 15		Lab ID: NAU-Nautilus Environmental		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	33	327	334	334	288	
	2	2	33	327	293	293	267	
	3	3	33	327	329	329	291	
	4	4	33	327	313	313	240	
	5	5	33	327	244	244	224	
	6	1	40	327	283	283	0	
	7	2	40	327	315	315	0	
	8	3	40	327	297	297	0	
	9	4	40	327	270	270	0	
	10	5	40	327	283	283	0	

Comments: West Basin Long-Term High Salinity Study

Echinoderm Survival and Development Test-Proportion Alive

Start Date:	6/19/2012 14:35	Test ID:	C120521.02	Sample ID:	40 ppt Batch (Exposure)
End Date:	6/19/2012 15:15	Lab ID:	NAU-Nautilus Environmental	Sample Type:	EFF2-Industrial
Sample Date:	6/19/2012 10:15	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

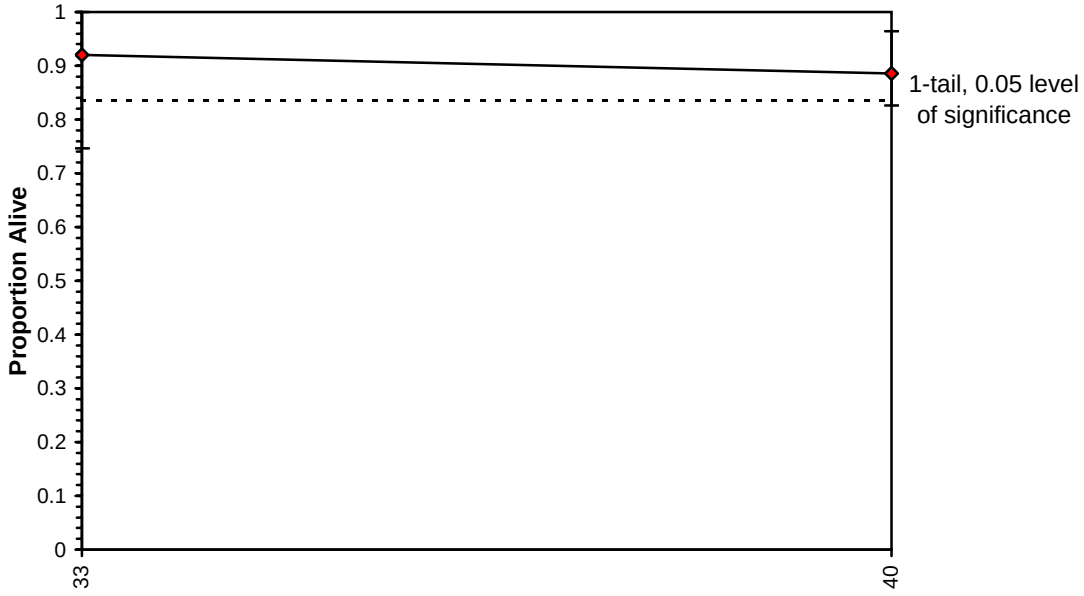
Conc-%	1	2	3	4	5
33	1.0000	0.8960	1.0000	0.9572	0.7462
40	0.8654	0.9633	0.9083	0.8257	0.8654

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.9199	1.0000	1.3468	1.0428	1.5431	15.779	5			
40	0.8856	0.9628	1.2343	1.1401	1.3780	7.405	5	1.087	1.860	0.1924

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93562	0.842	-0.4561	0.34506
F-Test indicates equal variances (p = 0.13)	5.40541	23.1539		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.11424	0.12017	0.03162	0.02676	0.30868	1, 8
Treatments vs 33						

Dose-Response Plot



Echinoderm Survival and Development Test-Proportion Normal

Start Date:	6/19/2012 14:35	Test ID:	C120521.02	Sample ID:	40 ppt Batch (Exposure)
End Date:	6/19/2012 15:15	Lab ID:	NAU-Nautilus Environmental	Sample Type:	EFF2-Industrial
Sample Date:	6/19/2012 10:15	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

Conc-%	1	2	3	4	5
33	0.8623	0.9113	0.8845	0.7668	0.9180
40	0.0000	0.0000	0.0000	0.0000	0.0000

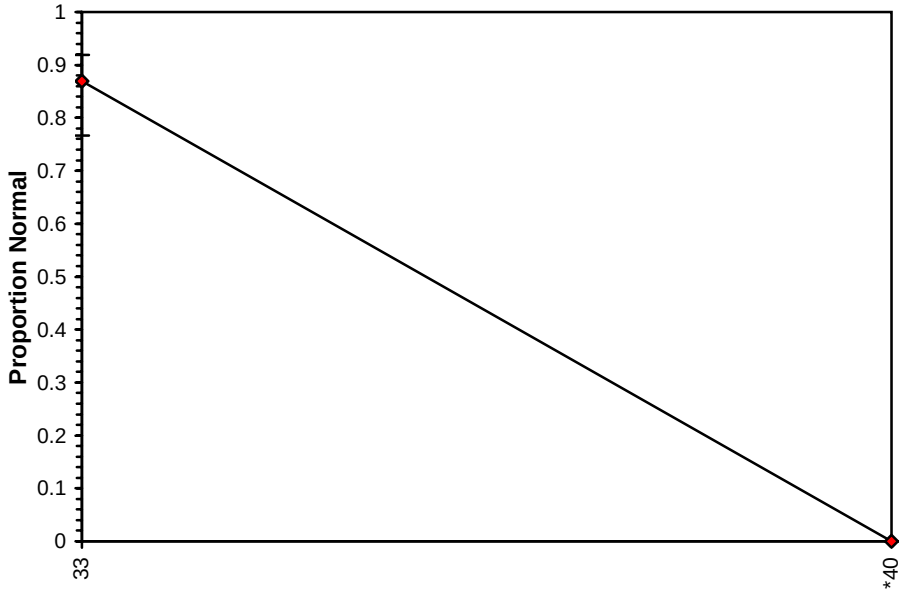
			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
33	0.8686	1.0000	1.2060	1.0668	1.2804	7.104	5		
*40	0.0000	0.0000	0.0277	0.0277	0.0277	0.000	5	15.00	19.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.78722	0.842	-1.5232	4.30704
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)

Wilcoxon Two-Sample Test indicates significant differences
Treatments vs 33

Dose-Response Plot



Marine Chronic Bioassay **Echinoderm Sperm-Cell Fertilization Worksheet**

Client: Weston Solutions
Sample ID: West Basin Ambient (Urchins)
Test No.: 1206-S139a

Start Date/Time: 6/19/2012 / ~~1435~~ 1435
End Date/Time: 6/19/2012 / ~~1515~~ 1515
Species: S. purpuratus
Animal Source: ~~Point Loma, CA SEA Lab~~ KEP
Date Collected: _____

Tech Initials: KF
Injection Time: 1420

Sperm Absorbance at 400 nm: 0.833 (target range of 0.8 - 1.0 for density of $4x10^6$ sperm/ml)

Eggs Counted: 175, 166, 167, 161, 186 Mean: 171 X 42 = 7182 eggs/ml

(target counts of 100 eggs per vertical pass on Sedgwick-Rafter slide for a final density of 4000 eggs/ml)

Initial density: 7182 eggs/ml = 1.80 dilution factor
Final density: 4000 eggs/ml - 1.0 part egg stock
0.80 parts seawater

egg stock 100 ml
seawater 80 ml

Prepare the embryo stock according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

	Sperm:Egg Ratio							
Rangefinder Test:	**2000:1**	**1600:1**	**1200:1**	**800:1**	**400:1**	**200:1**	**100:1**	**50:1**
ml Sperm Stock	50	40	30	20	10	5.0	2.5	1.25
ml Seawater	0.0	10	20	30	40	45	47.5	48.75

	Time	Rangefinder Ratio:	Fert.	Unfert.
Sperm Added (100 µl):	1350	50:1, 50:1	83, 84	17, 16
Eggs Added (0.5 ml):	1410	100:1, 100:1	92, 92	8, 8
Test Ended:	1420	200:1, 200:1	96, 94	4, 6
		400:1, 400:1	100, 98	0, 2

NOTE: Choose a sperm-to-egg ratio that results in fertilization between 80 and 90 percent. If more than one concentration is within this range, choose the ratio closest to 90 percent unless professional judgment dictates consideration of other factors (e.g., organism health, stage of reproductive season, site conditions).

Definitive Test

Sperm:Egg Ratio Used: 100:1

	Time		Fert.	Unfert.
Sperm Added (100 µl):	~~1435~~ 1435	QC1	91	9
Eggs Added (0.5 ml):	~~1455~~ 1455	QC2	82	18
Test Ended:	~~1515~~ 1515	Egg Control 1	0	100
		Egg Control 2	0	102

Comments: _____

QC Check: KF 7/12/12

Final Review: 7/13/12

Marine Chronic Bioassay | **Echinoderm Sperm-Cell Fertilization Worksheet**

Client: Weston Solutions
Sample ID: West Basin (Exposure Urchins)
Test No.: 1206-S1396
Tech initials: KF
Injection Time: 1455

Start Date/Time: 6/19/2012 KF ~~1035~~ 1605
End Date/Time: 6/19/2012 KF ~~1715~~ 1645
Species: S. purpuratus
Animal Source: ~~Point Loma, CA~~ SCA-Lab
Date Collected: _____

Sperm Absorbance at 400 nm: 0.987 (target range of 0.8 - 1.0 for density of $4x10^6$ sperm/ml)

Eggs Counted: 92, 87, 84, 93, 98
Mean: 90.8 X 42 = 3814 eggs/ml

(target counts of 100 eggs per vertical pass on Sedgwick-Rafter slide for a final density of 4000 eggs/ml)

Initial density: 3814 eggs/ml = 0.95 dilution factor
Final density: 4000 eggs/ml - 1.0 part egg stock
[/] parts seawater

egg stock 100 ml
seawater / ml

Prepare the embryo stock according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

	Sperm:Egg Ratio							
Rangefinder Test:	2000:1	1600:1	1200:1	800:1	400:1	200:1	100:1	50:1
ml Sperm Stock	50	40	30	20	10	5.0	2.5	1.25
ml Seawater	0.0	10	20	30	40	45	47.5	48.75

	Time	Rangefinder Ratio:	Fert.	Unfert.
Sperm Added (100 µl):	1527	50'1	74	36
Eggs Added (0.5 ml):	1537	100'1	88	12
Test Ended:	1547	100'1	92	8
		200'1	99	1

NOTE: Choose a sperm-to-egg ratio that results in fertilization between 80 and 90 percent. If more than one concentration is within this range, choose the ratio closest to 90 percent unless professional judgment dictates consideration of other factors (e.g., organism health, stage of reproductive season, site conditions).

Definitive Test

Sperm:Egg Ratio Used: 100'1

	Time		Fert.	Unfert.
Sperm Added (100 µl):	1605	QC1	88	12
Eggs Added (0.5 ml):	1625	QC2	85	15
Test Ended:	1645	Egg Control 1	0	100
		Egg Control 2	0	100

Comments: _____

QC Check: KF 7/12/12
Final Review: [illegible] 7/13/12

Marine Chronic Bioassay

Water Quality Measurements

Client : Weston Solutions

Test Species: *S. purpuratus*

Sample ID: West Basin (Ambient Urchins)

Start Date/Time: 6/19/2012 ~~1035~~ 1435

Sample Log No.: 12- 0488

End Date/Time: 6/19/2012 ~~1715~~ 1515

Dilutions made by: KS

Test No: 1206-S139a

Analyst: KS

	Initial Readings			
Concentration	**DO (mg/L)**	**pH (units)**	**Salinity/Cond. (ppt)/(µmhos/cm)**	**Temperature (°C)**
Ambient	8.7	7.91	34.3/52,000	15.4
Exposure (57,400 µmhos/cm)	7.9	7.90	38.7/57,400	15.5

Comments:

QC Check: KF 7/12/12

Final Review: KS 7/13/12

Marine Chronic Bioassay | **Water Quality Measurements**

Client : Weston Solutions | **Test Species:** *S. purpuratus*

Sample ID: West Basin (Exposure Urchins) | **Start Date/Time:** 6/19/2012 1605

Sample Log No.: 12-0488 | **End Date/Time:** 6/19/2012 1645

Dilutions made by: LA | **Test No:** 1206-S139b

Analyst: LA

	Initial Readings			
Concentration	**DO (mg/L)**	**pH (units)**	**Salinity/Cond. (ppt)/(µmhos/cm)**	**Temperature (°C)**
Ambient	8.7	7.91	34.3/52,000	15.4
Exposure (57,400 µmhos/cm)	7.9	7.90	36.7/57,400	15.5

Comments:

QC Check: VF 7/12/12 | **Final Review:** LS 7/13/12

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Fertilization
Test Run: 6/19/2012

Treatment	Random #	Number Counted	Number Fertilized
Ambient Urchin + Ambient Water	18	100	94
	3	100	81
	2	100	92
	6	100	85
	11	100	94
Ambient Urchin + Exposure Water	7	100	93
	20	100	90
	15	100	91
	19	100	89
	12	100	90
Exposure Urchin + Ambient Water	17	100	91
	8	100	89
	5	100	91
	13	100	95
	14	100	91
Exposure Urchin + Exposure Water	16	100	88
	9	100	97
	1	100	90
	10	100	94
	4	100	95

QC: VF 7/12/12
Final Review: VF 7/13/12

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Fertilization
Test Run: 6/19/2012

Random #	Number Counted	Number Fertilized
1	100	90
2	100	92
3	100	81
4	100	95
5	100	91
6	100	85
7	100	93
8	100	89
9	100	97
10	100	94
11	100	94
12	100	90
13	100	95
14	100	91
15	100	91
16	100	88
17	100	91
18	100	94
19	100	89
20	100	90

Read by: SL

QC: KF 7/12/12
Final review: KF 7/13/12

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Fertilization
Test Run: 6/19/2012

Treatment	Random #	Number Counted	Number Fertilized
Ambient Urchin + Ambient Water	18		
	3		
	2		
	6		
	11		
Ambient Urchin + Exposure Water	7		
	20		
	15		
	19		
	12		
Exposure Urchin + Ambient Water	17		
	8		
	5		
	13		
	14		
Exposure Urchin + Exposure Water	16		
	9		
	1		
	10		
	4		

QC: WE

QC: KF 7/12/12
Final Review: 6 7/13/12

Marine Chronic Bioassay **Echinoderm Larval Development Worksheet**

Client: Weston Solutions
Sample ID: West Basin (Exposure Urchins)
Test No.: 1206-S1392

Start Date/Time: 6/19/2012 / 1640
End Date/Time: 6/23/2012 / 1450
Species: S. purpuratus
Animal Source: SEA-Lab
Date Collected: _____

Tech initials: VF
Injection Time: 1455

Sperm Absorbance at 400 nm: 0.987 (target range of 0.8 - 1.0 for density of $4x10^6$ sperm/ml)

Eggs Counted: 24, 25, 24, 22, 27 Mean: 24.4 X 42 = 1025 eggs/ml

(target counts of 25 eggs per vertical pass on Sedgwick-Rafter slide for a final density of 1000 eggs/ml)

Initial density: 1025 eggs/ml = 1.03 dilution factor
Final density: 1000 eggs/ml - 1.0 part egg stock
[/] parts seawater

egg stock 200 ml
seawater / ml

Prepare the egg stock according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Volume of Sperm stock needed to fertilize eggs:

Volume of egg stock (ml) — * 1,000 eggs/ml * 500 sperm/egg * 1ml sperm stock/$4x10^6$ sperm = — ml sperm stock to add to egg stock. volume of sperm = 400 ml @ $4x10^6$ sperm/ml

Fertilization Time: 1540

Embryo Stock Fertilization Checks:

	Time	No. Fert.	No. Unfert.	%
10 minutes (1st fert.)	1550	99	1	99
20 minutes (2nd fert. If needed)				

Test Initiation Time: 1640 Embryo Stock Added: 0.25 ml

Test Termination:

	No. Normal	No. Abnormal	% Normal
QC1			
QC2			

Comments:

QC Check: VF 7/12/12 Final Review: VF 7/13/12

Marine Chronic Bioassay **Echinoderm Larval Development Worksheet**

Client: Weston Solutions
Sample ID: West Basin (Ambient Urchins)
Test No.: 1206-S139c

Start Date/Time: 6/19/2012 / 1640
End Date/Time: 6/23/2012 / 1450
Species: S. purpuratus
Animal Source: SEA-Lab
Date Collected:

Tech initials: VS
Injection Time: 1520

Sperm Absorbance at 400 nm: 0.833 (target range of 0.8 - 1.0 for density of $4x10^6$ sperm/ml)

Eggs Counted: 24, 27, 25, 29, 22 Mean: 25.4 X 42 = 1067 eggs/ml

(target counts of 25 eggs per vertical pass on Sedgwick-Rafter slide for a final density of 1000 eggs/ml)

Initial density: 1067 eggs/ml = 1.07 dilution factor
Final density: 1000 eggs/ml - 1.0 part egg stock
[/] parts seawater

egg stock 300 ml
seawater / ml

Prepare the egg stock according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Volume of Sperm stock needed to fertilize eggs:

Volume of egg stock (ml) — * 1,000 eggs/ml * 500 sperm/egg * 1ml sperm stock/$4x10^6$ sperm =
— ml sperm stock to add to egg stock. Volume of sperm = 600ul @ $4x10^6$ sperm/ml

Fertilization Time: 1620

Embryo Stock Fertilization Checks:

	Time	No. Fert.	No. Unfert.	%
10 minutes (1st fert.)	1630	99	1	99
20 minutes (2nd fert. If needed)				

Test Initiation Time: 1640 Embryo Stock Added: 0.25 ml

Test Termination:

	No. Normal	No. Abnormal	% Normal
QC1			
QC2			

Comments:

QC Check: KF 7/12/12 Final Review: LG 7/13/12

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Development
Test Run: 6/19/2012

Random #	Number Counted	Number Normal
1	297	0
2	348	333
3	~~283~~ 350	~~0~~ 325
4	~~350~~ 283	~~325~~ 0
5	329	291
6	309	271
7	300	59
8	293	267
9	315	0
10	270	0
11	357	324
12	318	158
13	313	240
14	244	224
15	310	124
16	283	0
17	334	288
18	358	347
19	282	8
20	305	48

QC: 7/12/12
Final Review: 7/13/12

	# counted	# fertilized
~~T0~~		
T0 A_1	315	309
T0 A_2	378	375
T0 A_3	376	367
T0 A_4	407	400
T0 A_5	367	365
T0 A_6	363	349
T0 E_1	297	294
T0 E_2	320	318
T0 E_3	334	331
T0 E_4	371	369
T0 E_5	316	313
T0 E_6	326	320

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Development
Test Run: 6/19/2012

Treatment	Random #	Number Counted	Number Normal
Ambient Urchin + Ambient Water	18		
	3		
	2		
	6		
	11		
Ambient Urchin + Exposure Water	7		
	20		
	15		
	19		
	12		
Exposure Urchin + Ambient Water	17		
	8		
	5		
	13		
	14		
Exposure Urchin + Exposure Water	16		
	9		
	1		
	10		
	4		

QC'd

QC: KF 7/12/12
Final Review: KS 7/13/12

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Development
Test Run: 6/19/2012

Treatment	Random #	Number Counted	Number Normal
Ambient Urchin + Ambient Water	18	358	347
	3	350	325
	2	348	333
	6	309	271
	11	357	324
Ambient Urchin + Exposure Water	7	300	59
	20	305	48
	15	310	124
	19	282	8
	12	318	158
Exposure Urchin + Ambient Water	17	334	288
	8	293	267
	5	329	291
	13	313	240
	14	244	224
Exposure Urchin + Exposure Water	16	283	0
	9	315	0
	1	297	0
	10	270	0
	4	283	0

Treatment	Replicate	Number Counted	Number Fertilized
Ambient Time Zero	A	315	309
	B	378	375
	C	376	367
	D	407	400
	E	367	365
	F	363	349
Exposure Time Zero	A	297	294
	B	320	318
	C	334	331
	D	371	369
	E	316	313
	F	326	320

QC: KF 7/13/12
Final Review: KF 7/13/12

Marine Chronic Bioassay

Water Quality Measurements

Client: Weston Solutions

Sample ID: West Basin (Ambient Urchins)

Sample Log No.: 12- 0488

Test No.: 1206-S139C

Test Species: *S. purpuratus*

Start Date/Time: 6/19/2012 1640

End Date/Time: 6/23/2012 1450

Site	Salinity/ Conductivity (ppt)/ (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (pH units)				
	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Ambient	34.3/ 52,000	34.2/ 52,000	33.9/ 52,400	33.8/ 52,200	33.7/ 52,000	15.4	15.3	15.7	15.0	14.8	8.7	8.7	7.4	8.3	8.7	7.91	7.98	7.93	7.88	7.95
Exposure (57,400 µmhos/cm)	38.7/ 57,400	38.4/ 57,800	38.0/ 57,700	37.8/ 57,600	37.8/ 57,700	15.5	15.0	15.7	14.9	14.6	7.9	8.5	7.7	8.2	8.7	7.90	7.98	7.95	7.92	7.94

		0	24	48	72	96
Technician Initials:	WQ Readings:	PA	VF	ES	VF	VF
	Dilutions made by:	PA				

Comments:

0 hrs:

24 hrs:

48 hrs:

72 hrs:

QC Check: VF 7/12/12

Final Review: LA 7/13/12

Marine Chronic Bioassay

Water Quality Measurements

Client: Weston Solutions

Sample ID: West Basin (Exposure Urchins)

Sample Log No.: 12- 0488

Test No.: 1206-5391d

Test Species: *S. purpuratus*

Start Date/Time: 6/19/2012 1640

End Date/Time: 6/23/2012 1450

Site	Salinity/ Conductivity (ppt)/ (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (pH units)				
	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Ambient	34.3/ 52,000	34.2/ 52,000	33.9/ 52,400	33.6/ 52,200	33.7/ 52,000	15.4	15.3	15.7	15.0	14.8	8.7	8.7	7.4	8.3	8.7	7.91	7.98	7.93	7.88	7.95
Exposure (57,400 µmhos/cm)	36.1/ 57,400	36.4/ 57,800	36.0/ 57,700	37.8/ 57,600	37.8/ 57,700	15.5	15.0	15.7	14.9	14.6	7.9	8.5	7.7	8.2	8.7	7.90	7.98	7.95	7.92	7.94

	0	24	48	72	96
WQ Readings:	PA	JF	ES	JF	JF
Dilutions made by:	PA				

Technician Initials:

Comments:

0 hrs:

24 hrs:

48 hrs:

72 hrs:

QC Check: KF 7/2/12

Final Review: JS 7/13/12

Test: EC-Echinoderm Survival and Development Test						Test ID: C120521.03		
Species: SP-Strongylocentrotus purpuratus						Protocol: USEPA98-USACE / USEPA 1998		
Sample ID: 33 ppt Batch (Ambient)						Sample Type: EFF2-Industrial		
Start Date: 7/10/2012 12:28				End Date: 7/10/2012 13		Lab ID: NAU-Nautilus Environmental		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	33	310	287	287	82	
	2	2	33	310	208	208	39	
	3	3	33	310	310	310	87	
	4	4	33	310	345	345	96	
	5	5	33	310	256	256	33	
	6	1	40	310	236	236	0	
	7	2	40	310	321	321	0	
	8	3	40	310	170	170	0	
	9	4	40	310	276	276	0	
	10	5	40	310	262	262	0	

Comments: West Basin Long-Term High Salinity Study

Echinoderm Survival and Development Test-Proportion Alive

Start Date:	7/10/2012 12:28	Test ID:	C120521.03	Sample ID:	33 ppt Batch (Ambient)
End Date:	7/10/2012 13:08	Lab ID:	NAU-Nautilus Environmental	Sample Type:	EFF2-Industrial
Sample Date:	7/9/2012 12:15	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

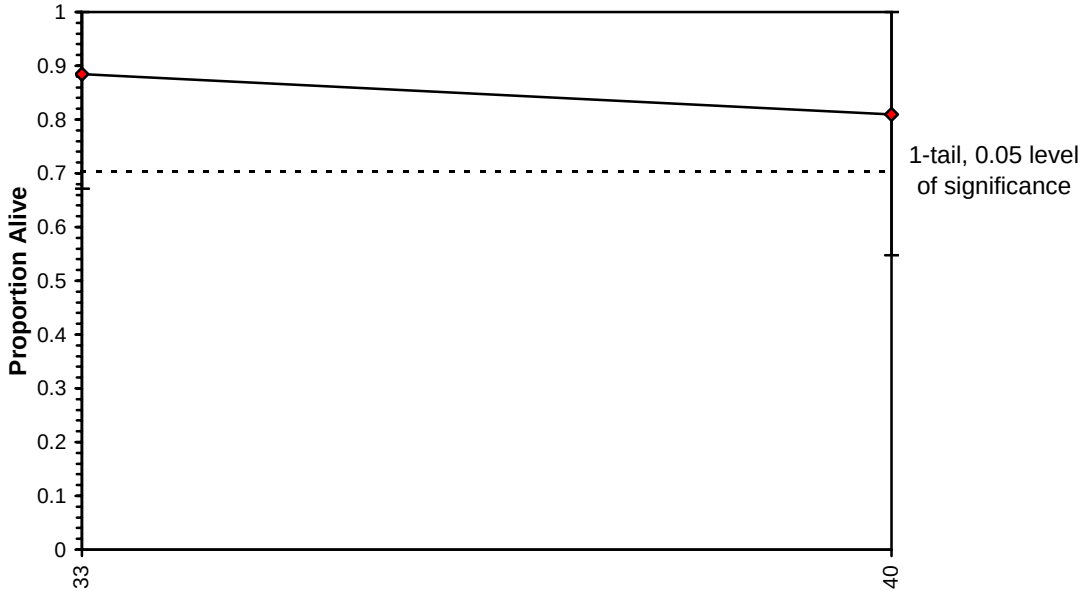
Conc-%	1	2	3	4	5
33	0.9258	0.6710	1.0000	1.0000	0.8258
40	0.7613	1.0000	0.5484	0.8903	0.8452

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.8845	1.0000	1.2960	0.9599	1.5424	19.622	5			
40	0.8090	0.9147	1.1672	0.8339	1.5424	22.162	5	0.794	1.860	0.3017

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94773	0.842	0.02949	-0.9549
F-Test indicates equal variances (p = 0.97)	1.03486	23.1539		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.22347	0.24123	0.04143	0.06579	0.45036	1, 8
Treatments vs 33						

Dose-Response Plot



Echinoderm Survival and Development Test-Proportion Normal

Start Date:	7/10/2012 12:28	Test ID:	C120521.03	Sample ID:	33 ppt Batch (Ambient)
End Date:	7/10/2012 13:08	Lab ID:	NAU-Nautilus Environmental	Sample Type:	EFF2-Industrial
Sample Date:	7/9/2012 12:15	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

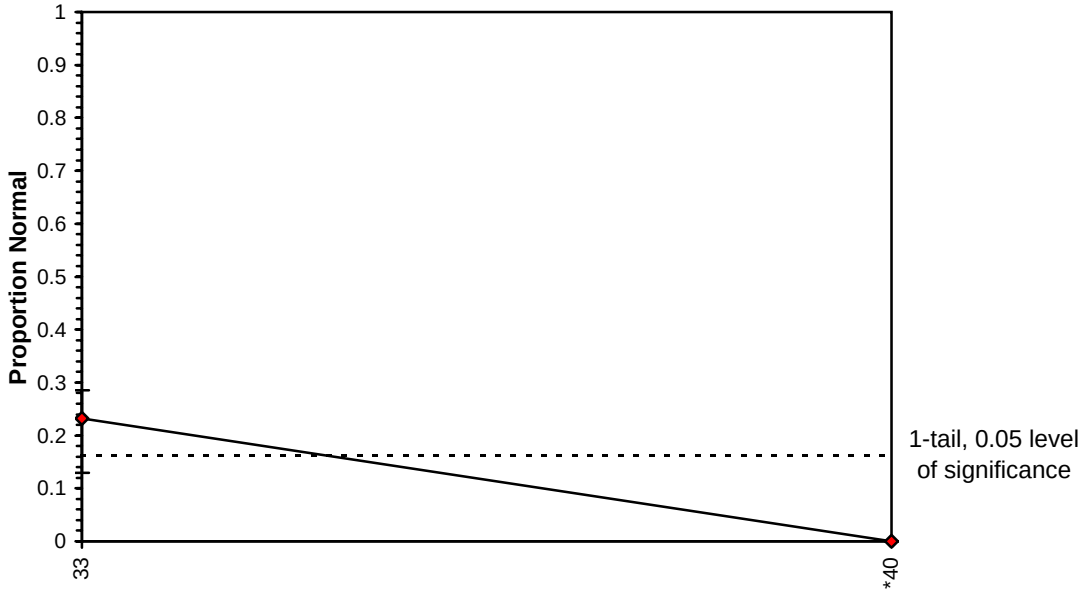
Conc-%	1	2	3	4	5
33	0.2857	0.1875	0.2806	0.2783	0.1289
40	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.2322	1.0000	0.4986	0.3672	0.5639	17.635	5			
*40	0.0000	0.0000	0.0284	0.0284	0.0284	0.000	5	11.957	2.132	0.0838

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.84305	0.842	-1.1859	2.05579
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Heteroscedastic t Test indicates significant differences	0.06628	0.28985	0.55271	0.00387	2.2E-06	1, 8
Treatments vs 33						

Dose-Response Plot



Test: EC-Echinoderm Survival and Development Test						Test ID: C120521.04		
Species: SP-Strongylocentrotus purpuratus						Protocol: USEPA98-USACE / USEPA 1998		
Sample ID: 40 ppt Batch (Exposure)						Sample Type: EFF2-Industrial		
Start Date: 7/10/2012 12:28				End Date: 7/10/2012 13		Lab ID: NAU-Nautilus Environmental		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counte	Number Normal	Notes
	1	1	33	222	159	159	0	
	2	2	33	222	122	122	0	
	3	3	33	222	139	139	0	
	4	4	33	222	129	129	0	
	5	5	33	222	113	113	0	
	6	1	40	222	78	78	0	
	7	2	40	222	145	145	0	
	8	3	40	222	33	33	0	
	9	4	40	222	107	107	0	
	10	5	40	222	111	111	0	

Comments: West Basin Long-Term High Salinity Study

Echinoderm Survival and Development Test-Proportion Alive

Start Date:	7/10/2012 12:28	Test ID:	C120521.04	Sample ID:	40 ppt Batch (Exposure)
End Date:	7/10/2012 13:08	Lab ID:	NAU-Nautilus Environmental	Sample Type:	EFF2-Industrial
Sample Date:	7/9/2012 12:15	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

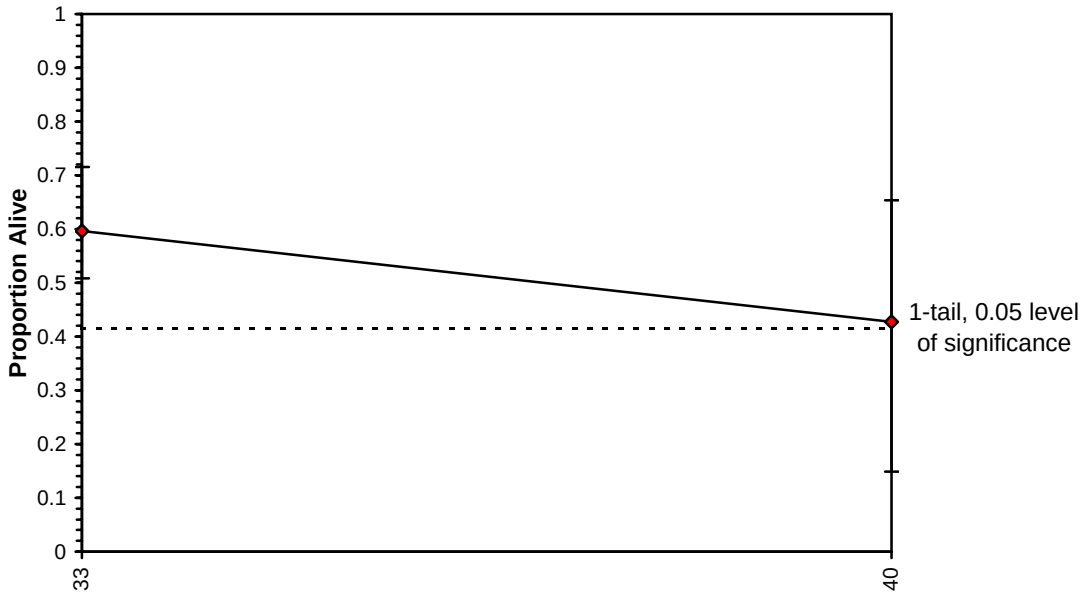
Conc-%	1	2	3	4	5
33	0.7162	0.5495	0.6261	0.5811	0.5090
40	0.3514	0.6532	0.1486	0.4820	0.5000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
33	0.5964	1.0000	0.8836	0.7944	1.0090	9.328	5			
40	0.4270	0.7160	0.7048	0.3958	0.9411	28.960	5	1.816	1.860	0.1831

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.95969	0.842	-0.6477	1.60449
F-Test indicates equal variances (p = 0.11)	6.13208	23.1539		

Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Homoscedastic t Test indicates no significant differences	0.18203	0.30459	0.07994	0.02423	0.10684	1, 8
Treatments vs 33						

Dose-Response Plot



Echinoderm Survival and Development Test-Proportion Normal

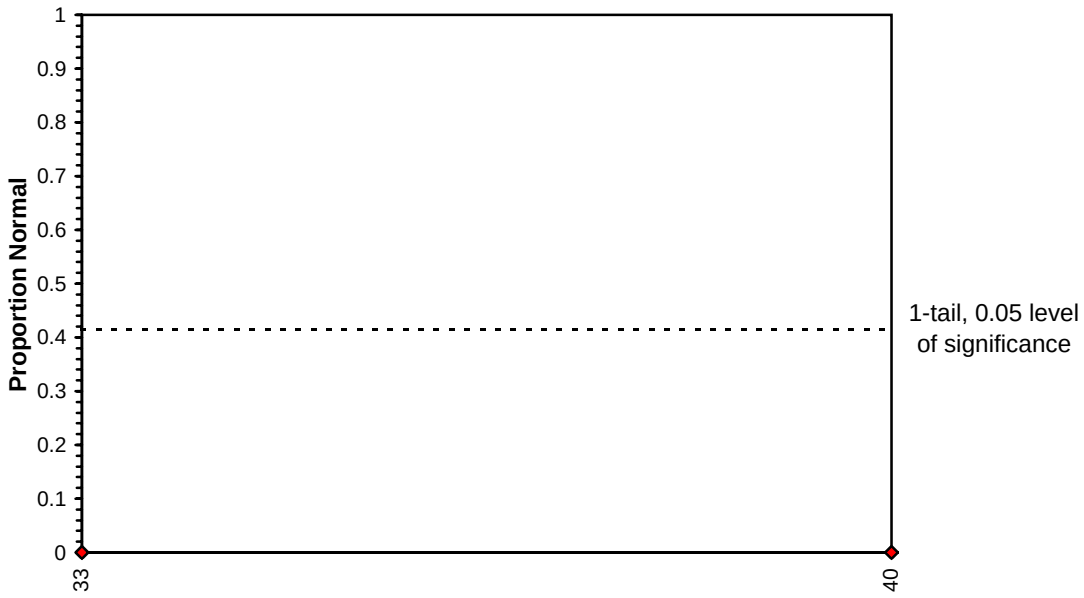
Start Date:	7/10/2012 12:28	Test ID:	C120521.04	Sample ID:	40 ppt Batch (Exposure)
End Date:	7/10/2012 13:08	Lab ID:	NAU-Nautilus Environmental	Sample Type:	EFF2-Industrial
Sample Date:	7/9/2012 12:15	Protocol:	USEPA98-USACE / USEPA	Test Species:	SP-Strongylocentrotus purpuratus
Comments:	West Basin Long-Term High Salinity Study				

Conc-%	1	2	3	4	5
33	0.0000	0.0000	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0000	0.0000	0.0000

			Transform: Arcsin Square Root				
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N
33	0.0000		0.0336	0.0336	0.0336	0.000	5
40	0.0000		0.0336	0.0336	0.0336	0.000	5

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	1	0.842		
Equality of variance cannot be confirmed				

Dose-Response Plot



Marine Chronic Bioassay | **Echinoderm Sperm-Cell Fertilization Worksheet**

Client: Weston Solution
Sample ID: West Basin (Ambient Urchins)
Test No.: 1207-S176 b

Start Date/Time: ~~7/9/2012~~ 7/10/12 / 1228
End Date/Time: ~~7/10/2012~~ 7/10/12 / 1306
Species: S. purpuratus
Animal Source: ~~Point Loma SCAMLab~~
Date Collected: ~~7/4/12~~

Tech initials: [illegible]
Injection Time: 1145

Sperm Absorbance at 400 nm: 0.942 (target range of 0.8 - 1.0 for density of $4x10^6$ sperm/ml)

Eggs Counted: 90, 107, 91, 101, 96

Mean: 97 X 42 = 4,074 eggs/ml

(target counts of 100 eggs per vertical pass on Sedgwick-Rafter slide for a final density of 4000 eggs/ml)

Initial density: 4,074 eggs/ml = 1.02 dilution factor
Final density: 4000 eggs/ml - 1.0 part egg stock
.02 parts seawater

egg stock 200 ml
seawater [illegible] ml

Prepare the embryo stock according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

	Sperm:Egg Ratio							
Rangefinder Test:	2000:1	1600:1	1200:1	800:1	400:1	200:1	100:1	50:1
ml Sperm Stock	50	40	30	20	10	5.0	2.5	1.25
ml Seawater	0.0	10	20	30	40	45	47.5	48.75

	Time	Rangefinder Ratio:	Fert.	Unfert.
Sperm Added (100 µl):	1202	50:1	90	10
Eggs Added (0.5 ml):	1212	50:1	91	9
Test Ended:	1222	100:1	99	1
		100:1	100	0

NOTE: Choose a sperm-to-egg ratio that results in fertilization between 80 and 90 percent. If more than one concentration is within this range, choose the ratio closest to 90 percent unless professional judgment dictates consideration of other factors (e.g., organism health, stage of reproductive season, site conditions).

Definitive Test

Sperm:Egg Ratio Used: 50:1

	Time		Fert.	Unfert.
Sperm Added (100 µl):	1228	QC1	89	11
Eggs Added (0.5 ml):	1248	QC2	82	18
Test Ended:	~~1306~~ 1308	Egg Control 1	0	100
		Egg Control 2	0	100

Comments:

QC Check: [signature] 8/16/12

Final Review: VF 8/16/12

Marine Chronic Bioassay | **Water Quality Measurements**

Client : Weston Solutions | **Test Species:** *S. purpuratus*

Sample ID: West Basin (Ambient Urchins) | **Start Date/Time:** 7/10/2012 1228

Sample Log No.: 12- 0521 | **End Date/Time:** 7/10/2012 1308

Dilutions made by: [illegible] | **Test No:** 1207-S176b

Analyst: [illegible]

	Initial Readings			
Concentration ~~(%)~~ PF	**DO (mg/L)**	**pH (units)**	**Salinity (ppt) / (µmhos/cm)**	**Temperature (°C)**
Ambient	7.5	7.87	34.1/51900	15.4
Exposure 62,700 ~~(57,000)~~ µmhos/cm)	7.5	7.89	41.7/62600	15.3

Comments:

QC Check: [illegible] 8/16/12 | **Final Review:** PF 8/16/12

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Fertilization
Test Run: 7/~~9~~10/2012

Treatment	Random #	Number Counted	Number Fertilized
Ambient Urchin + Ambient Water	18	100	94
	3	100	84
	2	100	79
	6	100	91
	11	100	86
Ambient Urchin + Exposure Water	7	100	87
	20	100	79
	15	100	76
	19	100	76
	12	100	76
☆ Exposure Urchin + Ambient Water	17		
	8		
	5		
	13		
	14		
☆ Exposure Urchin + Exposure Water	16		
	9		
	1		
	10		
	4		

8/16/12
VS

☆ Test not run due to low sperm density in exposure urchins

QC: ~~VS~~ 8/16/12

Final Review: ~~KF~~ 8/16/12

Marine Chronic Bioassay **Echinoderm Sperm-Cell Fertilization Worksheet**

Client: Weston Solution
Sample ID: West Basin (Exposure Urchins)
Test No.: 1207-S176d

Start Date/Time: ~~7/9/2012~~ 7/10/12 / N/A
End Date/Time: ~~7/9/2012~~ 7/11/12 N/A
Species: S. purpuratus
Animal Source: ~~Point Loma~~ SCAMP
Date Collected: ~~7/4/12~~

Tech initials: [illegible]
Injection Time: 1230

Sperm Absorbance at 400 nm: 0.080* (target range of 0.8 - 1.0 for density of $4x10^6$ sperm/ml)

Eggs Counted: 6-25 Mean: _____ X 42 = _____ eggs/ml

(target counts of 100 eggs per vertical pass on Sedgwick-Rafter slide for a final density of 4000 eggs/ml)

Initial density: _____ eggs/ml = _____ dilution factor egg stock _____ ml
Final density: 4000 eggs/ml - 1.0 part egg stock seawater _____ ml
_____ parts seawater

Prepare the embryo stock according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

	Sperm:Egg Ratio							
Rangefinder Test:	2000:1	1600:1	1200:1	800:1	400:1	200:1	100:1	50:1
ml Sperm Stock	50	40	30	20	10	5.0	2.5	1.25
ml Seawater	0.0	10	20	30	40	45	47.5	48.75

	Time	Rangefinder Ratio:	Fert.	Unfert.
Sperm Added (100 µl):				
Eggs Added (0.5 ml):				
Test Ended:				

NOTE: Choose a sperm-to-egg ratio that results in fertilization between 80 and 90 percent. If more than one concentration is within this range, choose the ratio closest to 90 percent unless professional judgment dictates consideration of other factors (e.g., organism health, stage of reproductive season, site conditions).

Definitive Test Sperm:Egg Ratio Used: _____

	Time		Fert.	Unfert.
Sperm Added (100 µl):		QC1		
Eggs Added (0.5 ml):		QC2		
Test Ended:		Egg Control 1		
		Egg Control 2		

Comments: * Unable to perform fertilization assay test due to low sperm density in the exposure urchins.

QC Check: KS 8/16/12 Final Review: KF 8/16/12

Marine Chronic Bioassay

Water Quality Measurements

Client : Weston Solutions

Test Species: *S. purpuratus*

Sample ID: West Basin (Exposure Urchins)

Start Date/Time: 7/~~9~~10/2012 ~~1330~~ 1400 PF

Sample Log No.: 12- 0521

End Date/Time: 7/~~9~~10/2012 ~~1415~~ 1445 PF

Dilutions made by: LY

Test No: 1207-5176 d

Analyst: PA

	Initial Readings			
Concentration ~~(%)~~ PF	DO (mg/L)	pH (units)	Salinity (ppt) / ~~(µmhos/cm)~~	Temperature (°C)
Ambient	7.5	7.87	34.1/51900	15.4
Exposure ~~57,000~~ 62,700 (µmhos/cm)	7.5	7.89	41.7/62600	15.3

Comments: * Test not run due to low sperm density in exposure urchins

QC Check: 8/16/12

Final Review: KF 8/16/12

Marine Chronic Bioassay **Echinoderm Larval Development Worksheet**

Client: Weston Solutions
Sample ID: West Basin (Ambient Urchins)
Test No.: 1207-S176a
Tech initials: B
Injection Time: 1145

Start Date/Time: 7/10/12 / 1330
End Date/Time: 7/13/12 / 1415
Species: S. purpuratus
Animal Source: ~~KP Point Loma~~ SCA L46
~~Date Collected: 6/4/12~~

Sperm Absorbance at 400 nm: 0.942 (target range of 0.8 - 1.0 for density of $4x10^6$ sperm/ml)

Eggs Counted: 25, 28, 20, 27, 23

Mean: 24.6 X 42 = 1,033 eggs/ml

(target counts of 25 eggs per vertical pass on Sedgwick-Rafter slide for a final density of 1000 eggs/ml)

Initial density: 1033 eggs/ml = 1.033 dilution factor
Final density: 1000 eggs/ml - 1.0 part egg stock
.03 parts seawater

egg stock 200 ml
seawater — ml

Prepare the egg stock according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Volume of Sperm stock needed to fertilize eggs:

Volume of egg stock (ml) — * 1,000 eggs/ml * 500 sperm/egg * 1ml sperm stock/$4x10^6$ sperm = — ml sperm stock to add to egg stock. Volume of sperm = 400 µL @ $4x10^6$ sperm/ml to 200mL of egg stock

Fertilization Time: 1215

Embryo Stock Fertilization Checks:

	Time	No. Fert.	No. Unfert.	%
10 minutes (1st fert.)	1230	99	1	99
20 minutes (2nd fert. If needed)				

Test Initiation Time: 1330 Embryo Stock Added: 0.25 ml

Test Termination: 1415

	No. Normal	No. Abnormal	% Normal
QC1	92	8	92%
QC2	93	7	93%

Comments:

QC Check: 8/16/12 Final Review: KF 8/16/12

Marine Chronic Bioassay

Water Quality Measurements

Client: Weston Solutions

Sample ID: West Basin (Ambient Urchins)

Sample Log No.: 12- 0521

Test No.: 1207- SI76a

Test Species: *S. purpuratus*

Start Date/Time: 7/~~9~~10/2012 1330

End Date/Time: 7/~~13~~14/2012 1415

Site	Salinity/Conductivity (ppt) / (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (pH units)				
	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Ambient JW	34.1/51,900	34.1/51,800	34.0/52,100	34.1/52,100	33.9/49,500	15.4	15.1	15.9	14.9	14.7	7.5	8.1	8.1	8.1	8.1	7.87	7.91	8.02	7.96	7.99
Exposure ~~(57,400)~~ 62,700 (µmhos/cm)	41.7/62,600	41.7/62,500	~~41.4~~ 41.5/~~61,400~~ 61,500 JF	41.4/61,900	41.5/62,600	15.3	15.1	15.8	15.2	14.6	7.5	8.0	8.0	8.1	8.0	7.89	8.01	8.05	7.97	8.05

Technician Initials:

	0	24	48	72	96
WQ Readings:	PA	PA	JF	AD	CL
Dilutions made by:	PA				

Comments:

0 hrs:

24 hrs:

48 hrs:

72 hrs:

QC Check: ~~8/16/12~~

Final Review: KF 8/16/12

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Development
Test Run: 7/9/2012
10

Treatment	Random #	(A) Number Counted	Normal Number ~~Fertilized~~
Ambient Urchin + Ambient Water	18	100	82
	3	435 KS	39
	2	100	87
	6	100	96
	11	35	33
Ambient Urchin + Exposure Water	7	236	Ø
	20	321	Ø
	15	170	Ø
	19	276	Ø
	12	262	Ø
Exposure Urchin + Ambient Water	17	159	Ø
	8	122	Ø
	5	139	Ø
	13	129	Ø
	14	113	Ø
Exposure Urchin + Exposure Water	16	78	Ø
	9	145	Ø
	1	33	Ø
	10	107	Ø
	4	111	Ø

QC: 8/14/12 KS

Final Review: KF 8/16/12

(A) There was evidence of embryo degradation in the test vials. Number counted reflects only complete and undegraded embryos.

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Development
Test Run: 7/9/2012
10

Treatment	Random #	(A) Total Number Counted	Number Normal
Ambient Urchin + Ambient Water	18	287	
	3	208	
	2	310	
	6	345	
	11	256	
Ambient Urchin + Exposure Water	7	236	
	20	321	
	15	170	
	19	276	
	12	262	
Exposure Urchin + Ambient Water	17	159	
	8	122	
	5	139	
	13	129	
	14	113	
Exposure Urchin + Exposure Water	16	78	
	9	145	
	1	33	
	10	107	
	4	111	

KF

Treatment	Replicate	(A) Total Number Counted	Number Fertilized
Ambient Time Zero	A	267	
	B	318	
	C	328	
	D	330	
	E	319	
	F	295	
Exposure Time Zero	A	213	
	B	259	
	C	210	
	D	230	
	E	215	
	F	205	

KF

QC: 8/14/12 KS

Final Review: KF 8/16/12

(A) There was evidence of embryo degradation in the test vials. Total # counted reflects all embryos found, including KF ~~for~~ those partially degraded.

Marine Chronic Bioassay **Echinoderm Larval Development Worksheet**

Client: Weston Solutions
Sample ID: West Basin (Exposure Urchins)
Test No.: 1207-S176C

Tech initials: KF
Injection Time: 1230

Start Date/Time: 7/10/12 / 1400
End Date/Time: 7/13/12 / 1415
Species: S. purpuratus
Animal Source: ~~KF Point Loma~~ SEALAB
~~Date Collected:~~ ~~KF~~

Sperm Absorbance at 400 nm: 0.080 (target range of 0.8 - 1.0 for density of $4x10^6$ sperm/ml)

Eggs Counted: 23, 25, 25, 29, 26

Mean: 25.6 X 42 = 1,075 eggs/ml

(target counts of 25 eggs per vertical pass on Sedgwick-Rafter slide for a final density of 1000 eggs/ml)

Initial density: 1075 eggs/ml = 1.075 dilution factor
Final density: 1000 eggs/ml - 1.0 part egg stock
[—] parts seawater

egg stock 100 ml
seawater — ml

Prepare the egg stock according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Volume of Sperm stock needed to fertilize eggs: 10 ml of sperm stock used to fertilize 100 ml of egg stock due to low density.

Volume of egg stock (ml) — * 1,000 eggs/ml * 500 sperm/egg * 1ml sperm stock/$4x10^6$ sperm = — ml sperm stock to add to egg stock.

Fertilization Time: 1330

Embryo Stock Fertilization Checks:

	Time	No. Fert.	No. Unfert.	%
10 minutes (1st fert.)	1340	73	27	73
20 minutes (2nd fert. If needed)	1350	71	29	71

Test Initiation Time: 1400 Embryo Stock Added: 0.25 ml

Test Termination:

	No. Normal	No. Abnormal	% Normal
QC1	KF ~~92~~ 93	KF ~~8~~ 7	~~92~~ 93
QC2	~~93~~	~~7~~	~~93~~

Comments:

QC Check: ~~KF~~ 8/16/12 Final Review: ~~KF~~ 8/16/12

Marine Chronic Bioassay

Water Quality Measurements

Client: Weston Solutions

Sample ID: West Basin (Exposure Urchins)

Sample Log No.: 12- 0521

Test No.: 1207-S176c

Test Species: *S. purpuratus*

Start Date/Time: 7/~~13~~10/2012 ~~1330~~ 1400

End Date/Time: 7/~~18~~14/2012 1415

Site	Salinity/Conductivity (ppt) / (µmhos/cm)					Temperature (°C)					Dissolved Oxygen (mg/L)					pH (pH units)				
	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Ambient	34.1/51900	34.1/51900	34.0/52000	34.1/52100	33.9/51800	15.4	15.1	15.9	14.9	14.7	7.5	8.1	8.1	8.1	8.1	7.87	7.91	8.02	7.90	7.99
Exposure ~~(57,400)~~ 62,700 (µmhos/cm)	41.7/62600	41.7/62500	41.5/62300	41.4/62100	41.5/62600	15.3	15.1	15.8	15.2	14.6	7.5	8.0	8.0	8.1	8.0	7.89	8.01	8.05	7.97	8.05

Technician Initials:		0	24	48	72	96
	WQ Readings:	PA	PA	VF	AD	CV
	Dilutions made by:	PA				

Comments:

0 hrs:

24 hrs:

48 hrs:

72 hrs:

QC Check: ~~DF~~ 8/16/12

Final Review: KF 8/16/12

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Development
Test Run: 7/9/2012
10

Treatment	Random #	(A) Number Counted	Normal Number ~~Fertilized~~
Ambient Urchin + Ambient Water	18	100	82
	3	4~~3~~5 KS	39
	2	100	87
	6	100	96
	11	35	33
Ambient Urchin + Exposure Water	7	236	∅
	20	321	∅
	15	170	∅
	19	276	∅
	12	262	∅
Exposure Urchin + Ambient Water	17	159	∅
	8	122	∅
	5	139	∅
	13	129	∅
	14	113	∅
Exposure Urchin + Exposure Water	16	78	∅
	9	145	∅
	1	33	∅
	10	107	∅
	4	111	∅

QC: 8/14/12 KS

Final Review: VF 8/16/12

(A) There was evidence of embryo degradation in the test vials. Number counted reflects only complete and undegraded embryos.

Weston Solution: West Basin Tank and Mesocosm
Echinoderm Development
Test Run: 7/9/2012
10

Treatment	Random #	(A) Total Number Counted	Number Normal
Ambient Urchin + Ambient Water	18	287	
	3	208	
	2	310	
	6	345	
	11	256	
Ambient Urchin + Exposure Water	7	236	
	20	321	
	15	170	
	19	276	
	12	262	
Exposure Urchin + Ambient Water	17	159	
	8	122	
	5	139	
	13	129	
	14	113	
Exposure Urchin + Exposure Water	16	78	
	9	145	
	1	33	
	10	107	
	4	111	

KF

Treatment	Replicate	Total Number Counted	Number Fertilized
Ambient Time Zero	A	267	
	B	318	
	C	328	
	D	330	
	E	319	
	F	295	
Exposure Time Zero	A	213	
	B	259	
	C	210	
	D	230	
	E	215	
	F	205	

KF

QC: 8/14/12 KS

Final Review: KF 8/16/12

(A) there was evidence of embryo degradation in the test vials. Total # counted reflects all embryo's found, including those partially degraded.

APPENDIX C

CHAIN-OF-CUSTODY, SAMPLE RECEIPT, AND ORGANISM RECEIPT FORMS

WESTON SOLUTIONS

☑ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

30217

DATE 2/7/11 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: West Basin Municipal Water District Salinity Study
PROJECT MANAGER / CONTACT: Amy Margolis/Scott Bodensteiner
COMPANY / CLIENT: Weston Solutions
ADDRESS:
PHONE / FAX / EMAIL: above

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: * 7-day mysid-C	* Kelp 48hr	*96hr Echin. Dev.	*96 Sandabs-A	* 48hr Abalone	* 7day Topsmelt	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	FOR WESTON USE ONLY: WESTON LAB ID
	West Basin Brine	2/7/11	1300	SLT	2GL-P	4	✓	✓	✓	✓	✓	✓			C11 0207.01

Sample Matrix Codes: FW= fresh water GW=ground water (SLT=salt water) SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass (P=plastic) B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other _____

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other _____

SAMPLED BY: PRINT SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1.				Jean M. Hasan		weston	2/7/11 1300
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WD 2/10/11 SH

WESTON SOLUTIONS

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CHAIN OF CUSTODY

30217

DATE 2/7/11 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: West Basin Municipal Water District Salinity Study
PROJECT MANAGER / CONTACT: Amy Margolis/Scott Bodensteiner
COMPANY / CLIENT: Weston Solutions
ADDRESS:
PHONE / FAX / EMAIL: above

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	* 7-day Mysid - C	* Kelp 48 hr	* 96 hr Echin. Dev.	* 96 Sand Dabs - A	* 48 hr Abalone	* 7-day Topsmelt	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
	West Basin Brine	2/7/11	1300	SLT	20L-P	4	✓	✓	✓	✓	✓	✓			

Sample Matrix Codes: FW= fresh water GW=ground water (SLT=salt water) SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass (P=plastic) B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other _____

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other _____

SAMPLED BY: PRINT Monica Tirtadidjaja SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. Monica Tirtadidjaja		United Water	02/07/2011	Sean M. Hasson		weston	2/8/11 1300
2.							
3.							
4.							
5.							
6.							

@WD 2/8/11 5 4

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

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☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

30219

DATE 2/11/11 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: West Basin municipal Water District Salinity Study
PROJECT MANAGER / CONTACT: Amy Margolis / Scott Bodenstedter
COMPANY / CLIENT: Weston Solutions
ADDRESS: above
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: *7-day Mysid-C	* Kelp 48hrs	*96hr Echno. Dev.	*96 Sand Dabs-A	*48hr Abalone	*7day Topsmelt			PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	FOR WESTON USE ONLY: WESTON LAB ID
	West Basin Brine	2/11/11	1255	SLT	20L-P	4	✓	✓	✓	✓	✓	✓			ice	16.3°C	C11021.01

Sample Matrix Codes: FW= fresh water GW=ground water (SLT)=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass (P)=plastic B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other _____

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other _____

SAMPLED BY: PRINT SIGNATURE

COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1.				Sean M. Hasan		Weston	2/11/11 1255
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

WESTON SOLUTIONS

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☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

30219

DATE 2/11/11 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: West Basin municipal Water District Salinity Study

PROJECT MANAGER / CONTACT: Amy Margolis / Scott Bodensteiner

COMPANY / CLIENT: Weston Solutions

ADDRESS: above

PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	*7-day Mysid-C	*Kelp 48hrs	*96hr Echino. Dev	*96 Sea Dabs-A	*48hr Abalone	*7day Topsmelt	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
	West Basin Brine	2/11/11	1255	SLT	20L-P	4	✓	✓	✓	✓	✓	✓	ice	16.3°C	

ANALYSIS/TEST REQUESTED — FOR WESTON USE ONLY (Sample temp., Weston Lab ID)

Sample Matrix Codes: FW= fresh water GW=ground water (SLT)=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify)

Container Code: G=glass (P)=plastic B=bags ☐ O=other

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other

SAMPLED BY: PRINT: Monica Tirtadidjaja SIGNATURE: [signature]

COMMENTS / SPECIAL INSTRUCTIONS:

	RELINQUISHED BY: Print Name	Signature	Firm	Date/Time	RECEIVED BY: Print Name	Signature	Firm	Date/Time
1.	Monica Tirtadidjaja	[signature]	United Water	2/11/11 1255	Sean M. Hassan	[signature]	Weston	2/11/11 1255
2.								
3.								
4.								
5.								
6.								

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

BIOASSAY SAMPLE RECEIPT

Client: West Basin MWD		Project: West Basin Municipal Water District Salinity Study	
Weston Sample ID:	C1102.11.01A	C1102.11.01B	C1102.11.01C
Client Sample ID:	West Basin Brine	West Basin Brine	West Basin Brine
Renewal Sample (Y/N):	N	N	N
Date/Time Received:	2/11/11 1520 1255 SH	2/11/11 1520 1255 SH	2/11/11 1520 1255
Airbill #:	N/A	N/A	N/A
Sample Tracking Information Kept for Records: (Y/N)	N	N	N
Collection Date/Time:	2/11/11 1255	2/11/11 1255	2/11/11 1255
Condition of Shipping Container:	good	good	good
Type and Capacity of Sample Container:	20L - Cubi	20L - Cubi	20L - Cubi
Total Sample Volume (L):	20L	20L	20L
Condition of Sampling Container:	good	good	good
Sample Container Appropriate: (Y/N)	Y	Y	Y
Custody Seals Intact: (Y/N)	N	N	N
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	Y
Sampler's Name Present on COC Form: (Y/N)	Y	Y	Y

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C1102.11.01A	11.4	8.3	7.7	60.8	—	—	0.00	1.84	SH/SL
C1102.11.01 B	12.4	9.2	7.7	60.4	—	—	0.00	2.03	SH/SL
C1102.11.01 C	11.9	9.0	7.7	60.6	—	—	0.00	2.02	SH/SL
~~C1102.11.01 D~~ ② SH									

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:	
Reason for unacceptability:	
Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:

① IW 2/11/11 SH
② WO 2/11/11 SH

BIOASSAY SAMPLE RECEIPT

Client: West Basin MWD		Project: West Basin Municipal Water District Salinity Study	
Weston Sample ID:	C110211.dD		
Client Sample ID:	West Basin Brine		
Renewal Sample (Y/N):	N		
Date/Time Received:	2/11/11 1255		
Airbill #:	N/A		
Sample Tracking Information Kept for Records: (Y/N)	N		
Collection Date/Time:	2/11/11 1255		
Condition of Shipping Container:	good		
Type and Capacity of Sample Container:	20L - Cubi		
Total Sample Volume (L):	20L		
Condition of Sampling Container:	good		
Sample Container Appropriate: (Y/N)	Y		
Custody Seals Intact: (Y/N)	N		
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y		
Sampler's Name Present on COC Form: (Y/N)	Y		

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C110211.dD	12.5	9.5	7.8	60.3	—	—	0.00	1.87	SH/SL

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:	
Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:

BIOASSAY SAMPLE RECEIPT

Client: West Basin MWD		Project: West Basin Municipal Water District Salinity Study	
Weston Sample ID:	C110207.01A	C110207.01B	C110207.01C
Client Sample ID:	West Basin Brine	West Basin Brine	West Basin Brine
Renewal Sample (Y/N):	N	N	N
Date/Time Received:	2/7/11 1300	2/7/11 1300	2/7/11 1300
Airbill #:	N/A	N/A	N/A
Sample Tracking Information Kept for Records: (Y/N)	N	N	N
Collection Date/Time:	2/7/11 ~~1200~~ 1300	2/7/11 1300	2/7/11 1300
Condition of Shipping Container:	good	good	good
Type and Capacity of Sample Container:	20L - Cubi	20L - Cubi	20L - Cubi
Total Sample Volume (L):	20L	20L	20L
Condition of Sampling Container:	good	good	good
Sample Container Appropriate: (Y/N)	Y	Y	Y
Custody Seals Intact: (Y/N)	N	N	N
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	Y
Sampler's Name Present on COC Form: (Y/N)	Y	Y	Y

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or (Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C110207.01A	~~8.8~~ 10.1	8.8	7.8	61.4	—	—	0.00	<0.5	SH/SL
" " B	20.1	8.6	7.8	61.1	—	—	0.01	<0.5	SH/SL
" " C	19.8	9.5	7.8	60.9	—	—	0.00	<0.5	SH/SL

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:	
Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:

① JE 2/7/11 SH

② JE 2/7/11 SH

BIOASSAY SAMPLE RECEIPT

Client: West Basin MWD		Project: West Basin Municipal Water District Salinity Study	
Weston Sample ID:	C110207.01-ED (1) SH		
Client Sample ID:	West Basin Brine		
Renewal Sample (Y/N):	N		
Date/Time Received:	2/7/11 1300		
Airbill #:	N/A		
Sample Tracking Information Kept for Records: (Y/N)	N		
Collection Date/Time:	2/7/11 1300		
Condition of Shipping Container:	good		
Type and Capacity of Sample Container:	20L - Cubi		
Total Sample Volume (L):	20L		
Condition of Sampling Container:	good		
Sample Container Appropriate: (Y/N)	Y		
Custody Seals Intact: (Y/N)	N		
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y		
Sampler's Name Present on COC Form: (Y/N)	Y		

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C110207.01D	19.9	8.9	7.8	61.0	—	—	0.00	<0.5	SH/SC

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:	
Reason for unacceptability:	
Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:

(1) ED 2/15/11 SH

ORGANISM RECEIPT LOG

Date: 2/8/11	Time: 1030	WESTON Batch ID: ABS 8151
Organism ID (Genus and species): Americamysis bahia	Supplier: Aquatic Bio Systems	
Address of Supplier: same	Invoice Attached: (Yes) No	
Phone: same	Contact: same	
No. Ordered: 650	No. Received: 715	Condition of Organisms: good
No. Dead: 0 >10% Dead?: Yes[1] (No)	Supplier Batch ID: hatch 2/1/11	Approximate Size or Age: 7 day
Shipper: UPS	B of L (Tracking No.) 1Z F46 73R 01 9938 8151	
Condition of Container: good	Received By: KS	
Confirmation of Organism ID: Provided by Supplier? (Yes) No; If "No", by Taxonomist Yes No	Taxonomist Name:	
Notes:		

D.O. (mg/L)	Temp. [2] (°C)	Conductivity or (Salinity) (Include Units)	pH (Units)	Technician (Initials)
11.5	18.6	28.	7.4	KS

Notes:

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

ORGANISM RECEIPT LOG

Date: 3/30/11	Time: 1040	WESTON Batch ID: ABS 0486
Organism ID (Genus and species): Atherinops Affinis	Supplier: Aquatic Biosystems	
Address of Supplier: Same	Invoice Attached: (Yes) No	
Phone: Same	Contact: Same	
No. Ordered: 450	No. Received: 495	Condition of Organisms: good
No. Dead: 18 ①AA >10% Dead?: Yes[1] No	Supplier Batch ID: Hatch: 3/17/11	Approximate Size or Age: 13 days
Shipper: FedEx	B of L (Tracking No.) 9874 1396 0486	
Condition of Container: good	Received By: SH	
Confirmation of Organism ID: Provided by Supplier? (Yes) No If "No", by Taxonomist Yes No	Taxonomist Name:	
Notes:		

	D.O. (mg/L)	Temp. [2] (°C)	Conductivity or (Salinity) (Include Units)	pH (Units)	Technician (Initials)
①	13.2	18.4	27.1	6.8	SH
②	12.1	18.7	27.1	7.1	

Notes:

① AA Technician Error 3/31/11 AA

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

ORGANISM RECEIPT LOG

Date:	Time:	WESTON Batch ID:
2/16/11	1030	DG021611

Organism ID (Genus and species):	Supplier:
Strongylocentrotus purpuratus	Dave Gutoff

Address of Supplier:	Invoice Attached
same	Yes (No)

Phone:	Contact:
Same	Dave

No. Ordered:	No. Received:	Condition of Organisms:
≈30	≈30	good

No. Dead: 0 >10% Dead?: Yes[1] (No)	Supplier Batch ID:	Approximate Size or Age:
	collected 2/16/11	adult

Shipper:	B of L (Tracking No.)
N/A	N/A

Condition of Container:	Received By:
good	amm

Confirmation of Organism ID:			
Provided by Supplier?	pers comm amm (Yes)	No	Taxonomist Name:
If "No", by Taxonomist	Yes	No	

Notes:

D.O. (mg/L)	Temp. [2] (°C)	Conductivity or Salinity (Include Units)	pH (Units)	Technician (Initials)
rcvd dry; no WQ	amm			

Notes:

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

ORGANISM RECEIPT LOG

Date:	Time:	WESTON Batch ID:
3/1/11	1315	TCA 3325

Organism ID (Genus and species):	Supplier:
Haliotis rufescens	The Cultured Abalone

Address of Supplier:	Invoice Attached
9580 Dos Pueblos Canyon Rd Goleta, CA 93117	Yes (No)

Phone:	Contact:
805 685-1956	Victor

No. Ordered:	No. Received:	Condition of Organisms:
10	10	good

No. Dead: ∅ >10% Dead?: Yes[1] (No)	Supplier Batch ID:	Approximate Size or Age:
	shipped 2/28/11	adult

Shipper:	B of L (Tracking No.)
FedEx	7944 7582 3325

Condition of Container:	Received By:
good	KS

Confirmation of Organism ID: Provided by Supplier? Yes (No) If "No", by Taxonomist (Yes) No	Taxonomist Name: LIN CRAFT

Notes: kept overnight 3 g's per tub 4 g's in bucket

I'd as Haliotis rufescens 3/2/11 LC using Morris et al 1980 Intertidal Invertebrates of California pg 232

D.O. (mg/L)	Temp.[2] (°C)	Conductivity or Salinity (Include Units)	pH (Units)	Technician (Initials)
*				

Notes: * rcvd dry, no WQ taken 3/1/11 KS

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

ORGANISM RECEIPT LOG

Date: 2/9/11	Time: 1150	WESTON Batch ID: ~~JBH~~ JB5267
Organism ID (Genus and species): Cithariichthys stigmaeus	Supplier: John Brezina	
Address of Supplier: same		Invoice Attached: Yes (No)
Phone: same	Contact: same	
No. Ordered: 500	No. Received: 500+	Condition of Organisms: good
No. Dead: >10% Dead?: ~~Yes~~ (1) @SH No	Supplier Batch ID:	Approximate Size or Age:
Shipper: FeDEx	B of L (Tracking No.) 873 4372 5267	
Condition of Container: good	Received By: SH	
Confirmation of Organism ID: Provided by Supplier? (Yes) No; If "No", by Taxonomist Yes No	Taxonomist Name:	
Notes:		

D.O. (mg/L)	Temp. (2) (°C)	Conductivity or (Salinity) (Include Units)	pH (Units)	Technician (Initials)
20.9	SH ① ~~19.8~~ 12.3	31.7	6.8	SH

Notes: A-C All three same water quality

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

@SH 9-14-10

① ~~JE 2/9/11~~ 2/9/11 SH ② JE 2/9/11 SH ③ JE 2/9/11 am

BIOASSAY SAMPLE RECEIPT

Client: West Basin Municipal Water District		Project: Salinity Study	
Weston Sample ID:	C110804.01	C110805.01a-g	
Client Sample ID:	1st Pass RO Conc.	West Basin Brine	
Renewal Sample (Y/N):	N	Y	
Date/Time Received:	8/4/11 1445	8/5/11 1705	
Airbill #:	7950 3964 6030	n/a	
Sample Tracking Information Kept for Records: (Y/N)	Y	Y	
Collection Date/Time:	8/3/11 1800	8/5/11 1318	
Condition of Shipping Container:	good	Good	
Type and Capacity of Sample Container:	cubi 20L	7x 20L cubi	
Total Sample Volume (L):	20 L	140L	
Condition of Sampling Container:	good	Good	
Sample Container Appropriate: (Y/N)	Y	Y	
Custody Seals Intact: (Y/N)	N/A	n/a	
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y	Y	
Sampler's Name Present on COC Form: (Y/N)	Y	Y	

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	Conductivity (mS/cm) or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C110804.01	13.6	7.3	7.7	62.7	—	—	0.00	<0.5	KS/JM
C110805.01 a	8.3	6.9	7.2	61.5	—	—	0.00	<0.5	BG/KC/JH
b	8.8	7.3	7.0	62.0	—	—	0.00	<0.5	
c	5.9	7.0	7.1	61.8	—	—	0.00	<0.5	
d	6.1	6.9	7.2	62.0	—	—	0.01	<0.5	
e	5.9	6.8	7.3	61.7	—	—	0.00	<0.5	
F	5.9	6.8	7.4	62.1	—	—	0.00	<0.5	
g	6.9	7.1	7.4	61.9	—	—	0.01	<0.5	V

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:	
Reason for unacceptability:	
Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:

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CHAIN OF CUSTODY

32198

DATE 08/03/11 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER

PROJECT MANAGER / CONTACT

COMPANY / CLIENT: West Basin Municipal Water District

ADDRESS: 1021 N. Harbor Dr. Redondo Beach, CA

PHONE / FAX / EMAIL

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	FOR WESTON USE ONLY: WESTON LAB ID
	1st Pass RO Conc (Sample collected per Scott Boden-Steiner Request	08/03	1635			1				C110804.01

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass P=plastic B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other _____

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other _____

SAMPLED BY: PRINT Monica Tirtadidjaja **SIGNATURE**

COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. Monica Tirtadidjaja		United Water	08/03 1800	Yasey Skriveth	Yasey Skriveth	Weston	8/4/11 1445
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

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CHAIN OF CUSTODY

DATE 8/5/11 32199 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: West Basin Municipal Water District Salinity Study
PROJECT MANAGER / CONTACT: Scott Bodenstein / Amy Margolis
COMPANY / CLIENT: Weston Solutions
ADDRESS: above
PHONE / FAX / EMAIL:

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: Mysid-C	Top-C Kelp 48hr	Echino. Dev.	PRESERVED HOW	FOR WESTON USE ONLY: SAMPLE TEMP. (°C) UPON RECEIPT	WESTON LAB ID
	West Basin Brine	8/5/11	1318	SLT	20L P	7	X	X	X	ice 4°C		

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass P=plastic B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other _____

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other _____

SAMPLED BY: PRINT Edgar Givon **SIGNATURE**

COMMENTS / SPECIAL INSTRUCTIONS
transported to Carlsbad lab arrived @ 1705 VS

RELINQUISHED BY

	Print Name	Signature	Firm	Date/Time
1.	Monica Tirtadjaja		West Basin	8/5/11 1318
2.				
3.				
4.				
5.				
6.				

RECEIVED BY

Print Name	Signature	Firm	Date/Time
Kasey Striveth	Kasey Striveth	Weston	8/5/11 1318

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

ORGANISM RECEIPT LOG

Date:	Time:	WESTON Batch ID:
8/4/11	1022	ABS 6533

Organism ID (Genus and species):	Supplier:
Americamysis Bahia	Aquatic Biosystems

Address of Supplier:	Invoice Attached
– Same –	(Yes) No

Phone:	Contact:
– Same –	– Same –

No. Ordered:	No. Received:	Condition of Organisms:
575	680	good

No. Dead: ϕ	Supplier Batch ID:	Approximate Size or Age:
>10% Dead?: Yes[1] (No)	HATCH: 7/28/2011 - 11	7 days

Shipper:	B of L (Tracking No.)
fedEX	9874 1397 6533
Condition of Container:	Received By:
good	SH

Confirmation of Organism ID:			
Provided by Supplier?	~~Yes~~ (circled)	No	
If "No", by Taxonomist	Yes	No	Taxonomist Name:

Notes:

D.O. (mg/L)	Temp. [2] (°C)	Conductivity or (Salinity) (Include Units)	pH (Units)	Technician (Initials)
11.3	19.2	31.6	7.2	SH

Notes:

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

ORGANISM RECEIPT LOG

Date:	Time:	WESTON Batch ID:
8/9/11	0935	ABS 7080

Organism ID (Genus and species):	Supplier:
Atherinops affinis	Aquatic Bio Systems

Address of Supplier:	Invoice Attached
same	(Yes) No

Phone:	Contact:
Same	Same

No. Ordered:	No. Received:	Condition of Organisms:
400	440	good

No. Dead: 2 >10% Dead?: Yes[1] (No)	Supplier Batch ID: Hatch 7/28/11	Approximate Size or Age: 12 day

Shipper:	B of L (Tracking No.)
Fed Ex	9874 1397 7080

Condition of Container:	Received By:
good	KS

Confirmation of Organism ID:			
Provided by Supplier?	(Yes)	No	
If "No", by Taxonomist	Yes	No	Taxonomist Name:

Notes:

D.O. (mg/L)	Temp. [2] (°C)	Conductivity or (Salinity) (Include Units)	pH (Units)	Technician (Initials)
10.2	19.8	27.9	7.1	KS

Notes:

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

ORGANISM RECEIPT LOG

Date:	Time:	WESTON Batch ID:
8/23/11	1350	PG0823 11

Organism ID (Genus and species):	Supplier:
Strongylocentrotus purpuratus	Dave Gutoff

Address of Supplier:	Invoice Attached
Same	Yes (No)

Phone:	Contact:
Same	Dave

No. Ordered:	No. Received:	Condition of Organisms:
60	40	Good

No. Dead: 0	Supplier Batch ID:	Approximate Size or Age:
>10% Dead?: Yes[1] (No)	Collected: 8/22/11	adult

Shipper:	B of L (Tracking No.)
N/A	N/A

Condition of Container:	Received By:
good	JH

Confirmation of Organism ID:			
Provided by Supplier?	Yes	(No)	Taxonomist Name: ZIN CRAFT
If "No", by Taxonomist	(Yes)	No	

Notes: Id'd as Strongylocentrotus purpuratus using Morris et al 1980 8/23/11

D.O. (mg/L)	Temp. [2] (°C)	Conductivity or Salinity (Include Units)	pH (Units)	Technician (Initials)
9 JH				

Notes: 0 received dry; No WQ 8/23/11 JH

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

BIOASSAY SAMPLE RECEIPT

Client: West Basin Municipal Water District	Project: Salinity Study		
Weston Sample ID:	C110923.01a-d		
Client Sample ID:	West Basin Brine		
Renewal Sample (Y/N):	No		
Date/Time Received:	9/23/11 1130		
Airbill #:	7952 1582 6477		
Sample Tracking Information Kept for Records: (Y/N)	N		
Collection Date/Time:	9/22/11 ① KS		
Condition of Shipping Container:	good		
Type and Capacity of Sample Container:	20L cubi x4		
Total Sample Volume (L):	80L		
Condition of Sampling Container:	good		
Sample Container Appropriate: (Y/N)	yes		
Custody Seals Intact: (Y/N)	N/A		
Ice or Frozen Blue Ice Present During Shipment/Transport: (Y/N)	Y		
Sampler's Name Present on COC Form: (Y/N)	① KS		

TAKE THE FOLLOWING MEASUREMENTS UPON ARRIVAL

WESTON ID	Temp. (°C) (0-6°C) *	Dissolved Oxygen (mg/L)	pH	Conductivity ~~(mS/cm)~~ or Salinity (ppt)	Hardness (mg $CaCO_3$/L)	Alkalinity (mg $CaCO_3$/L)	Total Chlorine (mg/L)	Total Ammonia (mg NH_3/L)	Tech
C110923.01a	14.1	7.1	7.7	62.7	—	—	0.00	<0.5	BG
b	14.8	6.5	7.8	62.6	—	—	0.00	<0.5	↓
c	12.8	6.9	7.8	62.5	—	—	0.00	<0.5	↓
↓ d	11.1	7.2	7.8	63.0	—	—	0.00	<0.5	↓

*Notify project manager or study director of temperatures above 6°C. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:	
Name of Client Contact:	Contacted by:
Client Response and/or Action to be Taken:	Date Action Taken:

① No COC could be obtained from West Basin staff, therefore sample time and sampler name are not known 11/28/11 KS

CHAIN OF CUSTODY

32264

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DATE 9/23/11 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: West Basin Municipal Water District Salinity Study
PROJECT MANAGER / CONTACT: Scott BodenSteiner
COMPANY / CLIENT: Weston Solutions
ADDRESS: above
PHONE / FAX / EMAIL: "

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED: Mysid-chronic	Topsmelt-chronic	Kelp-chronic	Echino-dev.	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	FOR WESTON USE ONLY: WESTON LAB ID
	West Basin Brine	9/22/11	①KS	SLT	P-20L	4	x	x	x	x	ice	11.1-14.8	C110923.01 a-d

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass P=plastic B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other _____

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other _____

SAMPLED BY: PRINT ①KS SIGNATURE →

COMMENTS / SPECIAL INSTRUCTIONS
① No COC was included with sample. This COC was created after the fact in lieu of an original COC. 9/28/11 KS

RELINQUISHED BY

	Print Name	Signature	Firm	Date/Time
1.	①KS			→
2.				
3.				
4.				
5.				
6.				

RECEIVED BY

Print Name	Signature	Firm	Date/Time
Beverly Griffith	Beverly Griffith	Weston	9/23/11 1130

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

ORGANISM RECEIPT LOG

Date: 10/18/11	Time: 0955	WESTON Batch ID: ABS 5906
Organism ID (Genus and species): Americamysis bahia	Supplier: Aquatic Biosystems	
Address of Supplier: — Same —		Invoice Attached (Yes) No
Phone: — Same —	Contact: — Same —	
No. Ordered: 600	No. Received: 660	Condition of Organisms: good
No. Dead: >10% Dead?: Yes[1] (No)	Supplier Batch ID: Hatched 10/11/11	Approximate Size or Age: 7 days
Shipper: Fed Ex	B of L (Tracking No.) 9874 1398 5906	
Condition of Container: Good	Received By: BG	
Confirmation of Organism ID: Provided by Supplier? (Yes) No; If "No", by Taxonomist Yes No	Taxonomist Name:	
Notes:		

D.O. (mg/L)	Temp. [2] (°C)	Conductivity or (Salinity) (Include Units)	pH (Units)	Technician (Initials)
11.7	15.6	31.1 ppt	7.1	BG

Notes:

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

ORGANISM RECEIPT LOG

Date:	Time:	WESTON Batch ID:
9/27/11	1020	ABS 2951

Organism ID (Genus and species):	Supplier:
Atherinops affinis	Aquatic Biosystems

Address of Supplier:	Invoice Attached
- Same -	(Yes) No

Phone:	Contact:
- Same -	- Same -

No. Ordered:	No. Received:	Condition of Organisms:
400	440	good

No. Dead:	Supplier Batch ID:	Approximate Size or Age:
>10% Dead?: Yes[1] (No)	Hatched: 9/15/11	12 days

Shipper:	B of L (Tracking No.)
Fed Ex	9874 1398 2951

Condition of Container:	Received By:
good	BG

Confirmation of Organism ID:			
Provided by Supplier?	(Yes)	No	Taxonomist Name:
If "No", by Taxonomist	Yes	No	

Notes:

D.O. (mg/L)	Temp. [2] (°C)	Conductivity or (Salinity) (Include Units)	pH (Units)	Technician (Initials)
① 12.7 ② 12.0	① 20.0 ② 19.9	① 27.9 ② 27.9	① 7.1 ② 7.2	BG

Notes:

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

ORGANISM RECEIPT LOG

Date:	Time:	WESTON Batch ID:
10/5/11	0930	DG 100511

Organism ID (Genus and species):	Supplier:
Strongylocentrotus purpuratus	Dave Gutoff

Address of Supplier:	Invoice Attached
- Same -	Yes (No)

Phone:	Contact:
- Same -	- Same -

No. Ordered:	No. Received:	Condition of Organisms:
19	19	Good

No. Dead: Ø >10% Dead?: Yes[1] (No)	Supplier Batch ID: collected: 10/4/11	Approximate Size or Age: ADULT

Shipper:	B of L (Tracking No.)
n/a	n/a

Condition of Container:	Received By:
GOOD	ke

Confirmation of Organism ID: Provided by Supplier? Yes (No) If "No", by Taxonomist (Yes) No	Taxonomist Name: Lin Craft LIN CRAFT

Notes:
Identified as Strongylocentrotus purpuratus using Morris, Abbott + Haderlie 1980. 10/5/11

D.O. (mg/L)	Temp. [2] (°C)	Conductivity or Salinity (Include Units)	pH (Units)	Technician (Initials)
① ke				→

Notes:
① Received dry. No WQ. 10/5/11 ke

(1) If number dead exceeds 10 percent, Lab Manager or Project Manager must be notified immediately.

(2) If temperature upon arrival is more than 3°C above or below the temperature at which the test will be run, Lab Manager or Project Manager must be notified immediately.

WESTON SOLUTIONS

☒ 2433 Impala Drive • Carlsbad, CA 92010 • (760) 795-6900, FAX 931-1580
☐ 1440 Broadway, Ste. 910 • Oakland, CA 94612 • (510) 808-0302, FAX 891-9710

CHAIN OF CUSTODY

32333

DATE 6/19/12 PAGE 1 OF 1

PROJECT NAME / SURVEY / PROJECT NUMBER: WEST BASIN
PROJECT MANAGER / CONTACT: SCOTT BODENSTEINER
COMPANY / CLIENT: WESTON SOLUTIONS
ADDRESS: -see above-
PHONE / FAX / EMAIL: -see above-

SITE ID (Location)	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE / VOLUME	TOTAL NUMBER OF CONTAINER	ANALYSIS/TEST REQUESTED	PRESERVED HOW	SAMPLE TEMP. (°C) UPON RECEIPT	FOR WESTON USE ONLY: WESTON LAB ID
	WEST BASIN BRINE	6/19/12	1015	H_2O	4L Cubi	5		ICE	2.3	

Sample Matrix Codes: FW= fresh water GW=ground water SLT=salt water SW=storm water WW=waste water SED=sediment A=air BIO=biologic SS=soil T=tissue O=other (specify) _____

Container Code: G=glass P=plastic B=bags ☐ O=other _____

Shipped By: ☐ Courier ☐ UPS ☐ FedEx ☐ USPS ☐ Client drop off ☐ Other _____

Turnaround Time: ☐ 2-day ☐ 5-day ☐ 7-day ☐ 10-day ☐ 14-day ☐ Standard ☐ Other _____

Reporting Requirements: ☐ PDF ☐ EDD ☐ Hard Copy ☐ Email ☐ Other _____

SAMPLED BY: PRINT KEVIN CURRY SIGNATURE Kevin Curry

COMMENTS / SPECIAL INSTRUCTIONS

RELINQUISHED BY				RECEIVED BY			
Print Name	Signature	Firm	Date/Time	Print Name	Signature	Firm	Date/Time
1. KEVIN CURRY	Kevin Curry	WESTON	6/19/12 1305	Katie Flaker	Katie Flaker	Nautilus	6/19/12 1305
2.							
3.							
4.							
5.							
6.							

WHITE – return to originator • YELLOW – lab • PINK – retained by originator

Nautilus Log in ID # 12-0488

Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Client: Weston Solutions
Sample ID: West Basin Bulk
Test ID No(s).: 1206-5139a,b,c,d

Sample (A, B, C):	—			
Log-in No. (12-xxxx):	0448			
Sample Collection Date & Time:	6/10/12 1015			
Sample Receipt Date & Time:	6/19/12 1705			
Number of Containers & Container Type:	1 4L Cubi			
Approx. Total Volume Received (L):	4L			
Check-in Temperature (°C)	2.3			
Temperature OK? [1]	(Y) N	Y N	Y N	Y N
DO (mg/L)	8.0			
pH (units)	7.71			
Conductivity (µS/cm)	—			
Salinity (ppt)	69.4			
Alkalinity (mg/L)*	240			
Hardness (mg/L)* [a]	—			
Total Chlorine (mg/L)	<0.02			
Technician Initials	JW / KH			

Test Performed: Echinoderm Development ~~Fertilization~~ Control/Dilution Water: 8:2 / (Lab SW) / Lab ART Other: _____
Alkalinity: 128 Hardness or Salinity: 34
Additional Control? Y (N) = _____ Alkalinity: _____ Hardness or Salinity: _____

Test Performed: _____ Control/Dilution Water: 8:2 / Lab SW / Lab ART Other: _____
Alkalinity: _____ Hardness or Salinity: _____
Additional Control? Y N = _____ Alkalinity: _____ Hardness or Salinity: _____

Test Performed: _____ Control/Dilution Water: 8:2 / Lab SW / Lab ART Other: _____
Alkalinity: _____ Hardness or Salinity: _____
Additional Control? Y N = _____ Alkalinity: _____ Hardness or Salinity: _____

Notes: [1] Temperature of sample should be 0-6°C, if received more than 24 hours past collection time.
* = mg/L as CaCO3, a = Measured for freshwater samples only, NA = Not Applicable

Sample Check-In Information

Sample Description: no odor, clear, no odor, no debris

COC Complete (Y/N)?
A ✓ B ____ C ____

Filtration? Y (N)
Pore Size: _____
Organisms or Debris

Salinity Adjustment? Y (N)
Artificial Salts: target ppt: _____
Hypersaline Brine: target ppt: _____
Tests: _____

pH Adjustment? Y (N)

	A	B	C
Initial pH:			
Amount of HCl added:			
Final pH:			

Cl_2 Adjustment? Y (N)

	A	B	C
Initial Free Cl_2:			
STS added:			
Final Free Cl_2:			

Additional Comments: _____

QC Check: KF 7/5/12
Final Review: KF 7/13/12

Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120

Client: Weston Solutions
Sample ID: West Basin Brine
Test ID No(s).: 1207-S176

Sample Check-In Information

Sample (A, B, C):	—			
Log-in No. (12-xxxx):	12-0521			
Sample Collection Date & Time:	7/9/12 1215			
Sample Receipt Date & Time:	7/9/12 1545			
Number of Containers & Container Type:	1/ 5 Gal sparkletts container			
Approx. Total Volume Received (L):	5 Gal			
Check-in Temperature (°C)	23.5 °C			
Temperature OK? [1]	(Y) N	Y N	Y N	Y N
DO (mg/L)	5.9			
pH (units)	7.81			
Conductivity (~~µ~~mS/cm)	91.5 ~~mS/cm~~ KF			
Salinity (ppt)	67.4			
Alkalinity (mg/L)*	223			
Hardness (mg/L)* [a]	—			
Total Chlorine (mg/L)	<0.02			
Technician Initials	SG			

Sample Description: ~~No color, No odor, No debris, sample was clear~~

COC Complete (Y/(N))?
A___ B___ C___

Filtration? Y (N)
Pore Size: ____
Organisms or Debris

Salinity Adjustment? ~~(Y)~~ ~~(N)~~ NO (sa sa)
Artificial Salts: target ppt: ____
Hypersaline Brine: target ppt: ____
Tests: ____

pH Adjustment? Y (N)

	A	B	C
Initial pH:			
Amount of HCl added:			
Final pH:			

Cl_2 Adjustment? Y (N)

	A	B	C
Initial Free Cl_2:			
STS added:			
Final Free Cl_2:			

Additional Comments: ____

Test Performed: Echinoderm Fertilization Control/Dilution Water: 8:2 / (Lab SW) / Lab ART Other: ____
Alkalinity: 125 Hardness or Salinity: 34 ppt
Additional Control? (Y) N = Brine Exposure Alkalinity: Not measured Hardness or Salinity: 41.7 ppt

Test Performed: Echinoderm Development Control/Dilution Water: 8:2 / (Lab SW) / Lab ART Other: ____
Alkalinity: 125 Hardness or Salinity: 34 ppt
Additional Control? (Y) N = Brine Exposure Alkalinity: Not measured Hardness or Salinity: 41.7 ppt

Test Performed: ____ Control/Dilution Water: 8:2 / Lab SW / Lab ART Other: ____
Alkalinity: ____ Hardness or Salinity: ____
Additional Control? Y N = ____ Alkalinity: ____ Hardness or Salinity: ____

Notes: [1] Temperature of sample should be 0-6°C, if received more than 24 hours past collection time.
* = mg/L as CaCO3, a = Measured for freshwater samples only, NA = Not Applicable

QC Check: SG 8/16/12
Final Review: KF 8/16/12

Nautilus Environmental
4340 Vandever Avenue
San Diego, CA 92120
Phone 858.587.7333
Fax 858.587.3961

Chain of Custody

Date 07/09/12 Page 1 of 1

Sample Collection By: Weston

Report to:
Company: Weston Solutions
Address:
City/State/Zip:
Contact:
Phone:
Email:

Invoice To:
Company:
Address:
City/State/Zip:
Contact:
Phone:
Email:

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	ANALYSES REQUIRED: Uranin Fertilization	ANALYSES REQUIRED: Uranin Development	Receipt Temperature (°C)
1	West Basin Brine	07/09/12	12:15	Brine	5Gal Sparkletts Container	1		X	X	23.5°
2										
3										
4										
5										
6										
7										
8										
9										
10										

PROJECT INFORMATION
Client:
PO No.:
Shipped Via:

SAMPLE RECEIPT
Total No. of Containers: 1
Received Good Condition? Y
Matches Test Schedule? Y

SPECIAL INSTRUCTIONS/COMMENTS:
*COC not provided by client. Completed by Nautilus staff

1) RELINQUISHED BY (CLIENT)
(Signature) (Time)
(Printed Name) (Date)
(Company)

2) RECEIVED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

3) RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

4) RECEIVED BY (LABORATORY)
(Signature) (Time) 1545
(Printed Name) Jeff Van Voorhis (Date) 7/9/12
(Company) Nautilus

Additional costs maybe required for sample disposal or storage.
Payment Net 30 unless otherwise contracted.

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DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Lab # 12-0521