Report

of

Test No. 806-1

Assessment of Freshwater Sediments as part of the Downtown Portland Sediment Characterization project, using a 28-day Amphipod, *Hyalella azteca*, Sediment Bioassay.

Submitted to

Hart Crowser, Inc.,
8910 SW Gemini Drive
Beaverton, OR 97008

Submitted by

Northwestern Aquatic Sciences
3814 Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

May 7, 2010

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 806-1

Title: Toxicity of freshwater sediments using a 28-day Amphipod, *Hyalella azteca*, sediment bioassay as part of the Downtown Portland Sediment Characterization Project.

Protocol No.: NAS-XXX-HA4c, February 11, 2000. Revision 3 (4-26-05). Based on ASTM 2001 (Standard test methods for measuring the toxicity of sediment-associated contaminants with fresh water invertebrates, E1706-00), Am. Soc. Test. Mat., Phila., PA, and EPA Method 100.1 (Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates, EPA/600/R-99/064).

STUDY MANAGEMENT

Study Sponsor: Hart Crowser, Inc., 8910 SW Gemini Drive, Beaverton, OR 97008
Sponsor's Study Monitor: Mr. Rick Ernst
Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365
Test Location: Newport laboratory
Laboratory's Study Personnel: G.J. Irissarri, B.S., Proj. Man./Study Dir.; L.K. Nemeth, B.A., M.B.A., QA Officer; R.S. Caldwell, PhD, Sr. Toxicologist; G.A. Buhler, B.S., Aq. Toxicologist; S.J. Gage, B.A., Sr. Tech.; L.P. Sandoval, B.S., Tech.; Y. Nakahama, Tech.
Study Schedule:
Test Beginning: 3-16-10, 1015 hrs.
Test Ending: 4-13-10, 1110 hrs.
Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 3814 Yaquina Bay Rd., Newport, OR 97365.
Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).
Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Test Sediments: Freshwater test sediments collected as part the Downtown Portland Sediment Characterization project. Details are as follows:

NAS Sample No.	3133G	3134G	3135G
Description	DPSC-G088	DPSC-G095	DPSC-G096
Collection Date	2/24/10	2/22/10	2/25/10
Receipt Date	3/4/10	3/4/10	3/4/10

Control Sediment: The negative control sediment (NAS#3136G) was collected on 3-10-10 from an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.
Treatments: Homogenized at test set up by mixing using stainless steel implements.
Storage: All test, reference, and control sediments were stored at 4°C in the dark in sealed containers until used.

TEST WATER

Source: Dechlorinated municipal tap water.
Dates of Preparation: 3/12/10, 3/30/10, 4/9/10
Water Quality:
pH: 6.9, 7.0, 7.1
conductivity: 130, 137, 150 µmhos/cm
hardness: 43, 43, 43 mg/L as $CaCO_3$
alkalinity: 30, 30, 30 mg/L as $CaCO_3$.

total chlorine: < 0.02, <0.02, <0.02 mg/L
Pretreatment: Dechlorinated and aerated ≥24 hr.

TEST ORGANISMS

Species: *Hyalella azteca,* amphipod.
Age/Size: 8-9 days old
Source: Chesapeake Cultures, Hayes, VA; received 3-12-10
Acclimation: Holding conditions for the five days prior to testing averaged: Temperature, 19.7 ± 1.3 °C; dissolved oxygen, 9.9 ± 2.9 mg/L; pH, 7.4 ± 0.5; conductivity, 328 ± 148 µmhos/cm; hardness, 111 ± 58 mg/L as $CaCO_3$; and alkalinity, 108 ± 61 mg/L as $CaCO_3$. Photoperiod, 16:8, L:D. Half of the water was replaced daily with dechlorinated municipal tap water during holding. Animals were fed YTC daily during holding.

TEST PROCEDURES AND CONDITIONS

The following is an abbreviated statement of the test procedures and a statement of the test conditions actually employed. See the test protocol (Appendix I) for a more detailed description of the test procedures used in this study.

Test Chambers: 300 ml high-form glass beakers
Test Volumes: 100 ml sediment layer; 175 ml test water.
Replicates/Treatment: 8 (plus two additional WQ beakers)
Organisms/Treatment: 80
Water Volume Changes: 2 water volumes per day
Aeration: None.
Feeding: Animals are fed 1.0 ml of YTC suspension per beaker daily.
Effects Criteria: 1) survival after 28 days, and 2) average individual dry weight after 28 days. Death is defined as no visible movement or response to tactile stimulation. Missing organisms were considered to be dead.
Water Quality and Other Test Conditions: The temperature, dissolved oxygen, conductivity, pH, hardness, alkalinity, and ammonia-nitrogen were measured in the overlying water of one replicate test container per treatment on days 0 and 28 of the test. Temperature was measured daily, pH and dissolved oxygen three times per week, and conductivity weekly, in the overlying water of one replicate test container per treatment. Hardness and alkalinity were measured with titrimetric methods. Total ammonia and pH were measured in the pore water from the bulk sediment prior to test initiation and an additional replicate beaker on day 10. Interstitial water samples were obtained by centrifugation. Ammonia-N was measured using Hach reagents based on the salicylate (Clin. Chim. Acta 14:403, 1996) colorimetric method; samples were not distilled prior to analysis. The photoperiod was 16:8, L:D.

DATA ANALYSIS METHODS

Survival, mortality and average individual dry weight were calculated for each replicate as follows:

percent survival = 100 x (number surviving/initial number tested)
percent mortality = 100 x (number dead/initial number tested)

average individual dry weight = (final wt. - tare wt.)/number weighed,
where:
final wt. = tare wt. + dry weight of organisms recovered on day 28, in mg

Means and standard deviations for the biological endpoints described above, and for water quality data, were computed using Microsoft Excel 2000.

PROTOCOL DEVIATIONS

The age of the *Hyalella* at test initiation was 8-9 days old not the 7-8 days as specified in the protocol.

REFERENCE TOXICANT TEST

The reference toxicant test is a multi-concentration toxicity test using potassium chloride, to evaluate the performance of the test organisms used in the sediment toxicity test. The performance is evaluated by

comparing the results of this test with historical results obtained at the laboratory. A summary of the reference toxicant test result is given below. The reference toxicant test raw data are found in Appendix III.

Test No.: 999-2708
Reference Toxicant and Source: Potassium Chloride (KCl), Fisher Lot #073280.
Test Date: 3-16-10.
Dilution Water Used: Moderately hard synthetic water prepared from Milli-Q® deionized water.
Result: 96-hr LC50, 0.35 g/L. This result is within the laboratory's control chart warning limits (0.32 – 0.47 g/L).

TEST RESULTS

Observations of water quality in the overlying water throughout the test are summarized in Table 1. A detailed tabulation of the water quality results by sample and test day can be found in Appendix II. Interstitial ammonia measurements and pH of bulk sediments are listed in Table 2. The means and standard deviations of percent mortality and average dry weight of *Hyalella* exposed for 28 days to sediments are summarized in Table 3. Detailed data organized by sample and replicate, and summary statistics for these observations, are given in Appendix II.

All water quality observations of overlying water temperature and dissolved oxygen were within the protocol specified ranges. Ammonia-N in the overlying water ranged between <0.1 and 0.2 mg/L for all day 0 and day 28 measurements. Interstitial bulk sediment values for ammonia-N ranged from <0.5 to 1.6 mg/L.

The test met the survival acceptability criteria specified in the test protocol with 1.3 % mean control mortality (≤20% required). The reference toxicant (positive control) EC50 result was within the laboratory's control chart limits (0.35 g/L; control chart mean ± 2 S.D. = 0.40 ± 0.07). It is concluded, therefore, that the test has developed fully acceptable data for use in making management decisions.

STUDY APPROVAL

Gerald Lissari 5-5-10
Project Manager/Study Director Date

Julie R. Fine 5-5-10
Quality Assurance Unit Date

Linda K. Nemeth 5/3/10
Assistant Laboratory Director Date

Table 1. Summary of water quality conditions during tests of the amphipod, *Hyalella azteca*, exposed to freshwater sediments.

Water Quality Parameter	Mean ± S.D.	Minimum	Maximum	N
Temperature (°C)	22.6 ± 0.3	22.0	23.3	116
Dissolved oxygen (mg/L)	6.7 ± 0.5	4.6	7.8	56
Conductivity (µmhos/cm)	147 ± 10	129	180	24
pH	6.6 ± 0.2	6.2	7.0	56
Hardness (mg/L as $CaCO_3$)	40 ± 5	34	43	8
Alkalinity (mg/L as $CaCO_3$)	34 ± 5	30	40	8
Total ammonia (mg/L)	---	<0.1	0.2	8

Table 2. Interstitial ammonia-N and pH in test sediment porewaters on day 0 and at test termination.

NAS Sample No.	Sample Description	Day 0		Day 28	
		pH	Ammonia (mg/L)	pH	Ammonia (mg/L)
3136G	Control	6.7	0.6	6.4	1.5
3133G	DPSC-G088	6.3	<0.5	6.4	0.7
3134G	DPSC-G095	6.9	<0.5	6.5	1.6
3135G	DPSC-G096	6.8	<0.5	6.3	0.8

Table 3. Mortality and growth results of *Hyalella azteca* 28-day sediment toxicity test.

NAS Sample No.	Sample Description	Percent mortality (Mean ± SD)	Average dry wt/amphipod (mg) (Mean ± SD)
3136G	Control	1.3 ± 3.5	0.49 ± 0.14
3133G	DPSC-G088	0.0 ± 0.0	0.42 ± 0.09
3134G	DPSC-G095	10.0 ± 7.6	0.48 ± 0.11
3135G	DPSC-G096	6.3 ± 10.6	0.51 ± 0.10

APPENDIX I

PROTOCOL

TEST PROTOCOL

FRESHWATER AMPHIPOD, *HYALELLA AZTECA*, 28-DAY SEDIMENT SURVIVAL AND GROWTH TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this study is to characterize the chronic toxicity of freshwater sediments using a 28-day exposure and survival and growth endpoints with the amphipod, *Hyalella azteca*.

1.2 Referenced Method: This protocol is based on ASTM Method E 1706-00 (ASTM 2001) and EPA Method 100.1 (EPA/600/R-99/064)

1.3 Summary of Method: A summary of test conditions for the amphipod 28-day sediment survival and growth test is tabulated below. The test with *Hyalella azteca* is conducted at 23 ± 1°C with a 16L:8D photoperiod at an illuminance of about 100-1000 lux. Test chambers are 300-mL high-form lipless beakers containing 100 mL of sediment and 175 mL of overlying water. Ten 7-8day old amphipods are used in each replicate. The number of replicates/treatment depends on the objective of the test. Eight replicates are recommended for routine testing. Amphipods in each test chamber are fed 1.0 mL of YCT food daily. Each chamber receives two volume additions per day of overlying water. Test endpoints include survival and growth.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
3814 Yaquina Bay Road, P.O. Box 1437
Newport, OR 97365.

2.4 Test Location:

_____

2.5 Laboratory's Personnel to be Assigned to the Study:
Study Director: _____
Quality Assurance Unit: _____
Aquatic Toxicologist: _____
Aquatic Toxicologist: _____

2.6 Proposed Testing Schedule: Tests are normally begun within 14 days of sample collection. Reference toxicant test to be run concurrently.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

3. TEST MATERIAL

The test materials are freshwater sediments. The control, reference, and test sediments are placed in solvent cleaned 1 L glass jars fitted with PTFE-lined screw caps. At the laboratory the samples are stored at 4°C in the dark. The original sealed containers may be stored for up to 8 weeks prior to testing, depending on the testing requirements. If jars are not not full when received or if sediment is removed for testing, headspaces should be filled with nitrogen to retard deterioration. A negative control sediment is collected from a clean site. In addition, a reference sediment, a clean sediment with physical characteristics similar to the test sediments, may be employed as a comparison station.

4. TEST WATER

Test water (overlying water) at NAS is normally dechlorinated tap water or moderately hard synthetic water. Synthetic dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals. Test water may also be well water, surface water, site water, or other water depending on the study design. The hardness or other water quality parameters of the dilution water may need to be adjusted to meet the study design.

5. TEST ORGANISMS

5.1 Species: amphipod, *Hyalella azteca*.

5.2 Source: Cultured at NAS. Alternatively, animals may be purchased from a reputable commercial supplier.

5.3 Age: 7-8 days old at start of test

5.4 Acclimation and Pretest Observation: Cultures are maintained at 23 ± 1°C under a 16:8 L:D photoperiod. Cultured amphipods are fed dried maple leaves with YTC. Rabbit chow, Tetramin® or TetraFin® flakes may also be used. Acclimation of test organisms to the test water may be desirable, depending on culture water, but it is not required. If test organisms are to be acclimated, fifty percent of the holding water is changed daily with the addition of test water.

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers used in the toxicity test are 300-mL high-form lipless glass beakers. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath or by placement in a temperature-controlled room. Aeration is not empolyed unless dissolved oxygen drops below 2.5 mg/L. The test is conducted under an illuminance of 100-1000 lux with a 16L:8D photoperiod.

6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in EPA/600/4-90/027F. New glassware and test systems are soaked 15 minutes in tap water and scrubbed with detergent (or cleaned in automatic dishwasher); rinsed twice with tap water; carefully rinsed once with fresh, dilute (10%, V:V) hydrochloric or nitric acid to remove scale, metals, and bases; rinsed twice with deionized water; rinsed once with acetone to remove organic compounds (using a fume hood or canopy); and rinsed three times with deionized water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of amphipods to test, control, and reference sediments. The sediments are placed on the bottom of the test containers and are overlain with test water. The test exposure is for 28 days. The renewal of overlying water consists of two volume additions per day, either continuous or intermittent. Each treatment consists of eight replicate test containers, each containing 10 organisms. Test chamber positions are completely randomized. Test organisms are randomly distributed to the test chambers. Blind testing is normally used.

7.2 Setup of Test Containers: Sediments are homogenized and placed in test chambers on the day before addition of test organisms. Sediment (100 ml) is placed into each of eight replicate beakers. After addition of the sediment, 175 ml of test water is gently added to each beaker in a manner to prevent resuspension. The overlying water is replaced twice daily. The test begins when amphipods are introduced to the test chambers. Initial water quality measurements are taken prior to the addition of test organisms.

7.3 Effect Criterion: The effect criteria used in the 28-day amphipod bioassay are mortality and growth. Death is defined as the lack of movement of body or appendages on response to tactile stimulation. Growth is measured as change in dry weight.

7.4 Test Conditions: No aeration is employed unless dissoved oxygen falls below 2.5 mg/L. The test temperature employed is 23 ± 1°C. A 16:8, L:D photoperiod is used. Illumination is supplied by daylight fluorescent lamps at 100-1000lux. The overlying water is replaced twice daily.

7.5 Beginning the Test: On the day the test begins, amphipods are impartially counted into small containers of test water (10/container). The test is begun by rinsing test organisms into the equilibrated test containers. For the growth endpoint, time-zero weight data should be collected.

7.6 Feeding: Amphipods are fed 1.0 mL of YCT daily per test chamber. A feeding may be skipped if there is a build up of excess food. However, all beakers must be treated similarly.

7.7 Test Duration, Type and Frequency of Observations, and Methods: The duration of the toxicity test is 28 days. The type and frequency of observations to be made are summarized as follows:

TYPE OF OBSERVATION	TIMES OF OBSERVATION
BIOLOGICAL DATA	
Survival, growth	Day 28
PHYSICAL AND CHEMICAL DATA	
Hardness, alkalinity, conductivity, and ammonia-N	Beginning and end of test in overlying water of one replicate beaker from each treatment.
Temperature	Daily in overlying water of one replicate beaker from each treatment.
Conductivity	Weekly
Dissolved oxygen and pH	3X/week
Optional pore water ammonia and/or sulfide	In test sediments prior to initiating the tests. Optionally in sediments from sacrificial test chambers at test beginning and/or end.

Dissolved oxygen is measured using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is measured using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using titrometric methods. Total soluble sulfide and total ammonia-N were

measured using Hach test kits based on the methylene blue (EPA Method 376.2) and salicylate (Clin. Chim. Acta 14:403, 1996) colorimetric methods, respectively; samples were not distilled prior to analysis.

Overlying water should be sampled just before water renewal from about 1 to 2 cm above the sediment surface using a pipet. It may be necessay to pool water samples from individual replicates. The pipet should be checked to make sure no organisms are removed during sampling of overlying water.

7.8 Test Termination: At test termination, the contents of each test container are sieved through a #35 (500 µm mesh) sieve to recover the amphipods. Amphipods from each replicate are put into a 30 mL plastic cup, rinsed with DI water, gently blotted and place into the appropriate tared aluminum weighing pan. The number of survivors for each container is recorded on the datasheet.

7.9 Growth Measurement: Growth is measured as average dry weight of animals in a test replicate at the end of the test on day 28. Pooled animals from each test replicate are gently blotted and placed into tared aluminum weigh pans. The pans are dried at 60-90°C to constant weight. The dried amphipods are placed into a dessicator and weighed as soon as possible to the nearest 0.01 mg (desirable to use 0.001 mg). The total weight of the dried amphipods in each pan is divided by the number of amphipods weighed to obtain an average dry weight per surviving amphipod per replicate.

8. CRITERIA OF TEST ACCEPTANCE

The test results are acceptable if the minimum survival of organisms in the control treatment at the end of the test is at least 80%.

9. DATA ANALYSIS

The endpoints of the toxicity test are survival and growth. Survival is obtained as a direct count of living organisms in each test container at the end of the test. Average amphipod dry weight, also measured at the end of the test, may be used to compare growth between treatment sediments and the control or reference sediment. Ordinarily the following data analysis is performed. Due to special requirements, alternative methods may be used. The means and standard deviations are calculated for each treatment level. Identification of toxic sediments is established by statistical comparison of test endpoints between test and control or reference sediments. Between treatment comparisons may be made using a Student's t-test or Wilcoxon's Two-Sample test, where each treatment is compared to the control or the reference sediment. An arcsine-square root transformation of proportional data, and tests for normality and heterogeneity of variances, are performed prior to statistical comparisons.

10. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; date and time of test beginning and end; information on the test material; information on the source and quality of the overlying/test water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including feeding, if any, and water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses and a summary table of endpoints; a description of the statistical methods used; any unusual information about the test or deviations from procedures; reference toxicant testing information.

11. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

12. REFERENCE TOXICANT

The reference toxicant test is a standard multi-concentration toxicity test using a specified chemical toxicant to evaluate the performance of test organisms used in the study. Reference toxicant tests are 96-hour, water only exposures, not 28-day sediment exposures. The reference toxicant test is run concurrently. Performance is evaluated by comparing the results of the reference toxicant test with historical results (e.g., control charts) obtained at the laboratory.

13. REFERENCED GUIDELINES

ASTM. 2001. Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates. ASTM Standard Method No. E 1706-00. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. EPA. 2000. Section 11, Test Method 100.1, *Hyalella azteca* 10-d Survival and Growth Test for Sediments, pp. 47-54 In: Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates (Second Edition). EPA/600/R-99/064.

Weber, C.I. (Ed.) 1993. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fourth Edition). EPA/600/4-90/027F.

14. APPROVALS

_____ for _____
Name Date

_____ for **Northwestern Aquatic Sciences**
Name Date

Appendix A
Test Conditions Summary

1. Test type	whole sediment toxicity test with renewal of overlying water
2. Test duration	28 days
3. Temperature	23 ± 1°C
4. Light quality	daylight fluorescent light
5. Illuminance	100-1000 lux
6. Photoperiod	16L:8D
7. Test chamber size	300-mL high-form lipless beakers, (Pyrex® 1040 or equivalent)
8. Sediment volume	100 mL
9. Overlying water volume	175 mL
10. Renewal overlying water	2 volume additions/day (continuous or intermittent)
11. Age of test organisms	7-8 days old at test initiation
12. Organisms per test chamber	10
13. Replicates per treatment	8 recommended for routine testing (depends on design)
14. Organisms per treatment	80
15. Feeding regime	YCT food, fed 1.0 mL daily/chamber
16. Cleaning	if screens are used, clean as needed
17. Aeration	None, unless DO falls below 2.5 mg/L
18. Overlying (test) water	Dechlorinated tap water, culture water, well water, surface water, site water or reconstituted water, depending on study design.
19. Water quality	Hardness, alkalinity, conductivity, ammonia-N beginning and end; temperature daily; conductivity weekly; DO & pH 3X/wk
20. Endpoints	Survival & growth (based on weight)
21. Test acceptability criteria	Minimum control survival of 80%
22. Sample holding	14 days at 4°C in the dark (recommended)
23. Sample volume required	1L (800 mL per sediment)
24. Reference toxicant	Concurrent testing required

APPENDIX II

RAW DATA

TEST DESCRIPTION, MONITORING, AND RESULTS BENCHSHEETS

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4c

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

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Test No. 806-1 Client Hart Crowser Investigator

STUDY MANAGEMENT

Client: Hart Crowser, Inc., 8910 SW Gemini Drive, Beaverton, OR 97008

Client's Study Monitor: Mr. Rick Ernst

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. Irissarri GJI

QA Officer L.K. Nemeth

1. GABehlen GAB
2. Cecilia P. Sandoval CPS
3. Yves Nakahama YN
4. R.S. Caldwell RSC
5. Susan Gogl SG
6.
7.
8.

Study Schedule:

Test Beginning: 3-16-10 1015 Test Ending: 4-13-10 1110

TEST MATERIAL

General description (see sample logbook/chain-of-custody for details):

NAS Sample No.:	3136G	3133G	3134G	3135G	
Description:	Control	DPSC-G088	DPSC-G095	DPSC-G096	
Collection Date:	3/10/10	2/24/10	2/22/10	2/25/10	
Receipt Date:	3/10/10	3/4/10	3/4/10	3/4/10	
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					

Error codes: 1) correction of handwriting error
2) written in wrong location; entry deleted
3) wrong date deleted, replaced with correct date
4) error found in measurement; measurement repeated

Test No. 806-1 Client Hart Crowser Investigator

SEDIMENT DESCRIPTIONS -- SUPPLEMENTAL NOTES

Sample No.	Description
3136G	FINE BLACK MUD
3133G	GRAY SAND W/ ROCKS AND WOODY DEBRIS
3134G	DARK BROWN GRAVEL & SAND W/ PLANT DEBRIS AND PAINT CHIPS
3135G	GRAY SAND W/MEDIUM SIZED ROCKS (SOMEPLED)

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No. 806-1 Client Hart Crowser Investigator

TEST WATER

Source: Dechlorinated Newport, OR tap water

Date of Collection/Preparation: 3-12-10, 3-30-10, 4-9-10

pH 6.9, 7.0, 7.1

Cond (umhos/cm2) 130, 137, 150

Hardness (mg/La0 43, 43, 43

Alkalinity (mg/L) 30, 30, 30

Treatments: Aerated ≥ 24 hrs, DECHLORINATED

TOTAL CHLORINE (mg/L): <0.02, <0.02, <0.02

TEST ORGANISMS

Species: *Hyalella azteca* Age: ~~7-15~~ 8-9 DAYS Date received: 3-12-10

Source: Chesapeake Cultures, Hayes, VA

Acclimation Data:

Date	Temp. (deg.C)	pH	DO (mg/L)	Cond umhos/cm	Feeding amount	Feeding description	Water changes	Hardness (mg/L)	Alkalinity (mg/L)
3-12-10	18.1	6.9	>15.0	550	10 mL	YTC	YES	188	200
3-13-10	19.5	7.8	8.5	401	"	"	"	154	130
3-14-10	19.3	7.7	8.5	275	"	"	"	94	90
3-15-10	20.0	7.3	9.1	224	"	"	"	68	80
3-16-10	21.6	7.2	8.4	189	–	–	–	51	40
Mean	19.7	7.4	9.9	328				111	108
S.D.	1.3	0.5	2.9	148				58	61
(N)	5	5	5	5				5	5

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test chambers: 300 ml glass beakers

Test volumes: 100 ml of test sediment; 275 ml total volume

Replicates/treatment: (8) 8 + 2 WQ REPLICATES Organisms/treatment: (80) 80 (10/REP)

Test water changes: Twice daily

Aeration: only if DO falls below 2.5 mg/L

Feeding: everyday beginning with day zero

Test temperature (deg.C): 23

Beaker placement: Total randomization

Photoperiod: 16:8, L:D

Control Sediment:

Source: From an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.

Date collected: 3/10/10

Sieved through 0.5 -mm screen

Storage: 4°C in the dark in closed containers. NAS# 3136G

MISCELLANEOUS NOTES

Light Intensity:

Date	Location	Light Intensity (ft-candles*)	Initials
3-19-10	BEAKER #19	87	GJI

*To convert ft-candles to lux multipy by 10.76

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No. 806-1 Client Hart Crowser Investigator

Test conducted in (circle one): room 1 room 2 trailer water bath other: ROOM # 3

Randomization chart: TOP SHELF

5	10	15	20	25	30	35	40		
4	9	14	19	24	29	34	39		
3	8	13	18	23	28	33	38		
2	7	12	17	22	27	32	37		
1	6	11	16	21	26	31	36		

Randomization chart:

Randomization chart:

Randomization chart:

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 0 (3/16/10) GJ/YN

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
8	23.3	7.5	129	6.6	34	30		Each beaker fed 1.0 ml
9	23.2	7.2	144	6.5	43	30		YTC suspension
11	23.2	7.4	180	6.6	34	30		Initials: GB
13	23.2	7.5	150	6.7	43	30		
								Water changed in all
								beakers.
								Time: 0605
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1705
								Initials: GS

*Water quality measurements to be taken.

Day 1 (3/17/10) GB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.9	7.3	136	6.4				Each beaker fed 1.0 ml
9	22.9	7.0	139	6.3				YTC suspension
11	23.0	7.2	157	6.3				Initials: GB
13	22.8	7.2	140	6.2				
								Water changed in all
								beakers.
								Time: 0600
								Initials: GB
								Water changed in all
								beakers.
								Time: 1635
								Initials: YN

*Water quality measurements to be taken.

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 2 (3/18/10) GB

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.4							Each beaker fed 1.0 ml
9	22.4							YTC suspension
11	22.6							Initials: GB
13	22.5							
								Water changed in all
								beakers.
								Time: 0600
								Initials: GB
								Water changed in all
								beakers.
								Time: 1705
								Initials: DS

*Water quality measurements to be taken.

Day 3 (3/19/10) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.2	7.1		6.7				Each beaker fed 1.0 ml
9	22.4	6.9		6.7				YTC suspension
11	22.4	7.2		6.8				Initials: GJL
13	22.1	7.1		6.7				
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1635
								Initials: YN

*Water quality measurements to be taken.

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 4 (3 /20 /10) GJ

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.8							Each beaker fed 1.0 ml
9	22.9							YTC suspension
11	22.7							Initials: GJ
13	22.7							
								Water changed in all
								beakers.
								Time: 0615
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1745
								Initials: LPS

*Water quality measurements to be taken.

Day 5 (3 /21 /10) GJ

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.8							Each beaker fed 1.0 ml
9	22.9							YTC suspension
11	22.9							Initials: GJ
13	22.7							
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1735
								Initials: LPS

*Water quality measurements to be taken.

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 6 (3/22/10) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.7	6.6		6.4				Each beaker fed 1.0 ml
9	22.8	6.6		6.3				YTC suspension
11	22.9	6.6		6.4				Initials: BB
13	22.5	6.7		6.4				
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1630
								Initials: YN

*Water quality measurements to be taken.

Day 7 (3/23/10) GJ

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.5							Each beaker fed 1.0 ml
9	22.7							YTC suspension
11	22.6							Initials: BB
13	22.4							
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1635
								Initials: YN

*Water quality measurements to be taken.

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 8 (3/24/10) GJI

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.3	6.4	137	6.6				Each beaker fed 1.0 ml
9	22.5	6.3	145	6.5				YTC suspension
11	22.5	4.6	155	6.3				Initials: GAB
13	22.3	6.2	147	6.5				
								Water changed in all
								beakers.
								Time: 0605
								Initials: GAB
								Water changed in all
								beakers.
								Time: 1645
								Initials: LPS

*Water quality measurements to be taken.

Day 9 (3/25/10) GJI

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.3							Each beaker fed 1.0 ml
9	22.6							YTC suspension
11	22.6							Initials: GJI
13	22.4							
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJI
								Water changed in all
								beakers.
								Time: 1650
								Initials: LPS

*Water quality measurements to be taken.

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 10 (3/26/10) GB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.5	6.8		6.8				Each beaker fed 1.0 ml
9	22.5	6.7		6.7				YTC suspension
11	22.5	6.4		6.7				Initials: GB
13	22.1	6.7		6.7				
								Water changed in all
								beakers.
								Time: 0610
								Initials: GB
								Water changed in all
								beakers.
								Time: 1635
								Initials: LPS

*Water quality measurements to be taken.

Day 11 (3/27/10) GB

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.4							Each beaker fed 1.0 ml
9	22.4							YTC suspension
11	22.4							Initials: GB
13	22.1							
								Water changed in all
								beakers.
								Time: 0600
								Initials: GB
								Water changed in all
								beakers.
								Time: 1655
								Initials: [illegible]

*Water quality measurements to be taken.

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 12 (3/28/10) BTB

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.4							Each beaker fed 1.0 ml
9	22.4							YTC suspension
11	22.5							Initials: BTB
13	22.7							
								Water changed in all
								beakers.
								Time: 0600
								Initials: BTB
								Water changed in all
								beakers.
								Time: 1730
								Initials: KN

*Water quality measurements to be taken.

Day 13 (3/29/10) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.7	6.4		7.0				Each beaker fed 1.0 ml
9	22.6	6.3		6.9				YTC suspension
11	22.6	6.1		6.9				Initials: GJL
13	22.3	6.4		6.9				
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1640
								Initials: BJ

*Water quality measurements to be taken.

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 14 (3 /30 /10) GJL

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.2							Each beaker fed 1.0 ml
9	22.3							YTC suspension
11	22.3							Initials: GJL
13	22.0							
								Water changed in all
								beakers.
								Time: 0605
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1645
								Initials: LPS

*Water quality measurements to be taken.

Day 15 (3 /31 /10) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.5	6.7	136	6.8				Each beaker fed 1.0 ml
9	22.7	6.8	140	6.8				YTC suspension
11	22.7	6.5	148	6.8				Initials: GJL
13	22.2	6.9	140	6.8				
								Water changed in all
								beakers.
								Time: 0605
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1645
								Initials: YN

*Water quality measurements to be taken.

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 16 (4 / 1 /10) GJ1

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.4							Each beaker fed 1.0 ml
9	22.5							YTC suspension
11	22.6							Initials: GJ1
13	22.1							
								Water changed in all
								beakers.
								Time: 0605
								Initials: GJ1
								Water changed in all
								beakers.
								Time: 1640
								Initials: YN

*Water quality measurements to be taken.

Day 17 (4 / 2 /10) GJ1

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.8	6.6		6.6				Each beaker fed 1.0 ml
9	22.8	6.7		6.6				YTC suspension
11	22.8	6.6		6.7				Initials: GJ1
13	22.3	6.8		6.7				
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJ1
								Water changed in all
								beakers.
								Time: 1645
								Initials: YN

*Water quality measurements to be taken.

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 18 (4 /3 /10) GJ

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	23.1							Each beaker fed 1.0 ml
9	23.1							YTC suspension
11	23.2							Initials: GJ
13	22.9							
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1645
								Initials:

*Water quality measurements to be taken.

Day 19 (4 /4 /10) GJ

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	23.0							Each beaker fed 1.0 ml
9	23.1							YTC suspension
11	23.1							Initials: GJ
13	22.7							
								Water changed in all
								beakers.
								Time: 0615
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1645
								Initials:

*Water quality measurements to be taken.

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 20 (4/5/10) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.8	6.2		6.6				Each beaker fed 1.0 ml
9	22.8	6.4		6.5				YTC suspension
11	22.8	6.2		6.5				Initials: GJL
13	22.5	6.5		6.5				
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1640
								Initials: YP

*Water quality measurements to be taken.

Day 21 (4/6/10) GJL

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.8							Each beaker fed 1.0 ml
9	22.7							YTC suspension
11	22.6							Initials: GJL
13	22.2							
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1650
								Initials: JPS

*Water quality measurements to be taken.

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 22 (4/7/10) GJI

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.6	6.5	142	6.3				Each beaker fed 1.0 ml
9	22.7	6.6	145	6.4				YTC suspension
11	22.7	6.5	151	6.4				Initials: GJI
13	22.3	6.7	146	6.4				
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJI
								Water changed in all
								beakers.
								Time: 1650
								Initials: CPS

*Water quality measurements to be taken.

Day 23 (4/8/10) GJI

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.3							Each beaker fed 1.0 ml
9	22.4							YTC suspension
11	22.4							Initials: GJI
13	22.2							
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJI
								Water changed in all
								beakers.
								Time: 1645
								Initials: YN

*Water quality measurements to be taken.

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 24 (4/9/10) GJI

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.8	6.4		6.3				Each beaker fed 1.0 ml
9	22.7	6.6		6.3				YTC suspension
11	22.8	6.6		6.4				Initials: GB
13	22.4	6.5		6.4				
								Water changed in all
								beakers.
								Time: 0410
								Initials: GB
								Water changed in all
								beakers.
								Time: 1645
								Initials: GB

*Water quality measurements to be taken.

Day 25 (4/10/10) GB

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.8							Each beaker fed 1.0 ml
9	22.8							YTC suspension
11	22.9							Initials: GB
13	22.6							
								Water changed in all
								beakers.
								Time: 0410
								Initials: GB
								Water changed in all
								beakers.
								Time: 1715
								Initials: [illegible]

*Water quality measurements to be taken.

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 26 (4 / 11 /10) GJ1

Beaker No.	Temp.* (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	23.0							Each beaker fed 1.0 ml
9	23.1							YTC suspension
11	23.1							Initials: GJ1
13	22.8							
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJ1
								Water changed in all
								beakers.
								Time: 1720
								Initials: [illegible]

*Water quality measurements to be taken.

Day 27 (4 /12 /10) GJ1

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH*	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
8	22.8	6.1		6.3				Each beaker fed 1.0 ml
9	23.0	6.6		6.4				YTC suspension
11	23.0	6.6		6.5				Initials: GJ1
13	22.7	6.5		6.5				
								Water changed in all
								beakers.
								Time: 0610
								Initials: GJ1
								Water changed in all
								beakers.
								Time: 1640
								Initials: [illegible]

*Water quality measurements to be taken.

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No 806-1 Client Hart Crowser Investigator

DAILY RECORD SHEET

Day 28 (4 /13 /10) 611

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
8	22.9	6.9	150	6.3	43	30		Each beaker fed 1.0 ml
9	22.9	7.5	152	6.5	43	40		YTC suspension
11	22.9	7.8	158	6.6	43	40		Initials: —
13	22.6	7.5	154	6.6	34	40		
								Water changed in all
								beakers.
								Time: 0605
								Initials: 611
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

Day (/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
								Each beaker fed 1.0 ml
								YTC suspension
								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No. 806-1 Client Hart Crowser Investigator

DAY 28 TEST TERMINATION SHEET

Beaker No.	Number of survivors	Initials
1	10	GJL
2	10	GJL
3	9	GJL
4		
5	10	GJL
6	10	GJL
7	10	GJL
8		
9		
10	10	GJL
11		
12	10	GJL
13		
14	9	GJL
15	9	GJL
16	10	GJL
17	10	GJL
18	8	GJL
19	10	GJL
20	10	GJL
21	9	GJL
22	10	GJL
23		
24	9	GJL
25	9	GJL
26	10	GJL
27	10	GJL
28	7	GJL
29	10	GJL
30	10	GJL
31	10	GJL
32	10	GJL
33	10	GJL
34	10	GJL
35		
36	10	GJL
37	10	GJL
38	8	GJL
39		
40	9	GJL
41		
42		
43		
44		
45		

Beaker No.	Number of survivors	Initials
46		
47		
48		
49		
50		
51		
52		
53		
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Test No. 806-1 Client Hart Crowser Investigator

ZERO-TIME WEIGHING DATA SHEET

Tare: Date 3-16-10 Oven temp (C.) 62 Drying time (hr.) 24 Initials GJL
Standard Weights: 10 mg: 10.009 100mg: 100.017

Final: Date 3-19-10 Oven temp (C.) 64 Drying time (hr.) 24 Initials GJL
Standard Weights: 10 mg: 10.009 100mg: 100.011

Equip. used: Oven: BLUE M #1 Balance: SARTORIUS M3P

(Dry overnight at 60-90 degrees C)

Pan #	Tare wt. (mg)	Total wt. (mg)	#weighed	Comments
1	28.402	29.010	10	
2	38.352	38.993	10	
3	37.606	38.205	10	
4	36.630	37.340	10	
5	39.271	39.894	10	

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4c

HYALELLA AZTECA 28-DAY SOLID PHASE SEDIMENT TEST

Test No. 806-1 Client Hart Crowser Investigator

WEIGHING DATA SHEET

Tare: Date 3-24-10 Oven temp (C.) 63 Drying time (hr.) 24 Initials GJL
Standard Weights: 10 mg: 10.010 100mg: 100.016

Final #1: Date 4-14-10 Oven temp (C.) 65 Drying time (hr.) 24 Initials GJL
Standard Weights: 10 mg: 10.008 100mg: 100.015

Final #2: Date 4-15-10 Oven temp (C.) 65 Drying time (hr.) 24 Initials GJL
Standard Weights: 10 mg: 10.008 100mg: 10.015

Equip. used: Oven BLUE M #1 Balance SARTORIUS M3P
(Dry overnight at 60-90 degrees C)

Bkr. #	Pan #	Tare wt. (mg)	Total wt. (mg) 1	Total wt. (mg) 2	no. weighed	put into pans-Initials	Comments
1	1	29.100	31.915	31.891	10	LPS	
2	2	38.531	41.354	41.322	10	LPS	
3	3	37.262	41.223	41.198	9	LPS	
4	4	37.409	–	–	–	–	
5	5	38.691	42.608	42.583	10	LPS	
6	6	37.569	41.600	41.573	10	LPS	
7	7	37.060	42.042	42.012	10	LPS	
8	8	36.916	–	–	–	–	
9	9	37.368	–	–	–	–	
10	10	40.864	45.080	45.068	10	LPS	
11	11	30.676	–	–	–	–	
12	12	37.845	42.492	42.482	10	LPS	
13	13	38.398	–	–	–	–	
14	14	38.924	42.984	42.981	9	LPS	
15	15	34.587	39.560	39.568	9	LPS	
16	16	37.287	41.836	41.834	10	LPS	
17	17	37.563	41.579	41.571	10	LPS	
18	18	39.127	42.113	42.113	8	LPS	
19	19	37.632	42.025	42.017	10	LPS	
20	20	36.249	39.907	39.898	10	LPS	
21	21	29.090	32.790	32.783	~~10~~ 9 LPS 4-14-10	LPS	
22	22	37.778	41.438	41.433	~~9~~ 10	LPS	
23	23	38.238	–	–	–	–	
24	24	40.733	44.741	44.736	9	LPS	
25	25	36.371	41.320	41.316	9	LPS	
26	26	32.633	37.480	37.473	10	LPS	
27	27	31.079	36.674	36.667	10	LPS	
28	28	31.908	34.845	34.844	7	LPS	
29	29	36.314	41.425	41.416	10	LPS	
30	30	35.843	42.757	42.749	10	YN	
31	31	41.039	45.155	45.154	10	YN	
32	32	39.071	44.139	44.130	10	YN	
33	33	37.199	41.674	41.665	10	YN	

LPS 2 4-14-10

Test No. 806-1 Client Hart Crowser Investigator

WEIGHING DATA SHEET

See page _____ for information on drying times and temperatures, standard weights,etc.

Bkr. #	Pan #	Tare wt. (mg)	Total wt. (mg) 1	Total wt. (mg) 2	no. weighed	put Into pans-initials	Comments
34	34	36.422	41.440	41.428	10	YR	
35	35	—	—	—	—	—	
36	36	38.937	44.264	44.252	10	YR	
37	37	36.627	42.223	42.211	10	YR	
38	38	35.031	40.441	40.430	8	YR	
39	39	—	—	—	—	—	
40	40	37.998	42.273	42.265	9	YR	
41	41						
42	42						
43	43						
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REC'D 3-12-10
LPS

Chesapeake Cultures

P.O. Box 507 Hayes, VA 23072 (804)693-4046 (804)694-4704 fax
www.c-cultures.com
growfish@c-cultures.com

NAS
Shipment Information

Species Hyalella azteca Date 3/11/10

Age ~3-4 d; 1.2-1.4 mm P.O. No. verbal

Quantity 660 + Invoice No. 6781

Temperature 24°C Salinity — pH 7.96

Notes Thank you!

Biologist [signature]

* *Please inspect shipment and report any problem immediately* *

TEST DATA ANALYSIS RECORDS

Data entry verified against laboratory bench sheets 4-19-10 JRF

Test Number: P806-1

Freshwater Sediment Test
28-day Hyalella azteca

Endpoints Data Entry and Calculations File

BKR=beaker number
INIT=initial number
SURV=number survivors
MORT=number dead=INIT-SURV
PSURV=%survival=100(SURV/INIT)
PMORT=%mortality=100(MORT/INIT)

TARE WT= ashed weight of pan used for that replicate at test termination (mg), or dry weight of pan if ash-free dry weight is not an endpoint
WT COUNT= number of test organisms weighed at test end
DRY WT= TARE WT + dry weight of test organisms recovered at test termination (mg)
TWT=total biomass=DRY WT-TARE WT
WT=average individual biomass=TWT/WT COUNT

INITIAL WEIGHT				
pan #	tare wt (mg)	final wt (mg)	wt count	avg. wt/ organism
1	28.402	29.01	10	0.061
2	38.352	38.993	10	0.064
3	37.606	38.205	10	0.060
4	36.63	37.34	10	0.071
5	39.271	39.894	10	0.062
			avg.	0.064

INDEX	BKR	NAS SMPL	CLIENT DESCRIP	REPL		INIT	SURV	MORT	PSURV	PMORT	TARE WT (mg)	WT COUNT	DRY WT (mg)	TWT (mg)	WT (mg)		SURV	MORT	PSURV	PMORT	WT
1	1	3136G	Control	1		10	10	0	100.0	0.0	29.100	10	31.891	2.79	0.28						
2	12	3136G	Control	2		10	10	0	100.0	0.0	37.845	10	42.482	4.64	0.46						
3	37	3136G	Control	3		10	10	0	100.0	0.0	36.627	10	42.211	5.58	0.56						
4	16	3136G	Control	4		10	10	0	100.0	0.0	37.287	10	41.834	4.55	0.45						
5	31	3136G	Control	5		10	10	0	100.0	0.0	41.039	10	45.154	7.87	0.79						
6	33	3136G	Control	6		10	10	0	100.0	0.0	37.199	10	41.665	4.47	0.45	Mean	9.9	0.1	98.8	1.3	0.49
7	3	3136G	Control	7		10	9	1	90.0	10.0	37.262	9	41.198	3.94	0.44	SD	0.4	0.4	3.5	3.5	0.14
8	7	3136G	Control	8		10	10	0	100.0	0.0	37.060	10	42.012	4.95	0.50	n	8	8	8	8	8
9	11	3136G	Control	9	wq replicate																
10	39	3136G	Control	10	day 0 replicate																
11	22	3133G	DPSC-G088	1		10	10	0	100.0	0.0	37.778	10	41.433	3.66	0.37						
12	6	3133G	DPSC-G088	2		10	10	0	100.0	0.0	37.569	10	41.573	4.00	0.40						
13	32	3133G	DPSC-G088	3		10	10	0	100.0	0.0	39.071	10	44.130	5.06	0.51						
14	27	3133G	DPSC-G088	4		10	10	0	100.0	0.0	31.079	10	36.667	5.59	0.56						
15	10	3133G	DPSC-G088	5		10	10	0	100.0	0.0	40.864	10	45.068	4.20	0.42						
16	20	3133G	DPSC-G088	6		10	10	0	100.0	0.0	36.249	10	39.898	3.65	0.36	Mean	10.0	0.0	100.0	0.0	0.42
17	2	3133G	DPSC-G088	7		10	10	0	100.0	0.0	38.531	10	41.322	2.79	0.28	SD	0.0	0.0	0.0	0.0	0.09
18	26	3133G	DPSC-G088	8		10	10	0	100.0	0.0	32.633	10	37.473	4.84	0.48	n	8	8	8	8	8
19	9	3133G	DPSC-G088	9	wq replicate																
20	35	3133G	DPSC-G088	10	day 0 replicate																
21	15	3134G	DPSC-G095	1		10	9	1	90.0	10.0	34.587	9	39.568	4.98	0.55						
22	14	3134G	DPSC-G095	2		10	9	1	90.0	10.0	38.924	9	42.981	4.06	0.45						
23	40	3134G	DPSC-G095	3		10	9	1	90.0	10.0	37.998	9	42.265								
24	18	3134G	DPSC-G095	4		10	8	2	80.0	20.0	39.127	8	42.113	2.99	0.37						
25	29	3134G	DPSC-G095	5		10	10	0	100.0	0.0	36.314	10	41.416	5.10	0.51						
26	21	3134G	DPSC-G095	6		10	9	1	90.0	10.0	29.090	9	32.783	3.69	0.41	Mean	9.0	1.0	90.0	10.0	0.48
27	5	3134G	DPSC-G095	7		10	10	0	100.0	0.0	38.691	10	42.583	3.89	0.39	SD	0.8	0.8	7.6	7.6	0.11
28	38	3134G	DPSC-G095	8		10	8	2	80.0	20.0	35.031	8	40.430	5.40	0.67	n	8	8	8	8	7
29	8	3134G	DPSC-G095	9	wq replicate																
30	23	3134G	DPSC-G095	10	day 0 replicate																
31	34	3135G	DPSC-G096	1		10	10	0	100.0	0.0	36.422	10	41.428	5.01	0.50						
32	19	3135G	DPSC-G096	2		10	10	0	100.0	0.0	37.632	10	42.017	4.39	0.44						
33	17	3135G	DPSC-G096	3		10	10	0	100.0	0.0	37.563	10	41.571	4.01	0.40						
34	24	3135G	DPSC-G096	4		10	9	1	90.0	10.0	40.733	9	44.736	4.00	0.44						
35	28	3135G	DPSC-G096	5		10	7	3	70.0	30.0	31.908	7	34.844								
36	25	3135G	DPSC-G096	6		10	9	1	90.0	10.0	36.371	9	41.316	4.95	0.55	Mean	9.4	0.6	93.8	6.3	0.51
37	36	3135G	DPSC-G096	7		10	10	0	100.0	0.0	38.937	10	44.252	5.32	0.53	SD	1.1	1.1	10.6	10.6	0.10
38	30	3135G	DPSC-G096	8		10	10	0	100.0	0.0	35.843	10	42.749	6.91	0.69	n	8	8	8	8	7
39	13	3135G	DPSC-G096	9	wq replicate																
40	4	3135G	DPSC-G096	10	day 0 replicate																

Data verified against laboratory bench sheets 4-19-16 JRF

Water Quality Data

BKR	NAS SMPL	CLIENT DESCRIP	DAY	Interstitial water pH	Interstitial water NH3
4	3135G	DPSC-G096	0	6.8	<0.5
23	3134G	DPSC-G095	0	6.9	<0.5
35	3133G	DPSC-G088	0	6.3	<0.5
39	3136G	Contol	0	6.7	0.6
8	3134G	DPSC-G095	28	6.5	1.6
9	3133G	DPSC-G088	28	6.4	0.7
11	3136G	Contol	28	6.4	1.5
13	3135G	DPSC-G096	28	6.3	0.8

BKR	NAS SMPL	CLIENT DESCRIP	REPL	DAY	Overlying water TEMP	DO	COND	pH	NH3	HARD	ALK
8	3134G	DPSC-G095	9	0	23.3	7.5	129	6.6	0.1	34	30
9	3133G	DPSC-G088	9	0	23.2	7.2	144	6.5	0.1	43	30
11	3136G	Contol	9	0	23.2	7.4	180	6.6	0.2	34	30
13	3135G	DPSC-G096	9	0	23.2	7.5	150	6.7	<0.1	43	30
8	3134G	DPSC-G095	9	1	22.9	7.3	136	6.4			
9	3133G	DPSC-G088	9	1	22.9	7.0	139	6.3			
11	3136G	Contol	9	1	23.0	7.2	157	6.3			
13	3135G	DPSC-G096	9	1	22.8	7.2	140	6.2			
8	3134G	DPSC-G095	9	2	22.4						
9	3133G	DPSC-G088	9	2	22.4						
11	3136G	Contol	9	2	22.6						
13	3135G	DPSC-G096	9	2	22.5						
8	3134G	DPSC-G095	9	3	22.2	7.1		6.7			
9	3133G	DPSC-G088	9	3	22.4	6.9		6.7			
11	3136G	Contol	9	3	22.4	7.2		6.8			
13	3135G	DPSC-G096	9	3	22.1	7.1		6.7			
8	3134G	DPSC-G095	9	4	22.8						
9	3133G	DPSC-G088	9	4	22.9						
11	3136G	Contol	9	4	22.7						
13	3135G	DPSC-G096	9	4	22.7						
8	3134G	DPSC-G095	9	5	22.8						
9	3133G	DPSC-G088	9	5	22.9						
11	3136G	Contol	9	5	22.9						
13	3135G	DPSC-G096	9	5	22.7						
8	3134G	DPSC-G095	9	6	22.7	6.6		6.4			
9	3133G	DPSC-G088	9	6	22.8	6.6		6.3			
11	3136G	Contol	9	6	22.9	6.6		6.4			
13	3135G	DPSC-G096	9	6	22.5	6.7		6.4			
8	3134G	DPSC-G095	9	7	22.5						
9	3133G	DPSC-G088	9	7	22.7						
11	3136G	Contol	9	7	22.6						
13	3135G	DPSC-G096	9	7	22.4						
8	3134G	DPSC-G095	9	8	22.3	6.4	137	6.6			
9	3133G	DPSC-G088	9	8	22.5	6.3	145	6.5			
11	3136G	Contol	9	8	22.5	4.6	155	6.3			
13	3135G	DPSC-G096	9	8	22.3	6.2	147	6.5			
8	3134G	DPSC-G095	9	9	22.3						
9	3133G	DPSC-G088	9	9	22.6						
11	3136G	Contol	9	9	22.6						
13	3135G	DPSC-G096	9	9	22.4						
8	3134G	DPSC-G095	9	10	22.5	6.8		6.8			
9	3133G	DPSC-G088	9	10	22.5	6.7		6.7			

11	3136G	Contol	9	10	22.5	6.4		6.7
13	3135G	DPSC-G096	9	10	22.1	6.7		6.7
8	3134G	DPSC-G095	9	11	22.4			
9	3133G	DPSC-G088	9	11	22.4			
11	3136G	Contol	9	11	22.4			
13	3135G	DPSC-G096	9	11	22.1			
8	3134G	DPSC-G095	9	12	22.4			
9	3133G	DPSC-G088	9	12	22.4			
11	3136G	Contol	9	12	22.5			
13	3135G	DPSC-G096	9	12	22.7			
8	3134G	DPSC-G095	9	13	22.7	6.4		7.0
9	3133G	DPSC-G088	9	13	22.6	6.3		6.9
11	3136G	Contol	9	13	22.6	6.1		6.9
13	3135G	DPSC-G096	9	13	22.3	6.4		6.9
8	3134G	DPSC-G095	9	14	22.2			
9	3133G	DPSC-G088	9	14	22.3			
11	3136G	Contol	9	14	22.3			
13	3135G	DPSC-G096	9	14	22.0			
8	3134G	DPSC-G095	9	15	22.5	6.7	136	6.8
9	3133G	DPSC-G088	9	15	22.7	6.8	140	6.8
11	3136G	Contol	9	15	22.7	6.5	148	6.8
13	3135G	DPSC-G096	9	15	22.2	6.9	140	6.8
8	3134G	DPSC-G095	9	16	22.4			
9	3133G	DPSC-G088	9	16	22.5			
11	3136G	Contol	9	16	22.6			
13	3135G	DPSC-G096	9	16	22.1			
8	3134G	DPSC-G095	9	17	22.8	6.6		6.6
9	3133G	DPSC-G088	9	17	22.8	6.7		6.6
11	3136G	Contol	9	17	22.8	6.6		6.7
13	3135G	DPSC-G096	9	17	22.3	6.8		6.7
8	3134G	DPSC-G095	9	18	23.1			
9	3133G	DPSC-G088	9	18	23.1			
11	3136G	Contol	9	18	23.2			
13	3135G	DPSC-G096	9	18	22.9			
8	3134G	DPSC-G095	9	19	23.0			
9	3133G	DPSC-G088	9	19	23.1			
11	3136G	Contol	9	19	23.1			
13	3135G	DPSC-G096	9	19	22.7			
8	3134G	DPSC-G095	9	20	22.8	6.2		6.6
9	3133G	DPSC-G088	9	20	22.8	6.4		6.5
11	3136G	Contol	9	20	22.8	6.2		6.5
13	3135G	DPSC-G096	9	20	22.5	6.5		6.5
8	3134G	DPSC-G095	9	21	22.8			
9	3133G	DPSC-G088	9	21	22.7			
11	3136G	Contol	9	21	22.6			
13	3135G	DPSC-G096	9	21	22.2			
8	3134G	DPSC-G095	9	22	22.6	6.5	142	6.3
9	3133G	DPSC-G088	9	22	22.7	6.6	145	6.4
11	3136G	Contol	9	22	22.7	6.5	151	6.4
13	3135G	DPSC-G096	9	22	22.3	6.7	146	6.4
8	3134G	DPSC-G095	9	23	22.3			
9	3133G	DPSC-G088	9	23	22.4			
11	3136G	Contol	9	23	22.4			
13	3135G	DPSC-G096	9	23	22.2			
8	3134G	DPSC-G095	9	24	22.8	6.4		6.3
9	3133G	DPSC-G088	9	24	22.7	6.6		6.3
11	3136G	Contol	9	24	22.8	6.6		6.4

13	3135G	DPSC-G096	9	24	22.4	6.5		6.4					
8	3134G	DPSC-G095	9	25	22.8								
9	3133G	DPSC-G088	9	25	22.8								
11	3136G	Contol	9	25	22.9								
13	3135G	DPSC-G096	9	25	22.6								
8	3134G	DPSC-G095	9	26	23.0								
9	3133G	DPSC-G088	9	26	23.1								
11	3136G	Contol	9	26	23.1								
13	3135G	DPSC-G096	9	26	22.8								
8	3134G	DPSC-G095	9	27	22.8	6.1		6.3					
9	3133G	DPSC-G088	9	27	23.0	6.6		6.4					
11	3136G	Contol	9	27	23.0	6.6		6.5					
13	3135G	DPSC-G096	9	27	22.7	6.5		6.5					
8	3134G	DPSC-G095	9	28	22.9	6.9	150	6.3	<0.1	43	30		
9	3133G	DPSC-G088	9	28	22.9	7.5	152	6.5	<0.1	43	40		
11	3136G	Contol	9	28	22.9	7.8	158	6.6	<0.1	43	40		
13	3135G	DPSC-G096	9	28	22.6	7.5	154	6.6	<0.1	34	40		
				Mean	22.6	6.7	147	6.6	—	40	34	6.5	—
				SD	0.3	0.5	10	0.2	—	5	5	0.2	—
				n	116	56	24	56	8	8	8	8	8
				Min	22.0	4.6	129	6.2	<0.1	34	30	6.3	<0.5
				Max	23.3	7.8	180	7.0	0.2	43	40	6.9	1.6

Test Number: P806-1

Freshwater Sediment Test
28-day Hyalella azteca

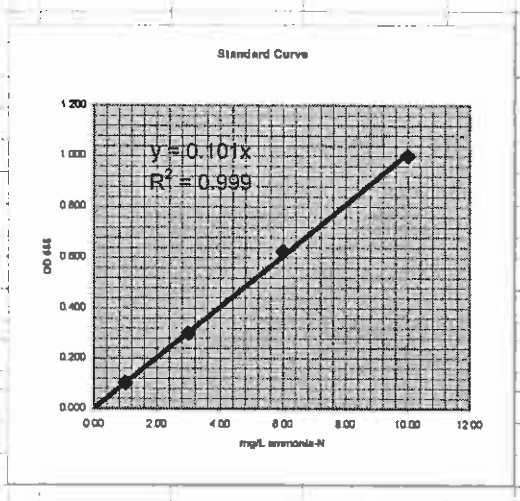
BKR	NAS SMPL	CLIENT DESCRIP	REPL	
1	3136G	Contol	1	
12	3136G	Contol	2	
37	3136G	Contol	3	
16	3136G	Contol	4	
31	3136G	Contol	5	
33	3136G	Contol	6	
3	3136G	Contol	7	
7	3136G	Contol	8	
11	3136G	Contol	9	wq replicate
39	3136G	Contol	10	day 0 replicate
22	3133G	DPSC-G088	1	
6	3133G	DPSC-G088	2	
32	3133G	DPSC-G088	3	
27	3133G	DPSC-G088	4	
10	3133G	DPSC-G088	5	
20	3133G	DPSC-G088	6	
2	3133G	DPSC-G088	7	
26	3133G	DPSC-G088	8	
9	3133G	DPSC-G088	9	wq replicate
35	3133G	DPSC-G088	10	day 0 replicate
15	3134G	DPSC-G095	1	
14	3134G	DPSC-G095	2	
40	3134G	DPSC-G095	3	
18	3134G	DPSC-G095	4	
29	3134G	DPSC-G095	5	
21	3134G	DPSC-G095	6	
5	3134G	DPSC-G095	7	
38	3134G	DPSC-G095	8	
8	3134G	DPSC-G095	9	wq replicate
23	3134G	DPSC-G095	10	day 0 replicate
34	3135G	DPSC-G096	1	
19	3135G	DPSC-G096	2	
17	3135G	DPSC-G096	3	
24	3135G	DPSC-G096	4	
28	3135G	DPSC-G096	5	
25	3135G	DPSC-G096	6	
36	3135G	DPSC-G096	7	
30	3135G	DPSC-G096	8	
13	3135G	DPSC-G096	9	wq replicate
4	3135G	DPSC-G096	10	day 0 replicate

AMMONIA EXPOSURE BENCHSHEETS AND ANALYSIS

Total Ammonia-N in Sediment Pore Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH_3-N (mg/L)	pH	Salinity (ppt)
	Blank	-----	-----	-----		
	1.0 mg/L NH_3-N Std.	----	0.101	1.00		
	3.0 mg/L NH_3-N Std.	-----	0.300	3.00		
	6.0 mg/L NH_3-N Std.	-----	0.625	6.00		
	10.0 mg/L NH_3-N Std.	-----	1.000	10.00		
	3.0 mg/L spike	-----	0.272	2.69		
	3.0 mg/L spike dupl.	-----	0.282	2.79		
	5.0 mg/L 2nd source		0.483	4.78		
1.	4	5	0.000	ND		
2.	23	5	0.006	ND		
3.	35	5	0.007	ND		
4.	39	5	0.012	0.59		



Reporting limit (mg/L) =	0.5
Recovery (%) =	91.4
Precision (RPD) =	-3.61
2nd source (%) =	95.6
Sample volume (ml):	0.10
Dilution factor	5

Sample Set Description:

Test No.: 806-1
Test Day: 0
Species: *Hyalella*

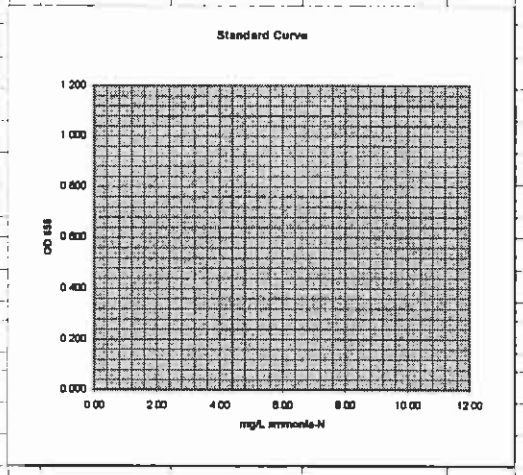
Sediment porewaters

Analyst:	RSC
Date analysed:	3/16/2010

Total Ammonia-N in Sediment Pore Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH_3-N (mg/L)	pH	Salinity (ppt)
	Blank	-----	-----	-----		
	1.0 mg/L NH_3-N Std.	-----	.101	1.00		
	3.0 mg/L NH_3-N Std.	-----	.300	3.00		
	6.0 mg/L NH_3-N Std.	-----	.625	6.00		
	10.0 mg/L NH_3-N Std.	-----	1.00	10.00		
	3.0 mg/L spike	-----	.272			
	3.0 mg/L spike dupl.	-----	.282			
	5.0 mg/L 2nd source	~	.483			
1.	4	5	.000		6.8	
2.	23	5	.006		6.9	
3.	35	5	.007		6.3	
4.	39	5	.012		6.7	



Reporting limit (mg/L) =	0.5
Recovery (%) =	#VALUE!
Precision (RPD) =	#VALUE!
2nd source (%) =	#VALUE!
Sample volume (ml):	0.10
Dilution factor	5

Sample Set Description:

Test No.: 806-1
Test Day: 0
Species: *Hyalella*

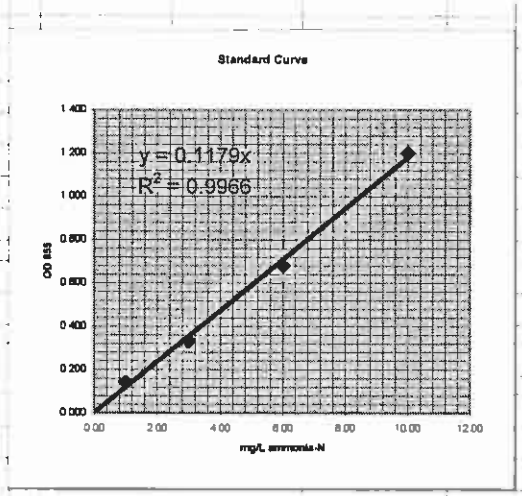
Sediment porewaters

Analyst: RSC
Date analysed: 3/16/2010

Total Ammonia-N in Sediment Pore Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH3-N (mg/L)	pH	Salinity (ppt)
	Blank	-----	-----	-----		
	1.0 mg/L NH3-N Std.	-----	0.140	1.00		
	3.0 mg/L NH3-N Std.	-----	0.330	3.00		
	6.0 mg/L NH3-N Std.	-----	0.680	6.00		
	10.0 mg/L NH3-N Std.	-----	1.200	10.00		
	3.0 mg/L spike	-----	0.340	2.88		
	3.0 mg/L spike dupl.	-----	0.331	2.80		
	5.0 mg/L 2nd source		0.528	4.47		
1.	8	5	0.038	1.61		
2.	9	5	0.017	0.72		
3.	11	5	0.035	1.48		
4.	13	5	0.018	0.76		



Reporting limit (mg/L) =	0.5
Recovery (%) =	94.8
Precision (RPD) =	2.68
2nd source (%) =	89.5
Sample volume (ml):	0.10
Dilution factor	5

Sample Set Description:

Test No.: 806-1
Test Day: 28
Species: *Hyalella*

Sediment porewaters

Analyst: RSC RSC
Date analysed: 4/13/2010

Total Ammonia-N in Sediment Pore Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH3-N (mg/L)	pH	Salinity (ppt)
	Blank	-----	-----	-----		
	1.0 mg/L NH3-N Std.	-----	.140	1.00		
	3.0 mg/L NH3-N Std.	-----	.330	3.00		
	6.0 mg/L NH3-N Std.	-----	.680	6.00		
	10.0 mg/L NH3-N Std.	-----	1.20	10.00		
	3.0 mg/L spike	-----	.340			
	3.0 mg/L spike dupl.	-----	.331			
	5.0 mg/L 2nd source		.528			
1.	8	5	.038		6.5	
2.	9	5	.017		6.4	
3.	11	5	.035		6.4	
4.	13	5	.018		6.3	
5.						
6.						
7.						
8.						
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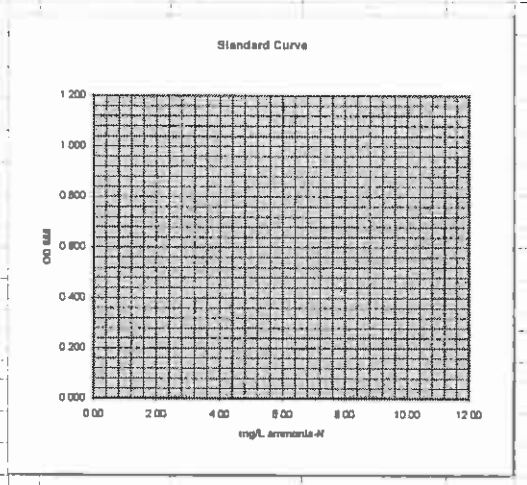


Reporting limit (mg/L) =	0.5
Recovery (%) =	#VALUE!
Precision (RPD) =	#VALUE!
2nd source (%) =	#VALUE!
Sample volume (ml):	0.10
Dilution factor	5

Sample Set Description:

Test No.: 806-1
Test Day: 28
Species: *Hyalella*

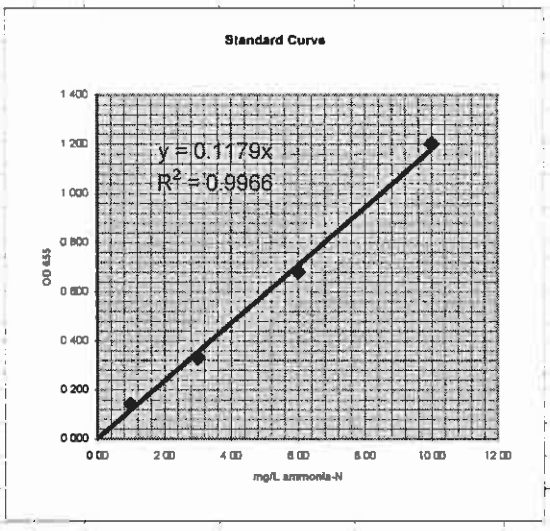
Sediment porewaters

Analyst: RSC
Date analysed: 4/13/2010

Total Ammonia-N in Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	-----	0.140	1.00
	3.0 mg/L NH_3-N Std.	-----	0.330	3.00
	6.0 mg/L NH_3-N Std.	-----	0.680	6.00
	10.0 mg/L NH_3-N Std.	-----	1.200	10.00
	3.0 mg/L spike	-----	0.340	2.88
	3.0 mg/L spike dupl.	-----	0.331	2.80
	5.0 mg/L 2nd source	-----	0.528	4.47
1.	Day 0 (3-16-10)	######		
2.	8	1	0.012	0.10
3.	9	1	0.017	0.14
4.	11	1	0.019	0.16
5.	13	1	0.010	ND
6.	Day 28 (4-13-10)	######		
7.	8	1	0.011	ND
8.	9	1	0.007	ND
9.	11	1	0.008	ND
10.	13	1	0.005	ND



Reporting limit (mg/L) =	0.1
Recovery (%) =	94.8
Precision (RPD) =	2.68
2nd source (%) =	89.5
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.: 806-1
Test Day: Days 0 & 28
Species: *Hyalella*

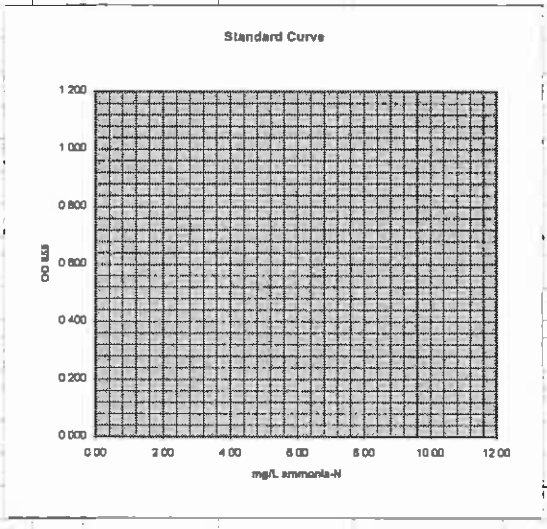
Overlying water

Analyst: RSC
Date analysed: 4/13/2010

Total Ammonia-N in Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	----	.140	1.00
	3.0 mg/L NH_3-N Std.	-----	.380	3.00
	6.0 mg/L NH_3-N Std.	----	.680	6.00
	10.0 mg/L NH_3-N Std.	----	1.20	10.00
	3.0 mg/L spike	-----	.340	
	3.0 mg/L spike dupl.	-----	.331	
	5.0 mg/L 2nd source	----	.528	
1.	Day 0 (3-16-10)	######		
2.	8	1	.012	
3.	9	1	.017	
4.	11	1	.019	
5.	13	1	.010	
6.	Day 28 (4-13-10)	######		
7.	8	1	.011	
8.	9	1	.007	
9.	11	1	.008	
10.	13	1	.005	



Reporting limit (mg/L) =	0.1
Recovery (%) =	#VALUE!
Precision (RPD) =	#VALUE!
2nd source (%) =	#VALUE!
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.: 806-1
Test Day: Days 0 & 28
Species: *Hyalella*

Overlying water

Analyst: RSC
Date analysed: 4/13/2010

CHAIN-OF-CUSTODY RECORDS

GSI Water Solutions, Inc.

CHAIN OF CUSTODY / LABORATORY ANALYSIS REQUEST FORM

Lab submittal Columbia Analytical Services, 1317 South 13th Ave., Kelso, WA 98626

Date March 3, 2010 Page 1 of 1

Project Name: DPSC Phase II
Project Number: 0205.008
Project Manager: Kevin Parrett
Company/Address:
GSI Water Sollutions
55 SW Yamhill Street
Portland, OR
Phone: (503) 239-8799
Fax: (503) 239-8940

Sampler's Signature: Erin Carroll

Analysis Requested

Sample I.D.	Date	Time	LAB I.D.	Sample Matrix	Number of Containers	Bioassay														REMARKS
DPSC-G088	2/24/2010			Sediment	3	X			NAS #		3133	G								Bioassay
DPSC-G096	2/25/2010			Sediment	2	X					3135	G								Bioassay
DPSC-G095	2/22/2010			Sediment	3	X					3134	G								Bioassay

PAGE 36 OF 38

Relinquished By	Received By
Erin Carroll	Julie Fiore
Signature: Erin Carroll	Signature: JULIE FIORE
Printed Name: GSI Water Solutions	Printed Name: NAS
Firm: 3-3-10 10:30	Firm: 3-4-10 1010
Date/Time	Date/Time

Relinquished By	Received By
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

TURNAROUND REQUIREMENTS

___ 24 hr ___ 48 hr ___ 5 day

x Standard (10 working days)

Send Reports to: Attn Erin Carroll, GSI Water Solutions, 55 SW Yamhill St, Suite 400, Portland, OR 97203

Email Reports to: ecarroll@gsiwatersolutions.com, kparrett@gsiwatersolutions.com, nick.ernst@hartcrowser.com

REPORT REQUIREMENTS

___ I Routine Report

X II Report (includes DUP, MS MSD, as required, may be charged as samples)

___ III Data Validation Report (includes All Raw Data)

___ RWQCB (MDLs/PQLs/TRACE#)

INVOICE INFORMATION

P.O. # ___

Bill to: Attn Nick Ernst, RG, Hart Crowser, Inc, 8910 SW Gemini Drive, Beaverton, OR 97008-7123

SAMPLE RECEIPT

Shipping VIA ___
Shipping # ___
Condition ___
Lab No ___

Special Instructions/Comments:

Per Final Sampling and Analysis Plan (February 2010) - outlined below

Custody Seal

Date 3-3-2010 Project DPSC - Phase II

Signature Erin Cerrell Container# 1 of 1

Custody Seal

Date 3-3-2010 Project DPSC - Phase II

Signature Erin Cerrell Container# 1 of 1

Custody Seal

Date 3-3-2010 Project DPSC Phase II

Signature Erin Cerrell Container# 1 of 1

Receipt Temp = 1°C

From: Origin ID: PHFA (804) 693-4046
Elizabeth Wilkins
CHESAPEAKE CULTURES, INC
6983 MID-COUNTY DR

GLOUCESTER, VA 23061

FedEx. Express

Ship Date: 11MAR10
ActWgt: 5.0 LB
CAD: 1401375/INET3010

Delivery Address Bar Code

SHIP TO: (541) 265-7225 BILL RECIPIENT

Gerald Irissarri
Northwestern Aquatic Sciences
3814 Yaquina Bay Rd.

Newport, OR 97365

Ref #
Invoice #
PO #
Dept #

TRK# 0201 7984 6568 8229

FRI - 12 MAR AM
PRIORITY OVERNIGHT

97365
OR-US
PDX

XH ONPA

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. *Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.*

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com. FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic value of the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental, consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss. Maximum for items of extraordinary value is $500, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

APPENDIX III

RAW DATA – REFERENCE TOXICANT TEST

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS- _____

ACUTE TOXICITY TEST (ALL SPECIES)

REVIEWED PAGES 1-7 -GJI

Test No. 999-2708 Client: QC Test Investigator _____

Test Type (rangefinding/definitive) _____ Test Length (hr) 96

Species *Hyalella azteca*

STUDY MANAGEMENT

Client: QC test

Client's Study Monitor: QC test

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. Irissarri GJI

QA Officer L. K. Nemeth

1. [illegible] 2. Lidia P. Sandoval LPS

3. M.S. Redmond MSR 4. _____

Test Beginning: 3-16-10 0930 Test Ending: 3-20-10 0840

TEST MATERIAL

Description: Potassium Chloride Crystals - Lot No.: FISHER 073280

NAS Sample No.				
Date of Collection:				
Date of Receipt:				
Temperature (deg C):				
Dissolved oxygen (mg/L):				
pH:				
Conductivity (umhos/cm):				
Hardness (mg/L):				
Alkalinity (mg/L):				
Salinity (ppt):				
Total chlorine (mg/L):				
Total ammonia-N (mg/L):				
_____:				

DILUTION WATER

Description: Moderately hard synthetic water

Date of Preparation/Collection: 3-9-10

Water Quality: Cond. (umhos/cm): 275 Salinity (ppt) [redacted] pH 7.7

Hardness (mg/L as $CaCO_3$): 103 Alkalinity (mg/L as $CaCO_3$): 70

Treatments: Aerated ≥ 24 hrs

TEST LOCATION

Test conducted in (circle one): room 1 room 2 trailer water bath other: ROOM #3

Randomization chart:

REP										
B	1	0.25	Ø	0.5	0.125	0.063				
A	Ø	0.125	1	0.063	0.25	0.5				

Error codes: 1) Correction of handwriting error
2) Written in wrong location; entry deleted
3) Wrong date deleted; replaced with correct date
4) Error found in measurement; measurement repeated

Revised 12-5-01

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2708 Client QC Test Investigator _____

TEST ORGANISMS

Species: *Hyalella azteca* Age: ~~7-8~~ 8-9 DAYS Size: –

Source: Chesapeake Cultures, Hayes, VA Date received: 3-12-10

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond. umhos/cm	Hardness (mg/L)	Alkalinity (mg/L)	Feeding Amount	Feeding description	Water changes
3-12-10	18.1	>15.0	6.9	550	188	200	10mL	YTC	½ REPLACED W/ DILUTION WATER
3-13-10	19.5	8.5	7.8	401	154	130	"	"	"
3-14-10	19.3	8.5	7.7	275	94	90	"	"	"
3-15-10	20.0	9.1	7.3	224	68	80	"	"	"
3-16-10	21.6	8.4	7.2	189	51	40	–	–	–
Mean	19.7	9.9	7.4	328	111	108			
S.D.	1.3	2.9	0.4	148	58	61			
(N)	5	5	5	5	5	5			

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test concentrations (50% series recommended): 1, 0.5, 0.25, 0.125, 0.063 0 g/L

Test chamber: 250 ml glass beakers Test volume: 100 ml

Replicates/treatment: 2 Organisms/treatment: 20 (10/rep)

Test water changes: None Aeration during test: None

Feeding: 0.5 ml YTC suspension per beaker on days 0 and 2

Duration: 24-hr, 48-hr, 96-hr Test temperature (deg.C): 23 ± 1 or 20 ± 1

Beaker placement: Stratified randomization Photoperiod: 16:8, L:D

MISCELLANEOUS NOTES

Test solution preparation:

Working stock: Dissolve 0.5g KCl crystals in dilution water and dilute to 500 mL.
Final conc.: 1.0 g/L.

Test concentration (g/L)	KCl working stock (ml/200ml)	Dilution water
1	200	Brought up to final volume of 200 ml with dilution water and distributed evenly between two replicates
0.5	100	
0.25	50	
0.125	25	
0.063	12.5	
0	0	

BMS 3-16-10

Revised 12-5-01

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2708 Client QC Test

DAILY RECORD SHEET

Day 0 (3 /16/10) GB

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	22.9	8.8	1887	7.8	94	80	10	10
2. 0.5	23.0	8.8	1049	7.7			10	10
3. 0.25	23.0	8.7	687	7.7			10	10
4. 0.125	22.8	8.7	475	7.7			10	10
5. 0.063	22.8	8.8	372	7.7			10	10
6. 0	22.9	8.8	262	7.7	86	80	10	10
All animals fed 0.5 ml YTC suspension. Initials:								

Day 1 (3 /17/10) GB

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	23.8	8.6	1889	7.5			10	10
2. 0.5	23.8	8.8	1046	7.4			10	10
3. 0.25	23.8	8.7	688	7.4			10	10
4. 0.125	23.8	8.6	467	7.4			10	10
5. 0.063	23.7	8.8	375	7.3			10	10
6. 0	23.6	8.7	272	7.4			10	10

Day 2 (3 /18/10) GB

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	22.5	8.6	1905	7.1			0(100)	0(100)
2. 0.5	22.6	8.4	1080	7.2			4(60)	3(70)
3. 0.25	22.5	8.2	676	7.0			10	10
4. 0.125	22.4	8.3	472	7.1			10	10
5. 0.063	22.5	8.5	369	7.1			10	10
6. 0	22.2	8.4	277	7.2			10	10
All animals fed 0.5 ml YTC suspension. Initials: GB								

Day 3 (3 /19/10) GB

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	—	—	—	—			∅	∅
2. 0.5	22.9	8.1	1185	7.7			∅(40)	∅(30)
3. 0.25	23.0	8.0	730	7.6			10	10
4. 0.125	23.0	7.8	514	7.5			10	10
5. 0.063	23.0	7.8	400	7.4			10	10
6. 0	23.0	7.5	297	7.3			10	10

Day 4 (3 /20/10) GB

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	—	—	—	—	—	—	∅	∅
2. 0.5	—	—	—	—			∅	∅
3. 0.25	23.3	7.8	769	7.6			10	10
4. 0.125	23.3	7.8	524	7.5			10	10
5. 0.063	23.2	7.8	415	7.4			10	10
6. 0	23.2	7.6	306	7.3	86	80	10	10
Mean	23.1	8.4		7.4	89	80		
SD	0.5	0.7		0.2	5	∅		
n	27	27		27	3	3		

Revised 12-5-01

REC'D 3-12-10
LPS

Chesapeake Cultures

P.O. Box 507 Hayes, VA 23072 (804)693-4046 (804)694-4704 fax
www.c-cultures.com
growfish@c-cultures.com

NAS
Shipment Information

Species Hyalella azteca Date 3/11/10

Age ~3-4 d; 1.2-1.4 mm P.O. No. verbal

Quantity 660 + Invoice No. 6781

Temperature 24°C Salinity — pH 7.96

Notes Thank you!

Biologist [signature]

✳ *Please inspect shipment and report any problem immediately* ✳

Acute 96-hr Toxicity Test-96 Hr Survival

Start Date:	3/16/2010 09:30	Test ID:	999-2708	Sample ID:	REF-Ref Toxicant
End Date:	3/20/2010 08:40	Lab ID:	ORNAS-Northwestern Aquati	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPAF 91-EPA Freshwater	Test Species:	HA-Hyalella azteca
Comments:					

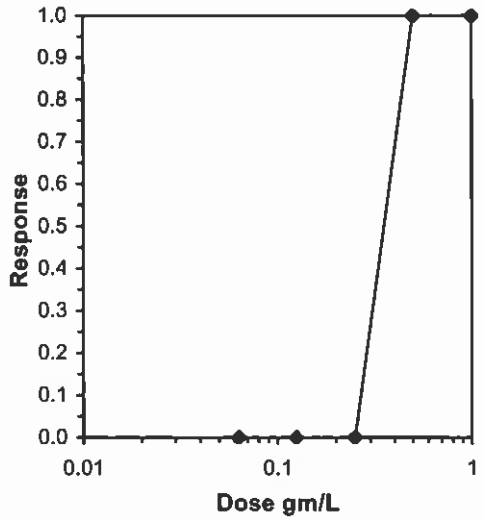
Conc-gm/L	1	2
D-Control	1.0000	1.0000
0.063	1.0000	1.0000
0.125	1.0000	1.0000
0.25	1.0000	1.0000
0.5	0.0000	0.0000
1	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
D-Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.063	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.125	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.5	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2	20	20
1	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2	20	20

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

Graphical Method

Trim Level	EC50
0.0%	0.3536
	0.3536



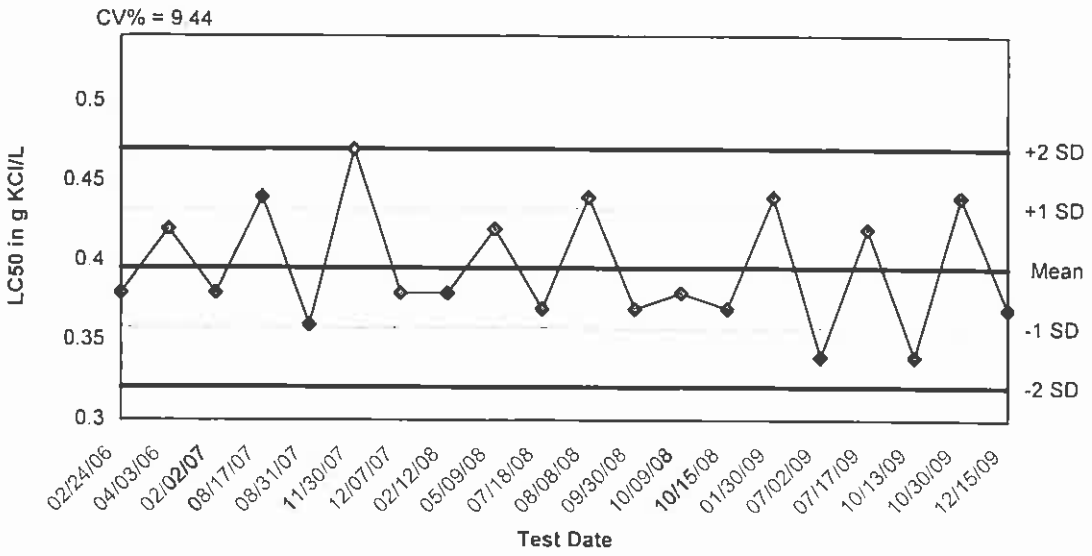
Test: AT-Acute 96-hr Toxicity Test
Test ID: 999-2708
Species: HA-Hyalella azteca
Protocol: EPAF 91-EPA Freshwater
Sample ID: REF-Ref Toxicant
Sample Type: KCL-Potassium chloride
Start Date: 3/16/2010 09:30
End Date: 3/20/2010 08:4
Lab ID: ORNAS-Northwestern Aquatic Sciences

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	10	10	10	10	10	
	2	2	D-Control	10	10	10	10	10	
	3	1	0.063	10	10	10	10	10	
	4	2	0.063	10	10	10	10	10	
	5	1	0.125	10	10	10	10	10	
	6	2	0.125	10	10	10	10	10	
	7	1	0.250	10	10	10	10	10	
	8	2	0.250	10	10	10	10	10	
	9	1	0.500	10	10	4	0	0	
	10	2	0.500	10	10	3	0	0	
	11	1	1.000	10	10	0	0	0	
	12	2	1.000	10	10	0	0	0	

Comments: data entry verified against laboratory bench sheets
4-19-10 JMF

Reviewed by:_____

Amphipod, Hyalella azteca, acute reference toxicant test



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
02/24/06	0.3800	0.3955	0.3582	0.3208	0.4328	0.4702
04/03/06	0.4200	0.3955	0.3582	0.3208	0.4328	0.4702
02/02/07	0.3800	0.3955	0.3582	0.3208	0.4328	0.4702
08/17/07	0.4400	0.3955	0.3582	0.3208	0.4328	0.4702
08/31/07	0.3600	0.3955	0.3582	0.3208	0.4328	0.4702
11/30/07	0.4700	0.3955	0.3582	0.3208	0.4328	0.4702
12/07/07	0.3800	0.3955	0.3582	0.3208	0.4328	0.4702
02/12/08	0.3800	0.3955	0.3582	0.3208	0.4328	0.4702
05/09/08	0.4200	0.3955	0.3582	0.3208	0.4328	0.4702
07/18/08	0.3700	0.3955	0.3582	0.3208	0.4328	0.4702
08/08/08	0.4400	0.3955	0.3582	0.3208	0.4328	0.4702
09/30/08	0.3700	0.3955	0.3582	0.3208	0.4328	0.4702
10/09/08	0.3800	0.3955	0.3582	0.3208	0.4328	0.4702
10/15/08	0.3700	0.3955	0.3582	0.3208	0.4328	0.4702
01/30/09	0.4400	0.3955	0.3582	0.3208	0.4328	0.4702
07/02/09	0.3400	0.3955	0.3582	0.3208	0.4328	0.4702
07/17/09	0.4200	0.3955	0.3582	0.3208	0.4328	0.4702
10/13/09	0.3400	0.3955	0.3582	0.3208	0.4328	0.4702
10/30/09	0.4400	0.3955	0.3582	0.3208	0.4328	0.4702
12/15/09	0.3700	0.3955	0.3582	0.3208	0.4328	0.4702

MR
2.10.10