TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 658-77

Title: Inland silverside, *Menidia beryllina*, 96-hr acute toxicity test using SP-11 final effluent sample. EPA NPDES permit number WAD009248295.

Protocol No.: NAS-XXX-MB1, September 10, 1991, Revision 3 (7-1-12). Based on Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA 821-R-02-012.

STUDY MANAGEMENT

Study Sponsor: CH2M-Hill Wyckoff Treatment Plant, 5350 Creosote Place NE, Bainbridge Island, WA 98110.

Sponsor's Study Monitor: Mr. Stanley Warner

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport laboratory.

Laboratory's Study Personnel: G.A. Buhler, B.S., Proj. Mgr./Study Dir.; L.K. Nemeth, B.A., M.B.A., QA Officer; G.J. Irissarri, B.S., Aq. Toxicol; J. B. Brown, B.S., D.V.M., Assoc. Aq. Toxicol.; Y. Nakahama, Sr. Tech.

Study Schedule:

Test Beginning: 11-9-16, 1110 hrs.

Test Ending: 11-13-16, 1120 hrs.

Disposition of Study Records: All raw data, reports and other study records are stored at Northwestern Aquatic Sciences, 3814 Yaquina Bay Rd., Newport, OR 97365.

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

Description: SP-11 final effluent. Details are as follows:

NAS Sample Number	5730G
Collection Date	11-8-16
Receipt Date	11-9-16
Temperature (°C)	4.2
pH	7.5
Dissolved oxygen (mg/L)	9.3
Salinity (‰)	8.5

Treatments: The sample was salinity adjusted to 30.0 ‰ by addition of Tropic Marin® Sea Salts. The sample was briefly temperature equilibrated prior to use.

Storage: Stored at 4°C in the dark until used.

DILUTION WATER

Source: Artificial seawater

Date of Preparation: 11-8-16

Water Quality: Salinity, 30.0 ‰; pH 8.1

Pretreatment: Prepared with Tropic Marin® sea salts and MilliQ® deionized water, aerated.

TEST ORGANISMS

Species: *Menidia beryllina*, inland silversides.

Age: 12 days at test initiation.

Source: Aquatic BioSystems, Inc. Fort Collins, CO.

Acclimation: Fish were received on 11-8-16. The water quality, including receiving water, prior to testing averaged: Temperature, 20.2°C; pH, 7.6; salinity, 29.5 ‰; dissolved oxygen, 8.5 mg/L. During acclimation, silverside larvae were fed *Artemia* nauplii daily and 50% of the holding water was changed daily.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 600 mL glass beakers containing 250 mL of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0% (control).
Salt Control: None.
Replicates/Treatment: 4
Organisms/Treatment: 40
Aeration: None
Feeding: *Artemia* nauplii 2 hrs. prior to test solution renewal at 48 hrs.
Water Volume Changes: One at 48 hours.
Effect Criterion: Mortality, defined as the lack of respiratory movement in response to tactile stimulation.
Water Quality and Other Test Conditions: Temperature, 20.3 ± 0.1°C; pH, 8.1 ± 0.2; salinity, 30.3 ± 0.5 ‰; dissolved oxygen, 6.6 ± 0.1 mg/L; and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival was calculated for each treatment replicate from the raw data and the means were obtained for each treatment level. The LC50 was calculated, where data permitted, either by the Probit or the Trimmed Spearman-Karber method. The statistical software employed for these calculations was CETIS, v.1.8.7.4, Tidepool Scientific Software.

PROTOCOL DEVIATIONS

None.

REFERENCE TOXICANT TEST

The routine reference toxicant test is a standard multi-concentration toxicity test using copper sulfate to evaluate the performance of the test organisms used in the effluent 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.: 999-3617
Reference Toxicant and Source: Copper as $CuSO_4 \bullet 5H_2O$, Argent Lot No. 0195, 1.0 mg/mL stock prepared 5-16-16.
Test Date: 11-9-16
Dilution Water Used: Yaquina Bay, OR seawater. Salinity 30.0 ‰, pH 8.0.
Results: LC50, 146 µg/L Cu. This result is within the laboratory's control chart warning limits (84.7 – 209).

TEST RESULTS

A detailed tabulation of the test results is given in Table 1. In this test, 100% of the organisms exposed to a 100% concentration of the effluent survived the 96-hour period. Survival in the dilution water controls was 100%, which met the test acceptability criteria of ≥ 90%.

NOEC (%)	100
LOEC (%)	>100
96-hr LC50 (%)	>100
(95% C.I.)	--
Method	By Data Inspection

STUDY APPROVAL

11-30-16
Project Manager/Study Director Date

Julie R. Jore 11-30-16
Quality Assurance Unit Date

11-30-16
Assistant Laboratory Director Date
for Linda Nemeth

Table 1. Survival of *Menidia beryllina* exposed to SP-11 final effluent sample from Wyckoff Treatment Plant.

Effluent Conc. (%)	Replicate	Number of fish surviving					96-hr % Survival	
		0-hr	24-hr	48-hr	72-hr	96-hr	Individual	Mean
100	1	10	10	10	10	10	100	
	2	10	10	10	10	10	100	
	3	10	10	10	10	10	100	
	4	10	10	10	10	10	100	100
50	1	10	10	10	10	10	100	
	2	10	10	10	10	10	100	
	3	10	10	10	10	10	100	
	4	10	10	10	10	10	100	100
25	1	10	10	10	10	10	100	
	2	10	10	10	10	10	100	
	3	10	10	10	10	10	100	
	4	10	10	10	10	10	100	100
12.5	1	10	10	10	10	10	100	
	2	10	10	10	10	10	100	
	3	10	10	10	10	10	100	
	4	10	10	10	10	10	100	100
6.25	1	10	10	10	10	10	100	
	2	10	10	10	10	10	100	
	3	10	10	10	10	10	100	
	4	10	10	10	10	10	100	100
Control	1	10	10	10	10	10	100	
	2	10	10	10	10	10	100	
	3	10	10	10	10	10	100	
	4	10	10	10	10	10	100	100

APPENDIX I

PROTOCOL

TEST PROTOCOL

SILVERSIDE (*MENIDIA BERYLLINA*, *M. MENIDIA*, AND *M. PENINSULAE*) ACUTE TOXICITY TEST

1 INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the acute toxicity of effluents and/or receiving waters using the silverside, *Menidia beryllina* (or *M. menidia*, *M. peninsulae*). With certain modifications this method is also applicable to other uses such as TIE testing, product testing and registration, control charting, etc.

1.2 Referenced Method: This protocol is based primarily on the U.S. EPA acute toxicity manual (EPA-821-R-02-012). Amendments may be incorporated to meet other methods or regulatory requirements as needed.

1.3 Summary of Method: Larval silverside (9-14 days old) are exposed for 24, 48, or 96-hr to different concentrations of effluent, receiving water, or a reference toxicant. The test may be static non-renewal, static renewal, or flow-through. The test chambers are 250 mL or larger beakers, each containing 200 mL or more of test solution. Two replicate beakers (four for the receiving water test), each with 10 organisms, are employed at each test concentration. A standard experimental design is employed consisting of exposure of the test animals to a minimum of five concentrations and a dilution water control in the definitive test, with a minimum 0.5 dilution series (100% and control in the single-concentration test). Mortality is the effect criterion. The data analysis normally consists of calculation of the LC50 and 95% confidence intervals and/or NOEC in the definitive test (pass/fail in a single concentration test). A test summary table is appended to the end of this protocol.

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: _____
Qual. Assurance Unit: _____
Aquatic Toxicologist: _____
Aquatic Toxicologist: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests must begin within 36 hours of the end of the sample collection period. In no case should an effluent test be started more than 72 hours after the sample collection. Holding times for other materials depend upon the material and the project design.

2.7 Quality Assurance: The test data are reviewed by the Quality Assurance Unit to assure that the studies are performed in accordance with the protocol and standard operating procedures and that reports accurately

reflect the raw data. Studies are conducted in a manner consistent with the general principles of GLP methods.

3 TEST MATERIAL

Test materials can include effluents, reference toxicants, receiving waters, sediment porewaters, formulated chemicals, etc. Samples are stored with minimum headspace at 0-6°C in the dark until used. For use in NPDES program testing, the lapsed time from sample collection to first use must not exceed 36 h. In static-renewal tests samples may be used up to 72 h after first use if stored as above.

4 DILUTION WATER

The choice of dilution water depends on test requirements. Clean natural filtered seawater is preferred. A salinity range of 1-32‰ ± 10% is recommended for *M. beryllina* (15-32‰ ± 10% for *M. menidia* and *M. peninsulae*). Artificial sea salts, hypersaline brine, and/or deionized Milli-Q water may be added to natural seawater or effluent/receiving water as needed for salinity adjustment. Modified GP2 or Tropic Marin® (or equivalent) artificial seawater may also be used.

5 TEST ORGANISMS

5.1 Species: Inland silverside, *Menidia beryllina*; or other silversides: *M. menidia* and *M. peninsulae*.

5.2 Source: The animals are purchased from commercial suppliers.

5.3 Age at Study Initiation: 9-14 days; ≤24-hr range in age.

5.4 Acclimation and Pretest Observation: Test organisms should be held in the laboratory in well aerated dilution water in order to acclimate to test conditions, if necessary. Pretest mortality should not exceed 10% per day prior to testing. Water quality should be monitored and recorded daily during acclimation.

6 DESCRIPTION OF TEST SYSTEM

6.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of test material with dilution water. The solution is made in excess and appropriate test volume aliquots are transferred into the test chambers. Prior to mixing, test material and dilution water are brought to test temperature and only aerated if necessary.

6.2 Test Chambers and Environmental Control: Test chambers are 250 mL or larger beakers holding 200 mL or more of test solution. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath or by holding in a constant temperature room. Aeration is not employed unless dissolved oxygen falls below 4.0 mg/L. If aerated, rate should not exceed 100 bubbles/minute. Effluents/receiving waters are aerated prior to testing if necessary. Photoperiod control of test chambers is provided.

6.3 Cleaning: All laboratory glassware, including test chambers, is cleaned based on the method described in EPA-821-R-02-012. New glassware and test systems are soaked 15 minutes in tap water and scrubbed with detergent (or cleaned in automatic dishwasher); rinsed three times with tap water; carefully rinsed once with fresh, dilute (10%, V:V) hydrochloric or nitric acid to remove scale, metals, and bases; rinsed three times with tap water; rinsed once with acetone to remove organic compounds (using a fume hood or canopy); and rinsed three times with tap water, then once 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 fish to five or more test concentrations (≤0.5 dilution series) and a dilution water control (or 100% and control for the single concentration receiving water test).

Exposures are for 24, 48, or 96 hours. Each treatment consists of two replicate test containers (four for the single-concentration test), each containing 10 fish. A stratified random design is used for the placement of beakers in the test area. Test organisms are impartially distributed to the test chambers by adding one or two animals to each chamber and repeating the process until each contains 10 organisms.

7.2 Effect Criterion: The effect criterion used in the silverside acute test is mortality, defined as the lack of body movement in response to tactile stimulation.

7.3 Test Conditions: The dissolved oxygen concentration in each test container must be greater than 4.0 mg/L throughout the test. The test temperature employed is 20 ± 1°C or 25 ± 1°C. The salinity should be in the range of 1-32‰ ± 10% (*M. beryllina*). The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps at an intensity of 50-100 ft candles. If the test is a 96-hr test, the test solutions must be renewed at 48 hours.

7.4 Preparation of Test Concentrations: The procedure will depend on factors including the salinity of the test material, the test salinity desired and the procedures selected for salinity adjustment.

7.5 Beginning of Test: The test is begun by adding the organisms to the equilibrated test containers as previously described.

7.6 Feeding: Artemia nauplii are made available while holding prior to the test. During a 96-hr test, 0.1 mL Artemia nauplii concentrate per beaker is provided 2 hours prior to test solution renewal at 48 hours.

7.7 Test Duration, Type and Frequency of Observations, and Methods: The test duration of the acute toxicity test is 24, 48 or 96-hours. The type and frequency of observations to be made during the test are summarized as follows:

TYPE OF OBSERVATION	TIMES OF OBSERVATION
BIOLOGICAL DATA	
Survival (in each test container).	Daily.
PHYSICAL AND CHEMICAL DATA	
Dissolved oxygen, pH, temperature, & salinity (in one replicate of each test level and the control).	Daily.
Total ammonia-N (in sample where toxicity may be contributed by unionized ammonia; i.e., total ammonia ≥ 5 mg/L)	Prior to use in test (optional as required).

During the test, dead organisms are removed at least every 24 hours. Dissolved oxygen is directly measured in test beakers using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH and temperature are measured directly in the test beakers by careful use of a combined pH/temperature probe and a properly calibrated meter with scale divisions of 0.1 pH units. Salinity is measured with a refractometer.

7.8 Criterion of Test Acceptance: The test results are acceptable if survival in the controls is at least 90%.

8 DATA ANALYSIS

Ordinarily, the following data analysis is performed. Due to special requirements, alternative methods may be used. Percent survival is calculated for each treatment replicate from the raw data and the means are obtained for each treatment level. For multi-concentration tests, the LC50 and/or NOEC are calculated. The LC50 is calculated using Maximum-Likelihood Probit, Spearman-Karber, or Trimmed Spearman-Karber (EPA-821-R-02-012, p 73). The NOEC is calculated according to the EPA flowchart (EPA-821-R-02-012, p 87). In the single concentration test, a pass/fail analysis is performed according to the EPA flowchart (EPA-821-R-02-012, p 86). An arcsine transformation is performed on survival data prior to

analysis. The statistical software employed for these calculations is either CETIS or ToxCalc, both by Tidepool Scientific Software. Some agencies require that toxic units (TU) be reported. The toxic unit acute (TU_a) is 100/LC50.

9 REPORTING

The final report of the test results includes the following standard information at a minimum: name and identification of the test including a reference to the test protocol or method; the client and client's study monitor; the investigator and laboratory; information on the test material; information on the dilution water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; information about any aeration that may have been required; definition of the effect criteria and other observations; responses in the control treatments; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures; reference toxicant testing information. In order to provide for independent outside QA evaluation, the final report should also include appended raw data records including A) a copy of the test protocol or other appropriate method description; B) copies of all of the test raw data including test bench sheets, data analysis printouts, and chain-of- custody records, and C) copies of all similar raw data pertaining to the reference toxicant test including the current control chart. The final report should also contain the approval signatures of the Study Director, Project Manager, QA Unit, and Laboratory Director.

10 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.

11 REFERENCE TOXICANT

Reference toxicant (positive control) testing should be included with each study or at regular intervals as defined in the Quality Assurance Program of the laboratory.

12 REFERENCES AND GUIDELINES

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

13 APPROVALS

_____ for _____
Name Date Client

_____ for **NORTHWESTERN AQUATIC SCIENCES**
Name Date

Appendix A
Test Conditions Summary

1. Test type	Static non-renewal, static renewal, or flow-through.
2. Test duration	24, 48, or 96 hrs.
3. Temperature	20 ± 1°C; or 25 ± 1°C (recommended). Temperature maximum deviation of 3°C during test (required).
4. Light quality	Ambient laboratory illumination (recommended).
5. Light intensity	50-100 footcandles (recommended).
6. Photoperiod	16 hr light, 8 hr dark (recommended).
7. Test chamber size	250 mL (recommended minimum).
8. Test solution volume	200 mL (recommended minimum).
9. Renewal of test solutions	After 48 hrs (required minimum). Alternatives may be required.
10. Age of test organisms	9-14 days; ≤24-h age range (required).
11. No. organisms per test chamber	10 for effluent and receiving water tests (required minimum).
12. No. replicate chambers per concentration	2 for effluent tests; 4 for receiving water tests (required minimums).
13. No. organisms per concentration	20 for effluent tests; 40 for receiving water tests (required minimums).
14. Feeding regime	*Artemia* nauplii are made available while holding prior to the test; add 0.1 mL *Artemia* concentrate 2 hr prior to renewal at 48 hr.
15. Test chamber cleaning	Cleaning not required.
16. Test chamber aeration	None, unless DO concentration falls below 4.0 mg/L; rate should not exceed 100 bubbles/min (recommended).
17. Dilution water	Uncontaminated natural seawater, filtered to ≤0.45µm, adjusted with hypersaline brine and/or Milli-Q® deionized water; or receiving water: 1-32‰ ± 10% for *M. beryllina*; 15-32‰ ± 10% for other *Menidia* sp.
18. Test concentrations	Effluents: minimum of five concentrations and a control. Receiving waters: 100% receiving water and a control.
19. Dilution series	Effluents: ≥0.5 dilution series (recommended). Receiving waters: none or ≥0.5 dilution series (recommended).
20. Endpoint	Mortality (required).
21. Sampling and sample holding requirements	Samples are first used within 36 hr of completion of sampling period (required for effluents and recommended for receiving waters.
22. Sample volumes required	1 L (recommended); 2 L for receiving waters (recommended).
23. Test acceptability criterion	≥ 90% survival in controls (required).
24. Reference toxicant	Run concurrently.

APPENDIX II

RAW DATA

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-MB1

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 658-77 Client: CH2M-Wyckoff Investigator Reviewed ppl-p

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

Species *Menidia beryllina*

STUDY MANAGEMENT

Client: CH2M-Wyckoff Treatment Plant, 5350 Creosote Place NE, Bainbridge Island, WA 98110

Client's Study Monitor: Mr. Stanley Warner

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Mgr./Study Dir. [illegible]

QA Officer L.K. Nemeth

1. [illegible] 2. G.J. IRISSARRI GJI

3. J. Brown JB 4.

Study Schedule:

Test Beginning: 11-9-16 1110 Test Ending: 11-13-16 1120

TEST MATERIAL

Description: CH2M- Wyckoff SP-11 - COMP

NAS Sample No.	5730G				
Date of Collection:	11-8-16				
Date of Receipt:	11-9-16				
Temperature (deg C):	4.2				
Dissolved oxygen (mg/L):	9.3				
pH:	7.5				
Conductivity (umhos/cm):	—				
Hardness (mg/L):	—				
Alkalinity (mg/L):	—				
Salinity (ppt):	8.5				
:					

DILUTION WATER

Description: Artificial seawater

Date of Preparation/Collection: 11-8-16

Water Quality: Cond. (umhos/cm): N/A Salinity (ppt) 30.0 pH 8.1

Hardness (mg/L as $CaCO_3$): N/A Alkalinity (mg/L as $CaCO_3$): N/A

Treatments: Prepared with Tropic Marin sea salts and MilliQ deionized water, aerated.

TEST LOCATION

Test conducted in (circle one): room 1 (room 2) trailer water bath other:_____

Repl. **Randomization chart:**

D	50	6.25	12.5	Ø	100	25				
C	6.25	100	Ø	25	50	12.5				
B	Ø	50	25	100	6.25	12.5				
A	100	12.5	Ø	6.25	25	50				

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

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 658-77 Client CH2M-Wyckoff Investigator

TEST ORGANISMS

Species: *Menidia beryllina* Age: 12 days Size:

Source: AQUATIC BIO SYSTEMS, Ft. Collins, CO Date received: 11-8-16

Acclimation Data:

Date	Temp. (deg.C)	pH	salinity (ppt)	DO (mg/L)	Feeding amount	Feeding description	Water changes	Comments
11-8-16	20.6	7.4	29.0	9.7	~½ mL	Artemia	YES	Rec'd H_2O
11-9-16	19.8	7.8	30.0	7.3	"	"	"	
Mean	20.2	7.6	29.5	8.5				
S.D.	—	—	—	—				
(N)	(2)	(2)	(2)	(2)				

Photoperiod during acclimation: 16:8 L:D

TEST PROCEDURES AND CONDITIONS

Test concentrations (50% series recommended): 100, 50, 25, 12.5, 6.25 & 0%

Test chamber: 600 mL glass beakers Test volume: 250 mL

Replicates/treatment: 4 Organisms/treatment: 40 (10/repl)

Test water changes: Yes@48 hours Aeration during test: None

Feeding: Yes@48 hours ~2 hours prior to test change

Duration: 24-hr, 48-hr, 96-hr Test temperature (deg.C): 20 +/- 1

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

MISCELLANEOUS NOTES

Test Concentration Preparation:

Test Concentration (%)	Volume of effluent* (mL)	Volume of Dilution water (mL)
100	1,000	0
50	500	500
25	250	750
12.5	125	875
6.25	62.5	937.5
0	0	1,000

11-9-16 Y

11-11-16 Y

*Effluent salinity adjusted to 30 ppt with Tropic Marin® Sea salts.

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 658-77 Client CH2M-Wyckoff Investigator

DAILY RECORD SHEET

Day 0 (11 9 16)

Conc. (%)	Temp. (deg.C)	pH	Sal. (ppt)	DO (ppm)	Survivors A	B	C	D
1. 100	20.3	7.7	30.5	6.3	10	10	10	10
2. 50	20.4	7.9	30.5	6.5	10	10	10	10
3. 25	20.3	8.0	29.5	6.7	10	10	10	10
4. 12.5	20.3	8.0	29.5	6.7	10	10	10	10
5. 6.25	20.3	8.1	29.5	6.7	10	10	10	10
6. 0	20.4	8.2	29.5	6.7	10	10	10	10

Day 1 (11 10 16)

Conc. (%)	Temp. (deg.C)	pH	Sal. (ppt)	DO (ppm)	Survivors A	B	C	D
1. 100	20.3	8.2	30.5	6.5	10	10	10	10
2. 50	20.3	8.2	30.5	6.5	10	10	10	10
3. 25	20.3	8.1	30.5	6.5	10	10	10	10
4. 12.5	20.3	8.0	30.0	6.5	10	10	10	10
5. 6.25	20.4	8.0	30.0	6.5	10	10	10	10
6. 0	20.4	7.9	30.0	6.5	10	10	10	10

Day 2 (11 11 16)

Conc. (%)	Temp. (deg.C)	pH	Sal. (ppt)	DO (ppm)	Survivors A	B	C	D
1. 100	20.2	8.4	31.5	6.6	10	10	10	10
2. 50	20.2	8.3	31.0	6.7	10	10	10	10
3. 25	20.3	8.2	30.5	6.7	10	10	10	10
4. 12.5	20.3	8.1	30.5	6.7	10	10	10	10
5. 6.25	20.3	8.0	30.5	6.7	10	10	10	10
6. 0	20.3	7.9	30.5	6.7	10	10	10	10

Day 3 (11 12 16)

Conc. (%)	Temp. (deg.C)	pH	Sal. (ppt)	DO (ppm)	Survivors A	B	C	D
1. 100	20.2	8.3	30.5	6.5	10	10	10	10
2. 50	20.2	8.2	30.5	6.6	10	10	10	10
3. 25	20.2	8.1	30.0	6.7	10	10	10	10
4. 12.5	20.1	8.1	30.5	6.5	10	10	10	10
5. 6.25	20.2	8.0	30.0	6.6	10	10	10	10
6. 0	20.2	8.0	30.0	6.6	10	10	10	10

Day 4 (11 13 16)

Conc. (%)	Temp. (deg.C)	pH	Sal. (ppt)	DO (ppm)	Survivors A	B	C	D
1. 100	20.2	8.4	31.0	6.7	10	10	10	10
2. 50	20.2	8.3	30.5	6.8	10	10	10	10
3. 25	20.2	8.2	30.0	6.8	10	10	10	10
4. 12.5	20.2	8.1	30.0	6.7	10	10	10	10
5. 6.25	20.2	8.1	30.5	6.8	10	10	10	10
6. 0	20.3	8.0	30.0	6.8	10	10	10	10

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

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

Rec'd 11/8/16

ORGANISM HISTORY

DATE: 11/7/2016

SPECIES: *Menidia beryllina*

AGE: 10 day

LIFE STAGE: Juvenile

HATCH DATE: 10/28/2016

BEGAN FEEDING: Immediately

FOOD: Rotifers, *Artemia* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	24°C	23-26 °C
SALINITY-CONDUCTIVITY:	25 ppt	23-26 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	180 mg/l	180-240 mg/l
pH:	8.26	7.92-8.30

Comments:

Facility Supervisor

CETIS Analytical Report

Inland Silverside 96-h Acute Survival Test				Northwestern Aquatic Sciences	
Analysis ID:	06-1036-7387	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv1.8.7
Analyzed:	15 Nov-16 10:20	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	15-9937-5780	**Test Type:**	Survival (96h)	**Analyst:**	
Start Date:	09 Nov-16 11:10	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Reconstituted Water
Ending Date:	13 Nov-16 11:20	**Species:**	Menidia beryllina	**Brine:**	Tropic Marin
Duration:	4d 0h	**Source:**	Aquatic Indicators, FL	**Age:**	
Sample ID:	02-2599-2489	**Code:**	D785F29	**Client:**	Wyckoff Treatment Plant
Sample Date:	08 Nov-16 09:10	**Material:**	Industrial Effluent	**Project:**	WET Quarterly Compliance Test (4Q)
Receive Date:	09 Nov-16 10:30	**Source:**	Wyckoff		
Sample Age:	26h	**Station:**			

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	100	>100	NA	1

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Dilution Water		6.25	18	10	1	6	0.8333	Asymp	Non-Significant Effect
		12.5	18	10	1	6	0.8333	Asymp	Non-Significant Effect
		25	18	10	1	6	0.8333	Asymp	Non-Significant Effect
		50	18	10	1	6	0.8333	Asymp	Non-Significant Effect
		100	18	10	1	6	0.8333	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	5	65540	<0.0001	Significant Effect
Error	0	0	18			
Total	0		23			

96h Proportion Survived Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	4	1	1	1	1	1	1	0	0.0%	0.0%
6.25		4	1	1	1	1	1	1	0	0.0%	0.0%
12.5		4	1	1	1	1	1	1	0	0.0%	0.0%
25		4	1	1	1	1	1	1	0	0.0%	0.0%
50		4	1	1	1	1	1	1	0	0.0%	0.0%
100		4	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Dilution Water	4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
6.25		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
12.5		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
25		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
50		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%
100		4	1.412	1.412	1.412	1.412	1.412	1.412	0	0.0%	0.0%

96h Proportion Survived Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	1
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

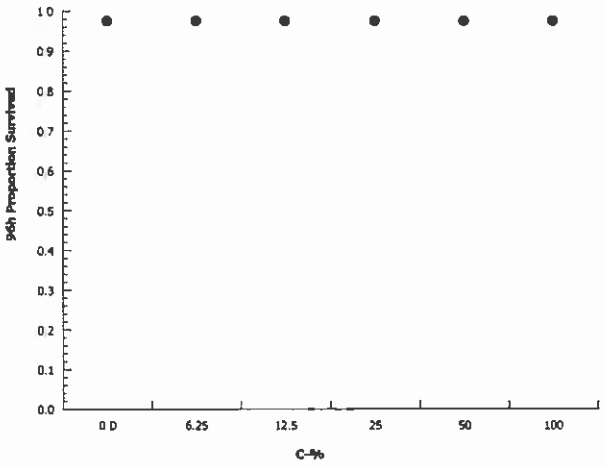
Inland Silverside 96-h Acute Survival Test — Northwestern Aquatic **Sciences**

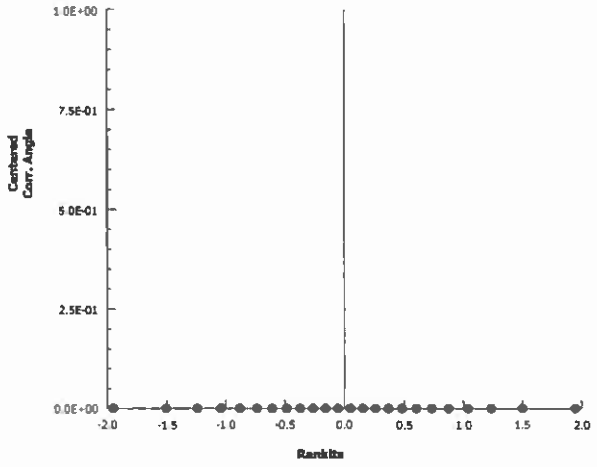
Analysis ID:	06-1036-7387	**Endpoint:**	96h Proportion Survived	**CETIS Version:**	CETISv1.8.7
Analyzed:	15 Nov-16 10:20	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1.412	1.412	1.412	1.412
6.25		1.412	1.412	1.412	1.412
12.5		1.412	1.412	1.412	1.412
25		1.412	1.412	1.412	1.412
50		1.412	1.412	1.412	1.412
100		1.412	1.412	1.412	1.412

Graphics





LC50 > 100% by data inspection. 11-15-16 JS

CETIS Test Data Worksheet

Inland Silverside 96-h Acute Survival Test				Northwestern Aquatic Sciences
Start Date:	09 Nov-16 11:10	**Species:**	Menidia beryllina	**Sample Code:** D785F29
End Date:	13 Nov-16 11:20	**Protocol:**	EPA/821/R-02-012 (2002)	**Sample Source:** Wyckoff
Sample Date:	08 Nov-16 09:10	**Material:**	Industrial Effluent	**Sample Station:**

C-%	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	D	1	17	10				10	
0	D	2	18	10				10	
0	D	3	5	10				10	
0	D	4	22	10				10	
6.25		1	11	10				10	
6.25		2	9	10				10	
6.25		3	15	10				10	
6.25		4	8	10				10	
12.5		1	4	10				10	
12.5		2	6	10				10	
12.5		3	10	10				10	
12.5		4	19	10				10	
25		1	7	10				10	
25		2	2	10				10	
25		3	16	10				10	
25		4	23	10				10	
50		1	21	10				10	
50		2	20	10				10	
50		3	12	10				10	
50		4	13	10				10	
100		1	3	10				10	
100		2	14	10				10	
100		3	1	10				10	
100		4	24	10				10	

data entry verified against laboratory bench sheets 11-16-16 JRF

Water Quality Data - test #658-77, Menidia acute test					
Day	Concentration	Temperature	pH	Salinity	DO
0	100	20.3	7.7	30.5	6.3
0	50	20.4	7.9	30.5	6.5
0	25	20.3	8.0	29.5	6.7
0	12.2	20.3	8.0	29.5	6.7
0	6.25	20.3	8.1	29.5	6.7
0	0	20.4	8.2	29.5	6.7
1	100	20.3	8.2	30.5	6.5
1	50	20.3	8.2	30.5	6.5
1	25	20.3	8.1	30.5	6.5
1	12.5	20.3	8.0	30.0	6.5
1	6.25	20.4	8.0	30.0	6.5
1	0	20.4	7.9	30.0	6.5
2	100	20.2	8.4	31.5	6.6
2	50	20.2	8.3	31.0	6.7
2	25	20.3	8.2	30.5	6.7
2	12.5	20.3	8.1	30.5	6.7
2	6.25	20.3	8.0	30.5	6.7
2	0	20.3	7.9	30.5	6.7
3	100	20.2	8.3	30.5	6.5
3	50	20.2	8.2	30.5	6.6
3	25	20.2	8.1	30.0	6.7
3	12.5	20.1	8.1	30.5	6.5
3	6.25	20.2	8.0	30.0	6.6
3	0	20.2	8.0	30.0	6.6
4	100	20.2	8.4	31.0	6.7
4	50	20.2	8.3	30.5	6.8
4	25	20.2	8.2	30.0	6.8
4	12.5	20.2	8.1	30.0	6.7
4	6.25	20.2	8.1	30.5	6.8
4	0	20.3	8.0	30.0	6.8
	MEAN	20.3	8.1	30.3	6.6
	SD	0.1	0.2	0.5	0.1
	N	30	30	30	30
	MIN	20.1	7.7	29.5	6.3
	MAX	20.4	8.4	31.5	6.8

Data entry verified against laboratory bench sheets
11-16-16 JRF

Northwestern Aqutic Sciences (REGION COPY)
DateShipped 11/8/2016
CarrierName FedEx
AirbillNo 7845 8474 1177

CHAIN OF CUSTODY RECORD
Wyckoff Eagle Harbor GWTP 2017/WA
Project Code WEH-0224Z
Cooler # 1 of 1

No: 10-110816-093931-0134
2017T10P303DD210W2LA00
Contact Name Keith Allers
Contact Phone 206-780-1711

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
658		Ground Water/ K Allers	Composite	ACTOX-CHRTOX(8 Weeks)	(< 6 C) (1)	SP-11	11/08/2016 09 10	Field Sample

9 of 10

Special Instructions NAS # 57306

Shipment for Case Complete? N
Samples Transferred From Chain of Custody #

Analysis Key: ACTOX-CHRTOX=Acute Toxicity, Chronic Toxicity

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	Keith Allers CH2M	11-8-2016 0755	[signature] NAS	11-9-16 1030	okay

ORIGIN ID BFIA (206) 780-1711
KEITH ALLERS
CH2M
5350 CREOSOTE PLACE N E
BAINBRIDGE ISLAND, WA 98110
UNITED STATES US

SHIP DATE 08NOV16
ACTWGT 48.00 LB
CAD 103963466/WSXI2500
DIMS 22x14x18 IN
BILL SENDER

TO GEARLD IRISSARRI
NORTHWESTERN AQUATIC SCIENCES
3814 YAQUINA BAY ROAD

NEWPORT OR 97365
(541) 265-7225
REF 436558.FP.Y5.01
INV
PO DEPT

544J3/CBB1/14E8

FedEx Express

WED - 09 NOV 12:00P
PRIORITY OVERNIGHT

TRK# 0201 7845 8474 1177

86 ONPA

97365
OR-US PDX

NORTHWESTERN
AQUATIC SCIENCES
A Division of NAS Associates, Inc

SAMPLE NO 658 DATE 11-8-2016
SIGNATURE Keith Allers
PRINT NAME AND TITLE Keith Allers Industrial Tech 3
SEAL BROKEN BY GB DATE 11-9-16

APPENDIX III

RAW DATA – REFERENCE TOXICANT TEST

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-3617 Client: QC Test Investigator Reviewed [illegible]
Test Type (rangefinding/definitive) Test Length (hr) 48
Species *Menidia beryllina* (Inland silverside)

STUDY MANAGEMENT

Client: QC Test
Client's Study Monitor: N/A
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Mgr./Study Dir. GA Buhler [illegible]
QA Officer L.K. Nemeth
1. Yves Nalchaime [illegible] 2. J. Brown JB
3. 4.
Study Schedule:
Test Beginning: 11-9-16 0915 Test Ending: 11-11-16 0955

TEST MATERIAL

Argent Reagent lot #0195
Description: Copper as: $CuSO_4$-$5H_2O$ 1.0 mg/mL stock prep: 5-16-16

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: Yaquina Bay Seawater
Date of Preparation/Collection: 11-8-16
Water Quality: Cond. (umhos/cm) N/A Salinity (ppt) 30.0 pH 8.0
Hardness (mg/L as $CaCO_3$): N/A Alkalinity (mg/L as $CaCO_3$): N/A
Treatments: Aerated, filtered to ≤ 0.45 um, salinity adjusted with Milli-Q® deionized water.

TEST LOCATION

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

Rep. **Randomization chart:**

B	1000	Ø	10	100	30	300				
A	Ø	100	300	1000	10	30				

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

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-3617 Client QC Test Investigator

TEST ORGANISMS

Species: *Menidia beryllina* Age: 12-day Size:

Source: Aquatic Bio Systems, Ft. Collins, CO Date received: 11-8-16

Acclimation Data:

Date	Temp. (deg.C)	pH	salinity (ppt)	DO (mg/L)	Feeding amount	Feeding description	Water changes	Comments
11-8-16	20.6	7.4	29.0	9.7	1/2 mL	Artemia	YES	Rec'd Org
11-8-16	19.7	8.1	30.5	7.2	"	"	"	
Mean	20.2	7.8	29.8	8.5				
S.D.	-	-	-	-				
(N)	(2)	(2)	(2)	(2)				

Photoperiod during acclimation: 16:8 L:D

TEST PROCEDURES AND CONDITIONS

Test concentrations (50% series recommended): 1,000, 300, 100, 30, 10 & 0 ug/L

Test chamber: 600 mL beakers Test volume: 250 mL

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

Test water changes: None Aeration during test: None

Feeding: ~2 hrs prior to test initiation

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

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

MISCELLANEOUS NOTES

Test solution perpetration:

Test Concentration (ug/L)	Volume of W.S.* (mL)	Volume of Dilution water (mL)
1,000	5.0	Appropriate amount of W.S. added to a graduated cylinder then brought up to volume (500mL) with dilution water.
300	1.5	
100	0.5	
30	0.15	
10	0.05	
0	0	

11-9-16 YC

*Working stock (W.S.) made by 5:45 (5mL ↑ 50 mL) dilution of concentrated (1.0 mg/mL) Cu stock with Milli-Q DI water. Final concentration: 100 ug/mL Cu.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-MB1

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-3617 Client QC Test Investigator _____

DAILY RECORD SHEET

Day 0 (11 19 16)

Conc. (ug/L)	Temp. (deg.C)	pH	Sal. (ppt)	DO (mg/L)	Survivors A	Survivors B
1. 1,000	20.3	8.0	30.0	6.7	10	10
2. 300	20.3	8.0	30.0	6.7	10	10
3. 100	20.4	8.0	30.5	6.7	10	10
4. 30	20.4	8.1	30.0	6.7	10	10
5. 10	20.4	8.1	30.0	6.7	10	10
6. 0	20.3	8.1	30.0	6.7	10	10

Day 1 (11 10 16)

Conc. (ug/L)	Temp. (deg.C)	pH	Sal. (ppt)	DO (mg/L)	Survivors A	Survivors B
1. 1,000	20.4	7.9	30.5	6.7	0C(10D)	0C(10D)
2. 300	20.4	7.8	30.5	6.3	0C(10D)	1C(9D)
3. 100	20.4	7.9	30.0	6.5	10	8(2D)
4. 30	20.5	7.9	30.0	6.5	10	9C(1D)
5. 10	20.5	8.0	30.0	6.5	10	10
6. 0	20.4	8.0	30.0	6.5	10	10

Day 2 (11 11 16)

Conc. (ug/L)	Temp. (deg.C)	pH	Sal. (ppt)	DO (mg/L)	Survivors A	Survivors B
1. 1,000	—	—	—	—	0	0
2. 300 *	20.3	7.9	32.0	6.9	0	0C(1D)
3. 100	20.2	7.9	32.0	6.7	10	8
4. 30	20.3	7.9	31.0	6.7	10	9
5. 10	20.3	8.0	31.0	6.7	10	10
6. 0	20.2	7.9	31.0	6.7	10	10

*B` Repl-

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

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

Rec'd 11/8/16

ORGANISM HISTORY

DATE: 11/7/2016

SPECIES: *Menidia beryllina*

AGE: 10 day

LIFE STAGE: Juvenile

HATCH DATE: 10/28/2016

BEGAN FEEDING: Immediately

FOOD: Rotifers, *Artemia* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	24°C	23-26 °C
SALINITY/CONDUCTIVITY:	25 ppt	23-26 ppt
TOTAL HARDNESS (as $CaCO_3$):	--	--
TOTAL ALKALINITY (as $CaCO_3$):	180 mg/l	180-240 mg/l
pH:	8.26	7.92-8.30

Comments:

Facility Supervisor

CETIS Summary Report

Test Code: 999-3617 | 07-2855-3734

Reference Toxicant 48-h Acute Survival Test — Northwestern Aquatic Sciences

Batch ID:	21-4735-2917	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	09 Nov-16 09:15	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Yaquina Bay Seawater
Ending Date:	11 Nov-16 09:55	**Species:**	Menidia beryllina	**Brine:**	
Duration:	49h	**Source:**	Aquatic Indicators, FL	**Age:**	

Sample ID:	08-4465-7632	**Code:**	325873E0	**Client:**	Internal Lab
Sample Date:	09 Nov-16 09:15	**Material:**	Copper sulfate	**Project:**	
Receive Date:	09 Nov-16 09:15	**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**			

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
07-9706-7591	48h Proportion Survived	EC50	145.7	120.4	176.4		Spearman-Kärber

48h Proportion Survived Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	2	1	1	1	1	1	0	0	0.0%	0.0%
10		2	1	1	1	1	1	0	0	0.0%	0.0%
30		2	0.95	0.3147	1	0.9	1	0.05	0.07071	7.44%	5.0%
100		2	0.9	0	1	0.8	1	0.1	0.1414	15.71%	10.0%
300		2	0	0	0	0	0	0	0		100.0%
1000		2	0	0	0	0	0	0	0		100.0%

48h Proportion Survived Detail

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
10		1	1
30		1	0.9
100		1	0.8
300		0	0
1000		0	0

CETIS Test Data Worksheet

Report Date: 15 Nov-16 10:08 (p 1 of 1)
Test Code: 07-2855-3734/999-3617

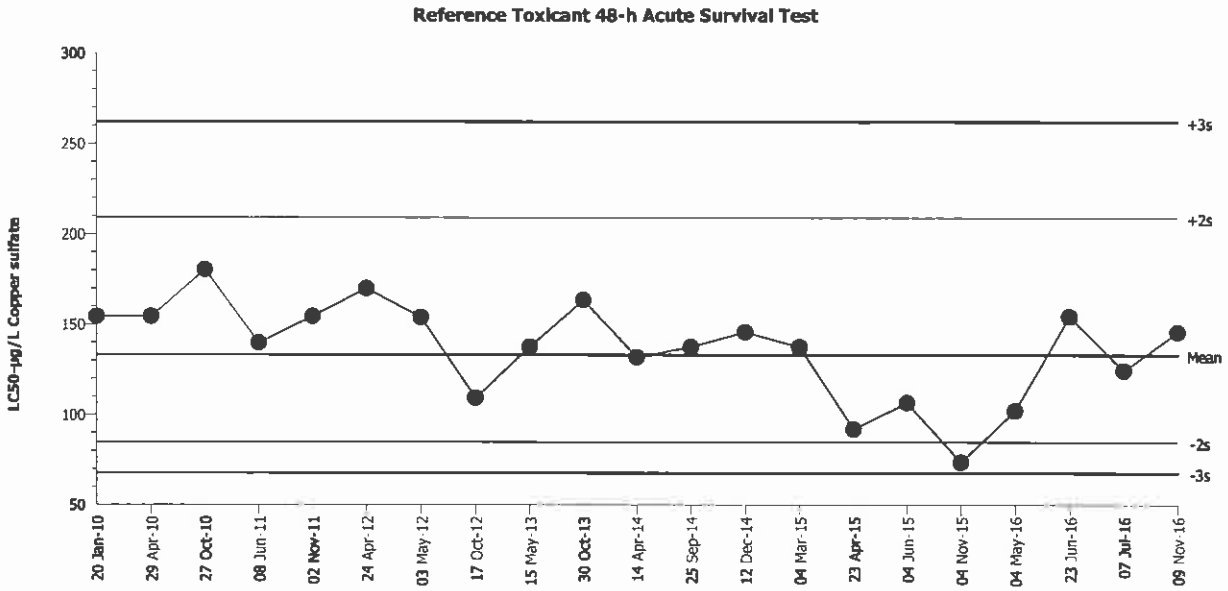
Reference Toxicant 48-h Acute Survival Test				Northwestern Aquatic Sciences
Start Date:	09 Nov-16 09:15	Species:	Menidia beryllina	Sample Code: 325873E0
End Date:	11 Nov-16 09:55	Protocol:	EPA/821/R-02-012 (2002)	Sample Source: Reference Toxicant
Sample Date:	09 Nov-16 09:15	Material:	Copper sulfate	Sample Station:

C-µg/L	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	Notes
0	D	1	8	10		10	
0	D	2	12	10		10	
10		1	6	10		10	
10		2	10	10		10	
30		1	5	10		10	
30		2	9	10		9	
100		1	2	10		10	
100		2	1	10		8	
300		1	4	10		0	
300		2	7	10		0	
1000		1	11	10		0	
1000		2	3	10		0	

data entry verified against laboratory bench sheets 11-16-16 JTF

Reference Toxicant 48-h Acute Survival Test Northwestern Aquatic Sciences

Test Type:	Survival (48h)	**Organism:**	Menidia beryllina (Inland Silverside)	**Material:**	Copper sulfate
Protocol:	EPA/821/R-02-012 (2002)	**Endpoint:**	48h Proportion Survived	**Source:**	Reference Toxicant-REF



Mean:	133.1	**Count:**	20	**-2s Warning Limit:**	84.72	**-3s Action Limit:**	67.6
Sigma:	NA	**CV:**	25.30%	**+2s Warning Limit:**	209.1	**+3s Action Limit:**	262

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2010	Jan	20	11:00	154.4	21.28	0.657			08-7238-7719	19-7735-9536
2		Apr	29	9:15	154.4	21.28	0.657			05-0906-4623	04-2473-2564
3		Oct	27	13:50	180.2	47.13	1.343			08-9091-3744	20-8575-1016
4	2011	Jun	8	9:15	139.7	6.66	0.2162			19-8506-0915	02-0234-8313
5		Nov	2	10:25	154.4	21.28	0.657			17-7747-0844	14-4821-2321
6	2012	Apr	24	8:40	169.8	36.71	1.079			09-0894-6453	11-2925-5863
7		May	3	8:30	153.9	20.82	0.6436			00-0711-2305	20-7362-3197
8		Oct	17	11:15	109.3	-23.8	-0.8726			10-0444-6311	00-7573-7836
9	2013	May	15	7:00	137.6	4.495	0.1471			16-6995-0954	16-4582-4481
10		Oct	30	13:25	163.5	30.43	0.9119			19-3608-8754	00-4003-9076
11	2014	Apr	14	11:30	131.8	-1.286	-0.04301			20-7450-8590	01-1253-6144
12		Sep	25	10:00	137.6	4.495	0.1471			15-5297-1657	07-1849-0124
13		Dec	12	8:30	145.7	12.65	0.402			09-0648-4504	05-6807-3777
14	2015	Mar	4	10:40	137.6	4.495	0.1471			21-1719-8305	13-3397-0822
15		Apr	23	8:45	91.95	-41.13	-1.637			10-0925-2273	19-0548-1025
16		Jun	4	13:15	106.7	-26.42	-0.98			13-8689-1181	03-9820-8141
17		Nov	4	11:50	73.52	-59.57	-2.628	(-)		13-1712-8446	07-9583-1346
18	2016	May	4	8:10	102.1	-31.02	-1.175			04-2416-9651	04-0389-3629
19		Jun	23	12:50	154.4	21.28	0.657			02-4383-5206	09-5052-4145
20		Jul	7	12:00	124.3	-8.78	-0.3023			15-9630-6419	09-4197-3954
21		Nov	9	9:15	145.7	12.65	0.402			07-2855-3734	07-9706-7591

Water Quality Data - test #999-3617, Menidia acute test					
Day	Concentration (g/L)	Temperature	pH	Salinity	DO
0	1000	20.3	8.0	30.0	6.7
0	300	20.3	8.0	30.0	6.7
0	100	20.4	8.0	30.5	6.7
0	30	20.4	8.1	30.0	6.7
0	10	20.4	8.1	30.0	6.7
0	0	20.3	8.1	30.0	6.7
1	1000	20.4	7.9	30.5	6.7
1	300	20.4	7.8	30.5	6.3
1	100	20.4	7.9	30.0	6.5
1	30	20.5	7.9	30.0	6.5
1	10	20.5	8.0	30.0	6.5
1	0	20.4	8.0	30.0	6.5
2	1000				
2	300	20.3	7.9	32.0	6.9
2	100	20.2	7.9	32.0	6.7
2	30	20.3	7.9	31.0	6.7
2	10	20.3	8.0	31.0	6.7
2	0	20.2	7.9	31.0	6.7
	MEAN	20.4	8.0	30.5	6.6
	SD	0.1	0.1	0.7	0.1
	N	17	17	17	17
	MIN	20.2	7.8	30.0	6.3
	MAX	20.5	8.1	32.0	6.9

data entry verified against laboratory bench sheets 11-16-16 JRF