Wyckoff Groundwater Treatment Plant: Third Quarter 2023 Bioassay Monitoring

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1. Introduction

This technical memorandum summarizes information obtained from the second quarter 2023 sampling event performed at the U.S. Environmental Protection Agency (EPA) Wyckoff/Eagle Harbor Superfund Site (the Site) groundwater treatment plant (GWTP) located at 5350 Creosote Place NE, Bainbridge Island, Washington. CH2M HILL Engineers, Inc. (CH2M)¹ conducted this sampling event to support the current biomonitoring requirements of the Site's National Pollutant Discharge Elimination System (NPDES).

Sampling was generally conducted in accordance with the final *Quality Assurance Project Plan, Groundwater Treatment Plant Operations and Maintenance* (QAPP; CH2M, 2022). While there were deviations from the QAPP as noted in the Laboratory Quality Data Review section, the data is deemed usable, and the sampling is considered to have met the monitoring requirements of the NPDES permit.

The current NPDES permit does not include effluent limits for chronic toxicity. Chronic toxicity testing was conducted on the effluent samples per the requirements outlined in the NPDES permit. The current NPDES permit does not include specific dilution series for chronic toxicity tests. For the mussel larvae chronic toxicity testing conducted during the third quarter 2023 sampling event, 65 percent effluent is the highest concentration tested due to the addition of hypersaline brine to achieve a salinity of 30 parts per trillion (ppt) per the *Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms* (EPA/600/R-95/136, 1995).

No statistically significant effects on the survival or development endpoints were observed for all test concentrations, indicating no evidence of the presence of chronic toxicity.

As stated above, the current NPDES permit does not include effluent limit for chronic toxicity. The chronic toxicity test requirement section of the permit (Section II.8) specifies the following:

"EPA and Ecology will evaluate the results to determine whether they indicate the occurrence of chronic toxicity outside the mixing zone. If it appears that this may be occurring, a toxicity evaluation and reduction plan will be prepared within 90 days. The evaluation portion of the plan may include additional toxicity testing if needed to follow up on initial results or gather information for a possible toxicity limit in the future."

The observed results for the chronic developmental endpoint would not trigger this requirement.

 $^{^1}$ CH2M HILL Engineers, Inc. is now a wholly owned subsidiary of Jacobs Engineering Group Inc.

2. Sampling and Analysis Results

Biomonitoring samples were collected per the monitoring frequency included in the NPDES permit. Samples were collected from a 24-hr. autosampler collection point at the effluent tank of the treatment system. Water samples were collected on July 11, 2023. Chemical testing was conducted on a split of each sample collected for bioassay testing per the NPDES permit requirement. The bioassays were performed by EcoAnalysts, Inc. (EcoAnalysts), Port Gamble, Washington, a Washington State Department of Ecology accredited lab. Table 1 lists the sample Laboratory ID and sampling analysis methods. EcoAnalysts sampling analysis report for chronic toxicity testing is provided in Attachment 1.

Table 1. Biological Testing Summary						
Laboratory	Laboratory ID	Method	Test Type/Descriptor/Species			
EcoAnalysts	P230711.01	EPA/600/R-95-136 Method 1005.0;	Chronic/48-hr Survival and			
		ASTM E724-89	Development/ <i>Mytilus galloprovincialis</i>			
		TOX042.12	(Mussel)			

No statistically significant effects were detected in any effluent concentration tested for the survival or development endpoint of the bivalve test. This result indicates a No Observed Effect Concentration of 65 percent (the highest concentration tested) of the effluent concentration and a chronic toxic unit of 1.5 for both endpoints. The Effect Concentration 50 is expected to affect 50 percent of the organisms and determined to be greater than 65 percent of the effluent concentration.

3. Laboratory Quality Data Review

A CH2M chemist validated the bioassay results Stage 2A in accordance with the QAPP. The QAPP (CH2M 2022) was cited by EcoAnalysts and the appropriate species of mussel specified in the QAPP was used for the analytical testing.

The data were 100 percent complete, and method and QAPP quality control requirements were met, with the following exceptions noted:

The QAPP reference toxicant copper sulfate was not used. The reference toxicant utilized was ammonia. A review of the total and unionized ammonia quality control data indicates the ammonia reference toxicant test results were within two standard deviations of the laboratory mean at the time of testing. There is no impact to the data and an addendum to the QAPP to utilize ammonia as reference toxicant has been requested in May 2023 after these samples were collected and analyzed.

4. Trends

A review of bioassay data collected from 2007 through the third quarter of 2023 indicated there were no statistically significant effect detected for the survival endpoint for any test concentrations and species. No statistically significant effect was detected for the sublethal endpoints with the exception for the sampling events from the third quarter of 2022 through second quarter of 2023. For these four sampling events, statistically significant effects were detected in the maximum test concentrations for the developmental endpoint of the chronic bioassay test.

Figure 1 shows the bivalve chronic bioassay NOEC and salinity for the 100 percent effluent samples from December 2018 through July 2023. NOEC for bivalve chronic bioassay tests conducted prior to December 2018 were 70 percent. Hypersaline brine (HSB) with a fixed concentration was used for the salinity adjustment for chronic toxicity testing conducted prior to December 2018, therefore the maximum test concentrations remained the same for that test period. The laboratories that conducted

the testing from December 2018 to November 2022 used HSB created at their laboratory (i.e. concentration varies slightly from batch to batch), therefore the resulting maximum test concentrations varies slightly for the different monitoring events. The maximum test concentration for the first and second quarter of 2023 is higher than previous monitoring events as well as third quarter of 2023 (i.e. 100 percent versus ~70 percent) due to the use of artificial sea salts as opposed to HSB. This resulted in a higher NOEC than those reported for the third and fourth quarter of 2022 despite a statistically significant effect was only observed in the maximum test concentration in the samples in all four sampling events. A review of the water quality parameters measured for the bioassay samples indicated the lowest detected salinity levels were detected in the samples collected from the most recent five sampling events (see Figure 1). While the elevated ammonia concentrations detected in the third and fourth quarter 2022 may have contributed to the observed toxicity during those sampling events, ammonia does not appear to be contributing to the toxicity observed in the monitoring events for the first and second quarter of 2023 (see Figure 2).





5. Overall Assessment

While the current NPDES permit does not include specific whole effluent toxicity (WET) limits, the Washington Administrative Code (WAC) 173-205-020 specifies the following:

"Whole effluent toxicity performance standard" means a level of effluent toxicity that is consistently so much lower than is necessary to meet state water quality standards (chapter 173-201A WAC) that no reasonable potential exists to violate the water quality standards. For acute toxicity, the performance standard is the median survival in one hundred percent effluent being equal to or greater than eighty percent and no individual test result showing less than sixty-five percent survival in one hundred percent effluent. For chronic toxicity, the performance standard is no chronic toxicity test demonstrating a statistically significant difference in response between the control and a test concentration equal to the acute critical effluent concentration. For permittees that are ineligible for an approved mixing zone, the performance standard will equal or be close to equal (in the case of acute toxicity) the water quality-based effluent toxicity limit.

Based on sampling results, the survival and development endpoints of the chronic toxicity test met the WET performance standard because survival rates and proportion normal development were within acceptable limits. Due to the recently observed toxicity from third quarter 2022 through second quarter of 2023, CH2M recommends triggering of an accelerated testing if the next testing meets EPA test acceptability criteria and a statistically significant effect is detected when compared to the lab control. As there are no established chronic toxicity criteria included in the permit, CH2M recommends an accelerated schedule of WET testing to establish whether a pattern of chronic toxicity exists. Consistent with WAC 173-205-090(1)(b), it is recommended that the accelerated testing to be conducted monthly for three months using the same toxicity test as in the routine effluent WET testing where a statistically significant effect is detected.

The NPDES permit does not include dilution series or indicate whether brine or artificial salt should be used for salinity adjustment for the chronic toxicity test. The NPDES permit Section II.5(b) and the QAPP specifies ASTM E 724-89 and EPA/600/R-95/136 as the protocol for the mussel chronic bioassay test, respectively. The bioassay lab currently uses natural seawater/hypersaline brine as control water/diluent, follows the EPA/600/R-95-136 Method 1005.0, and reference the older ASTM E724-89 method in conjunction with the EPA manual. There is no preference in brine or artificial salt stated in the ASTM E 724-89 method. EPA/600/R-95-136 states that salinity adjustment with brine is the preferred method (Sec 13.6.23.7.1) and that the use of artificial sea salts is necessary only when high effluent concentration preclude salinity adjustment by brine alone (Sec 13.6.23.1). To better understand the potential toxicity and the effects of using artificial salt for salinity adjustment, CH2M recommends conducting concurrent mussel chronic bioassay tests using both artificial salt and brine for salinity adjustments in 2023 Q4. The following lists the recommended test dilution series:

<u>Brine</u>

Maximum test concentration, 50%, 25%, 12.5%, 6.25%, and control

Artificial Salt

100%, Maximum test concentration for the chronic toxicity testing using brine for salinity adjustment, 50%, 25%, 12.5%, 6.25%, and control.

Statistical analysis for monitoring events from December 2018 to November 2022 compared chronic test samples to HSB data as opposed to the dilution water control (i.e. lab control) per the recommendation included in EPA/600/R96-136 Section 13.10.8.4.2 *"Statistical analysis should use the appropriate dilution*"

water control data." To allow for an accurate comparison with data collected during these monitoring events, CH2M recommends including statistical comparison to both lab and brine controls for all future chronic toxicity testing.

6. References

ASTM. 1989. Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of

Saltwater Bivalve Molluscs, E724-89. ASTM International, West Conshohocken, PA.

CH2M HILL Engineers, Inc. (CH2M, now a wholly owned subsidiary of Jacobs Engineering Group Inc.). 2022. *Quality Assurance Project Plan, Groundwater Treatment Plant Operations and Maintenance.* Final. Prepared for Wyckoff/Eagle Harbor Superfund Site, Bainbridge Island, Washington, U.S. Environmental Protection Agency, Region 10, Seattle, Washington. January.

EPA. 1995. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, 1st ed. EPA/600/R-95/136. U.S. Environmental Protection Agency, National Exposure Research Laboratory, Cincinnati, OH.

Washington Administrative Code (WAC) 173-205-020, "*Definitions*." Available at: <u>https://app.leg.wa.gov/WAC/default.aspx?cite=173-205-020</u>

WAC 173-205-090, "Response to noncompliance with whole effluent toxicity limits." Available at: https://app.leg.wa.gov/WAC/default.aspx?cite=173-205-090

Attachment 1 EcoAnalysts Toxicity Testing Results Wyckoff/Eagle Harbor Superfund Groundwater Treatment Plant

TOXICITY TESTING RESULTS WYCKOFF/EAGLE HARBOR SUPERFUND SITE GROUNDWATER TREATMENT PLANT BAINBRIDGE ISLAND, WA

NPDES TOXICITY TESTING: 3RD QUARTER 2023

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Contract: 68HE0318D0004 Task Order No: 68HE0722F0011

EcoAnalysts Report ID: PG1799Q3.01

Original Submittal Date: July 27, 2023 Revision Date: October 18, 2023



Toxicity Testing Results Wyckoff/Eagle Harbor Superfund Site Groundwater Treatment Plant

All testing reported herein was performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and EcoAnalysts is not responsible for use of less than the complete report. The test results summarized in this report apply only to the sample(s) evaluated. This document is uncontrolled when printed or accessed from electronic distribution.

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ACRONYMS AND ABBREVIATIONS

EC ₅₀ :	Effect Concentration to 50% of test population
EPA:	Environmental Protection Agency
LC ₅₀ :	Lethal Concentration to 50% of test population
LOEL:	Lowest Observed Effect Level
NOEL:	No Observed Effect Level
NPDES:	National Pollutant Discharge Elimination System
PMSD:	Percent Minimum Significant Difference
QAPP:	Quality Assurance Project Plan
QM:	Quality Manual
SOP:	Standard Operating Procedures
WET:	Whole Effluent Toxicity

1. EXECUTIVE SUMMARY

EcoAnalysts conducted Whole Effluent Toxicity (WET) testing as part of the biological compliance monitoring for Wyckoff/Eagle Harbor Superfund Site, in Bainbridge Island, Washington. The objective of this program was to assess the potential toxicity of discharge water to selected aquatic organisms following procedures defined under the facility's Quality Assurance Project Plan (QAPP) (CH2M HILL 2022). The results of the toxicity testing are contained in this report.

A statistically significant biological response of the test organisms was not detected at the 65% effluent sample concentration, the highest concentration tested, for the proportion survived or proportion normal endpoints (Table 1-1).

	Test		LOEL (%)	LC50/EC50 (%)
Chronic	<i>Mytilus galloprovincialis</i> 48-Hour Proportion Survived	65	>65	>65
	<i>Mytilus galloprovincialis</i> 48-Hour Proportion Normal	65	>65	>65

Table 1-1. Toxicity Test Results Summary.

NOEL = No Observed Effect Level

LOEL = Lowest Observed Effect Level

 LC_{50}/EC_{50} = Lethal/Effect Concentration to 50% of test population

2. METHODS

The sample was analyzed for toxicity using criteria outlined in ASTM E724-89 and the Environmental Protection Agency's (EPA) most recently promulgated effluent guidance documents outlined in Section 4.

To evaluate the relative sensitivity of the organisms, reference toxicity tests were performed using standard reference toxicants (Lee 1980).

2.1 Sample Collection and Storage

Jacobs personnel collected a sample on July 11, 2023. The sample was transported by EcoAnalysts personnel and received at the laboratory on the same day as collection. The sample temperature upon receipt was within the recommended temperature range, at 6.0°C.

Additional sample conditions are summarized in Table 2-1. The samples were held in a walk-in cold room at 4 ± 2 °C in the dark until utilized for testing.

Table 2-1.	Sample	Conditions	upon	Receipt	
	Jampie	contaitions	upon	neccipi	

Sample	071123
Laboratory ID	P230711.01
Date/Time sampled	7/11/23; 0110
Date/Time received	7/11/23; 1100
Dissolved Oxygen (mg/L) Recommended: >4.0 mg/L	6.6
Temperature (°C) Recommended: 0 – 6°C	6.0
pH (units) Recommended: 6 – 9	7.5
Conductivity (µS/cm)	939
Salinity (ppt)	0.5
Total Chlorine (mg/L)	ND ¹
Total Ammonia (mg/L)	0.190

¹ND: No detectable value

2.2 Bioassay Testing

Bioassay testing for this project consisted of one chronic bioassay. The test conducted in support of this project is summarized in Table 2-2.

Table 2-2	Biological	Testing	Performed
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Test Type	Test Descriptor	Species	Method
Chronic	48-Hour Survival and Development	Mytilus galloprovincialis (Mussel)	EPA/600/R-95-136 Method 1005.0; ASTM E724-89; TOX042.12

2.3 Organisms for Testing

Adult mussels (*Mytilus galloprovincialis*) were obtained from Taylor Shellfish in Shelton, Washington on June 6 and 27, 2023. They were delivered via Taylor Shellfish personnel and maintained under ambient seawater flow-through conditions at 12 ± 3 °C until utilized for testing. The overall health of the organisms was visually confirmed by a laboratory technician.

2.4 Water for Bioassay Testing

Seawater diluent used in this study came from the northern Hood Canal at Port Gamble, Washington. This water source has been used successfully on similar bioassay testing programs. Extensive testing on a variety of test species has shown that there is no significant potential for toxicity or bioaccumulation from this water supply. Chemical analysis of each water source is conducted and reviewed on an annual basis.

2.5 Sample Adjustment

The effluent sample was received at a salinity of 0.5 ppt. The salinity of the effluent sample was increased by the addition of hypersaline brine for the 48-hour Survival and Development test (targeted test salinity of 30 ± 2 ppt). Table 2-3 summarizes the salinity adjustment performed on the project sample in relation to marine test species.

A "Brine Control" was also prepared for the bivalve test that included an equal proportion of hypersaline brine added to a mixture of natural seawater (Lab Control) and deionized water. The results of this additional control are discussed in the sections below.

Sample ID: 071123	Sample Salinity Upon Receipt	Sample Salinity Adjustment (ppt)	Salinity Adjustment Media
Sample 1: Collected 7/11/23	0.5 ppt	30 ± 2	Hypersaline brine

Table 2-3. Salinity Adjustment of Project Samples

2.6 Data Management and Analysis

Endpoint data was calculated for each replicate, and the mean value and standard deviation were determined for each sample concentration. All hand-entered data was reviewed for data entry errors, which were corrected prior to summary calculations. A minimum of 10% of all calculations and data sorting was reviewed for errors. Review counts were conducted on any apparent outliers.

Statistical comparisons were made according to the EPA guidance. Statistical comparisons were performed using CETIS[™] software.

2.7 Quality Assurance/Quality Control

The quality assurance objectives for toxicity testing conducted by the testing laboratory are detailed in the method specific guidance documents and the laboratory's quality manual (QM). These objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Source and Condition of Test Organisms
- Condition of Equipment
- Test Conditions
- Instrument Calibration
- Use of Reference Toxicants
- Record Keeping

Data Evaluation

The batch of test organisms obtained was evaluated in a reference toxicant test that was run concurrently with the test period to establish the sensitivity of the test organisms. The reference toxicant LC_{50} or EC_{50} should fall within two standard deviations of the historical laboratory mean. Water quality measurements were monitored to ensure that they fell within prescribed limits.

The methods employed in every phase of the toxicity testing program are detailed in the EcoAnalysts Standard Operating Procedures (SOP). All EcoAnalysts staff members receive regular, documented training in all SOPs and test methods. Finally, all data collected and produced because of these analyses were recorded on approved data sheets. If an aspect of a test deviated from protocol, the test was evaluated to determine whether it was valid according to the regulatory agencies responsible for approval of the proposed permitting action.

3. **RESULTS**

The results of the effluent testing are presented in this section. Statistical comparisons and laboratory documents are provided in Appendix A. Chain-of-custody and sample receipt logs are provided in Appendix B.

3.1 *Mytilus galloprovincialis* Test Results

The chronic toxicity test with *M. galloprovincialis* was conducted on July 12, 2023. The test met EPA test acceptability criteria of \geq 50% survival, \geq 90% normal shell development and <25% Percent Minimum Significant Difference (PMSD) with 92.2% proportion survived, 93.7% proportion normal, and 3.5% PMSD for proportion normal in the laboratory control. Mean survival and proportion normal are summarized in Table 3-1. The test conditions are summarized in Table 3-2.

Concentrations of 6.25, 12.5, 25, 50, and 65% effluent were prepared utilizing laboratory water. Sample P230711.01 (received 7/11/23) was used for test initiation. Water quality parameters were within the acceptable limits throughout the duration of the 48-hour static test.

No significant difference was observed between the laboratory (dilution water) control and the brine control, indicating that the addition of hypersaline brine did not contribute to any negative biological effects.

The EC_{50} for the ammonia reference toxicant test was 9.89 mg/L total ammonia and was within two standard deviations of the laboratory mean (Table 3-2) at the time of testing. This indicates that the organisms are of a similar sensitivity to those previously tested at the EcoAnalysts laboratory.

Conc. (%)	Mean Proportion Survived (%)	Standard Deviation	NOEL (%)	LOEL (%)	EC ₅₀ Value (%)
Control	92.2	7.2			
Brine Control	91.3	7.4			
6.25	96.0	5.0			
12.5	99.2	1.5	65	>65	>65
25	88.2	11.4			
50	94.7	7.9			
65	88.6	4.5			
Conc. (%)	Mean Proportion Normal (%)	Standard Deviation	NOEL (%)	LOEL (%)	EC50 Value (%)
Control	93.7	1.7			
Brine Control	95.5	0.8			
6.25	94.8	2.3			
12.5	95.1	1.4	65	>65	>65
25	96.5	0.3			
50	95.4	1.6			
65	95.3	1.5			

Table 3-1. Results Summary for *Mytilus galloprovincialis* Embryo Development Test

NOEL = No Observed Effect Level;

LOEL = Lowest Observed Effect Level;

 LC_{50}/EC_{50} = Lethal/Effect Concentration to 50% of test population;

Proportion survived = total counted / stocking density;

Proportion normal = number normal/total counted;

Test Duration / Type	48-Ho	ur; Static				
Species	Mytilus ga	lloprovincialis				
Supplier	Taylor	Taylor Shellfish				
Date acquired	6/06/23 & 6/27/23					
Test Dates	7/12/23	- 7/14/23				
Age at test initiation Recommended: <4-hour embryos	<4	hours				
Sample(s) used:	071123;	P230711.01				
Holding Time at Initiation: Recommended: < 36 hours	35	hours				
Test Procedures	EPA/600/R-95-136, Meth	od 1005.0; SOP: TOX042.12				
Test location	EcoAnalysts, Port Gamble, WA					
Control water / Diluent	0.45 μm-filtered, Nor	th Hood Canal seawater				
Test Lighting	16 hour ligh	t / 8 hour dark				
Test Chamber	30-mL Chamber					
Exposure volume	10) mL				
Organisms/replicate	Recommended: 150–300	Actual: 261				
Replicates/treatment		4				
Concentration/treatment	6.25, 12.5, 25, 50 and 65%					
Feeding	N	None				
Test solution renewal	N	one				
Test Water Quality						
Test Dissolved Oxygen	Recommended: > 4.0 mg/L	Actual: 7.8 – 8.2 mg/L				
Test Temperature	Recommended: $16 \pm 1^{\circ}C$	Actual: 16.0 – 16.8 °C				
Test pH	Recommended: 7 – 9	Actual: 7.6 – 8.2				
Test Salinity	Recommended: $30 \pm 2 \text{ ppt}$	Actual: 30 – 31 ppt				
Control performance standard (Survival, Normal shell development, PMSD)	Recommended: ≥50% survival, ≥90% normal development, <25% PMSD	Actual: 92.2% survival, 93.7% normal development, 3.5% PMSD; Pass				
Reference Toxicant Date	7/1	12/23				
Reference Toxicant EC ₅₀	9.89 mg/L t	otal ammonia				
Laboratory Mean EC ₅₀	6.95 mg/L t	6.95 mg/L total ammonia				
Acceptable Range EC ₅₀ (± 2 SD)	4.02 – 12.0 mg/L total	ammonia (within range)				
Deviations from Test Protocol	Ν	None				

Table 3-2. Test Condition Summary for *Mytilus galloprovincialis* Embryo Development Test.

4. **REFERENCES**

- ASTM. 1989. Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs, E724-89. ASTM International, West Conshohocken, PA.
- CETIS. 2022. CETIS[™] Comprehensive Environmental Toxicity Information System User's Guide. Tidepool Scientific Software. McKinleyville, CA.
- CH2M HILL. 2022. Quality Assurance Project Plan, Groundwater Treatment Plant Operations and Maintenance, Final. Wyckoff/Eagle Harbor Superfund Site. Bainbridge Island, Washington.
- USEPA. 1995. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine Organisms and Estuarine Organisms, First Edition. EPA-600-R-95-136.

Toxicity Testing Results Wyckoff/Eagle Harbor Superfund Site Groundwater Treatment Plant

APPENDIX A

STATISTICAL COMPARISONS AND LABORATORY DOCUMENTS

Toxicity Testing Results Wyckoff/Eagle Harbor Superfund Site Groundwater Treatment Plant

APPENDIX A.1

MYTILUS GALLOPROVINCIALIS 48-HOUR SURVIVAL AND DEVELOPMENT TEST

STATISTICAL COMPARISON AND LABORATORY DATA SHEETS

Bivalve Larval Survival and Development Test Batch ID: 03-7618-7990 Test Type: Development-Survival Analyst: Batch ID: 03-7618-7990 Test Type: Development-Survival Analyst: Ending Date: 14 Jul-23 11:53 Protocol: EPA/600/R-95/136 (1995) Diluent: Laboratory Seawater Sample Det: 14 Jul-23 11:10 Species: Mytilus galloprovincialis Brine: Crystal Sea Marine M Sample Det: 11 Jul-23 01:10 Material: Treated Groundwater Source: Jacobs Wyckoff Receipt Date: 11 Jul-23 01:10 Material: Treated Groundwater Source: Jacobs Wyckoff Single Comparison Summary Cas (PC): Station: 71123 Station: 71123 Analysis ID Endpoint Comparison Method P-Value Comparison Result 0.3643 Brine Control passed combined 17-3418-1206 Proportion Normal Equal Variance t Two-Sample Test 0.3643 Brine Control passed propo Multiple Comparison Summary Analysis ID Endpoint Comparison Method / NOEL LOEL TOEL PMS 01-2864-3417		mmary Report					100 C 100	t Date: ode/ID:		8 Jul-23 09. 0711.01 / 0		
Start Date: 12 Jul-23 11:53 Protocol: EPA/600/R-95/136 (1995) Diluent: Laboratory Seawater Ending Date: 14 Jul-23 11:53 Species: Mytilus galloprovincialis Brine: Crystal Sea Marine M Sample Di: 01-8254-2759 Code: P230711.01 Project: WEH-031Z / Sample Date: 11 Jul-23 01:10 Material: Treated Groundwater . Source: Jacobs Wyckoff Sample Age: 35h (6 °C) Cilent: Jacobs Wyckoff . Station: 71123 - Single Comparison Summary Analysis ID Endpoint Comparison Method P-Value Comparison Result 19-2088-3693 Combined Proportion Normal Equal Variance I Two-Sample Test 0.3643 Brine Control passed combined Ortopassed propo 01-5968-2812 Proportion Normal Equal Variance I Two-Sample Test 0.3438 Brine Control passed propo 01-2864-3417 Proportion Normal Equal Variance I Two-Sample Test 0.3943 Brine Control passed propo 01-2864-317 Proportion Normal Equal Variance I Two-Sample Test 0.3943 Brine Control passed propo Multiple Comparison Summary Analysis ID Endpoint Comparison Method ✓ NOEL LOEL TOEL PMS 01-2864-3417 Proportion Nor	Bivalve Larv	al Survival and Devel	opment Test								coAnaly	-
Sample ID: 01-8254-2759 Code: P230711.01 * Project: WEH-0312 * Sample Date: 11 Jul-23 01:10 * Material: Treated Groundwater * Source: Jacobs Wyckoff Sample Age: 35h (6 °C) Client: Jacobs Wyckoff * Station: 71123 * Single Comparison Summary Analysis ID Endpoint Comparison Method P-Value Comparison Result 19-2088-3693 Combined Proportion Normal Equal Variance t Two-Sample Test 0.3643 Brine Control passed propo 17-3418-1206 Proportion Normal Equal Variance t Two-Sample Test 0.3943 Brine Control passed propo Multiple Comparison Summary Analysis ID Endpoint Comparison Method ✓ NOEL LOEL TOEL PMS Analysis ID Endpoint Comparison Method ✓ NOEL LOEL TOEL PMS 01-2864-3417 Proportion Normal Dunnett Multiple Comparison Test 65 >65 3.48 02-4245-1825 Proportion Normal Dunnett Multiple Comparison Test 65 >65 - -	Start Date: Ending Date:	12 Jul-23 11:53 * 14 Jul-23 11:10 •	Protocol: Species:	EPA/600/R-95/136 (1995 Mytilus galloprovincialis)		Dilu Brin	ient: ie:	Crystal Sea Ma	water Irine Mix *	Age:	
Analysis ID Endpoint Comparison Method P-Value Comparison Result 19-2088-3693 Combined Proportion Normal Equal Variance t Two-Sample Test 0.3643 Brine Control passed combined proportion passed propo 01-5968-2812 Proportion Normal Equal Variance t Two-Sample Test 0.9458 Brine Control passed propo 17-3418-1206 Proportion Survived Equal Variance t Two-Sample Test 0.3943 Brine Control passed propo Multiple Comparison Summary Analysis ID Endpoint Comparison Method ✓ NOEL LOEL TOEL PMS 01-2864-3417 Proportion Normal Dunnett Multiple Comparison Test 65 >65 3.48 02-4245-1825 Proportion Survived Dunnett Multiple Comparison Test 65 >65 3.48 02-4245-1825 Proportion Normal Linear Interpolation (ICPIN) ✓ Ecvel % 95% LCL 95% 19-0849-7751 Proportion Normal Linear Interpolation (ICPIN) ✓ EC15 >65 00-0209-0608 Proportion Survived Linear Interpolation (ICPIN) ✓ EC15 >65 <td>Sample Date Receipt Date</td> <td>: 11 Jul-23 01:10 : 11 Jul-23 11:00</td> <td>Material: CAS (PC):</td> <td>Treated Groundwater "</td> <td></td> <td></td> <td>Proj Sou</td> <td>iect: rce:</td> <td>WEH-031Z ' Jacobs Wyckof</td> <td>-</td> <td>Aye.</td> <td></td>	Sample Date Receipt Date	: 11 Jul-23 01:10 : 11 Jul-23 11:00	Material: CAS (PC):	Treated Groundwater "			Proj Sou	iect: rce:	WEH-031Z ' Jacobs Wyckof	-	Aye.	
19-2088-3693 Comparison Norma Equal Variance t Two-Sample Test 0.3643 Brine Control passed combination 01-5968-2812 Proportion Normal Equal Variance t Two-Sample Test 0.3458 Brine Control passed propo 17-3418-1206 Proportion Survived Equal Variance t Two-Sample Test 0.3943 Brine Control passed propo Multiple Comparison Summary Analysis ID Endpoint Comparison Method ✓ NOEL LOEL TOEL PMS 01-2864-3417 Proportion Normal Dunnett Multiple Comparison Test 65 >65 3.48 02-4245-1825 Proportion Normal Dunnett Multiple Comparison Test 65 >65 3.48 02-4245-1825 Proportion Normal Dunnett Multiple Comparison Test 65 >65 3.48 02-4245-1825 Proportion Normal Linear Interpolation (ICPIN) ✓ Ectit % 95% LCL 95% 19-0849-7751 Proportion Normal Linear Interpolation (ICPIN) ✓ EC15 >65 00-0209-0608 Proportion Survived Linear Interpolation (ICPIN) ✓ EC15	Single Comp	arison Summary				-						-
19-2088-3693 Combined Proportion Norma Equal Variance t Two-Sample Test 0.3643 Brine Control passed combination of the passed proponent of the passed prop							P-Value	Comp	arison Recult			
Multiple Comparison Summary Analysis ID Endpoint Comparison Method ✓ NOEL LOEL TOEL PMS 01-2864-3417 Proportion Normal Dunnett Multiple Comparison Test 65 >65 3.48 02-4245-1825 Proportion Survived Dunnett Multiple Comparison Test 65 >65 17.0 Point Estimate Summary Analysis ID Endpoint Point Estimate Method ✓ Level % 95% LCL 95% 19-0849-7751 Proportion Normal Linear Interpolation (ICPIN) ✓ EC15 >65 </td <td>01-5968-2812</td> <td>Proportion Normal</td> <td>Equal</td> <td>Variance t Two-Sample To</td> <td>est</td> <td></td> <td>0.3643 0.9458</td> <td>Brine Brine</td> <td>Control passed Control passed</td> <td>combined proportion</td> <td>normal</td> <td>S n 1 1</td>	01-5968-2812	Proportion Normal	Equal	Variance t Two-Sample To	est		0.3643 0.9458	Brine Brine	Control passed Control passed	combined proportion	normal	S n 1 1
O1-2864-3417 Proportion Normal Dunnett Multiple Comparison Test 65 >65 3.48 02-4245-1825 Proportion Survived Dunnett Multiple Comparison Test 65 >65 17.0 Point Estimate Summary Analysis ID Endpoint Point Estimate Method ✓ Level % 95% LCL 95% 19-0849-7751 Proportion Normal Linear Interpolation (ICPIN) ✓ EC15 >65	Multiple Com	parison Summary									-	-
01-2864-3417 Proportion Normal Dunnett Multiple Comparison Test 65 >65	Analysis ID	Endpoint	Comp	arison Method		1	NOEL	LOFI	TOFI	DMED	ти	
Point Estimate Summary Analysis ID Endpoint Point Estimate Method ✓ Level % 95% LCL 95% 19-0849-7751 Proportion Normal Linear Interpolation (ICPIN) ✓ EC15 >65							65	>65		3.48% 17.0%	1.5	1
Analysis ID Endpoint Point Estimate Method ✓ Level % 95% LCL 95% 19-0849-7751 Proportion Normal Linear Interpolation (ICPIN) ✓ EC15 >65 ✓ EC20 >65	Point Estimat	e Summary				-				(1.0.)0	1.0	
19-0849-7751 Proportion Normal Linear Interpolation (ICPIN) ✓ EC15 >65 ✓ EC20 >65 ✓ EC40 >65 ✓ EC50 >65 ✓ EC50 >65 ✓ EC50 >65 ✓ EC25 >65 ✓ EC20 >65	Analysis ID	Endpoint				1	Level	%	95% LCL	95% UCL	ти	s
00-0209-0608 Proportion Survived Linear Interpolation (ICPIN)	19-0849-7751	Proportion Normal	Linear	Interpolation (ICPIN)		1 1 1	EC20 EC25 EC40	>65 >65 >65	Ē		<1.5 <1.5 <1.5 <1.5	1
✓ EC25 >65 ✓ EC40 >65	00-0209-0608	Proportion Survived	Linear	Interpolation (ICPIN)		1	EC15	>65	<u>ш</u>	-	<1.5 <1.5	1
						1	EC25 EC40	>65 >65	-	Ξ	<1.5 <1.5 <1.5 <1.5	
Test Acceptability	Test Acceptab	ility									1.0	-
TAC Limits Analysis ID Endpoint Attribute Test Stat Lower Upper Overlap Decision	Analysis ID	Endpoint	Attribu	te Test Stat		Li		Querte	Destate			



CETIS™ v2.1.4.6 x64 (000-089-342-3)

Analyst: Mant QA: MIL

CETIS Summary Report

-101

50

65

Bivalve Larval Survival and Development Test

4

4

0.9473

0.8860

0.8221

0.8140

Test Code/ID:

Report Date:

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EcoAnalysts

Combined Pr	oportion Norn	nal Summar	У								
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	.4	0.8774	0.7194	1.0350	0.7701	1,0000	0.0497	0.0993	11.32%	
0	BC	4	0.8716	0.7601	0.9832	0.7816	0.9310	0.0351	0.0701	8.05%	0.00%
6.25		4	0.9167	0.8326	1.0010	0.8697	0.9732	0.0264	0.0529	5.77%	0.66%
12.5		4	0.9588	0.9245	0.9931	0.9310	0.9808	0.0108	0.0215	100 million 100 million	-4.48%
25		4	0.8611	0.6660	1.0560	0.7241	1.0000	0.0613	0.1226	2.25%	-9.28%
50		4	0.9205	0.7857	1.0550	0.8008	1.0000	0.0424	1. A. 1. A. 1. A. 2012	14.24%	1.86%
65		4	0.8448	0.7618	0.9279	0.7778	0.8966	0.0424	0.0847	9.20% 6.18%	-4.91% 3.71%
Proportion No	ormal Summar	ry .							212775		0.1174
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	4	0.9372	0.9100	0.9644	0.9195	0.9556	0.0085	0.0171	1.82%	0.00%
0	BC	4	0.9549	0.9425	0.9673	0.9488	0.9652	0.0039	0.0078	0.82%	101000
6.25		4	0.9479	0.9109	0.9849	0.9268	0.9701	0.0116	0.0232	2.45%	-1.89%
12.5		4	0.9509	0.9285	0.9733	0.9301	0.9605	0.0070	0.0232	1.48%	-1.14%
25		4	0.9652	0.9602	0.9702	0.9611	0.9677	0.0016	0.0031		-1.46%
50		4	0.9541	0.9279	0.9802	0.9311	0.9683	0.0082	0.0164	0.33%	-2.99%
65		4	0.9532	0.9295	0.9768	0.9435	0.9750	0.0074	0.0164	1.72% 1.56%	-1.80% -1.70%
Proportion Su	rvived Summa	ary							211.0.14		1-1070
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	0/ 54
2	D	4	0.9215	0.8075	1.0350	0.8314	1.0000	0.0358	0.0717		%Effect
0	BC	4	0.9128	0.7958	1.0300	0.8238	0.9732	0.0358		7.78%	0.00%
5.25		4	0.9598	0.8800	1.0390	0.8966	1.0000	1 1 1 1 1 1 E E E E	0.0735	8.05%	0.94%
12.5		4	0.9923	0.9680	1.0170	0.9693	1.0000	0.0251	0.0501	5.22%	-4.16%
25		4	0.8822	0.7014	1.0630		·	0.0077	0.0153	1.54%	-7.69%
0			U.GOLL	0.7014	1.0030	0.7510	1.0000	0.0568	0.1136	12.88%	4.26%

1.0720

0.9580

0.8314

0.8238

1.0000

0.9195

0.0393

0.0226

0.0787

0.0453

12.88%

8.30%

5.11%

4.26%

-2.81%

3.85%



CETIS Summary Report

Rivalva Lanval C 1.1 2

0.9676

0.9537

0.9442

0.9677

0.9631

0.9750

0.9611

0.9683

0.9435

Bivalve Larva	al Survival and	Developme	ent Test			EcoAnalysts
Combined Pr	oportion Norn	nal Detail		-		MD5: 3855CE37BB97039E79A06A86221E93CB
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	MD0, 00000E37BB97039E79A06A86221E93CB
0	D	0.7701	0.8314	1.0000	0.9080	
0	BC	0.7816	0.8506	0.9310	0.9234	
6.25		0.9502	0.8697	0.8736	0.9732	
12.5		0.9540	0.9310	0.9693	0.9808	
25		0.8008	0.9195	1.0000	0.7241	
50		0.9464	0.8008	0.9349	1.0000	
65	Sec. 10	0.7778	0.8966	0.8314	0.8736	
Proportion No	ormal Detail	0.75				MD5: C72EC66A58998BBB3105460D9B7E5957
Солс-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	D	0.9263	0.9195	0.9474	0.9556	
0	BC	0.9488	0.9652	0.9567	0.9488	
6.25		0.9288	0.9701	0.9268	0.9658	
12.5		0.9540	0.9605	0.9301	0.9588	
			and the second s			

0.9643

0.9311

0.9500

Proportion	Survived	Detail
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25

50

65

Proportion S	urvived Detail				1	MD5	949C5C41CAC03B2A43E0374FC22ACF55
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	116.57	0.0000 HORODODER43E0374F022A0F33
0	D	0.8314	0.9042	1.0000	0.9502		
0	BC	0.8238	0.8812	0.9732	0.9732		
6.25		1.0000	0.8966	0.9425	1.0000		
12.5		1.0000	0.9693	1.0000	1.0000		
25		0.8276	0.9502	1.0000	0.7510		
50		0.9923	0.8314	0.9655	1.0000		
65		0.8238	0.9195	0.8812	0.9195		

Analyst: MANA QA: MA

Report Date:

Test Code/ID:

CETIS Summary Report

Bivalve Larval Survival and Development Test

Divalve Larva	a Survival and	Developme	nt Test			EcoAnalysts
Combined Pr	oportion Norn	nal Binomial	s			
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	D	201/261	217/261	270/270	237/261	
0	BC	204/261	222/261	243/261	241/261	
6.25		248/261	227/261	228/261	254/261	
12.5		249/261	243/261	253/261	256/261	
25		209/261	240/261	272/272	189/261	
50		247/261	209/261	244/261	284/284	
65		203/261	234/261	217/261	228/261	
Proportion No	ormal Binomia	lis			and the set	
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	D	201/217	217/236	270/285	237/248	
0	BC	204/215	222/230	243/254	241/254	
6.25		248/267	227/234	228/246	254/263	
12.5		249/261	243/253	253/272	256/267	
25		209/216	240/248	272/283	189/196	
- CO -						

Report Date:

Test Code/ID:

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P230711.01 / 05-2656-0435

Proportion Survived Binomials

247/259

203/215

209/217

234/240

244/252

217/230

50

65

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	D	217/261	236/261	261/261	248/261	
0	BC	215/261	230/261	254/261	254/261	
6.25		261/261	234/261	246/261	261/261	
12.5		261/261	253/261	261/261	261/261	
25		216/261	248/261	261/261	196/261	
50		259/261	217/261	252/261	261/261	
65		215/261	240/261	230/261	240/261	

284/305

228/240

Analyst: MAEL QA: NU

Bivalve Lan	al C	duct	and D	1				Te	st Code/ID:	P230711.01 / 05-2656-043
- A				elopment Test						EcoAnalysts
Start Date: End Date: Sample Date	14 J	ul-23	11:53 11:10 01:10	Protocol:	Mytilus galloprov EPA/600/R-95/1 Treated Groundv	36 (1995)		Sampl	e Code: P2307 e Source: Jacob e Station: 71123	s Wyckoff
Conc-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal			
0	BC	1	9	261	215	215 ,	204			Notes
0	BC	2	20	261	230	230 .	222			
0	BC	3	2	261	254	254 .	243			
0	BC	4	1	261	254	254 .	241			
0	D	1	13	261	217	217	201			
0	D	2	5	261	236	236	217			
0	D	3	23	261	285	285 .	270	1.1		
0	D	4	11	261	248	248 •	237			
6.25		1	12	261	267	267 .	248			
6.25		2	19	261	234	234 •	227			
6.25		3	28	261	246	246	228			
6.25		4	3	261	263	263 -	254	+		
12.5		1	4	261	261	261	249			
12.5	11	2	25	261	253	253 ,	243			
12.5		3	22	261	272	272 .	253			
12.5		4	27	261	267	267 -	256	1		
25		1	21	261	216	216 .	209			
25		2	10	261	248	248 .	240	-		
25		3	6	261	283	283 .	272	<u>a</u> 11		
25		4	15	261	196	196	189	3		
50		1	18	261	259	259 -	0.17	1		
50		2	24	261	217	217 .	209			
50		3	7	261	252	252 .	244			
50	- 1	4	8	261	305	305	284	•		
65		1	17	261	215	215 .	203			
65		2	16	261	240	240	234	+		
65		3	26	261	230	230	217			
65		4	14	261	240	240	228			

Analyst: MANA QA: MM



48-Hour Chronic WET Test

Version	IV.2	GENERAL	
	Client	Jacobs- Wyckoff	1
	Project	WEH-031Z	
	Project Number	PG1799	
	Project Manager	Marisa Seibert	Note: input lowest and highest decimal for temp
	Date Sample Received	7/11/2023	
	Test type	48-Hour Chronic Toxicity Using Bivalve Larvae	
	Matrix	Liquid	1
	Test Acceptability	≥90% normal shell development, ≥50% survival (mussels) or ≥70% survival (oysters), MSD <25%	TEST
	Test Start Date	07/12/23	TES
	Test Species	Mytilus spp.	1
	Organism Batch	TS060623.01 & TS062723.01	
	Organism Acquired	6/6/23 & 6/27/23	
	Organism Acclimation	#VALUE!	
	Organism Age	<4 hr old embryos	
	Test Protocol	TOX 042	
	Test Location	Incubator 1	
	Light Intensity	50-100 foot candles	
	Light Cycle	16L:8D	Salinity Adjustment CSMM Batch #
	Water Description	0.45 um filtered seawater	NA
	Organisms per Replicate	150 - 300	
	Test Chamber Size	30 mL	Formalin Lot #
	Exposure Volume	10 mL	220304-50
	Test Dissolved Oxygen	> 4.0	
	Test Temperature	16±1	Rose Bangel Batch #
	Test Salinity	30 ± 2	5135
	Test pH	8±1	

1	1	est Parameters	
	11	Min	Max
	DO	4.0	
est	Temp	15	17
	Salinity	28	32
	pH	7	9

TEST START TIME/INIT: 1153 NL/SZ TEST END TIME/INIT: MS 110

CLIENT SAMPLE ID	LAB ID
71123	P230711.01

-	concentrations
1	Control
2	Brine Contro
3	6.25%
4	12.5%
5	25%
6	50%
7	65%
8	*
9	

5135

7/12/2023 Jacobs 48-Hour Chronic Bivalve WET NPDES V.2.xlsx Setup

48-Hour Chronic WET Test

ECOANALYSTS, INC.

CLIENT	Jacobs- Wyckoff	DATE RECEIVED	7/11/23	PROTOCOL	TOX 042
PROJECT	WEH-031Z	TEST START DATE		PROJECT MANAGER	Marisa Seibert
CLIENT SAMPLE ID	71123	TEST END DATE	1.55.4.51	SPECIES	Mytilus spp.
LAB SAMPLE ID	P230711.01	MATRIX	Liquid	NO. OF ORGANISMS	150 - 300

	4	8-Hour Chronic	c Toxicity Using Biva	lve Larvae	
		DO (mg/L)	TEMP (°C)	SALINITY (ppt)	pH
	Concentration (%)	> 4.0	15 - 17	28 - 32	7-9
Day 0	Control	8.1	16.8	30	7.9
Stock	Brine Control	8.0	16.5	31	7.7
Date 7/12/23	6.25%	8.1	16.6	30	7.9
Time 1118	12.5%	8.2	16.5	30	7.9
Tech MS	25%	8.7.	16.3	30	7.8
Meter # 7	50%	8.2	16.2		7.7
	65%	8.2	16.0	31	7.6
Day 1	Control		16.3 0		1. •
Surrogate	Brine Control		16.3 0	1	
Date 7/13/23	6.25%		16.3 0		
Time 0928	12.5%		16.3 0		
rech SR	25%		16.3		
Meter # TI6	50%		16.3 0		
A 23	65%		16.3 0		
Day 2	Control	7.9	16.0	30	7.8
urrogate	Brine Control	7.8	10.1	21	7.9
Date 7/14/23	6.25%	8.0	14.2	31	8.0
ime 1040	12.5%	8.0	10.1	31 30	8.0
ech MS	25%	0.0	16.2	31	8.1
Meter# 7	50%	8.0	14.3	31	8.1
	65%	8.0	16.2	31	8.2

O Temp from temp blank - 51/52 7/13/23

48-Hour Chronic WET Test

ECOANALYSTS, INC.

CLIENT	Jacobs- Wyckoff	DATE RECEIVED	7/11/23	PROTOCOL	TOX 042
PROJECT		TEST START DATE		PROJECT MANAGER	Marisa Seibert
CLIENT SAMPLE ID	71123	TEST END DATE		SPECIES	Mytilus spp.
LAB SAMPLE ID	P230711.01	MATRIX	Liquid	NO. OF ORGANISMS	150 - 300

48-Hour Chronic Toxicity Using Bivalve Larvae

Concentration (%)	REP	Normal	Abnormal	Date	Tech	Comments/QA Counts
	1	264		7/17	NS	
	2	240		7/17	ng	
Stocking Density	3	2710		7/17	NR	
Stocking Density	4	254		7/17	R	
	5	271		7/13	NL	
	6	254		7/17	Ma	
	1	201	16	7116	NL	N:203 201/217=.924 7 A:13 203/216=.940
Control	2	217	19	7/16	NL	<u>A·13 2051210710</u>
control	3	270	15	7/16	NL	
	4	237	III.	7/16	NI	
	1	204	Ŋ	7/17	mk	
Brine Control	2	wi	8	7/17	MIC	1
brine control	3	243	- 11	7/17	MK	
	4	241	13	7/17	mic	
	1	248	19	7/17	mik	
6.25%	2	227	7	7/17	MIC	N:226 1. diff- 01.
0.2370	3	228	18	7/17	MK	
	4	254	9	7/17	mk	
	1	249	12	7/17	MK	1
12.5%	2	243	10	7/17	MK	
12.570	3	253	19	7/17	mic	
	4	256	II II	7/17	MK	N: 190 + diff: 0
	1	209	7	7/17	mic	
25%	2	240	7	7/17	mk	
	3	272	11	7/17	mic	5 M
	4	189	7	7/17	MK	N: 190 A: 7 1. diff= .02 52
100	1	247	12	7/17	MIK	
50%	2	209	8	7/17	MIK	
10 9 M	3	244	8	717	ML	
	4	284	21	719	mil	
	1	203	12	7116	NL	N:203 1. diff= 1.357
65%	2	234	6	7/14	N	
1000	3	217	13	7/10	NL	
	4	228	12	7/14	NL	

OWC- 52 7/19/23

\frown	49 Have Character Million	-
	48-Hour Chronic WET Test	0

E13.00 100	Jacobs- Wyckoff	DATE RECEIVED	7/11/23	PROTOCOL	TOX 042
PROJECT	WEH-031Z	TEST START DATE	7/12/23	PROJECT MANAGER	Marisa Seiber
CLIENT SAMPLE ID	71123	TEST END DATE	7/14/23	SPECIES	Mytilus spp.
LAB SAMPLE ID	P230711.01	MATRIX	Liquid	NO. OF ORGANISMS	150 - 300
	48-Hour (Chronic Toxicity Usi		A CONTRACT CONTRACTOR OF A CONTRACTOR OF A CONTRACT OF A C	
PAWNING METHOD	INITIAL SPAWN				
Heat Shock		NG TIME 856		FINAL SPAWNING TIME 930	
MALES FEM. 2	ALES 5	SPERM VIABILITY GOOD		EGG CONDITION	
BEGIN FERTILIZATION	END FERTILIZ	ATION		GOOD CONDITION OF EMBRYOS	
930		1153		Good	
TIME OF INITIATION INITI	ALS				
of embryos in 1 mL of 100X diluted embr count 1 Count 2 Mear 137 147	yo stock	DENSITY CALCULAT # embryos in 14200	original stock	= # of embryos in diluted stock x 10	0
orcontage of ombain start and a same					
ercentage of embryo stock needed = 2700 0.19) embryos per 1 mL/# embr	os in original stock			
L of egg stock to add to FSW to achieve t 7.605633803 Add this volume to bea	otal volume = percentage o	f embro stock needed * 40	mL (or desire	d volume of embryo stock)	
		uesired volume of embryo	stock) with FS	w = final embryo stock	
dd 0.1 mL of final embryo stock to test ch	ambers		_		

ECOANALYSTS, INC.

48-Hour Chronic WET Test

CLIENT		Jacobs- Wyckoff	DATE RECEIVED	7/11/23	PROTOCOL	TOX 042
PROJECT		WEH-031Z	TEST START DATE	7/12/23	PROJECT MANAGER	Marisa Seibert
CLIENT SAMPI	LE ID	71123	TEST END DATE	7/14/23	SPECIES	Mytilus spp.
LAB SAMPLE I	D	P230711.01	MATRIX	Liquid	NO. OF ORGANISMS	150 - 300
			48-Hour Chronic Toxic	ity Using Bivalv	e Larvae	24L43
D		Vol. Effluent Sample		A		

Day of Test	Concentration	Added (mL)	Vol. Diluent Added (mL)	Total Volume (mL)	Diluent Type	FSW
	0%	0	200.0	200		
	Brine Control	#VALUE!	#VALUE!	200		
	6.25%	12.5	187.5	200		
0	12.5%	25	175.0	200		
	25%	50	150.0	200		
	50%	100	100.0	200		
	65%	130	70.0	200		

Test Dilution Prep

Date	Balance ID	Sample ID (P#)	Water Batch ID	Initials
7/12/23	7	9230711.01	FSW071223.01	18

	0	cells are chan				
			ORGANISM	CLIENT	CLIENT SAMPLE ID	DATE
				Jacobs- Wyckoff	71123	7/12/23
Volume per Co	the second s	5) -	200			
Test Parameter		ppt				
Salinity of Brine		87.00				
Salinity of Sam	ble	0.50				
Test Salinity		30.00	1			
				Test Dilution Pre	eparation (List highe	est to lowest!)
Salinity Adjustm	ent Multiplier =		0.52	Concentration		
		grams added		(%)	Sample (gms.)	Seawater (gms
mls. Sample*	500.00	499.3		65,00	201.5	2.8
mls. Brine	258.77	275.6		50.00	155.0	49.3
	1			25.00	77.5	126.8
Adjust volume	so C16>F19	774.88		12.50	38.7	165.5
Post Adjustmen	t Concentration	n (%) =	65.90	6.25	19.4	184.9
					0.0	204.2
					492.05	
Brine Control F						
	linity Adjustme		highest	Amount Brine	Amount DI	Amount Seawate
Sample Number/Name	Multiplier	Volume BC	concentration	(grams)	(grams)	(grams)
71123	0.52	200	65.0	70.2	125.2	8.9
Norksheet Pre	paration Date	Initials				
	MS					
Dilution Prepar	ation Date / In	itials				
the second se	MS					

Divalv	C Lai	val Sulv	ival a	nd Dev	elopment	lest						_		A	II Mat	ching L
	- Colored - Colo	Develop All Proto		Surviva	t	and the second second		galloprovinci			erial:	Total A		1.2		
1010	.01.		COIS	-		Епарот	t: Combin	ed Proportion	n Normai	Sou	rce:	Refere	nce i c	oxican	I-REF	
al Ammonia	16-14-12-10-8-14-10-14-14-14-14-14-14-14-14-14-14-14-14-14-	でし		1 1				Proportion		opment Test indpoint	ø	*	1			+2: +1: Me -1s -2s
	20 Sep-22	28 Sep-22 -	21 Oct-22 -	24 Oct-22 -	27 Oct-22 - 30 Nov-22 -	07 Dec-22 - 13 Jan-23 -	09 Feb-23	17 Feb-23 - 14 Mar-23 -	28 Mar-23 - 28 Mar-23 -	31 Mar-23 - 31 Mar-23 -	05 Apr-23 -	11 Apr-23 -	12 Apr-23 -	12 May-23 -	07 Jun-23 -	12 Jul-23 -
	1.000						And the second	ali maker								
							Lognorma	al Cumulativ	e Mean P	lot						
		M	ean:	6.945	C	ount: 20	Lognorm				-25	Action I	imit:	4 02		
	1		ean: gma:	1.000116	C	ount: 20 V: 27.	Lognorma		ing Limit:	5.28		Action L Action L			y.	
Qualit	v Con	Si	gma:	1.000116				-1s Warn	ing Limit:	5.28					2	
	1000	Si trol Data	gma: a	NA	C	V: 27.	80%	-1s Warn +1s Warn	ing Limit: ing Limit:	5.28 9.12	+2s /	Action L	Limit:	12		
Point	1000	Si trol Data Month	gma: a	NA Time				-1s Warn +1s Warn Warning	ing Limit:	5.28 9.12 Test ID	+2s /	Action L alysis II	Limit: D La	12 abora	tory	
Point 1	Year	Si trol Data Month	gma: a Day	NA Time 16:02	CV QC Data	V: 27. Delta	80% Sigma	-1s Warn +1s Warn Warning (+)	ing Limit: ing Limit:	5.28 9.12	+2s / Ana 47 00-	Action L alysis II 7476-67	Limit: D La 700 Ec	12 abora coAna	tory	
Point 1 2	Year	Si trol Data Month	gma: a Day 20	NA Time 16:02 16:31 14:16	QC Data 9.267 5.182 7.804	V: 27. Delta 2.322 -1.763 0.8596	80% Sigma 1.057	-1s Warn +1s Warn Warning	ing Limit: ing Limit:	5.28 9.12 Test ID 11-7896-95-	+2s / Ana 47 00-7 54 11-1	Action L alysis II 7476-67 9896-88	Limit: D La 700 Ec 334 Ec	12 abora coAna coAna	tory alysts	
Point 1 2 3 4	Year	Si trol Data Month Sep	gma: a Day 20 28 21 24	NA Time 16:02 16:31 14:16 15:17	QC Data 9.267 5.182 7.804 6.15	V: 27. Delta 2.322 -1.763 0.8596 -0.795	80% Sigma 1.057 -1.073	-1s Warn +1s Warn Warning (+)	ing Limit: ing Limit:	5.28 9.12 Test ID 11-7896-95- 10-3818-03- 05-2022-42- 01-4864-23-	+2s A Ana 47 00- 54 11- 67 03- 36 19-	Action I alysis II 7476-67 9896-88 4308-39 5269-55	Limit: D La 700 Ec 334 Ec 566 Ec	12 abora coAna coAna coAna coAna	tory alysts alysts alysts alysts	
Point 1 2 3 4 5	Year	Si trol Data <u>Month</u> Sep Oct	gma: a Day 20 28 21 24 27	NA Time 16:02 16:31 14:16 15:17 17:02	QC Data 9.267 5.182 7.804 6.15 4.776	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372	-1s Warn +1s Warn Warning (+)	ing Limit: ing Limit:	5.28 9.12 Test ID 11-7896-954 10-3818-033 05-2022-420 01-4864-233 12-4527-09	+2s / Ana 47 00- 54 11- 54 11- 67 03- 36 19- 36 19- 74 13-	Action L alysis II 7476-67 9896-88 4308-39 5269-55 7457-78	Limit: D La 700 Ec 334 Ec 965 Ec 566 Ec 390 Ec	12 abora coAna coAna coAna coAna	tory alysts alysts alysts alysts alysts	
Point 1 2 3 4 5 6	Year	Si trol Data Month Sep Oct Nov	gma: a Day 20 28 21 24 27 30	NA Time 16:02 16:31 14:16 15:17 17:02 14:32	QC Data 9.267 5.182 7.804 6.15 4.776 7.166	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169 0.2208	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372 0.1147	-1s Warn +1s Warn Warning (+) (-)	ing Limit: ing Limit:	5.28 9.12 Test ID 11-7896-954 10-3818-033 05-2022-424 01-4864-233 12-4527-09 11-2220-419	+2s / Ana 47 00- 54 11- 54 11- 67 03- 36 19- 36 19- 74 13- 95 10-	Action L 7476-67 9896-88 4308-39 5269-56 7457-78 4569-37	Limit: D La 700 Ec 334 Ec 365 Ec 366 Ec 390 Ec 704 Ec	12 aborat coAna coAna coAna coAna coAna	tory alysts alysts alysts alysts alysts alysts	
Point 1 2 3 4 5 6 7	Year 2022	Si trol Data Month Sep Oct Nov Dec	gma: a 20 28 21 24 27 30 7	NA Time 16:02 16:31 14:16 15:17 17:02 14:32 17:43	QC Data 9.267 5.182 7.804 6.15 4.776 7.166 7.159	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169 0.2208 0.214	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372 0.1147 0.1112	-1s Warn +1s Warn Warning (+) (-)	ing Limit: ing Limit:	5.28 9.12 Test ID 11-7896-954 10-3818-033 05-2022-424 01-4864-233 12-4527-099 11-2220-419 19-4874-803	+2s / Ana 47 00- 54 11- 54 11- 67 03- 36 19- 36 19- 35 10- 30 20- 30 20-	Action L 7476-67 9896-88 4308-39 5269-55 7457-78 4569-37 9525-00	Limit: D La 700 Ec 334 Ec 965 Ec 566 Ec 390 Ec 704 Ec 017 Ec	12 abora coAna coAna coAna coAna coAna coAna	tory alysts alysts alysts alysts alysts alysts alysts	
Point 1 2 3 4 5 6 7 8	Year	Si trol Data Month Sep Oct Dec Jan	gma: a Day 20 28 21 24 27 30 7 13	NA Time 16:02 16:31 14:16 15:17 17:02 14:32 17:43 15:30	QC Data 9.267 5.182 7.804 6.15 4.776 7.166 7.159 9.078	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169 0.2208 0.214 2.133	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372 0.1147 0.1112 0.9813	-1s Warn +1s Warn Warning (+) (-) (-)	ing Limit: ing Limit:	5.28 9.12 Test ID 11-7896-954 10-3818-032 05-2022-424 01-4864-233 12-4527-09 11-2220-414 19-4874-803 14-2219-39	+2s / Ana 47 00- 54 11- 67 03- 36 19- 74 13- 75 10- 30 20- 79 18-	Action I 7476-67 9896-88 4308-39 5269-55 7457-78 4569-37 9525-00 3945-15	Limit: D La 700 Ec 334 Ec 965 Ec 566 Ec 390 Ec 704 Ec 017 Ec 944 Ec	12 abora coAna coAna coAna coAna coAna coAna coAna coAna	tory alysts alysts alysts alysts alysts alysts alysts alysts	
Point 1 2 3 4 5 5 6 7 8 9	Year 2022	Si trol Data Month Sep Oct Nov Dec	gma: a Day 20 28 21 24 27 30 7 13 9	NA Time 16:02 16:31 14:16 15:17 17:02 14:32 17:43 15:30 15:28	QC Data 9.267 5.182 7.804 6.15 4.776 7.166 7.159 9.078 9.246	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169 0.2208 0.214 2.133 2.301	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372 0.1147 0.1112 0.9813 1.049	-1s Warn +1s Warn Warning (+) (-) (-)	ing Limit: ing Limit: Action	5.28 9.12 Test ID 11-7896-95- 10-3818-03: 05-2022-424 01-4864-23: 12-4527-09 11-2220-414 19-4874-80: 14-2219-39 00-8572-73	+2s / Ana 47 00- 54 11- 67 03- 36 19- 36 19- 35 10- 30 20- 79 18- 68 10-	Action I 7476-67 9896-88 4308-39 5269-55 7457-78 4569-37 9525-00 3945-19 5325-07	Limit: D La 700 Ec 334 Ec 965 Ec 566 Ec 390 Ec 704 Ec 944 Ec 783 Ec	12 abora coAna coAna coAna coAna coAna coAna coAna coAna coAna	tory alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts	
Point 1 2 3 4 5 6 7 8 9 9 10	Year 2022	Si trol Data Month Sep Oct Dec Jan Feb	gma: Day 20 28 21 24 27 30 7 13 9 17	NA Time 16:02 16:31 14:16 15:17 17:02 14:32 17:43 15:30 15:28 14:30	QC Data 9.267 5.182 7.804 6.15 4.776 7.166 7.159 9.078 9.246 12.4	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169 0.2208 0.214 2.133 2.301 5.452	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372 0.1147 0.1112 0.9813 1.049 2.123	-1s Warn +1s Warn Warning (+) (-) (-)	ing Limit: ing Limit:	5.28 9.12 Test ID 11-7896-95- 10-3818-03: 05-2022-420 01-4864-23: 12-4527-09 11-2220-419 19-4874-800 14-2219-39 00-8572-730 20-3891-710	+2s / Ana 47 00- 54 11- 67 03- 36 19- 74 13- 95 10- 30 20- 79 18- 68 10- 03 06-	Action I 7476-67 9896-88 4308-39 5269-56 7457-78 4569-37 9525-00 3945-19 5325-07 7296-39	Limit: D La 700 Ec 334 Ec 335 Ec 390 Ec 40 Ec 390 Ec 40 Ec 390 Ec 40 Ec 390 Ec 40 Ec	12 aborat coAna coAna coAna coAna coAna coAna coAna coAna coAna coAna	tory alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts	
Point 1 2 3 4 5 6 6 7 8 9 10 11	Year 2022	Si trol Data Month Sep Oct Dec Jan	gma: a Day 20 28 21 24 27 30 7 13 9 17 14	NA Time 16:02 16:31 14:16 15:17 17:02 14:32 17:43 15:30 15:28 14:30 15:15	QC Data 9.267 5.182 7.804 6.15 4.776 7.166 7.159 9.078 9.246 12.4 8.955	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169 0.2208 0.214 2.133 2.301 5.452 2.01	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372 0.1147 0.1112 0.9813 1.049 2.123 0.9316	-1s Warn +1s Warn Warning (+) (-) (-)	ing Limit: ing Limit: Action	5.28 9.12 Test ID 11-7896-95- 10-3818-03: 05-2022-420 01-4864-23: 12-4527-09 11-2220-419 19-4874-800 14-2219-39 00-8572-730 20-3891-710 00-9622-900	+2s / Ana 47 00- 54 11- 67 03- 36 19- 36 19- 30 20- 79 18- 68 10- 03 06- 67 21-	Action I 7476-67 9896-88 4308-39 5269-56 7457-78 4569-37 9525-00 3945-19 5325-07 7296-39 3408-37	Limit: D La 700 Ec 334 Ec 965 Ec 566 Ec 390 Ec 704 Ec 944 Ec 936 Ec 936 Ec 763 Ec	12 aborat coAna coAna coAna coAna coAna coAna coAna coAna coAna coAna coAna	tory alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts alysts	
Point 1 2 3 4 5 5 6 7 8 9 10 11 11 12	Year 2022	Si trol Data Month Sep Oct Dec Jan Feb	gma: a Day 20 28 21 24 27 30 7 13 9 17 14 28	NA Time 16:02 16:31 14:16 15:17 17:02 14:32 17:43 15:30 15:28 14:30 15:15 15:46	QC Data 9.267 5.182 7.804 6.15 4.776 7.166 7.159 9.078 9.246 12.4 8.955 5.455	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169 0.2208 0.214 2.133 2.301 5.452 2.01 -1.49	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372 0.1147 0.1112 0.9813 1.049 2.123 0.9316 -0.8848	-1s Warn +1s Warn Warning (+) (-) (-)	ing Limit: ing Limit: Action	5.28 9.12 Test ID 11-7896-95- 10-3818-03- 05-2022-42- 01-4864-23- 12-4527-09 11-2220-41- 19-4874-80- 14-2219-39 00-8572-73- 20-3891-71- 00-9622-90- 02-2233-38-	+2s / Ana 47 00- 54 11- 54 11- 67 03- 36 19- 75 10- 30 20- 79 18- 68 10- 03 06- 67 21- 90 16- 90 16-	Action I 7476-67 9896-88 4308-39 5269-55 7457-78 4569-37 9525-00 3945-19 5325-07 7296-39 3408-37 3797-44	Limit: D La 700 Ec 334 Ec 3566 Ec 390 Ec 704 Ec 944 Ec 936 Ec 763 Ec 494 Ec	12 abora coAna	tory alysts	
Point 1 2 3 4 5 5 6 7 8 9 10 11 12 13	Year 2022	Si trol Data Month Sep Oct Dec Jan Feb	gma: a Day 20 28 21 24 27 30 7 13 9 17 14 28 28 28	NA Time 16:02 16:31 14:16 15:17 17:02 14:32 17:43 15:30 15:28 14:30 15:15 15:46 15:47	QC Data 9.267 5.182 7.804 6.15 4.776 7.166 7.159 9.078 9.246 12.4 8.955 5.455 6.941	V: 27. Delta 2.322 -1.763 0.8596 -0.795 -2.169 0.2208 0.214 2.133 2.301 5.452 2.01 -1.49 -0.00424	Sigma 1.057 -1.073 0.4276 -0.4455 -1.372 0.1147 0.1112 0.9813 1.049 2.123 0.9316 -0.8848 -0.00224	-1s Warn +1s Warn Warning (+) (-) (-)	ing Limit: ing Limit: Action	5.28 9.12 Test ID 11-7896-95- 10-3818-03: 05-2022-42- 01-4864-23: 12-4527-09 11-2220-41: 19-4874-80: 14-2219-39 00-8572-73: 20-3891-71: 00-9622-90: 02-2233-38: 01-6969-09:	+2s / Ana 47 00- 54 11- 54 11- 67 03- 36 19- 74 13- 95 10- 79 18- 68 10- 03 06- 67 21- 90 16- 38 06-	Action I 7476-67 9896-88 4308-39 5269-55 7457-78 4569-37 9525-07 7296-39 3408-37 3797-44 4639-76	Limit: D La 700 Ec 334 Ec 366 Ec 390 Ec 704 Ec 390 Ec 704 Ec 393 Ec 393 Ec 393 Ec 393 Ec 393 Ec 393 Ec 393 Ec 394 Ec 394 Ec 395 Ec 396 Ec 396 Ec 396 Ec 396 Ec 397 Ec 397 Ec 398 Ec	12 abora coAna co	tory alysts	
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CETIS QC Plot

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Quality Cor Point Year 1 2022 2 3 4 5 5 5 5 5 5 5 5 7 8 9 2023 10	Mi Si Month Aug Sep Oct Dec Jan Feb Mar	ean: 0 gma: N 24 16 2 14 20 16 28 16 21 14 24 15 27 17 7 17 13 15 9 15 17 14 28 15 31 16 31 16 5 15 11 16 12 15 12 15	1211 A 123 154 152 16 17 102 130 143 130 146 147 152 154 13 13 135	6 C QC Data 0.1359 0.04851 0.1767 0.04973 0.1071 0.1096 0.1156 0.09634 0.1703 0.1664 0.2912 0.1275 0.1637 0.1949 0.06349 0.1685 0.1673	Count: 20 V: 47 Delta 0.01427 -0.07309 0.05514 -0.01451 -0.01201 -0.00601 -0.02527 0.04872 0.04872 0.04872 0.04476 0.1696 0.00587 0.04207 0.07329 -0.05811 0.04694 0.04574	Lognor 7.70% Sigma 0.245 9 -2.03 0.826 7 -1.975 1 -0.2808 1 -0.2297 1 -0.112 7 -0.5145 0.7442 0.6923 1.929 0.1041 0.6563 1.042 1 -1.436 0.7211 0.7053 1 -0.1273	mal Cumulat -1s Warr +1s Warring (-) (-) (+)	tive Mean I ning Limit: ning Limit: Action	Plot 0.0773 0.191 Test ID 00-7678- 13-9573- 13-8303- 14-4835- 20-9426- 18-7734- 01-3898- 15-6747- 14-6111- 11-1705- 05-8051- 08-8126- 03-3638- 14-3337- 01-2022- 01-0596- 13-1124-	-2 +2 9875 (6141 (2046 (8902 (4253 - 9147 (0369 - 3203 - 3358 - 9064 (1741 (4059 - 8838 - 1963 - 2925 - 2964 - 3474 - 1396 (0872 (Analysis 2s Action 2s Action 2s Action 2s Action 09-4475- 09-4475- 00-4748- 15-1656- 15-5237-4 19-9850-3 15-5237-4 19-5184-3 00-9866-3 00-4535-1 10-2993-3 12-4289-3 13-8011 11-3364-1 10-8703-1 18-0348-1 07-7214-9 03-4589-4	ID 4646 5521 8760 6246 9707 5740 0673 9524 2896 0428 2407 2851 4764 1842 5300 0749 9910 6060	t: 0.04 t: 0.30 EcoAn	492 01 alysts	F

Report Date:

25 Jul-23 11:53 (1 of 1)

Analyst: SZ QA: Mara

CETIS QC Plot

Bivalve Larva	al Survival and	Developme	nt Test									F	coAnalysts
Batch ID: Start Date:	03-7618-7990 12 Jul-23 12:57 14 Jul-23 11:11	Te: 7 Pro 1 Sp		Development-S EPA/600/R-95/ Mytilus gallopro Bivalvia	136 (1995)			Ana Dilu Brin Sou	ent: ie:	Labo Crys	ah Zischke oratory Seav stal Sea Mar lor Shellfish	vater	
	and the second second			Contraction of the second second		_		i nestri	P 52 5	Tay	or Sheimsn		Age:
Sample ID:	13-3784-5321		de:	P220819.68				Proj			erence Toxic		
Sample Date Receipt Date			terial: S (PC):	Total Ammonia				Sou	rce:		erence Toxic 0819.68	ant	
Sample Age:			ent:	Internal Lab				Stat	ion.	F22	0019.00		
	parison Summ	201	27020			-	-	-			****		
		ary	Came	aniana Mathad			1	NOF	105		TOPI	DMCD	
Analysis ID	Endpoint Combined Prop	nortion Norr		parison Method			-	NOEL 7.85	LOE 12.7	L.	TOEL 9.985	PMSD 13.0%	
				ett multiple Com	parison resi		~	7.05	12.7		9.965	13.0%	
Point Estima	te Summary												
Analysis ID	Endpoint			Estimate Meth			-	Level	mg/L		95% LCL	95% UCL	<u></u>
04-6529-8407	Combined Prop	portion Norr	na Linea	r Interpolation (I	CPIN)		200	EC15	8.27		7.763	8.555	
							1	EC20	8.48		7.997	8.76	
							1	EC25 EC40	8.70 9.40		8.237 8.995	8.969 9.624	
_							- 6.1	EC40 EC50	9.40	2	9.535	9.624	
T	L. 1814					-	-	2000	0.00	-	0.000	10.00	
Test Accepta					40.20		C Li	mits					
Analysis ID	Endpoint	Toron and the	Attrib		Test Stat		-	Upper	Over	lap	Decision	-	_
06-4445-5178	Combined Prop	portion Norr	na PMSI)	0.1297	<<		0.25	No	_	Passes C	riteria	
Combined P	roportion Norm	al Summar	y										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	1	Max	Std I	Err	Std Dev	CV%	%Effect
0	D	4	0.931	5W23V28	1.0010	0.8812		0.9770	0.02		0.0441	4.74%	0.00%
1.76		4	0.921	81	0.9650	0.8812		0.9387	0.01		0.0274	2.97%	1.03%
3.76		4	0.932		1.0140	0.8621		0.9847	0.02		0.0513	5.50%	-0.10%
7.85 12.7		4	0.886		1.0230	0.8161		1.0000	0.04		0.0858	9.68%	4.84%
17.9		4	0.000		0.0000	0.0000		0.0000	0.00		0.0000	-	100.00%
	Na katakan kalanasi		0.000	0.0000	0.0000	0.0000	-	1000000		-			
	roportion Norm				Sec. 1			MD	5: 6B2	9F5F	2D4DB7A4	BCCCDB80	204B8728
Conc-mg/L	Code	Rep 1	Rep 2		Rep 4				_				
0	D	0.9770	0.908		0.8812								
1.76		0.8812	0.938		0.9387								
3.76		0.9847	0.862		0.9464								
7.85		1.0000	0.816		0.8238								
12.7		0.0000	0.000		0.0000								
17.9		0.0000	0.000	0 0.0000	0.0000								
Combined P	roportion Norm	al Binomia	s										
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4		_						
0	D	255/261	237/2	61 250/261	230/261								
1.76		230/261	245/2		245/261								
3.76		257/261	225/2		247/261								
		263/263	213/2		215/261								
7.85		0/261	0/261	0/261	0/261								
12.7													
		0/261	0/261		0/261								

CETISTM v2.1.4.6 x64 (009-428-048-3)

QA: MANS

Bivalve Larv	al Survival and	Developm	ent Test									Ed	oAnalysts
Batch ID: Start Date: Ending Date Test Length:	03-7618-7990 12 Jul-23 12:5 14 Jul-23 11:1 46h	7 Pr 1 Sp	est Type: rotocol: pecies: axon:	Development-S EPA/600/R-95/ Mytilus gallopro Bivalvia	136 (1995)			Dilu Brir	lyst: ent: ie: irce:	Lab Crys	ah Zischke oratory Seav stal Sea Mar lor Shellfish		Age:
Sample ID: Sample Date Receipt Date Sample Age	e: 19 Aug-22	M C/	ode: aterial: AS (PC): ient:	P220819.68UI/ Unionized Amr				Sou	iect: rce: ion:	Refe	erence Toxic erence Toxic 0819.68UIA	cant	
	nparison Summ			10000 0 200			_	_					
Analysis ID	Endpoint		Com	parison Method			1	NOEL	LOE	e.	TOEL	PMSD	
	7 Combined Pro	portion Nor				i i		0.184	0.29	_	0.2338	13.0%	
Point Estima	ate Summary						-				1.20		
Analysis ID	Endpoint		Point	Estimate Meth	od		1	Level	mg/L		95% 1 01	95% UCL	
	6 Combined Pro	portion Nor	12.121.111		F.10		•	EC15	0.19	_	0.1807	0.2031	_
	1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1	a alternation		and the second second				EC20	0.20		0.1872	0.2084	
								EC25	0.20	71	0.1938	0.2138	
								EC40	0.224	46	0.2138	0.23	
					_			EC50	0.23	64	0.2273	0.2409	
Test Accepta	ability					TA	CLI	imits	-				
Analysis ID	Endpoint		Attrib	oute	Test Stat		1.1	Upper	Over	lap	Decision		
04-0420-142	7 Combined Pro	portion Nor	ma PMS	0	0.1297	<<		0.25	No		Passes C	riteria	
Combined P	roportion Norm	al Summa	rv.							-			
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min		Max	Std I	Frr	Std Dev	CV%	%Effect
0	D	4	0.931		1.0010	0.8812		0.9770	0.02	_	0.0441	4.74%	0.00%
0.041		4	0.921	5 0.8779	0.9650	0.8812		0.9387	0.01		0.0274	2.97%	1.03%
0.088		4	0.932	0 0.8504	1.0140	0.8621		0.9847	0.02	56	0.0513	5.50%	-0.10%
0.184		4	0.886	0 0.7495	1.0230	0.8161		1.0000	0.04	29	0.0858	9.68%	4.84%
0.297		4	0.000		0.0000	0.0000		0.0000	0.000	00	0.0000		100.00%
0.419		4	0.000	0 0.0000	0.0000	0.0000		0.0000	0.000	00	0.0000	-	100.00%
Combined P	roportion Norm	al Detail						MD	5: 195	6FF9	BF9B63F4A	58B3D5F5	7A60BF07
Conc-mg/L	Code	Rep 1	Rep 2	2 Rep 3	Rep 4						6		
0	D	0.9770	0.908	0 0.9579	0.8812		-						
0.041		0.8812	0.938	7 0.9272	0.9387								
0.088		0.9847	0.862	1 0.9349	0.9464								
0.184		1.0000	0.816	1 0.9042	0.8238								
0.297		0.0000	0.000	0 0.0000	0.0000								
0.419		0.0000	0.000	0 0.0000	0.0000								
Combined P	roportion Norm	al Binomia	Is										
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4								
0	D	255/261	237/2	61 250/261	230/261								
0.041		230/261	245/2	61 242/261	245/261								
0.088		257/261	225/2	61 244/261	247/261								
0.184		263/263	213/2	61 236/261	215/261								
0.297		0/261	0/261	0/261	0/261								
the second se		0/004	0/004	0/004	DIOCA								
0.419		0/261	0/261	0/261	0/261								

CETIS Test Data Worksheet

25 Jul-23 11:39 (p 1 of 1) P220819.68 / 02-0009-8192

Report Date:

Bivalve Larv	al Surv	vival a	nd Dev	elopment Te	st				EcoAnalysts
Start Date: End Date: Sample Date	12 J 14 J	ul-23 ⁻ ul-23 ⁻	12:57 11:11	Species: Protocol:	Mytilus galloprovi EPA/600/R-95/13 Total Ammonia			0819.68 rence Toxicant 0819.68	
Conc-mg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal		Notes
0	D	1	4	261	265	265	255		
0	D	2	6	261	245	245	237		
0	D	3	12	261	272	272	250		
0	D	4	16	261	241	241	230		
1.76	1.000	1	9	261	250	250	230		
1.76		2	19	261	264	264	245		
1.76		3	5	261	255	255	242		
1.76		4	10	261	261	261	245		
3.76		1	2	261	263	263	257		
3.76		2	11	261	243	243	225		
3.76		3	7	261	260	260	244		
3.76		4	22	261	256	256	247		
7.85		1	17	261	275	275	263		
7.85		2	8	261	232	232	213		
7.85	1	3	3	261	256	256	236		
7.85	1.2 2	4	15	261	233	233	215		
12.7		1	14	261	253	253	0		
12.7		2	24	261	249	249	0		
12.7		3	1	261	263	263	0		
12.7		4	13	261	240	240	0		
17.9		1	21	261	257	257	0		
17.9	1	2	18	261	253	253	0		
17.9	17.2	3	20	261	241	241	0		
17.9		4	23	261	266	266	0		

QA:MU

CETIS Test Data Worksheet

25 Jul-23 11:51 (p 1 of 1) P220819.68UIA / 13-3479-3905

Report Date:

Test Code/ID:

Bivalve L	arval	Surv	ival a	nd Dev	elopment Tes	st		-	EcoAnalyst		
Start Date End Date Sample D		14 Ju	ul-23 1 ul-23 1 ug-22	11:11	Species: Protocol: Material:	Mytilus galloprovi EPA/600/R-95/13 Unionized Ammo	86 (1995)	Sample Code: P220819.68UIA Sample Source: Reference Toxicant Sample Station: P220819.68UIA			
Conc-mg	/L (Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes		
	0	D	1	7	261	265	265	255			
1.1.1	0	D	2	18	261	245	245	237	e		
	0	D	3	22	261	272	272	250			
	0	D	4	24	261	241	241	230			
0.04	11	-	1	13	261	250	250	230			
0.04	11		2	3	261	264	264	245			
0.04	11		3	21	261	255	255	242			
0.04	11		4	20	261	261	261	245			
0.08	38		1	5	261	263	263	257			
0.08	38		2	19	261	243	243	225			
0.08	38		3	10	261	260	260	244			
0.08	38		4	1	261	256	256	247			
0.18	34		1	16	261	275	275	263			
0.18	34		2	11	261	232	232	213			
0.18	34		3	4	261	256	256	236			
0.18	34		4	17	261	233	233	215			
0.29	97		1	12	261	253	253	0			
0.29	97		2	8	261	249	249	0			
0.29	97		3	23	261	263	263	0			
0.29	97		4	2	261	240	240	0			
0.41	19		1	9	261	257	257	0			
0.41	19		2	15	261	253	253	0			
0.41	19		3	14	261	241	241	0			
	-										

266

0

0.419

4

6

261

266

Analyst: SZ QA: Mous

Un-ionized Ammonia Calculator

CLIENT:	Jacobs Wyckoff	Date of Test:	July 12, 2023
PROJECT:	WEH-031Z	Test Type:	Mytilus galloprovincialis
COMMENTS.	P220810 68		

COMMENTS: |P220819.68 To convert Total Ammonia (mg/L) to Free (un-ionized) Ammonia (mg/L) enter the corresponding total ammonia, salinity, temperature, and pH.

and the second second		Mod NH3T (mg/L)		pH	temp (C)		pKa ^s	NH ₃ U (mg/L
1	Target / Sample Name	Actual	Actual	Actual	Actual	Calculated	Calculated	Calculated
lonic strength:pKa ^s	Example 3.5	2.000	10.0	7.5	5.0	278.15	9.2520	0.008
	1				1.00			
	2 1.5	1.76	30	7.9	16.7	289.85	9.2559	0.041
	3 3	3.76	30	7.9	16.7	289.85	9.2559	0.088
17724	4 6	7.85	30	7.9	16.7	289.85	9.2559	0.184
	5 12	12.7	30	7.9	16.7	289.85	9.2559	0.297
	6 18	17.9	30	7.9	16.7	289.85	9.2559	0.419
the second se	7				10000		1. T	
	В							1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	9						1	
9.35 10			1	-				
933-	1		1					
930 931 1								
934 933 930 930 931 935 935 938	3			-				No. of Street, or other
927 -	4						· · · · · · · · · · · · · · · · · · ·	Sec
926	5							
$y = 0.0003x^2$	6					1000		
+ 0.0091x +	7				1.000			
9.2502	в							1
1	9	1.1		1000	1.1.1.1			
20	D							
2	1		· · · · · · · · · · · · · · · · · · ·				1	1.
23	2		10.00		1			-
2:	3		1					
24				-				-
2					-			
20		1			-		-	-
2		-		_	-			110
21					-	-		
2				-	-			-
30				-		-		-
3				-	1			-
33	-				-			
33				-		-		-
34						-		
3					-			-
36								
3					-			
38				-	-			-
39					-			-
1.00								
40				-		-		
4				-	-			-
4:								
43		-			-			
44					-		·	
4				and the second				

QA V MARLE

48 Hour Bivalve Development Reference Toxicant Test

Test ID: P220B19	. 68	Replica	ates: 4	5	Study Director M. Scibe	A	Locat	ion: 1 N(, 1		
Dilution Water FSW071123.	Batch:	Organi	sm Batch:		Associated Tes	t(s):	Orgar			
Chamber Size/ 30 ml she	Type:	Exposu	ire Volume 10 ml			101.01.1				
Toxicant: Amr	monium C	hloride		[Date Prepared	7/41/23	Initial	Initials:		
Target Conc		ns: ting works	heet		Quantity of Target: See spikir		Quar Targe		Diluent:	
	See spiking worksheet					king worksheet	Actua	1: 20	oml	
				SPAW	NING DAT	A				
Initial Spawnin	g Time:	Final S Time:	pawning 0930		ion Time: 0930	No. of Females:	5	No. of Ma	ales: 2	
Embryo Density (count		1	37	2	17	3		Mean:	142	
Stocking Volu	ne Calcula	ation: 142	x 100 = 14	200, 2700/	14200 = 0.1	9, 40×0.19=(7.61, 4	0-7.61=	(32.39) FSW	
0 Hours	Date:	7/12	WQ Time	1256		Start Time: 12	57	Initia	IS: NL	
				S	ТОСК					
			Control	1.5	3	6		12	18 '	
D.Q. (%) (>4.0 mg/L)			8.1	8.0	8.0	8.1	8	.0	8.0	
Temperature (16 ± 1°C)		6.7	16.7	Ke.	7 Ke-	1	6.7	16.7	
Salinity (30 ± 2 ppt)			30	30	30	30	3	0	30	
рН (6-9)		-	7.9	7.9	7.9	7.9	7	.9	7.9	
Meter #			8	8	8	8	4	8	8	
Day 1	Tempe (16 ± 1°	erature C)	15.7		Meter #	T16		Initial	s: SR	
Day 2	Date:	7/14/23	WQ Time	105-	M	End Time: //(1		s: NS	
			Formalin	22030	1-50	Rose Bengal Lot 513				
	-			S	ТОСК		-		5.	
			Control	1.5	3	6	3	12	18	
D.O. (%) (>4.0 mg/L)			8.1	8.1	8.(8.1	0. (С	8.0	
Temperature (16 ± 1°C)	1	6.1	155	16.1	16.1	16	.4	16.5	
Salinity (30 ± 2 ppt)		2	30	3	31	31	31		31	
рН (6-9)		E	3.1	8.0	8.0	8.0	8.0	С	0.8	
Meter #				7	7		7			

@1E-52 7/12/23

20 October 2021 Ver.5

48 Hour Bivalve Development Reference Toxicant Test

Conc.	Rep	Number Normal	Number Abnormal	Date	Initials	
	1	0 1255	10	7/20/23	52	
61	2	237	8	7/20/23	SZ	
Control	3	250	22	7/20/23	SZ	-1
	4	230	u	+121/23	MK	
	1	230	20	7/21/23	MIC	G
1.5	2	245	19	7/21/23	MK	
1.5	3	242	13	7/21/23	MK	
	4	245	16	7/21/23	MK	
	1	257	6	7/21/23	MIK	
3	2	225	18	7/21/23	MK	
3	3	244	16	7/21/23	MIK	
	4	247	9	7/21/23	MR	
	1	263	12	7/21/23	MIR	
6	2	213	19	7/21/23	MK	C
	3	236	20	7/21/23	MIC	
	4	215	18	7/21/23	MIC	
	1	0	253	7/21/25	MK	
12	2	0	249	7/21/23	mk	
12	3	0	263	7/21/23	MIC	
	4	0	240	7/21/23	mic	
	1	0	257	7/21/23	MK	
18	2	0	257	7/21/23	MIC	
10	3	0	241	7/21/23	mk	C
	4	0	266	7/21/23	MF	
		Stocking	Density			
Rep		Cou	nt	Init		_
1		264	1	NL		_
2 3		246		NU		_
3 4		276		NL		_
4 5		254		NL M		
6		250		M	_	-
	Mean:	241				_

OIE-52 7/20/23

(2)QA: 230N, 23A, 230/250=0.92, 230/253=0.91, 7. diff=1.1-52 7/25/23 (3)QA: 214N, 20A, 213/232=0.92, 214/234=0.91 7. diff=0.4-52 7/25/23 (1)QA: ON, 240A, 0/241=0, 0/240=0 7. diff=0-52 7/25/23

20 October 2021 Ver.5

Page | 2 of 2

	Ammonia Reference Toxicant Spiking Worksheet	9
Reference Toxicant ID: Date Prepared: Technician Initials:	P220819.68 7/11/23 ABNL	
Biv / Echi	no NH ₃ RT	

Assumptions in Model

Stock ammonia concentration is 9,000 mg/L = 9 mg/mL

Date: Measurement: 76

7/6/2023 7646.666667

Te	st Solutions		the start was a second start of the second start of the
Measured Concentration	Desired Concentration	Volume	Volume of stock to reach desired concentration
mg/L	mg/L	mL	mL stock to increase
0.00	0		SALT WATER
2-15 -1A202	1.76 1.5	200	0.059
7940	3.710 3	200	0.118
5.100	7.85 6	200	0.235
13.30	12.7 12	200	0.471
1930)	17.9 18	200	0.706
		1.1.1	
			and the second sec

OIE-NL7/12

Toxicity Testing Results Wyckoff/Eagle Harbor Superfund Site Groundwater Treatment Plant

APPENDIX B

CHAIN-OF-CUSTODY, SAMPLE RECEIPT FORMS, AND ORGANISM RECEIPT FORMS

Page 1 of 1

EcoAnalysts Inc. (REGION COPY) DateShipped: 7/11/2023 CarrierName: EcoAaylists (hand delivery) AirbillNo:

Jacobs, Wyckoff-Wyckoff Eagle Harbor GWTP 2023/WA Project Code: WEH-031Z Cooler #: 1 of 1

No: 10-071123-103825-0710

IFD10W2LA0010PXTSDDD2 Contact Name: Daniel Baca Contact Phone: 661-313-3807

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
071123		Ground Water/ D. Baca	Composite	CHRTOX(8 Weeks)	N (1)	SP-11	07/11/2023 01:10	Field Sample

				Shipment for Case	Complete? N		
special Instruction	ns: 2023 Week 28-Q3 Bioassay Sample		Samples Transferred From Chain of Custody #				
analysis Key: CH	RTOX=Chronic Toxicity						
Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receip		
	Dunk (D JACOBS	2-11-23	All EwAnalysts	7/1/23/100	6.0%		
	04.0		0.9	1 (100	Lab 10: P230711.01		
		Balline . while the second					
				1			

SAMPLE RECEIPT

Client: Client ID:					Lab ID:			Re	newals:						
Jacobs)acobs 071123				11	Vn	3071	1.	61	1					
Project			-	1			1.5								
WER-03	17	-							-	-					
Date/Time R	ece	ived:			-		X	uba	1	100				_	
Airbill #:					-1	NIA			1						
Shipper Tracking Information Kept for Records: (Y/N/NA)					NA										
Collection Date/Time:					7/1/230110										
Sample Holding Time (must be ≤36 hours at test initiation)					14050110										
Condition of	Ship	ping Co	ntai	ner:			Good				-			-	
Type and Capacity of Sample Container:					4 Loubi										
Total Sample	Vol	ume (L)					41								
Condition of			1011				Good							1	
Sample Conta	aine	r Approp	oriat	te: (Y/N)	_		<u> </u>						-		
Custody Seals (Intact/Broke	s In en/	tact: Not Pres	ent)			Intact			1					
Frozen Wet o Shipment/Tra	r Bl	ue Ice P port: (Y/	rese N)	ent During	9			1	4						
Sampler's Na (Print Name/	me	Present	on (COC Form			Daniel Baca								
Color:			-				Clear							-	
	TA		E	FOLLO	NI	NG	ME			MENT	SUPC	N ARE	RIVAL		
		*			Π			1	T			1		[m	
LAB ID	Meter #	Temp. (°C) (0-6°C)	Meter #	Dissolved Oxygen (mg/L)	Meter #	Hd	Motor #	Cond. (JJS/cm)	Meter #	Sal. (ppt)	Hardness (mg CaCO ₃ /L)	Alkalinity (mg CaCO ₃ /L)	Total Chlorine (mg/L)	Total NH3 (mg/L)	Tech
1230711.01	9	6.0	9	6.6	9	7.9	59	939	9				ND	0.1904	h
											1				1
								1					1.00		
	1 1							1.000							

*Notify project manager or study director of temperatures above 6°C or \geq 36 hours holding time. Client must be notified ASAP.

If there are sample receipt problems, complete the following:

Reason for unacceptability:

Name of Client Contact:	Contacted by:	
Client Response and/or Action to be Taken:	Date Action Taken:	-

ORGANISM REC	CEIPT LOC	1
--------------	-----------	---

Date: Time: 1545				Batch No. TS 060623.01							
Organism	n:				1	13000	013.01				
		M.	sp.				÷				
Source /	Supplier:										
		Tay	lor SI	hellins	4						
No. Order	ed:	No	. Receive	d:	So	urce Batch					
			1011	1	atch date, etc.	date. etc.).					
				165 Harvest. 6/6/23							
Condition	of Organi	sms:		Approximat	e Si	70 OF Ages					
C	ord			(Days-from hat	tch, I	ife stage, size	class, etc.):				
D	0001			Mixe							
Shipper:											
	Wier	·		B of L (Tracking No.)							
10 million (1997)				Courier							
Condition	1	ler:		Received By:							
60	nd		_	M-se		eA		F			
Container	D.O. (mg/L)	Temp. Cond (°C) (inclu		I. pH Ide (Units)		# Dead	% Dead*	Tech. (Initials)			
1	0	0	Units)			-		MR			
					-		1	103			
					-						
				_							
51 door											
f >10% contact	lab manager			_				S			
otes:											
Orovi	a day -	MS OTO	127					51.5			
7/15	J										
113		C	Organism R	leceipt Log v1	.1		Page	of			
							rage.	of			

TAYLOR SHELLFISH FA	
ARVEST DATE:	Harvest Minute
ARVEST Gallet	Refe; Date
TEM:	Refer Hour
FARM CODE:	Refer Minute

ORGANISM RECEIPT LOG

Organism			4 4			1200	2723		
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Source / S		taul	or so	Jack	fish				
No. Ordere	No.	Receive	oource Daten.						
Condition	of Organis			Appro (Days)	oximate Si	ze or Age: ife stage, size		+	
Shipper:	Couri			BofL	- (Tracking				
Condition of G	or contained	er:		Recei	ved By:	0		-	
Container	D.O. (mg/L)	Temp. (°C)	Cond Sal (Inclu Units	de	pH (Units)	# Dead	% Dead*	Tech. (Initials)	
X					°		->	JL	
if >10% contac	t lab manager		-	÷.					
lotes:	-	1	M	_				-	

7/27/15

Organism Receipt Log v1.1

