TOXICOLOGY TESTING RESULTS PORT GAMBLE BAY RESTORATION MONITORING 2018 PORT GAMBLE, WASHINGTON

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EcoAnalysts Report ID: PG1123.02

Submittal Date: November 5, 2018

Revision Date: December 7, 2018

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.

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ACRONYMS AND ABBREVIATIONS

AFDW:	Ash-free dry weight
cm:	Centimeter
CSL:	Cleanup Screening Level
°C:	Degrees Celsius
EC ₅₀ :	Effective Concentration that results in a 50% reduction in a sub-lethal endpoint
g:	Grams
LC ₅₀ :	Lethal Concentration that results in a 50% reduction in survival
L:	Liter
μm:	Micrometer
mg:	Milligram
mg/L:	Milligrams per liter
mL:	Milliliter
mm:	Millimeter
NELAP:	National Environmental Laboratory Accreditation Program
NOEC:	No Observed Effect Concentration
OR:	Oregon
ppt:	parts per thousand
PSEP:	Puget Sound Estuary Protocols (PSEP 1995)
SCO:	Sediment Cleanup Objective
SCUM II:	Sediment Cleanup User's Manual II
SMS:	Sediment Management Standards
SOP:	Standard operation procedure
SMARM:	Sediment Management Annual Review Meeting
UIA:	Un-ionized ammonia
USACE:	United States Army Corps of Engineers
USEPA:	United States Environmental Protection Agency
WA:	Washington State
WAC:	Washington Administrative Code
WDOE:	Washington (State) Department of Ecology

1. INTRODUCTION

EcoAnalysts conducted biological toxicity testing with sediment samples collected by Anchor QEA, LLC. (Anchor) as part of the restoration monitoring activities being performed at the Port Gamble Bay Cleanup Site in Port Gamble, Washington. Sediments were evaluated for biological effects following guidance provided by the Washington State Department of Ecology (WDOE) Sediment Management Standards (SMS) under the Washington Administrative Code (WAC) 173-204-315. This report presents the results of the toxicity testing portion of the Port Gamble Bay sediment investigation.

2. METHODS

This section summarizes the test methods followed for this biological characterization. Test methods followed guidance provided by the Puget Sound Estuary Program (PSEP 1995), the Sediment Cleanup User's Manual II (SCUM II; WDOE 2017), and the various updates presented during the Sediment Management Annual Review Meeting (SMARM). Sediment toxicity was evaluated using three standard PSEP bioassays; the 10-day amphipod test, the 20-day juvenile polychaete survival and growth test, and the 48-hour benthic larval development test.

2.1 Sample Collection and Organism Receipt

Nineteen test sediments were collected between September 6 and 19, 2018 and were received at EcoAnalysts on same day as collection. Reference sediments from Carr Inlet, WA were collected by EcoAnalysts on September 28, 2018 and received on the same day. Sediment samples were stored in a walk-in cold room at 4 ± 2 °C in the dark. The test sediment was not sieved prior to testing. All tests were conducted within the eight-week holding time.

Amphipods (*Eohaustorius estuarius*) were supplied by Northwest Amphipod in Newport, Oregon. Animals were held in native sediment at 15°C prior to test initiation. Juvenile polychaete worms (*Neanthes arenaceodentata*) were obtained from Aquatic Toxicology Support in Bremerton, Washington. Juvenile polychaetes were held in seawater at 20°C (Neanthes were cultured in water-only and were not held in sediment prior to testing). *Mytilus galloprovincialis* (mussel) broodstock were provided by Taylor Shellfish in Shelton, WA. Broodstock were held in unfiltered seawater at 14 – 16°C prior to spawning.

Native *Eohaustorius* sediment from Yaquina Bay, Oregon was also provided by Northwest Amphipod for use as control sediment treatments for the amphipod and juvenile polychaete tests.

2.2 Sample Testing Plan

Based on instruction from Anchor representatives, 12 of the 19 samples collected from the site were selected for bioassay testing. Five samples were identified to be evaluated with the full bioassay suite (three species testing) while seven samples were to be evaluated with the larval benthic test only. Sample locations and their corresponding bioassays are outlined in Table 2-1.

Sample ID	Benthic Larval Development Test	Juvenile Polychaete Survival and Growth Test	Amphipod Survival Test
SMA1B-IT2-0-10-180907	Х	Х	Х
SMA1B-IT3-0-10-180919	Х	Х	Х
SMA2C-IT3-0-10-180907	Х	Х	Х
SMA2C-IT6-0-10-180907	Х	Х	Х
SMA2C-IT9-0-10-180906	Х	Х	Х
SMA1-ST-0-10-COMP-180917	Х		
SMA1A-IT-0-10-COMP-180917	Х		
SMA2A-IT-0-10-COMP-180919	Х		
SMA2A-ST-0-10-COMP-180918	Х		
SMA2B-IT-0-10-COMP-180918	Х		
SMA2B-ST-0-10-COMP-180918	Х		
BW-15-0-10-180917	Х		
SMA2C-IT2-0-10-180906			
SMA2C-IT5-0-10-180906			
SMA2C-IT8-0-10-180906			
SMA2C-IT4-0-10-180906	Sam	nple not analyzed for sedimer	nt toxicity
SMA2C-IT1-0-10-180906			
SMA2C-IT7-0-10-180906			
SMA1B-IT1-0-10-180907			

Table 2-1. Bioassay Sample Assignments

X = Indicates test to be conducted with associated samples

2.3 Sample Grain Size and Reference Comparison

Sediment grain size is one of the characteristics used in selecting the appropriate reference sediment(s) to compare the chemical and biological responses of project sediments. The percent fines value is defined as the amount of sediment that passes through a 62.5-µm sieve, expressed as a percentage of the total sample analyzed. This is also the sum of the silt and clay fraction of sediment. Wet-sieve grain size results for the reference samples was conducted in the field (at the time of collection) and after receipt at the EcoAnalysts laboratory. The percent-fines determination of the project sediments is summarized in Table 2-2.

Treatment	Sample Abbreviation	Percent Fines ¹	Treatment Compared To:
CARR-20 (Reference)		40%	
CR-21 (Reference)		14%	
SMA1B-IT2-0-10-180907	SMA-1B-IT2	2%	CR-21
SMA1B-IT3-0-10-180919	SMA-1B-IT3	4%	CR-21
SMA2C-IT3-0-10-180907	SMA-2C-IT3	10%	CR-21
SMA2C-IT6-0-10-180907	SMA-2C-IT6	8%	CR-21
SMA2C-IT9-0-10-180906	SMA-2C-IT9	4%	CR-21
SMA1-ST-0-10-COMP-180917	SMA-1-ST	14%	CR-21
SMA1A-IT-0-10-COMP-180917	SMA-1A-IT	6%	CR-21
SMA2A-IT-0-10-COMP-180919	SMA-2A-IT	0%	CR-21
SMA2A-ST-0-10-COMP-180918	SMA-2A-ST	6%	CR-21
SMA2B-IT-0-10-COMP-180918	SMA-2B-IT	0%	CR-21
SMA2B-ST-0-10-COMP-180918	SMA-2B-ST	0%	CR-21
BW-15-0-10-180917	BW-15	36%	CARR-20

Table 2-2. Sample and Reference Grain Size Comparison

¹ Wet sieve results

Project sample BW-15-0-10-180917 was compared to the Carr Inlet reference CARR-20 for the purposes of evaluating the sediment under the sediment management standards. All other project samples were compared to reference station CR-21.

Station coordinates for the reference samples are summarize in Table 2-3.

Table 2-3.	Reference	Station	Coordinates

Station	Latitude	Longitude		
CARR-20	47.33298	-122.66981		
CR-21	47.33111	-122.67889		

2.4 10-day Amphipod Bioassay

The 10-day amphipod acute toxicity test was conducted with *Eohaustorius estuarius*. Test organisms were supplied by Northwestern Aquatic Sciences in Newport, OR and held in native sediment at 15°C prior to test initiation. Organisms were fed during the holding period a diet of ground TetraMarin[®] ad libitum. Native sediment from Yaquina Bay, OR was provided by the organism supplier for use as the control treatment sediment in the test. This matrix has been used successfully in prior tests with this species and is known to support positive organism health and survival.

The amphipod bioassay was conducted as 10-day static exposures with five replicates for each test treatment, reference treatment, and control. Two centimeters of sediment (approximately 175 mL) were placed into each 1-L glass chamber with 775 mL of overlying water. Trickle-flow aeration was provided through glass pipettes, and care was taken to avoid disturbing the sediment surface. Test chambers were placed into randomly assigned positions and allowed to equilibrate to test conditions overnight.

Prior to the test initiation, water quality measurements were taken in all replicates for each test treatment and included dissolved oxygen, temperature, salinity, and pH. Ammonia and sulfide concentrations were measured in both interstitial (pore water) and overlying water at initiation and termination. These measurements were made from a sacrificial surrogate chamber for each test treatment. Sediment pore water was extracted via centrifugation. During the test, water quality was monitored daily in one surrogate replicate per treatment. All water quality instruments were calibrated daily or on their recommended schedule. Records of instrument calibration were retained in the laboratory logs.

To initiate the test, organisms were randomly allocated to each of the test chambers. Initial stocking densities were 20 organisms per test chamber. Amphipods that did not bury within approximately one hour were replaced with healthy amphipods. No food was provided during the 10-day exposure for the amphipod test.

At test termination, sediment from each test chamber was sieved through a 0.5-mm screen to recover all organisms. The number of surviving and dead amphipods was then enumerated.

2.5 20-day Juvenile Polychaete Bioassay

The 20-day polychaete survival and growth test was conducted with juvenile polychaete worms (*Neanthes arenaceodentata*). Test organisms were obtained from Aquatic Toxicology Support in Bremerton, WA and held in seawater at 20°C (Neanthes were cultured in water-only and were not held in sediment prior to testing). Organisms were fed during the holding period a diet of ground TetraMarin® ad libitum. Native sediment of the amphipod Eohaustorius estuarius from Yaquina Bay, OR was provided by Northwestern Aquatic Sciences for use as the control treatment sediment for the test. This coarse sand control sediment has been routinely tested in conjunction with this species at this laboratory and results from historical testing have demonstrated acceptable organism health and sediment quality.

The polychaete bioassay was conducted as a 20-day static-renewal test, with overlying exchanges of 300 mL of water occurring every third day. Each test treatment, reference treatment, and control consisted of five replicates of 1-L glass chambers, which were filled with two centimeters of sediment (approximately 175 mL) and 775 mL of overlying water. Trickle-flow aeration was provided through glass pipettes, and care was taken to avoid disturbing the sediment surface. Test chambers were then randomly assigned positions and allowed to equilibrate to test conditions overnight.

Prior to the test initiation, water quality measurements were taken in a surrogate chamber for each test treatment and included dissolved oxygen, temperature, salinity, and pH. Ammonia and sulfide concentrations were measured in both interstitial (pore water) and overlying water at initiation and termination. These measurements were made from a sacrificial surrogate chamber for each test treatment. Sediment pore water was extracted via centrifugation. During the test, water quality was monitored daily in one surrogate replicate per treatment. All water quality instruments were calibrated daily or on their recommended schedule. Records of instrument calibration were retained in the laboratory logs.

To initiate the test, organisms were randomly allocated to each of the test chambers. Initial stocking densities were five worms per test chamber. During the test, organisms were fed a diet of 40-mg of TetraMarin[®] slurry every other day (approximately 8-mg dry weight per worm). Pre-test initial biomass was determined by taking dry weight and ash-free dry weight (AFDW) measurements of three replicates of five worms each on Day 0.

At test termination, sediment from each test chamber was sieved through a 0.5-mm screen. All worms were recovered, enumerated, rinsed in deionized water (to remove salt), and transferred to preweighed aluminum foil weigh boats. After drying in an oven at 60°C for approximately 24 hours, each weigh-boat was removed, cooled in a desiccator and weighed to obtain dry weight measurements. They were then heated to 550°C for 2 hours to determine the ashed weight. Ash-free dry weights (AFDW) were calculated to correct for the influence of sediment grain size differences between treatments:

AFDW=Dry weight-Ashed weight

Both dry weight and AFDW were used to determine individual worm weight and growth rates.

2.6 Larval Developmental Bioassay

The bivalve larval development test was conducted with the mussel, *Mytilus galloprovincialis*. Adult organisms were obtained from Taylor Shellfish in Shelton, WA and were held under flowing natural seawater at 12°C prior to spawning induction. Adult mussels were fed during the holding period a marine algal suspension ad libitum. The control treatment for this assay employed a clean seawater treatment (no sediment).

The larval development bioassay was conducted as a static exposure with five replicates for each test treatment, reference treatment, and control. Approximately 18 g (±1 g) of sediment was placed into each 1-L glass chamber with 900 mL of overlying water. Trickle-flow aeration was provided through glass pipettes, and care was taken to avoid disturbing the sediment surface. Test chambers were then shaken for 10 seconds and placed into randomly assigned positions. The larval test was performed without aeration unless dissolved oxygen levels fell below threshold levels for action.

Prior to the test initiation, water quality measurements were taken in the surrogate chamber for each test treatment and included dissolved oxygen, temperature, salinity, and pH. Ammonia and sulfide concentrations were measured in the overlying water at initiation and termination. These measurements were made from a sacrificial surrogate chamber for each test treatment. During the test, water quality was monitored daily in one surrogate replicate per treatment. All water quality instruments were calibrated daily or on their recommended schedule. Records of instrument calibration were retained in the laboratory logs.

To initiate the test, mussels were placed in clean seawater and acclimated at 16°C for approximately 20 minutes. The water bath temperature was then increased over a period of 15 minutes to 20°C. Mussels were held at 20°C and monitored for spawning individuals. Spawning females and males were removed

from the water bath and placed in individual containers with seawater. These individuals were allowed to spawn until sufficient gametes were available to initiate the test. After the spawning period, eggs were transferred to fresh seawater and filtered through a 0.5 mm Nitex[®] mesh screen to remove large debris, feces, and excess gonadal matter. A composite was made of the sperm and diluted with fresh seawater. The fertilization process was initiated by adding sperm to the isolated egg containers. Egg-sperm solutions were periodically homogenized with a perforated plunger during the fertilization process and sub-samples observed under the microscope for egg and sperm viability. Approximately one to one and a half hours after fertilization, embryo solutions were checked for fertilization rate. Only those embryo stocks with >90% fertilization were used to initiate the tests. Embryo solutions were rinsed free of excess sperm and then combined to create one embryo stock solution. Density of the embryo stock solution. This was used to determine the volume of embryos tock solution to deliver approximately 27,000 embryos to each test chamber.

The protocol calls for test termination when 95% of the embryos in the control have reached the prodissoconch I stage (approximately 48-60 hours). At termination, the overlying seawater was decanted into a clean 1-L jar and mixed with a perforated plunger. From this container, a 10 mL subsample was transferred to a scintillation vial and preserved in 5% buffered formalin. Larvae were subsequently stained with a dilute solution of Rose Bengal in 70% alcohol to help visualization of larvae. The number of normal and abnormal larvae was enumerated on an inverted microscope. Normal larvae included all D-shaped prodissoconch I stage larvae. Abnormal larvae included abnormally shaped prodissoconch I larvae and all early stage larvae.

2.7 Data Analysis and QA/QC

All water quality and endpoint data were entered into Excel spreadsheets. Water quality parameters were summarized by calculating the mean, minimum, and maximum values for each test treatment. Endpoint data were calculated for each replicate and the mean values and standard deviations were determined for each test treatment.

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 were reviewed for errors. Review counts were conducted on any apparent outliers.

For the larval test, the normalized combined mortality and abnormality endpoint was used to evaluate the test sediment. This was based on the number of normal larvae in each treatment and reference sample divided by the mean number of normal larvae in the control replicates, as defined in the SCUM II guidance document (Ecology 2015).

For SMS and CSL suitability determinations, comparisons were made according to DMMP User Manual (DMMP, 2016) and Fox et al. (1998), using BioStat software. Data reported as percent mortality or survival were transformed using an arcsine square root transformation prior to statistical analysis. All data were tested for normality using the Wilk-Shapiro test and equality of variance using Levene's test. Determinations of statistical significance were based on one-tailed Student's t-tests with an alpha of 0.05. A comparison of the larval endpoint relative to the reference was made using an alpha level of 0.10. For samples failing to meet assumptions of normality, a Mann-Whitney test was conducted to determine significance. For those samples failing to meet the assumptions of normality and equality of variance, a t-test on rankits was used.

To evaluate the relative sensitivity of the organisms, reference toxicity tests were performed using standard reference toxicants (Lee 1980). A water-only reference-toxicant test was conducted concurrently with the sediment tests using ammonium chloride. The ammonium chloride reference-toxicant test was used to ensure animals used in the test were healthy and of similar sensitivity to prior tests. This test also provided information on the sensitivity to ammonia concentrations that would possibly be present in the sediments.

Statistical analyses of all dose-response tests were performed using CETIS Comprehensive Toxicity Data Analysis and Database Software version 1.9.2.6. Comparisons between the lab control and each test concentration were performed following recommended USEPA decision matrices (USEPA 2002).

3. **RESULTS**

The results of the sediment testing, including a summary of test results and water quality observations are presented in this section. Data for each of the replicates, as well as laboratory bench sheets are provided Appendix A and statistical analyses are provided in Appendix B.

3.1 10-day Amphipod Bioassay

The bioassay test with *E. estuarius* was validated with 4% mortality in the native sediment control, which met the performance criterion of $\leq 10\%$ mortality for SMS evaluations. This result indicates that the test conditions were suitable for adequate amphipod survival. Mean mortality in the reference treatments CARR-20 and CR-21 was 4% and 2%, respectively, which met the performance criteria ($\leq 25\%$ mortality) and indicated that the reference sediments were acceptable for suitability determination. Mean mortality in the five project samples ranged from 1 - 15%. All endpoint results are summarized in Table 3-1. Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in Table 3-2, Table 3-3, and Table 3-4.

Water quality parameters were within the acceptable limits throughout the duration of the test.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The LC_{50} value was within ±2 standard deviations from the laboratory historical mean. This result indicates that the test organisms used in this study were of similar sensitivity to those previously tested at EcoAnalysts.

Ammonia concentrations observed in the *E. estuarius* test were below the No Observed Effect Concentration (NOEC) value derived from the concurrent ammonia reference-toxicant test (Table 3-3; compare to NOEC of 134 mg/L). Values were also below the published threshold concentration of 15 mg/L total ammonia (Barton 2002). Therefore, ammonia concentrations within the sediment samples should not have been a contributor to any adverse biological effects observed in the test treatments. Initial sulfide concentrations in interstitial water were unable to be measured due to an insufficient volume of porewater collected from the coarse-grained sediments.

Treatment	Replicate	Number Initiated	Number Surviving	Number Missing or Dead	Percentage Mortality	Mean Percentage Mortality	SD
	1	20	19	1	5		
	2	20	19	1	0		
Control	3	20	20	0	5	4	4.2
	4	20	18	2	0		
	5	20	20	0	0		
	1	20	18	2	5		
	2	20	20	0	25		
CARR-20	3	20	19	1	5	4	4.2
	4	20	20	0	5		
	5	20	19	1	0		
	1	20	20	0	0		
	2	20	19	1	20		
CR-21	3	20	20	0	20	2	2.7
	4	20	20	0	20		
	5	20	19	1	5		
	1	20	15	5	10		
	2	20	19	1	10		
SMA-1B-IT2	3	20	19	1	15	7	10.4
	4	20	20	0	15		
	5	20	20	0	0		
	1	20	16	4	10		
	2	20	16	4	0		
SMA-1B-IT3	3	20	16	4	0	15	7.1
	4	20	19	1	0		
	5	20	18	2	0		
	1	20	18	2	5		
	2	20	17	3	15		
SMA-2C-IT3	3	20	17	3	0	10	6.1
	4	20	20	0	5		
	5	20	18	2	0		
	1	20	20	0	0		
	2	20	20	0	5		
SMA-2C-IT6	3	20	20	0	0	1	2.2
	4	20	20	0	5		
	5	20	19	1	0	1	
	1	20	17	3	0		İ
	2	20	20	0	5	1	
SMA-2C-IT9	3	20	19	1	25	4	6.5
	4	20	20	0	5		
	5	20	20	0	5		

 Table 3-1. Test Results for Echaustorius estuarius

Treatment	Dissolved Oxygen (mg/L) ≥5.1 mg/L			Temperature (°C) 15 ± 1°C			Salinity (ppt) 28 ± 2 ppt			pH 7 - 9 units		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Control	8.3	8.1	8.5	15.3	15.1	15.7	27	27	28	8.0	7.8	8.0
CARR-20	8.3	8.0	8.6	15.4	15.1	15.8	27	27	28	8.0	7.8	8.2
CR-21	8.3	8.1	8.4	15.3	15.1	15.5	28	27	28	8.1	7.6	8.4
SMA-1B-IT2	8.3	7.2	8.5	15.4	15.2	15.7	27	27	28	8.0	7.8	8.1
SMA-1B-IT3	8.3	8.1	8.5	15.3	15.1	15.6	28	27	28	8.1	7.9	8.3
SMA-2C-IT3	8.3	8.2	8.5	15.3	15.1	15.5	27	27	28	8.0	7.9	8.2
SMA-2C-IT6	8.4	8.2	8.6	15.3	15.1	15.5	27	27	28	8.0	7.8	8.1
SMA-2C-IT9	8.2	8.0	8.4	15.3	15.1	15.6	28	28	29	8.0	7.8	8.1

 Table 3-2. Water Quality Summary for Echaustorius estuarius

Table 3-3. Ammonia and Sulfide Summary for Eohaustorius estuarius

Treatment	Overlying Ammonia (mg/L Total) ¹ NOEC = 134 mg/L		(mg/L Total) (mg/L Total)			g Sulfides Total) /alue = 1.9 g/L	Interstitial Sulfides (mg/L Total) ² Trigger Value = 1.9 mg/L		
	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	
Control	0.00	0.00	0.00	NM	ND	0.000	NM	NM	
CARR-20	0.969	1.31	8.42	3.94	0.001	0.004	NM	0.140	
CR-21	0.695	4.01	NM	6.60	ND	ND	NM	NM	
SMA-1B-IT2	0.152	0.00	NM	NM	ND	ND	NM	NM	
SMA-1B-IT3	0.279	0.00	NM	NM	ND	0.000	NM	NM	
SMA-2C-IT3	0.299	0.00	NM	NM	0.012	ND	NM	NM	
SMA-2C-IT6	0.00	0.00	NM	NM	ND	ND	NM	NM	
SMA-2C-IT9	0.00	8.89	1.53	NM	ND	ND	NM	NM	

¹NOEC (concurrent reference-toxicant test derived) = 134 mg/L total ammonia

²Inouye 2015: Total sulfide value 1.9 mg/L derived from hydrogen sulfide dissociation (0.122 mg/L H₂S @ 15°C, 28 ppt, and 8.1 pH)

ND = not detected; measurement below detection limit

NM = not measured; insufficient porewater recovered for analysis

Table 3-4.Test Condition Summary for Echaustorius estu
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T	est Conditions: PSEP E. estuarius						
Date sampled	September	6 – 19, 2018					
Date received	September	6 – 19, 2018					
Test dates	October 9	- 19, 2018					
Sample storage conditions	4°C,	dark					
Days of holding Recommended: ≤8 weeks (56 days)	20 – 33 Days						
Source of control sediment	Yaquina Bay, OR						
Test Species	Eohaustori	us estuarius					
Supplier	Northwest Amph	ipod, Newport, OR					
Date acquired	Octobe	r 4, 2018					
Age class	Mature ad	ult, 3-5 mm					
Test Procedures		revisions, SCUM II (2017) SED002.09					
Test location	EcoAnalysts Port	Gamble Laboratory					
Test type/duration	10-Da	10-Day static					
Control water	North Hood Canal seawater, 0.45µm filtered						
Test dissolved oxygen	Recommended: > 5.1 mg/L	Observed: 7.2 – 8.6 mg/L					
Test temperature	Recommended: 15 \pm 1 °C	Observed: 15.1 – 15.8°C					
Test Salinity	Recommended: 28 ± 2 ppt	Observed: 27 – 29 ppt					
Test pH	Recommended: 7 - 9	Observed: 7.6 – 8.4					
Control Performance Standard SMS	Recommended: Control ≤ 10% mortality	Observed: 4% mortality; Pass					
Reference Performance Standard SMS	Recommended: Reference ≤ 25% mortality	Observed mortality: 2%, 4%; Pass					
Reference Toxicant LC50 (total ammonia)	LC ₅₀ = 18	39.1 mg/L					
Mean; Acceptable Range (total ammonia)	148.0; 77.4	– 282.7 mg/L					
NOEC (total ammonia)	134	mg/L					
NOEC (unionized ammonia)	0.74	mg /L					
Test Lighting		(ambient and constant)					
Test chamber		ss Chamber					
Replicates/treatment	5 + 2 surrogates (one used for WQ measurements throughout the test)						
Organisms/replicate		20					
Exposure volume	175 mL sedime	nt/ 775 mL water					
Feeding		one					
Water renewal	N	one					
Deviations from Test Protocol	N	one					

3.2 20-day Juvenile Polychaete Bioassay

No mortality was observed in the *N. arenaceodentata* control sediment and mean individual growth (MIG) in the control was 0.808 mg/ind/day (dry weight) and 0.455 mg/ind/day (AFDW). These values fall within the test acceptability criteria of <10% mean mortality and ≥0.38 mg/ind/day dry weight (Kendall 1996), indicating that the test conditions were suitable for adequate polychaete survival and growth. A summary of the test results for all samples is shown in Table 3-5. Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in Table 3-6, Table 3-7, Table 3-8, and Table 3-9.

Mean mortality in the reference treatments ranged from 0-8%, meeting the reference performance standard of $\leq 10\%$ (WDOE 2017; USACE 2015). Mean individual growth for the reference treatments ranged from 0.735 to 0.840 mg/ind/day (dry weight) and 0.473 to 0.475 mg/ind/day (AFDW). When compared to the control, MIG expressed as AFDW ranged from 1.039 to 1.044, which met the reference performance standard of ≥ 0.80 (WDOE 2017).

Mortality in the project sediments ranged from 0% to 4%. Mean individual growth (as dry weight) in the test treatments ranged from 0.695 to 0.860 mg/ind/day. Mean individual growth in the AFDW assessment, which removes variability caused by gut contents, ranged from 0.429 to 0.529 mg/ind/day as AFDW.

All water quality parameters were within the acceptable limits throughout the duration of the test. Initial mean individual biomass (pretest) of the test organisms met the recommended criterion of 0.25 – 1.0 mg/individual at 0.859 mg/ind dry weight and 0.760 mg/ind AFDW.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The LC_{50} value was within control chart limits (±2 standard deviations from the laboratory historical mean). This result indicates that the test organisms used in this study were of similar sensitivity to those previously tested at EcoAnalysts.

Ammonia concentrations observed in the *N. arenaceodentata* test were below the No Observed Effect Concentration (NOEC) value derived from the concurrent ammonia reference-toxicant test (Table 3-7; compare to NOEC of 173 mg/L). Initial sulfide concentrations in the interstitial water were below the NOEC of 3.4 mg/L total sulfides (Kendall and Barton 2004) for all samples.

		Number		Mean	Individual Growth (mg/ind/day)					
Treatment	Rep	Initiated	Survivors	Mortality (%)	Dry Weight	Mean	Std Dev	AFDW	Mean	Std Dev
	1	5	5		0.773			0.456		
	2	5	5	0	0.909			0.487	0.455	0.060
Control	3	5	5		0.736	0.808	0.142	0.423		
	4	5	5		0.633			0.375		
	5	5	5		0.990			0.534		
	1	5	5		1.092			0.611		
	2	5	5		0.478			0.317		
CARR-20	3	5	5	0	1.094	0.840	0.264	0.552	0.475	0.114
4	4	5	5		0.703			0.423		
	5	5	5		0.833			0.473		
	1	5	5		0.775			0.461		
	2	5	5		0.496			0.335		
CR-21	21 3 5 5	5	8	0.802	0.735 0.147	0.530	0.473	0.099		
4	4	5	3		0.886			0.599		Dev 0.060 0.114
	5	5	5		0.717			0.440		
	1	5	5		0.888			0.535		
SMA-1B-IT2 3	2	5	5		0.802			0.535		
	3	5	5	4	1.066	0.860	0.150	0.590	0.527	0.059
	4	5	5		0.654			0.429		
	5	5	4		0.890			0.546		
	1	5	5		0.926			0.569	0.499	0.066
	2	5	5		0.695		0.140	0.480		
SMA-1B-IT3	3	5	5	0	0.741	0.748		0.496		
	4	5	5		0.826			0.551		
	5	5	5		0.554			0.401		
	1	5	5		0.788			0.499		
	2	5	5		0.704			0.477		
SMA-2C-IT3	3	5	5	0	0.729	0.746	0.032	0.565	0.514	0.033
	4	5	5		0.761			0.513		
	5	5	5		0.746			0.515		Dev 0.060 0.114 0.099 0.059 0.059 0.066 0.033
	1	5	5		0.608			0.362		
	2	5	5]	0.801			0.506]	
SMA-2C-IT6	3	5	5	4	0.839	0.782	0.099	0.438	0.466	0.067
	4	5	5		0.831			0.530]	0.059 0.066 0.033 0.067
	5	5	4		0.832			0.493]	
	1	5	5		0.574			0.375		
	2	5	5		0.844			0.482] [
SMA-2C-IT9	3	5	5	0	0.678	0.695	0.098	0.429	0.429	0.040
	4	5	5	1	0.708			0.449	1	
	5	5	5	1	0.670			0.412	1	

Table 3-5. Test Results for Neanthes arenaceodentata

Treatment		lved O (mg/L) 4.6 mg			mperat (°C) 20 ± 1°(2	Salinity (ppt) 28 ± 2 pp	t	7	pH 7 - 9 units		
	Mean	Min	Max	Mean	Min	Мах	Mean	Min	Max	Mean	Min	Max	
Control	7.4	6.6	7.8	19.7	19.3	20.4	28	27	29	7.8	7.7	8.0	
CARR-20	7.2	6.6	7.7	19.9	19.6	20.6	28	28	29	7.8	7.6	8.0	
CR-21	6.6	5.5	7.4	19.8	19.4	20.5	28	27	29	7.7	7.4	7.9	
SMA-1B-IT2	7.5	7.1	7.7	20.0	19.7	20.6	28	28	29	8.0	7.8	8.1	
SMA-1B-IT3	7.4	7.0	7.7	19.9	19.5	20.4	28	27	29	8.0	7.8	8.1	
SMA-2C-IT3	7.5	7.2	7.7	19.6	19.3	20.1	28	27	28	7.9	7.8	8.0	
SMA-2C-IT6	7.3	6.6	7.7	19.9	19.5	20.5	28	27	28	7.8	7.6	7.9	
SMA-2C-IT9	7.4	7.1	7.7	20.0	19.7	20.6	28	28	29	7.8	7.7	8.0	

Table 3-6. Water Quality Summary for Neanthes arenaceodentata

Table 3-7. Ammonia Summary for Neanthes arenaceodentata

Treatment	Overlying (mg/L ¹ NOEC = 1		Interstitial Ammonia (mg/L Total) ¹ NOEC = 173 mg/L			
	Day 0	Day 20	Day 0	Day 20		
Control	0.00	1.17	0.00	1.79		
CARR-20	0.410	1.36	3.21	NM		
CR-21	0.304	7.50	NM	NM		
SMA-1B-IT2	0.585	0.420	8.75	NM		
SMA-1B-IT3	0.622	0.326	NM	NM		
SMA-2C-IT3	0.282	1.84	NM	NM		
SMA-2C-IT6	0.00	2.77	0.096	NM		
SMA-2C-IT9	0.00	1.44	0.296	1.81		

¹NOEC (concurrent reference-toxicant test derived) = 173 mg/L total ammonia

NM = not measured; insufficient porewater recovered for analysis

Treatment	Overlyinş (mg/L ¹ Trigger Valu		Interstitial Sulfides (mg/L Total) ¹ Trigger Value = 3.4 mg/L			
	Day 0	Day 20	Day 0	Day 20		
Control	0.008	0.001	ND	0.020		
CARR-20	0.014	0.000	0.012	ND		
CR-21	0.017	0.003	ND	0.070		
SMA-1B-IT2	0.007	0.000	0.240	NM		
SMA-1B-IT3	0.011	0.000	NM	NM		
SMA-2C-IT3	0.009	0.001	0.110	NM		
SMA-2C-IT6	0.008	0.003	0.130	ND		
SMA-2C-IT9	0.004	0.001	0.310	0.000		

Table 3-8. Sulfide Summary for Neanthes arenaceodentata

¹Kendall and Barton 2004

ND = not detected; measurement below detection limit

NM = not measured; insufficient porewater recovered for analysis

Test Conditions: PSEP N. arenaceodentata								
Date sampled	September 6 –	- 19, 2018						
Date received	September 6 –							
Test dates	October 3 – 2							
Sample storage conditions	4°C, da							
Days of holding								
Recommended: ≤8 weeks (56 days)	14 – 27 c	lays						
Source of control sediment	Yaquina Ba	ay, OR						
Test Species	Neanthes arena	ceodentata						
Supplier	Aquatic Toxicolo	ogy Support						
Date acquired	September 2	28, 2018						
Age class	Juvenile; 23 - 28 Days	post emergence						
Test Procedures	PSEP 1995 with SMARM rev	visions, SCUM II (2017)						
Test Procedures	SOP No. SED	0009.08						
Test location	EcoAnalysts Port Gar	mble Laboratory						
Test type/duration	20-Day static	renewal						
Control water	North Hood Canal seawa	ter, 0.45μm filtered						
Test dissolved oxygen	Recommended: > 4.6 mg/L	Observed: 5.5 – 7.8 mg/L						
Test temperature	Recommended: 20 ± 1 °C	Observed: 19.3 – 20.6 °C						
Test Salinity	Recommended: 28 ± 2 ppt	Observed: 27 – 29 ppt						
Test pH	Recommended: 7 - 9	Observed: 7.4 – 8.1						
	Recommended: 0.5 - 1.0 mg	0.859 mg (dry weight)						
Initial biomass	Minimum: 0.25 mg	0.760 mg (AFDW)						
	Recommended:	Observed: 0% Pass						
Control Performance Standard	Control < 10% mortality	Observed: 0% Pass						
control Performance Standard	Recommended: ≥ 0.72 mg/ind/day	Observed:						
	Minimum: ≥ 0.38 mg/ind/day	0.808 mg/ind/day; Pass						
	(as Dry Weight)	0.808 mg/ma/day, Fass						
Reference performance standard	Recommended: Mortality ≤20%	0 – 8%; Pass						
(SMS)	$MIG_{Reference}/MIG_{Control} \ge 0.80$	1.039 – 1.044; Pass						
Reference Toxicant LC ₅₀	LC ₅₀ = 197.3	3 mg/l						
(total ammonia)	2030 - 1971							
Mean; Acceptable Range	174.9; 122.5 – 2	249.6 mg/l						
(total ammonia)		_						
NOEC (total ammonia)	173 mg	g/L						
NOEC (unionized ammonia)	2.059 m	-						
Test Lighting	50 – 100 foot							
Test chamber	1-Liter Glass (
Replicates/treatment	5 + 2 surro (one used for WQ measureme							
Organisms/replicate	5							
Exposure volume	175 mL sediment/	775 ml water						
Feeding	40 mg/jar every other day (8							
Water renewal	Water renewed every third day (1/3							
Deviations from Test Protocol	None	•						
	NOTE	•						

Table 3-9. Test Condition Summary for Neanthes arenaceodentata

3.3 Larval Development Bioassay

The larval development test with *M. galloprovincialis* was validated by 0.977 proportion normal survivorship, defined as the mean number of normal larvae within the control divided by the stocking density. This value was within both the SMS acceptability criteria of \geq 0.70. A summary of the test results for all samples is shown in Table 3-10. Summaries of water quality measurements, ammonia and sulfide concentrations, and test conditions are presented in, Table 3-11, Table 3-12, and Table 3-13.

Mean normal survival of the reference sediments were between 0.894 and 0.920 of the control response, which met the SMS reference acceptability criteria (N_R/N_C) of ≥ 0.65 . This is defined as the number of normal larvae in the reference sample(s) divided by the number of normal larvae in the control. The test mean chamber stocking density (measured at test initiation) was 33.6 embryos/mL and was within the test objective of 20 - 40 embryos/mL.

Water quality parameters were within acceptable limits throughout the duration of the test.

A reference-toxicant test (positive control) was performed on the batch of test organisms utilized for this study. The LC_{50} value was within control chart limits (±2 standard deviations from the laboratory historical mean). This result indicates that the test organisms used in this study were of similar sensitivity to those previously tested at EcoAnalysts.

Ammonia concentrations observed in the *M. galloprovincialis* test were below the No Observed Effect Concentration (NOEC) value derived from the concurrent ammonia reference-toxicant test (Table 3-12; compare to NOEC 6.0 mg/L total ammonia). Initial sulfide concentrations were below the trigger value of 0.009 mg/L total sulfides, derived from hydrogen sulfide dissociation (0.0025 mg/L H₂S) and mean water quality data (Inouye 2015). This indicates that ammonia and sulfide concentrations within the sediment samples should not have contributed to any adverse biological effects observed in the test treatments.

Treatment	Rep	Number Normal	Number Abnormal	Mean # Normal (N)	Std. Dev.	Control Normal Survival Nc/I	Reference Normal Survival Relative to Control N _R /N _c	Performance Standard	
	1	345	14						
	2	343	11					≥0.70;	
Control	3	344	11	333.2	15.6	0.977		Meets Criterion	
	4	310	7						
	5	324	12						
	1	250	8						
	2	332	5					≥0.65;	
CARR-20	3	294	6	297.8	33.7		0.894	Meets Criterion	
	4	285	14						
	5	328	9						
	1	264	11						
	2	352	7					≥0.65;	
CR-21	3	298	7	310.4	32.6		0.920	Meets Criterion	
	4	325	6						
	5	313	12				L		
	1	337	6						
	2	274	5						
SMA-1B-IT2	3	316	6	302.2	25.2				
	4	300	3						
	5	284	5						
	1	318	6	320.4					
	2	299	8		10.0				
SMA-1B-IT3	3	336	10		13.6				
	4	324	11						
	5	325	4						
	1	305	10						
	2	342	13	212.0	21.0				
SMA-2C-IT3	3	305	8	313.8	21.0				
	4	289	4			See Section 4.3 for Larval Test Suitabilit			
	5	328	10			see sec		st Suitability	
	1 2	286 318	8 10				Determination		
SMA-2C-IT6	3	286	5	303.6	21.0				
SIVIA-2C-ITO	4	333	5	505.0	21.0				
	4 5	295	11						
	1	293	11						
	2	287	11						
SMA-2C-IT9	3	291	14 7	293.2	9.0				
JIVIA-20-113	4	304	9	233.2	5.0				
	5	304	9						
	1	266	9						
	2	289	11						
		203	11	277.8 18.1					
SN/Δ_1_ST		204	2	277 Q	12 1				
SMA-1-ST	3	304 269	2 13	277.8	18.1				

Table 3-10. Test Results for Mytilus galloprovincialis

Toxicology Testing Results Port Gamble Bay Restoration Monitoring 2018 Port Gamble, Washington

Treatment	Rep	Number Normal	Number Abnormal	Mean # Normal (N)	Std. Dev.	Control Normal Survival N _c /I	Reference Normal Survival Relative to Control N _R /N _c	Performance Standard
	1	328	4					
	2	292	13					
SMA-1A-IT	3	328	10	307.6	18.7			
	4	297	10					
	5	293	11					
	1	323	6					
	2	287	5					
SMA-2A-IT	3	313	7	317.6	18.9			
	4	333	4	-				
	5	332	10					
	1	275	14					
SMA-2A-ST	2	336	11	304.2				
	3	285	6		25.3			
	4	303	8					
	5	322	6					
	1	280	7					
	2	297	10					
SMA-2B-IT	3	318	4	298.0	20.3			
	4	276	10					
	5	319	10					
	1	320	8					
	2	302	12					
SMA-2B-ST	3	277	7	301.2	16.1			
	4	310	5					
	5	297	2					
	1	268	10					
	2	287	30					
BW-15	3	340	21	294.4	29.3			
	4	305	16					
	5	272	19					

I = Mean Initial count (Stocking density); 336

N_c = Mean Control Normal

N_R = Mean Reference Normal

Treatment		lved Ox (mg/L) 5.0 mg/			mperatı (°C) 16± 1°C			Salinity (ppt) 8 ± 1 pp		7	pH 7 - 9 units		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	
Control	7.6	7.5	7.7	16.7	16.5	16.9	28	28	28	7.8	7.7	7.8	
CARR-20	6.8	6.2	7.5	16.6	16.5	16.8	28	28	28	7.7	7.6	7.7	
CR-21	6.7	6.5	7.0	16.6	16.4	16.8	28	28	28	7.7	7.6	7.7	
SMA-1B-IT2	7.1	6.9	7.3	16.7	16.5	16.8	28	28	28	7.7	7.7	7.7	
SMA-1B-IT3	7.2	7.0	7.7	16.8	16.5	17.0	28	28	28	7.7	7.7	7.7	
SMA-2C-IT3	7.2	7.1	7.5	16.6	16.4	16.9	28	28	28	7.7	7.7	7.7	
SMA-2C-IT6	7.4	7.2	7.6	16.8	16.4	17.0	28	27	28	7.7	7.7	7.8	
SMA-2C-IT9	7.6	7.4	7.7	16.6	16.5	16.7	28	28	28	7.8	7.7	7.8	
SMA-1-ST	6.3	5.7	6.9	16.8	16.6	16.9	28	28	28	7.7	7.6	7.7	
SMA-1A-IT	6.1	5.7	6.7	16.8	16.7	17.0	28	28	28	7.7	7.7	7.7	
SMA-2A-IT	6.8	6.4	7.4	16.9	16.7	17.0	28	28	28	7.7	7.7	7.7	
SMA-2A-ST	6.7	6.4	7.4	16.7	16.3	17.0	28	28	28	7.7	7.6	7.7	
SMA-2B-IT	6.0	5.7	6.5	16.7	16.4	16.8	28	28	28	7.7	7.6	7.7	
SMA-2B-ST	7.1	6.9	7.4	16.7	16.5	16.9	28	28	28	7.7	7.7	7.7	
BW-15	6.6	6.1	7.4	16.6	16.3	16.8	28	28	28	7.7	7.6	7.7	

 Table 3-11. Water Quality Summary for Mytilus galloprovincialis

Treatment	Overlying (mg/L ¹ NOEC =	Total)	Overlying Sulfides (mg/L Total) ² Trigger Value = 0.009 mg/L			
	Day 0	Final (Day 2)	Day 0	Final (Day 2)		
Control	0.00	0.00	ND	0.002		
CARR-20	0.00	0.00	0.008	0.005		
CR-21	0.00	0.00	0.004	0.002		
SMA-1B-IT2	0.00	0.00	ND	0.007		
SMA-1B-IT3	0.00	0.00	0.002	0.003		
SMA-2C-IT3	0.00	0.00	0.001	ND		
SMA-2C-IT6	0.00	0.00	ND	0.003		
SMA-2C-IT9	0.00	0.00	0.000	ND		
SMA-1-ST	0.00	0.00	0.005	0.003		
SMA-1A-IT	0.00	0.00	ND	0.001		
SMA-2A-IT	0.00	0.00	ND	0.002		
SMA-2A-ST	0.00	0.00	ND	0.001		
SMA-2B-IT	0.00	0.00	0.004	0.006		
SMA-2B-ST	0.00	0.00	0.007	ND		
BW-15	0.00	0.00	0.005	0.004		

Table 3-12. Ammonia and Sulfide Summary	for Mytilus galloprovincialis
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¹NOEC (concurrent reference-toxicant test derived) = 6.0 mg/L total ammonia

²Inouye 2015: Total sulfide value 0.009 mg/L derived from hydrogen sulfide dissociation (0.0025 mg/L H₂S @ 16°C, 28 ppt, and 7.7 pH) ND = Non-detect

Test Co	nditions: PSEP M. galloprovincialis					
Date sampled	September 6	– 19, 2018				
Date received	September 6					
Test dates	October 3					
Sample storage conditions	4°C, 0					
Holding time	44.27	2				
Recommended: < 8 weeks (56 days)	14 – 27 Days					
Test Species	Mytilus gallo	provincialis				
Supplier	Taylor Shellfish	, Shelton, Wa				
Date acquired	October	2, 2018				
Age class	<4-h old e	embryos				
Test Procedures	PSEP 1995 with SMARM r SOP No. SE					
Test location	EcoAnalysts Port Ga	amble Laboratory				
Test type/duration	48-60 Hour static test	(Actual: 48.5 hours)				
Control water	North Hood Canal sea v	vater, 0.45µm filtered				
Test dissolved oxygen	Recommended: >5.0 mg/L	Observed: 5.7 – 7.7 mg/L				
Test temperature	Recommended: 16 \pm 1 °C	Observed: 16.3 – 17.0 °C				
Test Salinity	Recommended: 28 ± 1 ppt	Observed: 27 – 28 ppt				
Test pH	Recommended: 7 - 9	Observed: 7.6 – 7.8				
Stocking Density	Recommended: 20 – 40 embryos/mL	Observed: 33.6 embryos/mL				
Control performance standard (SMS)	Recommended: Control normal survival ≥ 0.70	Observed: 0.977 Pass				
Reference performance standard (SMS)	Recommended: Reference normal survival relative to control ≥ 0.65	Observed: 0.894 – 0.920; Pass				
Reference Toxicant	Total Ammonia	Unionized Ammonia				
Reference Toxicant EC50 (total ammonia)	EC ₅₀ = 8.20 mg/L	EC ₅₀ = 0.106 mg/L				
Mean; Acceptable Range (total ammonia)	6.81; 3.38 – 13.71 mg/L	0.111; 0.049 – 0.252 mg/L				
NOEC Combined proportion normal (total ammonia)	6.0 mg/L	0.086 mg/L				
Test Lighting	50 – 100 foo	ot candles				
Test chamber	1-Liter Glass					
Replicates/treatment	5 + 1 surrogate (used for WQ mea					
Exposure volume	18 g sediment/					
Feeding	Nor					
Water renewal	Nor					
Deviations from Test Protocol	Nor					

Table 3-13. Test Condition Summary for Mytilus galloprovincialis

4. DISCUSSION

Sediments were evaluated based on Sediment Management Standards (SMS) criteria. The biological criteria are based on both statistical significance (a statistical comparison) and the degree of biological response (a numerical comparison). The SMS criteria are derived from the Washington Department of Ecology's Sediment Cleanup User's Manual II (SCUM II; WDOE 2017). Comparisons were made for each treatment against the reference sample. Two numerical comparisons were made under SMS, the Sediment Cleanup Objective (SCO) and the Cleanup Screening Level (CSL).

4.1 Amphipod Test Suitability Determination

Under the SMS program, a treatment will fail SCO if mean mortality in the test sediment relative to the reference sediment is >25% and the difference between mean mortality in the treatment compared to mean mortality in the reference is statistically significant (p < 0.05). Treatments fail the CSL if mean mortality in the test treatment >30% relative to the reference sediment and the difference is statistically significant.

Project sediments from the Port Gamble Bay restoration site do not fail the SCO and CSL criteria for the amphipod test as shown in Table 4-1.

Treatment	Mean Mortality (%)	Compared To:	Statistically Different than Reference? (P=0.05)	Mortality Comparison to Reference MT-MR (%)	Fails SCO? ¹ > 25 %	Fails CSL? ² > 30 %
Control	4					
CARR-20	4					
CR-21	2					
SMA-1B-IT2	7					
SMA-1B-IT3	15	CR-21	No	13	No	No
SMA-2C-IT3	10	CR-21	No	8	No	No
SMA-2C-IT6	1	CR-21	No	1	No	No
SMA-2C-IT9	4	CR-21	No	2	No	No

 $^1SCO:$ Statistical Significance and $M_T\!>\!\!25\%$

²CSL: Statistical Significance and M_T - M_R >30%

M_T = Treatment Mortality

M_R = Reference Mortality

4.2 Juvenile Polychaete Test Suitability Determination

Suitability determinations for the juvenile polychaete test were based on mean individual growth (MIG). A test treatment fails SCO criteria if MIG is statistically lower in the test treatment, relative to the reference, and the ratio of the MIG in the test treatment is <0.70 that of the reference. The treatments will fail CSL criteria if the MIG is significantly lower than the reference treatment and the ratio between the MIG of the treatment and the MIG of the reference is <0.50.

All Port Gamble Bay project sediments pass the SCO and CSL criteria when evaluated on a dry weight and AFDW basis (Table 4-2).

Treatment	MIG (mg/ind/day)	Comparison To:	Statistically Less than Reference? (p=0.05)	MIG Relative to Reference MIG _T /MIG _R	Fails SCO? ¹ < 0.70	Fails CSL? ² < 0.50					
Dry Weight											
Control	0.808										
CARR-20	0.840										
CR-21	0.735										
SMA-1B-IT2	0.860	CR-21	No	1.17	No	No					
SMA-1B-IT3	0.748	CR-21	No	1.02	No	No					
SMA-2C-IT3	0.746	CR-21	No	1.01 No		No					
SMA-2C-IT6	0.782	CR-21	No	No 1.06		No					
SMA-2C-IT9	MA-2C-IT9 0.695		No	0.95	No	No					
Ash-Free Dry Weight											
Control	0.455										
CARR-20	0.475										
CR-21	0.473										
SMA-1B-IT2	0.527	CR-21	No	1.11	No	No					
SMA-1B-IT3	0.499	CR-21	No	1.06	No	No					
SMA-2C-IT3	A-2C-IT3 0.514		No	1.09	No	No					
SMA-2C-IT6	0.466	CR-21	No	0.98	No	No					
SMA-2C-IT9 0.429		CR-21	No	0.91	No	No					

Table 4-2. SMS Comparison for Neanthes arenaceodentata

 $^1SCO:$ Statistical Significance and $\rm MIG_T/MIG_R{<}0.70$

 $^2\text{CSL}:$ Statistical Significance and $\text{MIG}_{T}/\text{MIG}_{R}$ <0.50

 MIG_T = Treatment Mean Individual Growth

MIG_R = Reference Mean Individual Growth

4.3 Larval Test Suitability Determination

Larval test treatments fail SCO criteria if the number of normal larvae in the test treatment is significantly lower (p < 0.10) than that of the reference and if the ratio between the normal larval development in the test treatment is less than 0.85 of the normal development in the reference. Treatments fail CSL criteria if the number of normal larvae in the test treatment is significantly lower (p < 0.10) than that of the reference and if the ratio between the normal development in the test treatment is significantly lower (p < 0.10) than that of the reference and if the ratio between the normal larval development in the test treatment is less than 0.70 of the normal development in the reference.

All Port Gamble Bay project sediments pass both the SCO and CSL criteria for larval bivalve development evaluation (Table 4-3).

Treatment	Mean Normal Survival (%) ¹	Mean Number Normal	Compared To:	Statistically Less than Reference? (p=0.10)	Normal Survival to Reference NT/NR	Fails SCO? ² <0.85	Fails CSL? ³ <0.70
Control	97.7	333.2					
CARR-20	89.4	297.8					
CR-21	92.0	310.4					
SMA-1B-IT2	90.5	302.2	CR-21	No	0.97	No	No
SMA-1B-IT3	MA-2C-IT3 93.6 MA-2C-IT6 91.1	320.4	CR-21	No	1.03	No	No
SMA-2C-IT3		313.8	CR-21	No	1.01	No	No
SMA-2C-IT6		303.6	CR-21	No	0.98	No	No
SMA-2C-IT9		293.2	CR-21	No	0.94	No	No
SMA-1-ST	83.4	277.8	CR-21	Yes	0.89	No	No
SMA-1A-IT	92.3	307.6	CR-21	No	0.99	No	No
SMA-2A-IT	95.3	317.6	CR-21	No	1.02	No	No
SMA-2A-ST	91.1	304.2	CR-21	No	0.98	No	No
SMA-2B-IT	89.4	298.0	CR-21	No	0.96	No	No
SMA-2B-ST	90.4	301.2	CR-21	No	0.97	No	No
BW-15	87.9	294.4	CARR-20	No	0.99	No	No

Table 4-3. SMS Comparison for *Mytilus galloprovincialis*

¹ Control data is normalized to the stocking density; reference and project treatments are normalized to the control

 2 SCO: Statistical Significance and (N_T/N_R) <0.85

 3 CSL: Statistical Significance and (N_T/N_R) <0.70

 N_{T} =Treatment Mean Number Normal

 N_R =Reference Mean Number Normal

Nc =Control Mean Number Normal

5. SUMMARY

A summary of the biological tests conducted on the Port Gamble Bay restoration site sediments evaluated under the SMS sediment quality criteria (Table 5-1) are provided below.

All project sediments pass the SCO and CSL performance criteria for all tests performed on the Port Gamble Bay restoration site sediments.

Treatment	Sedime	nt Cleanup Ob	jectives	Cleanup Screening Levels				
freatment	Amphipod	Polychaete	Larval	Amphipod	Polychaete	Larval		
SMA-1B-IT2	Pass	Pass	Pass	Pass	Pass	Pass		
SMA-1B-IT3	Pass	Pass	Pass	Pass	Pass	Pass		
SMA-2C-IT3	Pass	Pass	Pass	Pass	Pass	Pass		
SMA-2C-IT6	Pass	Pass	Pass	Pass	Pass	Pass		
SMA-2C-IT9	Pass	Pass	Pass	Pass	Pass	Pass		
SMA-1-ST			Pass			Pass		
SMA-1A-IT			Pass			Pass		
SMA-2A-IT			Pass			Pass		
SMA-2A-ST			Pass			Pass		
SMA-2B-IT			Pass			Pass		
SMA-2B-ST			Pass			Pass		
BW-15			Pass			Pass		

Table 5-1. Summary of SMS Evaluation

*Shaded cells represent tests not conducted as part of the test design

6. **REFERENCES**

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 December 2017

APPENDIX A. TEST AND REFERENCE TOXICANT TEST RESULTS

- 1. Eohaustorius estuarius 10-Day Test
- 2. Neanthes arenaceodentata 20-Day Test
- 3. Mytilus galloprovincialis Bivalve Larval Test

APPENDIX B. STATISTICAL COMPARISONS

STATISTICAL RESULTS: *EOHAUSTORIUS ESTUARIUS* TEST STATISTICAL RESULTS: *NEANTHES ARENACEODENTATA* TEST STATISTICAL RESULTS: *MYTILUS GALLOPROVNICIALIS* LARVAL TEST

APPENDIX C.CHAIN-OF-CUSTODY LOGS

APPENDIX A. TEST AND REFERENCE TOXICANT TEST RESULTS

1. Eohaustorius estuarius 10-Day Test

Eco Analysts

10 DAY SOLID PHASE TEST DATA

	CLIENT		F	ROJE	CT	JOB	N0.	PI	ROJECT MA	N. LABO	DRATORY	PROTO	COL SI	PECIES	
	Anchor QEA	Port (Gamble Monitoring PG1123				Brian Hester Port Gamble /			PSEI	PSEP 1995 Eohaustorius estuarius				
ENDPOINT DATA & OBSERVATIONS								T							
#M= Nu L=Anox	#S≃ Number on the Surface #M= Number of Mortality				DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10	୍ର ଅ
	L=Anoxic Surface F=Fungal Patches	Inface tches w (DO?)			DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	N
	D=No Air Flow (DO?) U=Excess food			10/10/18	10/11	10/12	10/13	10/14	10/15	10/14	10/17	10/18	10101	EM/	
	N=Normal B=No Burrows		7-0	1	TECHNICIAN	TECHNICIAN	TECHNICIAN	TECHNICIAN	TECHNICIAN	TECHNICIAN	TECHNICIAN	TECHNICIAN	TECHNICIAN		R R R
					VO	SW	29	M	MK	Sw)	SW	5W	MK	82	NUMBER REMAINING
	Sample ID	REP	JAR #	#	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	NUN
*		1			N	N	2	N	N	2	N	2	Ν	N	19
		2			1	1	1	1	1	1	1		1	1	19
	Control /	3													20
		4													18
		5			J	L	V			4	1	4		+	20
F		1			Ν	N	N			N	N	ン		\mathcal{N}	18
		2					1				l í	1			20
	CARR-20 /	3											1		19
		4											· /		20
		5			J	1	ý			4	L	1		4	19
		1			55	45	N			N	N	\sim		N	20
[. . 		2			2	N	(ſ	1	ì		1	[9
	CR-21 /	3			[N									20
	662."	4				2 S	,						•		20
		5			V	\sim	\mathbf{V}			7	1	L		+	19
Ī		1			N	\sim	N			N	N	N		\sim	15
		2)	1	15			1	1	1		ſ	19
	SMA-1B-IT2 /	3					N								19
		4					1								20
		5			J	T	V	V	Y	7	T	J	7	\downarrow	20

Eco Analysts

	CLIENT		F	PROJE		JOB		1	ROJECT MA		ORATORY	PROTO	COL S	PECIES		
	Anchor QEA			Port (Gamble Moni	toring	PG1123		Brian Hes		ort Gamble /	PSE	P 1995 E	ohaustorius e	estuarius	
						1		1	SERVATION	1	1	1	·····	······	-	
	#S= Number on the Surface #M= Number of Mortality				DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10	В	
	L=Anoxic Surface F=Fungal Patches				DATE	DATE	DATE	DATE	DATE	DATE		DATE	DATE	DATE	AIN	
	D≕No Ăir Flow (DO?) U=Excess food		NITIAL # O		10/18	10/11	61/21	10/13	10/14	10/15	10/16	10/17	10/18	10/19	E M	
	N=Normal B=No Burrows		20		TECHNICIAN		TECHNICIAN				TECHNICIAN	TECHNICIAN	TECHNICIAN		R. F.	
		REP	JAR	INITIAL	WB	ક્ષ્પ્ર	29	Me	WK	EN)	82	Ŵ	MK	€N N	NUMBER REMAINING	
	Sample ID	REP	#	#	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	OBSERVNS.	Z Z	
, some	_	1			Ň	2\$	N	N	N	N	N	N	N	N	16, M	
		2				N	<u> </u>	15	<u> </u>	18	N				16	Zm
	SMA-1B-IT3 /	3				<u> </u>	.	Ν		N	18				16	1~
		4					ļ			<u> </u>	N				19	
		5			V	đ	V			+	N	15		-	18	m
		1			15	N			V	N	N	N		N	18	m
		2			N	N	_		lS		<u> </u>	N			17	
	SMA-2C-IT3 /	3				15			N			١S			17	lm
		4				N						N			20	
		5			V	\sim	V			d	4	N		4	18,1M	
		1			Ņ	\sim	\sim			N	N	\sim		N	20	
, I		2													20	
ý I	SMA-2C-IT6 /	3													20	
		4													20	
		5			¥		Ψ			t	al .	4			19	
		1			N	\mathbb{N}	N			N	Ņ	N		Ν	17	
		2													20	
	SMA-2C-IT9 /	3													19	
		4			·····										20	
		5			\checkmark	ð	Ņ		∇	4	4	4	1	d	20	



CLIENT Anch	nor QEA	PR	OJEC Port	-	le Monitoring	SPEC Eo	l ES haustorius estua	arius	TEST START I	DATE Samble	TEST	START DATE 09Oct18	TEST END DATE 19Oct18
IOB NUMBER PG	61123	PR	OJEC		IAGER Hester	LABC	PRATORY Port Gamble /		DILUTION WA FSW10				
					D.O. (mg/L)	T	WATER QU		DATA ALINITY (ppt)				
	ST CONDITIONS	DAY	REP		>5.1 D.O.		15 ± 1 TEMP	<u> </u>	28 ± 2 SALINITY	q 	H (pH units) 7 - 9 pH	ТЕСН.	Date
Cor	ntrol /	0	1	meter	mg/L მ.3	meter	°C	meter		meter	unit		
·····	ntrol /	0	2			0	15.3	5	27	8	8.0	MK	10/9/18
·····	·····				8.4		15.2		27		8.0		
	ntrol /	0	3		B.3		15.7		27		g.o		
	ntrol /	0	4		8.4		15.2		27		B. 0		
Cor	ntrol /	0	5	J	8.3	4	15.3		27	4	8.0	Ą	đ
Cor	ntrol /	1	Surr	४	8.3	8	15.3	8	28	8	7.8	us	10/10
Cor	ntrol /	2	Surr	8	8,2	8	15.4	8	28	8	7.9	MAOLU	10/11
Cor	ntrol /	3	Surr	8	8.1	8	15.5	ક્ર	28	8	7.9	RE	10/12
Cor	ntrol /	4	Surr	в	() 8,0.8.5	8	15.1	Ø	28	B	8.0	MK	Lolia
Cor	ntrol /	5	Surr	8	8:4	8	15.3	8	28	8	8.0	MK	10/14
Con	ntrol /	6	Surr	8	8.4	8	15.2	8	27	8	7.9	8W	10/15
Con	ntrol /	7	Surr	8	8,4	8	15.2	8	27	8	8.0		10/16
Con	itrol /	8	Surr	8	8.4	8	15.2	8	21	8	7.9	SW	10/17
Con	itrol /	9	Surr	в	в.5	в	15.1	в	28	в	7.9	JL	10/18
Con	trol /	10	1	S	903	¥	15,4	8	27	8	4.0	fr	10/19
Con	trol /	10	2	(8.3		15.21	Í	28	ſ	8.0		
Con	trol /	10	3		9,13		15.5		28		8.0		/
Con	trol /	10	4		6.3		15.4		28		8.0		
Con	trol /	10	5		8.3	V	15.3	\mathbf{V}	27	$\forall \uparrow$	8.0	0	

QWC. MK 10/13.

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CLIENT Anchor QEA	PF	ROJE(Port		ble Monitoring	SPE0	CIES bhaustorius estu	iarius	TEST START Port (D ATE Gamble		START DATE 1 09Oct18	EST END DATE 19Oct18
JOB NUMBER PG1123	PF	ROJEC		NAGER I Hester	LABO	DRATORY Port Gamble	/	DILUTION WA	TER B , 00518.0			
			1			WATER QL						
TEST CONDITIONS				D.O. (mg/L) >5.1		TEMP (°C) 15 ± 1	s	ALINITY (ppt) 28 ± 2	þ	oH (pH units) 7 - 9		
SAMPLE ID	DA	Y REP	mete	D.O. r mg/L	meter	TEMP °C	mete	SALINITY r ppt	meter	рН	TECH.	Date
CARR-20 /	0	1	в	8.4	8	[5,]	β	27	8	8.0	MK	087 10/a/1B
CARR-20 /	0	2		8.4		15.2	ŤŤ	27	ĨĬ	8.0		087-10/9/18
CARR-20 /	0	3		8.2		15.4		27	┨┼╴	8.0		
CARR-20 /	0	4		8.3		15,4		27		8.0		
CARR-20 /	0	5	J	8.3	2	15.4		27		8.0		
CARR-20 /	1	Surr	8	8.3	8	15,5	8	28	8	7.8	w	10/10
CARR-20 /	2	Surr	8	8.6	8	15.8	8	28	8	7.9	MAO24	10/11
CARR-20 /	3	Surr	8	8.7	8	15.6	8	78	0 B	7.9	RE	10/17
CARR-20 /	4	Surr	ß	8.5	Ø	15,2	B	UB VB	8	8.0	MK	
CARR-20 /	5	Surr	8	8.3	8	15.4	8	28	8	8.0	MK	10/13
CARR-20 /	6	Surr	8	8.3	8	15.4	8	27	8	8.D	SW SW	10/14 10/15
CARR-20/	7	Surr	8	8.2	8	15.4	8	27	8	8.0	FW	10/10
CARR-20 /	8	Surr	8	8.3	8	15.3	8	27	8	8.0		10/17
CARR-20 /	9	Surr	B	8.3	в	LS.2	B	27	B	B.O	 	10/18
CARR-20 /	10	1	43	8.0	8	15.Ce	8	27	8	8.2	1	10/19
CARR-20 /	10	2	1	8.3		15.4	1	28	1	8,2		1
CARR-20 /	10	3		6.2		15.5		27	┣─┼╂	8.2		
CARR-20 /	10	4	1 - Constant of the second sec	8.3		15.5		27	╞╶┼╼╂	8.1		
CARR-20 /	10	5	Y	8.3	\checkmark	15.4	1	28	V T	8.2		

OWC. MK 10/9.



CLIENT Anchor QEA	PR	DJEC		e Monitoring	SPEC	CIES haustorius estua	riuc	TEST START D	DATE Samble	TEST S	TART DATE TI 09Oct18	EST END DATE 19Oct18
JOB NUMBER	PR		T MAN	•		RATORY	inus	DILUTION WA		TCH PROTO		190018
PG1123			Brian I			Port Gamble /		FSW10			PSEP 1995	
			Г г).O. (mg/L)	1	WATER QUA		DATA ALINITY (ppt)	T			
TEST CONDITIONS			L	>5.1		15 ± 1	- ³	28 ± 2		H (pH units) 7 - 9	TECH.	Date
SAMPLE ID	DAY	REP	meter	D.O. mg/L	meter	TEMP °C	meter	SALINITY ppt	meter	pH unit	reon.	Date
CR-21 /	0	1	8	8.3	8	15.3	g	27	8	8.0	MK	10/9/18
CR-21 /	0	2		8.1		15.2		27		7.6	5	
CR-21 /	0	3		8.3		15.5		27		7.9		
CR-21 /	0	4		6.2		15.2		27		7.C		
CR-21 /	0	5	J	8.3	L.	15.3		27	A	<i>8.0</i>	Ý	1
CR-21 /	1	Surr	8	8.4	8	15.1	8	28	8	79	ws	10/10
CR-21 /	2	Surr	8	8.3	8	15.4	8	28	8	8-0	MAR24	10/11
CR-21 /	3	Surr	Z	8.2	в	15.4	g	28	8	7.9	Re	10/12
CR-21 /	4	Surr	9	8.4	в	15,1	8	rb	6	B.1	MK	10/13
CR-21 /	5	Surr	8	8.1	8	15.3	8	28	8	8.2	MK	10/14
CR-21 /	6	Surr	8	8.3	8	15.3	8	28	8	8.2	SN .	10/15
CR-21 /	7	Surr	8	8.3	8	15.3	8	28	8	8.3	8W	10/16
CR-21 /	8	Surr	8	8.2	8	15.2	8	28	8	8.3	ନ୍ୟ	10/17
CR-21 /	9	Surr	в	8.3	ક	15.1	B	28	в	8.3	K	10/1B
CR-21 /	10	1	8	8,3	Ş	15.5	8	27	8	8.3	Ve	10/19
CR-21 /	10	2		8-3	ſ	,5.4		28		8,4	1	
CR-21 /	10	3		8.2		15,2		28		8.4		
CR-21 /	10	4		8.3		15.3		28		9.3		
CR-21 /	10	5	6	8.3	2	15,4	\downarrow	28	V	8.3		4



CLIENT Anchor QEA	PR	OJEC		e Monitoring	SPEC	IES haustorius estua	riuo	TEST START D	DATE Samble	TEST S		ST END DATE
JOB NUMBER	PR					RATORY	mus	DILUTION WA		TCH PROTO	09Oct18	19Oct18
PG1123				Hester		Port Gamble /		FSW10			PSEP 1995	
					-	WATER QU						
TEST CONDITIONS				D.O. (mg/L) >5.1		TEMP (°C) 15 ± 1	S	ALINITY (ppt) 28 ± 2	p	H (pH units) 7 - 9		
SAMPLE ID	DAY	REP	meter	D.O. mg/L	meter	TEMP °C	meter	SALINITY ppt	meter	pH unit	TECH.	Date
SMA-1B-IT2 /	0	1	в	7.8	8	15,4	e	27		7.9	MK	10/9/18
SMA-1B-IT2 /	0	2		8.3	†Ť	15.4	Ť	27	Ĭ	8.0		1
SMA-1B-IT2 /	0	3		8,4		15.3		27		B,D		
SMA-1B-IT2 /	0	4		8.4		15.2		27		8.0		
SMA-1B-IT2 /	0	5	Ţ	8.1	2	15.4	J	27	J	8.0		
SMA-1B-IT2 /	1	Surr	8	8.4	8	15.4	8	27	४	7.8	WB	10/10
SMA-1B-IT2 /	2	Surr	8	8.3	8	15.6	8	28	8	0,8	Mart	10/11
SMA-1B-IT2 /	3	Surr	В	8.4	8	15.4	8	28	8	7.9	RE	10/12
SMA-1B-IT2 /	4	Surr	в	8.5	θ	15.2	в	28	в	B.U	MK	10/13
SMA-1B-IT2 /	5	Surr	8	8.5	8	15.3	8	28	8	8.0	MK	10/14
SMA-1B-IT2 /	6	Surr	8	8.4	8	15.3	8	27	8	8.0	SW	10/15
SMA-1B-IT2 /	7	Surr	8	8.3	8	15.3	8	27	8	8.0	s)	10/16
SMA-1B-IT2 /	8	Surr	8	8.5	8	15.3	8	27	8	0- 8	ŝ	10/17
SMA-1B-IT2 /	9	Surr	ଟ	8.5	ક	15.3	Ŷ	27	Q	8.0	K	10/18
SMA-1B-IT2 /	10	1	8	7.2	8	15.7	8	27	8	8.1	V	10/19
SMA-1B-IT2 /	10	2	ſ	8.3		15.6	-	27	1	8.0		/
SMA-1B-IT2 /	10	3	and the second second	8.3		15.3	a source of the second s	28	A CONTRACTOR	8.1		
SMA-1B-IT2 /	10	4		8.3	and the second second second	15.4	Werk man-pain	27	With the party starter	8.0		
SMA-1B-IT2 /	10	5	\checkmark	8-2	\checkmark	15.3	4	28	6	8.	\downarrow	L.



CLIENT Anchor QEA	PRO	OJEC Port		e Monitoring	SPEC	l ES haustorius estua	rius	TEST START D Port G		TEST	09Oct18	TEST END DATE 19Oct18
JOB NUMBER	PRO		T MAN	Ű	1	RATORY	-	DILUTION WAT	ER BA	TCH PROTO	DCOL	
PG1123			Brian	Hester		Port Gamble /		FSW100	0518.01		PSEP 1995	
					_	WATER QUA						
TEST CONDITIONS	;			0.0. (mg/L) >5.1		TEMP (°C) 15 ± 1	S/	ALINITY (ppt) 28 ± 2	pl	H (pH units) 7 - 9	TECH.	Date
SAMPLE ID	DAY	REP	meter	D.O. mg/L	meter	TEMP °C	meter	SALINITY ppt	meter	pH unit		Date
SMA-1B-IT3 /	0	1	e	β.3	8	15.2	B	27	B	B.O	MK	10/9/18
SMA-1B-IT3 /	0	2		<u>в.ч</u>		15.2		27	- T	8.0		1
SMA-1B-IT3 /	0	3		8.4		15.3		27		8.0		
SMA-1B-IT3 /	0	4		B.3		15.2		27		B-0		
SMA-1B-IT3 /	0	5	J	8.2	1	15.4	J	27	J	8.0		
SMA-1B-IT3 /	1	Surr	8	8.4	ষ্ঠ	15,2	8	28	б	7,9	US	10/10
SMA-1B-IT3 /	2	Surr	8	8.4	8	15.4	8	28	8	8.0	MARLY	10/11
SMA-1B-IT3 /	3	Surr	в	8.2	B	15.5	8	28	8	7.9	RE	10/12
SMA-1B-IT3 /	4	Surr	g	8.5	8	15.2	8	28	B	8.1	MK	10/13
SMA-1B-IT3 /	5	Surr	8	8.5	8	15.2	8	28	8	8.1	MK	10/14
SMA-1B-IT3 /	6	Surr	8	8.4	8	15.2	8	27	8	8.1	5~	10/15
SMA-1B-IT3 /	7	Surr	8	8.2	8	15.3	8	27	8	8.1	ณ	10/16
SMA-1B-IT3 /	8	Surr	8	8.4	8	15.2	8	28	8	8.1	82	10/17
SMA-1B-IT3 /	9	Surr	В	8.5	в	15.1	в	28	3	8.1	UL	10/18
SMA-1B-IT3 /	10	1	8	8.2	8	15.4	8	28	8	8.2	sh	10/19
SMA-1B-IT3 /	10	2	ſ	8.3		15.2		27		8.2		/
SMA-1B-IT3 /	10	3		8.4		15.2		28		8.3		
SMA-1B-IT3 /	10	4		4,i		15.2		28		8.2		
SMA-1B-IT3 /	10	5	¥9	8.3	\checkmark	15.6	V	27	1	8. (4	Ļ



CLIENT Anchor QEA	P	ROJ P			le Monitoring	SPEC Ec	CIES haustorius estua	arius	TEST START I	DATE Gamble	TEST	START DATE 1 09Oct18	TEST END DATE 19Oct18
JOB NUMBER PG1123	P	ROJ			IAGER Hester	LABC	Port Gamble /		DILUTION WA		· · · · · ·	DCOL PSEP 1995	
							WATER QU	ALITY	DATA				
TEST CONDITIONS					D.O. (mg/L) >5.1		TEMP (°C) 15 ± 1	S	ALINITY (ppt) 28 ± 2	р	H (pH units) 7 - 9		
SAMPLE ID	D	AY R	EP	meter	D.O.	meter	TEMP	meter	SALINITY	meter	рН	TECH.	Date
SMA-2C-IT3 /		0	1	в	8.3	в	15.3	β	27	в	8.0	MK	10/9/18
SMA-2C-IT3 /		0	2		B.3		15.3		27		8.0		
SMA-2C-IT3 /		0	3		B.2		15.4		27		8.0		
SMA-2C-IT3 /	()	4		8.3		15.3		27		B.0		
SMA-2C-IT3 /	(0	5	ſ	8.3	٦	15.4	1	27	\checkmark	8.0	ļ	4
SMA-2C-IT3 /		I S	urr	8	6.3	8	15.3	8	27	ъ	7.9	VB	10/10
SMA-2C-IT3 /	2	2 S	urr	8	8.4	8	15.4	8	28	8	8-0	MARIE	10/11
SMA-2C-IT3 /	3	3 S	urr	8	B.J	8	15.5	8	98	8	7.9	RE	[0]]
SMA-2C-IT3 /	4	s s	ırı	в	g.5	8	15.1	8	28	в	Bil	MK	10/13
SMA-2C-IT3 /	5	S St	ırr	8	8.3	8	15.3	8	28	8	8.1	MK	10/14
SMA-2C-IT3 /	6	SI	ırr	8	8.4	8	15.3	8	27	8	8.0	ちょう	10/15
SMA-2C-IT3 /	7	Su	ırr	8	8.3	8	15.3	8	27	8	8.1	8~	10/16
SMA-2C-IT3 /	8	SL	ırr	8	8.4	8	15.2	8	27	8	8.0	5W	10/17
SMA-2C-IT3 /	9	S	ILL 1	9	8.4	G	15.3	Я	27	3	7.9	L	10/18
SMA-2C-IT3 /	10) 1		-F	8.3	8	15,3	8	27	8	8.2	×	15/19
SMA-2C-IT3 /	10) 2		1	8.3		15.3)	28	1	8.1	1	
SMA-2C-IT3 /	10	3 3			8.4		15.3		27		5.2		/
SMA-2C-IT3 /	10) 4		V	S. 3		15.3		27		8.1		
SMA-2C-IT3 /	10	5		V I	8.2	V	15.4	V	27	Y	8, (J	



CLIENT Anchor QEA	PRO	DJEC		e Monitoring	SPEC	IES haustorius estua	rius	TEST START D Port G		TEST S	TART DATE TE	ST END DATE 19Oct18
JOB NUMBER	PRO		T MAN	0		RATORY		DILUTION WAT		TCH PROTO		
PG1123			Brian I	Hester		Port Gamble /		FSW10	0518.01		PSEP 1995	
						WATER QUA						
TEST CONDITIONS).O. (mg/L) >5.1		TEMP (°C) 15 ± 1	S/	28 ± 2	р	H (pH units) 7 - 9	TECH.	Dete
SAMPLE ID	DAY	REP	meter	D.O. mg/L	meter	°C	meter	SALINITY ppt	meter	pH unit	TECH.	Date
SMA-2C-IT6 /	0	1	в	B.3	8	15.3	в	27	B	8.0	MK	10/9/18
SMA-2C-IT6 /	0	2	Ť	8.3		15.4	ſ	27		8.0		1
SMA-2C-IT6 /	0	3		8.3		15.2		27		B.O		
SMA-2C-IT6 /	0	4		8.3		15.4		27		g.0		
SMA-2C-IT6 /	0	5	Ľ	в.З	J	15.3	1	27	1	8.0	Ļ	4
SMA-2C-IT6 /	1	Surr	8	8.4	8	15.3	8	27	४	7.8	UB	10/10
SMA-2C-IT6 /	2	Surr	8	8.4	8	15.4	8	28	8	7.9	MARY	20/11
SMA-2C-IT6 /	3	Surr	в	8.4	8	15.3	8	28	g	7.9	RE	10/12
SMA-2C-IT6 /	4	Surr	в	B.5	8	15.3	8	VB	8	B,O	MK	10/13
SMA-2C-IT6 /	5	Surr	8	8.5	8	15.2	8	28	8	8.0	MK	10/14
SMA-2C-IT6 /	6	Surr	8	8.5	8	15.2	8	27	8	0.8	Sh)	10/15
SMA-2C-IT6 /	7	Surr	8	8.4	8	15.2	8	27	8	8.0	RV	10/14
SMA-2C-IT6 /	8	Surr	8	8.6	8	15.2	8	27	8	8.0	ŝ	10/17
SMA-2C-IT6 /	9	Surr	в	8.6	в	151	θ	27	3	8.0	<u>0</u> ~	10/18
SMA-2C-IT6 /	10	1	4	8.3	8	15,3	8	27	8	8.1	×	10/19
SMA-2C-IT6 /	10	2	[8.3	ſ	15.3	1	27		8,1		1
SMA-2C-IT6 /	10	3		8.3		15.4		28		8. (
SMA-2C-IT6 /	10	4		9.2		15.5		27		8.1		
SMA-2C-IT6 /	10	5	Y	8.3	1	15.2	¢	28	\mathbf{i}	8-1	6	4



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10 DAY SOLID PHASE TEST DATA

CLIENT Anchor QEA	PR	OJEC Port		le Monitoring	SPEC Eo	CIES haustorius estua	arius	TEST START D	DATE Gamble		START DATE 09Oct18	TEST END DATE 19Oct18
IOB NUMBER PG1123	PR	OJEC		IAGER Hester	LABC	ORATORY Port Gamble /		DILUTION WA FSW10			PSEP 1995	
						WATER QU						
TEST CONDITIONS				D.O. (mg/L) >5.1		TEMP (°C) 15 ± 1	S	ALINITY (ppt) 28 ± 2	q	H (pH units) 7 - 9		
SAMPLE ID	DAY	REP		D.O.		TEMP		SALINITY		рН	TECH.	Date
			meter		meter		meter		meter	unit		
SMA-2C-IT9 /	0	1	ß	B.4	ß	15.2	ß	28	8	8.0	MK	10/9/18
SMA-2C-IT9 /	0	2		B.4		15.1		28	† Ť	B.0		
SMA-2C-IT9 /	0	3		8.2		15.3		28		8.0		
SMA-2C-IT9 /	0	4		B.3		15.3		28		B.O		
SMA-2C-IT9 /	0	5	4	8.4	7	15.3	2	28	T	8.0	J	L L
SMA-2C-IT9 /	1	Surr	8	8.3	8	15.2	δ	28	δ	7.8	UB	10)16
SMA-2C-IT9 /	2	Surr	8	8.2	8	15.4	8	29	8	8,0	MARY	10/11
SMA-2C-IT9 /	3	Surr	G	8.0	B	15.5	ଞ	29	8	7.8	RE	10/12
SMA-2C-IT9 /	4	Surr	g	B.1	B	[5.]	B	29	B	7.9	MK	10/13
SMA-2C-IT9 /	5	Surr	8	8.4	8	15.2	8	29	8	8.0	MK	10/14
SMA-2C-IT9 /	6	Surr	8	0,8	8	15.3	8	28	8	087.9	Sin	10/15
SMA-2C-IT9/	7	Surr	8	8.1	8	15.3	8	28	8	8.0	FW	10/14
SMA-2C-IT9 /	8	Surr	8	8.1	8	15.2	8	28	8	7.9	8W	10/17
SMA-2C-IT9 /	9	Surr	в	B.(в	(5.)	8	28	в	B.0	JL	10/18
SMA-2C-IT9 /	10	1	в	8.3	8	15.4	C	28	8	6.0	V	10/19
SMA-2C-IT9 /	10	2	٢	8.3	*	15.4	\setminus	28		8.1	Γ	
SMA-2C-IT9 /	10	3		8.3		15.2		28		4.(And Andrew Community	
SMA-2C-IT9 /	10	4	and the second second	8.4		15.le		28		8.1		
SMA-2C-IT9 /	10	5	V	8.3	V	15.3	4	28	1	8.0	4	

DIE 10-15-18 5

Page _____ of ____

Ammonia and Sulfide Analysis Record

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Client/I	-	Anc		Port Ga		0	anism:	Eov				Test I	Ouration ((days): 	0	
PI OV	ERL	EST AYING	/ (IN G (OV	ITIAL P / PE	FINAL REWATER	/O' R (PW	THER (/) (circl	(circle o e one) /	one) Comm	ents:				DAY of TE	CST:)
			<u></u>	Calibra	ation Standa	rds T	empera	ture		and the second second second			<u></u>			~
			Date						oeratur	e:				should be with re at time and o		
			10/9/1	3				21.6	°C			Standard				
Sample ID or Description		onc. Rep	Samp	ate of oling and nitials	Ammonia Value (mg/L)		eter #/ np (°C)	Dat Readin Init	ng and	Sample Preserved (Y/N)	рН	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (mg/L)	Multi- plier	Calc- ulated Sulf. (mg/L)
Ø	SI	ur	10/9/1	8 (p	0.00	10	22.2	10/9/1	8 mr	N			10	ND	١	ND
CH1212-20			1		0.969	1	1	1		1			l	0.001	1	100.0
CK.21					0.695									ND		ND
SMA IB-ITZ					0.152											
1B-113	5-172 0.152 3-173 0.270															
26-153					0.299									0.012		0.012
26-176					0.00									ND		ND
26-179		ſ	J	/	0.00	1	T	Ţ		9			7	ND	J	L
												20				
Ø	SI	N	10911	BCR	0.00						7,9	28	0 —			\rightarrow
CARR-20				1	8.42						7.8	29	()			\rightarrow
CNE-21				Υ	• •											\rightarrow
SMA 18-172					()											->
1 13-153					<u> </u>											~
26-13					(D											- <u>`</u>
26-176					0											2
1 26-119					1-53						7.9	28	<u> () </u>			~
								~	,							
		OIn	suffici	ent pw 6	r analysis. m	16 10/1	a. (DWK.	10 10 0	٩						

Ammonia and Sulfide Analysis Record

Page _ l_of _ l

	Client/P		Pact	(ramble)		anism:	Fab				Test	Duration ((days):	3	
L		ETEST ERLYIN	/ IN IG (OV		/ (FINAL) DREWATE	/ 0 R (PV	THER (circl	(circle e one)	one) / Comm	ients:				DAY of TH	EST: <u> </u> 6	I
Γ				Calibr	ation Standa	rds 7	Cempera	ature								
			Date	•					peratur	e:				should be with the at time and		
		10/19	/18				21	.3 0	U				-			
	ble ID or cription	Conc. or Rep	Sam	Pate of pling and nitials	Ammonia Value (mg/L)		eter #/ np (°C)	Readi	te of ng and tials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (mg/L)	Multi- plier	Calc- ulated Sulf. (mg/L)
1	Ø	Sur	lolia	1 Ra	0.0	TI	20.3	10/1	9 RE	N	1		10	0	1	0
	R- 70	<u> </u>			1.31	1	20.3				\rightarrow			0.004	<u> </u>	0.004
	-21			<u> </u>	4.01	-	20.4				+			ND ND		ND
	1B-172				0.0		20.3				`	<u> </u>		-		ND
	1B-1T3				<u>C.o</u>		20.3					$ \land $		0 ND		0 ND
	2(-173				0.0		20.4					\vdash		ND		ND
	2C-1T6			<u> </u>	0.0	ł	20.4		/			\vdash	<u> </u>	ND	1	ND
0)(-IT9			-	0.01		00.4									
	Ø	0														$ \rightarrow $
	Ř-20	Surr	10/10	3 RE	3.94	-11	21.4	10/19	RE	N	7.07	28	2	0.028	5	0.14
CF	2-21	1		1	(e.leo	1	20 30			1	7.11	29	2			>
SMA	IB IT2	0										<u> </u>				\rightarrow
1	IB IT3	$\bigcirc -$				<u> </u>										>
Í	B IT 3 3 C · IT 3 3 C · IT 3 3															<u> </u>
1. 8	C ITG @					<u> -</u>										\rightarrow
∂	C-179 0.					V		- 1	/	₩.						\rightarrow

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3 Insufficient Ookume

Date: Time: Batch No. 10/04/18 1230 NWA100418 Organism: Eohs Source / Supplier: Northwest Amphipod No. Ordered: No. Received: Source Batch: Collection date, hatch date, etc.): 1910 1910 + 101. Collected 10/02/18 **Condition of Organisms:** Approximate Size or Age: (Days from hatch, life stage, size class, etc.): Loud J-Imm Shipper: B of L (Tracking No.) Fed Ex 0215 B1127869 9210 **Condition of Container: Received By:** Good JU Cond. or D.O. Temp. Container Sal. pН Tech. (mg/L)# Dead % Dead* (°C) (Include (Units) (Initials) Units) 7.8 \star X ٨. 5 *if >10% contact lab manager Notes: * Revol Duy.

ORGANISM RECEIPT LOG

Northwest Amphipod

3814 Yaquina Bay Rd., P.O. Box 542, Newport, OR 97365 Tel: 541-867-7225, nwamphipod@gmail.com

SUBJECT: Animal Collec	tion Data Sheet (shipping)											
SOLD TO: EcoAnalysts 4770 NE View J P.O. Box 216 Port Gamble W.		Brian Hester/	Collin Ray/Hillary Eicholer 360.297.6040 Julia Baum 360.509.4141										
FedEx# 1817-5]	P.O. # PGL										
DATE OF SHIPMENT: 10													
Species	ANIMA	AL HISTORY Age/Size	Number Shipped										
Eohaustorius estuarius		3-5mm	1910 + 10%										
	WATER QUALITY	AT TIME OF SHIPMENT											
Temperature (°C): 19-7	рН: 8-0	Salinity (ppt): 35.0	D.O. (mg/L): 8.0										
Other:													
PACKAGED BY:	575	DATE:	10-3-18										
Interstitial WQ: Temp: 11.0	uina Bay, OR. °C, Salinity 34.5 ppt; salinit	ty adjusted ~5 ppt up or down as	needed.										
	Collected 10-2-18 from Yaquina Bay, OR. Interstitial WQ: Temp: 11.0°C, Salinity 34.5 ppt; salinity adjusted ~5 ppt up or down as needed. Held at 15°C in aerated water. ADDITIONAL COMMENTS 4-liters of 0.5 mm sieved home sediment included.												

PLEASE RETURN ALL SHIPPING MATERIALS

If you have any questions, Please call Gary Buhler or Gerald Irissarri at (541) 265-7225. Thank You.

MAINTENANCE LOG FOR CULTURES

ORGANISM:	Eohs	
LOCATION:	Bath 5	

Batch Nu	imber: N	WAIOC	041B	A	Date	e Receivec	1: 10/00	4/18	Initial	# of Organi	isms: į	910
Date	Feed AM/PM	Tub No.	D.O.	Temp (°C)	Cond/ Sal		H₂O Change	Organisms appear healthy (Y/N)	# Mort	% Mort*	Init.	Comments
10/05	<u> </u>		7.7	16.5	3	7.9	N	4	45		JU	
1.1		2	7,9	16.6	32	7.9	Ţ	J	9		L	
W/6		<u> </u>	7.4	16.9	32	8.0	Y	Y	<u> </u>		CR	
		2	7.8	17.0	32	8.0	Y	ſ	4		J.	
10.7	- X		7.7	16.1	32	7.9	Y	<u> </u>	11		BH	
	X	2	7.9	16.1	32	8.0	Y	Y	3		\checkmark	
10/8		1	7,5	16.3	30	7.9	N	Y			500	
L		2	7.9	16.2	30	8.0	N	¥	4		Sw)	
10/09	·		B.D	15.6	30	7,9	Ŋ	4				
		2	B.1	15.5	30	8.0	L	Į			L	
		'										

FT = Flow-through **if* >10% notify lab manager

eference	Toxicant 96-h	Acute S	urvival	l Test														All Ma	tching La
est Type: rotocol:	Survival EPA/600/R-9	4/025 (19	94)		Organisn Indpoint			torius ion Su			mphip	od)	Mate Sour			I Amm erence	1	int-RE	F
					Refe	erenc	e Toxic	ant 96-	h Acute	e Surviv	al Test								
3	50																		
3	00-									<		Sample and the second	10 ⁻¹¹ + 1 ⁻¹			and the subscription of th			+2s
. <u>e</u> 2	50-	\sim			Ŗ														
EC50-mg/L Total Ammonia	00-	· · · · · ·				× · · - ·			n theas	Ne			•				·····		+1s
/L Total	50-	•		\checkmark			-•	\checkmark	-	Theorem is not a	•		\bigwedge		/ `	\backslash		1	•
C50-mc	00										\wedge			$\backslash/$				/	Mean
ш 1	00							1 - Tana and a state of the sta	and a subscription of			W		ĕ			V		-1s -2s
	15 Sep-14 00	10 Dec-14 27 Feb-15	26 Jun-15-	25 Sep-15-	06 Nov-15	07 Dec-15-	08 Apr-16-	03 Aug-16-	19 Aug-16-	02 Sep-16-	30 Sep-16-	26 May-17-	28 Jul-17-	01 Sep-17-	31 Dec-17-	23 Feb-18-	02 Mar-18-	24 Aug-18-	09 Oct-18
	é b	ف ن	ċ	ġ.	à	Ś.	à	-Dr	ģ	ġ.	å	-È	÷	ġ.	ģ	ف	l 🗄	ġ	ά

Report Date:

22 Oct-18 16:14 (1 of 1)

		Me	ean:	148	Co	ount:	20	-1s Warn	ing Lim	it: 107	-2s Action Limi	t: 77.42
		Si	gma:	n/a	C	/ :	33.20%	+1s Warn	ing Limi	t: 204.5	+2s Action Limi	t: 282.7
Quali	ty Con	trol Data	a									
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2014	Sep	15	15:10	106.3	-41.62	-1.02	(-)		07-1282-2061	01-5984-9612	ENVIRON
2		Nov	14	14:25	168	20.03	0.392			09-0717-5355	19-7840-9499	ENVIRON
3		Dec	10	15:50	168.3	20.34	0.3977			19-3485-9112	05-9978-3434	ENVIRON
4	2015	Feb	27	12:35	108.8	-39.17	-0.9496			19-3876-5860	21-0291-4043	ENVIRON
5		Jun	26	13:20	197.1	49.12	0.8853			00-5720-1886	11-7391-9309	ENVIRON
6		Sep	25	17:30	157.8	9.849	0.199			05-7835-3625	14-8488-2762	ENVIRON
7		Nov	6	15:30	240.8	92.85	1.504	(+)		07-0462-4762	05-5994-4603	ENVIRON
8		Dec	7	15:58	180.1	32.11	0.6066			18-5380-2632	01-5604-1684	ENVIRON
9	2016	Apr	8	14:40	178.3	30.36	0.5764			20-3339-4511	20-5786-8614	ENVIRON
10		Aug	3	16:55	155	7.067	0.1441			15-5854-7986	14-0317-8212	ENVIRON
11			19	14:25	177	28.99	0.5526			10-0746-9736	13-2092-5186	ENVIRON
12		Sep	2	16:25	80.2	-67.76	5 -1.891	(-)		06-2389-4542	16-8119-8926	ENVIRON
13			30	15:00	152.6	4.68	0.09616			16-2341-4864	11-2277-7148	ENVIRON
14	2017	May	26	13:00	97.99	-49.98	-1.273	(-)		06-2743-8362	04-6967-6524	EcoAnalysts
15		Jul	28	14:20	196.9	48.89	0.8816			14-8451-4586	00-9100-0373	EcoAnalysts
16		Sep	1	15:45	100.5	-47.5	-1.196	(-)		02-8963-0820	06-1020-6763	EcoAnalysts
17		Dec	31	15:47	220.3	72.34	1.229	(+)		09-7306-1854	08-4856-6308	EcoAnalysts
18	2018	Feb	23	13:35	144.3	-3.65	-0.07714			21-0530-3984	12-8139-0101	EcoAnalysts
19		Mar	2	11:45	83.01	-64.95	5 -1.785	(-)		11-4485-4691	17-1248-6929	EcoAnalysts
20		Aug	24	15:55	186.5	38.58	0.7155			16-5739-3244	17-2559-2384	EcoAnalysts
21		Oct	9	15:00	189.1	41.18	0.7582			20-4720-6933	11-3401-1593	EcoAnalysts

CETIS QC Plot

CETIS Q	C Plot														Repoi	rt Date	e:	22 Oc	t-18 1	6:15 (1 of	1)
Reference	Toxican	: 96-h /	Acute S	urviva	I Test											911-cd:cd:b///company		4	All Ma	tching La	bs
Test Type: Protocol:	Surviva EPA/60		/025 (19	94)		Organi: Enclpoi						Amphi	ood)	Mat Sou	erial: irce:		l Amm erence	onia Toxicai	nt-RE	F	
3	00					R	eferen	ice Toxi	icant 96	i-h Acut	e Survi	val Tes	t								
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	15 Sep-14 0	14 NOV-14-	27 Feb-15-	26 Jun-15-	25 Sep-15-	06 Nov-15-	07 Dec-15	08 Apr-16	03 Aug-16-	19 Aug-16-	02 Sep-16-	30 Sep-16-	26 May-17-	28 Jul-17-	01 Sep-17-	31 Dec-17-	23 Feb-18-	02 Mar-18-	24 Aug-18-	09 Oct-18	
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Quali	ty Con	trol Data	a									
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2014	Sep	15	15:10	50.5	-25.07	-0.7577			07-1282-2061	16-3885-0935	ENVIRON
2		Nov	14	14:25	114	38.43	0.7731			09-0717-5355	07-0500-8008	ENVIRON
3		Dec	10	15:50	59.4	-16.17	-0.4525			19-3485-9112	07-0579-1018	ENVIRON
4	2015	Feb	27	12:35	29.3	-46.27	-1.781	(-)		19-3876-5860	19-7961-3594	ENVIRON
5		Jun	26	13:20	132	56.43	1.049	(+)		00-5720-1886	15-3704-4199	ENVIRON
6		Sep	25	17:30	117	41.43	0.8219			05-7835-3625	21-0939-3919	ENVIRON
7		Nov	6	15:30	165	89.43	1.468	(+)		07-0462-4762	19-7906-3673	ENVIRON
8		Dec	7	15:58	138	62.43	1.132	(+)		18-5380-2632	00-7335-5231	ENVIRON
9	2016	Apr	8	14:40	85.2	9.634	0.2256			20-3339-4511	16-7438-0764	ENVIRON
10		Aug	3	16:55	98	22.43	0.4888			15-5854-7986	05-8855-9934	ENVIRON
11			19	14:25	76.9	1.334	0.03291			10-0746-9736	12-8850-4495	ENVIRON
12		Sep	2	16:25	54.1	-21.47	-0.6282			06-2389-4542	18-8647-7799	ENVIRON
13			30	15:00	63.2	-12.37	-0.336			16-2341-4864	17-9345-6065	ENVIRON
14	2017	May	26	13:00	26.6	-48.97	-1.963	(-)		06-2743-8362	12-3565-7845	EcoAnalysts
15		Jul	28	14:20	151	75.43	1.302	(+)		14-8451-4586	09-8418-8824	EcoAnalysts
16		Sep	1	15:45	86.5	10.93	0.2541			02-8963-0820	17-0422-4621	EcoAnalysts
17		Dec	31	15:47	83.6	8.034	0.19			09-7306-1854	06-1883-5465	EcoAnalysts
18	2018	Feb	23	13:35	69.7	-5.866	-0.1519			21-0530-3984	16-8514-1800	EcoAnalysts
19		Mar	2	11:45	31.2	-44.37	-1.663	(-)		11-4485-4691	15-7110-1336	EcoAnalysts
20		Aug	24	15:55	75.6	0.03449	0.0008578			16-5739-3244	15-9917-9528	EcoAnalysts
21		Oct	9	15:00	134	58.43	1.077	(+)		20-4720-6933	14-7074-1873	EcoAnalysts

006-469-472-7

CETIS C	C Plot										F	Repor	t Date	e:	22 0	ct-18 1	6:20 (1 of 1)
Reference	Toxicant	: 96-h	Acute S	Survival Te	est											All Ma	tching Labs
Test Type: Protocol:	Survival EPA/60		4/025 (1	994)	Organism: Endpoint:				ius (Amp	hipod)	Mate Sour			nized . erence	1		F
					Refer	ence Toxic	ant 96-1	n Acute	Survival 1	ſest	<u></u>		.^.				
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	26.15	2	101	27	1.90	08	03 /	197	02 30	26 1	28	01 (31 [23	021	24 /	60
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	Si	igma:			V: 38.10)%			ing Lim					n Limi			
Quality Co	ontrol Dat	a		WINNED.													
Point Yea		Day		QC Data	Delta	Sigma	Wa	rning	Action	Test ID		Ana	alysis	ID	Labo	atory	
	4 Aug	26	15:45	1.087		-0.5648				16-9917			7453-		ENVI		
2	Sep	15	15:10	0.6543		-1.945		(-)		04-2286			1229-		ENVI		
3	Nov	14	14:25	1.119		-0.4857				07-5753			1415-		ENVI		
4	Dec	10	15:50	1.441		0.2008				04-0714			0742-		ENVI		
	5 Feb	27	12:35	0.8668		-1.18		(-)		10-1977				0232	ENVI		
6	Sep	25	17:30	1.361		0.04586				00-7510	-8480		9779-		ENVI		
7	Nov	6	15:30	1.605	0.2673	0.4952				14-1974	-2437	14-	7486-	0204	ENVI	RON	

0.4952 0.26/3 14-1974-2437 14-7486-0204 NVIRON 8 7 Dec 15:58 1.807 0.4686 0.8163 ENVIRON 12-1918-7694 00-1085-2209 9 2016 Apr 8 14:40 1.512 0.1736 0.3318 17-7738-6530 02-5159-2977 ENVIRON 10 Aug 3 16:55 1.775 0.4365 0.7677 15-5470-2613 20-0153-1348 ENVIRON 11 19 14:25 1.264 -0.07434 -0.1554 11-7594-3529 18-2266-1841 ENVIRON 12 Sep 2 16:25 0.5558 -0.7822 -2.389 (-) (-) 20-2236-1025 01-7459-0032 ENVIRON 13 30 15:00 1.885 0.5468 0.9316 12-0597-8760 12-1436-9613 ENVIRON 14 2017 May 26 13:00 1.101 -0.2374 -0.5312 15-8049-8093 00-1911-6893 EcoAnalysts 15 Jul 28 14:20 2.103 0.7648 1.229 (+) 03-7130-7368 EcoAnalysts 11-4327-6237 16 Sep 1 15:45 1.407 0.06921 0.1371 18-6405-8290 07-0280-8863 EcoAnalysts 17 Dec 31 15:47 2.466 1.128 1.662 (+) 16-6781-4604 13-3844-2137 EcoAnalysts 18 2018 Feb 0.0228 23 13:35 1.361 0.04594 00-2027-3508 17-9124-7622 EcoAnalysts 19 Mar 2 11:45 1.301 -0.03713 -0.07651 02-5827-5523 13-4470-6509 EcoAnalysts 20 Aug 24 15:55 1.708 0.3702 0.664 17-5739-4878 03-7944-2577 EcoAnalysts

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QA:

ETIS Q	C Plot												
Reference	Toxicant	96-h	Acute S	urvival Te	st							All Mate	hing Lab
Fest Type:			1005 141	20.43			orius estuari	us (Amp		terial:		zed Ammonia	
Protocol:	EPA/600	/R-94	/025 (19	994)	Endpoint:	Proportio	on Survived		SC	urce:	Referen	nce Toxicant-REF	
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	15 Sep-14 14 Nov-14	,		26 Jun-15-		08 Apr-16	03 Aug-16- 19 Aug-16-			01 Sep-17	31	23 Feb-18 23 Feb-18 02 Mar-18 24 Aug-18	09 Oct-18
	Me	ean: gma:	61-99-22 0.928 n/a	6 C	ount: 20 V: 51.8	-	-91-6n9 -19 -6n9 61 -1s Warn +1s Warn	ing Lim	it: 0.5705	-2s	ਨ Action L	81- 81- 81- 49- 92 W V 82 00 75 Limit: 0.3505 Limit: 2.46	09 Oct-16
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Point Year 1 2014 2 3 4 2015 5 5 5 5 5 5 5 5 5 5 5 5 5 5 7 8 9 2016	Ma Si ntrol Data Month 4 Sep Nov Dec 5 Feb Jun Sep Nov Dec 6 Apr	ean: gma: a 15 14 10 27 26 25 6 7 8	0.928 n/a Time 15:10 14:25 15:50 12:35 13:20 17:30 15:30 15:58 14:40	6 C C QC Data 0.497 0.881 0.943 0.334 1.578 1.111 1.22 1.733 0.918	Delta -0.4316 -0.4763 0.01437 -0.5946 0.6494 0.1824 0.2914 0.8044 -0.01063	Sigma -1.283 -0.1081 0.03153 -2.099 1.088 0.368 0.368 0.5601 1.281 -0.02362	-1s Warn +1s Warn (-) (-) (+)	ing Lim ing Lim Action	it: 0.5705 it: 1.512 Test ID 04-2286-383 07-5753-682 04-0714-330 10-1977-712 13-7504-658 00-7510-848 14-1974-243 12-1918-769 17-7738-653	-2s +2s An 7 01 8 01 4 12 9 04 8 11 30 05 37 10 94 05 50 07	Action L Action L 4675-93 -5478-50 -5251-71 -0485-40 -4090-15 -3466-18 -4251-02 -5204-95 -6987-73	Limit: 0.3505 Limit: 2.46 2 Laboratory 24 ENVIRON 22 ENVIRON 22 ENVIRON 25 ENVIRON 25 ENVIRON 25 ENVIRON 25 ENVIRON 26 ENVIRON 26 ENVIRON 26 ENVIRON	09 Oct-12
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11-3401-1593	Proportion Sur	vived	Spearma	n-Kärber				EC50	·∕189.1	166.3	215.1		1
Proportion Su	rvived Summa	ary											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min		Max	Std Err	Std De	v CV%	%Effe	ct
0	D	4	0.9000	0.5818	1.0000	0.6000		1.0000	0.1000	0.2000		0.00%	
17.1		4	1.0000	1.0000	1.0000	1.0000		1.0000	0.0000	0.0000		-11.11	%
34.8		4	0.8500	0.4712	1.0000	0.5000		1.0000	0.1190	0.2380		5.56%	
59 424		4	0.9500	0.7909	1.0000	0.8000		1.0000	0.0500	0.1000		-5.56%	
134 276		4	0.8500 0.1750	0.7581 0.0227	0.9419	0.8000		0.9000	0.0289	0.0577	6.79%	5.56% 80.56%	
270 541		4 4	0.0000	0.0227	0.3273 0.0000	0.1000 0.0000		0.3000 0.0000	0.0479 0.0000	0.0957 0.0000	54.71%	100.00	
Proportion Su	nvived Detail	•		0.0000						0.0000			
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4								
0	D	1.0000	1.0000	0.6000	1.0000		******						
17.1		1.0000	1.0000	1.0000	1.0000								
34.8		1.0000	0.5000	1.0000	0.9000								
69		0.8000	1.0000	1.0000	1.0000								
134		0.8000	0.8000	0.9000	0.9000								
276		0.3000	0.1000	0.1000	0.2000								
541		0.0000	0.0000	0.0000	0.0000								
Proportion Su	rvived Binom	ials									at		
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4								
0	D	10/10	10/10	6/10	10/10								
17.1		10/10	10/10	10/10	10/10								
34.8		10/10	5/10	10/10	9/10								
69		8/10	10/10	10/10	10/10								
134		8/10	8/10	9/10	9/10								
276		3/10	1/10	1/10	2/10								
541		0/10	0/10	0/10	0/10								

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CETI	S Tes	t Daf	ta W	orks	sheet				Report Date: Test Code/ID:	22 Oct-18 16:14 (p 1 of 2) 7A05E615 / 20-4720-6933
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	276		2	22	10		ŗ			
	276		3	2	10		-			
	276		4	23	10					

ETIS Tes	st Dat	a W	orks	sheet		Report Date: Test Code/ID:	22 Oct-18 16:14 (p 2 of 2 7A05E615 / 20-4720-693
Conc-mg/L	Code	Rep	Pos	# Exposed	# Survived	Notes	
/ 541		1	6	10	0-		
541		2	13	10	0 -		
541		3	16	10	0,		
541		4	5	10	0		



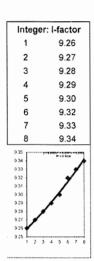


CETIS Sum	mary Rep	ort						port Date: st Code/ID	:		Oct-18 16:20 286038 / 17-		,
Reference Tox	icant 96-h Acເ	ute Survival	Test								Eco	Analys	ts
Start Date: -(Ending Date: - Test Length: 9		0 Pro 0 Spe	ecies: E ion: N	Survival EPA/600/R-94/(Éohaustorius es Malacostraca BE99A5CC			Di Br Sc	ine: N purce: N		ble rn Ac	quatic Scien	Age:	S
Sample Date: Receipt Date: Sample Age:	15 May-17 15 May-17 512d 15h	Mat CA: Clie	terial: S (PC):	Inionized Amm	nonia		Sc	ource: F	Reference Reference 0170515.1	Toxic			
Multiple Comp	arison Summ Endpoint	ary	Compa	rison Method			√ NOEL	LOEL	TOE		TU	PMSD	G
05-9114-6332		vived		lany-One Rank			1.0.74	×1.221	0.950		10	24.6%	1
Point Estimate				-									
	Endpoint		Point E	stimate Metho	od		√ Level	mg/L	95%	LCL	95% UCL	ти	s
16-8151-1630		vived		nan-Kärber			EC50	0.9139			0.994		1
Proportion Su			· · · · · ·										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std I	Dev	CV%	%Effe	st
0	D	4	0.9000	0.5818	1.0000	0.6000	1.0000	0.1000			22.22%	0.00%	
0.141		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000		oo	0.00%	-11.11	%
0.288		4	0.8500	0.4712	1.0000	0.5000	1.0000	0.1190			28.01%	5.56%	
0.475		4	0.9500	0.7909	1.0000	0.8000	1.0000	0.0500			10.53%	-5.56%	,
0.74		4	0.8500	0.7581	0.9419	0.8000	0.9000	0.0289		1	6.79%	5.56%	
1.221		4	0.1750	0.0227	0.3273	0.1000	0.3000	0.0479		1	54.71%	80.56%	6
1.535		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				100.00	
Proportion Su	rvived Detail									1			
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4								
0	D	1.0000	1.0000	0.6000	1.0000					1			
0.141		1.0000	1.0000	1.0000	1.0000								
0.288		1.0000	0.5000	1.0000	0.9000								
0.475		0.8000	1.0000	1.0000	1.0000								
0.74		0.8000	0.8000	0.9000	0.9000								
1.221		0.3000	0.1000	0.1000	0.2000								
1.535		0.0000	0.0000	0.0000	0.0000								
Proportion Su	rvived Binom	ials								1			
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4								
0	D	10/10	10/10	6/10	10/10								
0.141		10/10	10/10	10/10	10/10								
0.288		10/10	5/10	10/10	9/10								
0.475		8/10	10/10	10/10	10/10								
0.74		8/10	8/10	9/10	9/10								
1.221		3/10	1/10	1/10	2/10								
1.535		0/10	0/10	0/10	0/10								

Un-ionized Ammonia Calculator

CLIENT:	Various	Date of Test: October 9, 2018	-
PROJECT:	PG1123, PG1214	Test Type: Eohaustorius estuarius	:
COMMENTS			

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



	od NH3T (mg/L)	salinity (ppt)	pН	temp (C)	temp (K)	i-factor	Mod	NH3U (mg/L
Target / Sample Name	Actual	22.9	8.0	24,1	297.26	9.3053	E BAR	#VALUE!
Example 3.5	2.000	10.0	7.5	5.0	278.16	9.2750	建物的	0.008
0	0	31	7.6	13.7	286.86	9.3270		
15.6	17.1	31	7.6	13.9	287.06	9.3270		0.141
31.2	34.8	31	7.6	14.0	287.16	9.3270		0.288
62.5	69	31	7.5	14.6	287.76	9.3270	<u> </u>	0.475
125	134	31	7.4	14.7	287.86	9.3270		0.740
250	276	31	7.3	14.8	287.96	9.3270		1.221
500	541	31	7.1	14.0	288.16	9.3270		1.535
500			1,1	15.0	200,10	9.3270		1.000
							+	
							+	
							+	
	-							
							<u> </u>	
							ļ	
	-							
							1	
							1	
		1	1					

Report Date: Test Code/ID: 22 Oct-18 16:20 (p 1 of 2) 67286038 / 17-3069-9320

Reference To Start Date: End Date: Sample Date:	09 C 13 C	oct-18 oct-18	15:00 13:50	Protoco	s: Eohausto	R-94/025 (1994)	EcoAnalyst Sample Code: 3E99A5CC Sample Source: Reference Toxicant Sample Station: p170515.110
Conc-mg/L 0	Code D	Rep 1	Pos 7	# Exposed 10	# Survived 10		Notes
0	D	2	4	10	10		
0	D	3	25	10	6		
0	D	4	20	10	10		
0.141		1	2	10	10 -		
0.141		2	23	10	10 _		
0.141		3	14	10	10		
0.141		4	19	10	10		
0.288 -		1	16	10	10 🧳		
0.288		2	28	10	5 -		
0.288		3	17	10	10 🦯		
0.288		4	9	10	9 -		
0.475 [,]		1	22	10	8 ,		
0.475		2	10	10	10 🦻		
0.475		3	5	10	10		
0.475		4	18	10	10		
0.74		1	24	10	8 -		
0.74		2	6	10	8		
0.74		3	8	10	9 _		
0.74		4	26	10	9 -		
1.221 [.]		1	1	10	3		
1.221		2	27	10	1		
1.221		3	13	10	1 ,		
1.221		4	11	10	2 /		

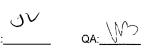


ETIS Tes	t Dat	ta W	orks	sheet			Report Date: Test Code/ID:	22 Oct-18 16:20 (p 2 of 2) 67286038 / 17-3069-9320
Conc-mg/L	Code	Rep	Pos	# Exposed	# Survi	ved	Notes	
1.535		1	21	10	0	/		
1.535		2	3	10	0			
1.535		3	12	10	0	/		
1.535		4	15	10	0			

006-469-472-7







Ammonia Reference Toxicant Spiking Worksheet

Reference Toxicant ID:	PM0515,110
Date Prepared:	10/9/18
Technician Initials:	ĺR

Amp/Eoh NH₃ RT

Assumptions in Model Stock ammonia concentration is 10,000 mg/L = 10 mg/mL

Date: 10/2/2018 Measurement: 9,833

Te	st Solutions		Volume of etc	ock to reach desired
Measured Concentration	Desired Concentration	Volume		centration
mg/L	mg/L	mL	mL sto	ck to increase
				SALT WATER
541	500	3200		244.076
276	2.50	3200		122.038
134	125	3200		61.019
69.0	62.5	3200		30.510
34.8	31.2	3200		15.230
17.1	15.6	3200		7.615
0.00	0			



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Ammonia Reference Toxicant Test Water Quality Data Sheet

CLIENT		PROJECT					T						L/	BORAT		1			
TEST ID		LOT #:								naustori	us es	tuarius		Роп	t Gambl		SEPA	1994 / AS	TM 2006
P170515.110			298(6C5	10					R									
CHAMBER SIZE/TYPE		EXPOSUR	EVOLUME		-		Т	EST START	DATE	INITI		TIME		ST END	DATE			TIME	
1L Plastic				800mL	-			09C	ct18		MK	UR 1	00		130	Oct18		138	sD
							WAT	FER QL	JALI ⁻	TY DA	ΤΑ								
TEST	CONDIT	IONS				(mg/L)		MP(C)		L (ppt)		pH	TECHNICIA	N	AMMO	NIA		<u></u>	
					2	• 8.0 D.O.		5 <u>+</u> 2 темр.	ala sederande d'al de la	2 <u>+</u> 2		7 - 8.3			MMONIA	1			T
SAMPLE ID	CONCEN	1	DAY	REP	L	1			34	ALANIT T		рН	- WQ TECH/ DAT	E	1	Tech		1	
	value	units			meter		meter	°C	meter	ppt	meter	unit		мете	R mg/L				
			0	Stock	в	7.0	ß	13.7	<u> </u>	31	B	7.6	JL 19/09	10	0.00	FW			
Ref.Toxammonia	0	mg/L	2	1	3	$1 \sqrt{g}$	8	16.6	8	31	8	7.8	MARLY 19/1						
			4	2	Ø	7.5	8	15.1	в	31	g	7.B	MK 10		0.414	JL			
			0	Stock	в	6.9	в	13.9	G	3(.	Ø	7,6	JL 19/01	1 10	17.1	ณ			
Ref.Toxammonia	15.6	mg/L	2	1	8	7.2	8	16.6	8	31	8	7.7	MAR + 19/1						
			4	2	0	7.4	в	15.0	ઝ	31	8	7.8	MK 10/13	10	17.8	JL			
			0	Stock	в	7.0	в	14.0	в	31	в	7.6	JL 19/00	16		RU			
Ref.Toxammonia	31.2	mg/L	2	1	8	7.2	2	16.4	8	31	. 8	7.7	Mat 19/11						
			4	2	ð	7.2	в	15.3	B	31	8	7.8	MK 10/13	10	36.5	JL			
			0	Stock	Ø	7.3	в	14.6	в	31	в	7.5	N 10/00		69.0	Sw			
Ref.Toxammonia	62.5	mg/L	2	1	8	7.1	8	16.7	8	31	8	7.7	MURH '8/11						a second as a second
			4	2	B	7.3	8	15,1	B	31	Ø	7.7	MK 10/13	10	69.7	ال			
			0	Stock	в	7,7	в	14.7	в	31	в	7.4	JL 10/09	16	0/04/134	Sw			1
Ref.Toxammonia	125	mg/L	2	1	8	7.5	8	16.8	8	31	8	7.7	MPR+ 19/11						
			4	2	8	7.6	B	15.3	в	31	в	7.7	MK 10/13	رە	120				
			0	Stock	8	7.3	в	14.8	8	31	B		J - 10/00		0135	L.S			
Ref.Toxammonia	250	mg/L	2	1	8	1.1	8) (0.10	8	31	X		men 19/1		61.0				
			4	2	8	7.4	ð	15.1	R	31	ð	7.6	MK coll3	_	269	ىر			
05/11/15 () ie	10-9-18	Actual	= 134,	276			<u> </u>		oh R		· <u> </u>			<u>.</u>	<u>.</u>				1 of 1



Ammonia Reference Toxicant Test Water Quality Data Sheet

CLIENT		PROJECT							<i>Г</i> .	houst	La riva	t-			LA	BORAT		1			004/05	TM 2006
						_					orius	esil	Janus	S		Pon	Gamb	le	056	EPA 1	994 / AS	TM 2006
TEST ID		LOT #:						DILUTION PR		IALS:												
p170515.110			298	6651	D																	
CHAMBER SIZE/TYPE		EXPOSUR	VOLUME				1	TEST START	DATE	1	NITIALS	*****	TI	ME	TE	ST END	DATE				TIME	
1L Plastic				800mL				09C	Oct18		mĸ,	CV	R	1500			130	Dct18	3			1357
						1	WA	TER QL	JALI	TY D	ΑΤΑ											
	ANDITI	-			DC) (mg/L)	T	EMP(C)	SA	AL (ppt	b	p	эΗ	TEOU			AMMO	NIA				
TEST C	ONDITI	ONS				> 8.0		15 <u>+</u> 2	3	82 <u>+</u> 2		7.7	- 8.3	IECH	NICIA							
			0	Stock	в	7.2	в	15.0	B	31	E	3	7.1	10/09	. JL	10	541	Ser.	J			
Ref.Toxammonia	500	mg/L	2	1	\bigcirc				CONSIGNATION OF THE CONSIG				ىرىمەر يەكەر ئەرىيە يەلىلىكى بىر			Constanting Constanting Rockwords					U.	
			4	2	(\mathcal{V})				taa ooliinkeksiistöö	and Constant And Constant				Could Country and Added					,			

(NO Surviving animals. J2 10/22/18.

Ammonia ference Toxicant Test Water Qurity Data Sheet

			:					SPECIE				ius est	uarius	;]
		PRO	JECT			1	T MANAG B. He			BORATOR	•			1 / AST	M 2006]
			SU	RVIVA	L & E							OOL			1112000	1
OBSERVATI N = Normal	ON KEY				DAY 1			DAY 2			DAY 3			DAY 4		l
LOE = Loss of equilibi Q = Quinscent	ium			DATE			DATE	<i>.</i> .		DATE	,	,	DATE	1.0 1.	0	
DC = Discoloration			#OF	10/1	10)18	-	10,	1010	8	10	19/1	8	10	13 1	6	
NB = No body F = Floating on surfac			NISMS	TECHNIC	CIAN		TECHNI	CIAN		TECHNIC	CIAN		TECHNI	CIAN		1
-		10			lis		M	ARH		R	E			mr		
SAMPLE ID	CONC. value units	REP	INITIAL NUMBER	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	: OBS	#ALIVE	#DEAD	OBS	
		1	ιu	10	υ	Я	10	0	Ņ	10		IF	lo	Ø	IF	
Ref.Tox Ammonia	0 mg/L	2		10	U		10	0		10	C	3F	lo	Ø	N	
	0 mg/c	3		10	6		10	6		10	0	١F	6	Q2	ZND	
		4		10	0	J	10	0	Ŧ	10	0	3F	10	Ø	Ν	
		1		10	0	γ	lo	0	Ν	10	0	9E	lo	Ø	3F	
Ref.Tox Ammonia	15.6 mg/L	2		10	0	2F	ίυ	0		10	c	N	10	Ø	N	
		3		lp	Ő	IF	10	0		10	0	N	10	Ø		
		4		10	0	Ν	10	0	4	10	0	N	10	0	Ľ	
		1		10	0	1F	10	0	Ν	10	0	IF	10	Ø	Ν	
Ref.Tox Ammonia	31.2 mg/L	2		IU	0	2F	10	0	2F	10	υ	3F	5	١	YF,	YN
		3			Ø	2F	10	ð	2F	10	0	N	10	Ø	Ν	
	2	4		10		3F	Ю	0	Ν	10		IF	9	Ø	IF,	INB
		1		16	Ó	Ņ	10	0	1Q	10	0	1ªR	8	١	IF	INB
Ref.Tox Ammonia	62.5 mg/L	2		10	0		10	٥	Ν	10	0	١Q	10	Ø	Ŋ	
		3		0	0	2F	10	٥	β	10	0	N	10	0	J	
		4		10	0	Ν	10	0	IF	10	0	3F	10	Ø	IF	
		1		10	D	IF	10	0	1Q	10	0	2F 10	B	2	1F	
Ref.Tox Ammonia	125 mg/L	2		10	D	2P	9		2F	٩	Ø	ZQ	8	1	IF	
		3			0	UP .	1	0	N		Ò	1F 20	9	1	2F	
		4		10	0	UP	9	1	4	9	0	1Q	9	Ø	IF	4
		1		9	1	IFO		0	Q	5	4	Q	3	2	Q	
Ref.Tox Ammonia	250 mg/L	2		F	3	Q	5	2	Q	4	1	Q	<u> </u>	3		
		3		<u> </u>		Q	/	2	Q	4	3	Q		3	ļ.,	
		4		8	2	Q	7	1	Q	3	4	Q	\mathcal{V}	1	V	

Ammon[;] Reference Toxicant Test Water C Iity Data Sheet

							SPECIES							
									Eoha	ustori	us est	uarius		
CLIENT		PROJECT			PROJEC	T MANAG	SER	LA	BORATOR	RA L	PROTOC	OL		
						B. Hes	ster	F	ort Ga	mble	USEF	PA 1994 / /	94 / ASTM 2006 Day 4	
		SUF	VIVA	L & E	BEHA	VIOR	DAT	Ά						
OBSERVA	TION KEY			DAY 1			DAY 2		1	DAY 3		C	AY 4	
N = Normal LOE = Loss of equili	bium		DATE			DATE			DATE			DATE		
DC = Discoloration		IITIAL # OF	10	101	8	10	111/19	в	$\left \right\rangle$					
NB = No body	10	RGANISMS	TECHNIC	CIAN		TECHNIC	CIAN		TEOHNK	CIAN	TECHNICIAN			
F = Floating on surfa				VB		V	NACH			L			A.	
SAMPLE ID	value units	NUMBER	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE #D	EAD: OBS	
		1 10	Ø	10)									
Ref. Tox Ammonia	500 mg/L	2		9	Q	0	١	-					<u>\</u>	
	, , , , , , , , , , , , , , , , , , ,	3	3	17	Q	0	3	-			<u> </u>			
SAMPLE ID Ref.Tox Ammonia		4		9	Q	0	(-					J	

2. Neanthes arenaceodentata 20-Day Test



CLIENT	1977/07604/061/061/09704/1704/1264	****	PROJE	ст				JOB NO	·.		PF	ROJEC	T MAN	AGER			LABOR	ATORY			PROTO	COL	1		S	PECIES	
An	ichor QEA			Port Ga	amble M	onitoring	1		PG	1123				3. Heste				Port G	iamble		PSEF	P 1995			Neanthes	arenaceodentata	
N = Normal 🗘 ₩ #E = Emergence #M = Mortality	= other	Vorm		<i>F</i>	Sev.	¥		Ł	4	5		ψ.	DINT DA		BSERVA	2		July 1	لذ			e de la	Z				
G = Growth (fungal, bacterial, ou O = No Air Flow (DO F ≈ Floating on Surf TC = Too Cloudy U=Excess food	D?)	5	Date and initials	r 1/91	10/5 8	to the CA		10/8 V	10/9 ME	Son 01/01	No.	a ciloi	19/3 M	to/14 MK	me si/q	V9 \$\$/91	10/17 En	10/18 5	The billor	16/20 52	16/21 Pr	10/22 6	10/23 C	NUMBER REMAINING	(ARE WEIGHT (mg)	roTAL WEIGHT (mg)	ASHED WEIGHT (mg)
CUENTIENVA	ROND	REP JAR	INITIAL # (if differs)	-	2	9	4	ŝ	9	~	œ	6	9	5	12	13	14	15	16	17	18	19	20	NN	17	10	ASI
		1		Ν	N	N	א	N	N	NC	3	3	G	V	୪	6	G	15	G	G	G	λ	N	5	209.99	291.59	242.15
		2					<u> </u>		ſ	\downarrow	6 (3			G	16	6	G		N	λ	Ν	N	5	2 200.35	295.52	243.07
Contro	ol /	3							h	Ur	JI	E			N	N	N	15		15	IE	N	N	5	3 181.29	259.22	213.13
		4							N	NN	JV)			G	(gr	6	G		N	N	1Ē	UN A	5	7 214.16	281.74	240.40
		5		7	1	\mathbf{V}	V	V	\downarrow	U (9 11	Ē	L	Ţ	IE	6	6	G	T	3	G	6	N	5	5 208.23	311.51	254,32
		1		2	N	N	G	G	G	G (6 (5	G	G	G	G	G	١E	6	ઉ	Cr	G	4	5	6 195.34	308.85	243.96
		2		N			G	ଜ	Ť		3				[-	N		U				5	224.77	276.84	241.38
CARR-2	20 /	3 15		101			N	Ņ	u	N (3							6		Ø				5	231.35	345.08	286.08
		4		N					Ņ	G (5							G						5	° 216.30	290.85	244.80
		5		N	-	V	V	4	Ψ		4		٢	J	2	4	مە	୪	2	2	4	7	\checkmark	5	10 233.01	320.63	269.58
	Rep	Nu	mber	Tare V (m	g)	Dry W (m	ng)	Ashed V (mg	~ 1	Boat.														-	58 222.47		
Initial Biomass	1		5	46.		50.		47.1	2	101	-													le	x 220.28		
	3		5		. 15	50. 52.		47.2 48.	20 .00	102 103														6	5 312.02		

0 WC 10/22/18 SW

J

. M⁽¹ - -15)



CLIENT		PROJE	PROJECT JOB NO. PROJE										PROJECT MANAGER					LABORATORY					:				
Anchor QEA		_	Port G	amble M	lonitoring	I		PG	1123		B. Hester							Gamble		1	OCOL P 1995			SPECIES Neanthes arenaceodentata			
N = Normat () W = 0	ther wo	Am	r —	·		1	1	T			ENI	POINT	DATA &	OBSERV	ATIONS									iveantile	s arenaceodentata		
#E = Emergence #M = Mortality G = Growth	IN TAL # OF ORGANISM: 5	Date and Initials	10/4 Pil	10/5 80	10/6 CRC	10h CR	12.	Tw b/o,	10/10 CM3	14/1 Pw	32 0/01	IN 2/10,	10 /14 ME	1 1	16 0	10/17 Fr	10/18 FL	10/19 MK		2/1	1.2	10/23 CM3	REMAININ	IARE WEIGHT (mg)	TOTAL WEIGHT (mg)	ASHED WEIGHT (mg)	
CLIENT: ENVIRON ID	REP JAR	(if differs)	-	~	e	4	2	ø	7	8	5	10	5	12	13	14	15	16	17	18	19	20	NUMBER	TAR	TOTA	ASHEE	
	1		N	N	N	N	N	て	N	Ø	G	G	6	6	И	ତ	C	G	U	6	ଓ	G	5	" 195.51	277.26	227.33	
CR-21 /	3						V	J J	5	6					U		6		Ц		6		5	12 193.88	247.77	210.52	
010-217	4						6	کی	6	8					U		U		U		6		5	13 212.04	296.53	239.77	
	5 7		15		\checkmark	V C	N	N G	2	ક ડિ					U		U ,		U		U		3	14 212.26	268.01	229,77	
	1		N	.1		6	প	0	6		V				<u>y</u>	-	4	4	4	+	G	L	5	¹⁵ 239.45	315.40	267.64	
	2)~ \	N	N	N	N	4	9	5	5			ۍ ۱	6	6	G	6	G	6	G	5	5	16 195.97	289.07	231.81	
SMA-1B-IT2/	3			_				ل ا	5	کا ر										_			5	204.38	288.89	231.59	
	4					-		N	9	দ ব													5	197.34	308.25	245.46	
	5				\downarrow	-		V U	N	N									2		_		5	198.68	268.33	221.63	
	1		<u></u>	N	4.1	$\frac{\Psi}{1}$	V	<u>N</u>	V	6	1	-		+			2	v		4	ـله مـــــــــــــــــــــــــــــــــــ	\mathbb{V}	4	20 199.45	274.12	227.39	
	2	- '	N	<u> / </u>	N	N	N	N 	N	N G	N			6	2	G	6	5	6	5	6	S	5	²¹ 197.86	294.76	234.07	
SMA-1B-IT3 /	3							_			6	-				$\left \right $					6		5	186.58	260.36	208.57	
	4				$\left \cdot \right $					6											16		כ	100.54	263.98	210.57	
	5						\mathbf{y}		N	G	\mathbf{y}										G		<u>ゝ</u>	101121	268.21	209.34	
						V	<u> </u>	- (গ	V	<u> </u>	2		ملم	~			イ	Ч	7	6	4	5	25 176.05	235.71	191.84	

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CLIENT		PROJECT					JOB NO).			PROJECT MANAGER				LABORATORY				PROTO	COL		SPECIES					
Anchor QEA			Port G	amble M	lonitoring			PG	1123		B. Hester ENDPOINT DATA & OBSERVATIONS						Port G	amble		PSEP	9 1995		Neanthes arenaceodentata				
	(- h - h						1				END	POINT	ATA & O	BSERVA	TIONS												
N = Normal QW = Other E = Emergence #M = Mortality G = Growth ((Ingal, bacterial, or algal) D = No Air Flow (DO?) F = Floating on Surface TC = Too Cloudy U=Excess food	UDY M 1. + 07 ORGANIS 5	Date and initials	Cr 1/01	16/5 R.)	-		10/8 cm	10/9 NK	10/10 CV2	10/11 &	32 elloi	10/13 MK	10/14 MK	19/15 52	10/10 20	10/17 RJ	10/13 Br	W/a MK	10/20 En	10/21 Sr	10/25 Qu	10/23 CB	MBER REMAINING	ARE WEIGHT (mg)	TOTAL WEIGHT (mg)	hED WE/GHT (mg)	
CLIENT/ENVIRON ID	82P J	E INITIAL # (if differs)	-	2	3	4	5	ω	~	80	6	9	÷	12	13	14	15	16	17	18	19.	20	ž	F	Ĕ	HSV	
	1		N	لر	N	N	Ν	Ņ	G	G	୯	G	8	6	G	G	6	G	6	6	G	ھ	5	26 197.13	280.26	226.55	
	2							ſ	Ņ	6	ſ	f	ŀ			1	18				1	Í	5	²⁷ 189.34	264.02	212.53	
SMA-2C-IT3 /	3							G	ନ	G							G				7		5	²⁸ 203.36	280.55	220.22	
	4					\checkmark	\downarrow	Ν	Ν	G							G				ιE		5	²⁹ 209.06	289,45	234.33	
	5		T	1	$\mathbf{\Lambda}$	G	G	G	G	G	U			2	ð	1	6	1	Τ	Ţ	6	V	5	30 193.34	272.20	216.92	
	1		N	N	N	Ń	Ν	N	Ġ	હ	G			G	6	ઉ	G	G	Ь	G	6	٩	5	³¹ 196.24	261.29	221.32	
	2		1	1	1				دم	6				1		1	ιE	ŀ		[1		5	32 174.21	258.62	204.26	
SMA-2C-IT6 /	3								G	6	TP-site						େ						5	33 196.85	285.03	237.48	
	4								S	6	\mathbf{V}						୯						5	³⁴ 225.30	312.66	255.91	
	5		11	1	\checkmark	\checkmark	\checkmark	J	N	Ø	N			ح	4	÷	IE	J	Ł	7	Ţ		4	35 218.91	288.89	246.38	
	1		N	N	N	N	N	N	Ν	G	G			૯	G	G	હ	G	6	6	6	6	5	36 194.27	255.92	214.58	
	2		1	1	1	1	1	N		Ν	N			1	1	1	હિ		1	1	IE	1	5	³¹ 255.88	344.62	292.65	
SMA-2C-IT9 /	3									G	G						6				G		6	³⁸ 236.02	308.13	261.47	
	4									G	1,				Gi da bilan	t Anna a lang ta	E				1			³⁹ 294.25	369.39	320.73	
	5			L	\checkmark	\checkmark	V	V	\checkmark	G	V	J	ł	2	Ţ	7	4	ſ	4	┢	T		5	40 182.64	253.91	208.96	



CLIENT			PRO	JECT			START TIME/ ENI	E	DILUTIO	N WATE	R BATCH	PROTOCOL		TEST START DATE	
Anchor QEA				Port	Gamble Monitorir	ng	100	1	0960		FSW1	00218.01	PS	EP 1995	3-Oct-2018
JOB NUMBER		PRO	JECT N	IANAGER		LABORATORY		TEMP. R	ECDR./H	IOBO#	TEST SPEC	IES	TEST END DATE		
PG1123					B. Hester		Port Gamble						Neanthes a	arenaceodentai	a 23-Oct-2018
Test Location:							WATER Q	-	Y DATA				,		
Test Acceptablility								_	pplier:	un.	and the second se				
80% Survival in Control									ganism Batcher Chamber Size						
TEST CONDITIONS					DO (mg/L) > 4.6		TEMP (C) 20 ± 1		SALINITY 28 ± 1	(ppt)		рН 8.0±1.0			
CLIENT/ENVIRON ID	DAY	REP	JAR	meter	D.O.	meter	TEMP	me	SALINI	ry pt	meter	pH unit	WATE		TECH/DATE
Control /	0	Surr	8	в	7.5	Ø	20.1	в	the second se		в	B.O		s)	MK 10/3
Control /	1	Surr	1	8	7.4	8	20.2	8	20	l	8	7.7			SN 10/4
Control /	2	Surr		8	7.3	8	20.2	5	\$ 20	1	8	7.8		J	FW 10/5
Control /	3	Surr		8	7.4	8	20.4	8	s za	1	8	7.8	CR		CR 1016
Control /	4	Surr		8	6.6	8	19.9	8	32	8	8	7,8		CR	CR 10/7
Control /	5	Surr		8	7.0	8	19.9	8		7	8	7.8			UB 10/8
Control /	6	Surr		8	7.4	B	19.9	lé	3 28)	в	7.9			MK 10/9
Control /	7	Surr		8	7. \	8	19.6	8	5 29	<u>ð</u>	8	7.7			WS 10/10
Control /	8	Surr		8	7.6	8	19.6	8	\$ 2	8	8	7.9		JL	SN 10/11
Control /	9	Surr		8	7.3	8	19.6	8		8	8	7.7	SW		RE 10/12
Control /	10	Surr	L	0	7.7	B	19.5	B	26	3	в	7.9		MK	MK 10/13
Control /	11	Surr	8	в	7.5	в	19.6	E		•	B	7.9			MK 10/14
Control /	12	Surr	1	8	1.4	8	19.6	8	3 28	/ >	8	7.9	82	MK	EN 10/15
Control /	13	Surr		8	7.7	8	19.4	8	28	3	8	7.9			SW 10/16
Control /	14	Surr		8	7.8	8	19.4	8		3	8	7.8		82	Sw 10/17
Control /	15	Surr		8	7.3	8	19.4	8	28		8	7.8	S~		Sw 10/18
Control /	16	Surr		8	7.4	8	19.5	8			8	7.9		สม	MK 10/19
Control /	17	Surr		8	7.2	8	19.5	8			8	7.8			SW 10/20
Control /	18	Surr		8	7.2	8	19.5	8	_		8	7.8	พ	s	Sw 10/21
Control /	19	Surr		8	7.3	8	19.4	8			8	7.8			8W 10/22
Control /	20	Surr	L	8	7.3	8	19.3	8	25	8	8	7.9			SW 10/23

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CLIENT			PRO	JECT			START TIME/ END	TIME	DILUT	ION WATE	R BATCH	PROTOCOL		TEST START DATE
Anchor QEA				Port	Gamble Monitorin	g		COLUMN AND A	7	FSW1	00218.01	PSEP	1995	3-Oct-2018
JOB NUMBER		PRO	JECT	ANAGER		LABORATORY		TEMP	. RECDR./I	HOBO#	TEST SPECIES		TEST END DATE	
PG1123					B. Hester		Port G	amble				Neanthes aren	aceodentata	23-Oct-2018
Test Location:							WATER QU							I
Test Acceptablility	-							Suppli	n Water Batch: er:					
_ 90% Survival in Control									sm Batch: Age: hamber Size;					
TEST CONDITIONS					DO (mg/L)	1000	TEMP (C)		SALINITY (ppt)		рН			
CLIENT/ENV/RON ID	DAY	REP	> 4.6				20 ± 1 TEMP		28 ± 2 SALINITY	2 8.0±1.1		WATER		TEQUIDATE
				meter	¥	meter		meter 0		meter El	unit	RENEWAL	Feeding	TECH/DATE
CARR-20 /	0	Surr	16	8	7.5	8	20.2	8	29	B	7.9		SW	MK 10/3
CARR-20 /	1	Surr		8	7.0	8	20.4	8	29	8	7.6			8~ 10/4
CARR-20 /	2	Surr		8	7.2	8	20.3	8	29	8	7.7		UL	Sw 10/5
CARR-20 /	3	Surr		8	6.6	8	20.6	8	29	8	7.7	CR		(RId6
CARR-20 /	4	Surr		8	7.4	8	19.8	8	28	8	7.8		a	(R:017
CARR-20 /	5	Surr		8	6.9	8	20.1	8	28	8	7.7			UB 10/8
CARR-20 /	6	Surr		8	7.4	B	20,1	в	ĩB	8	7.8	~ 0	しし	MK 10/9
CARR-20 /	7	Surr		8	7.2	8	19.7	8	28	8	7.6			UB 10/10
CARR-20 /	8	Surr		8	7.4	8	19.8	8	28	8	7.9		JU	Sw 10/11
CARR-20 /	9	Surr		8	7.0	8	19.9	8	28	8	7.7	SW		RE 10/12
CARR-20 /	10	Surr	T	в	7,7	В	19.6	в	2B	B	8.0		MK	ME 10/13
CARR-20 /	11	Surr	16	8	75	8	19.9	8	28	8	7.9			MK 10/14
CARR-20 /	12	Surr]	8	7.5	8	19.8	8	28	8	8.0	82	MK	SW 10/15
CARR-20 /	13	Surr		8	7.3	8	19.6	8	28	8	7.9			SN 10/16
CARR-20 /	14	Surr		8	7.7	8	19.6	8	28	8	7.9		8W	SW 10/17
CARR-20 /	15	Surr		8	7.1	8	19.6	8	28	8	7.8	ณ		SW 10/18
CARR-20 /	16	Surr		8	7.4	8	19.7	8	23	8	7.9		Sw	MK 10/19
CARR-20 /	17	Surr		8	7.1	8	19.7	8	28	8	7.9			SW 10/20
CARR-20 /	18	Surr		8	6.9	8	19.9	8	28	8	7.8	5	Sw	SW 10/21
CARR-20 /	19	Surr		8	7.1	8	19.6	8	28	8	7.8			SW 10/22
CARR-20 /	20	Surr	1	8	7.0	8	19.6	8	28	8	7.9			SW 10/23

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CLIENT			PRO.	JECT			START TIME/ END	TIME	D	ILUTION	WATE	RBATCH	PROTOCOL		TEST START DATE
Anchor QEA				Port G	amble Monitorin	g			-	I	FSW10	00218.01	PSE	P 1995	3-Oct-2018
JOB NUMBER			PRO.	ЈЕСТ М	ANAGER		LABORATORY		T	EMP. RE	CDR./H	OBO#	TEST SPECIE	S	TEST END DATE
PG1123					B. Hester		Port Ga	amble					Neanthes ar	enaceodentata	23-Oct-2018
Test Location:	_						WATER QU	100,001,000	Contraction of the second s		A				
Test Acceptability:	-							Supplie	Water Batch: er:						
> 90% Survival in Control									sm Batch: Ag	ge:					
TEST CONDITIONS					DO (mg/L) > 4.6		TEMP (C) 20 ± 1		SALINITY (pj			pH 8 QLA Q			
CLIENT/ENVIRON ID	DAY	REP	JAR	meter	D.O. mg/L	meter	TEMP	meter	28 ± 2 SALINITY ppt		meter	8.0±1.0 pH unit	WATER		TECH/DATE
CR-21 /	0	Surr	4	в	7.3	B	20.1	B	29		в	7.9	KEREINA	SW	MK 10/3
CR-21 /	1	Surr	1	8	6.7	8	20.3	8	29		8	1.5		-	SW 10/4
CR-21 /	2	Surr		8	6.3	8	20.2	8	29		8	7.7		Ju	SW 10/5
CR-21 /	3	Surr		8	6.3	8	20.5	8	29		8	7,7	CR		CR 10/6
CR-21 /	4	Surr	,	8	6.6	8	19.8	8	Z8	S	8	7.6		CR	CR IDT
CR-21 /	5	Surr		8	5.5	8	20.1	8	28	-	४	7.5	•		UB 10/8
CR-21 /	6	Surr		B	le.1	B	19.9	B	28		B	7.7		- UL	MK 10/9
CR-21 /	7	Surr		8	5.6	8	19.8	8	28		8	7.4			UB 10/10
CR-21 /	8	Surr	·	8	6.9	8	19.8	8	28		8	7.8		Ju	SN 10/11
CR-21 /	9	Surr		8	6.1	8	19.8	8	28		Е	7.5	SW		Rg 10/12
CR-21 /	10	Surr	T	в	7.0	B	19.6	8	UB		в	7.8		MK	MK 10/13
CR-21 /	11	Surr	4	в	6.7	9	19.8	8	rb		8	7-B			MK 10/14
CR-21 /	12	Surr	1	8	7.3	8	19.6	8	28		8	7.8	82	MK	Sw 10/15
CR-21 /	13	Surr		8	6.8	8	19.6	8	27		8	7.7			EN 10/16
CR-21 /	14	Surr		8	7.4	8	19.5	8	27		8	7.8		N SV	SW 10/17
CR-21 /	15	Surr		8	6.1	8	19.5	8	27		8	7.7	<u>&</u>		SN 10/18
CR-21 /	16	Surr		8	6.7	8	19.7	8	27		8	7.8		જ્ય	MK 10/19
CR-21 /	17	Surr		8	6.8	8	19.5	8	28		8	7.7			SN 10/20
CR-21 /	18	Surr		8	6.6	8	19.6	8	27		8	7.8	5 F	Sw)	En 10/21
CR-21 /	19	Surr		8	6.6	8	19.5	8	28		8	7.7			Su 10/22
CR-21 /	20	Surr	1	8	6.5	8	19.4	8	28		8	7.9			SW 10/23

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CLIENT			PRO.	IECT			START TIME/ END	TIME	DILU	ITION WAT	ER BATCH	PROTO	COL		TEST START DATE	
Anchor QEA				Port G	Samble Monitoring	g		Sector	-	FSW	100218.01		PSEP 19	95	3-Oct-2018	
JOB NUMBER			PRO.	IECT M	ANAGER		LABORATORY		TEM	P. RECDR	/HOBO#	TEST SF	ECIES		TEST END DATE	
PG1123					B. Hester		Port Ga	mble				Neanth	es arenac	eodentata	23-Oct-2018	
							WATER QUA									
Test Location. Test Acceptablility:	_							Dilution	Water Batch:	and the second s						
> 90% Suprival in Control									m Batch: Age:							
									amber Size:							
TEST CONDITIONS					DO (mg/L)		TEMP (C)	S	ALINITY (ppt)		рН 8.0±1.0					
CLIENT/ENVIRON ID	DAY	REP	JAR	1	> 4.6 D.O.		20 ± 1 TEMP		28 ± 2 SALINITY		рН		ATER	Feeding	TECH/DATE	
CLEENT/ENVIRONID	DAT	REP	344	meter	mg/L	meter	°C	meter	ppt	mete		REN	IEWAL		1	
SMA-1B-IT2 /	0	Surr	17	Q	7.6	8	20.1	8	29	8	8.0			SW	MK 103	
SMA-1B-IT2 /	1	Surr		8	7.2	8	20.5	8	29	8	7.8				SW 10/4	
SMA-1B-IT2 /	2	Surr	1	8	7.3	8	20.3	8	29	8	7.9			S	SW 19/5	
SMA-1B-IT2 /	3	Surr		8	7.3	8	20.6	8	29	8	7.9	C	R		CR10/6	
SMA-1B-IT2 /	4	Surr		8	7.4	8	19.8	8	28	8	7.9			Q	CR 10/1	
SMA-1B-IT2 /	5	Surr		8	7.1	8	20.2	8	28	5	7.9				UB 10/8	
SMA-1B-IT2 /	6	Surr		в	7,5	β	20.2	8	W	B	8.0		N	して	MK 10/9	
SMA-1B-IT2 /	7	Surr		8	7,2	8	19.8	8	28	8	7.8				UB 10/10	
SMA-1B-IT2 /	8	Surr		8	7.5	8	20.0	8	28	8	8.0			JL	Sw 10/11	
SMA-1B-IT2 /	9	Surr		8	7.4	8	20.0	8	28	8		S	W		RE 10/12	
SMA-1B-IT2 /	10	Surr	يلە	в	7.7	Ø	[9.8	B	28	в	9.1			MK	ME 10/13	
SMA-1B-IT2 /	11	Surr	17	8	7.6	8	20.0	8	28	8	B.l				MK 10/14	
SMA-1B-IT2 /	12	Surr		8	7.7	8	19.9	8	28	8	8.1	8	ى	MR	SW 10/15	
SMA-1B-IT2 /	13	Surr		9	7.7	9	19.7	8	28	8	8.1				R 10/16	
SMA-1B-IT2 /	14	Surr		8	7.7	8	19.8	8	28	8	8.1			Sw)	SW 10/17	
SMA-1B-IT2 /	15	Surr		8	7.4	8	19.7	8	28	8	0.8	১	と		SW 10/18	
SMA-1B-IT2 /	16	Surr		в	7.6	B	19.7	8	28	8	8.1			SW	M/ 10/19	
SMA-1B-IT2 /	17	Surr		8	7.4	8	19.9	8	28	8	8.1		•		Sans 10/20	
SMA-1B-IT2 /	18	Surr		8	7.5	8	19.9	8	28	8	8.0	•	<u>S</u> W	62	SW 10/21	
SMA-1B-IT2 /	19	Surr		8	1.5	8	19.7	8	28	8	8.0				SW 10/22	
SMA-1B-IT2 /	20	Surr	T	8	7.5	8	19.7	8	28	8	8.1			and the second se	Sur 10/23	

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CLIENT			PRO	JECT			START TIME/ END	TIME	1	DILUTION WA	ATER 8	ватсн	PROT	OCOL		TEST STAR	T DATE
Anchor QEA				Port (Gamble Monitorin	g	+		-	FS\	W100	218.01		PSEP 19	95	3-Oc	t-2018
JOB NUMBER			PRO	JECT N	ANAGER		LABORATORY		1	EMP. RECDI	R./HO	BO#	TEST	SPECIES		TEST END	DATE
PG1123					B. Hester		Port Ga	mble					Near	thes arenac	eodentata	23-00	:t-2018
			· · · · ·				WATER QUA										
Test Location: Test Acceptablitities	-							Dilution	n Water Batch er:			No. of Concession, Name of Conce	=				
> 98% Survival in Control								Organis	sm Batch: 7	ige:							
TEST CONDITIONS					DO (mg/L)		TEMP (C)		SALINITY (F	opt)		рН					
CLIENT/ENVIRON ID	DAY	REP	JAR		> 4.6 D.O.		20 ± 1 TEMP		28±2 SALINITY	,		<u>8.0±1.0</u> рН		WATER	Feeding	TECH	/DATE
			ļ	meter A		meter		meter				unit	R	ENEWAL			
SMA-1B-IT3 /	0	Surr	34	8	7.6	B	19.9	в	28	ß		7,9			SW	MK	103
SMA-1B-IT3 /	1	Surr		8	7.2	8	20.2	8	28	8		7.8				The sea	10/4
SMA-1B-IT3 /	2	Surr		8	7.3	8	20.1	8	29	8	{	7.9			Ju	82	10/5
SMA-1B-IT3 /	3	Surr		8	7.3	8	20.4	8	29	8	3	7.9	0	R		GR	10/6
SMA-1B-IT3 /	4	Surr		8	7.4	8	19.7	8	Z8	8	5	7.9			CR	CR	10/7
SMA-1B-IT3 /	5	Surr		8	7.0	8	20.1	8	28	8	5	79				ИB	6/8
SMA-1B-IT3 /	6	Surr		8	7.4	8	20.1	8	rb	9	>	8.1		じし	しし		0/9
SMA-1B-IT3 /	7	Surr		8	7.0	δ	19.8	8	28	8		7.8				UBI	0/10
SMA-1B-IT3 /	8	Surr		8	7.3	8	20.0	8	28	8	?	8.1			ノレ	Sw	10/11
SMA-1B-IT3 /	9	Surr		б	7.3	8	20.0	G	28			7.9	5	W		Re	10/12
SMA-1B-IT3 /	10	Surr	7	B	7.7	6	19.7	8	ZB	8		g.v			MK	MK	10/3
SMA-1B-IT3 /	11	Surr	34	8	7.6	8	20,0	8	28	8	2	8,0				MK	$\omega 14$
SMA-1B-IT3 /	12	Surr		8	7.7	8	19.8	8	28	8		8.0		Sw	MK	Sw	10/15
SMA-1B-IT3 /	13	Surr		8	7.5	8	19.6	8	2-	1 8		8.0				8N	10/16
SMA-1B-IT3 /	14	Surr		8	7.5	8	19.6	8	28	8	2	8.0			δ	8W	10/17
SMA-1B-IT3 /	15	Surr		8	7.4	8	19,5	8	28	5 8		7.9		え		Sw	10/18
SMA-1B-IT3 /	16	Surr		8	7.6	8	19.6	8	2B	1-		в.0			sw)	MC	10/19
SMA-1B-IT3 /	17	Surr		8	7.3	8	19.8	8	28	8		8.0				ଟ୍ୟ	10/20
SMA-1B-IT3 /	18	Surr		8	7.3	8	19.7	8	28	8	´	0.8		ิณ	SN	ଷ୍ଟ	10/21
SMA-1B-IT3 /	19	Surr		8	7.3	8	19.6	8	28			7.9				SN	10/22
SMA-1B-IT3 /	20	Surr	2	8	7.4	$\left \mathbf{Q} \right $	0 28 19.7	8	28	8		8.1				8~ 1	0 23

Owc 10/23/18 Sul

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CLIENT			PRO	JECT			START TIME/ END	TIME	DILU	ITION WATE	R BATCH	PROTOCOL		TEST START DATE
Anchor QEA				Port (Gamble Monitorin	g			-	FSW10	00218.01	PSEP 19	995	3-Oct-2018
JOB NUMBER			PRO.	JECT M	ANAGER		LABORATORY		ТЕМ	P. RECDR./H	ЮВ О #	TEST SPECIES		TEST END DATE
PG1123					B. Hester		Port G	amble				Neanthes arenad	eodentata	23-Oct-2018
Test Location:	1						WATER QU		1000 C C C C C C C C C C C C C C C C C C					
Test Acceptablility:	-							Supplie	Water Batch: r:					
> 98% Survival in Control]								m Batch: Age: amber Size:					
TEST CONDITIONS					DO (mg/L)		TEMP (C)		SALINITY (ppt)		pH			
CLIENT/ENV/RON ID	DAY	REP	JAR		> 4.6 D.O.		20 ± 1 TEMP		28 ± 2 SALINITY	_	8.0±1.0 pH	WATER	Feeding	TECH/DATE
SMA-2C-IT3 /	0	Surr	44	meter	mg/L 7.6	meter	<u>، د</u> ۱۹،۶	meter	ve ve	meter	unit 8,0	RENEWAL	SW	MK 10/3
SMA-2C-IT3 /	1	Surr	1	8	7.4	8	19.6	8	28	8	7.9		200	SW 10/4
SMA-2C-IT3 /	2	Surr	-	8	7.4	8	19.7	8	28	8			Ju	Sw 10/5
SMA-2C-IT3 /	3		-			+					8.0	(.)	00	
		Surr	-	8	7.4	8	20.1	8	28	8	8.0	R	10.00	CR 10/6
SMA-2C-IT3 /	4	Surr		8	7.5	8	19.5	8	28	8	8.0		cr	(R 1017
SMA-2C-IT3 /	5	Surr		8	7.2	8	19.8	8	27	8	7.9			UB 10/8
SMA-2C-IT3 /	6	Surr		8	7.6	8	19.6	в	27	в	8.0	L V	UL	MK 10/9
SMA-2C-IT3 /	7	Surr		8	7.4	8	19.5	8	28	8	7.8			UB 10/10
SMA-2C-IT3 /	8	Surr		8	7.4	8	19.6	8	28	8	8.0	· · · · · · · · · · · · · · · · · · ·	VL	FW 10/11
SMA-2C-IT3 /	9	Surr		G	7.5	8	19.7	8	28	g	7.8	SU		RE 10/12
SMA-2C-IT3 /	10	Surr	T	B	7.7	B	19.5	B	28	B	B.0		ME	MK 10/13
SMA-2C-IT3 /	11	Surr	44	8	7.6	8	19.6	8	28	8	7.9			MK VO(14
SMA-2C-IT3 /	12	Surr	١	8	7.7	8	19.5	8	28	8	8.0	Sw	MK	SW 10/15
SMA-2C-IT3 /	13	Surr		8	7.5	8	19.4	8	27	8	7.9			8W 10/16
SMA-2C-IT3 /	14	Surr		8	7.6	8	19.4	8	28	8	7.9		EN)	8N 10/17
SMA-2C-IT3 /	15	Surr		8	1,5	8	19.3	8	28	8	7.9	ଷ୍ୟେ		SW 10/18
SMA-2C-IT3 /	16	Surr	T	8	7.5	8	19.5	8	28	8	8.0		Su	MK 10/19
SMA-2C-IT3 /	17	Surr	1	8	7.4	8	19.5	8	28	8	7.9		V	SN 10/20
SMA-2C-IT3 /	18	Surr	1	8	7.4	8	19.6	8	28	8	7.8	Ŵ	R	EN 10/21
SMA-2C-IT3 /	19	Surr		8	7.4	8	19.5	8	28	8	7.8			SN 10/22
SMA-2C-IT3 /	20	Surr	1	8	1.3	8	19.4	8	28	8	7.9			Sw 10/23



CLIENT			PRO	JECT			START TIME/ END	TIME	DILUTI	ON WATE	R BATCH	PROTOCOL		TEST START DATE	
Anchor QEA				Port	Gamble Monitorin	g	+		-	FSW1	00218.01	PSEP 19	995	3-Oct-2018	
JOB NUMBER			PRO	JECT	ANAGER		LABORATORY		TEMP.	RECDR./H	OBO#	TEST SPECIES		TEST END DATE	
PG1123					B. Hester		Port G	amble				Neanthes arenad	eodentata	23-Oct-2018	
	-						WATER QU								
Test Location: Test Acceptablility:	+							Dilution	Water Batch:	and the second se					
90% Survival in Control									sm Batelit. Age:						
				04 m-2104030/00					hamber Size:						
TEST CONDITIONS					DO (mg/L) > 4.6		TEMP (C) 20 + 1		SALINITY (ppt)		рН 8.0±1.0				
CLIENT/ENVIRON ID	DAY	REP	JAR		D.O.		20 ± 1 TEMP		28 ± 2 SALINITY		рН	WATER	Feeding	TECH/DATE	
	-		-	meter		meter	<u>°C</u>	meter		meter	unit	RENEWAL			
SMA-2C-IT6 /	0	Surr	37	8	7,6	Ø	20.0	8	VO	B	7.9		SW	MK 103	
SMA-2C-IT6 /	1	Surr		8	6.6	8	20.3	8	28	8	7.6			SW 10/4	
SMA-2C-IT6 /	2	Surr		8	7.0	8	20.2	8	28	8	7.7		N	82 10/5	
SMA-2C-IT6 /	3	Surr		8	7.0	8	20.5	8	28	8	7.8	CR		CR 10/6	
SMA-2C-IT6 /	4	Surr	\prod	8	7.4	8	19.8	8	28	8	7.8		CR	CR 10/7	
SMA-2C-IT6 /	5	Surr		8	7.0	8	20.1	8	27	8	7.7			UB 10/5	
SMA-2C-IT6 /	6	Surr		8	7,4	୬	201	8	ZB	8	7.9	UV	\mathcal{U}	MK 10/9	
SMA-2C-IT6 /	7	Surr		8	7.2	8	19.7	8	28	S	7.7-			UB 10/10	
SMA-2C-IT6 /	8	Surr		8	7,4	Q	19.9	8	28	8	7.9		Jr	BN 10/11	
SMA-2C-IT6 /	9	Surr		g	7.2	8	20.0	8	28	8	7.7	SU		RE 10/12	
SMA-2C-IT6 /	10	Surr		B	7.7	8	19.7	8	28	8	7.9		MK	MK 10/13	
SMA-2C-IT6 /	11	Surr	31	8	7.5	8	19.9	8	28	8	7.B			MK 10/14	
SMA-2C-IT6 /	12	Surr		8	7.5	8	19.8	8	28	8	7.8	5N	MK	SW 10/15	
SMA-2C-IT6 /	13	Surr		8	7.4	8	19.6	8	27	8	7.8			SW 10/16	
SMA-2C-IT6 /	14	Surr		8	7.5	8	19.6	8	28	8	7.8		82	SW 10/17	
SMA-2C-IT6 /	15	Surr		8	7.2	8	19.5	8	28	8	7.7	Sw		SW 10/18	
SMA-2C-IT6 /	16	Surr		8	7.6	8	19.6	8	28	8	7.8		SN	MIC 10/19	
SMA-2C-IT6 /	17	Surr		8	7.1	8	19.7	8	27	8	7.8			SW 10/20	
SMA-2C-IT6 /	18	Surr		8	7.2	8	19.7	8	28	8	7.7	SN	Sw)	SN 10/21	
SMA-2C-IT6 /	19	Surr		8	7.2	8	19.7	8	28	8	7.7			Sw 10/22	
SMA-2C-IT6 /	20	Surr	7	8	7.3	8	19.6	8	28	8	7.8			Sw 10/23	



CLIENT			Τ	PRO.	JECT			START TIME/ END	TIME		DILUTIO	N WATE	R BATCH	PROT	OCOL		TEST START DATE
Anchor QEA					Port (Gamble Monitori	ng			-		FSW1	00218.01		PSEP 19	995	3-Oct-2018
JOB NUMBER				PRO.	ЈЕСТ М	ANAGER		LABORATORY			TEMP. R	ECDR./H	10BO#	TEST	SPECIES		TEST END DATE
PG1123						B. Hester		Port G	amble					Near	nthes arenac	ceodentata	23-Oct-2018
								WATER QU									
Test Location:									Dilution	Water Bato	n:			[
90% Survival in Control									Organis	m Batch:	Age:						
TEST CONDITIONS					C.S.	DO (mg/L)		TEMP (C)		amber Size	opt)		рH	1			
		1				> 4.6 D.O.		20 ± 1 TEMP		28 ± 2 SALINIT	· · · · · ·		8.0±1.0		WATER		
CLIENT/ENVIRON ID	DA	Y R		JAR	meter	mg/L	meter	°C	meter	р	t	meter	pH unit		ENEWAL	Feeding	TECH/DATE
SMA-2C-IT9 /	0	Sı	um	9	8	7.5	θ	20.3	6	U)	B	3.0			SW	MK 10/3
SMA-2C-IT9 /	1	Sı	un	1	8	7.1	8	20.5	8	28	,	8	7.7				Sw 10/4
SMA-2C-IT9 /	2	Su	urr		8	7.4	8	20.3	8	28	•	8	7.8			22	SW 10/5
SMA-2C-IT9/	3	Su	urr		8	7.1	8	20.6	8	Ze	1	8	7.8	(R		CR 10/6
SMA-2C-IT9 /	4	Sı	m		8	7.1	8	19.9	8	ZŹ		8	7.8			CR	CR 10/7
SMA-2C-IT9 /	5	SL	m		8	7.2	8	20.2	8	2.8		8	7.8				NB 10/5
SMA-2C-IT9 /	6	SL	m		Š	7.5	8	20.2	8	20		B	7.9		N	して	MK 10/9
SMA-2C-IT9 /	7	Su	ın		8	7.3	8	19.9	8	28	Ť	8	7.7		0		UB 10/10
SMA-2C-IT9 /	8	Su	ILL		8	7.5	8	20.1	8	28	7	8	7.9			UL	8~ 10/11
SMA-2C-IT9 /	9	Su	ILL		8	7.5	8	20.0	8	28	>	8	7.7	5	W .		Re 10/12
SMA-2C-IT9 /	10	Su	IIT .	2	B	7.7	0	19.8	6	28		6	7.9			MK	MK 10/13
SMA-2C-IT9 /	11	Su	ırr	9	8	7.6	8	20.1	8	28		8	7.9				MK 10/14
SMA-2C-IT9 /	12	Su	III	1	8	7.5	8	19.9	8	28		8	7.8	8	ິນ	MK	Sw 10/15
SMA-2C-IT9 /	13	Su	m		8	7.5	8	19.8	8	28		8	7.8				SW 10/16
SMA-2C-IT9 /	14	Su	m		8	7.6	8	19.8	8	28		ନ୍ଦ	7.8	Sec.		82	Sw 10/17
SMA-2C-IT9 /	15	Su	m		8	7.3	8	19.7	8	28		8	7.8		ନ୍ଧ		SW 10/18
SMA-2C-IT9 /	16	Su	'n		8	7.4	8	19.9	8	28		8	7.8			82	MK 10/19
SMA-2C-IT9 /	17	Su	п		8	7.2	8	19.9	8	28		8	7-8				SW 10/20
SMA-2C-IT9 /	18	Su	m		8	7.2	8	19.9	8	28		ç	7.7		8	8~	SW 10/21
SMA-2C-IT9 /	19	Su	п		8	7.2	8	19.8	8	2.8		8	7.7				SW 10/22
SMA-2C-IT9 /	20	Sur	rr	7	8	7.4	8	19.7	8	28		8	7.8				SW 10/23

Ammonia and Sulfide Analysis Record

Client/Pr ANCHOK		A Frankle	L FINAL		anism: N	eanthes			Test I	Duration (2	20	
OVE	ETEST CRLYIN	G (OV) /	C FINAL POREWATEI	∠_0 R (PV	THER \$7(circl	(circle one) le one) / Comm	nents:				DAY of TH	EST:	
			libration Standa	rds T	ſempera	ature Temperatur	e: 22.)°C			e should be with are at time and o		
Sample ID or Description	Conc. or Rep	Date of Sampling a Initials	(mg/L)	Ten	eter #/ np (°C)	Date of Reading and Initials	Sample Preserved (Y/N)	pH	Sal (ppt)	Sample Volume (mL)	Measured Sulf. (mg/L)	Multi- plier	Calc- ulated Sulf. (mg/L)
0V 0 (CARF 20 CR. 21 IB IT2 IT3 2C IF3 IT6 IT9	Surr.	ر ¹⁰ /03/ر8 ر	C 0.00 0.410 0.304 0.585 0.622 0.987 0.00 C.00	TI	21.0	10/03/18 J.	N				0.008 0.017 0.017 0.007 0.007 0.011 0.009 0.008 0.004		
PW 8 CAPP20 CR21 18-TT2 TT3 2C TT3 TT6 TT9	Surr		0.00 3.21 0 8.75 0 0 0.096 0.296		21.0 21.0 21.0 21.0 21.0 21.0	10[03 RE		7.2 7.3 7.4 7.5 7.5 7.2 7.3	29 29 7 26 24 26 27		ND 0.006 ND 0.048 0.011 G.013 0.031	2 2 5 5 10 10 10	ND 0.012 ND 3-090240 240 0.110 0.130 0.310

() Insufficient volume AE 10(03. (2) [E.J. 10/03.

Ammonia and Sulfide Analysis Record

Test Duration (days): 20 **Client/Project: Organism:** Nearthes Anchor / POA Gamble PRETEST / INITIAL / FINAL / OTHER (circle one) DAY of TEST: 20 OVERLYING (OV) / POREWATER (PW) (circle one) / Comments: **Calibration Standards Temperature** Sample temperature should be within +1°C of 10/23/18 22.2°C Date: **Temperature:** standards temperature at time and date of analysis. Calc-Date of Date of Sample Measured Ammonia Sample Meter #/ Multi-Sample ID or Conc. Sal ulated Sampling and Reading and Volume Sulf. Value Preserved pН Temp (°C) Description or Rep (ppt) plier Sulf. Initials (mg/L)Initials (Y/N)(mL)(mg/L)(mg/L)Ø Surv. 10/23/18 11 1.17 TI 21.4 10/23 UL $0\sqrt{}$ N 0.001 10 (ARR 20 .36 0.000 7.50 CR21 0.003 1B 172 420 0 0.000 18 IT3 0 326 0.000 .84 26173 100.0 2.77 0.003 20 176 1.44 t J L 20 179 0.001 ĩ, B 79 7.5 27 2 (~ 0.020 TI 11.2 0.004 PW CARP 20 0 7.0 ς 27 L ND ND (i)2.9 F06,0 0 070 (R21 27 GI Ú 1B152 ~> $\overline{\mathbb{O}}$ 1B 173 2C IT3 \bigcirc D 2 (ON NI) 5 27 26116 7.6 ND 1.81 T 7.5 2 27 5 26,179 0.00 Ł 0.00

OINSUfficient volume for analysis. I 10/23 (DIE.J- 10/23. C

Page _____ of ____

ORGANISM RECEIPT LOG

Date: 9-2	Q 107	Time					ch No.		
1-2	8-18		1020			A.	TS0928	518	
Organism:			e e a d	\	- 1				
Nean	thes a	rena	C~00	ent	ata				
Source / Su	pplier:	```	5	t.					
Aquat	ic Tox	, cology	Sub	porl					
No. Ordere	d:	No.	Receive	d:			rce Batch: ction date, hat	tch date, etc.):	
840		9	24			Em	lerge Dat	e 09-5-	10-20(8
Condition o		ms:					e or Age: e stage, size c	lass, etc.):	
Goo	d			2	3-2	_8	duys ol	d	
Shipper:				B of	L (Trac	king	No.)		
Cou	rier				NA				
Condition of	of Containe	er:		Rece	ived B	y:			
Goe	ъд				BH	18	2		
Container	D.O. (mg/L)	Temp. (°C)	Cond Sal (Inclu Unit		pl (Uni		# Dead	% Dead*	Tech. (Initials)
Comp	14.0	19.1	Ĺ Ŋ		7.	ろ			Sw, BH
*if >10% contac	ct lab managei	-							
Notes:									



Aquatic Toxicology Support 1849 Charleston Beach Road West Bremerton, Washington 98312 (360) 813-1202

Order Summary

Species: Neanthes arenaceodentata*	Emerge Date: Sept 5-10'18
Number Ordered: 840	Number Shipped: $840 + 104_{\circ}$
Date Shipped: Sept 28'18	Salinity (ppt): 31
*Smith 1964 CSULL and Peach strain Food w	

*Smith 1964. CSU Long Beach strain. Feed upon arrival.

MAINTENANCE LOG FOR CULTURES

ORGANISM: Neanners LOCATION: Bath 2

Batch Nu	imber:	97509	28 (B		Dat	e Received	1: 9/2	B / (B	Initial	# of Organ	isms:	
Date 2019	Feed AM/PM	Tub No.	D.O.	Temp (°C)	Cond/	pН	H₂O Change	Organisms appear healthy (Y/N)	# Mort	% Mort*	Init.	Comments
9/29		10-d 1	6.9	19.7	32	7.8	N	Y			UL	
		2	6.9	19.9	32	7,B			4			
		20.d	6.2	19.9	32	7.5		L				
930	J	10.d 1	6.9	19.9	32	7.8	4	4			N	
		2	6.9	200	32	7.B					(
J		20. d	6.5	198	31	7.6	-	L			L	
10/01		10.d (7.0	20.0	32	7.9	Ŋ	Ч			JL	
		2	6.8	20.1	32	7.B					(
L		20.d	6.3	19.7	32	7.7						
10/2		10d 1	7.0	19.5	32	7.9	N	Y			MK	
(-	2	7.1	19.5	32	7.8						
U		20d 1	6.7	19.4	N	7.7	t	L		-	5	
10.3		2021	7.1	19.1	32	7.8	\sim	Y			ВИ	
								,				

FT = Flow-through **if* >10% *notify* lab manager

4/3/17

Reference	e I (oxicant	96-n	Acute	Survival	lest									All Ma	tching Lab
Fest Type Protocol:				I			sm: Neanth int: Proport			(Polycha	Mate Sou	erial: rce:	Total A Refere		ia xicant-RE	F
	350 300		/			F	teference Toxic	ant 96-h Acute	Survival	Test						
:50-mg/L Total Amm	250 200 150		ł							_		•		•	0	+2s +1s Mean -1s -2s
	100	05 Jan-16	2	26 Feb-16- 15 Apr-16-	-24 Jun-16-	21 Jul-16- 26 Aug-16-	16 Sep-16- 23 Sep-16-	21 Oct-16- 05 May-17-	26 May-17-	09 Jun-17- 28 Jui-17-	25 Aug-17-	16 Nov-17-	27 Dec-17-	23 Feb-18-	15 Jun-18– 17 Aug-18–	02 Oct-18
luality C	ont	Si	ean: gma:	174.9 : n/a		Count: 2 CV: 1	0 7.90%	-1s Warr +1s Warr	-				Action Action			
oint Yea				Time	QC Dat	ta Delta	Sigma	Warning	Action	Test ID		۸n	alysis IC	<u>ا</u> ۱	boratory	
		Jan	5	15:40	211.6	36.74	1.072	(+)	70001	08-2089	-5605		0377-20		VIRON	
			29	10:55	170.9	-3.953	-0.1285			17-5198			4316-44		VIRON	
		Feb	26	13:05	251.9	77.04	2.052	(+)	(+)	12-4659					VIRON	
		Apr	15	11:20	187.5	12.62	0.3917	. ,	. ,	14-5662			2817-74		VIRON	
		Jun	24	14:10	161.5	-13.35	-0.4466			18-4503	3329				VIRON	
i		Jul	21	14:00	130.8	-44.03	-1.63	(-)		03-2252	3368		5043-45		VIRON	
,		Aug	26	17:00	191.5	16.65	0.5112			03-0001	-3671	08-	4097-95	52 E	VIRON	
\$		Sep	16		196.9	21.99	0.6659			15-1361	3636	10-	0806-25	73 E	VIRON	
-			23	14:00	135.9	-39	-1.418	(-)		11-8849	-2684	05-	6423-69	75 EN	VIRON	
0		Oct	21	12:20	157.3	-17.52	-0.5936			07-3517	7142	10-	6382-33	44 EN	VIRON	
1 201	17	May	5	11:10	145.4	-29.42	-1.036	(-)		19-9695	-8635	12-	9907-41	32 Ec	oAnalysts	
2			26	11:20	135.4	-39.44	-1.437	(-)		02-4398	8901	19-	3251-43	83 Ec	oAnalysts	
3		Jun	9	13:12	152.9	-21.94	-0.7537			06-5936	-3810	21-	1385-61	47 Ec	oAnalysts	
4		Jul	28	10:45	183.1	8.221	0.2582			04-6413		06-	5419-20	75 Ec	coAnalysts	
5		Aug	25	10:40	172.2	-2.631	-0.0852			03-6651			4165-49		oAnalysts	
6		Nov	16	13:40	188.2	13.35	0.4136			03-0415		04-	9955-51	24 Ec	oAnalysts	
7		Dec	27	15:35	165.8	-9.019	-0.2977			01-8821			9204-36		coAnalysts	
	18	Feb	23	16:20	226.4	51.55	1.452	(+)		13-7905	-8989		7098-67		coAnalysts	
9		Jun	15	14:35	170.5	-4.41	-0.1436			04-1274	1602	03-	0642-19	93 Ec	oAnalysts	
20		Aug	4 -	14.15	04 - 0	10 10	1 169			07 0700			0400 40			

CETIS QC Plot

Report Date:

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22 Oct-18 16:37 (1 of 1)

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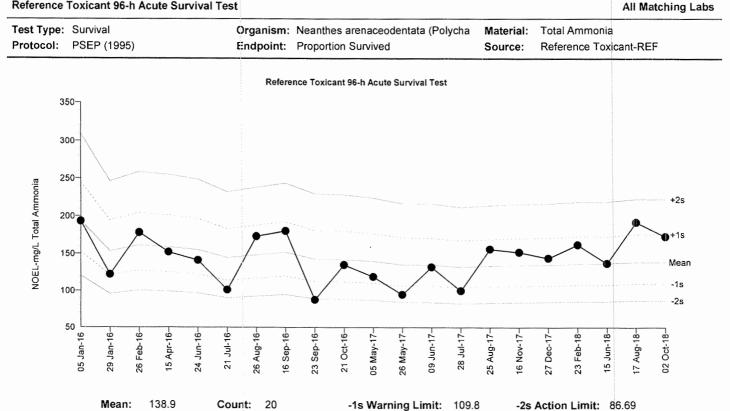
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Analyst: _____ QA:_____

07-8700-6256 13-3406-4651 EcoAnalysts

21-2226-7904 00-1709-8680 EcoAnalysts



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		Si	gma:	n/a	C	V:	23.90%	+1s Warni	ng Limi	i t: 176	+2s Action Lim	i t: 222.8
ualit	ty Con	trol Dat	a									
oint	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
	2016	Jan	5	15:40	193	54.07	1.393	(+)		08-2089-5605	14-5672-8302	ENVIRON
			29	10:55	122	-16.93	-0.5508			17-5198-4435	20-2746-8183	ENVIRON
		Feb	26	13:05	178	39.07	1.05	(+)		12-4659-9912	04-9112-4627	ENVIRON
		Apr	15	11:20	152	13.07	0.3808			14-5662-2397	08-8399-3634	ENVIRON
		Jun	24	14:10	141	2.066	0.06254			18-4503-3329	05-9137-4303	ENVIRON
		Jul	21	14:00	101	-37.93	-1.351	(-)		03-2252-3368	05-6001-6512	ENVIRON
		Aug	26	17:00	173	34.07	0.9292			03-0001-3671	13-0809-8319	ENVIRON
		Sep	16	13:45	180	41.07	1.097	(+)		15-1361-3636	20-6898-0370	ENVIRON
			23	14:00	87.6	-51.33	-1.954	(-)		11-8849-2684	14-0354-7159	ENVIRON
)		Oct	21	12:20	135	-3.934	-0.1217			07-3517-7142	04-1673-2094	ENVIRON
	2017	May	5	11:10	119	-19.93	-0.6563			19-9695-8635	08-7557-3106	EcoAnalysts
2			26	11:20	94.7	-44.23	-1.624	(-)		02-4398-8901	20-6641-5688	EcoAnalysts
3		Jun	9	13:12	132	-6.934	-0.2169			06-5936-3810	02-9842-7509	EcoAnalysts
4		Jul	28	10:45	99.9	-39.03	-1.398	(-)		04-6413-3650	18-1225-7941	EcoAnalysts
5		Aug	25	10:40	156	17.07	0.4909			03-6651-4426	09-2206-9228	EcoAnalysts
6		Nov	16	13:40	152	13.07	0.3808			03-0415-6136	18-4343-4696	EcoAnalysts
7		Dec	27	15:35	144	5.066	0.1518			01-8821-8905	01-3003-6293	EcoAnalysts
8	2018	Feb	23	16:20	162	23.07	0.6508			13-7905-8989	16-4206-5191	EcoAnalysts
9		Jun	15	14:35	137	-1.934	-0.0594			04-1274-1602	00-8204-0817	EcoAnalysts
0		Aug	17	14:15	192	53.07	1.371	(+)		07-8700-6256	00-3442-0298	EcoAnalysts
1		Oct	2	14:10	173	34.07	0.9292			21-2226-7904	05-0269-1791	EcoAnalysts

CETIS QC Plot

006-469-472-7

Analyst: _____ QA:_____

CETIS QC Plot Reference Toxicant 96-h Acute Survival Test										Report Date:	26 Oct-18 09:27 (1 of 1)
Refere	nce 1	loxican	t 96-ł	Acute	Survival T	est					All Matching Labs
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		05 Nov-15		05 Jan-16- 29 Jan-16-	26 Feb-16	24 Jun-16 21 Jul-16	26 Aug-16- 23 Sep-16-	21 Oct-16- 05 May-17-	26 May-17 09 Jun-17 28 Jul-17	25 Aug-17 16 Nov-17 27 Dec-17 23 Feb-18	15 Jun-18- 17 Aug-18- 02 Oct-18-
		05		50 05	26	2 24	26 23	21 05	26 09 26	25 27 27 23	15 17 02
			ean:	1.768		ount: 20			ning Limit: 1.525		nit: 1.315
			igma	: n/a	C	V: 14.	90%	+1s Warr	ning Limit: 2.049	+2s Action Lir	nit: 2.376
Quality	Con	trol Dat	а								
		Month	Day	Time	QC Data	Delta	Sigma	Warning	Action Test ID	Analysis ID	Laboratory
	2015	Nov	5	16:00	1.894	0.126	0.4658		13-9158-	6969 12-9319-1772	ENVIRON
2	2040	Dec	4	15:55	1.68	-0.0881	-0.3459		05-0232-		
3 2 4	2016	Jan	5	15:40	2.076	0.3081	1.087	(+)	16-5879-		
5		Feb	29 26	10:55 13:05	2.116 2.236	0.3487 0.468	1.218	(+)	02-3774-		
6		Jun	20	14:10	1.621	-0.1467	1.589 -0.5863	(+)	18-2733- 14-5937-		
7		Jul	21	14:00	1.412	-0.3557	-1.52	(-)	13-0851-		
8		Aug	26	17:00	1.818	0.05013	0.1892	(-)	18-0730-		
9		Sep	23	14:00	1.482	-0.2861	-1.195	(-)	16-0277-		
10		Oct	21	12:20	1.851	0.08363	0.3128		15-4953-		
	2017	May	5	11:10	1.947	0.1794	0.654		06-1983-	2716 10-6060-2702	EcoAnalysts
12			26	11:20	1.668	-0.09972	-0.3929		11-9977-		EcoAnalysts
13 14		Jun	9 20	13:12	1.32	-0.4474	-1.974	(-)	20-5746-		•
14		Jui Aug	28 25	10:45 10:40	1.989 1.716	0.2214	0.7983		11-9488-		
16		Nov	25 16	13:40	2.122	-0.05214 0.3543	-0.2026 1.236	(+)	04-3451-		-
17		Dec	27	15:35	1.678	-0.03985	-0.353	(+)	21-2485- 14-3251-		-
	2018		23	16:20	1.939	0.1708	0.6241		08-4313-		
19		Jun	15	14:35	1.432	-0.3357	-1.425	(-)	13-9420-		
20		Aug	17	14:15	1.721	-0.0467	-0.1811	.,	16-0114-		•
21		Oct	2	14:10	2.087	0.3195	1.124	(+)	02-7017-		
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Reference	Toxicant	96-h	Acute	Survival Te	est						All Matching La
Test Type: Protocol:							nes arenaceo tion Surviveo		^D olycha Mate Sou		d Ammonia e Toxicant-REF
	c				Re	ference Toxi	cant 96-h Acute	e Survival T	est		
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	05 Nov-15		05 Jan-16 29 Jan-16	26 Feb-16	21 Jul-16	26 Aug-16- 23 Sep-16-	21 Oct-16	26 May-17 09 Jun-17	28 Jul-17	16 Nov-17- 27 Dec-17- 23 Feb-18-	15 Jun-18- 17 Aug-18- 02 Oct-18-
	04		09 29	26	21 24	26 /	21 0 05 M	26 M	28 25 /	16 N 27 D 23 F	15 . 17 /
			1.50	~							
		ean: igma:	1.56 n/a		ount: 20 V: 16	.30%		ning Limi ning Limi		-2s Action Lin +2s Action Lin	
uality Ca							15 Wall		. 1.000		int, 2.157
uality Co											
pint Year	Nov	Day 5	16:00	QC Data 1.627	Delta 0.06667	Sigma 0.2584	Warning	Action		Analysis ID	Laboratory
2010	Dec	4	15:55	1.473	-0.08733	-0.3558			13-9158-6969 05-0232-3049	18-5085-3785 09-1115-6716	
2016		5	15:40	2.023	0.4627	1.604	(+)		16-5879-5239	13-0355-9173	
		29	10:55	1.883	0.3227	1.161	(+)		02-3774-6836	16-2829-1192	
	Feb	26	13:05	1.635	0.07467	0.2887	()		18-2733-1978	17-6331-1700	
	Jun	24	14:10	1.415	-0.1453	-0.6039			14-5937-9292	10-8537-0051	
	Jui	21	14:00	1.27	-0.2903	-1.272	(-)		13-0851-4355	06-2505-9350	
	Aug	26	17:00	1.732	0.1717	0.6447	(-)		18-0730-6378	04-2606-0638	
	Sep	23	14:00	1.085	-0.4753	-2.244	()	()			
	Oct	21	12:20	1.725	0.1647	-2.244 0.6197	(-)	(-)	16-0277-5330	10-1484-1501	
		5							15-4953-5653	10-3980-3312	
2017	May		11:10	1.812	0.2517	0.9236			06-1983-2716		EcoAnalysts
	lu-	26 0	11:20	1.529	-0.03133				11-9977-1019		EcoAnalysts
3	Jun	9	13:12	1.258	-0.3023	-1.33	(-)		20-5746-1828	13-3286-2330	
ļ s	Jul	28 25	10:45	1.532	-0.02833	-0.1132			11-9488-2902	00-8692-4177	EcoAnalysts
	Aug	25	10.40	1 52	0 02022	0 1010			0 4 0 4 F 4 4 0 4 0		

07-6966-4955 EcoAnalysts

00-9775-4668 EcoAnalysts

04-4998-7500 EcoAnalysts

12-5767-7210 EcoAnalysts

12-4705-5925 EcoAnalysts

03-4717-2264 EcoAnalysts

12-2051-3096 EcoAnalysts



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04-3451-1040

21-2485-6236

14-3251-3795

08-4313-9079

13-9420-2469

16-0114-0602

02-7017-5318

006-469-472-7

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CETIS Summary Report

Report Date: Test Code/ID:

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22 Oct-18 16:37 (p 1 of 1) 7E7F3D00 / 21-2226-7904

Reference To	xicant 96-h Acu	te Surviva	l Test									Ec	oAnalys	sts
Batch ID: Start Date: Ending Date: Test Length:	20-2661-2066 02 Oct-18 14:10 06 Oct-18 14:50 4d 1h	0 Pr 0 Sp		Survival PSEP (1995) Neanthes arena Polychaeta	aceodentata	1		Dilı Bri	alyst: uent: ne: urce:	Not App		/ater gy Support	Age:	
Sample ID:	17-6336-1456	Co	ode:	691AC2B0				Pro	ject:	Referer	nce Toxic	ant		
Sample Date:	: 15 May-17 -	Ma	aterial:	Total Ammonia				So	urce:	Referer	nce Toxic	ant í		
	: 15 May-17 🦯		AS (PC):					Sta	tion:	P17051	5.103 🖉			
Sample Age:	505d 14h	CI	ient:	Internal Lab					w					
Multiple Com	parison Summa	ary												
Analysis ID	Endpoint		Comp	arison Method				NOEL	LOE	L T	OEL	TU	PMSD) S
05-0269-1791	Proportion Surv	vived	Fisher	Exact Test			/	173	·⁄223	1	96.4		n/a	1
Point Estima	te Summary													
Analysis ID	Endpoint		Point	Estimate Meth	od		\checkmark	Level	mg/L	- 9	5% LCL	95% UCL	TU	S
00-1709-8680) Proportion Surv	vived	Trimm	ned Spearman-K	lärber			EC50	197.3	3 1	95.5	199		1
Proportion S	urvived Summa	ıry												
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min		Max	Std E	Err S	td Dev	CV%	%Effe	ct
0	D	3	1.000		1.0000	1.0000		1.0000	0.000	00 00	.0000	0.00%	0.00%	
63.6		3	1.000		1.0000	1.0000		1.0000	0.000	00 00	.0000	0.00%	0.00%	
116		3	1.000		1.0000	1.0000		1.0000	0.000		.0000	0.00%	0.00%	
148		3	1.000		1.0000	1.0000		1.0000	0.000		.0000	0.00%	0.00%	
173		3	1.000		1.0000	1.0000		1.0000	0.000		.0000	0.00%	0.00%	
223		3	0.033	3 0.0000	0.1768	0.0000		0.1000	0.033	33 0	.0577	173.21%	96.679	%
-	urvived Detail		_											
Conc-mg/L	Code	Rep 1	Rep 2											
0	D	1.0000	1.000											
63.6		1.0000	1.000											
116		1.0000	1.000											
148		1.0000	1.000											
173		1.0000	1.000											
223		0.0000	0.100	0 0.0000						110-0110-010-010-01				
Proportion S	urvived Binomi	als												
Conc-mg/L	Code	Rep 1	Rep 2	and the second										
0	D	10/10	10/10											
63.6		10/10	10/10											
116		10/10	10/10											
		10/10	10/10											
148														
148 173 223		10/10 0/10	10/10	10/10										

Analyst:_____ QA:____M

CETIS Tes	t Dat	a W	orks	heet					Report Date: Test Code/ID:	22 Oct-18 16:36 (p 1 of 1) 7E7F3D00 / 21-2226-7904
Reference To	ference Toxicant 96-h Acute Survival Test Int Date: 02 Oct-18 14:10 Species: Neanthes arenaceodentata Sample Code:							anta dal matrix ang di ang dan di dalam da	an an ann an an ann ann an an ann an an	EcoAnalysts
Start Date: End Date: Sample Date:	06 O	ct-18	14:50	Protoco	s: Neanthes bl: PSEP (19 l: Total Am	995)	Sample Code: 69 Sample Source: R Sample Station: P			
Conc-mg/L	Code D	Rep 1	Pos 13	# Exposed	# Survived			Notes		
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0	D	2	10	10	10 -					
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- 63.6		1	8	10	10 _					
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116		2	15	10	10					
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/ 148		1	14	10	10					
148			17							
		2		10	10 _					
148		3	9	10	10 -					
/ 173		1	12	10	10 _				ла на политични и политични	
173		2	11	10	10 _					
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223		2	4	10	1 _					
223		3	5	10	0 -					

Analyst:_____ QA:_____

CETIS	Summary	Report
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Report Date: Test Code/ID:

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26 Oct-18 09:27 (p 1 of 1) 101A8C56 / 02-7017-5318

Reference To	xicant 96-h Acu	te Surviva	l Test								Ec	oAnalys	sts
Batch ID: Start Date: Ending Date: Test Length:	16-8756-8795 02 Oct-18 14:10 06 Oct-18 14:50 4d 1h) Pr) Sp	ecies: N	urvival SEP (1995) eanthes arena olychaeta	aceodentata	I		Dilu Brir	ne:	Laboratory Seav Not Applicable Aquatic Toxicolo		Age:	
Sample ID:	07-0788-5901	Co	de: 2/	A317B4D				Dro					
Sample Date:				nionized Amn	nonia			-		Reference Toxic Reference Toxic			
Receipt Date			AS (PC):		lonia					P170515.103	am		
Sample Age:	-			ternal Lab				Stat		11/0010.100			
Multiple Com	parison Summa	ary											
Analysis ID	Endpoint	-	Compar	ison Method			\checkmark	NOEL	LOEL	TOEL	τυ	PMSD) 5
12-2051-3096	Proportion Surv	vived		xact Test				2.059	2.114	2.086		n/a	1
Point Estima	te Summary												
Analysis ID	Endpoint		Point Es	stimate Meth	od		1	Level	mg/L	95% LCL	95% UCL	TU	s
01-2654-4798	Proportion Surv	vived		Spearman-K				EC50	2.087	2.085	2.089	10	1
Proportion S	urvived Summa	ry											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min		Max	Std E	rr Std Dev	CV%	%Effe	ct
0	D	3	1.0000	1.0000	1.0000	1.0000		1.0000	0.000		0.00%	0.00%	
1.192		3	1.0000	1.0000	1.0000	1.0000		1.0000	0.000		0.00%	0.00%	
1.733		3	1.0000	1.0000	1.0000	1.0000		1.0000	0.000		0.00%	0.00%	
1.974		3	1.0000	1.0000	1.0000	1.0000		1.0000	0.000		0.00%	0.00%	
2.059		3	1.0000	1.0000	1.0000	1.0000		1.0000	0.000		0.00%	0.00%	
2.114		3	0.0333	0.0000	0.1768	0.0000		0.1000	0.033		173.21%	96.67%	
Proportion S	urvived Detail		1										
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3									
0	D	1.0000	1.0000	1.0000									
1.192		1.0000	1.0000	1.0000									
1.733		1.0000	1.0000	1.0000									
1.974		1.0000	1.0000	1.0000									
2.059		1.0000	1.0000	1.0000									
2.114		0.0000	0.1000	0.0000									
Proportion S	urvived Binomia	als										<u></u>	
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3									
0	D	10/10	10/10	10/10									
1.192		10/10	10/10	10/10									
1.733		10/10	10/10	10/10									
1.974		10/10	10/10	10/10									
		10/10	10/10	10/10									
2.059													

006-469-472-7

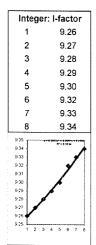
ETIS Tes	t Dat	a W	orks	heet				Report Date: Test Code/ID:	26 Oct-18 09:26 (p 1 of 1) 101A8C56 / 02-7017-5318
Reference To	xicant	96-h	Acute	Survival Te	est				EcoAnalysts
Start Date: End Date: Sample Date:		ct-18	14:50	Protoco	s: Neanthe bl: PSEP (1 l: Unionize		Sample Code: 2A317B4D Sample Source: Reference Toxicant Sample Station: P170515.103		
· · · · · · · · · · · · · · · · · · ·	Code			# Exposed			Notes		
0	D	1	8	10	10				
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1.192		1	4	10	10				
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1.192		3	3	10	10	· · · · · · · · · · · · · · · · · · ·			
1.733		1	11	10	10				
1.733		2	14	10	10	* • • • • • • • • • • • •			
1.733		3	17	10	10				
1.974		1	15	10	10	· · · · · · · · · · · · · · · · · · ·			
1.974	111 UNIV 211	2	12	10	10				
1.974		3	18	10	10				
2.059		1	10	10	10				
2.059		2	13	10	10				
2.059		3	16	10	10				
2.114		1	9	10	0				
2.114		2	7	10	1				
2.114		3	6	10	0	· · · · · · · · · · · · · · · · · · ·			

Analyst: $\mathcal{J} \mathcal{V}$ QA: \mathcal{J}^{\flat}

Un-ionized Ammonia Calculator

CLIENT:	Various	Date of Test:	October 2, 2018	
PROJECT:	PG1162, PG1123	Test Type:	Neanthes arenaceodentata	
COMMENTS.				

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



Target / Sample Name	12220	NH3T (mg/L) Actual	22.9	рН 8.0	temp (C)	temp (K) 297.26	i-factor 9.3053	1 813598	NH3U (mg/ #VALUE
Example 3.5	884e	2.000	10.0	7.5	5.0	278.16	9.2750	1 40 6606 1 49 60 6	0.008
	-			and protection and	and the state of the	E10.10	0.2700	- <i>20</i> 966799	0.000
0		0	32	8.0	19.0	292.16	9.3298		
60		63.6	32	7.8	19.0	292.16	9.3298		1.192
100	-	116	32	7.7	19.0	292.16	9.3298		1.733
140		148	32	7.7	19.0	292.16	9.3298		1.974
180		173	32	7.6	19.0	292.16			
220		223	32	7.5			9.3298		2.059
		225	32	1.0	19.0	292.16	9.3298		2.114
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Ammonia meference Toxicant Test Survival Data Sheet

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								SPECIE		eanth	es are	enaced	odenta	ata	
			JECT Crescen	t City		^{в №.} PG11	60		CT MANA	GER	LABOR	ATORY		PROTO	
						BEHA			Heste	:r	PO	rt Gar	nble .	USAG	CE 1991
OBSERVA	TION KEY				DAY			DAY			DAY	3		DAY	4
N = Normal LOE = Loss of equili Q = Quinscent DC = Discoloration NB = No body F = Floating on surfa	Г		al # OF ANISMS D	TECHNI	13/1 cian G	<u>8</u>	DATE LC TECHNI			TECHN)	DATE	16/18 cian	5
CLIENT/ENVIRON ID	CONC.	REP	INITIAL	1-				MK			mi		C	R	
	value units	5	NUMBER	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS
		1		1.0	0	N	10	0	N	(0	Ø	N	10	0	Ŋ
Ref.Tox Ammonia	0 mg/L	2		10	C	N	10	0		lo	Ø		10	0	
		3		10	0	N	10	0	4	lo	0	4	10	д	\checkmark
		1		10	σ	N	10	Ø	Я	60	Ø	Ν	10	0	Ν
Ref.Tox Ammonia	60 mg/L	2		10	0	Я	lo	ଡ		10	Ø		ισ	0	
		3		10	0	N	เอ	0	Ļ	10	Ø	Ţ	10	0	V
		1		10	0	Ν	(0	Ø	5	10	0	N	10	0	Ν
Ref.Tox Ammonia	100 mg/L	2		10	0	N	(อ	0		10	Ø		10	0	
		3		10	0	N	(0	0	Ţ	10	0	Ŷ	6	0	\checkmark
		1		16	0	2	lo	0	2	lo	0	Ņ	10	0	Ν
Ref.Tox Ammonia	140 mg/L	2		10	0	N	10	Ø		10	0			0	1
		3		10	0	N	lo	0	Ţ	b	0	Ţ	10	0	\checkmark
		1		lo	0	N	10	Ø	Q	10	Ø	Q	10	0	N
Ref.Tox Ammonia	180 mg/L	2		10	0	N	lo	Ø		lo	0		lo	O	
		3		10	0	N	ιο	Ø	ſ	ιo	0	Ţ	10		V
		1		lo	0	Ν	10	0	Q	lo	Ø	Q	0	lo	N
Ref.Tox Ammonia	220 mg/L	2		10	0	N	10	Ø		lo	0		1	9	1
		3		10	0	N	10	Ø	1	lo	Ø	Ţ	0	10	V

Ammonia Reference Toxicant Test Survival Data Sheet

CLIENT		PROJEC			<u></u>			SPECIES						LAB	ORATORY			PROTOC	
		LOT #:	C	rescent	City					anthes	arena					Gamb	le .		CE 1991
P 1905 5. 60	3			2986C5	10		ang manananya ka kata k	TEST START		2Oct18			1410 MF	AY ENI	D DATE	Dct18		TIME 145	0
CHAMBER SIZE/TYPE	(EXPOSU	REVOLUM	E															
Glass pint jar				250 m	L														
							WA		JALI	TY DA	TA								
TEST	CONDIT	IONS) (mg/L) > 4.6	d a grant a	EMP(C) 20 <u>+</u> 1		AL (ppt) 0 <u>+</u> 2	7.8	рН 3 <u>+</u> 0.5			AMMO	NIA		SULFIDE	ES
	CONCEN	TRATION				D.O.	5 1636-4 5	TEMP.				рН		A	MMONIA			SULFIDES	
CLIENT/ENVIRON ID	value	units	- DAY	REP	mete	r mg/L	mete	r °C	meter	ppt	meter	unit	WQ TECH/ DATE	метен	R mg/L	Tech	meter	mg/L	— Tech
Ref.Toxammonia	0	mg/L	0	Stock	8	7.4	в	19.0	в	32	3	B.0	MK 10/2	(0	0.00				
			4	1	8	7.3	8	20.0	8	32	\$	8,0	CRIOK						
Ref.Toxammonia	60	mg/L	0	Stock	в	7.3	в	19.0	в	32	8	7 <i>.</i> Ç	MK W/2	(0	63.6				\square
		g/L	4	1	8	7.1	8	20.1	8	33	8	7.9	CR 10/6						
Ref.Toxammonia	100	mg/L	0	Stock	в	7.4	в	19.0	в	32	в	7.7	MK WZ	ر٥	116				\square
		g/L	4	1	8	7.0	8	20.1	8	33	8	7.8	CR 10/6						
Ref.Toxammonia	140	mg/L	0	Stock	в	7.4	8	19.0	в	32	в	7.7	MK 10/2	٧٥	148				\square
		g, E	4	1	8	7.0	8	20.1	8	33	B	7.8	CR 10/6						
Ref.Toxammonia	180	mg/L	0	Stock	в	7.4	в	19.0	8	32	β	7.6	MK col2	Ŋ	173				\square
Her. Fox. animonia	100	iiig/L	4	1	8	7.1	8	20.1	8	33	8	7.8	CR 10/6						
Ref.Toxammonia	220	mg/L	0	Stock	B	7.4	6	19.0	в	32	в	7.5	MK col2	W	223				\square
		iiig/L	4	1	8	6.7	8	20.1	8	33	8	7.8	CR 10/6						

	Spiking Worksheet	
Reference Toxicant ID:	P170515,103	
Date Prepared:	10/2/18	-
Technician Initials:	MK .	-

Neanthes NH₃ RT

Assumptions in Model Stock ammonia concentration is 10,000 mg/L = 10 mg/mL

Date: Measurement:

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10/2/2018 8/30/2018 9833

	st Solutions			
Measured Concentration	Desired Concentration	Volume		k to reach desired ntration
mg/L	mg/L	mL	mL stock	to increase
0			FRESH WATER (mL)	SALT WATER (mL)
63.6	60	750		6.86
116	100	750		11.44
148	140	750		16.02
173	180	750		20.59
223	220	750		25.17

3. Mytilus galloprovincialis Bivalve Larval Test

CLIENT	PROJECT	JOB NUMBER	PROJECT MANAGER	LABORATORY	PROTOCOL
Anchor QEA	Port Gamble Monitoring	_	Brian Hester	Port Gamble	

TEST ORGANISM SPAWNING DATA

SPECIES			TEST START DATE
Mytilus	spp		3-Oct-18
SUPPLIER		11 ()	ORGANISM BATCH
Tan	yler she	lifish	TS 1002 18
		INITIAL SPAWNING TIME	FINAL SPAWNING TIME
heat	Taylor Shellfish WNING METHOD INITIAL SPAWNING Nectshock 1225 ES FEMALES SPERM VIABILITY 6 4	1225	1321
males 6	FEMALES	SPERM VIABILITY	EGG CONDITION
BEGIN FERT	Jal	END FERTILIZATION	CONDITION OF EMBRYOS

SAMPLE STORAGE	
4 Degrees Celsius - dark	
SEDIMENT TREATMENT	
none	
TEST CHAMBERS	
1 L Mason Jars	
EXPOSURE VOLUME	
900mL seawater / 18g S	ediment
TIME OF SHAKE	
1000-1040	
TIME OF INITIATION	
1620	

SPECIAL CONDITIONS

UV LIGHT EXPOSURE (YES/NO)	AERATION FROM TEST INITIATION (YES/NO)
2	N
SCREEN TUBE TEST (YES/NO)	OTHER (EXPLAIN)
2	Resuspension

EMBRYO DENSITY CALCULATIONS 85×100 = 8500 egs/~L Target 27,000 esstate/jor 8500 = 3.17 Delive 3.2 mL/jar

 $PT = \frac{2700}{8500} = 0.317$ X70~L = 22 mL ess stock MBML securche Delive 0.100mL/via/

				ilus spp		
r Anchor QEA	PROJECT Port Gamble	JOB NUMBER Monitoring		manager In Hester	LAB / LOCATION Port Gam	
			BSERVATION D	ΑΤΑ		
CLIENT/ ID	REP	NUMBER NORMAL	NUMBER	DATE	TECHNICIAN	COMMENTS
	1		02345 371	10/25/18	UB	
	2		338			
STOCKING DENSITY	3		326 322			
	4		322			
	5		323	<u> </u>		
	1	345	14	10/16/18	JW	
	2	343	11			
Control /	3	344	11			
	4	310	7			312/4 1
	5	324	12			
	1	250	8			
	2	332	5			
CARR-20 /	3	294	6			
	4	285	14			
1999-199	5	328	9			
	1	264	11			
	2	352	7			
CR-21 /	3	298	7			
	4	325	6			325/6
	5	313	12	8		

() WC, NB 10/25

			SPECI			
CLIENT Anchor QEA	PROJECT Port Gamble	JOB NUMBER	PROJI	ytilus spp ECT MANAGER	LAB / LOCATIO	
			BSERVATION	rian Hester	Port Gai	mble / PSEP (1995)
CLIENT/ ID	REP	NUMBER NORMAL	NUMBER	DATE	TECHNICIAN	COMMENTS
	1	337	6	10/16/18	Jw	:
	2	2.74	5			
SMA-1B-IT2 /	3	316	6			
	4	300	3			293/4 04
	5	284	5			,
	1	318	6			
	2	299	S			
SMA-1B-IT3 /	3	336	10			
	4	324	[]			
	5	325	4			
	1	3 05	10	10/17/18		
	2	342	13			341/12 04
SMA-2C-IT3 /	3	305	8			
	4	289	Ц			
	5	328	16			
	1	286	ç			
	2	318	10			
SMA-2C-IT6 /	3	286	5			
	4	655	5			
	5	295	11	ł		

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				SPECIES Mvti	lus spp	,				
CLIENT Anchor QEA	PROJECT Port Gambl	JOB NUMBER e Monitoring	0	PROJECT	MANAGER n Heste		1	ort Gai		PROTOCOL PSEP (1995)
		LARVAL O	BSERVATI	ON D	ATA					
CLIENT/ ID	REP	NUMBER NORMAL	NUMBER		DAT	E	тесн	NICIAN	C	OMMENTS
	1	2.87	11		10/17	118	J	w		
	2	291	14							
SMA-2C-IT9 /	3	283	7							
	4	304	9							
	5	301	9						281	0/1204
	1	266	9							
	2	289	11							
SMA-1-ST /	3	304	2							
	4	269	13							
	5	261	7							
	1	328	4							
	2	292	13							
SMA-1A-IT /	3	328	16							
	4	297	10							
	5	293	11							
	1	323	6							
	2	287	5							
SMA-2A-IT /	3	313	7							
	4	333	4							
	5	332	10			L		ł		

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						SPECIËS Myti	ilus sp					anna fraid 1 ann an Seann Alla Fra	
CLIENT Anchor (1		ale Monitoring	JOB NUMBER		PROJECT		ĒR	1	LOCATIO	mble /	PROTOCOL PSEP (1	
	Anchor QEA Port Gamble Monitoring 0 LARVAL OBSI CLIENT/ ID REP NUMBER NORMAL 1 275 2 3 285 4 5 3285 4 4 303 5 5 322 1 5 322 1 5 322 1 5 322 1 5 322 1 5 322 1 5 316 1 5 319 1 5 319 1 5 319 1 5 319 1 5 302 1 5 202 1 5 207 1 6 207 1 6 207 1 6 207 1 6 207 1 7 3 3 <th></th> <th></th> <th></th> <th></th> <th>1 10</th> <th></th> <th></th> <th></th> <th></th>							1 10					
CLIENT/	ID	REP			NUMBER		D	ATE	TECHN	ICIAN		COMMENTS	
		1	2	75	14		10 1	2/18	ა	w			
		2	2	36	(1								****
SMA-2A	-ST /	3	2	85	6								
		4	3	03	8								
		5	3	122	6								
		1	7	280	7								
		2	2	97	10								
SMA-2B	9-IT /	3		318	4								
		4	2	76	10								
		5	3	19	16							. <u></u>	
		1	3	20	8								
		2	3	02	12								
SMA-2B	-ST /	3	2	.77	7	-							
		4	3	10	5								
		5	2	97	2						28	1/2	04
		1	2	68	10								
		2	2	.87	30								
BW-1	5 /	3	2	540	21								
		4	2	505	16								
		5	2	72	19			Ţ					

NT Anchor			PROJECT Port Gar	nhle	Monitori		PECIES		Mytilus	son			LAB / LOCA		mble /		ROTOCOL PSEP (1995
NUMBER	QLA		PROJECT MAN		Monitorin	-	EST START D	ATE	riyenus		TIME	-	TEST END D		IME		
0			Bri	an H	ester		030ct18 620					0					1650
y 384 observations needed only if development endpoint not met by day							FER QU			A							
TEST				DO (mg/L) >5.0			emp (°C) 16 ± 1	Sal (ppt) 28 ± 1		рН 7 - 9		A	mmonia NA		Sulfide NA	Ŧ	
SAMPLE ID	DAY	Random #		REP		-	TEMP.		ALINITY		рН	AMMONIA		s	ULFIDE	TECH	DATE
SAMPLE ID	DAY	kandom #	KEP	meter	mg/L	meter	°C	meter	ppt	meter	unit	Techn.	mg/L (total)	Techn.	mg/L (Total		
Control /	0	37	WQ Surr	8	7.7	8	16.5	8	28	8	7.7	Re	0.00	ME	ND	RE	10/3/1
Control /	1	1	WQ Surr	в	7.5	B	16.7	8	28	в	7.8					MK	10/4
Control /	2		WQ Surr	8	7.5	8	16.9	8	28	8	7.8	SON	0.00	r	0.002	(m)	10/5
Control /	3		WQ Surr														
Control /	4		WQ Surr														
CARR-20 /	0	45	WQ Surr	в	7.5	в	16.5	B	28	8	7.7	89	0.00	MK	0.008	RE	10/3/1
CARR-20 /	1	1	WQ Surr	8	6.6	8	16.6	в	28	в	7.7					MK	10/4
CARR-20 /	2	V	WQ Surr	8	6.2	8	16.8	8	28	8	7.6	Far	0.00	JL	0.005	80	10/5
CARR-20 /	3		WQ Surr														
CARR-20 /	4		WQ Surr														
CR-21 /	0	65	WQ Surr	g	7.0	8	16.4	8	28	8	7.7	Re	0.00	ME	0.004	Ra	10/3/1
CR-21 /	1	1	WQ Surr	в	6.5	в	16.5	в	28	в	7.7					MK	1
CR-21 /	2		WQ Surr	8	6.5	8	16.8	8	28	8	7.6	SW	0.00	JL	0.002	Su	10/5
CR-21 /	3		WQ Surr						i e ciù								
CR-21 /	4		WQ Surr														

Anchor (2EA		PROJECT Port Gar	nble	Monitori		PECIES		Mytilus	spp			LAB / LOCA		mble /		PROTOCOL PSEP (1995)	
NUMBER O			project man Bri	an He	ester	Т	U30ct18 TIME 1620						TEST END DATE				1650	
y 384 observations needed onl		ent endpoint n	ot met by day 2			_	TER QUALITY DATA							_				
col	TEST		(a) (b)		(mg/L) >5.0		emp (°C) 16 ± 1		Sal (ppt) 28 ± 1		рН 7 - 9	A	mmonia NA		NA	н	2	
SAMPLE ID	DAY	Random #	REP	meter	D.O. mg/L	meter	TEMP.	S	ALINITY	meter	pH unit		MMONIA mg/L (total		ULFIDE mg/L (Total	TECH	DATE	
SMA-1B-IT2 /	0	78	WQ Surr	в	7.3	8	28	8	28	8	7.7	RE	0.00	ME	ND	RE	10/3/18	
SMA-1B-IT2 /	1	1	WQ Surr	в	7.1	8	16.8	8	28	B	7.7					MK	10/4	
SMA-1B-IT2 /	2	V	WQ Surr	8	6.9	8	16.7	8	28	8	7.7	ŝ	00.0	JL	0,007	لمح	10/5	
SMA-1B-IT2 /	3		WQ Surr															
SMA-1B-IT2 /	4		WQ Surr															
SMA-1B-IT3 /	0	32	WQ Surr	G	7.7	8	16.5	8	28	8	7.7	89	0.00	MY	0.002 -NDD	RE	10/3/	
SMA-1B-IT3 /	1	1	WQ Surr	в	7.0	в	17.0	8	28	B	7.7					MK	10/4	
SMA-1B-IT3 /	2	V	WQ Surr	8	7.0	8	16.8	8	28	8	7.7	RN	0.00	JL	0,003	Su	10/5	
SMA-1B-IT3 /	3		WQ Surr															
SMA-1B-IT3 /	4		WQ Surr															
SMA-2C-IT3 /	0	76	WQ Surr	G	7.5	8	16.4	8	28	8	7.7	Pa	0.00	WK	100.0	RE	10/3/	
SMA-2C-IT3 /	1	1	WQ Surr	-	7.1	8	16.6	в	28	8	7.7						10/4	
SMA-2C-IT3 /	2	V	WQ Surr	8	7,1	8	16.9	8	28	8	7.7	S'	0.00	Je	ND	62	10/5	
SMA-2C-IT3 /	3		WQ Surr	_												_		
SMA-2C-IT3 /	4		WQ Surr	_					-									
SMA-2C-IT6 /	0	6	WQ Surr	0	7.4	8		8	27	8	7.7	8c	0.00	MK	ND		10/3/1	
SMA-2C-IT6 /	1		WQ Surr	0	7.2	8		8	28	в	7.7					-	10/4	
SMA-2C-IT6 /	2	V	WQ Surr		37.3	8	17.0	8	28	8	7.8	SU	0.00	sc	0.003	SW	10/5	
SMA-2C-IT6 /	3		WQ Surr		_											-		

() WC- 10/3/18 RE (2) WC-MK 10/3. (3 MR SW 10-5-18 D)=7.6

Anchor			PROJECT Port Gar	mbla	Monitori		PECIES		Mutiluc				LAB / LOCA		mble /		ROTOCOL SEP (1995)
Anchor	QLA		PROJECT MAR		Monitorin	-	EST START D	ATE	Mytilus	spp	TIME		TEST END D		IME		
0			Brian Hester 03Oct18								162	0	10.	5.1	8		1650
8.4 observations needed or	ly if develops	nent endpoint r	not met by day 2	DO	(mg/L)		ER QUA	_	Y DAT	A	pН		mmonia	-	Sulfide	-	
co	NDITIONS				>5.0		16 ± 1		28 ± 1		7 - 9		NA		NA	Б	E E
SAMPLE ID	DAY	Random #	REP	_	D.O.	-	TEMP.	_	ALINITY		рH		MMONIA	_	ULFIDE	TECH	DATE
247		-		meter	mg/L	meter	°C	meter	ppt	meter	unit				mg/L (Total	1	
MA-2C-IT9 /	0	30	WQ Surr	0	7.7	8	16.5	8	28	8	7.7	Re	0.00	MIC	0.00	Re	10/3/18
MA-2C-IT9 /	1		WQ Surr	в	7.4	9	16.7	Ø	28	B	7.8					ME	-10/4
MA-2C-IT9 /	2	2	WQ Surr	8	7.6	8	16.6	8	28	8	7.8	80	0.00	JL	ND	Ful	10/5
MA-2C-IT9 /	3		WQ Surr														
MA-2C-IT9 /	4		WQ Surr														
5MA-1-ST /	0	82	WQ Surr	8	6.2	g	16.6	в	28	g	7.7	Ra	0.00	HK	0.005	RE	10/3/18
SMA-1-ST /	1	1	WQ Surr	в	6.9	в	16.8	8	28	B	7.7					MK	+0/00
5MA-1-ST /	2	V	WQ Surr	8	5.7	8	16.9	8	28	8	7.6	80	0.00	JL	0.003	81	10/5
SMA-1-ST /	3		WQ Surr														
5MA-1-ST /	4		WQ Surr														
MA-1A-IT /	0	88	WQ Surr	8	6.7	8	16.7	8	28	8	7.7	Re	0.00	ME	ND	Æ	10/3/18
SMA-1A-IT /	1	1	WQ Surr	8	6.80	B	16.7	B	28	B	7.7					MK	10/4
MA-1A-IT /	2	N	WQ Surr	8	5.9	8	17.0	8	28	8	7.7	SW	0.00	JL	0.001	8	10/5
MA-1A-IT /	3		WQ Surr														
MA-1A-IT /	4		WQ Surr						_								
MA-2A-IT /	0	12	WQ Surr	8	7.4	8	16.7	8	28	8	7.7	RE	0.00	MK	ND	RE	10/3/14
SMA-2A-IT /	1	1	WQ Surr	в	6.4	8	17.0	в	28	в	7.7					MK	10/4
SMA-2A-IT /	2	ł	WQ Surr	8	6.6	9	16.9	8	28	8	7.7	80	0.00	JL	0002	80	1015
MA-2A-IT /	3		WQ Surr														
SMA-2A-IT /	4		WQ Surr														

1) MF. Actual = 5.7 ME 10/4.

@ 18. MK 10/4.

Anchor (QEA			ort Gamble Monitoring				species Mytilus spp							mble /	P	ROTOCOL SEP (1995
NUMBER O			project man Bri	nager ian Hester			TEST START DATE 030ct18				1620		TEST END DATE		T	165C	
ay 384 observations needed only if development endpoint not met by day 3 TEST CONDITIONS							Temp (°C) Sal (ppt) 16 ± 1 28 ± 1				Ammonia NA		Sulfide		TECH	DATE	
SAMPLE ID	SAMPLE ID DAY Random		REP	meter	D.O. mg/L	meter	TEMP. °C	S. meter	ALINITY ppt	meter	pH unit	_	MMONIA mg/L (total)		ULFIDE mg/L (Total	TE	DA
SMA-2A-ST /	0	18	WQ Surr	в	7.4	8	16.3	8	28	8	7.7	RE	0.00	MK	ND	RE	10/3/1
SMA-2A-ST /	1	1	WQ Surr	в	6.4	Ø	17.0	B	28	в	7.7					MK	10/4
SMA-2A-ST /	2		WQ Surr	8	6.4	8	16.8	8	28	8	7.6	SU	0.00	JL	0.00(Su	10/5
SMA-2A-ST /	3		WQ Surr						12.01								
SMA-2A-ST /	4		WQ Surr														
SMA-2B-IT /	0	59	WQ Surr	8	6.5	8	16.4	g	28	8	7.7	Re	0.00	MK	0.004	RE	10/3/18
SMA-2B-IT /	1	1	WQ Surr	B	5.7	в	16.8	в	28	8	7.7					MK	10/4
SMA-2B-П /	2	V	WQ Surr	8	5.9	8	16.8	8	28	8	7.4	San	0.00	JL	0.006	and	10/5
SMA-2B-IT /	3		WQ Surr														
SMA-2B-IT /	4		WQ Surr														
SMA-2B-ST /	0	23	WQ Surr	G	7.4	8	16.5	8	28	8	7.7	R	0.00	MK	0.007	RE	10/3/18
SMA-2B-ST /	1	1	WQ Surr	в	6.9	в	16.9	8	28	в	7.7					MK	· logy
SMA-2B-ST /	2	T	WQ Surr	8	6.9	8	16.8	8	28	8	7.7	8)	0.00	JL	ND	82	10/5
SMA-2B-ST /	3		WQ Surr														
SMA-2B-ST /	4		WQ Surr										1 -				
BW-15 /	0	46	WQ Surr	8	7.4	8	16.3	8	28	8	7.7	Re	0.00	MK	0.005	Re	10/3/18
BW-15 /	1	1	WQ Surr	в	6.3	в	16.8	в	28	в	7.7						10/4
BW-15 /	2	ł	WQ Surr	8	6.1	8	16.7	8	28	8	7.6	Su	0.00	Ju	0.004	8)	10/5
BW-15 /	3		WQ Surr														
BW-15 /	4		WQ Surr														

ORGANISM RECEIPT LOG

Date:		Time):	Batch No.								
[O ·	2.18](015			TSIO	0218				
Organism:												
	My	f;lus	gall	0								
Source / Su			r	(
-	Taylo	r Sh	elltis	sh								
No. Ordere	d:	No.	Receive	d:		1	rce Batch:	tch date. etc.):				
<	8 1bs		8 16	5	S (Ollected 10.2.18 Totter Inlet							
Condition of	of Organism	าร:				te Siz	e or Age: fe stage, size o					
	600d			Adult								
Shipper:	,			B of	L (Trac							
	(our	ier				N.	A					
Condition of	of Containe	r:		Rece	ived B	y:	<u></u>					
	6000					MA	214					
Container	D.O. (mg/L)	Temp. (°C)	Cond Sal (Inclu Unit	l. Ide	pl (Un		# Dead	% Dead*	Tech. (Initials)			
\		0	_			_			MARLH			
			-									
*if >10% contac												
Notes: ()	Shipped (Timp not	ty with	h ikp ed	vits	MAR	ut K	0.2.18					

MAINTENANCE LOG FOR CULTURES

ORGAN LOCATI	IISM: ON:	M 	lyt.lus bath 1	ga llof	ovincia,	l.'s							
Batch Nu	Batch Number: TST00318 TS100218 Date Received: 10.2.18 Initial # of Organisms: 8165											ilbs	
Date	Fe	ed /PM	Tub No.	D.O.	Temp (°C)	Cond/ Sal	рН	H2O Change	Organisms appear healthy (Y/N)	# Mort	% Mort*	Init.	Comments
10.3	X		ĺ	5.6	13.7	31	7.4	FT	Ý	Û		BA	
V	Х		2	6.5	13.5	31	7.6	FT	Υ	0		V	
10/5		K.C	1	5.4	13.5	31	7.4	FT	Ý	0		80	
	\checkmark	9×	2	7.4	13.1	32	7.7	FT	У	0		7	
10/8		\checkmark	١	6.2	13.0	31	7.6	FT	Υ	1		SW	
4		\checkmark	L	7.4	13.3	31	7.7	FT	ý	D		82	
10/10	\checkmark		1	6.5	12.8	31	7.4	FT .	Ý.	0		Sw.	
1	\checkmark		2	7.5	12.8	31	7.6	1	Ţ	0	-	h	
10/12			J	6.4	13.0	31	7.4	FT	Ŷ	6	-	RE	
V			Э	7.3	127	31	7-6	FT	Ý	0	-	RE	
10/15		1	ι /	6.6	13.3	30	7,5	FT	Ý.	0	-	UB .	
			Z	6.8	12,9	31	7.7		<u> </u>	Û		L	
10/17		\checkmark	(6.6	13.0	31	1.5	FT	'Υ,	G		52	
Ļ		\checkmark	2	7.6	12.7	31	7.6	7	4			4	
10/19		\checkmark	١	6.8	13.0	30	7.6	F.T	У	D		8W	
1		\mathbf{v}	2	7.7	12.7	31	7.8	T	Ý	0		T	
10/22	\checkmark		۱	7.0	12.7	31	7.6	FT	Ý	0		SN .	
L	\checkmark		2	7.8	12,10	31	7.8	FT	Ý	Ø		5w	

FT = Flow-through *if >10% notify lab manager

DIE 10.3.10 BH DWC 10.5.18 AM Feed SW

4/3/17

CETIS QC Plot

ivalve Lar est Type: rotocol:	Development-Survival EPA/600/R-95/136 (1995)	Organism: Endpoint:		incialis (Bay Mussel rtion Normal) Material: Source:	Total Ammo Reference T	
		Bivalve	Larval Survival and	Development Test			
14	4						+2s
1:	2–			a present of constraints of the second s	****	× -	
- 10		the second s	and the second sec			•	
EC50-mg/L Total Ammonia							+1s
otal An	8-		· · · · · · · · · · · · · · · · · · ·				
mg/L T	6-					and the second se	Mean
EC50	4-						- 1s
		· · · · · ·			Contract of the second second second second		-2s
	23 Feb-16 17 Mar-16- 14 Apr-16- 13 Jul-16- 20 Jul-16-	03 Aug-16- 17 Aug-16- 21 Sep-16-	28 Oct-16- 20 Apr-17- 27 Sep-17-	28 Dec-17- 23 Jan-18- 21 Feb-18-	28 Feb-18- 06 Mar-18-	01 Jun-18	24 Jul-18- 22 Aug-18- 03 Oct-18-
	Ap Ap 3 Ju 0 Ju	ing Set	Ap Sei	Jar Fei	Ma Fel	nf nf	Au Au

		M	ean:	6.807	С	ount:	20	-1s Warn	ing Limi	it: 4.794	-2s Action Lim	iit: 3.377
		Si	gma:	n/a	C	V:	36.10%	+1s Warn	ing Limi	t: 9.66	+2s Action Lim	iit: 13.71
Quality Control Data												
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Feb	23	17:50	5.292	-1.516	-0.7189			18-1470-2153	19-1029-0373	ENVIRON
2		Mar	17	19:30	3.757	-3.05	-1.697	(-)		15-5000-9198	13-5264-4225	ENVIRON
3		Apr	14	17:15	6.621	-0.186	-0.07907			20-6935-4588	11-5576-6536	ENVIRON
4		Jul	13	19:55	5.147	-1.66	-0.7981			21-3594-7965	13-9208-2204	ENVIRON
5			20	19:37	6.871	0.063	7 0.02659			15-8198-2198	11-4931-7833	ENVIRON
6		Aug	3	18:20	4.732	-2.075	5 -1.038	(-)		01-0657-3943	18-0523-9298	ENVIRON
7			17	17:05	5.081	-1.726	-0.8348			12-6418-6345	06-5970-9287	ENVIRON
8		Sep	21	17:05	3.644	-3.163	-1.784	(-)		12-2755-6335	12-7771-4113	ENVIRON
9		Oct	28	16:55	4.947	-1.86	-0.9112			11-5556-2644	13-8974-7601	ENVIRON
10	2017	Apr	20	17:20	7.867	1.06	0.4132			10-4553-7194	08-5173-1627	EcoAnalysts
11		Sep	27	17:50	9.055	2.248	0.8145			17-5033-2538	21-1690-3737	EcoAnalysts
12		Dec	28	15:06	10.19	3.381	1.151	(+)		14-5351-9068	16-2506-4728	EcoAnalysts
13	2018	Jan	23	15:10	9.255	2.448	0.8769			09-7170-7085	18-2220-1310	EcoAnalysts
14		Feb	21	16:50	5.699	-1.109	-0.5074			11-9789-0593	04-0007-2351	EcoAnalysts
15			28	15:50	7.78	0.972	4 0.3812			07-6747-7949	18-9659-8443	EcoAnalysts
16		Mar	6	17:25	12.04	5.23	1.627	(+)		07-4370-2173	07-8492-0076	EcoAnalysts
17		Jun	1	18:20	11.33	4.525	1.455	(+)		12-7842-7476	20-1810-5029	EcoAnalysts
18			26	19:10	8.678	1.871	0.6931			17-9894-2551	06-4820-9232	EcoAnalysts
19		Jul	24	14:29	8.87	2.062	0.7554			03-7590-2196	04-9004-0822	EcoAnalysts
20		Aug	22	17:20	7.194	0.387	0.1579			16-3013-6338	06-6775-4461	EcoAnalysts
21		Oct	3	16:45	8.195	1.388	0.5296			12-1625-9203	05-0256-3584	EcoAnalysts

Analyst: UV QA: UV

006-469-472-7

CETIS QC Plot

Bivalve Larval Survival and Development Test All Matching Labs Organism: Mytilus galloprovincialis (Bay Mussel) Material: Total Ammonia Test Type: Development-Survival Protocol: EPA/600/R-95/136 (1995) Endpoint: Combined Proportion Normal Source: **Reference Toxicant-REF Bivalve Larval Survival and Development Test** 12-+2s 10-8-NOEL-mg/L Total Ammonia +1s 6 Mean 4 -1s 2---2s 0 17 Aug-16-14 Apr-16-28 Oct-16-28 Feb-18-13 Jul-16-26 Jun-18-17 Mar-16-20 Jul-16-27 Sep-17-24 Jul-18-23 Feb-16 03 Aug-16-21 Sep-16~ 28 Dec-17-23 Jan-18-06 Mar-18-01 Jun-18-22 Aug-18--03 Oct-18-20 Apr-17-21 Feb-18-

			ean: gma:	4.071 n/a	-		20 53.10%	-1s Warr +1s Warr	•		-2s Action Lim +2s Action Lim	
Qualit	ty Con	trol Data	а									
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Feb	23	17:50	3.5	-0.5715	5 -0.3032			18-1470-2153	12-0892-9662	ENVIRON
2		Mar	17	19:30	2.02	-2.051	-1.405	(-)		15-5000-9198	10-0930-7275	ENVIRON
3		Apr	14	17:15	3.52	-0.5515	5 -0.2918			20-6935-4588	02-5801-5963	ENVIRON
4		Jul	13	19:55	3.57	-0.5015	-0.2635			21-3594-7965	00-8086-5441	ENVIRON
5			20	19:37	5.65	1.579	0.6569			15-8198-2198	15-7963-0031	ENVIRON
6		Aug	3	18:20	3.37	-0.7015	5 -0.3791			01-0657-3943	18-2881-4415	ENVIRON
7			17	17:05	3.28	-0.7915	-0.4334			12-6418-6345	16-7479-3581	ENVIRON
8		Sep	21	17:05	1.49	-2.581	-2.015	(-)	(-)	12-2755-6335	04-9221-3739	ENVIRON
9		Oct	28	16:55	1.78	-2.291	-1.659	(-)		11-5556-2644	02-1682-8136	ENVIRON
10	2017	Apr	20	17:20	5.33	1.259	0.54			10-4553-7194	12-0068-9010	EcoAnalysts
11		Sep	27	17:50	3.76	-0.3115	5 -0.1595			17-5033-2538	01-8974-4211	EcoAnalysts
12		Dec	28	15:06	7.64	3.569	1.262	(+)		14-5351-9068	19-5965-2391	EcoAnalysts
13	2018	Jan	23	15:10	7.23	3.159	1.151	(+)		09-7170-7085	00-5532-1927	EcoAnalysts
14		Feb	21	16:50	3.04	-1.031	-0.5857			11-9789-0593	12-8443-3147	EcoAnalysts
15			28	15:50	4.05	-0.0214	-0.01059			07-6747-7949	13-3889-9717	EcoAnalysts
16		Mar	6	17:25	8.72	4.649	1.527	(+)		07-4370-2173	08-6054-3126	EcoAnalysts
17		Jun	1	18:20	8.34	4.269	1.438	(+)		12-7842-7476	16-9291-1976	EcoAnalysts
18			26	19:10	7.04	2.969	1.098	(+)		17-9894-2551	00-8683-5940	EcoAnalysts
19		Jul	24	14:29	4.05	-0.0214	45 -0.01059			03-7590-2196	16-4897-6151	EcoAnalysts
20		Aug	22	17:20	3.77	-0.3015	5 -0.1542			16-3013-6338	05-9641-9153	EcoAnalysts
21		Oct	3	16:45	6.01	1.939	0.7807			12-1625-9203	13-5762-5882	EcoAnalysts

Analyst: $\underline{\mathcal{IV}}$ QA: $\underline{\mathcal{IV}}$

CETIS QC Plot

Bivalve Larval Survival and Development Test All Matching Labs Organism: Mytilus galloprovincialis (Bay Mussel) Material: Unionized Ammonia Test Type: Development-Survival **Reference Toxicant-REF** Protocol: EPA/600/R-95/136 (1995) Endpoint: Combined Proportion Normal Source: **Bivalve Larval Survival and Development Test** 0.30-+2s 0.25-EC50-mg/L Unionized Ammonia 0.20 +1s 0.15 Mean 0.10 -1s 0.05 -2s 0.00 17 Mar-16-21 Sep-16~ 06 Mar-18-22 Aug-18-03 Oct-18-15 Jan-16 14 Apr-16-13 Jul-16-20 Jul-16-03 Aug-16-17 Aug-16-28 Oct-16-27 Sep-17-23 Jan-18-21 Feb-18-01 Jun-18-26 Jun-18-24 Jui-18-20 Apr-17-28 Feb-18-28 Dec-17 0.111 20 -1s Warning Limit: 0.07368 -2s Action Limit: 0.0489 Mean: Count:

		IAIG	an:	0.111		Junt: 20		-15 Wall	ing Lin	0.07300	-25 ACTION LIN	
		Si	gma:	n/a	C/	/: 42.8	0%	+1s Warn	ing Lim	it: 0.1673	+2s Action Lim	it: 0.2522
Qualit	ty Con	trol Data	a									
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Jan	15	18:45	0.07307	-0.03795	-1.02	(-)		14-3705-6085	19-2478-0688	ENVIRON
2		Mar	17	19:30	0.0747	-0.03632	-0.9661			04-9304-7933	11-8311-5806	ENVIRON
3		Apr	14	17:15	0.1231	0.01209	0.252			21-0694-5716	16-1625-7449	ENVIRON
Ļ		Jul	13	19:55	0.1066	-0.004396	-0.09852			17-3624-8523	09-8766-4801	ENVIRON
5			20	19:37	0.1295	0.01852	0.3761			16-4492-6137	18-6316-6428	ENVIRON
6		Aug	3	18:20	0.0688	-0.04222	-1.167	(-)		09-2291-5121	03-3596-0456	ENVIRON
7			17	17:05	0.08185	-0.02917	-0.7433			07-3188-3147	05-9364-3209	ENVIRON
3		Sep	21	17:05	0.05781	-0.05321	-1.591	(-)		12-6262-3928	08-6003-5732	ENVIRON
3		Oct	28	16:55	0.06459	-0.04644	-1.321	(-)		05-5636-6924	16-1083-2604	ENVIRON
10	2017	Apr	20	17:20	0.1634	0.05235	0.9419			05-0815-7437	21-2956-9302	EcoAnalysts
11		Sep	27	17:50	0.1319	0.02091	0.4208			20-9743-5500	21-3701-9130	EcoAnalysts
12		Dec	28	15:06	0.1522	0.04115	0.7688			11-9837-6366	14-7670-9371	EcoAnalysts
13	2018	Jan	23	15:10	0.08248	-0.02854	-0.7247			14-9653-2794	09-5264-1795	EcoAnalysts
14		Feb	21	16:50	0.08676	-0.02426	-0.6012			15-2546-6673	13-8547-7245	EcoAnalysts
15			28	15:50	0.1317	0.02067	0.4162			15-8114-9389	20-6854-2996	EcoAnalysts
16		Mar	6	17:25	0.2738	0.1628	2.201	(+)	(+)	00-7847-6930	00-7321-8707	EcoAnalysts
17		Jun	1	18:20	0.2103	0.09926	1.557	(+)		05-1801-7066	04-7994-1641	EcoAnalysts
18			26	19:10	0.1255	0.01446	0.2985			06-7139-6937	06-3245-7683	EcoAnalysts
19		Jul	24	14:29	0.1286	0.01757	0.3582			16-0134-7952	19-7798-4523	EcoAnalysts
20		Aug	22	17:20	0.1449	0.03384	0.6487			07-1087-5324	12-5339-9193	EcoAnalysts
21		Oct	3	16:45	0.1056	-0.005424	-0.1221			01-0403-3220	16-2351-0172	-

V Analyst:_

CETIS QC Plot

Bivalve Larval Survival and Development Test All Matching Labs Organism: Mytilus galloprovincialis (Bay Mussel) Material: Unionized Ammonia Test Type: Development-Survival EPA/600/R-95/136 (1995) Endpoint: Combined Proportion Normal Reference Toxicant-REF Protocol: Source: **Bivalve Larval Survival and Development Test** 0.25-+2s 0.20-NOEL-mg/L Unionized Ammonia 0.15 +1s 0.10 Mean 0.05 -1s -2s 0.00 13 Jul-16-20 Jul-16-01 Jun-18-22 Aug-18-17 Mar-16-14 Apr-16-03 Aug-16-17 Aug-16-21 Sep-16-21 Feb-18-28 Feb-18-26 Jun-18-03 Oct-18-15 Jan-16 28 Oct-16-27 Sep-17-23 Jan-18-06 Mar-18-24 Jul-18-20 Apr-17-28 Dec-17-

		Me	ean:	0.064	51 Co	ount: 20		-1s Warn	ing Limi	t: 0.03622	-2s Action Lim	it: 0.02033
		Si	gma:	n/a	C	/: 62.9	0%	+1s Warn	ing Limi	t: 0.115	+2s Action Lim	it: 0.2048
Quali	ty Con	trol Data	a									
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2016	Jan	15	18:45	0.033	-0.03151	-1.161	(-)		14-3705-6085	10-1556-6538	ENVIRON
2		Mar	17	19:30	0.04	-0.02451	-0.8276			04-9304-7933	18-2075-7796	ENVIRON
3		Apr	14	17:15	0.07	0.005494	0.1416			21-0694-5716	12-4502-8479	ENVIRON
4		Jul	13	19:55	0.065	0.0004942	0.01322			17-3624-8523	04-6243-8640	ENVIRON
5			20	19:37	0.105	0.04049	0.8438			16-4492-6137	18-5505-5894	ENVIRON
6		Aug	3	18:20	0.049	-0.01551	-0.4762			09-2291-5121	05-1896-5100	ENVIRON
7			17	17:05	0.054	-0.01051	-0.3079			07-3188-3147	16-9734-3329	ENVIRON
8		Sep	21	17:05	0.024	-0.04051	-1.712	(-)		12-6262-3928	13-9034-6853	ENVIRON
9		Oct	28	16:55	0.023	-0.04151	-1.786	(-)		05-5636-6924	02-7414-4116	ENVIRON
10	2017	Apr	20	17:20	0.105	0.04049	0.8438			05-0815-7437	03-4135-8920	EcoAnalysts
11		Sep	27	17:50	0.045	-0.01951	-0.6236			20-9743-5500	07-1720-0800	EcoAnalysts
12		Dec	28	15:06	0.114	0.04949	0.9862			11-9837-6366	06-0841-7631	EcoAnalysts
13	2018	Jan	23	15:10	0.064	-0.000506	-0.01363			14-9653-2794	04-0773-5227	EcoAnalysts
14		Feb	21	16:50	0.047	-0.01751	-0.5483			15-2546-6673	21-3476-8661	EcoAnalysts
15			28	15:50	0.068	0.003494	0.09136			15-8114-9389	10-5284-4887	EcoAnalysts
16		Mar	6	17:25	0.198	0.1335	1.942	(+)		00-7847-6930	03-9693-3709	EcoAnalysts
17		Jun	1	18:20	0.174	0.1095	1.719	(+)		05-1801-7066	00-0472-0630	EcoAnalysts
18			26	19:10	0.1	0.03549	0.7593			06-7139-6937	00-3402-6456	EcoAnalysts
19		Jul	24	14:29	0.059	-0.005506	-0.1545			16-0134-7952	12-3548-9987	EcoAnalysts
20		Aug	22	17:20	0.076	0.01149	0.284			07-1087-5324	19-8244-5254	EcoAnalysts
21		Oct	3	16:45	0.086	0.02149	0.4981			01-0403-3220	16-6521-7341	EcoAnalysts

Analyst: $\underline{\mathcal{IV}}$ QA: $\underline{\mathcal{VV}}$

006-469-472-7

CETIS Sur	nmary Repo					Report Date: Test Code/ID:			26 Oct-18 10:31 (p 1 of 1) 487EA483 / 12-1625-9203				
Bivalve Larva	al Survival and D	evelopmen	t Test			te da se e l'Andrea e anna da sena		uldeln draw owne a commen				Ec	oAnalyst
Batch ID: Start Date: Ending Date: Test Length:	15-3382-8184 03 Oct-18 16:45 05 Oct-18 16:40 48h		ocol: I cies: I	Development-S EPA/600/R-95/ Mytilus gallopro	136 (1995)			Anal Dilue Brin Sour	ent: L e: (Laborato Crystal S Taylor Sl	Sea Mar		Age:
Sample ID: Sample Date: Receipt Date Sample Age:	: 15 May-17		erial: (PC):	7A5A1C38 Total Ammonia Internal Lab				Proj Sou Stati	rce: F	Reference Reference P170515	ce Toxic		
Multiple Com	parison Summa	ry											A
Analysis ID 13-5762-5882	Endpoint Combined Prope	ortion Norma		t Multiple Com			√	NOEL 6.01	LOEL 12		9EL 192	TU	PMSD 12.9%
Point Estima	te Summary			******									
Analysis ID	Endpoint		Point E	Estimate Metho	od		\checkmark	Level	mg/L	95	% LCL	95% UCL	τu
05-0256-3584	Combined Prop	ortion Norma	a Spearn	nan-Kärber				EC50	8.195	8.0)95	8.297	
Test Accepta	bility					т	~ 1	imits			·		
Analysis ID	Endpoint		Attribu	ite	Test Stat			Upper	Overla	an De	cision		
	2 Combined Prop	ortion Norma			0.1287	<<		0.25	No		isses C	riteria	
	roportion Norma												
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min		Max	Std Ei	rr St	d Dev	CV%	%Effec
0	D	3	0.9666		1.0000	0.9481		1.0000	0.0168		0290	3.00%	0.00%
0.867	2	3	0.9885		1.0000	0.9654		1.0000	0.0115		0200	2.02%	-2.27%
1.46		3	0.9896		1.0000	0.9689		1.0000	0.0104		0180	1.82%	-2.39%
3.18		3	0.9677	0.8287	1.0000	0.9031		1.0000	0.0323	3 0.0	0559	5.78%	-0.12%
6.01		3	0.9319	0.7643	1.0000	0.8651		1.0000	0.0390	0.0	0675	7.24%	3.58%
12		3	0.0127	0.0000	0.0306	0.0069		0.0208	0.0042	2 0.0	0072	56.77%	98.69%
20.7		3	0.0000	0.0000	0.0000	0.0000		0.0000	0.000	0 0.0	0000		100.00
Combined P	roportion Norma	l Detail											
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3									
0	D	0.9481	1.0000	0.9516									
0.867		0.9654	1.0000	1.0000									
1.46		1.0000	0.9689	1.0000									
3.18		1.0000	0.9031	1.0000									
6.01		1.0000	0.8651	0.9308									
12		0.0069	0.0104	0.0208									
20.7		0.0000	0.0000	0.0000									
		Binomials	;									ala,	
	roportion Norma	Dinomaia											
	roportion Norma Code	Rep 1	Rep 2	Rep 3									
Combined P													
Combined P Conc-mg/L	Code	Rep 1	Rep 2	2 275/289									
Combined P Conc-mg/L 0	Code	Rep 1 274/289	Rep 2 292/29	2 275/289 5 298/298									w
Combined P Conc-mg/L 0 0.867	Code	Rep 1 274/289 279/289	Rep 2 292/29 295/29	2 275/289 5 298/298 9 302/302									
Combined P Conc-mg/L 0 0.867 1.46	Code	Rep 1 274/289 279/289 320/320	Rep 2 292/29 295/29 280/28	2 275/289 5 298/298 39 302/302 39 295/295									
Combined P Conc-mg/L 0 0.867 1.46 3.18	Code	Rep 1 274/289 279/289 320/320 293/293	Rep 2 292/29 295/29 280/28 261/28	2 275/289 5 298/298 39 302/302 39 295/295									

CETIS Tes	t Dat	ta W	orks	heet					Report Date: Test Code/ID:	26 Oct-18 10:31 (p 1 of 1) 487EA483 / 12-1625-9203
Bivalve Larva	l Surv	vival a	nd Dev	/elopment	Test					EcoAnalysts
Start Date: End Date: Sample Date:	05 C)ct-18	16:45 ^ 16:40 ^	Protoc		s galloprovin 00/R-95/136 Ammonia		Sample Code: 7A5A1C38 Sample Source: Reference Toxicant Sample Station: P170515.105		
Conc-mg/L 0	Code D	Rep 1	Pos 11	Initial Density 289	Final Density 277	# Counted 277	# Normal 274	Notes		
0	D	2	1	289	294	294	292	NAd		
0	D	3	17	289	280	280	275	on your		
0.867	,	· · · · ·		289		: 	279	total up		
		1	6		284	284				
0.867		2	2	289	301	301	295			
0.867		3	8	289	303	303	298			
1.46		1	19	289	324	324	320			
1.46		2	12	289	285	285	280			
1.46		3	14	289	307	307	302			
3.18	•	1	4	289	301	301	293			
3.18		2	10	289	264	264	261			
3.18		3	9	289	306	306	295			
6.01		1	15	289	320	320	289			
6.01		2	13	289	279	279	250			
6.01		3	3	289	301	301	269			
12 🏒		1	16	289	225	225	2			
ے ۔ 12		2	21	289	286	286	-			
12		3	5	289	323	323	6			
20.7 🦯	-	1	20	289	293	293	0			
20.7		2	7	289	305	305	0			
20.7		3	18	289	310	310	0			

Analyst: <u>)</u> _____QA: <u></u> ____

	nmary Repoi	L					Т	est Code/I	D:	633	6BC4 / 01-	-0403-32	20
Bivalve Larva	I Survival and De	velopment	Test								Eco	oAnalyst	ts
Batch ID: Start Date: Ending Date: Test Length:	14-2069-0648 03 Oct-18 16:45 05 Oct-18 16:40 48h	Test Prote Spec Taxo	ies: Myt	velopment-Si A/600/R-95/1 ilus gallopro	36 (1995)		D B	rine:		ratory Seawater tal Sea Marine Mix or Shellfish		Age:	
Sample ID: Sample Date: Receipt Date: Sample Age:	15 May-17	Code Mate CAS Clier	rial: Uni (PC):	E0045C onized Amm ernal Lab	onia		s	ource:	Reference ⁻ Reference ⁻ P170515.10	Toxica			
Multiple Com	parison Summar	У											
Analysis ID	Endpoint		Comparis	on Method		\checkmark	NOEL	LOEL	. TOEL	-	ти	PMSD	
16-6521-7341	Combined Propo	rtion Norma	a Dunnett N	lultiple Com	parison Test		0.086	0.138	0.108	39		12.9%	
Point Estima	te Summary	(11) (11) (11) (11) (11) (11) (11) (11)											
Analysis ID	Endpoint		Point Est	imate Metho	bd	\checkmark	Level	mg/L	95%	LCL	95% UCL	τυ	;
	Combined Propo	ortion Norma	a Spearmar	n-Kärber			EC50	0.105	6 0.104	15	0.1067		
Test Accepta	bility					TACI							
•			Attribute		Test Stat		Upper	· Overl	ap Decis	sion			
Analysis ID 16-6521-7341	Endpoint Combined Propo	ortion Norma			0.1287	<<	0.25	No		es Crit	teria		
						21							
	oportion Normal	-	N/		05% 1101	B45m	Mov	Std E	rr Std [CV%	%Effe	ct
Conc-mg/L 0	Code D	Count 3	Mean 0.9666	95% LCL 0.8945	95% UCL 1.0000	Min 0.9481	Max 1.000				3.00%	0.00%	
0.013	D	3	0.9885	0.8945	1.0000	0.9654	1.0000				2.02%	-2.27%	
0.013		3	0.9896	0.9450	1.0000	0.9689	1.000				1.82%	-2.39%	
0.021		3	0.9677	0.8287	1.0000	0.9031	1.000				5.78%	-0.12%	
0.086		3	0.9319	0.7643	1.0000	0.8651	1.000				7.24%	3.58%	
0.138		3	0.0127	0.0000	0.0306	0.0069	0.020				56.77%	98.699	%
0.24		3	0.0000	0.0000	0.0000	0.0000	0.000	0.000				100.00	0%
Combined P	roportion Normal	Detail											
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3									
0	D	0.9481	1.0000	0.9516		1							
0.013		0.9654	1.0000	1.0000									
0.021		1.0000	0.9689	1.0000									
0.046		1.0000	0.9031	1.0000									
0.086		1.0000	0.8651	0.9308									
0.138		0.0069	0.0104	0.0208									
0.24		0.0000	0.0000	0.0000									
Combined P	roportion Norma	I Binomials	5										
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3									
0	D	274/289	292/292	275/289									
0.013		279/289	295/295	298/298									
0.021		320/320	280/289	302/302									
0.046		293/293	261/289	295/295									
0.086		289/289	250/289	269/289									
0.138		2/289	3/289	6/289									
				0/289									

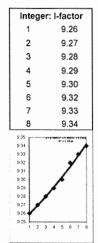
CETIS Tes	t Dat	ta W	orks	heet					6 Oct-18 10:35 (p 1 of 1 6336BC4 / 01-0403-322
Bivalve Larva	l Surv	vival a	nd De	velopment	Test				EcoAnalyst
Start Date: End Date: Sample Date:	05 C	oct-18	16:45 - 16:40	Protoc	ol: EPA/6	s galloprovin 00/R-95/136 zed Ammon	6 (1995)	Sample Code:3AE0045CSample Source:Reference ToxicantSample Station:P170515.105 ~	
······	Code D	Rep	Pos 18	Initial Density 289	Final Density 277	# Counted	# Normal 274 🖌	Notes	
0		1							
0	D	2	11	289	294	294⁄⁄	292 🖊		
0	D	3	13	289	280	280 🦯	275		
0.013 /	/	1	12	289	284	284 🖊	279 🖊		
0.013		2	21	289	301	301 🦯	295 🖊		
0.013		3	3	289	303	303 🦯	298 🖊		
0.021 🗸		1	9	289	324	324 🗸	320 🖊		
0.021		2	15	289	285	285 🖌	280 🖍		
0.021		3	17	289	307	307	302 🗸		
0.046 /	•••••	1	16	289	301	301-/	293		
0.046		2	10	289	264	264 /	261		
0.046		-	2	289	306	306	295		
0.086 /		1	1	289	320	320-	289 ⁄		
0.086		2	6	289	279	279 🖍	250		
0.086		3	8	289	301	301 🖊	269 🦯		
0.138		1	20	289	225	225 🖊	2 1		
0.138		2	5	289	286	286 🖊	3 1		
0.138		3	14	289	323	323 /	61		
0.24	•	1	19	289	293	293/	0 ⁄		
0.24		2	4	289	305	305	0		*****
0.24		3	7	289	310	310. 🖌	0		

Analyst: <u>J</u> QA: <u>J</u>

Un-ionized Ammonia Calculator

CLIENT:	Various	Date of Test:	October 3, 2018 -
PROJECT:	PG1123, PG1162	Test Type:	Mytilus gallo 🧹
COMMENTE			

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



Tar	Sample get / Sample Name	1000	NH3T (mg/L) Actual	22,9	рН 8.0	temp (C) 24.1	temp (K) 297.26	i-factor 9.3053	IVIOU	NH3U (mg/ #VALUE!
NG A	Example 3.5	80623	2.000	10.0	7.5	5.0	278.16	9.2750		0.008
				10 17 19 19 19 19 19 19 19 19 19 19 19 19 19	1000 P. 10 T. 1		1999 - 1997 A - 1993			
	0 /		0	28 /	7.8 2	15.5	288.66	9.3187		
	0.75 /		0.867 /	28 /	7.8	15.2	288.36	9.3187		0.013
	1.5		1.46 <	28	7.8	15.0	288.16	9.3187		0.021
	3		3.18 -	28	7.8	15.1	288.26	9.3187		0.046
	6		6.01 /	28	7.8 /	15.0 🖍	288.16	9.3187		0.086
	12		12 /	28	7.71	15.1	288.26	9.3187		0.138
	18		20.7 /	28	7.7 /	15.2	288.36	9.3187		0.240
				P						
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									-	
		1								
									-	
									1	
									1	

Test ID: PI7051	5:105	Replicat			Stu	dy Director: B. Hes	ber	Location:	c.	
Dilution Water I FSW 10031B.07	Batch:	Organisı TS I	n Batch: 002\0		Ass ¥	B. Hes sociated Test(s): 261162; PG	1123	Organism:	billus spp.	
Chamber Size/T 30 ml shell		Exposur	e Volume: 10 ml							
Toxicant: Amm Chloride:	29860310							Initials: MK		
Target Conce	ntrations: See spiking		neet		-	antity of Stoo rget: See spiking w		Quantity of Target: 200	Diluent:	
	See spiking	g worksh	neet		Act	tual: See spiking	g worksheet	Actual:		
0 Hours	Date:	3/18	WQ Time	•	STO	ЭСК	Start Time: \	645 Initia	ls: BH	
	Control		0.75	1.5		3	6	12	18	
D.O. (%) (>5.0 mg/L)	7.6	7	8	7.9		B.0	B·O	B.O	B .1	
Temperature $(16 \pm 1^{\circ}C)$	15.5	15	.2	15.0		1511	15.0	15.1	15.2	
Salinity (28 ± 1 ppt)	28		rb	28		28	2B	28	rb	
pH (7.8±0.5)	7.8	7	·.C	7.8		7.8	7.B	7.7	7,7	
Day 1	Temperation $(16 \pm 1^{\circ}C)$	ture	١	5.6°C		10/4 MK				
Final Day	Date: 10	05/18	WQ Time	: 1490	STO	ЭСК	End Time: ((40 Initia	ls: UC	
	Control		0.75	1.5		3	6	12	18	
D.O. (%) (>5.0 mg/L)	8.0		8.1	B'3		<i>8.</i> 3	B. J	8.4	8.3	
Temperature $(16 \pm 1^{\circ}C)$	IS.3		15,2	14.6	,	15.2	14.5	15.3	15.2	
Salinity (28 ± 1 ppt)	28		28	29		28	29	28	29	
pH (7.8 ± 0.5)	7.8		7.8	7.8		9.F	7.8	7.8	7.8	

48 Hour Bivalve Development Reference Toxicant Test

Law

Notes:

	our Divaive	Developme	nt Reference		<u>551</u>
Conc.	Rep	Number Normal	Number Abnormal	Date	Initials
	1	274	3	10.25.18	MARH
Control	2	292	2	1	
	3	275	5		
	1	279	5		
0.75	2	.295	6		
	3	298	5		
	1	320	14	·····	
1.5	2	280	T E		
	3	302	5		
	1	293	8		
3	2	261	3		
	3	295	11		
	1	289	31		
6	2	250	29		
	3	269	32		
	1		223		
12	2	2 3	283		
	3	6	317		
	1	0	293		
18	2	0	305		
	3	0	310		1 L
		Stocking	Density		
Rep		Cou	int	In	
1		3[]		n N	nARH
2		274			
3		260			<u>†</u>
	Mean:	280	1	(L
QA Count Checks:				7 #4 conc/r	z/1
#1 conc/rep $\frac{\emptyset}{24}$	#2 conc/re		#3 conc/rep 12	# normal	-
# normal <u>2</u> 74 ' # abnormal <u></u>	# normal _ # abnorma	<u>510</u>	# normal 5 # abnormal 280	# abnorm	al 12
Tech. Init	Tech. Init.	US	Tech. Init	Tech. Init	WS
$\frac{\substack{\text{Calc.}\\279}}{200} = 97.9 \frac{275}{200} =$	98.2 <u>310</u> = 98	$\frac{320}{324} = 98.8$	5 285 = 1.8 3 285 = -	1.0 275 -	45.8 293 = 97.3 301 = 97.3
QA Check Acceptabili	ity: 12 <5% differ	ence in means of QA	& orig. counts		

48 Hour Bivalve Development Reference Toxicant Test

Ammonia Reference Toxicant Spiking Worksheet

Reference Toxicant ID:	P170575.105
Date Prepared:	10/3/18
Technician Initials:	MK

Biv / Echino NH₃ RT

Assumptions in Model Stock ammonia concentration is 9,000 mg/L = 9 mg/mL Date: Measurement: 10/2/2018 9833

Tes	st Solutions						
Measured Concentration	Desired Concentration	Volume	Volume of stock to reach desired concentration				
mg/L	mg/L	mL	mL stock to increase				
0	0			SALT WATER			
0.867	0.75	200		0.023			
1.46	1.5	200		0.046			
3.18	3	200		0.092			
6.01	6	200		0.183			
12.0	12	200		0.366			
20.7	18	200		0.549			

APPENDIX B. STATISTICAL COMPARISONS

Statistical Results: *Eohaustorius estuarius* Test

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1B-IT2	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	7	Mean:	2
SD:	10.368	SD:	2.739
Tr Mean:	11.168	Tr Mean:	5.168
Trans SD:	12.352	Trans SD:	7.077

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	8.935		Statistic:	Student's t	
	Residual SD:	6.532		Test Residual SD:	7.265		Balanced Design:	Yes	
	SS:	810.58		Ref. Residual Mean:	6.202		Transformation:	ArcSin	
	К:	5		Ref. Residual SD:	1.415				
	b:	27.334		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.9217		Calculated Value:	0.8256		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level: Calculated Value:	0.05 -0.9425
	Override Option:	N/A						Critical Value: Accept Null Hypothesis:	>= 1.860 Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	25	30	0	0	18.832	5.168			-11.168
2	5	12.921	5	12.921	1.753	7.753			-11.168
3	5	12.921	0	0	1.753	5.168			-5.168
4	0	0	0	0	11.168	5.168			-5.168
5	0	0	5	12.921	11.168	7.753			-5.168
6									1.753
7									1.753
8									7.753
9									7.753
10									18.832

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1B-IT3	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	15	Mean:	2
SD:	7.071	SD:	2.739
Tr Mean:	22.21	Tr Mean:	5.168
Trans SD:	6.274	Trans SD:	7.077

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	5.226		Statistic:	Student's t	
	Residual SD: SS:	4.339 357.778		Test Residual SD: Ref. Residual Mean:	2.285 6.202		Balanced Design: Transformation:	Yes ArcSin	
	К: b:	5 17.562		Ref. Residual SD: Deg. of Freedom:	1.415 8				
				-				Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.862		Calculated Value:	0.8121		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.05
	Override Option:	N/A						Calculated Value: Critical Value: Accept Null Hypothesis:	-4.0292 >= 1.860 Yes

Replicate Number 1 2	Test Data 20 20 20	Trans. Test Data 26.565 26.565 26.565	Reference Data O 5 0	Trans. Reference Data 0 12.921 0	Levene's Test Residuals 4.355 4.355 4.355	Levene's Reference Residuals 5.168 7.753 5.168	Mann- Whitney Ranks	Rankits	Shipiro- Wilk Residuals -9.289 -5.168 -5.168
5 6 7 8 9 10	10	12.921 18.435	0 5	0 12.921	9.289 3.775	5.168 7.753			-5.168 -3.775 4.355 4.355 4.355 7.753 7.753 7.753

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT3	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	10	Mean:	2
SD:	6.124	SD:	2.739
Tr Mean:	16.489	Tr Mean:	5.168
Trans SD:	9.471	Trans SD:	7.077

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	6.595		Statistic:	Student's t	
	Residual SD:	5.425		Test Residual SD:	5.943		Balanced Design:	Yes	
	SS:	559.119		Ref. Residual Mean:	6.202		Transformation:	ArcSin	
	К:	5		Ref. Residual SD:	1.415				
	b:	22.023		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.8674		Calculated Value:	0.144		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.05
	Distributedi	100		nonogeneous	100			Calculated Value:	-2.141
	Override Option:	N/A						Critical Value: Accept Null Hypothesis:	>= 1.860 Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	10	18.435	0	0	1.946	5.168			-16.489
2	15	22.786	5	12.921	6.298	7.753			-5.168
3	15	22.786	0	0	6.298	5.168			-5.168
4	0	0	0	0	16.489	5.168			-5.168
5	10	18.435	5	12.921	1.946	7.753			1.946
6									1.946
7									6.298
8									6.298
9									7.753
10									7.753

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT6	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	1	Mean:	2
SD:	2.236	SD:	2.739
Tr Mean:	N/A	Tr Mean:	N/A
Trans SD:	N/A	Trans SD:	N/A

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean: Residual SD: SS: K: b:	0 4.192 333.903 5 15.917		Test Residual Mean: Test Residual SD: Ref. Residual Mean: Ref. Residual SD: Deg. of Freedom:	4.135 3.467 6.202 1.415 8		Statistic: Balanced Design: Transformation:	Mann-Whitney Yes rank-order	
	Alpha Level: Calculated Value: Critical Value:	0.05 0.7588 <= 0.842		Alpha Level: Calculated Value: Critical Value:	0.1 1.2344 >= 1.860		Null: Alternate:	Experimental Hypothesis x1 >= x2 x1 < x2	
	Normally Distributed: Override Option:	No Not Invoked		Variances Homogeneous:	Yes			Mann-Whitney N1: Mann-Whitney N2: Degrees of Freedom: Experimental Alpha Level: Calculated Value: Critical Value: Accept Null Hypothesis:	5 5 15 >= 21.000 Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	0	4	0	4	2.584	5.168	4		-5.168
2	0	4	5	9	2.584	7.753	4		-5.168
3	0	4	0	4	2.584	5.168	4		-5.168
4	0	4	0	4	2.584	5.168	4		-2.584
5	5	9	5	9	10.337	7.753	4		-2.584
6							4		-2.584
7							4		-2.584
8							9		7.753
9							9		7.753
10							9		10.337

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT9	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	4	Mean:	2
SD:	6.519	SD:	2.739
Tr Mean:	N/A	Tr Mean:	N/A
Trans SD:	N/A	Trans SD:	N/A

Anchor Port Gamble 2018 Eohs

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
Res	sidual Mean:	0		Test Residual Mean:	8.57		Statistic:	Mann-Whitney	
Res	sidual SD:	5.765		Test Residual SD:	3.999		Balanced Design:	Yes	
SS:		631.513		Ref. Residual Mean:	6.202		Transformation:	rank-order	
К:		5		Ref. Residual SD:	1.415				
b:		22.508		Deg. of Freedom:	8				
								Experimental Hypothesis	
Alp	oha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
Calo	lculated Value:	0.8022		Calculated Value:	1.2481		Alternate:	x1 < x2	
Crit	tical Value:	<= 0.842		Critical Value:	>= 1.860				
								Mann-Whitney N1:	5
								Mann-Whitney N2:	5
Nor	rmally			Variances				Degrees of Freedom:	
Dist	stributed:	No		Homogeneous:	Yes			Experimental Alpha Level:	0.05
								Calculated Value:	11.5
Ove	erride Option:	Not Invoked						Critical Value:	>= 21.000
								Accept Null Hypothesis:	Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	15	10	0	3.5	15.645	5.168	3.5		-7.141
2	0	3.5	5	8	7.141	7.753	3.5		-7.141
3	5	8	0	3.5	5.779	5.168	3.5		-7.141
4	0	3.5	0	3.5	7.141	5.168	3.5		-5.168
5	0	3.5	5	8	7.141	7.753	3.5		-5.168
6							3.5		-5.168
7							8		5.779
8							8		7.753
9							8		7.753
10							10		15.645

Statistical Results: Neanthes arenaceodentata Test

Project Name:	Anchor Port Gamble 2018 Neanthes Dry Weight
rioject nume.	Anenor For Gamble 2010 Weatheres Dry Weight

x1	Ref Samp:	x2
SMA-1B-IT2	Ref ID:	CR-21
	Alias:	
5	Replicates:	5
0.86	Mean:	0.735
0.15	SD:	0.147
0.86	Tr Mean:	0.735
0.15	Trans SD:	0.147
	SMA-1B-IT2 5 0.86 0.15 0.86	SMA-1B-IT2 Ref ID: 5 Alias: 0.86 Mean: 0.15 SD: 0.86 Tr Mean:

Residual Mean: 0 Residual Mean: 0.006 Statistic: Statistic:	Shapiro-Wilk Results:			Levene's Results:			Test Results:			
Alpha Level: 0.05 Alpha Level: 0.3939 Alpha Level: 0.0454 Null: x1 >= x2 x1 >= x2 Critical Value: <= 0.842		Residual SD: SS: K:	0.096 0.176 5		Test Residual SD: Ref. Residual Mean: Ref. Residual SD:	0.092 0.103 0.091		Balanced Design:	Yes	
Distributed: Yes Experimental Alpha Level: 0.05 Override Option: N/A -1.3294 -1.3294 Override Option: N/A -1.860 -1.860 Accept Null Hypothesis: Yes -1.860 Min. Difference for Power: -1.860 Min. Difference for Power: -1.860 Replicate Trans. Levene's Mann- Wilk Reference Test Trans. Levene's Mann-		Alpha Level: Calculated Value:	0.05 0.939		Alpha Level: Calculated Value:	0.1 0.0454			x1 >= x2	
Trans. Levene's Mann- Shipiro- Replicate Test Trans. Reference Test Reference Whitney Wilk		Distributed:				Yes			Experimental Alpha Level: Calculated Value: Critical Value:	0.05 -1.3294 >= 1.860
Replicate Test Trans. Reference Reference Test Reference Whitney Wilk										
	Penlicate	Tect	Trans	Peference						
Number Data Test Data Data Data Network Networ	Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1 0.888 0.888 0.75 0.75 0.02 0.04 -0.259 2 0.802 0.802 0.496 0.496 0.058 0.239 -0.206	2									
3 1.066 1.066 0.802 0.802 0.206 0.067 -0.058	3									
4 0.654 0.654 0.864 0.886 0.886 0.206 0.151 -0.018	4									
5 0.89 0.89 0.717 0.717 0.03 0.018 0.028	5	0.89	0.89	0.717	0.717	0.03	0.018			

7 8 9

10

0.028 0.03 0.04 0.067

0.151 0.206

Project Name:	Anchor Port Gamble 2018 Neanthes Dry Weight

4

5

6

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8 9

10

0.826 0.554

0.826 0.554

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1B-IT3	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	0.748	Mean:	0.735
SD:	0.14	SD:	0.147
Tr Mean:	0.748	Tr Mean:	0.735
Trans SD:	0.14	Trans SD:	0.147

0.886

0.717

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean: Residual SD: SS: K: b:	0 0.093 0.165 5 0.393		Test Residual Mean: Test Residual SD: Ref. Residual Mean: Ref. Residual SD: Deg. of Freedom:	0.102 0.081 0.103 0.091 8		Statistic: Balanced Design: Transformation:	Student's t Yes No Transformation	
	J. Alpha Level: Calculated Value: Critical Value:	0.05 0.939 <= 0.842		Alpha Level: Calculated Value: Critical Value:	0.1 0.0161 >= 1.860		Null: Alternate:	Experimental Hypothesis x1 >= x2 x1 < x2	
	Normally Distributed: Override Option:	Yes N/A		Variances Homogeneous:	Yes			Degrees of Freedom: Experimental Alpha Level: Calculated Value: Critical Value: Accept Null Hypothesis: Power: Min. Difference for Power:	8 0.05 -0.1455 >= 1.860 Yes
Replicate Number 1 2 3	Test Data 0.926 0.695 0.741	Trans. Test Data 0.926 0.695 0.741	Reference Data 0.775 0.496 0.802	Trans. Reference Data 0.775 0.496 0.802	Levene's Test Residuals 0.178 0.053 0.007	Levene's Reference Residuals 0.04 0.239 0.067	Mann- Whitney Ranks	Rankits	Shipiro- Wilk Residuals -0.239 -0.194 -0.053

0.886

0.717

0.078 0.194

0.151

0.018

-0.053 -0.018 -0.007 0.04

0.067

0.078 0.151

0.178

Project Name:	Anchor Port Gamble 2018 Neanthes Dry Weight	
Sample:	x1	Ref Samp:
Samp ID:	SMA-2C-IT3	Ref ID:
Alias:		Alias:
Replicates:	5	Replicates:
Mean:	0.746	Mean:
SD:	0.032	SD:
Tr Mean:	0.746	Tr Mean:
Trans SD:	0.032	Trans SD:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean: Residual SD: SS: K: b:	0 0.069 0.09 5 0.28		Test Residual Mean: Test Residual SD: Ref. Residual Mean: Ref. Residual SD: Deg. of Freedom:	0.023 0.018 0.103 0.091 8		Statistic: Balanced Design: Transformation:	Approximate t Yes No Transformation Experimental Hypothesis	
	Alpha Level: Calculated Value: Critical Value:	0.05 0.8673 <= 0.842		Alpha Level: Calculated Value: Critical Value:	0.1 1.914 >= 1.860		Null: Alternate:	$x_1 >= x_2$ $x_1 < x_2$	
	Normally Distributed: Override Option:	Yes N/A		Variances Homogeneous:	No			Degrees of Freedom: Experimental Alpha Level: Calculated Value: Critical Value: Accept Null Hypothesis: Power: Min. Difference for Power:	4 0.05 -0.1547 ≻= 2.132 Yes
Replicate Number 1 2 3 4 5 6 7	Test Data 0.788 0.704 0.729 0.761 0.746	Trans. Test Data 0.788 0.704 0.729 0.761 0.746	Reference Data 0.775 0.496 0.802 0.886 0.717	Trans. Reference Data 0.775 0.496 0.802 0.886 0.717	Levene's Test Residuals 0.042 0.042 0.017 0.015 0	Levene's Reference Residuals 0.04 0.239 0.067 0.151 0.018	Mann- Whitney Ranks	Rankits	Shipiro- Wilk Residuals -0.239 -0.042 -0.018 -0.017 0 0.015 0.04

x2 CR-21 5 0.735 0.147 0.735 0.147

0.042

0.067

0.151

8

9 10

Project Name:	Anchor Port Gamble 2018 Neanthes Dry Weight

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT6	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	0.782	Mean:	0.735
SD:	0.098	SD:	0.147
Tr Mean:	N/A	Tr Mean:	N/A
Trans SD:	N/A	Trans SD:	N/A

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean: Residual SD: SS: K:	0 0.081 0.125 5		Test Residual Mean: Test Residual SD: Ref. Residual Mean: Ref. Residual SD:	0.07 0.06 0.103 0.091		Statistic: Balanced Design: Transformation:	Mann-Whitney Yes rank-order	
	b: Alpha Level:	0.323		Deg. of Freedom: Alpha Level:	8 0.1		Null:	Experimental Hypothesis x1 >= x2	
	Calculated Value: Critical Value:	0.8356 <= 0.842		Calculated Value: Critical Value:	0.6805 >= 1.860		Alternate:	x1 < x2 Mann-Whitney N1:	5
	Normally			Variances				Mann-Whitney N2: Degrees of Freedom:	5
	Distributed: Override Option:	No Not Invoked		Homogeneous:	Yes			Experimental Alpha Level: Calculated Value: Critical Value: Accept Null Hypothesis:	0.05 9 >= 21.000 Yes
								Power: Min. Difference for Power:	res

Replicate Number 1	Test Data 0.608	Trans. Test Data 2	Reference Data 0.775	Trans. Reference Data 4	Levene's Test Residuals 0.174	Levene's Reference Residuals 0.04	Mann- Whitney Ranks 1	Rankits	Shipiro- Wilk Residuals -0.239
2	0.801	5	0.496	1	0.019	0.239	2		-0.174
3	0.839	9	0.802	6	0.057	0.067	3		-0.018
4	0.831	7	0.886	10	0.049	0.151	4		0.019
5	0.832	8	0.717	3	0.05	0.018	5		0.04
6							6		0.049
7							7		0.05
8							8		0.057
9							9		0.067
10							10		0.151

Project Name:	Anchor Port Gamble 2018 Neanthes Dry Weight	
Sample:	x1	Ref Samp:
Samp ID:	SMA-2C-IT9	Ref ID:
Alias:		Alias:
Replicates:	5	Replicates:
Mean:	0.695	Mean:
SD:	0.097	SD:
Tr Mean:	0.695	Tr Mean:
Trans SD:	0.097	Trans SD:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	idual SD:	0 0.081 0.124 5 0.341		Test Residual SD: Ref. Residual Mean: Ref. Residual SD:	0.065 0.065 0.103 0.091 8		Statistic: Balanced Design: Transformation:	Student's t Yes No Transformation	
Calcu	culated Value:	0.05 0.9335 <= 0.842		Calculated Value:	0.1 0.7588 >= 1.860		Null: Alternate:	Experimental Hypothesis x1 >= x2 x1 < x2	
Distr		Yes N/A		Variances Homogeneous:	Yes			Degrees of Freedom: Experimental Alpha Level: Calculated Value: Critical Value: Accept Null Hypothesis:	8 0.05 0.5125 >= 1.860 Yes
				Trans.	Levene's	Levene's	Mann-	Power: Min. Difference for Power:	Shipiro-
Replicate Test	t	Trans.	Reference		Test	Reference	Whitney		Wilk
Number Data 1 0.574 2 0.844 3 0.673 4 0.703 5 0.677	a 74 44 78 08	Test Data 0.574 0.844 0.678 0.708 0.67	Data 0.775 0.496 0.802 0.886 0.717	0.496 0.802 0.886	Residuals 0.121 0.149 0.017 0.013 0.025	Residuals 0.04 0.239 0.067 0.151 0.018	Ranks	Rankits	Residuals -0.239 -0.121 -0.025 -0.018 -0.017

x2 CR-21 5 0.735 0.147 0.735 0.147

> -0.017 0.013

0.04 0.067

0.149 0.151

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-			
Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1B-IT2	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	0.527	Mean:	0.473
SD:	0.059	SD:	0.099
Tr Mean:	0.527	Tr Mean:	0.473
Trans SD:	0.059	Trans SD:	0.099

Anchor Port Gamble 2018 Neanthes AFDW

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean: Residual SD: SS: K: b:	0 0.053 0.053 5 0.228		Test Residual Mean: Test Residual SD: Ref. Residual Mean: Ref. Residual SD: Deg. of Freedom:	0.039 0.04 0.073 0.056 8		Statistic: Balanced Design: Transformation:	Student's t Yes No Transformation	
	Alpha Level: Calculated Value: Critical Value:	0.05 0.9686 <= 0.842		Alpha Level: Calculated Value: Critical Value:	0.1 1.1034 >= 1.860		Null: Alternate:	Experimental Hypothesis x1 >= x2 x1 < x2	
	Normally Distributed: Override Option:	Yes N/A		Variances Homogeneous:	Yes			Degrees of Freedom: Experimental Alpha Level: Calculated Value: Critical Value: Accept Null Hypothesis:	8 0.05 -1.0444 >= 1.860 Yes

Replicate Number 1 2 3 4 5 5 6 7 7 8	Test Data 0.535 0.535 0.535 0.59 0.429 0.546	Trans. Test Data 0.535 0.535 0.59 0.429 0.546	Reference Data 0.461 0.335 0.53 0.599 0.44	Trans. Reference Data 0.461 0.335 0.53 0.599 0.44	Levene's Test Residuals 0.008 0.008 0.063 0.098 0.019	Levene's Reference Residuals 0.012 0.138 0.057 0.126 0.033	Mann- Whitney Ranks	Rankits	Shipiro- Wilk Residuals -0.138 -0.033 -0.012 0.008 0.008 0.008 0.019 0.057
7 8 9 10									

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1B-IT3	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	0.499	Mean:	0.473
SD:	0.066	SD:	0.099
Tr Mean:	0.499	Tr Mean:	0.473
Trans SD:	0.066	Trans SD:	0.099

Anchor Port Gamble 2018 Neanthes AFDW

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean: Residual SD: SS: K: b:	0 0.055 0.057 5 0.235		Test Residual Mean: Test Residual SD: Ref. Residual Mean: Ref. Residual SD: Deg. of Freedom:	0.048 0.038 0.073 0.056 8		Statistic: Balanced Design: Transformation:	Student's t Yes No Transformation	
	Alpha Level: Calculated Value: Critical Value:	0.05 0.97 <= 0.842		Alpha Level: Calculated Value: Critical Value:	0.1 0.8142 >= 1.860		Null: Alternate:	Experimental Hypothesis x1 >= x2 x1 < x2	
	Normally Distributed: Override Option:	Yes N/A		Variances Homogeneous:	Yes			Degrees of Freedom: Experimental Alpha Level: Calculated Value: Critical Value: Accept Null Hypothesis:	8 0.05 -0.4946 >= 1.860 Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	0.569	0.569	0.461	0.461	0.07	0.012			-0.138
2	0.48	0.48	0.335	0.335	0.019	0.138			-0.098
3	0.496	0.496	0.53	0.53	0.003	0.057			-0.033
4	0.551	0.551	0.599	0.599	0.052	0.126			-0.019
5	0.401	0.401	0.44	0.44	0.098	0.033			-0.012
6									-0.003
7									0.052
8									0.057
9									0.07
10									0.126

Project Name:	Anchor Port Gamble 2018 Neanthes AFDW
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Samp ID: SMA-2C-IT3 Ref ID: C Alias: Alias: Alias: Alias:	
Replicates: 5 Replicates: 5	i
Mean: 0.514 Mean: 0	0.473
SD: 0.032 SD: 0	0.099
Tr Mean: 0.514 Tr Mean: 0	0.473
Trans SD: 0.032 Trans SD: 0	0.099

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	0.021		Statistic:	Approximate t	
	Residual SD:	0.048		Test Residual SD:	0.022		Balanced Design:	Yes	
	SS:	0.044		Ref. Residual Mean:	0.073		Transformation:	No Transformation	
	К:	5		Ref. Residual SD:	0.056				
	b:	0.203		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.9434		Calculated Value:	1.9328		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	5
	Distributed:	Yes		Homogeneous:	No			Experimental Alpha Level:	0.05
								Calculated Value:	-0.8739
	Override Option:	N/A						Critical Value:	>= 2.015
								Accept Null Hypothesis:	Yes
								Power:	

```
Min. Difference for Power:
```

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	0.499	0.499	0.461	0.461	0.015	0.012			-0.138
2	0.477	0.477	0.335	0.335	0.037	0.138			-0.037
3	0.565	0.565	0.53	0.53	0.051	0.057			-0.033
4	0.513	0.513	0.599	0.599	0.001	0.126			-0.015
5	0.515	0.515	0.44	0.44	0.001	0.033			-0.012
6									-0.001
7									0.001
8									0.051
9									0.057
10									0.126

-			
Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT6	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	0.466	Mean:	0.473
SD:	0.067	SD:	0.099
Tr Mean:	0.466	Tr Mean:	0.473
Trans SD:	0.067	Trans SD:	0.099

Anchor Port Gamble 2018 Neanthes AFDW

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean: Residual SD: SS: K: b:	0 0.055 0.057 5 0.236		Test Residual Mean: Test Residual SD: Ref. Residual Mean: Ref. Residual SD: Deg. of Freedom:	0.053 0.032 0.073 0.056 8		Statistic: Balanced Design: Transformation:	Student's t Yes No Transformation	
	Alpha Level: Calculated Value: Critical Value:	0.05 0.9695 <= 0.842		Alpha Level: Calculated Value: Critical Value:	0.1 0.7098 >= 1.860		Null: Alternate:	Experimental Hypothesis x1 >= x2 x1 < x2	
	Normally Distributed: Override Option:	Yes N/A		Variances Homogeneous:	Yes			Degrees of Freedom: Experimental Alpha Level: Calculated Value: Critical Value: Accept Null Hypothesis:	8 0.05 0.1344 >= 1.860 Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	0.362	0.362	0.461	0.461	0.104	0.012			-0.138
2	0.506	0.506	0.335	0.335	0.04	0.138			-0.104
3	0.438	0.438	0.53	0.53	0.028	0.057			-0.033
4	0.53	0.53	0.599	0.599	0.064	0.126			-0.028
5	0.493	0.493	0.44	0.44	0.027	0.033			-0.012
6									0.027
7									0.04
8									0.057
9									0.064
10									0.126

Project Name:	Anchor Port Gamble 2018 Neanthes AFDW

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT9	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	0.429	Mean:	0.473
SD:	0.04	SD:	0.099
Tr Mean:	0.429	Tr Mean:	0.473
Trans SD:	0.04	Trans SD:	0.099

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean: Residual SD:	0 0.049		Test Residual Mean: Test Residual SD:	0.029 0.024		Statistic: Balanced Design:	Student's t Yes	
	SS: K: b:	0.046 5 0.211		Ref. Residual Mean: Ref. Residual SD: Deg. of Freedom:	0.073 0.056 8		Transformation:	No Transformation	
	Alpha Level: Calculated Value:	0.05 0.9763		Alpha Level: Calculated Value:	0.1 1.6263		Null: Alternate:	Experimental Hypothesis x1 >= x2 x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally Distributed:	Yes		Variances Homogeneous:	Yes			Degrees of Freedom: Experimental Alpha Level: Calculated Value:	8 0.05 0.911
	Override Option:	N/A						Critical Value: Accept Null Hypothesis:	>= 1.860 Yes
								Power:	

Min. Difference for Power:

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	0.375	0.375	0.461	0.461	0.054	0.012			-0.138
2	0.482	0.482	0.335	0.335	0.053	0.138			-0.054
3	0.429	0.429	0.53	0.53	0	0.057			-0.033
4	0.449	0.449	0.599	0.599	0.02	0.126			-0.017
5	0.412	0.412	0.44	0.44	0.017	0.033			-0.012
6									0
7									0.02
8									0.053
9									0.057
10									0.126

Statistical Results: Mytilus galloprovnicialis Larval Test

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2A-IT	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	317.6	Mean:	310.4
SD:	18.916	SD:	32.624
Tr Mean:	317.6	Tr Mean:	310.4
Trans SD:	18.916	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:		Levene's Results:			Test Results:			
Residual Mean:	0		Test Residual Mean:	14.08		Statistic:	Student's t	
Residual SD:	17.303		Test Residual SD:	10.488		Balanced Design:	Yes	
SS:	5688.4		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
К:	5		Ref. Residual SD:	19.308				
b:	73.86		Deg. of Freedom:	8				
							Experimental Hypothesis	
Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
Calculated Value:	0.959		Calculated Value:	0.9607		Alternate:	x1 < x2	
Critical Value:	<= 0.842		Critical Value:	>= 1.860				
Normally			Variances				Degrees of Freedom:	8
Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
							Calculated Value:	-0.4269
Override Option:	N/A						Critical Value:	>= 1.397
							Accept Null Hypothesis:	Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	323	323	264	264	5.4	46.4			-46.4
2									
287	287								
352	352	30.6	41.6			-30.6			
3									
313	313								
298	298	4.6	12.4			-12.4			
4									
333	333								
325	325	15.4	14.6			-4.6			
5									
332	332								
313	313	14.4	2.6			2.6			
6									5.4
7									14.4
8									14.6
9									15.4
10									41.6

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT6	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	303.6	Mean:	310.4
SD:	21.007	SD:	32.624
Tr Mean:	303.6	Tr Mean:	310.4
Trans SD:	21.007	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	17.52		Statistic:	Student's t	
	Residual SD:	17.804		Test Residual SD:	7.59		Balanced Design:	Yes	
	SS:	6022.4		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
	К:	5		Ref. Residual SD:	19.308				
	b:	76.592		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.9741		Calculated Value:	0.6467		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
	Distributedi			nomogeneousi	105			Calculated Value:	0.3919
	Override Option:	N/A						Critical Value: Accept Null Hypothesis:	>= 1.397 Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	286	286	264	264	17.6	46.4			-46.4
2									
318	318								
352	352	14.4	41.6			-17.6			
3									
286	286								
298	298	17.6	12.4			-17.6			
4									
333	333								
325	325	29.4	14.6			-12.4			
5									
295	295								
313	313	8.6	2.6			-8.6			
6									2.6
7									14.4
8									14.6
9									29.4
10									41.6

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT3	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	313.8	Mean:	310.4
SD:	21.017	SD:	32.624
Tr Mean:	313.8	Tr Mean:	310.4
Trans SD:	21.017	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	16.96		Statistic:	Student's t	
	Residual SD:	17.806		Test Residual SD:	9.064		Balanced Design:	Yes	
	SS:	6024		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
	К:	5		Ref. Residual SD:	19.308				
	b:	76.996		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.9841		Calculated Value:	0.6877		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
	bistinbatear			nonogeneousi	105			Calculated Value:	-0.1959
	Override Option:	N/A						Critical Value: Accept Null Hypothesis:	>= 1.397 Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	305	305	264	264	8.8	46.4			-46.4
2									
342	342								
352	352	28.2	41.6			-24.8			
3									
305	305								
298	298	8.8	12.4			-12.4			
4									
289	289								
325	325	24.8	14.6			-8.8			
5									
328	328								
313	313	14.2	2.6			-8.8			
6									2.6
7									14.2
8									14.6
9									28.2
10									41.6

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2B-ST	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	301.2	Mean:	310.4
SD:	16.084	SD:	32.624
Tr Mean:	301.2	Tr Mean:	310.4
Trans SD:	16.084	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	11.36		Statistic:	Student's t	
	Residual SD:	16.689		Test Residual SD:	9.869		Balanced Design:	Yes	
	SS:	5292		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
	К:	5		Ref. Residual SD:	19.308				
	b:	72.098		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.9823		Calculated Value:	1.2539		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
	Distributed.	165		nomogeneous.	163			Calculated Value:	0.5656
	Override Option:	N/A						Critical Value: Accept Null Hypothesis:	>= 1.397 Yes

Replicate	Test	Trans.	Reference	Trans. Reference	Levene's Test	Levene's Reference	Mann- Whitney		Shipiro- Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	320	320	264	264	18.8	46.4	Naliks	Raikits	-46.4
2	520	320	204	204	10.0	40.4			-40.4
302	302								
352	352	0.8	41.6			-24.2			
3									
277	277								
298	298	24.2	12.4			-12.4			
4									
310	310								
325	325	8.8	14.6			-4.2			
5									
297	297								
313	313	4.2	2.6			0.8			
6									2.6
7									8.8
8									14.6
9									18.8
10									41.6
10									41.0

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2B-IT	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	298	Mean:	310.4
SD:	20.31	SD:	32.624
Tr Mean:	298	Tr Mean:	310.4
Trans SD:	20.31	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:		Levene's Results:			Test Results:			
Residual Mean:	0		Test Residual Mean:	16.4		Statistic:	Student's t	
Residual SD:	17.633		Test Residual SD:	8.735		Balanced Design:	Yes	
SS:	5907.2		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
К:	5		Ref. Residual SD:	19.308				
b:	76.239		Deg. of Freedom:	8				
							Experimental Hypothesis	
Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
Calculated Value:	0.9839		Calculated Value:	0.7513		Alternate:	x1 < x2	
Critical Value:	<= 0.842		Critical Value:	>= 1.860				
Normally			Variances				Degrees of Freedom:	8
Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
							Calculated Value:	0.7215
Override Option:	N/A						Critical Value:	>= 1.397
							Accept Null Hypothesis:	Yes

Replicate	Test	Trans.	Reference	Trans. Reference	Levene's Test	Levene's Reference	Mann- Whitney		Shipiro- Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	280	280	264	264	18	46.4			-46.4
2									
297	297								
352	352	1	41.6			-22			
3									
318	318								
298	298	20	12.4			-18			
4									
276	276								
325	325	22	14.6			-12.4			
5									
319	319								
313	313	21	2.6			-1			
6									2.6
7									14.6
8									20
9									21
10									41.6

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2A-ST	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	304.2	Mean:	310.4
SD:	25.253	SD:	32.624
Tr Mean:	304.2	Tr Mean:	310.4
Trans SD:	25.253	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	19.84		Statistic:	Student's t	
	Residual SD:	18.929		Test Residual SD:	12.069		Balanced Design:	Yes	
	SS:	6808		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
	К:	5		Ref. Residual SD:	19.308				
	b:	81.956		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.9866		Calculated Value:	0.3614		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	8 0.1
	Distributed.	res		Homogeneous.	res			Calculated Value:	0.336
	Override Option:	N/A						Critical Value: Critical Value: Accept Null Hypothesis:	0.336 >= 1.397 Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	275	275	264	264	29.2	46.4			-46.4
2									
336	336								
352	352	31.8	41.6			-29.2			
3									
285	285								
298	298	19.2	12.4			-19.2			
4									
303	303								
325	325	1.2	14.6			-12.4			
5									
322	322								
313	313	17.8	2.6			-1.2			
6									2.6
7									14.6
8									17.8
9									31.8
10									41.6

-			
Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1-ST	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	277.8	Mean:	310.4
SD:	18.102	SD:	32.624
Tr Mean:	277.8	Tr Mean:	310.4
Trans SD:	18.102	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
Residua	al Mean: 0			Test Residual Mean:	14.96		Statistic:	Student's t	
Residua	al SD: 17.	.119		Test Residual SD:	6.924		Balanced Design:	Yes	
SS:	550	68		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
К:	5			Ref. Residual SD:	19.308				
b:	73.	.705		Deg. of Freedom:	8				
								Experimental Hypothesis	
Alpha L	Level: 0.0	05		Alpha Level:	0.1		Null:	x1 >= x2	
Calculat	ated Value: 0.9	9757		Calculated Value:	0.9331		Alternate:	x1 < x2	
Critical	l Value: <=	0.842		Critical Value:	>= 1.860				
Normal	llv			Variances				Degrees of Freedom:	8
Distribu		s		Homogeneous:	Yes			Experimental Alpha Level:	0.1
								Calculated Value:	1.9538
Overrid	de Option: N/	Ά						Critical Value:	>= 1.397
	. ,							Accept Null Hypothesis:	No

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	266	266	264	264	11.8	46.4			-46.4
2									
289	289								
352	352	11.2	41.6			-16.8			
3									
304	304								
298	298	26.2	12.4			-12.4			
4									
269	269								
325	325	8.8	14.6			-11.8			
5									
261	261								
313	313	16.8	2.6			-8.8			
6									2.6
7									11.2
8									14.6
9									26.2
10									41.6

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1B-IT3	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	320.4	Mean:	310.4
SD:	13.612	SD:	32.624
Tr Mean:	320.4	Tr Mean:	310.4
Trans SD:	13.612	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:		Levene's Results:			Test Results:			
Residual Mean:	0		Test Residual Mean:	9.52		Statistic:	Student's t	
Residual SD:	16.22		Test Residual SD:	8.486		Balanced Design:	Yes	
SS:	4998.4		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
К:	5		Ref. Residual SD:	19.308				
b:	69.357		Deg. of Freedom:	8				
							Experimental Hypothesis	
Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
Calculated Value:	0.9624		Calculated Value:	1.4843		Alternate:	x1 < x2	
Critical Value:	<= 0.842		Critical Value:	>= 1.860				
Normally			Variances				Degrees of Freedom:	8
Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level: Calculated Value:	0.1 -0.6326
Override Option:	N/A						Critical Value: Accept Null Hypothesis:	>= 1.397 Yes

				Trans.		Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference		Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	318	318	264	264	2.4	46.4			-46.4
2									
299	299								
352	352	21.4	41.6			-21.4			
3									
336	336								
298	298	15.6	12.4			-12.4			
4									
324	324								
325	325	3.6	14.6			-2.4			
5									
325	325								
313	313	4.6	2.6			2.6			
6									3.6
7									4.6
8									14.6
9									15.6
10									41.6

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1B-IT2	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	302.2	Mean:	310.4
SD:	25.163	SD:	32.624
Tr Mean:	302.2	Tr Mean:	310.4
Trans SD:	25.163	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	19.44		Statistic:	Student's t	
	Residual SD:	18.904		Test Residual SD:	12.681		Balanced Design:	Yes	
	SS:	6790		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
	К:	5		Ref. Residual SD:	19.308				
	b:	81.657		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.982		Calculated Value:	0.3949		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
								Calculated Value:	0.445
	Override Option:	N/A						Critical Value:	>= 1.397
								Accept Null Hypothesis:	Yes

				Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	337	337	264	264	34.8	46.4			-46.4
2									
274	274								
352	352	28.2	41.6			-28.2			
3									
316	316								
298	298	13.8	12.4			-18.2			
4									
300	300								
325	325	2.2	14.6			-12.4			
5									
284	284								
313	313	18.2	2.6			-2.2			
6									2.6
7									13.8
8									14.6
9									34.8
10									41.6

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-1A-IT	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	307.6	Mean:	310.4
SD:	18.716	SD:	32.624
Tr Mean:	307.6	Tr Mean:	310.4
Trans SD:	18.716	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	16.32		Statistic:	Student's t	
	Residual SD:	17.257		Test Residual SD:	4.168		Balanced Design:	Yes	
	SS:	5658.4		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
	К:	5		Ref. Residual SD:	19.308				
	b:	73.676		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.9593		Calculated Value:	0.815		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
									0
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
	Override Option:	N/A						Calculated Value: Critical Value: Accept Null Hypothesis:	0.1665 >= 1.397 Yes

1 328 328 264 204 20.4 46.4 -46.4 2 292 292 292 -10.6 -10.					Trans.	Levene's	Levene's	Mann-		Shipiro-
1 328 328 264 204 20.4 46.4 -46.4 2 292 292 292 -10.6 -10.	Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
2 292 292 352 352 15.6 328 328 -15.6 298 328 -14.6 297 297 -14.6 297 297 -14.6 297 297 -14.6 297 297 -14.6 293 325 10.6 -14.6 5 -12.4 -12.4 5 -12.4 -12.4 5 -12.4 -12.4 6 -12.4 -12.4 6 -12.4 -12.4 6 -12.4 -12.4 7 -12.4 -12.4 6 -12.4 -12.4 7 -12.4 -12.4 6 -12.4 -12.4 7 -12.4 -12.4 7 -12.4 -12.4 6 -12.4 -12.4 7 -12.4 -12.4 6 -12.4 -12.4 7 -12.4 -12.4 8 -12.4 -12.4	Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
292 92 352 352 15.6 3	1	328	328	264	264	20.4	46.4			-46.4
352 352 15.6 -15.6 3	2									
3 328 -44.6 -44.6 298 298 20.4 -14.6 4 -14.6 -14.6 297 297 -14.6 298 297 -14.6 297 297 -14.6 298 297 -14.6 299 293 -14.6 293 293 -10.6 6 -10.6 -10.6 6 -10.6 -10.6 7 -10.6 -10.6 9 -10.6 -10.6	292	292								
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6 2.6 7 14.6 8 20.4 9	293	293								
7 14.6 8 20.4 9	313	313	14.6	2.6			-10.6			
8 20.4 9 20.4	6									2.6
9 20.4	7									14.6
	8									20.4
10 41.6	9									20.4
	10									41.6

Sample:	x1	Ref Samp:	x2
Samp ID:	SMA-2C-IT9	Ref ID:	CR-21
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	293.2	Mean:	310.4
SD:	9.011	SD:	32.624
Tr Mean:	293.2	Tr Mean:	310.4
Trans SD:	9.011	Trans SD:	32.624

Project Name:

Shapiro-Wilk Results:		Levene's Results:			Test Results:			
Residual Mean:	0		Test Residual Mean:	7.44		Statistic:	Student's t	
Residual SD:	15.529		Test Residual SD:	3.465		Balanced Design:	Yes	
SS:	4582		Ref. Residual Mean:	23.52		Transformation:	No Transformation	
К:	5		Ref. Residual SD:	19.308				
b:	65.79		Deg. of Freedom:	8				
							Experimental Hypothesis	
Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
Calculated Value:	0.9446		Calculated Value:	1.8329		Alternate:	x1 < x2	
Critical Value:	<= 0.842		Critical Value:	>= 1.860				
Normally			Variances				Degrees of Freedom:	8
Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
							Calculated Value:	1.1364
Override Option:	N/A						Critical Value:	>= 1.397
							Accept Null Hypothesis:	Yes

Replicate	Test	Trans.	Reference	Trans. Reference	Levene's Test	Levene's Reference	Mann- Whitney		Shipiro- Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
	287	287	264	264	6.2	46.4	RdHKS	Rankits	
1	287	287	264	204	0.2	40.4			-46.4
2									
291	291								
352	352	2.2	41.6			-12.4			
3									
283	283								
298	298	10.2	12.4			-10.2			
4									
304	304								
325	325	10.8	14.6			-6.2			
5									
301	301								
313	313	7.8	2.6			-2.2			
6									2.6
7									7.8
8									10.8
9									14.6
10									41.6

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Sample:	x1	Ref Samp:	x2
Samp ID:	BW-15	Ref ID:	CARR-20
Alias:		Alias:	
Replicates:	5	Replicates:	5
Mean:	294.4	Mean:	297.8
SD:	29.348	SD:	33.708
Tr Mean:	294.4	Tr Mean:	297.8
Trans SD:	29.348	Trans SD:	33.708

Project Name:

Anchor Port Gamble 2018 Mytilus

Shapiro-Wilk Results:			Levene's Results:			Test Results:			
	Residual Mean:	0		Test Residual Mean:	22.48		Statistic:	Student's t	
	Residual SD:	20.507		Test Residual SD:	15.153		Balanced Design:	Yes	
	SS:	7990		Ref. Residual Mean:	25.76		Transformation:	No Transformation	
	К:	5		Ref. Residual SD:	17.514				
	b:	87.815		Deg. of Freedom:	8				
								Experimental Hypothesis	
	Alpha Level:	0.05		Alpha Level:	0.1		Null:	x1 >= x2	
	Calculated Value:	0.9651		Calculated Value:	0.3167		Alternate:	x1 < x2	
	Critical Value:	<= 0.842		Critical Value:	>= 1.860				
	Normally			Variances				Degrees of Freedom:	8
	Distributed:	Yes		Homogeneous:	Yes			Experimental Alpha Level:	0.1
	bistributeur			nomogeneousi				Calculated Value:	0.1701
	Override Option:	N/A						Critical Value: Accept Null Hypothesis:	>= 1.397 Yes

		_	- /	Trans.	Levene's	Levene's	Mann-		Shipiro-
Replicate	Test	Trans.	Reference	Reference	Test	Reference	Whitney		Wilk
Number	Data	Test Data	Data	Data	Residuals	Residuals	Ranks	Rankits	Residuals
1	268	268	250	250	26.4	47.8			-47.8
2									
287	287								
332	332	7.4	34.2			-26.4			
3									
340	340								
294	294	45.6	3.8			-22.4			
4									
305	305								
285	285	10.6	12.8			-12.8			
5									
272	272								
328	328	22.4	30.2			-7.4			
6									-3.8
7									10.6
8									30.2
9									34.2
10									45.6
10									45.0

APPENDIX C. CHAIN-OF-CUSTODY LOGS

Chai	n of Custo/ `ecord and Laboratory Analysis	s Request								co	C#					1
	Date: Laboratory : EcoAnalysts Project Name: Project Number: Project Contact: Phone Number: Shipment Method: Date: Cheronne Oreiro Date: Port Gamble - OMMP LTM 180388-01.01 Cheronne Oreiro 206.287.9130 Delivery			liners	chive			S	edim	ent a	nd Fi	eld C	C			QEA
Line	Field Sample ID	Collection Date/Time	Matrix	No. of Containers	Bioassay Archive											Comments
1	SMA20-179-0-10-180906	9/6/18 0900	SE	١	X											
	SMAZC - ITZ-0-10-180906	1 0920	SE	1	Ý											
3	SMA2.C-IT5-0-10-180900	0930	SE	l	$\dot{\varphi}$											
4	SMAZC - IT8-0-10-190906	0940	SE	1	4	1										
5	SMA2C - TTY -0-10-190706	0950	SE	t	4	;										
	SMAZC-IT.1-0-10-180900	1000	SE	Ì	4											
7	SMAZC - IT 7-0-10 -120916	1 1010	SE	I	Ý	2										
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11			SE													
12			SE													
13			SE													
14			SE													
1	See project SAP/QAPP for analyte lists and test methods															

2 Email sample confirmation report to labdata@anchorgea.com

Additional notes/comments:

Relinquished By: WALCZUK	Company: Anchor	QEA LLC.	Received By:	tor	Company:	EcoAnaly	sts
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Cha	n of Custo Secord and Laboratory Analysis								c	:OC#							$f^{(n)}$	
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Į	Laboratory : EcoAnalysts Project Name: Port Gamble - OMMP LTM			-														
	Project Number: 180388-01.01			-														
	Project Contact: Cheronne Oreiro			1														
	Phone Number: 206.287.9130																	
	Shipment Method: Delivery			lers	live													
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Line	Field Sample ID	Collection Date/Time	Matrix	No. of Containers	Bioassay Archive													Comments
1	SMAIB-IT2-0-10-100907	917/18 084	S SE	t	X													
2	SMAIB-IT1-0-10-180907 SMAZC-IT3-0-10-180907 SMAZC-IT6-0-10-180907	917/18 085	S se	l	Y													
3	SMAZC-IT3-0-W-180907	91713 093		l	X													
4	SMA2C-ITG-0-10-180907	9/7/18 094	O SE	l	\succ													
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2	Email sample confirmation report to labdata@anchorqea.com		Addition	a no	165/	comm	ents.											
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	Signature/Printed Name			Date	/Time	е	Signa	ture/Pr	inted N	ame								Date/Time

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	Project Name: Port Gamble - OMMP LTM] ≩																
	Project Number: 180388-01.01				tal			ļ													
	Project Contact: Jason Cornetta				Ē					•											
	Phone Number: 206.971.2680				ž																
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Line	Field Sample ID	Collection Date/Time	Matrix	No. of Containers	Larval abnormality/mortality															Comme	ents
1		9/17/18 1205	SE	١	X	ĺ															
2	SMAI-ST-0-10-Comp-180917 SMAIA-IT-0-10-Comp-180917 BW-15-0-10-180917	9/17/18 1510	SE	l	X																
3	BW-15-0-10-180917	9/17/18 1546	SE	1	K									_							
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ľ	Signature/Printed Name	· · · · · · · · · · · · · · · · · · ·		Date/			Sig	natur	e/Prin	ted N	ame		.					1		Date/Time]
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4 SE	2	SMA2B-IT-0-10-Comp-180918	9/18/18	1510	SE	1	X															
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