

Chronic Toxicity Testing Results for Wyckoff Eagle Harbor Groundwater Treatment Plant

Monitoring Period: July 2020

Prepared for:

Jacobs 1100 112th Ave NE Suite 500 Bellevue, WA, 98004

Prepared by:

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Date Submitted: August 18, 2020

Data Quality Assurance:

- Enthalpy Analytical is accredited in accordance with NELAP by the State of Oregon Environmental Laboratory Accreditation Program (ORELAP ID 4053). It is also certified by the State of California Water Resources Control Board Environmental Laboratory Accreditation Program (Certificate No. 1802) and the State of Washington Department of Ecology (Lab ID C552). Specific fields of testing applicable to each accreditation are available upon request.
- All data have been reviewed and verified.
- All test results have met minimum test acceptability criteria under their respective US EPA protocols, unless otherwise noted in this report.
- All tests have met internal Quality Assurance Program requirements.

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Results verified by:

Eric Green, Project Manager

Introduction

A toxicity test was performed using a groundwater composite sample collected from the Wyckoff Eagle Harbor Groundwater Treatment Plant on Bainbridge Island in Washington. This test was performed to satisfy quarterly monitoring requirements according to the project Quality Assurance Project Plan (QAPP 2013). The chronic bioassay was conducted using the bivalve *Mytilus galloprovincialis* (Mediterranean mussel). Testing was performed at Enthalpy Analytical located in San Diego, California.

Materials and Methods

The groundwater sample was collected into a low-density polyethylene cubitainer by Jacobs personnel, packed in a cooler containing ice, and shipped overnight to Enthalpy. Appropriate chain-of-custody (COC) procedures were employed during collection and transport. Upon arrival at the laboratory, the cooler was opened, the sample inspected, and the contents verified against information on the COC form. Standard water quality parameters were measured and recorded on a sample check-in form and are summarized in Table 1. The sample was stored at 4° C in the dark until used for testing.

Sample ID	071420
Enthalpy Log-in Number	20-0770
Collection Date; Time	7/14/2020; 0936h
Receipt Date; Time	7/15/2020; 0915h
Receipt Temperature (°C)	5.0
Dissolved Oxygen (mg/L)	7.4
рН	7.38
Conductivity (µS/cm)	14,120
Salinity (ppt)	8.8
Alkalinity (mg/L CaCO ₃)	396
Total Chlorine (mg/L)	0.02
Total Ammonia (mg/L as N)	3.3

Table 1. Sample Information

NM = not measured

Test Methods

Chronic toxicity testing was conducted according to the method set forth in USEPA (1995). This method is summarized in Table 2.

Table 2. Summary of Methous for th	
Test Period	7/15/2020, 1355h to 7/17/2020, 1310h
Test Organism	Mytilus galloprovincialis
Test Organism Source	M-Rep (Carlsbad, CA)
Test Organism Age	4 hours post fertilization
Test Duration	48 ± 2 hours
Test Type	Static
Test Chamber, Test Solution Volume	30 mL glass vial, 10 mL
Test Temperature	15 ± 1°C
Dilution Water	Laboratory Seawater (Source: Scripps Institution of Oceanography [SIO] intake) diluted with de-ionized water
Additional Control	Brine Control (de-ionized water and hypersaline brine)
Test Salinity	30 ± 2 ppt
Source of Salinity	Hypersaline brine made by freezing seawater to a salinity of 97.2 ppt
Test Concentrations (% sample)	76.0 ^a , 35, 18, 9, 4, and 2%, lab and brine controls
Number of Replicates	5
Photoperiod	16 hours light/8 hours dark
Test Protocol	EPA/600/R-95/136
Test Acceptability Criteria for Controls	\geq 50% mean survival, \geq 90% mean development rate
Reference Toxicant	Copper chloride ^b
Statistical Software	CETIS™ 1.8.7.20

Table 2. Summary of Methods for the Bivalve Larval Development Test

^a Highest concentration tested due to the addition of hypersaline brine

^b A deviation to the QAPP was approved by USEPA and Washington Department of Ecology to conduct reference toxicant testing with copper chloride. See QA section.

Results

There were no statistically significant effects observed in any effluent concentration tested for the survival or development endpoint of the bivalve test. This results in a no observed effect concentration (NOEC) of 76.0 (the highest concentration tested) and a chronic toxic unit (TU_c) of less than 1.32 for both endpoints.

Results for the chronic toxicity test are summarized in Tables 3 and 4. Individual statistical summaries for the test and copies of the laboratory bench sheets are provided in Appendix A. The sample check-in sheet and COC form are provided in Appendices B and C, respectively.

Species	Endpoint NOEC LOEC (% effluent) (% effluent)		Toxic Unit (TU _c)	EC ₂₅ (% effluent)	
Biyolyo	Normal Development	76.0	> 76.0	< 1.32	> 76.0
Bivalve	Survival	76.0	> 76.0	< 1.32	> 76.0

NOEC = No Observed Effect Concentration

LOEC = Lowest Observed Effect Concentration

Chronic Toxic Unit (TU_c) = 100/NOEC. NOTE: Since 100% sample was not tested, the TU_c value can only be calculated up to the highest concentration tested. If no toxicity is observed at this concentration, the TU_c is reported as less than the calculated value. Effect Concentration 25 (EC_{25}) = Concentration expected to cause an effect to 25% of the organisms

Concentration (% Effluent)	Mean Survival (%)	Mean Normal Development (%)						
0 (Brine Control)	91.1	97.9						
0 (Lab Control)	94.1	98.1						
2	95.9	98.3						
4	92.5	98.8						
9	96.6	98.2						
18	96.6	98.2						
35	94.6	98.7						
76.0 ^a	91.6	97.4						

Table 4. Detailed Results for the Bivalve Development Chronic Toxicity Test

^a Highest concentration tested due to the addition of hypersaline brine

Quality Assurance

The sample was received within the required 36-hour holding time, in good condition, and within the appropriate temperature range of 0-6°C. All control acceptability criteria were met and water quality parameters remained within the appropriate ranges throughout the test. Statistical analyses followed standard USEPA flowchart selections. Dose-response relationships were reviewed to ensure the reliability of the results. Based on the dose response observed, the calculated effects concentrations were deemed reliable. Minor QA/QC issues that were unlikely to have any bearing on the final test results, such as slight temperature deviations, are noted on the data sheets and a list of qualifier codes used on bench data sheets is presented in Appendix D.

Reference Toxicant

Results for the reference toxicant tests used to monitor laboratory performance and test organism sensitivity are summarized in Table 5. A deviation to the QAPP was approved by USEPA and Washington Department of Ecology to conduct reference toxicant testing with copper chloride rather than copper sulfate. The results for the concurrent reference toxicant test were within the acceptable range of the mean historical test results plus or minus two standard deviations for development. The EC₅₀ for survival was greater than the highest concentration tested; indicating organisms may have been less sensitive than typical for the survival endpoint. Reference toxicant statistical summaries and laboratory bench sheets are provided in Appendix E.

Species and Endpoint	NOEC (%)	EC₅₀ (μg/L copper)	Historical mean ± 2 SD (μg/L copper)	CV (%)
Bivalve Normal Development	5	13.9	9.03 ± 6.47	35.8
Bivalve Survival Rate	20	> 40.0	29.7 ± 5.08	8.56

NOEC = No Observed Effect Concentration

Effect Concentration 50 (EC₅₀) = Concentration expected to cause an effect to 50% of the organisms

CV = Coefficient of Variation

References

- CH2MHill. 2013. Quality Assurance Project Plan Groundwater Treatment Plant Operations, Maintenance, Bainbridge, Washington. Prepared for USEPA Region 10 June 5, 2013.
- Standard Guide for Conducting Static Acute Toxicity Tests with Embryos of Four Species of Saltwater Bivalve Molluscs. 1989. ASTM Standard E 724-89.
- Tidepool Scientific Software. 2000-2013. CETIS Comprehensive Environmental Toxicity Information System Software, Version 1.8.7.20.
- USEPA. 1995. Short-Term Method for Estimating the Chronic Toxicity of Effluents and Receiving Waters to the West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. pp. 209-258 and 389-465.
- Washington State Department of Ecology. 2016. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Publication No. WQ-R-95-80. Revised June 2016

Appendix A Statistical Summaries and Raw Bench Sheets

Report Date: 17 Aug-20 08:36 (p 1 of 2) **CETIS Summary Report Test Code:** 2007-S059 | 11-6319-6188 **Bivalve Larval Survival and Development Test** Nautilus Environmental (CA) 16-0484-7554 Batch ID: Test Type: Development-Survival Analyst: Start Date: 15 Jul-20 13:55 EPA/600/R-95/136 (1995) Protocol: **Diluent: Diluted Natural Seawater** 17 Jul-20 13:10 Ending Date: Species: Mytilus galloprovincialis Brine: Frozen Seawater **Duration:** 47h Source: M-Rep, Carlsbad, CA Age: Sample ID: 02-9423-5209 Code: 20-0770 Client: Jacobs Sample Date: 14 Jul-20 09:36 Material: Effluent Sample **Project:** Receive Date: 15 Jul-20 09:15 Source: Jacobs Sample Age: 28h (5 °C) Station: Wyckoff **Comparison Summary** NOEL LOEL TOEL PMSD Analysis ID Endpoint TU Method L1.316 03-4229-2286 **Development Rate** 76 >76 NA 2.0% **Dunnett Multiple Comparison Test** 11-2108-7541 Survival Rate 76 >76 NA 13.7% £1.316 **Dunnett Multiple Comparison Test Point Estimate Summary** Analysis ID Endpoint Level % 95% LCL 95% UCL TU Method 02-6789-9030 **Development Rate** EC25 >76 N/A N/A <1.316 Linear Interpolation (ICPIN) **EC50** >76 N/A N/A <1.316 17-4635-1121 Survival Rate EC25 >76 N/A N/A <1.316 Linear Interpolation (ICPIN) EC50 >76 N/A N/A <1.316 **Test Acceptability** Analysis ID Endpoint Attribute Test Stat **TAC Limits** Overlap Decision 02-6789-9030 **Development Rate** Control Resp 0.9788 0.9 - NL Yes Passes Acceptability Criteria 03-4229-2286 **Development Rate** Control Resp 0.9788 0.9 - NL Yes Passes Acceptability Criteria 11-2108-7541 Survival Rate Control Resp 0.9107 0.5 - NL Yes Passes Acceptability Criteria 17-4635-1121 Survival Rate Control Resp 0.9107 0.5 - NŁ Yes Passes Acceptability Criteria **Development Rate Summary** C-% **Control Type** Count Mean 95% LCL 95% UCL Min Max Std Err CV% Std Dev %Effect 0 Brine Control 5 0.9788 0.9637 0.9939 0.971 1 0.005439 0.01216 1.24% 0.0% 0 Lab Control 5 0.981 0.9677 0.9943 0.9923 0.9636 0.004781 0.01069 1.09% -0.23% 2 5 0.9832 0.9764 0.99 0.9797 0.9929 0.002448 0.005475 0.56% -0.45% 4 5 0.9878 0.9739 1 0.9732 1 0.005017 0.01122 -0.92% 1.14% 9 5 0.9819 0.9726 0.9911 0.9745 0.9942 0.003331 0.007449 0.76% -0.32% 18 5 0.9821 0.9718 0.9924 0.994 0.9739 0.003707 0.00829 0.84% -0.34% 35 5 0.9871 0.977 0.9971 0.9789 0.00362 0.008095 1 0.82% -0.85% 76 5 0.9742 0.47% 0.9539 0.9944 0.9551 0.9865 0.007305 0.01633 1.68% Survival Rate Summary C-% **Control Type** Count Mean 95% LCL 95% UCL Min Max Std Err Std Dev CV% %Effect 0 Brine Control 5 0.9107 0.8308 0.9906 0.8491 0.06435 0.0% 1 0.02878 7.07% 0 Lab Control 5 0.9409 0.8426 1 0.8176 1 0.07913 0.03539 8.41% -3.32% 2 5 0.9585 0.8986 1 0.8868 1 0.04823 5.03% -5.25% 0.02157 4 5 0.9245 0.8664 0.9827 0.8805 1 0.02095 0.04685 5.07% -1.52%

9

18

35

76

5

5

5

5

0.966

0.966

0.9459

0.9157

0.8929

0.9077

0.8587

0.8566

1

1

1

0.9748

0.8616

0.8868

0.8491

0.8553

1

1

1

0.9811

Analyst: JU QA: FU8/18/20

0.05893

0.04698

0.07026

0.04761

6.1%

4.86%

7.43%

5.2%

-6.08%

-6.08%

-3.87%

-0.55%

0.02636

0.02101

0.03142

0.02129

CETIS Summary Report

Bivalve	Larval	Survival	and	Development Test	
Diraito	Larvar	ourritui	una	Bevelopment rest	

Report Date:	
Test Code:	

17 Aug-20 0	8:36 (p 2 of 2)
2007-S059	11-6319-6188

Nautilus Environmental (CA)

Development Rate Detail
C-% Control Type Rep 1 Rep 2 Rep 3 Rep 4 Rep 5
0 Brine Control 0.9778 0.971 0.9714 0.9737 1
0 Lab Control 0.9636 0.9923 0.9861 0.9808 0.9822
2 0.9809 0.9809 0.9815 0.9797 0.9929
4 0.9938 1 0.979 0.9732 0.9931
9 0.9817 0.9808 0.9781 0.9745 0.9942
18 0.9872 0.994 0.9767 0.9787 0.9739
35 0.9818 0.9874 0.9789 1 0.9873
76 0.9574 0.9551 0.9865 0.9853 0.9864
Survival Rate Detail
C-% Control Type Rep 1 Rep 2 Rep 3 Rep 4 Rep 5
0 Brine Control 0.8491 0.8679 0.8805 0.956 1
0 Lab Control 1 0.8176 0.9057 0.9811 1
2 0.9874 0.9874 1 0.9308 0.8868
4 1 0.8805 0.8994 0.9371 0.9057
9 1 0.9811 0.8616 0.9874 1
18 0.9811 1 1 0.8868 0.9623
35 1 1 0.8931 0.8491 0.9874
76 0.8868 0.9811 0.9308 0.8553 0.9245
Development Rate Binomials
C-% Control Type Rep 1 Rep 2 Rep 3 Rep 4 Rep 5
0 Brine Control 132/135 134/138 136/140 148/152 172/172
0 Lab Control 159/165 129/130 142/144 153/156 166/169
2 154/157 154/157 159/162 145/148 140/141
4 159/160 140/140 140/143 145/149 143/144
9 161/164 153/156 134/137 153/157 172/173
18 154/156 165/166 168/172 138/141 149/153
35 162/165 157/159 139/142 135/135 155/157
76 135/141 149/156 146/148 134/136 145/147
Survival Rate Binomials
C-% Control Type Rep 1 Rep 2 Rep 3 Rep 4 Rep 5
0 Brine Control 135/159 138/159 140/159 152/159 159/159
0 Lab Control 159/159 130/159 144/159 156/159 159/159
2 157/159 157/159 159/159 148/159 141/159
2157/159157/159159/159148/159141/1594159/159140/159143/159149/159144/159
2157/159157/159159/159148/159141/1594159/159140/159143/159149/159144/1599159/159156/159137/159157/159159/159
2157/159157/159159/159148/159141/1594159/159140/159143/159149/159144/1599159/159156/159137/159157/159159/15918156/159159/159159/159141/159153/159
2157/159157/159159/159148/159141/1594159/159140/159143/159149/159144/1599159/159156/159137/159157/159159/159

CETIS Ana	alytical Re	port					-	ort Date: Code:		-	12 (p 1 of 4) 1-6319-6188
Bivalve Larva	al Survival and	d Developr	nent Test						Nautilus	Environ	mental (CA)
Analysis ID: Analyzed:	03-4229-228 07 Aug-20 1	-	-	Development R Parametric-Cor		tments		IS Version: cial Results:	CETISv1. Yes	.8.7	
Data Transfo	rm	Zeta	Alt Hy	p Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Angular (Corre	ected)	NA	C > T	NA	NA		2.0%	76	>76	NA	1.316
Dunnett Mult	iple Comparis	on Test									
Control	vs C-%		Test S	tat Critical	MSD DF	P-Value	P-Type	Decision(α:5%)		
Brine Control	2		-0.373	9 2.407	0.065 8	0.9351	CDF	Non-Signi	ficant Effect		
	4		-1.307	2.407	0.065 8	0.9952	CDF	Non-Signit	ficant Effect		
	9		-0.235	8 2.407	0.065 8	0.9115	CDF	Non-Signi	ficant Effect		
	18		-0.285	1 2.407	0.065 8	0.9206	CDF	Non-Signi	ficant Effect		
	35		-1.049	2.407	0.065 8	0.9894	CDF	Non-Signi	ficant Effect		
	76		0.6249	2.407	0.065 8	0.6256	CDF	Non-Signi	ficant Effect		
ANOVA Table)										
Source	Sum S	quares	Mean	Square	DF	F Stat	P-Value	Decision(α:5%)		
Between	0.00912	22896	0.0015	20483	6	0.83	0.5568	Non-Signit	ficant Effect		
Error	0.05129	9094	0.0018	31819	28						
Total	0.0604	1384			34						
Distributiona	l Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Bartlet	t Equality o	f Variance	3.499	16.81	0.7441	Equal Var	iances			
Distribution	Shapir	o-Wilk W N	lormality	0.9487	0.9146	0.1032	Normal D	istribution			
Development	Rate Summa	ry									
C-%	Control Type		Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Brine Control		0.9788		0.9939	0.9737	0.971	1	0.005439	1.24%	0.0%
2		5	0.9832		0.99	0.9809	0.9797	0.9929	0.002448	0.56%	-0.45%
4		5	0.9878		1	0.9931	0.9732	1	0.005017	1.14%	-0.92%
9		5	0.9819		0.9911	0.9808	0.9745	0.9942	0.003331	0.76%	-0.32%
18		5	0.9821		0.9924	0.9787	0.9739	0.994	0.003708	0.84%	-0.34%
35 76		5 5	0.9871 0.9742		0.9971	0.9873	0.9789	1	0.00362	0.82%	-0.85%
				0.9539	0.9944	0.9853	0.9551	0.9865	0.007305	1.68%	0.47%
	rected) Transf		•	050/ 1.01	0.50/ 1101				e		
<u>C-%</u>	Control Type			95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Brine Control		1.432	1.362	1.503	1.408	1.4	1.533	0.02534	3.96%	0.0%
2		5	1.443	1.412	1.473	1.432	1.428	1.486	0.01102	1.71%	-0.71%
4 9		5	1.468	1.405	1.531	1.487	1.406	1.529	0.02261	3.45%	-2.47%
9 18		5	1.439	1.398	1.479	1.432	1.41	1.495	0.0146	2.27%	-0.45%
35		5 5	1.44 1.461	1.397 1.411	1.483	1.424	1.408	1.493	0.01559	2.42%	-0.54%
76		5 5			1.511	1.458	1.425	1.528	0.01792	2.74%	-1.98%
10		5	1.416	1.353	1.478	1.449	1.357	1.454	0.02264	3.58%	1.18%

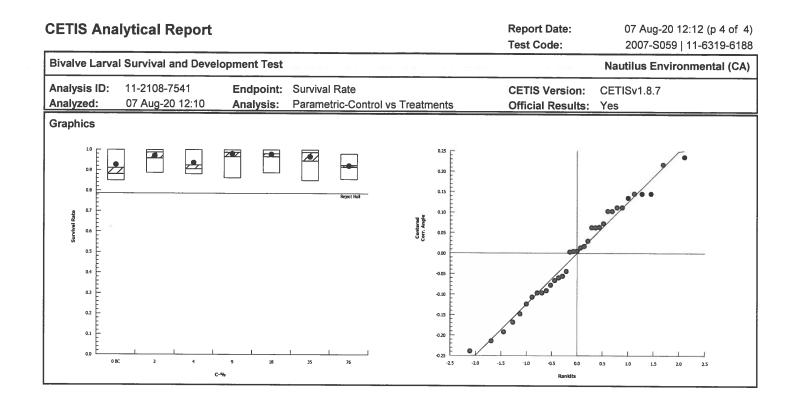
Analyst: JU QA: Englist 20

CETIS Analytical I	Report		Report Date: Test Code:	07 Aug-20 12:12 (p 2 of 4) 2007-S059 11-6319-6188
Bivalve Larval Survival	and Development Test			Nautilus Environmental (CA)
Analysis ID: 03-4229- Analyzed: 07 Aug-2		Development Rate Parametric-Control vs Treatments		CETISv1.8.7 Yes
Graphics	4 9 18 C-%	Biset Neal 1000 100 1000 1	-2.0 -1.5 -1.0 -0.5 0.0 -0.5 Rankits	

Analyst: JU QA: FL8/18/20

CETIS Ana	alytical Re	port						ort Date: Code:		0	l2 (p 3 of 4) I-6319-6188
Bivalve Larv	al Survival and	Developm	ent Test	==					Nautilus	s Environn	nental (CA)
Analysis ID: Analyzed:	11-2108-754 07 Aug-20 12		•	•						ETISv1.8.7 jes	
Data Transfo	orm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Angular (Corr	rected)	NA	C > T	NA	NA		13.7%	76	>76	NA	1.316
Dunnett Mult	tiple Comparis	on Test									· · · · · · · · · · · · · · · · · · ·
Control	vs C-%		Test Sta	t Critical	MSD DF	P-Value	P-Type	Decision(α:5%)		
Brine Control	2		-1.173	2.407	0.206 8	0.9927	CDF	Non-Signif	icant Effect		
	4		-0.2196	2.407	0.206 8	0.9084	CDF	Non-Signif	icant Effect		
	9		-1.554	2.407	0.206 8	0.9979	CDF	Non-Signif	icant Effect		
	18		-1.449	2.407	0.206 8	0.9970	CDF	-	icant Effect		
	35		-1.056	2.407	0.206 8	0.9896	CDF	-	icant Effect		
	76		0.09497	2.407	0.206 8	0.8299	CDF	+	icant Effect		
ANOVA Table	e										
Source	Sum Sc	uares	Mean So	uare	DF	F Stat	P-Value	Decision(α:5%)		
Between	0.10826	72	0.018044	53	6	0.9878	0.4523	Non-Significant Effect			
Error	0.51150	49	0.018268	103	28						
Total	0.61977	21			34						
					34						
Distributiona	al Tests								· · · · · · · · · · · · · · · · · · ·		
Distributiona Attribute	al Tests Test			Test Stat		P-Value	Decision	(α:1%)			<u> </u>
	Test	Equality of	Variance	Test Stat 1.355		P-Value 0.9685	Decision Equal Var				
Attribute	Test Bartlett				Critical			iances			
Attribute Variances	Test Bartlett Shapiro	Equality of		1.355	Critical 16.81	0.9685	Equal Var	iances			
Attribute Variances Distribution Survival Rate C-%	Test Bartlett Shapiro e Summary Control Type	Equality of		1.355	Critical 16.81	0.9685	Equal Var	iances	Std Err	CV%	%Effect
Attribute Variances Distribution Survival Rate C-% 0	Test Bartlett Shapiro e Summary	Equality of Wilk W No Count 5	Mean 0.9107	1.355 0.9777 95% LCL 0.8308	Critical 16.81 0.9146	0.9685 0.6838	Equal Var Normal Di	iances stribution	Std Err 0.02878	CV% 7.07%	%Effect 0.0%
Attribute Variances Distribution Survival Rate C-% 0 2	Test Bartlett Shapiro e Summary Control Type	Equality of Wilk W No <u>Count</u> 5 5	Mean 0.9107 0.9585	1.355 0.9777 95% LCL 0.8308 0.8986	Critical 16.81 0.9146 95% UCL 0.9906 1	0.9685 0.6838 Median 0.8805 0.9874	Equal Var Normal Di Min 0.8491 0.8868	iances stribution Max			
Attribute Variances Distribution Survival Rate C-% 0 2 4	Test Bartlett Shapiro e Summary Control Type	Equality of Wilk W No <u>Count</u> 5 5 5 5	Mean 0.9107 0.9585 0.9245	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664	Critical 16.81 0.9146 95% UCL 0.9906	0.9685 0.6838 Median 0.8805 0.9874 0.9057	Equal Var Normal Di Min 0.8491	iances stribution Max 1	0.02878	7.07%	0.0%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9	Test Bartlett Shapiro e Summary Control Type	Equality of Wilk W No <u>Count</u> 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8664 0.8929	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874	Equal Var Normal Di Min 0.8491 0.8868 0.8805 0.8616	iances stribution Max 1 1	0.02878 0.02157 0.02095 0.02636	7.07% 5.03%	0.0% -5.25%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18	Test Bartlett Shapiro e Summary Control Type	Equality of -Wilk W No <u>Count</u> 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9874	Equal Var Normal Di Min 0.8491 0.8868 0.8805	Max 1 1	0.02878 0.02157 0.02095	7.07% 5.03% 5.07%	0.0% -5.25% -1.52%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35	Test Bartlett Shapiro e Summary Control Type	Equality of -Wilk W No <u>Count</u> 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966 0.9459	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9811 0.9874	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491	Max 1 1 1 1 1 1 1 1 1	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142	7.07% 5.03% 5.07% 6.1%	0.0% -5.25% -1.52% -6.08%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18	Test Bartlett Shapiro e Summary Control Type	Equality of -Wilk W No <u>Count</u> 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9874	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868	Max 1 1 1 1 1 1 1	0.02878 0.02157 0.02095 0.02636 0.02101	7.07% 5.03% 5.07% 6.1% 4.86%	0.0% -5.25% -1.52% -6.08% -6.08%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35 76 Angular (Cor	Test Bartlett Shapiro e Summary Control Type Brine Control	Equality of -Wilk W No 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966 0.9459 0.9157	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587 0.8566	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9811 0.9874	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491	Max 1 1 1 1 1 1 1 1 1	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142	7.07% 5.03% 5.07% 6.1% 4.86% 7.43%	0.0% -5.25% -1.52% -6.08% -6.08% -3.87%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35 76 Angular (Cor C-%	Test Bartlett Shapiro e Summary Control Type Brine Control	Equality of -Wilk W No 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966 0.9459 0.9157	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9811 0.9874	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491	Max 1 1 1 1 1 1 1 1 1	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142	7.07% 5.03% 5.07% 6.1% 4.86% 7.43%	0.0% -5.25% -1.52% -6.08% -6.08% -3.87%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35 76 Angular (Cor C-% 0	Test Bartlett Shapiro e Summary Control Type Brine Control	Equality of -Wilk W No 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966 0.9459 0.9157 mary Mean 1.296	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587 0.8566 95% LCL 1.109	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1 1 0.9748	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9871 0.9874 0.9245	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491 0.8553	Max 1 1 1 1 1 1 1 1 1 0.9811	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142 0.02129	7.07% 5.03% 5.07% 6.1% 4.86% 7.43% 5.2%	0.0% -5.25% -1.52% -6.08% -6.08% -3.87% -0.55%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35 76 Angular (Cor C-% 0 2	Test Bartlett Shapiro e Summary Control Type Brine Control	Equality of -Wilk W No 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966 0.9459 0.9157 mary Mean 1.296 1.396	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587 0.8566 95% LCL	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1 0.9748 95% UCL 1.482 1.552	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9874 0.9874 0.9874 0.9245 Median	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491 0.8553 Min	Max 1 1 1 1 1 1 1 1 0.9811 Max	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142 0.02129 Std Err	7.07% 5.03% 5.07% 6.1% 4.86% 7.43% 5.2%	0.0% -5.25% -1.52% -6.08% -6.08% -3.87% -0.55%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35 76 Angular (Cor C-% 0 2 4	Test Bartlett Shapiro e Summary Control Type Brine Control	Equality of -Wilk W No 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966 0.9459 0.9157 mary Mean 1.296	1.355 0.9777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587 0.8566 95% LCL 1.109 1.241 1.158	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1 0.9748 95% UCL 1.482	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9874 0.9874 0.9245 Median 1.218	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491 0.8553 Min 1.172	iances istribution Max 1 1 1 1 1 1 1 0.9811 Max 1.531	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142 0.02129 Std Err 0.06719	7.07% 5.03% 5.07% 6.1% 4.86% 7.43% 5.2% CV% 11.59%	0.0% -5.25% -1.52% -6.08% -6.08% -3.87% -0.55% %Effect 0.0%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35 76 Angular (Cor C-% 0 2 4 9 0 2 4 9 9	Test Bartlett Shapiro e Summary Control Type Brine Control	Equality of -Wilk W No 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.9459 0.9157 mary Mean 1.296 1.396 1.315 1.429	1.355 0.97777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587 0.8566 95% LCL 1.109 1.241 1.158 1.254	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1 0.9748 95% UCL 1.482 1.482 1.552 1.471 1.603	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9874 0.9245 Median 1.218 1.458	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491 0.8553 Min 1.172 1.228	iances istribution Max 1 1 1 1 1 1 1 1 0.9811 Max 1.531 1.531	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142 0.02129 Std Err 0.06719 0.05601	7.07% 5.03% 5.07% 6.1% 4.86% 7.43% 5.2% CV% 11.59% 8.97%	0.0% -5.25% -1.52% -6.08% -6.08% -3.87% -0.55% %Effect 0.0% -7.74%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35 76 Angular (Cor C-% 0 2 4 9 0 2 4 9 18 35 76	Test Bartlett Shapiro e Summary Control Type Brine Control	Equality of -Wilk W No 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.966 0.9459 0.9157 mary Mean 1.296 1.396 1.315 1.429 1.42	1.355 0.97777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587 0.8566 95% LCL 1.109 1.241 1.158 1.254 1.254 1.263	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1 0.9748 95% UCL 1.482 1.552 1.471 1.603 1.577	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9811 0.9874 0.9245 Median 1.218 1.458 1.259	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491 0.8553 Min 1.172 1.228 1.218 1.19 1.228	iances istribution Max 1 1 1 1 1 1 1 1 1 0.9811 Max 1.531 1.531 1.531	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142 0.02129 Std Err 0.06719 0.05601 0.05649	7.07% 5.03% 5.07% 6.1% 4.86% 7.43% 5.2% CV% 11.59% 8.97% 9.61%	0.0% -5.25% -1.52% -6.08% -6.08% -3.87% -0.55% %Effect 0.0% -7.74% -1.45%
Attribute Variances Distribution Survival Rate C-% 0 2 4 9 18 35 76 Angular (Cor C-% 0 2 4 9 0 2 4 9 9	Test Bartlett Shapiro e Summary Control Type Brine Control	Equality of -Wilk W No 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Mean 0.9107 0.9585 0.9245 0.966 0.9459 0.9157 mary Mean 1.296 1.396 1.315 1.429	1.355 0.97777 95% LCL 0.8308 0.8986 0.8664 0.8929 0.9077 0.8587 0.8566 95% LCL 1.109 1.241 1.158 1.254	Critical 16.81 0.9146 95% UCL 0.9906 1 0.9827 1 1 1 0.9748 95% UCL 1.482 1.482 1.552 1.471 1.603	0.9685 0.6838 Median 0.8805 0.9874 0.9057 0.9874 0.9811 0.9874 0.9245 Median 1.218 1.458 1.259 1.458	Equal Var Normal Di 0.8491 0.8868 0.8805 0.8616 0.8868 0.8491 0.8553 Min 1.172 1.228 1.218 1.218 1.19	iances istribution Max 1 1 1 1 1 1 1 0.9811 Max 1.531 1.531 1.531 1.531	0.02878 0.02157 0.02095 0.02636 0.02101 0.03142 0.02129 Std Err 0.06719 0.05601 0.05649 0.06286	7.07% 5.03% 5.07% 6.1% 4.86% 7.43% 5.2% CV% 11.59% 8.97% 9.61% 9.84%	0.0% -5.25% -1.52% -6.08% -6.08% -3.87% -0.55% %Effect 0.0% -7.74% -1.45% -10.25%

Analyst: Ja QA: E68/1870





CETIS Analytic	al Report					•	rt Date: Code:		Nug-20 08:3 7-S059 11	
Bivalve Larval Surv	vival and Devel	opment Test			-			Nautilus	Environm	ental (CA)
•	789-9030 Jug-20 8:35	Endpoint: Analysis:	Development F Linear Interpola				S Version: al Results:	CETISv1. Yes	.8.7	
Linear Interpolatior	o Options									
X Transform Y	Transform	Seed	Resamples	Exp 95% CL	Meth	od				
Linear Li	near	1766866	1000	Yes	Two-l	Point Interpo	lation			
Point Estimates										
Level %	95% LCL 95%	& UCL TU	95% LCL	95% UCL						
EC25 >76	N/A N/A	<1.3	16 NA	NA						
EC50 >76	N/A N/A	× <1.3	16 NA	NA						
Development Rate	Summary			Calculate	d Variat	e(A/B)				
C-% Contro	l Type Co	unt Mea	n Min	Max St	d Err	Std Dev	CV%	%Effect	A	в
0 Brine C	ontrol 5	0.978	38 0.971	1 0.	05439	0.01216	1.24%	0.0%	722	737
2	5	0.98	32 0.9797	0.9929 0.0	02448	0.005474	0.56%	-0.45%	752	765
4	5	0.98	78 0.9732	1 0.0	005017	0.01122	1.14%	-0.92%	727	736
9	5	0.98	0.9745	0.9942 0.0	003331	0.007449	0.76%	-0.32%	773	787
18	5	0.982	0.9739	0.994 0.0	003708	0.00829	0.84%	-0.34%	774	788
35	5	0.98	71 0.9789		0362	0.008095	0.82%	-0.85%	748	758
76	5	0.974	42 0.9551	0.9865 0.0	07305	0.01633	1.68%	0.47%	709	728
Graphics	20 30	40 50	• 1 • • • • • • • • • • • • • • • • • •							

Analyst: JU QA: EG8/18/20

CETIS	5 Ana	lytical Repo	ort						Report Date: Fest Code:		-	3:36 (p 2 of 2 11-6319-618
Bivalve	e Larva	I Survival and D	evelopmen	t Test						Nautilu	s Enviror	nmental (CA
Analys Analyz		17-4635-1121 17 Aug-20 8:36		point: lysis:	Survival Rate Linear Interpola	ation (ICPIN)			CETIS Version: Official Results		.8.7	
Linear	Interpo	plation Options			· · · · ·							
X Tran	sform	Y Transform	n See	d	Resamples	Exp 95% (CL Me	ethod				
Linear		Linear	7729	937	1000	Yes		/o-Point Ir	terpolation			
Point E	Estimat	es										
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL						
EC25	>76	N/A	N/A	<1.31	6 NA	NA						
EC50	>76	N/A	N/A	<1.31	6 NA	NA						
Surviva	al Rate	Summary				Calcula	ated Var	riate(A/B)				
C-%	C	Control Type	Count	Mean	Min	Max	Std Err	Std D	ev CV%	%Effect	Α	в
0	E	Brine Control	5	0.910	0.8491	1	0.02878	3 0.064	35 7.07%	0.0%	724	795
2			5	0.958	5 0.8868	1	0.02157	7 0.048	23 5.03%	-5.25%	762	795
4			5	0.924	5 0.8805	1	0.02095	5 0.046	85 5.07%	-1.52%	735	795
9			5	0.966	0.8616	1	0.02636	6 0.058	93 6.1%	-6.08%	768	795
18			5	0.966	0.8868	1	0.02101	0.046	98 4.86%	-6.08%	768	795
35			5	0.945	9 0.8491	1	0.03142	2 0.070	26 7.43%	-3.87%	752	795
76			5	0.915	0.8553	0.9811	0.02129	0.047	61 5.2%	-0.55%	728	795
Graphi	ics											
	¹⁰ Fo											
	0.9	r			•							
	08											
	0.7											
	Ē											
urvival Rate	0.6											
Survh	0.5											
	0.4											
	0.3											
	Ē											
	02											
	0.1											
	E.	ليتتجلب			ليتماممنك							
	00	10 20 3	80 40	50	60 70 80							

C-%

QA: EL 8/8/20

CETIS Test Data Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

Start Date: End Date: Sample Date:	17 J	lul-20 lul-20 lul-20		Species: Protocol: Material:	Mytilus galloprovi EPA/600/R-95/13 Effluent Sample			Sample Code: Sample Source: Sample Station:	
C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal		Notes
			31			157	154	JU	8/6/20
			32			135	135	74	1
			33			143	140		
			34			136	134		
			35			157	155		
			36			149	145		
			37			135	132		
			38			137	134		
			39			172	172		
			40			172	168		
			41			148	146		
			42			173	172		
			43			144	143		
			44			152	148		
			45			169	166		
			46			157	153	· · · · · · · · · · · · · · · · · · ·	
			47			140	136		
			48			144	142		
			49			148	145		
			50			156	154		
			51			165	162		
			52			160	159		
			53			141	135		
			54			159	157		
			55			140	140		
			56			153	149		
			57			162	159		
			58			165	151		
			59			147	145		
			60			147	139		
	1		61			164	161	· · · · · · · · · · · · · · · · · · ·	
			62			156	153		
			63				153		
			64			156	149		
			65			156			
			66			141	165		
			67			138	138 134		
			68			157	154		
			69						
			70			141	140 129		

Analyst: JCL QA: AC8/6/20

CETIS Test Data Worksheet

Bivalve Larval Survival and Development Test

Nautilus Environmental (CA)

t Date: Date: ple Date	17 、	lul-20 lul-20 lul-20		Species: Protocol: Material:	Mytilus galloprovi EPA/600/R-95/13 Effluent Sample			Sample Code: 20- ク <i>구구の</i> Sample Source: Jacobs Sample Station: Wyckoff
C-%	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
0	BC	1	37			144	(41	DM 7/18/20
0	BC	2	67			1		
0	BC	3	47					
0	BC	4	44					
0	BC	5	39					
0	LC	1	58			172	168	
0	LC	2	70					
0	LC	3	48	1				
0	LC	4	63					
0	LC	5	45					
2		1	31			164	162	
2		2	68					
2		3	57					
2		4	49					
2		5	69					
4		1	52			172	171	
4		2	55					
4		3	33					
4		4	36					
4		5	43					
9		1	61			153	(50	
9		2	62					
9		3	38					
9		4	46					
9		5	42					
18		1	50			158	155	
18		2	65					
18		3	40					
18		4	66					
18		5	56					
35 35		1	51 54			176	173	
35		2 3	54 60					
35		4	32					
35		4	32 35					
55 6 75.1		5	53			14-	141	
		2	53 64			145	141	DM 7/18/20
6 75.1		2	41					
6 75.1 6 75.1	-	4	34					
		5	59		-			
6 75.1 B		3	55					

CETIS™ v1.8.7.20

Analyst: AT QA: ACS/ 6/20

Marine Chronic Bioassay DM-014

Client: JACOBS

Sample ID: Wyckoff

Sample Log No.: 20- 0770

Test No.: 2007-S 659

Water Quality Measurements

Test Species:		
Start Date/Time:	7/15/20	1355
End Date/Time:	7/17/20	1310

Concentration		Salinity		T	emperatu	re	Diss	olved Ox	ygen		рН	
(% sample)		(ppt)			(°C)ΰ(∖			(mg/L)			(pH units)
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	36.1	29.7	29.6	16.0	16.1	15.6	8,5	8.2	8.4	8.11	225	7.80
Brine Control	30.4	30.0	30.3	15.80	15.9	15.4	7.9	8.1	8.5	8.17	Tiet	7.82
2	30.1	29.9	30.2	16.0	B10.0	15.4	8,1	8.2	8.4	8.09		7.81
4	30.2	29.9	30.2	16.0	15.8	15.4	8.3	8.1	8.4	8.67	8.00	7.84
9	30.2	29.9	30.2	160	16.1	15.6	8.3	8.1	8.4	860	1-76	7.85
18	30.2	29.8	30.2	16.0	16.1	15.5	8.3	8.1	8.4	7.90	8.06 F.	7.91
35	30.1	29.8	30.2	16.0	16.1	15.5	8.3	8-1	8.4	7-83	8.06	7.97
76	30.1	29.8	30.2	16.0	16.0	15.6	8.2	8.6	8.3	7,77	8.04	8.03
										,		
						•.						

Technician Initials:	0 24 48 WQ Readings: EQ FL GP Dilutions made by: FT Image: Construction of the second seco	onmental Chamber:
Comments:	0 hrs: (Aremprature measured using Surrog 4 4 vial RT 7/15/20 24 hrs: BOIBHL7/16/20 48 hrs:	0
QC Check:	EG 7/17/20	Final Review: <u>AC 816120</u>

Enthalpy Analytical. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chr DC-010	onic Bioassay			Brine Dilution Worksheet
Project:	JACOBS		_ Analys	st: EG/RT
Sample ID:	Wyckoff		_ Test Da	te: 7/15/2020
Test No:	2007-SOS9		Test Ty	pe: Mussel Development
Salinity of Ef	fluent	8.8	_	
Salinity of Br	ine	97.2	_ Date of Brine use	ed: <u>6/9/2020</u>
Target Salini	ty	30	Alkalinity of Brine Contr	rol: <u>15</u> mg/L as CaCO3
Test Dilution	Volume	250	-	
		Effluent	Brine Control	
(TS - SE)/(SB TS = targe		0.32	0.45	

SB = salinity of brine

Concentration %	Effluent Volume (ml)	Salinity Adjustment Factor	Brine Volume (ml)	Dilute to: (ml)
Control	NA	NA	NA	250
2	5.0	0.32	1.6	250
4	10.0	0.32	3.2	250
9	22.5	0.32	7.1	250
18	45.0	0.32	14.2	250
35	87.5	0.32	27.6	250
76.0	190.0	0.32	60.0	250

	DI Volume			
Brine Control	134.3	0.45	60.0	250

Total Brine Volume Required (ml): 173.5

QC Check: RT 7/18/20

Final Review: <u>AC 816/2</u>0

Enthalpy Analytical. 4340 Vandever Avenue. San Diego, CA 92120

Marine Chronic Bioassay DM-013

Client/Sample:	JACOBS/Wyckoff
Test No.:	2007-5059
Test Species:	Mytilus galloprovincialis
Animal Source/Batc	hTank: M-rep/3A
Date Received:	4/21/20
Test Chambers:	30 mL glass shell vials
Sample Volume:	10 mL

1007

Larval Development Worksheet

Start Date/Time:	7/15	5/2020	1355	
End Date/Time:	7/17	7/2020	1310	
Technician Initials:	EG	RT		

Spawn Information

First Gamete Release Time:

Gamete Selection

Sex	Number Spawning
Male	3
Female	3+

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	1,2	Ok density + Motility
Female 1	2	grood density pale color, mostly rom
Female 2	3	good density, overeishedor, mostly non
Female 3	-	

Egg Fertilization Time: 1105

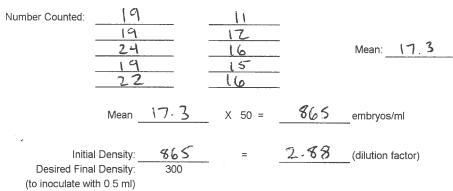
Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage		
Female 1	99		
Female 2	100		
Female 3			

Stock(s) chosen for testing	j: {
-----------------------------	------

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos



Prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

TØ Vial No.	No. Dividing	Total	% Dividing	Mean % Dividing
TØA	179	181	98.9	
TØ B [.]	139	139	100	
тøс	166	166	100	99.8
тød	167	167	100	1 17 -
TØE	147	147	100	
TØ F	155	155	100	
<u>X</u> =	159			

48-h QC: 133/136 = 97.8%

Comments:

QC Check:

RT 7/18/20

Enthalpy Analytical. 4340 Vandever Avenue. San Diego, CA 92120.

Final Review: ACS/6/20

Appendix B Sample Check-In Information

Enthalpy Analytical 4340 Vandever Avenu		Client:	JACO		Harbor Gwt	Sample Check-In Information
San Diego, CA 92120	-	Sample ID: Test ID No(s).:			THAT DOT GWI	Sample Description:
						A: colortesspear, odortess, no debris
	Sample (A, B, C):	A				
	Log-in No. (20-xxxx):	0770				· · · · · ·
Sar	nple Collection Date & Time:	7/14/20 0936				COC Complete (Y/N)?
5	Sample Receipt Date & Time:					ABC
Number of C	ontainers & Container Type:	1,1Laubi				
Approx	. Total Volume Received (L):	~				Filtration? Y N
	Check-in Temperature (°C)	5.0				Initials: A) B) C)
	Temperature OK? ¹	Y N	Y N	Y N	Y N	Pore Size:
	DO (mg/L)	7.4				Organisms or Debris
	pH (units)	7.38				Salinity Adjustment? 🕢 N
	Conductivity (µS/cm)	@ +14120				Test: Mussel Source: Brill Target ppt: 30
	Salinity (ppt)	8.8				Test: Source: Target ppt:
	Alkalinity (mg/L) ²	396				Test: Source: Target ppt:
	Hardness (mg/L) ^{2, 3})				pH Adjustment? Y (N)
	Total Chlorine (mg/L)	0.02				A C
	Technician Initials	¥L				Initial pH:
						Amount of HCI added:
Test Performed:	MUSSE Development dditional Control? OP N	Control/Dilution Wat	ter: 8:2 / J=ar		Other:	Final pH:
		Alkalinity: 101	Hardness o	r Salinity: 3000+		Cl ₂ Adjustment? Y N
A	dditional Control? 🔗 N	= Brine A	Ikalinity: 95	Hardness or S	Salinity: 30 pp+	АВС
					//	Initial Free Cl ₂ :
Test Performed:		Control/Dilution Wat	ter: 8:2 / La	bSW / LabART	Other:	STS added:
		Alkalinity:	Hardness o	r Salinity:		Final Free Cl ₂ :
A	dditional Control? Y N	= A	Ikalinity:	Hardness or S	Salinity:	
						Sample Aeration? Y(N)
Test Performed:		Control/Dilution Wat	ter: 8:2 / La	b SW / Lab ART	Other:	ABC
		Alkalinity:			_	Initial D.O.
A	dditional Control? Y N	=A	kalinity:	Hardness or S	Salinity:	Duration & Rate
						Final D.O.
	Temperature of sample should				ne.	
	mg/L as CaCO3, ³ Measured f	or freshwater samples	s only, NA = Not /	Applicable		Subsamples for Additional Chemistry Required?
Additional Comments:	ADDIEKL 7/16/-	26				Tech Initials AFL BC
	a and the					
						QC Check: <u>RT 7/18/20</u> Final Review: Ac 8 (6/20
						Final Review: AC 816/20

Overlying Water

y

Total Ammonia Analysis

Freshwater

	:: JACOBS			······		_
	: Mussel Dev	elopment				_
	: 0.0	_	A	Analyst nalysis Date	: 7/21/20	-
	Enthalpy	Sub-Sample	Test	NH3-N	N x 1.22 Ammonia	7
Sample ID	ID	Date	Day	(mg/L)	(mg/L)	4
Blank Spike (10 mg/L NH ₃)		NA	NA	9.5	11.6	-
Wyckoff	20- 0770	7/15/2020	Check In	3.3	4.0	
Spike Check (10 mg/L NH3)		NA	NA			-
						-
Batch QA Sample	20-0971			36.7	44.8	
Sample Duplicate ^a	20-0971	NA	NA	36.3	44.3	-
Sample Duplicate + Spike ^a		NA	NA	43.3	52.8	-
Spike Check (10 mg/L NH ₃)		NA	NA	9.5	11.6	-
<u>Relative Percent Difference (</u> <u>Percent Recovery =</u>	[average ammor	nia] (mg/L) (mg/L) - [sample]) x 100 Nominal	Acceptable Ra	ange: 0-20% ange: 80-120% ^b
QC Sample ID	[NH ₃]	[Sample Dup]	[Spike]	[Spike]	RPD	% Recovery
Blank	0.0	NA	11.6	10	NA	116
Batch QA Sample	44.8	44.3	52.8	10	1.1	80
Comments:	covery applies only due to one or both	/ to the blank spik	e. Spike recove	eries in samples		
QC Check: PT 3/15/20	i mg/L			Final Review:	BO 8/1.	5 20
Enthalpy Analytical. 4340 Vandever Avenue	. San Diego, CA 921	20.			<u> </u>	

Appendix C Chain-of-Custody Form Page 1 of 1

Enthalpy Analytical (REGION COPY)

DateShipped: 7/14/2020 CarrierName: FedEx AirbillNo: 7709 4990 2064

Jacobs, Wyckoff-Wyckoff Eagle Harbor GWTP 2020/WA Project Code: WEH-029P Cooler #: 1 of 1

No: 10-071420-101314-0479

2020T10P000DD210W2LA00 Contact Name: Keith Allers Contact Phone: 206-780-1711

Sample Identifier	CLP Sample No.	Matrix/Sampler	Coll. Method	Analysis/Turnaround (Days)	Tag/Preservative/Bottles	Location	Collection Date/Time	Sample Type
071420		Ground Water/ K.Allers	Composite	CHRTOX(8 Weeks)	(< 6 C) (1)	SP-11	07/14/2020 OG:36	Field Sample
							,	
							-	
						·		

	Shipment for Case Complete? N
Special Instructions:	Samples Transferred From Chain of Custody #
Analysis Key: CHRTOX=Chronic Toxicity	

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
	Knoth aller - JACOBS	1020	Milfer Nautilus	7/15/2020 0915	

Recipt temp: 5.0°C Nautilus ID: 20-0770 Appendix D List of Qualifier Codes



Glossary of Qualifier Codes:

- Q1 Temperatures out of recommended range; corrective action taken and recorded in Test Temperature Correction Log
- Q2 Temperatures out of recommended range; no action taken, test terminated same day
- Q3 Sample aerated prior to initiation or renewal due to dissolved oxygen (D.O.) levels below 6.0 mg/L
- Q4 Test aerated; D.O. levels dropped below 4.0 mg/L
- Q5 Test initiated with aeration due to an anticipated drop in D.O.
- Q6 Airline obstructed or fell out of replicate and replaced; drop in D.O. occurred
- Q7 Salinity out of recommended range
- Q8 Spilled test chamber/ Unable to recover test organism(s)
- Q9 Inadequate sample volume remaining, 50% renewal performed
- Q10 Inadequate sample volume remaining, no renewal performed
- Q11 Sample out of holding time; refer to QA section of report
- Q12 Replicate(s) not initiated; excluded from data analysis
- Q13 Survival counts not recorded due to poor visibility or heavy debris
- Q14 D.O. percent saturation was checked and was $\leq 110\%$
- Q15 Did not meet minimum test acceptability criteria. Refer to QA section of report.
- Q16 Percent minimum significant difference (PMSD) was <u>below</u> the lower bound limit for acceptability. This indicates that statistics may be over-sensitive in detecting a difference from the control due to low variability in the data set.
- Q17 Percent minimum significant difference (PMSD) was <u>above</u> the upper bound limit for acceptability. This indicates that statistics may be under-sensitive in detecting a difference from the control due to high variability in the data set.
- Q18 Incorrect Entry
- Q19 Illegible Entry
- Q20 Miscalculation
- Q21 Other (provide reason in comments section)
- Q22 Greater than 10% mortality observed upon receipt and/or in holding prior to test initiation. Organisms acclimated to test conditions at Nautilus and ultimately deemed fit to use for testing.
- Q23 Test organisms received at a <u>temperature</u> greater than 3°C outside the recommended test temperature range. However, due to age-specific protocol requirements and/or sample holding time constraints, the organisms were used to initiate tests upon the day of arrival. Organisms were acclimated to the appropriate test conditions upon receipt and prior to test initiation.
- Q24 Test organisms received at <u>salinity</u> greater than 3 ppt outside of the recommended test salinity range. However, due to age-specific protocol requirements and/or sample holding time constraints, the organisms were used to initiate tests upon the day of arrival. Organisms were acclimated to the appropriate test conditions upon receipt and prior to test initiation.

Appendix E Reference Toxicant Test Results

CETIS Summary Report

12 Aug-20 11:56 (p 1 of 3) 200715msdv | 17-4780-3294

Bivalve Larva	I Survival and Developr	nent Test						Nautilus Environmental (CA
Batch ID: Start Date: Ending Date: Duration:	15 Jul-20 13:55 F 17 Jul-20 13:10 S	Fest Type: Protocol: Species: Source:	Development- EPA/600/R-95 Mytilus gallop M-Rep, Carlst	5/136 (1995) rovincialis				luted Natural Seawater ot Applicable
Sample ID:	04-7267-3004	Code:	200715msdv				Client: Int	ernal
Sample Date:	15 Jul-20	Naterial:	Copper chlorid	le			Project:	
Receive Date:	15 Jul-20 🗧	Source:	Reference To:	kicant				
Sample Age:	14h S	Station:	Copper Chlori	de				
Comparison S	Summary							
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	τυ	Method	
14-5603-4025	Combined Developmen	t Ra 10	20	14.14	10.2%		Dunnett	Multiple Comparison Test
19-8463-7267	Development Rate	5	10	7.071	2.41%		Dunnett	Multiple Comparison Test
01-3736-1147	Survival Rate	20	40	28.28	11.4%		Dunnett	Multiple Comparison Test
Point Estimate	e Summary					*****		
Analysis ID	Endpoint	Level	μg/L	95% LCL	95% UCL	τu	Method	
11-0488-5403	Combined Developmen	t Ra EC25 EC50	11.24 14.16	10.31 13.54	12.09 14.73		Linear Ir	terpolation (ICPIN)
14-0926-7215	Development Rate	EC25	10.9	10.08	11.53		Linear Ir	terpolation (ICPIN)
		EC50	13.94	13.39	14.36			,
14-7805-7540	Survival Rate	EC25	>40	N/A	N/A		Linear Ir	terpolation (ICPIN)
		EC50	>40	N/A	N/A			
Test Acceptab	bility	EC50	>40	N/A	N/A			
•	ility Endpoint	EC50		N/A Test Stat		ts	Overlap	Decision
Analysis ID	2	Attrib				ts	Overlap Yes	Decision Passes Acceptability Criteria
Analysis ID 14-0926-7215	Endpoint	Attrib Contro	ute	Test Stat	TAC Limi	ts	-	
Test Acceptab Analysis ID 14-0926-7215 19-8463-7267 01-3736-1147	Endpoint Development Rate	Attrib Contro Contro	ute bl Resp	Test Stat 0.9869	TAC Limi 0.9 - NL	ts	Yes	Passes Acceptability Criteria
Analysis ID 14-0926-7215 19-8463-7267	Endpoint Development Rate Development Rate	Attrib Contro Contro Contro	ute bl Resp bl Resp	Test Stat 0.9869 0.9869	TAC Limi 0.9 - NL 0.9 - NL	ts	Yes Yes	Passes Acceptability Criteria Passes Acceptability Criteria

CETIS Summary Report

Report Date: Test Code: 20

12 Aug-20 11:56 (p 2 of 3) 200715msdv | 17-4780-3294

		****					Test	Code:	2007	15msdv 1	7-4780-3294
Bivalve La	rval Survival and	Developme	nt Test						Nautilus	s Environn	nental (CA)
Combined	Development Rat	e Summary									
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.887	0.8062	0.9678	0.8239	0.9695	0.02909	0.06506	7.33%	0.0%
2.5		5	0.948	0.9109	0.9852	0.9119	0.9944	0.01337	0.0299	3.15%	-6.88%
5		5	0.9525	0.8925	1	0.8742	0.9885	0.02159	0.04827	5.07%	-7.39%
10		5	0.7944	0.7146	0.8741	0.7233	0.8802	0.02874	0.06426	8.09%	10.44%
20		5	0	0	0	0	0	0	0		100.0%
40		5	0.001258	0	0.00475	0	0.006289	0.001258	0.002813	223.6%	99.86%
	ent Rate Summary	,									
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL		Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.9869	0.9729	1	0.9695	1	0.005032	0.01125	1.14%	0.0%
2.5		5	0.9817	0.9559	1	0.9471	1	0.009274	0.02074	2.11%	0.52%
5		5	0.9823	0.9669	0.9977	0.9613	0.9929	0.005556	0.01242	1.27%	0.46%
10		5	0.8115	0.7426	0.8805	0.7325	0.8802	0.02483	0.05553	6.84%	17.77%
20		5	0	0	0	0	0	0	0		100.0%
40		5	0.001639	0	0.006191	0	0.008197	0.001639	0.003666	223.6%	99.83%
Survival Ra	ate Summary										
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.8994	0.8066	0.9921	0.8302	1	0.0334	0.07468	8.3%	0.0%
2.5		5	0.966	0.9227	1	0.9245	1	0.01561	0.0349	3.61%	-7.41%
5		5	0.9698	0.9065	1	0.8805	1	0.0228	0.05098	5.26%	-7.83%
10		5	0.9786	0.9397	1	0.9245	1	0.01401	0.03132	3.2%	-8.81%
20		5	0.9006	0.8647	0.9366	0.8553	0.9308	0.01295	0.02896	3.22%	-0.14%
40		5	0.761	0.6428	0.8792	0.6415	0.9057	0.04256	0.09517	12.51%	15.38%
Combined	Development Rate	e Detail									
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	0.8428	0.9695	0.8239	0.8553	0.9434					
2.5		0.9371	0.9944	0.9497	0.9119	0.9471					
5		0.9811	0.9371	0.8742	0.9885	0.9815					
10		0.7233	0.7547	0.8802	0.7736	0.84					
20		0	0	0	0	0					
40		0	0.006289	0	0	0					
Developme	nt Rate Detail	•									
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	1	0.9695	0.9924	0.9855	0.9868					
2.5		1	0.9944	0.9805	0.9864	0.9000					
5		0.9873	0.9613	0.9929							
10					0.9885	0.9815					
20		0.7325	0.8163	0.8802	0.7885	0.84					
2U		0	0	0	0	0					
		^			0	0					
40		0	0.008197	0		-					
40 Survival Ra			0.008197	0							
40 Survival Ra C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
40 Survival Ra C-µg/L 0		Rep 1 0.8428		Rep 3 0.8302	Rep 4 0.8679						
40 Survival Ra C-µg/L 0 2.5	Control Type	Rep 1 0.8428 0.9371	Rep 2	Rep 3	Rep 4	Rep 5					
40 Survival Ra C-µg/L 0 2.5 5	Control Type	Rep 1 0.8428	Rep 2	Rep 3 0.8302	Rep 4 0.8679	Rep 5 0.956					
40 Survival Ra C-µg/L 0 2.5	Control Type	Rep 1 0.8428 0.9371	Rep 2 1 1	Rep 3 0.8302 0.9686	Rep 4 0.8679 0.9245	Rep 5 0.956 1					
40 Survival Ra C-µg/L 0 2.5 5	Control Type	Rep 1 0.8428 0.9371 0.9937	Rep 2 1 1 0.9748	Rep 3 0.8302 0.9686 0.8805	Rep 4 0.8679 0.9245 1	Rep 5 0.956 1 1					

Bivalve Larval Survival and Development Test

I	Report Date:
	Test Code:

12 Aug-20 11:56 (p 3 of 3) 200715msdv | 17-4780-3294

Nautilus Environmental (CA)

Combined Development Rate Binomials										
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5				
0	Lab Control	134/159	159/164	131/159	136/159	150/159				
2.5		149/159	178/179	151/159	145/159	161/170				
5		156/159	149/159	139/159	172/174	159/162				
10		115/159	120/159	147/167	123/159	147/175				
20		0/159	0/159	0/159	0/159	0/159				
40		0/159	1/159	0/159	0/159	0/159				
Developmer	nt Rate Binomials		*********							
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5				
0	Lab Control	134/134	159/164	131/132	136/138	150/152				
2.5		149/149	178/179	151/154	145/147	161/170				
5		156/158	149/155	139/140	172/174	159/162				
10		115/157	120/147	147/167	123/156	147/175				
20		0/142	0/148	0/146	0/144	0/136				
40		0/102	1/122	0/116	0/121	0/144				
Survival Rat	e Binomials									
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5				
0	Lab Control	134/159	159/159	132/159	138/159	152/159				
2.5		149/159	159/159	154/159	147/159	159/159				
5		158/159	155/159	140/159	159/159	159/159				
10		157/159	147/159	159/159	156/159	159/159				
20		142/159	148/159	146/159	144/159	136/159				
40		102/159	122/159	116/159	121/159	144/159				

CETIS An	alytical Rep	ort						ort Date: Code:			55 (p 1 of 4 7-4780-3294
Bivalve Larv	al Survival and	Developme	nt Test					····	Nautilus	Environ	mental (CA)
Analysis ID: Analyzed:	14-5603-4025 12 Aug-20 11:		-	mbined Deve rametric-Cor	•			IS Version: ial Results:	CETISv1. Yes	8.7	
Data Transfo	orm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Angular (Corr	rected)	NA	C > T	NA	NA		10.2%	10	20	14.14	
Dunnett Mul	tiple Compariso	n Test		****	nya mananga talani talah katikagi.						
Control	vs C-µg/L		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision(α:5%)		
Lab Control	2.5		-1.801	2.227	0.138 8	0.9949	CDF		ficant Effect	******	
	5		-2.092	2.227	0.138 8	0.9977	CDF	Non-Signit	ficant Effect		
	10		2.212	2.227	0.138 8	0.0514	CDF	Non-Signif	ficant Effect		
ANOVA Tabl	e						,				
Source	Sum Squ	uares	Mean Squ	uare	DF	F Stat	P-Value	Decision(α:5%)		
Between	0.227228		0.0757428	32	3	7.873	0.0019	Significant	Effect		
Error	0.153926		0.0096204	1	16						
Total	0.381154	.8			19						
Distributiona	al Tests					. —				_	
Attribute	Test			Test Stat	Critical	P-Value	Decision(α:1%)			
Variances		Equality of ∖		0.5808	11.34	0.9008	Equal Var		Her Land Constanting		
Distribution	Shapiro-	Wilk W Nor	mality	0.9514	0.866	0.3890	Normal Di	stribution			
Combined D	evelopment Rate	e Summary									2012/11/2012/01/2012/02/2012/02/2012/02/2012/02/2012/2012/2012/2012/2012/2012/2012/2012/2012/2012/2012/2012/20
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.887	0.8062	0.9678	0.8553	0.8239	0.9695	0.02909	7.33%	0.0%
2.5		5	0.948	0.9109	0.9852	0.9471	0.9119	0.9944	0.01337	3.15%	-6.88%
5		5	0.9525	0.8925	1	0.9811	0.8742	0.9885	0.02159	5.07%	-7.39%
10 20		5 5	0.7944 0	0.7146 0	0.8741 0	0.7736	0.7233	0.8802	0.02874	8.09%	10.44%
40		5	0.001258	0	0.00475	0 0	0 0	0 0.006289	0 0.001258	223.6%	100.0% 99.86%
Angular (Cor	rrected) Transfor							0.000200	0.001200	223.070	55.00 %
C-µg/L	Control Type				0.5% 11.01	NA					
<u>о-ру/с</u> 0	Lab Control	Count 5	Mean 1,241	95% LCL	95% UCL	Median	Min	Max	Std Err	<u>CV%</u>	%Effect
2.5		5	1.353	1.248	1.459	1.181 1.339	1.138 1.27	1.395 1.496	0.05109 0.03805	9.2% 6.29%	0.0% -9.0%
5		5	1.371	1.238	1.504	1.433	1.208	1.463	0.03803	7.8%	-9.0% -10.45%
10		5	1.104	1.002	1.206	1.075	1.017	1.217	0.03674	7.44%	11.05%
20		5	0.03966	0.03965	0.03967	0.03966	0.03966	0.03966	0	0.0%	96.81%
40		5	0.04761	0.02555	0.06967	0.03966	0.03966	0.07939	0.007945	37.32%	96.17%
Graphics											
0.9						0.20					/
			₽	Reject Null	-	-					
Combined Development Rate		L]			0.10		vaneeraa	• •	/	
0.6 Develo					Centered	0.05			990		
paulde 0.5					0	Ę			•		
- E						0.00		000000000			
0.4						-0.05		000			
0.3						-0.10					
0.2						Ę	~				
0.1						-0.15					
0.0		L	@		L	-0.20	L		I	I	
	0 LC 2.5	S Countil	10 20	40			1.0 -1.5 -1.0	-0.5 0.0	0.5 1.0	1.5 2.0	2.5
		C-µg/L	·····					Rankits			

	alytical Repo							ort Date: Code:	20071	5msdv 1	55 (p 2 of 4 7-4780-3294
Bivalve Larva	al Survival and E	Developme	nt Test						Nautilus	s Environ	nental (CA)
Analysis ID: Analyzed:	19-8463-7267 12 Aug-20 11:		-	velopment R ametric-Cor		tments		IS Version: cial Results	CETISv1 : Yes	.8.7	
Data Transfo	rm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	τυ
Angular (Corre	ected)	NA	C > T	NA	NA		2.41%	5	10	7.071	
Dunnett Mult	iple Comparisor	n Test									
Control	vs C-µg/L		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision	(α:5%)		
Lab Control	2.5		0.3315	2.227	0.085 8	0.6183	CDF		ficant Effect		
	5		0.5115	2.227	0.085 8	0.5397	CDF	Non-Signi	ficant Effect		
	10*		8.826	2.227	0.085 8	<0.0001	CDF	Significan	t Effect		
ANOVA Table)										
Source	Sum Squ	ares	Mean Squ	lare	DF	F Stat	P-Value	Decision	α:5%)		
Between	0.4015166		0.1338388		3	36.6	<0.0001	Significan	t Effect		
Error	0.0585129		0.0036570	58	16						
Total	0.4600295	5			19						
Distributiona	l Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances		quality of V		1.467	11.34	0.6900	Equal Var	iances			
Distribution	Shapiro-\	Nilk W Nori	mality	0.9684	0.866	0.7218	Normal Di	istribution			
Development	Rate Summary										
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.9869	0.9729	1	0.9868	0.9695	1	0.005032	1.14%	0.0%
2.5		5	0.9817	0.9559	1	0.9864	0.9471	1	0.009274	2.11%	0.52%
5		5	0.9823	0.9669	0.9977	0.9873	0.9613	0.9929	0.005556	1.27%	0.46%
10		5	0.8115	0.7426	0.8805	0.8163	0.7325	0.8802	0.02483	6.84%	17.77%
20		5 5	0	0	0	0	0	0	0		100.0%
40		5	0.001639	0	0.006191	0	0	0.008197	0.001639	223.6%	99.83%
	rected) Transfor	med Sumn	nary								
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.462	1.402	1.523	1.456	1.395	1.528	0.02168	3.31%	0.0%
2.5		5	1.45	1.359	1.54	1.454	1.339	1.53	0.03262	5.03%	0.87%
5 10		5	1.443	1.389	1.497	1.458	1.373	1.486	0.01939	3.0%	1.34%
20		5 5	1.125 0.04181	1.036	1.213	1.128	1.027	1.217	0.03188	6.34%	23.08%
40		5	0.04181	0.04096 0.02959	0.04266 0.07992	0.04168 0.04644	0.04111 0.04168	0.04289 0.09066	0.000306 0.009063	1.63% 37.01%	97.14% 96.26%
Graphics										01.0170	00.2070
						0.10					
0.9	<u> </u>			Reject Null	-	0.08					
E		Γ				-					
0.8		20				0.06				7	
T.0 It Kate						0.04					
Development Rate					Centered	0.02 -					
0.5					0	0.00		00000000000	Ø		
						-0.02					
0.4						-0.04	•				
0.3						-0.06					
0.2						-0.08	• •				
0.1						Ē	/				
Ē						-0.10					
0.0	DLC 2.5	5	10 20	40	L	-0.12	1.0 -1.5 -1.0	-0.5 0.0	0.5 1.0	1.5 2.0	2.5
		C-µg/L						Rankits			

CETIS™ v1.8.7.20

CETIS An	alytical Rep	ort						ort Date: t Code:		-	55 (p 3 of 4 7-4780-3294
Bivalve Larv	al Survival and	Develo	oment Test			1,000,000,000,000,000,000,000,000 ,0000		energene version in her energy services			mental (CA)
Analysis ID: Analyzed:	01-3736-1147 12 Aug-20 11:	54	Endpoint: Su Analysis: Pa	irvival Rate irametric-Coi	ntrol vs Trea	atments		IS Version		.8.7	
Data Transfo	orm	Zeta	Alt Hyp	Trials	Seed	ter til til en forste som en stade	PMSD	NOEL	LOEL	TOEL	TU
Angular (Cori	rected)	NA	C > T	NA	NA		11.4%	20	40	28.28	
Dunnett Mul	tiple Compariso	n Test									
Control	vs C-µg/L		Test Stat	Critical	MSD DI	P-Value	P-Type	Decision	(a:5%)		
Lab Control	2.5		-1.786	2.362	0.176 8	0.9985	CDF		ificant Effect		
	5		-2.103	2.362	0.176 8	0.9995	CDF	-	ificant Effect		
	10		-2.273	2.362	0.176 8	0.9997	CDF	-	ificant Effect		
	20		0.365	2.362	0.176 8	0.7040	CDF	-	ificant Effect		
	40*		2.841	2.362	0.176 8	0.0182	CDF	Significar			
ANOVA Tabl	е										
Source	Sum Squ	ares	Mean Sq	uare	DF	F Stat	P-Value	Decision	(α:5%)		
Between	0.543329	4	0.108665	9	5	7.81	0.0002	Significar			
Error	0.333911	3	0.013912	97	24			•			
Total	0.877240	8			29						
Distributiona	al Tests						*********************				
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Bartlett E	Equality	of Variance	4.935	15.09	0.4239	Equal Var				
Distribution	Shapiro-	Wilk W	Normality	0.9863	0.9031	0.9571	Normal D				
Survival Rate	e Summary										
C-µg/L	Control Type	Cour	nt Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.8994	0.8066	0.9921	0.8679	0.8302	1	0.0334	8.3%	0.0%
2.5		5	0.966	0.9227	1	0.9686	0.9245	1	0.01561	3.61%	-7.41%
5		5	0.9698	0.9065	1	0.9937	0.8805	1	0.0228	5.26%	-7.83%
10		5	0.9786	0.9397	1	0.9874	0.9245	1	0.01401	3.2%	-8.81%
20		5	0.9006	0.8647	0.9366	0.9057	0.8553	0.9308	0.01295	3.22%	-0.14%
40		5	0.761	0.6428	0.8792	0.761	0.6415	0.9057	0.04256	12.51%	15.38%
Angular (Cor	rected) Transfor	med Su	ummary								
	O a sector of T	Coun	it Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
C-µg/L	Control Type		mcan							and the second se	
С-µg/L 0	Lab Control	5	1.28	1.076	1.483	1.199	1.146	1.531	0.07334	12.81%	0.0%
С-µg/L 0 2.5		5 5	1.28 1.413	1.076 1.271	1.555	1.393	1.146 1.292	1.531 1.531	0.07334 0.05099	12.81% 8.07%	0.0% -10.41%
С-µg/L 0 2.5 5		5 5 5	1.28 1.413 1.437	1.076 1.271 1.273	1.555 1.6	1.393 1.491	1.292 1.218				
С-µg/L 0 2.5 5 10		5 5 5 5	1.28 1.413 1.437 1.449	1.076 1.271 1.273 1.328	1.555 1.6 1.571	1.393 1.491 1.458	1.292 1.218 1.292	1.531 1.531 1.531	0.05099 0.05889 0.04378	8.07%	-10.41%
С-µg/L 0 2.5 5		5 5 5	1.28 1.413 1.437	1.076 1.271 1.273	1.555 1.6	1.393 1.491	1.292 1.218	1.531 1.531	0.05099 0.05889	8.07% 9.17%	-10.41% -12.26%

000-089-187-3

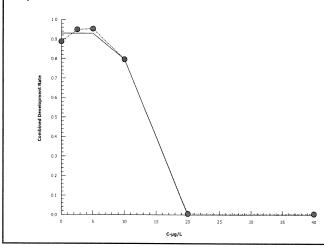
Analyst: JU QA: 608/18/20

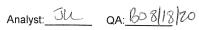
CETIS Analytical Report Report Date: 12 Aug-20 11:55 (p 4 of 4) 200715msdv | 17-4780-3294 Test Code: **Bivalve Larval Survival and Development Test** Nautilus Environmental (CA) Analysis ID: 01-3736-1147 Endpoint: Survival Rate **CETIS Version:** CETISv1.8.7 Analyzed: 12 Aug-20 11:54 Analysis: Parametric-Control vs Treatments **Official Results:** Yes Graphics 1.0 0.30 F _ 2 CO. 0.25 0.9 Ž 0.8 0.20 Reject Null 0.15 0.7 Survival Rate Centered Corr. Angle 0.10 0.6 09 0.05 ٥.: 0.00 900 0.05 0. -0.10 F 0.2 -0.15 0.1 -0.20 0.0 -0.25 0 LC 2.5 5 10 20 40 ·2.0 ·1.5 -2.5 -0.5 -1.0 0.0 0.5 1.0 2.5 1.5 2.0 C-µg/L Rankits

QA:BO 3/18/20

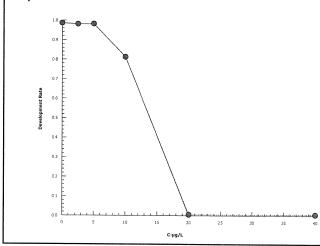
CETIS	Anal	ytical Repo	ort					•	ort Date: Code:		-	56 (p 1 of 3) 7-4780-3294
Bivalve	Larval	Survival and D	evelopmen	t Test						Nautilus	s Environ	mental (CA)
Analysi Analyze		11-0488-5403 12 Aug-20 11:5		•	Combined De [.] Linear Interpo	•			IS Version: cial Results:	CETISv1 Yes	.8.7	
Linear I	nterpol	ation Options				*****		######################################		, Péleski Manadala ang Kang Kang Kang Kang Kang Kang Kang		
X Trans	form	Y Transform	See	d	Resamples	Exp 95%	CL Met	thod				
Linear		Linear	6665	566	1000	Yes	Two	o-Point Interp	olation			
Point E	stimate	s										
Level	µg/L	95% LCL	95% UCL									
EC25	11.24	10.31	12.09						1.410 - 210 (California - Ur and Arrows California - Ur			
EC50	14.16	13.54	14.73									
Combin	ed Dev	elopment Rate	Summary			Calcu	lated Vari	ate(A/B)				
C-µg/L	Co	ontrol Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	Α	в
0	La	b Control	5	0.887	0.8239	0.9695	0.02909	0.06506	7.33%	0.0%	710	800
2.5			5	0.948	0.9119	0.9944	0.01337	0.0299	3.15%	-6.88%	784	826
5			5	0.9525	0.8742	0.9885	0.02159	0.04827	5.07%	-7.39%	775	813
10			5	0.7944	0.7233	0.8802	0.02874	0.06426	8.09%	10.44%	652	819
20			5	0	0	0	0	0		100.0%	0	795
40			5	0.0012	58 0	0.006289	0.001258	3 0.002813	223.6%	99.86%	0	795

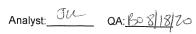
Graphics





CETIS	S Ana	lytical Repo	ort					•	ort Date: Code:			:56 (p 2 of 3 17-4780-3294
Bivalve	e Larva	Survival and D	evelopm	ent Test						Nautilu	s Enviror	nmental (CA)
Analysi Analyzo		14-0926-7215 12 Aug-20 11:5			Development ₋inear Interpo)		IS Version: cial Results:	CETISv1 Yes	.8.7	
Linear	Interpo	lation Options	inini de statemento de la constana		an yana sa dhudhada dan mayadaga		MANANA SI ITI MUMANI MANANA MI		n Bach - Canadal a de Anna Anna Anna Anna Anna Anna		alaan ay ahaa ahaa ahaa ahaa ahaa ahaa aha	
X Trans	sform	Y Transform	n Se	ed I	Resamples	Exp 95%	CL Meth	nod				
Linear		Linear	81	8614 [~]	000	Yes	Two-	Point Interp	olation		·····	unter etter generation forstande statis - Ligen et
Point E	Stimate	es										
Level	μg/L	95% LCL	95% UC	L								
EC25	10.9	10.08	11.53									
EC50	13.94	13.39	14.36									
Develo	pment	Rate Summary				Calcu	lated Varia	te(A/B)				
C-µg/L	с	ontrol Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	А	в
0	La	ab Control	5	0.9869	0.9695	1	0.005032	0.01125	1.14%	0.0%	710	720
2.5			5	0.9817	0.9471	1	0.009274	0.02074	2.11%	0.52%	784	799
5			5	0.9823	0.9613	0.9929	0.005556	0.01242	1.27%	0.46%	775	789
10			5	0.8115	0.7325	0.8802	0.02483	0.05553	6.84%	17.77%	652	802
20			5	0	0	0	0	0		100.0%	0	716
40			5	0.00163	9 0	0.008197	0.001639	0.003666	223.6%	99.83%	0	605





CETIS	S Ana	lytical Repo	ort		1011-1010-001-001-001-001-001-001-001-0				-	ort Date: Code:		•	:56 (p 3 of 3 17-4780-329
Bivalve	e Larval	Survival and D	evelopn	nent Test							Nautilu	s Enviror	mental (CA
Analys Analyz		14-7805-7540 12 Aug-20 11:5		Indpoint: Analysis:	Survival Rate Linear Interpol	lation (ICPII	N)			IS Version: al Results:	CETISv1 Yes	.8.7	
Linear	Interpo	lation Options		1991 H M & CONTRACTOR AND CONTRACTOR OFFIC			and the second secon		Geldeline Construction of a second		<u></u>		
X Trans	sform	Y Transform	s	eed	Resamples	Exp 95%	6 CL	Method	1				
Linear		Linear	1	852204	1000	Yes			int Interp	olation			
Point F	stimate	29											
Level	µg/L	95% LCL	95% U	C 1									
EC25	240	N/A	N/A										
EC50	>40	N/A	N/A										
Surviva	al Rate S	Summary				Calc	ulated	Variate(
C-µg/L		ontrol Type	Count	Mean	Min	Max	Std		td Dev	CV%	%Effect	А	
0		ab Control	5	0.8994		1	0.03		.07468	8.3%	0.0%	715	B 795
2.5			5	0.966		1	0.01		.0349	3.61%	-7.41%	768	795
5			5	0.9698		1	0.02		.05098	5.26%	-7.83%	771	795
10			5	0.9786	6 0.9245	1	0.01		.03132	3.2%	-8.81%	778	795
20			5	0.9006	6 0.8553	0.9308	0.01	295 0	.02896	3.22%	-0.14%	716	795
40			5	0.761	0.6415	0.9057	0.042	256 0	.09517	12.51%	15.38%	604	795
Graphic	10 0.9 0.8 0.7 0.6												

03

0.1

0.0 0.0 0.0 5 10 15 20 25 20 33 40 **C-pg/L**



ivalve Larval Surviva	I and Developm	ent Test				Nautilus Environme	ental (CA
est Type: Developme rotocol: EPA/600/R	ent-Survival -95/136 (1995)		Mytilus galloprovincialis Combined Developmer			per chloride erence Toxicant-REF	****
		Biv	alve Larval Survival and Developn	ient Test			
20					the same and the same state of the same	+3s	
15-						+25	
-					•	•* 25	
e 10-							
EC50-Jg/L Copper chloride						Mean	
EC50-J1g/LL							
0						-25	
						-3s	
-5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -5 -	-19-	-616161-	-020202-	50 50 50	20	S 20 20	
28 Aug-19 11 Sep-19	12 Sep-19- 18 Sep-19- 17 Oct-19-	30 Oct-19- 27 Nov-19- 05 Dec-19-	11 Dec-19- 08 Jan-20- 22 Jan-20- 04 Feb-20-	05 Feb-20 25 Feb-20 17 Mar-20	06 Apr-20	28 Apr-20 12 May-20 11 Jun-20- 15 Jul-20-	

-2s Warning Limit: 2.582

+2s Warning Limit: 15.31

Report Date:

12 Aug-20 11:57 (1 of 1)

Qualit	ty Con	trol Data	a								
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Aug	28	14:30	7.348	-1.6	-0.5027		~	01-0546-0046	21-3090-7111
2		Sep	11	14:30	11.93	2.987	0.9383			09-2717-2159	04-2480-9094
3			12	14:25	8.444	-0.5036	-0.1582			19-6218-6352	07-5188-6358
4			18	13:20	7.4	-1.548	-0.4863			10-9359-1611	21-3838-7021
5		Oct	17	12:30	4.368	-4.58	-1.439			01-8239-7270	07-0806-0577
6			30	12:30	7.518	-1.43	-0.4493			07-8198-2858	11-8079-0492
7		Nov	27	20:00	7.249	-1.699	-0.5339			12-9914-0499	16-0529-7707
8		Dec	5	13:15	4.982	-3.966	-1.246			04-7411-4445	13-6587-0425
9			11	13:35	7.245	-1.703	-0.535			10-8800-1613	10-7929-5811
10	2020	Jan	8	13:40	12.34	3.392	1.066			07-8444-5322	01-1422-4896
11			22	13:25	14.72	5.772	1.813			02-1152-2212	07-1224-7163
12		Feb	4	16:30	14.68	5.728	1.799			19-9078-6483	21-0369-4045
13			5	13:10	7.103	-1.845	-0.5797			06-6849-2235	04-8167-3886
14			25	14:15	14.58	5.633	1.77			09-2101-6353	02-3593-4650
15		Mar	17	14:20	7.408	-1.54	-0.4839			14-6169-3689	18-9939-7640
16		Apr	6	17:15	6.537	-2.411	-0.7574			02-0082-4673	13-2096-3831
17			15	13:25	11.68	2.735	0.8592			16-4614-0901	11-3098-9850
18			28	13:25	7.292	-1.656	-0.5204			06-8086-6028	13-2749-2065
19		May	12	16:15	8.819	-0.1291	-0.04056			12-3773-8150	00-4087-7530
20		Jun	11	15:45	7.306	-1.642	-0.516			20-6521-9403	10-1893-3875
21		Jul	15	13:55	14.16	5.214	1.638			17-4780-3294	11-0488-5403

CETIS QC Plot

Mean:

Sigma: 3.183

8.948

Count: 20

35.60%

CV:

-3s Action Limit: -0.6014

+3s Action Limit: 18.5

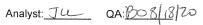
Bivalve Lar	val Survival and Developmer	nt Test	Nautilus Environmental (C
est Type: Protocol:	Development-Survival EPA/600/R-95/136 (1995)	Organism: Mytilus galloprovincialis (Bay Musse Endpoint: Development Rate	el Material: Copper chloride Source: Reference Toxicant-REF
		Bivalve Larval Survival and Development Test	
	20		+3s
	15		+25
Q	10-		\land
er chlorid			Mean
EC50-µg/L Copper chloride	5-		
EC50-I			-25
			-35
	0, 28 Aug-19 11 Sep-19- 12 Sep-19- 18 Sep-19- 18 Sep-19- 17 Oct-19-	30 Oct.19 27 Nov.19 - 05 Dec.19- 11 Dec.19- 04 Feb.20 - 04 Feb.20 - 05 Feb.20 -	ar-20- ar-20- y-20- h-20- h-20-
	28 A 11 5 12 5 12 5 18 5 17 0	30 OCt-19 27 Nov-19 05 Dec-19 08 Jan-20 08 Jan-20 04 Feb-20 05 Feb-20 05 Feb-20	17 Mar-20 06 Apr-20 28 Apr-20- 12 May-20- 11 Jun-20- 15 Jul-20-

Report Date:

12 Aug-20 11:57 (1 of 1)

			ean: gma:	9.031 3.236			20 35.80%	-2s Warning L +2s Warning L		-3s Action Limit: +3s Action Limit:	
Quali	ty Con	trol Dat	a								
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning Actio	on Test ID	Analysis ID	
1	2019	Aug	28	14:30	7.351	-1.68	-0.5192		01-0546-0046	10-3410-8075	
2		Sep	11	14:30	11.98	2.952	0.9121		09-2717-2159	17-4622-9429	
3			12	14:25	8.608	-0.423	4 -0.1308		19-6218-6352	06-5225-4823	

		1-					0.0.1	00 2111 2100	11-4022-0420
3			12	14:25	8.608	-0.4234	-0.1308	19-6218-6352	06-5225-4823
4			18	13:20	7.546	-1.485	-0.459	10-9359-1611	16-7089-5314
5		Oct	17	12:30	4.375	-4.656	-1.439	01-8239-7270	19-1864-9270
6			30	12:30	7.481	-1.55	-0.4789	07-8198-2858	15-7183-3565
7		Nov	27	20:00	7.297	-1.734	-0.5358	12-9914-0499	01-7534-7240
8		Dec	5	13:15	5.087	-3.944	-1.219	04-7411-4445	10-0471-4567
9			11	13:35	7.32	-1.711	-0.5287	10-8800-1613	20-9346-8800
10	2020	Jan	8	13:40	12.43	3.398	1.05	07-8444-5322	06-2499-4329
11			22	13:25	14.68	5.65	1.746	02-1152-2212	04-4145-0874
12		Feb	4	16:30	15.01	5.977	1.847	19-9078-6483	06-3219-7963
13			5	13:10	7.132	-1.899	-0.5868	06-6849-2235	20-3119-3253
14			25	14:15	15	5.969	1.845	09-2101-6353	13-1093-9538
15		Mar	17	14:20	7.489	-1.542	-0.4766	14-6169-3689	12-6636-5212
16		Apr	6	17:15	6.609	-2.422	-0.7483	02-0082-4673	11-5300-1558
17			15	13:25	11.68	2.652	0.8195	16-4614-0901	19-2371-7781
18			28	13:25	7.365	-1.666	-0.5148	06-8086-6028	17-1633-3832
19		May	12	16:15	8.876	-0.1547	-0.04782	12-3773-8150	04-4023-9067
20		Jun	11	15:45	7.306	-1.725	-0.5332	20-6521-9403	18-5947-9043
21		Jul	15	13:55	13.94	4.908	1.517	17-4780-3294	14-0926-7215



CETIS™ v1.8.7.20

000-089-187-3

CE	TIS	QC	Plot
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Bivalve Larval Survival and Development Test Nautilus Environmental (
Test Type: Protocol:	Development-Survival EPA/600/R-95/136 (1995)		Mytilus galloprovincialis (Bay Musse Survival Rate	Material: Source:	Copper chloride Reference Toxicant-REF						
		Biva	alve Larval Survival and Development Test								
ECS0-µg/L Copper chloride	45 40 40 40 40 40 40 40 40 40 40	12 Sep-19- 18 Sep-19- 17 Oct-19-	30 Oct:19- 27 Nov:19- 05 Dec:19- 08 Jan-20- 08 Jan-20- 22 Jan-20- 23 Jan-20-	05 Feb-20	+35 +35 +25 +25 -25 -25 -35 -25 -35 -35						

Mean:	29.67	Count:	20	-2s Warning Limit:	24.59	-3s Action Limit:	22.05
Sigma:	2.54	CV:	8.56%	+2s Warning Limit:	34.75	+3s Action Limit:	37.29

Quality Control Data	Qua	lity	Control	Data
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Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Aug	17	14:00	29.6	-0.06634	-0.02612			15-9584-4385	20-0172-5237
2			20	14:15	37.92	8.249	3.248	(+)	(+)	14-8361-1578	02-5800-6574
3			24	16:00	30.04	0.3674	0.1446			19-4374-5817	17-7461-0750
4			28	14:30	28.66	-1.005	-0.3958			01-0546-0046	13-4512-6481
5		Sep	11	14:30	33.71	4.045	1.592			09-2717-2159	01-1883-2964
6			12	14:25	29.16	-0.5059	-0.1992			19-6218-6352	02-6393-7831
7			18	13:20	29.04	-0.631	-0.2484			10-9359-1611	04-3365-2341
8		Oct	17	12:30	24.88	-4.788	-1.885			01-8239-7270	13-2801-3685
9			30	12:30	29.32	-0.3471	-0.1366			07-8198-2858	20-5233-5110
10		Nov	27	20:00	29.07	-0.6033	-0.2375			12-9914-0499	00-1104-7300
11		Dec	5	13:15	28.21	-1.456	-0.5731			04-7411-4445	20-5035-4724
12			11	13:35	29.18	-0.4907	-0.1932			10-8800-1613	02-9848-3585
13	2020	Jan	8	13:40	29.6	-0.06894	-0.02714			07-8444-5322	01-5655-1706
14			22	13:25	29.76	0.08561	0.0337			02-1152-2212	19-4150-8988
15		Feb	5	13:10	29.83	0.1563	0.06154			06-6849-2235	07-0404-6516
16		Mar	17	14:20	26.48	-3.188	-1.255			14-6169-3689	14-2151-4803
17		Apr	6	17:15	29.18	-0.4932	-0.1942			02-0082-4673	12-2147-8498
18			15	13:25	30	0.33	0.1299			16-4614-0901	00-5465-8677
19			28	13:25	29.9	0.226	0.08896			06-8086-6028	08-1083-2165
20		May	12	16:15	29.85	0.181	0.07127			12-3773-8150	18-0143-0286
21		Jun	11	15:45	35.5	5.829	2.295	(+)		20-6521-9403	17-6494-5506

*EC50 for survival is greater than highest concentration tested on 7/15/20

Bivalve Larval Survival and Development Test Nautilus Environmental (Ca										
Development-Survival EPA/600/R-95/136 (1995)	Organism: Mytilus galloprovincialis (Bay Mussel Endpoint: Survival Rate	Material: Source:	Copper chloride Reference Toxicant-REF							
	Bivalve Larval Survival and Development Test									
70										
60-			+35							
50			+25							
40										
30			Mean							
20	¥									
10-			-25							
0										
-10			-35							
17 Aug-19 20 Aug-19- 24 Aug-19- 28 Aug-19- 28 Aug-19-	12 Sep-19 17 Oct-19 30 Oct-19 27 Nov-19 05 Dec-19 11 Dec-19 08 Jan-20 22 Jan-20	05 Feb-20	06 Apr-20 15 Apr-20 28 Apr-20 12 May-20 11 Jun-20							
	Development-Survival EPA/600/R-95/136 (1995)	Development-Survival EPA/600/R-95/136 (1995) Bivalve Larval Survival and Development Test	Development-Survival EPA/600/R-95/136 (1995) Organism: Mytilus galloprovincialis (Bay Mussel Source: Bivalve Larval Survival Rate Source:							

CETIS QC Plot

Mean:	29.67	Count:	20	-2s Warning Limit:	8.901	-3s Action Limit:	-1.484
Sigma:	10.38	CV:	35.00%	+2s Warning Limit:	50.44	+3s Action Limit:	60.82

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2019	Aug	17	14:00	29.6	-0.06634	-0.00639			15-9584-4385	20-0172-5237
2			20	14:15	37.92	8.249	0.7943			14-8361-1578	02-5800-6574
3			24	16:00	30.04	0.3674	0.03538			19-4374-5817	17-7461-0750
4			28	14:30	28.66	-1.005	-0.09682			01-0546-0046	13-4512-6481
5		Sep	11	14:30	33.71	4.045	0.3895			09-2717-2159	01-1883-2964
6			12	14:25	29.16	-0.5059	-0.04872			19-6218-6352	02-6393-7831
7			18	13:20	29.04	-0.631	-0.06077			10-9359-1611	04-3365-2341
8		Oct	17	12:30	24.88	-4.788	-0.461			01-8239-7270	13-2801-3685
9			30	12:30	29.32	-0.3471	-0.03342			07-8198-2858	20-5233-5110
10		Nov	27	20:00	29.07	-0.6033	-0.0581			12-9914-0499	00-1104-7300
11		Dec	5	13:15	28.21	-1.456	-0.1402			04-7411-4445	20-5035-4724
12			11	13:35	29.18	-0.4907	-0.04726			10-8800-1613	02-9848-3585
13	2020	Jan	8	13:40	29.6	-0.06894	-0.00664			07-8444-5322	01-5655-1706
14			22	13:25	29.76	0.08561	0.008244			02-1152-2212	19-4150-8988
15		Feb	5	13:10	29.83	0.1563	0.01505			06-6849-2235	07-0404-6516
16		Mar	17	14:20	26.48	-3.188	-0.307			14-6169-3689	14-2151-4803
17		Apr	6	17:15	29.18	-0.4932	-0.04749			02-0082-4673	12-2147-8498
18			15	13:25	30	0.33	0.03178			16-4614-0901	00-5465-8677
19			28	13:25	29.9	0.226	0.02176			06-8086-6028	08-1083-2165
20		May	12	16:15	29.85	0.181	0.01743			12-3773-8150	18-0143-0286
21		Jun	11	15:45	35.5	5.829	0.5613			20-6521-9403	17-6494-5506
											41

A Reference toxicant warning and control chart limits recalculated based on 75th percentile interlaboratory coefficient of Variation, as defined in EPA-833-R-00-003, for compansion purposes any



CETIS Test Data Worksheet

Report Date: 11 Jul-20 17:57 (p 1 of 1) 17-4780-3294/200715msdv Test Code:

Bivalve Larval Survival and Dev	velopment Test

tart Date: nd Date: ample Date	17 .	lul-20 lul-20 lul-20		Protocol:	Mytilus galloprovi EPA/600/R-95/13 Copper chloride			Sample Code:200715msdvSample Source:Reference ToxicantSample Station:Copper Chloride
C-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal	Notes
			1			140	139	JUL OBO DM 8/12/20
			2			132	(3)	
			3			167	147	
			4			116	Ø	JU 8/12/20
			5			122	1	1
			6			148	0	· · · · ·
			7			170	161	
			8			175	147	
			9			146	Ø	
			10			136	Õ	
			11			152	150	
			12			154	151	
			13			147	120	
			14		~	134	134	
			15			138	(36	
			16			144	Ø	
			17			179	178	
			18			174	172	
			19			102	\bigcirc	
			20			147	145	
			21			149	149	
			22			158	156	
			23			155	149	
			24			121	\Diamond	
			25			42-	0	
			26			156	123	
			27			164	159	
			28			162	159	
			29			157	115	
			30			144	Ø	4 2



CETIS Test Data Worksheet

Report Date: 11 Jul-20 17:57 (p 1 of 1) Test Code: 17-4780-3294/200715msdv

Bivalve Larva	I Surv	vival a	and De	evelopment Test	:				Nautilus Environmental (CA)
Start Date: End Date: Sample Date:	17 J	ul-20 ul-20 ul-20		Protocol:	Mytilus galloprovi EPA/600/R-95/13 Copper chloride			Sample Code: Sample Source: Sample Station:	200715msdv Reference Toxicant Copper Chloride
C-µg/L	Code	Rep	Pos	Initial Density	Final Density	# Counted	# Normal		Notes
0	LC	1	14			130	(30	OM 7/1	8/20
0	LC	2	27			100		VI //1	
0	LC	3	2						
0	LC	4	15						
0	LC	5	11						
2.5		1	21			153	(52		
2.5		2	17			<u>_</u>	150		
2.5		3	12						
2.5		4	20						
2.5		5	7						
5		1	22			153	150		
5		2	23			1 - 2			
5		3	1						
5		4	18						
5		5	28						
10		1	29						
10		2	13			143	123		
10		3	3						
10		4	26						
10		5	8						
20		1	25			145	0		
20		2	6						
20		3	9						
20		4	16						
20		5	10				~		
40		1	19			98	980	cells (550	ed
40		2	5						W. W. 3.
40		3	4						
40		4	24						
40		5	30						

QC: EG

A Q18 pm 3/18/20



Marine Chronic Bioassay DM-014

Client: Internal

Sample ID: CuCl₂

Test No.: 200715msdv

Water Quality Measurements

Test Species:	M. gallopro	vincialis
Start Date/Time:	7/15/2020	1355
End Date/Time:	7/17/2020	1312

Concentration		Salinity		T	emperatu	re	Diss	olved Ox	ygen		рН	
(μg/L)		(ppt)			(°C)Ŷ\	-		(mg/L)			(pH units)
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	31,9	31.4	31.4	15.9	16.3	15.5	8.8	8.3	8.4	8.09	王子	7.86
2.5	32.1	31.7	32.2	15.7	15.8	15.2	8.7	8.4	8.4	8.10	9.05 7.75	7.90
5	32.1	31.7	32.2	15,6	15.8	15.2	8.8	8.2	8.3	8-11	0.0.07 7.776	7.94
10	32.1	Ə1.7	32.2	15.9	16.0	15.4	8.6	8.2	8.3	8-11	8-06-77	7.93
20	32.1	31.7	32.2	15.7	15.9	15.4	8.7	83	8.3	8.12	8.00 7.7	7.93
40	32.0	31.6	32.1	15.7	15.9	15.4	8.7	8.2	8.3	8.12	288	7.93

	0 2	<u>2</u> 4 4	18	High conc. made (µg/L):	40	
WQ Readings:	E. K	1 4	2	Vol. Cu stock added (mL):	1.8	
Dilutions made by:				Final Volume (mL):	500	
-				Cu stock concentration (µg/L):	11,400	
ber: <u> </u>						
						a da citada ante a como a como a desta de alta de alta da
$24 \text{ hrs:} (A) \oplus B$	1-7/16/2	10				
48 hrs:						
EL 7/17/20				Final Review:	BO 8/18/20	
	Dilutions made by:	WQ Readings: Dilutions made by: PT Dilutions made by: Dilutions made by: Dilution	WQ Readings: F_{L} F_{L} F_{L} Dilutions made by: F_{T} ber: D . 0 hrs: 24 hrs: (F) (NEVL 7/16/20	Dilutions made by: PT Der: D . 0 hrs: 24 hrs: (P) (NEVL 7/16/20	WQ Readings: Dilutions made by: PT · · · · · · · · · · · · · · · · · ·	WQ Readings: μ_{L} μ_{L} μ_{L} $Vol. Cu stock added (mL):$ $l.8$ Dilutions made by: μ_{T} P $Final Volume (mL):$ 500 Cu stock concentration (μ g/L): $II, 400$ 0 hrs: Q Q $II, 400$ 24 hrs: P P $II, 400$ 48 hrs: II III III

Enthalpy Analytical. 4340 Vandever Avenue. San Diego, CA 92120.

Marine Chronic Bioassay DM-013

Client/Sample:	Internal/CUCIZ
Test No.:	200715 msdv
Test Species:	Mytilus galloprovincialis
Animal Source/Batc	hTank: M-rep/3A
Date Received:	4/21/20
Test Chambers:	30 mL glass shell vials
Sample Volume:	10 mL

1007

Larval Development Worksheet

Start Date/Time:	7/15/2020	1355
End Date/Time:	7/17/2020	1310
Technician Initials:	EGIRT	

Spawn Information

First Gamete Release Time:

Gamete Selection

Sex	Number Spawning
Male	3
Female	3+

Sex	Beaker Number(s)	Condition (sperm motility, egg density, color, shape, etc.)
Male	1,2	Ok density & motility
Female 1	2	grood density, pale color, mostly round
Female 2	3	good density, oraneisticator, mostly rand
Female 3	~	

Egg Fertilization Time: 1105

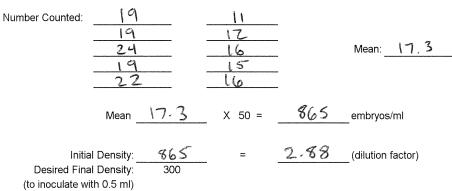
Embryo Stock Selection

Stock Number	% of embryos at 2-cell division stage
Female 1	99
Female 2	100
Female 3	Sandara.

Stock(s) chosen for testing:

Embryo Inoculum Preparation

Target count on Sedgwick-Rafter slide for desired density is 6 embryos



Prepare the embryo inoculum according to the calculated dilution factor. For example, if the dilution factor is 2.25, use 100 ml of existing stock (1 part) and 125 ml of dilution water (1.25 parts).

Time Zero Control Counts

TØ Vial No.	No. Dividing	Total	% Dividing	Mean % Dividing
TØ A	179	181	98.9	
TØ B	139	139	100	
тøс	166	166	100	99.8
TØ D	167	167	100	
TØ E	147	147	100	
TØ F	155	185	100	
<u>X</u> =	159			

48-h QC: 133/136 = 97.8%

Comments:

QC Check:

RT 7/18/20

Enthalpy Analytical. 4340 Vandever Avenue. San Diego, CA 92120.

Final Review: BO 8/18/20