

# Chronic Toxicity Test Results for the Carlsbad Desalination Plant

# Sample ID: M-001 Monitoring Period: 1<sup>st</sup> of 3 Most-sensitive Species Screens, August 2017

Prepared for:	IDE AMERICAS, Inc. 4590 Carlsbad Boulevard Carlsbad, CA 92008					
Prepared by:	Nautilus Environmental					

Submitted: August 23, 2017

#### Data Quality Assurance:

- Nautilus Environmental is accredited in accordance with NELAP by the State of Oregon Environmental Laboratory Accreditation Program (Certificate No. 4053). It is also certified by the State of California Department of Health Services Environmental Laboratory Accreditation Program (Certificate No. 1802) and the State of Washington Department of Ecology (Lab ID C552).
- All data have been reviewed and verified.
- All test results have met minimum test acceptability criteria under their respective EPA protocols, unless otherwise noted in this report.
- o All test results have met internal Quality Assurance Program requirements.

California

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Results verified by: \_\_\_\_\_ advienne libor

#### INTRODUCTION

A set of sensitive life-stage bioassays using Pacific topsmelt (*Atherinops affinis*), red abalone (*Haliotis rufescens*), and giant kelp (*Macrocystis pyrifera*), were conducted with 24-hour composite discharge samples collected in August 2017 for the Poseidon Resources (Channelside) LLC, Carlsbad Desalination Project (CDP) in accordance with regulations described in the permit that was adopted in 2006 (Order No. R9-2006-0065). This is the first of three consecutive monthly screens to be conducted in order to identify the most sensitive species, which will subsequently be used for routine toxicity monitoring. The results of the August toxicity screening are contained in this report. A determination of the most-sensitive species will be based on a review of the percent effect from control for all species once all three rounds of testing are complete. Bioassay testing was conducted at the Nautilus Environmental (Nautilus) laboratory in San Diego, California between August 1 and 8, 2017.

#### MATERIALS AND METHODS

Sample collection was performed by IDE Americas, Inc. (IDE) personnel, and the samples were delivered to Nautilus on the same day as collection. Following arrival at Nautilus, an aliquot of the sample was poured off and the following water quality parameters were measured: pH, dissolved oxygen (DO), temperature, salinity, alkalinity, and total chlorine. The sample was stored at 4°C in the dark until used for testing. A summary of the sample collection and receipt information is provided in Table 1, and water quality parameters measured upon receipt at Nautilus are presented in Table 2.

#### Table 1. Sample Information

Client/Project:	IDE Americas, Inc./ Carlsbad Desalination Plant
Monitoring Period:	August 2017 (1 <sup>st</sup> of 3 most-sensitive species screens)
Sample ID, Material:	M-001, desalination plant effluent
Sample Collection Dates, Times:	8/1/17, 08:00; 8/3/17, 08:00; 8/5/17, 08:30
Sample Receipt Dates, Times:	8/1/17, 13:07; 8/3/17, 13:43; 8/5/17, 10:00
Sampling Method:	24-hour Composite

#### Table 2. Water Quality Measurements upon Sample Receipt – M-001 Effluent Sample

Sample Date	рН	DO (mg/L)	Temp (°C)	Salinity (ppt)	Alkalinity (mg/L as CaCO₃)	Total Chlorine (mg/L)
8/1/17	8.01	6.0	5.0	64.2	64.2 206	
8/3/17	8.09	7.1	4.5	50.2	152	<0.02
8/5/17	7.75	6.5	9.0	34.1	123	<0.02

Testing for all three species was conducted in accordance with the guidance described in "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms" (USEPA 1995), and the methods are summarized in Table 3 through 5. Statistical analyses for all tests were conducted using the or the Comprehensive Environmental Toxicity Information System<sup>™</sup> (CETIS) software by Tidepool Scientific.

Test Period:	8/1/17, 14:15 through 8/8/17, 10:45
Test Organism:	Pacific topsmelt (Atherinops affinis)
Test Organism Source, Age:	Aquatic BioSystems (Fort Collins, CO), 13-days at test start
Lab Control/Dilution Water:	Natural seawater (source: Scripps Institution of Oceanography (SIO) inlet), 34±2 parts per thousand (ppt); 20-µm filtered
Test Concentrations:	2.5, 5.0, 6.06, 10, and 15 percent unadjusted M-001 sample; lab control
Test Type:	7-day chronic survival and growth
Acceptability Criteria:	$\geq$ 80% mean survival and $\geq$ 0.85 mg/fish mean dry weight in the lab control. Percent minimum significant difference (PMSD) must be < 25 for survival and < 50 for growth.
Reference Toxicant Testing:	Copper chloride

## Table 3. Pacific Topsmelt Chronic Bioassay Specifications

Table 4. Glanc Kelp Chronic Dicassay Specifications	Table 4.	<b>Giant Kel</b>	o Chronic Bioassay	y Specifications
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Test Period:	8/1/17, 15:30 through 8/3/17, 12:45
Test Organism:	Giant kelp (Macrocystis pyrifera)
Test Organism Source:	Field collected off Point Loma in San Diego, CA
Lab Control/Dilution Water:	Natural seawater (source: SIO inlet), $34\pm2$ ppt; 0.2-µm filtered
Test Concentrations:	2.5, 5.0, 6.06, 10, and 15 percent unadjusted M-001 sample; lab control $% \left( 1,1,2,2,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,$
Test Type:	48-hour chronic germination and growth
Acceptability Criteria:	Lab Control: $\geq$ 70% mean germination and $\geq$ 10 µm mean germ- tube lengths. The no observed effect concentration (NOEC) for the copper reference toxicant test must be < 35 µg/L, and the PMSD must be $\leq$ 20 for both endpoints.
Reference Toxicant Testing:	Copper chloride

Test Period:	8/1/17, 15:45 through 8/3/17, 17:10
Test Organism:	Red Abalone (Haliotis rufescens)
Test Organism Source:	American Abalone Farms (Davenport, CA)
Lab Control/Dilution Water:	Natural seawater (source: SIO inlet), 34±2 ppt; 1-µm filtered
Additional Control:	High salinity controls were conducted with the abalone test only due to their sensitivity to elevated salinity (Phillips et al. 2012) The salinity controls were made by adding hypersaline brine (produced at Nautilus by freezing laboratory seawater) to natural seawater to match the salinity of the 6.06 and 15 percent effluent concentrations.
Test Concentrations:	2.5, 5.0, 6.06, 10, and 15 percent unadjusted M-001 sample; lab control and high salinity control
Test Type:	48-hour larval shell development
Acceptability Criteria:	Control mean development $\geq$ 80% and PMSD must be < 20. There must be a statistically significant effect at the 56 µg/L zinc concentration in the reference toxicant test.
Reference Toxicant Testing:	Zinc sulfate

#### Table 5. Red Abalone Chronic Bioassay Specifications

Statistical analyses were conducted using USEPA flowchart specifications as outlined in the test guidance manual (USEPA 1995). Organism performance in each sample dilution series was compared to that observed in the laboratory control. Results were used to calculate the No Observed Effect Concentration (NOEC) and chronic toxic unit ( $TU_c$ ) values.

In addition to USEPA flowchart statistical methods, the results were also analyzed using the USEPA's Test of Significant Toxicity (TST) approach specified in National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (USEPA, 2010). Notably, the California State Water Resources Control Board (SWRCB) published a Draft Policy for Toxicity Assessment and Control (SWRCB, 2012), which includes the TST as an alternative method to evaluate toxicity data. This approach applies a modified t-test that takes into account both the statistical power of the test and the magnitude of biological effects in determining the presence of a response. For this sample, the in-stream waste concentration (IWC) is 6.06 percent unadjusted effluent, and results are reported as "Pass" if a sample is considered non-toxic according to the TST calculation, or "Fail" if considered toxic according to the TST. As the TST statistical analysis is not in the 2006 CDP permit, the TST results are included for comparison purposes only.

#### RESULTS

There were no adverse effects observed at the 6.06 percent concentration (IWC) for any of the species tested. Therefore, all test results passed and were within permit compliance.

The purpose of conducting a 3-species screen with a plant (giant kelp), a vertebrate (Pacific topsmelt), and an invertebrate (red abalone) species is to determine which of these three species is most sensitive to the effluent sample. Although there were no adverse effects observed in any of the tests at the IWC, the abalone was the only species to be adversely affected at the highest test concentration and was clearly the most sensitive during this round of testing.

Statistical results for the toxicity tests are summarized in Table 6, and detailed test results are summarized in Table 7. Raw test data and full statistical analyses can be found in Appendix A. Sample receipt information and copies of the chain-of-custody forms are in Appendices B and C, respectively.

Test Species and Endpoint	NOEC (% sample)	LOEC (% sample)	TU <sub>c</sub> value (toxic units)	TST Result (Pass/Fail)	Percent Effect at IWC
Pacific Topsmelt					
Survival	15	>15	<6.67	Pass	-8.7
Biomass	15	>15	<6.67	Pass	-5.8
Giant Kelp					
Germination	15	>15	<6.67	Pass	0.0
Growth	15	>15	<6.67	Pass	-7.9
Red Abalone					
Development	10	15	10	Pass	-0.22

#### Table 6. Summary of Statistical Results for the M-001 Sample

NOEC = No Observed Effect Concentration

LOEC = Lowest Observed Effect Concentration

 $TU_c$  = Chronic Toxic Unit: 100÷NOEC

TST: Pass = sample is non-toxic at the 6.06% IWC according to the TST calculation; Fail = sample is toxic at the 6.06% IWC according to the TST calculation. The TST analysis is not in the existing CDP permit; TST analysis is included here for comparison purposes only.

Percent effect (PE) from control is calculated as: PE= ((mean response in control-mean response in the IWC)/mean response in control) \*100. A negative PE results when organism performance in the sample is greater than that in the control.

Pacific Topsmelt		Giant	Red Abalone		
Test Concentration (% effluent)	Mean Survival (%)	Mean Survival (%) (mg/fish)		Mean Growth (µm length)	Mean Normal Development (%)
Lab Control	92.0	1.05	98.4	16.4	91.0
2.5	100	1.25	98.2	17.1	91.8
5.0	100	1.19	97.8	16.9	92.0
6.06	100	1.11	98.4	17.7	91.2
10	96.0	1.14	99.0	17.1	91.6
15	100	1.22	98.0	17.0	36.8*

Table 7. Summary of Results	for M-001 Most-sensitive	<b>Species Testing</b>
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\* An asterisk indicates a statistically significant difference when compared to the lab control. The control matching salinity in the 6.06 percent concentration resulted in 91.6 percent mean normal development; the control matching salinity of the 15 percent concentration resulted in 50.2 percent normally developed larvae.

## QUALITY ASSURANCE

The samples were received the same day as collection within the appropriate temperature range, and all tests were initiated within the 36-hour holding time. The laboratory controls met the minimum acceptability criteria as set by USEPA. The PMSD values, which are a measure of test variability, were within the acceptable range. Therefore, all test results were deemed valid for reporting purposes.

Statistical analyses followed USEPA flowchart selections and dose-response relationships were reviewed to evaluate reliability of the results. Additionally, appropriate threshold effect and alpha levels were used for statistical analyses according to the TST Implementation Document guidelines (USEPA 2010).

Results for the concurrent reference toxicant tests used to monitor laboratory performance and test organism sensitivity are summarized in Table 8 and presented in full in Appendix D. The reference toxicant tests met all test acceptability criteria, except for the lab control from the abalone test. Due to suspected contamination in some of the reference toxicant replicate vials, the lab control from the concurrent IDE test was substituted for statistical analysis. Also, one replicate from the 10 and 32  $\mu$ g/L zinc concentrations was excluded from analysis. All other test criteria were met and the median effect concentration (EC<sub>50</sub>) values for all three species were within two standard deviations (SD) of the historical mean, indicating typically organism sensitivity. A list of qualifier codes used on bench datasheets can be found in Appendix E.

Test Species	Endpoint	EC₅₀ (µg/L)	Historical Mean EC50 ±2 SD (µg/L)	CV (%)
Pacific	Survival	91.2	74.6 ± 32.0	21.5
Topsmelt	Biomass	108	78.1 ± 39.2	25.1
Giant Kelp	Germination	179	145 ± 96.1	33.2
	Growth	178	162 ± 81.0	25.0
Red Abalone	Development	65.5	59.6 ± 23.9	20.1

#### Table 8. Reference Toxicant Test Results

 $EC_{50}$  = Concentration expected to cause an adverse effect to 50 percent of the test organisms. Topsmelt and kelp data are reported in  $\mu$ g/L of copper; abalone data are reported in  $\mu$ g/L of zinc.

Historical Mean  $EC_{50} \pm 2$  SD = Mean of historical test results plus or minus two standard deviations

CV = Coefficient of Variation

#### REFERENCES

- California State Water Resources Control Board (SWRCB) 2012. Draft Policy for Toxicity Assessment and Control. June 2012. Sacramento, CA.
- Phillips, B.M., B.S. Anderson, K. Siegler, J.P. Voorhees, S. Katz, L. Jennings and R.S. Tjeerdema. 2012. Hyper-Saline Toxicity Thresholds for Nine California Ocean Plan Toxicity Test Protocols. Final Report. University of California, Davis, Department of Environmental Toxicology at Granite Canyon.
- Tidepool Scientific Software. 2000-2013. CETIS<sup>™</sup> Comprehensive Environmental Toxicity Information System Software, Version 1.8.7.20
- USEPA. 1995. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136.
- USEPA. 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System. United States Environmental Protection Agency Office of Wastewater Management (EPA-833-R-00-003).
- USEPA. 2010. National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document. EPA/833/R-10/003. June 2010.

Appendix A

Test Data and Statistical Analyses

Pacific Topsmelt

# **CETIS Summary Report**

09 Aug-17 17:23 (p 1 of 2) 1708-S030 | 02-4304-1390

Pacific Topsmelt 7-d Survival and Growth Test Nautilus Environmental (CA)											
Batch ID: Start Date: Ending Date: Duration:	02-6679-1255 01 Aug-17 14:1 08 Aug-17 10:4 6d 20h	5 Pro 5 Sp 5 So	st Type: otocol: ecies: urce:	Growth-Surviva EPA/600/R-95/ Atherinops affin Aquatic Biosyst	l (7d) 136 (1995) iis ems, CO		Anal Dilue Brine Age:	yst: ent: Natu e: Not 13d	ural Seawate Applicable	Pr	
Sample ID: Sample Date: Receive Date: Sample Age:	10-2263-2542 01 Aug-17 08:0 01 Aug-17 13:0 6h (5 °C)	Co Ma 7 So Sta	de: iterial: urce: ation:	17-0829 Effluent Sample IDE M-001	2		Clier Proje	nt: IDE ect:			
Comparison Summary											
Analysis ID	Endpoint		NOEL	LOEL	TOEL	PMSD	TU	Method			
01-1426-9276	7d Survival Rat	е	15	>15	NA	9.66%	<i>4</i> 6.667	Steel Man	y-One Rank	Sum Test	
11-7659-2948	Mean Dry Biom	lass-mg	15	>15	NA	20.4% 🖪	< 6.667	Dunnett N	Iultiple Com	parison Tes	t
Point Estimat	e Summary										
Analysis ID	Endpoint		Level	%	95% LCL	95% UCL	TU	Method			
03-9337-9041	7d Survival Rat	e	EC25	>15	N/A	N/A	<6.667	Linear Inte	erpolation (I	CPIN)	
			EC50	>15	N/A	N/A	<6.667	· · · · · · · · · · · · · · · · · · ·			
20-0303-1148	Mean Dry Biom	lass-mg	IC25	>15	N/A	N/A	<6.667	Linear Inte	erpolation (I	CPIN)	
			IC50	>15	N/A	N/A	<6.667				
Test Acceptab	bility										
Analysis ID	Endpoint		Attrib	ute	Test Stat	TAC Limi	ts	Överlap	Decision		
01-1426-9276	7d Survival Rat	e	Contro	ol Resp	0.92	0.8 - NL		Yes	Passes A	cceptability	Criteria
03-9337-9041	7d Survival Rat	e	Contro	ol Resp	0.92	0.8 - NL		Yes	Passes A	cceptability	Criteria
11-7659-2948	Mean Dry Biom	nass-mg	Contro	ol Resp	1.05	0.85 - NL		Yes	Passes A	cceptability	Criteria
20-0303-1148	Mean Dry Biom	ass-mg	Contro	ol Resp	1.05	0.85 - NL		Yes	Passes A	cceptability	Criteria
01-1426-9276	/d Survival Rat	e	PMSL	)	0.09657	NL - 0.25		NO	Passes A		Criteria
11-7059-2940	Mean Dry Bion	lass-mg	FINISL		0.2037	NL - 0.5		NU	Fasses A	ceptability	Chiena
7d Survival Ra	ate Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.92	0.784	1	0.8	1	0.04899	0.1095	11.91%	0.0%
2.5		5	1	1	1	1	1	0	0	0.0%	-8.7%
5		5	1	1	1	1	1	0	0	0.0%	-8.7%
10		5	0.96	0.8489	1	0.8	1	0.04	0 08944	9.32%	-4.35%
15		5	1	1	1	1	1	0	0	0.0%	-8.7%
Mean Dry Bio	mass-mo Summ	narv									
C-%	Control Type	Count	Mean	95% LCI	95% UCI	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	1.05	0.9626	1.138	0.968	1.146	0.03161	0.07067	6.73%	0.0%
2.5	220 0011101	5	1.246	1.12	1.373	1.074	1.332	0.04568	0.1022	8.2%	-18.66%
5		5	1.19	0.9472	1.432	0.874	1.402	0.08731	0.1952	16.41%	-13.25%
6.06		5	1.111	0.8613	1.361	0.952	1.454	0.09002	0.2013	18.11%	-5.79%
10		5	1.137	0.9677	1.307	0.906	1.244	0.06103	0.1365	12.0%	-8.26%
15		5	1.218	1.091	1.345	1.078	1.364	0.04568	0.1021	8.39%	-15.96%

# **CETIS Summary Report**

Pacific Top	smelt 7-d Surviva	I and Grov	Ν	autilus Environmental (CA)				
7d Survival	Rate Detail							
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.8	1	1	1	0.8		
2.5		1	1	1	1	1		
5		1	1	1	1	1		
6.06		1	1	1	1	1		
10		1	1	1	0.8	1		
15		1	1	1	1	1		
Mean Dry B	iomass-mg Detai		97					
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
Û	Lab Control	0.996	1.146	1.082	1.06	0.968		ana ana amin'ny fany (fan 1970). Ana amin'ny fany fan amin'ny fany fan
2.5		1.266	1.248	1.332	1.074	1.312		
5		1.402	1.234	0.874	1.174	1.264		
6.06		1.024	1.122	1.454	0.952	1.004		
10		1.244	0.906	1.206	1.206	1.124		
15		1.196	1.078	1.364	1.236	1.216		

Analyst: AC QA: 158/18/17

CETIS Ana	alytical Rep	ort			Report Date:         09 Aug-17 17:23 (p           Test Code:         1708-S030   02-430			23 (p 1 of 3) 2-4304-1390				
Pacific Tops	melt 7-d Surviva	I and Gr	owth Test							Nautilus	Environn	nental (CA)
Analysis ID: Analyzed:	01-1426-9276 09 Aug-17 17:	E 22	Endpoint: 7d S Analysis: Nor	Survival Rati parametric-	e Control	vs T	reatments	CET Offic	IS Version	: CETISv1. s: Yes	8.7	
Data Transfo	orm	Zeta	Alt Hyp	Trials	Seed			PMSD	NOEL	LOEL	TOEL	TU
Angular (Corr	ected)	NA	C > T	NA	NA			9.66%	15	>15	NA	6.667
Steel Many-C	) Dne Rank Sum T	est										
Control	vs C-%		Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision	ı(α:5%)		
Lab Control	2.5		32.5	16	1	8	0.9870	Asymp	Non-Sign	ificant Effect		
	5		32.5	16	1	8	0.9870	Asymp	Non-Sign	ificant Effect		
	6.06		32.5	16	1	8	0.9870	Asymp	Non-Sign	ificant Effect		
	10		30	16	2	8	0.9446	Asymp	Non-Sign	ificant Effect		
	15		32.5	16	1	8	0.9870	Asymp	Non-Sign	ificant Effect		
ANOVA Tabl	9		di Mandala di Kang dan Kanang Jawa Kanang Jawa Kanang Kanang Kanang Kanang Kanang Kanang Kanang Kanang Kanang K									
Source	Sum Squ	iares	Mean Squ	are	DF		F Stat	P-Value	Decision	ı(α:5%)		
Between	0.03969553 0.007939		0.0079391	06	5		1.68	0.1778	Non-Sign	ificant Effect		
Error	0.1134158 0.004725			58	24							
Total	0.1531113				29			_				
Distributiona	I Tests											
Attribute	Test			Test Stat	Critica	ıl	P-Value	Decision	(α:1%)			
Variances	Mod Lev	ene Equa	ality of Variance	1.8	4.248		0.1637	Equal Var	iances			
Variances	Levene I	Equality c	of Variance	16.15	3.895		<0.0001	Unequal \	/ariances			
Distribution	Shapiro-	Wilk W N	lormality	0.712	0.9031		<0.0001	Non-norm	al Distributi	ion		
7d Survival F	Rate Summary											
C-%	Control Type	Count	Mean	95% LCL	95% U	CL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.92	0.784	1		1	0.8	1	0.04899	11.91%	0.0%
2.5		5	1	1	1		1	1	1	0	0.0%	-8.7%
5		5	1	1	1		1	1	1	0	0.0%	-8.7%
6.06		5	1	1	1		1	1	1	0	0.0%	-8.7%
10		5	0.96	0.8489	1		1	0.8	1	0.04	9.32%	-4.35%
15		5	1	1	1		1	1	1	0	0.0%	-8.7%
Angular (Cor	rected) Transfo	rmed Su	nmary									
C-%	Control Type	Count	Mean	95% LCL	95% U	CL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.25	1.088	1.412		1.345	1.107	1.345	0.05833	10.43%	0.0%
2.5		5	1.345	1.345	1.346		1.345	1.345	1.345	0	0.0%	-7.62%
5		5	1.345	1.345	1.346		1.345	1.345	1.345	0	0.0%	-7.62%
6.06		5	1.345	1.345	1.346		1.345	1.345	1.345	0	0.0%	-7.62%
10		5	1.298	1.165	1.43		1.345	1.107	1.345	0.04763	8.21%	-3.81%
15		5	1.345	1.345	1.346		1.345	1.345	1.345	0	0.0%	-7.62%

Analyst: AC QA: 138/18/17



Analyst: AC QA: 158/18/17

CETIS A	Analytical Rep	ort			Repo Test	ort Date: Code:	09 Aug-17 17:23 (p 3 of 3) 1708-S030   02-4304-1390				
Pacific To	opsmelt 7-d Surviva	al and Grow	/th Test						Nautilu	s Environn	nental (CA)
Analysis I Analyzed:	D: 11-7659-2948 09 Aug-17 17:	En 22 An	dpoint: Mea alysis: Par	an Dry Biom ametric-Cor	ass-mg ntrol vs Trea	tments	CET Offic	IS Version: ial Results:	CETISv1 Yes	.8.7	
Data Tran	sform	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Untransfor	rmed	NA	C > T	NA	NA		20.4%	15	>15	NA	6.667
Dunnett N	Iultiple Compariso	n Test									
Control	vs C-%		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision(	α:5%)		
Lab Contro	ol 2.5		-2.163	2.362	0.214 8	0.9996	CDF	Non-Signif	icant Effect	t	
	5		-1.536	2.362	0.214 8	0.9967	CDF	Non-Signif	icant Effect	t	
	6.06		-0.6711	2.362	0.214 8	0.9603	CDF	Non-Signif	icant Effect	t	
	10		-0.9581	2.362	0.214 8	0.9813	CDF	Non-Signif	icant Effect	t	
 	15		-1.85	2.362	0.214 8	0.9988	CDF	Non-Signif	icant Effect	t	
ANOVA T	able				Antest.						
Source	Sum Squ	ares	Mean Squ	are	DF	F Stat	P-Value	Decision(	α:5%)		
Between	0.133049	5	0.0266098	9	5	1.297	0.2982	Non-Signif	icant Effect	t	
Error	0.492483	3	0.0205201	4	24	_					
Total	0.625532	8			29						
Distributi	onal Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Bartlett E	Equality of V	/ariance	5.698	15.09	0.3367	Equal Var	iances		11. g. 14. 11. 1. 1. 1. 1. 1.	
Distribution Shapiro-Wilk W Normality 0.9698			0.9698	0.9031	0.5327	Normal Di	stribution				
Mean Dry	Biomass-mg Sumr	nary									
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.05	0.9626	1.138	1.06	0.968	1.146	0.03161	6.73%	0.0%
2.5		5	1.246	1.12	1.373	1.266	1.074	1.332	0.04568	8.2%	-18.66%
5		5	1.19	0.9472	1.432	1.234	0.874	1.402	0.08731	16.41%	-13.25%
6.06		5	1.111	0.8613	1.361	1.024	0.952	1.454	0.09002	18.11%	-5.79%
10		5	1.137	0.9677	1.307	1.206	0.906	1.244	0.06103	12.0%	-8.26%
15		5	1.218	1.091	1.345	1.216	1.078	1.364	0.04568	8.39%	-15.96%
Graphics											
1.6 1.4 1.2 25 25 20 20 20 20 20 20 20 20 20 20 20 20 20	0LC 2.5	5	6.06 10	Reject Null	Centered	0.35 0.20 0.20 0.15 0.10 0.05 0.00 0.05 0.00 0.05 0.00 0.15 0.00 0.05 0.00 0.15 0.00 0.05 0.00 0.15 0.00 0.00	-2.0 -1.5 -				- 2.5
1		C-%						Rankits			

Analyst:<u>AC</u>QA:<u>458/18</u>/17

CETIS	S Ana	lytical Repo	ort			Repo Test	ort Date: Code:	09 Aug-17 17:23 (p 1 of 2) 1708-S030   02-4304-1390					
Pacific	: Topsn	nelt 7-d Survival	and Growt	h Test						0.000	Nautilu	s Enviro	onmental (CA)
Analys Analyz	is ID: ed:	03-9337-9041 09 Aug-17 17:2	End 23 Ana	dpoint: 7d Survival Rate alysis: Linear Interpolation (ICPIN)					CETI Offic	S Version: ial Results:	CETISv1 Yes	.8.7	
Linear	Interpo	lation Options											
X Tran	sform	Y Transform	n See	d	Resamples	Exp 95%	CL	Method					
Linear		Linear	1845	5168	1000	Yes	-	Two-Point	Interp	olation			<b>.</b>
Point B	Estimat	es			, <u>and an and an and an and an and an and an </u>								
Level	%	95% LCL	95% UCL	τU	95% LCL	95% UCL							
EC25	>15	N/A	N/A	<6.667	7 NA	NA							
EC50	>15	N/A	N/A	<6.667	7 NA	NA							
7d Survival Rate Summary						Calcu	lated V	/ariate(A/B	5)				
C-%	-% Control Type Count		Count	Mean	Min	Max	Std E	irr Std	Dev	CV%	%Effect	Α	В
0	L	ab Control	5	0.92	0.8	1	0.048	99 0.10	95	11.91%	0.0%	23	25
2.5			5	1	1	1	0	0		0.0%	-8.7%	25	25
5			5	1	1	1	0	0		0.0%	-8.7%	25	25
6.06			5	1	1	1	0	0		0.0%	-8.7%	25	25
10			5	0.96	0.8	1	0.04	0.08	944	9.32%	-4.35%	24	25
15			5	1	1	1	0	0		0.0%	-8.7%	25	25
Graphi	cs												
7d Survival Rate			9	0									

0.3 0.2 0.1

0.0 0.0 0 2 4 6 8 10 12 14 16 C-%

Analyst: <u>AC</u> QA: 458/18/17

CETIS	S Ana	lytical Repo	ort								Re Te	port Date: st Code:	09 / 170	Aug-17 17:23 (p 2 of 2) 8-S030   02-4304-1390
Pacific	: Topsm	nelt 7-d Survival	and G	Growt	h Test	*****						**************************************	Nautilu	s Environmental (CA)
Analys	is ID:	20-0303-1148		End	point:	Mea	n Dry Biom	ass-mg			CE	TIS Version:	CETISv1	.8.7
Analyz	ed:	09 Aug-17 17:2	23	Anal	Iysis: Linear Interpolation (I			ation (ICPIN	)	Official Results			: Yes	
Linear	Interpo	lation Options												
X Tran	sform	Y Transform	ı	Seed	ł	Res	amples	Exp 95%	CL	Meth	od			
Linear		Linear		1354	840	1000	2	Yes		Two-	Point Inte	rpolation		
Point I	Estimat	es												
Level	%	95% LCL	95%	UCL	τu		95% LCL	95% UCL						
IC25	>15	N/A	N/A		<6.66	7	NA	NA						
IC50	>15	N/A	N/A		<6.66	7	NA	NA						
Mean I	Mean Dry Biomass-mg Summary					Calculated Variate								
C-%	Control Type Count		nt	Mean Min		Min	Max	Std	Err	Std Dev	/ CV%	%Effect		
0	L	ab Control	5		1.05		0.968	1.146	0.0	3161	0.07067	6.73%	0.0%	
2.5			5		1.246		1.074	1.332	0.04	4568	0.1022	8.2%	-18.66%	
5			5		1.19		0.874	1.402	0.0	8731	0.1952	16.41%	-13.25%	
6.06			5		1.111		0.952	1.454	0.09	9002	0.2013	18.11%	-5.79%	
10			5		1.137		0.906	1.244	0.06	5103	0.1365	12.0%	-8.26%	
15			5		1.218		1.078	1.364	0.04	4568	0.1021	8.39%	-15.96%	
Graphi	cs		******											
Mond Day Biogram			<b>0</b>		<b>.</b>									

8 10 12 14 16

0.6 0.4

0.2

0.0 2 4 6 8

C-%

Analyst: AC QA: 45 8/18/17

CETIS An	alytical Rep	ort		Rep Test	ort Date: Code:	09 / 170	09 Aug-17 17:25 (p 1 of 1) 1708-S030   02-4304-1390				
Pacific Tops	melt 7-d Surviv	al and Gro	owth Test	TST					Nautilu	s Environr	nental (CA)
Analysis ID:	04-8856-2739	E	ndpoint: 7d	Survival Rat	ie 	<b>T</b> 0	CET	IS Version	: CETISv1	.8.7	
Analyzeo:	09 Aug-17 17	:25 <b>A</b>	nalysis: Par	ametric Bio	equivalence	-Two Samp	le Offic	cial Result	s: Yes		
Data Transfo	orm	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Cor	rected)	NA	C*b < T	NA	NA	0.75	4.31%	15	>15	NA	6.667
TST-Welch's	t Test										
Control	vs C-%		Test Stat	Critical	MSD DF	P-Value	P-Type	Decisio	n(α:25%)		
Lab Control	2.5*		9.321	0.7407	0.032 4	0.0004	CDF	Non-Sigr	nificant Effect		
	5*		9.321	0.7407	0.032 4	0.0004	CDF	Non-Sigr	nificant Effect	:	
	6.06*		9.321	0.7407	0.032 4	0.0004	CDF	Non-Sigr	nificant Effect	:	
	10*		5.569	0.7111	0.046 7	0.0004	CDF	Non-Sigr	nificant Effect		
	15*		9.321	0.7407	0.032 4	0.0004	CDF	Non-Sigr	nificant Effect		
ANOVA Tabl	e										
Source	Sum Sq	uares	Mean Squ	lare	DF	F Stat	P-Value	Decisior	ı(α:5%)		
Between	0.039695	53	0.0079391	06	5	1.68	0.1778	Non-Sigr	nificant Effect		
Error	0.113415	58	0.0047256	58	24						
Total	0.153111	3			29						
Distributiona	al Tests								Da Adalara an		
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Mod Lev	/ene Equa	lity of Variance	1.8	4.248	0.1637	Equal Var	iances	99 Jahr 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997		
Variances	Levene	Equality of	Variance	16.15	3.895	<0.0001	Unequal V	/ariances			
Distribution	Shapiro	Wilk W N	ormality	0.712	0.9031	<0.0001	Non-norm	al Distribut	ion		
7d Survival I	Rate Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.92	0.784	1	1	0.8	1	0.04899	11.91%	0.0%
2.5		5	1	1	1	1	1	1	0	0.0%	-8.7%
5		5	1	1	1	1	1	1	0	0.0%	-8.7%
6.06		5	1	1	1	1	1	1	0	0.0%	-8.7%
10		5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	-4.35%
15		5	1	1	1	1	1	1	0	0.0%	-8.7%
Angular (Cor	rected) Transfo	rmed Sun	nmary								
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.25	1.088	1.412	1.345	1.107	1.345	0.05833	10.43%	0.0%
2.5		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-7.62%
5		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-7.62%
6.06		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-7.62%
10		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	-3.81%
15		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	-7.62%

#### 000-089-187-4

Analyst: 4C QA: 45 8/18/17

CETIS An	ETIS Analytical Report								Report Date:09 ATest Code:170			ug-17 17:26 (p 1 of 1) 8-S030   02-4304-1390		
Pacific Tops	melt 7-d	Survival and	Growth Test		TS	ST-				Nautilu	s Environ	mental (CA)		
Analysis ID: Analyzed:	13-520 09 Au	68-9947 g-17 17:25	Endpoint: Analysis:	Mea Para	an Dry Biom ametric Bioe	ass-mg equivalence	-Two Samp	CET le Offic	CETIS Version: CETISv1.8.7 e Official Results: Yes					
Data Transfo	orm	Zeta	Alt H	lyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU		
Untransforme	d	NA	C*b <	Т	NA	NA	0.75	3.52%	15	>15	NA	6.667		
TST-Welch's	t Test													
Control	vs	C-%	Test	Stat	Critical	MSD D	P-Value	P-Type	Decisior	n(a:25%)				
Lab Control	:	2.5*	8.911		0.7176	0.037 6	<0.0001	CDF	Non-Sigr	nificant Effect	t			
	:	5*	4.441		0.7407	0.067 4	0.0057	CDF	Non-Sigr	nificant Effect	t			
	(	6.06*	3.474		0.7407	0.069 4	0.0127	CDF	Non-Sigr	nificant Effect	t			
		10*	5.336		0.7267	0.048 5	0.0015	CDF	Non-Sigr	nificant Effect	t			
		15*	8.36		0.7176	0.037 6	<0.0001	CDF	Non-Sigr	ificant Effect	t			
ANOVA Table	e													
Source	S	um Squares	Mean	Squ	are	DF	F Stat	P-Value	Decision	ı(α:5%)				
Between	0	.1330495	0.026	60989	9	5	1.297	0.2982	Non-Sigr	ificant Effect				
Error	0	.4924833	0.020	52014	4	24			0					
Total	0	.6255328				29								
Distributiona	I Tests													
Attribute	-	Test			Test Stat	Critical	P-Value	Decision(	α:1%)					
Variances	I	Bartlett Equality	of Variance		5.698	15.09	0.3367	Equal Var	ances					
Distribution		Shapiro-Wilk W	Normality		0.9698	0.9031	0.5327	Normal Di	stribution					
Mean Dry Bio	omass-m	g Summary												
C-%	Contro	l Type Cou	nt Mean		95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect		
0	Lab Co	ntrol 5	1.05		0.9626	1.138	1.06	0.968	1.146	0.03161	6.73%	0.0%		
2.5		5	1.246		1.12	1.373	1.266	1.074	1.332	0.04568	8.2%	-18.66%		
5		5	1.19		0.9472	1.432	1.234	0.874	1.402	0.08731	16.41%	-13.25%		
6.06		5	1.111		0.8613	1.361	1.024	0.952	1.454	0.09002	18.11%	-5.79%		
10		5	1.137		0.9677	1.307	1.206	0.906	1.244	0.06103	12.0%	-8.26%		
15		5	1.218		1.091	1.345	1.216	1.078	1.364	0.04568	8.39%	-15.96%		

#### 000-089-187-4

CETIS™ v1.8.7.20

Analyst: .4C QA: 18/19/17

Final Review: 18/17

Client: ID	E	
Sample ID.	aily.M-001	
Test No.:	1708-5030	

Test Species: A. affinis

Start Date/Time: 8/1/2017 14/5

End Date/Time: 8/8/2017 1045

Concentration	Ren	Rand	nd Test Day / No. Organisms Alive							Percent	
(%)	1.001	#	0	1	2	3	4	5	6	7	Survival
Lab Control	а	3	5	4	4	14	4	4	4	4	80
	b	9	5	5	5	5	5	5	5	5	100
	с	1	5	5	5	5	$\leq$	5	5	5	100
	d	7	5	.5	5	5	2	5	5	5	100
	е	6	5	4	4	4	4	4	4	4	80
2.5	а	27	5	5	5	5	5	5	5	15	(00)
	b	21	5	5	5	5	5	5	5	5	100
	с	2	5	.5	5	5	S	.5	5	5	100
	d	22	5	5	5	5	5	5	5	5	100
	е	30	5	5	5	5	5	5	5	5	100
5.0	а	17	5	5	5	15	5	5	5	$<$	100
	b	20	5	5	5	5	5	5	6	5	100
	c	16	5	5	5	5	5	5	ß	5	100
	d	26	5	5	5	5	5	5	5	5	100
	е	29	5	5	5	5	5	5	5	5	100
6.06	а	15	5	5	5	5	5	5	5	5	100
	b	25	5	5	5	5	5	5	2	5	100
	с	13	5	5	5	5	5	.5	5	5	100
	d	24	5	5	5	5	5	.5	5	5	1.00
	е	8	5	5	5	5	5	5	5	5	100
2510	а	19	5	5	5	5	5	5	5	5	106
	b	28	5	5	5	5	S	5	5	5	100
	C	12	5	5	5	5	5	5	5	5	100
	d	10	5	4	4	4	Ч	4	4	4	\$0
	e	23	5	5	5	5	5	5	5	5	
15015	a	11	5	.5	5	5	$\leq$	5	5	5	100
	d	14	5	5	5	5	5	5	5	5	160
	с	5	5	5	5	5	5	5	5	5	100
	d	4	5	5	5	5	5	5	5	5	001
	е	18	5	5	5	5	5	5	5	5	(0)
Rand # QC:	Tech	Initials	CG	RH	PM	RAD	DM	RH	CH	Pm	
Initial Count QC'd by: ACS		Time	1415	1015	1440	1400	1410	1145	1015	1045	×
Initiated by: CG	•	L			L				1 - 1		
	•										
Time Fed (day):0	1	2	3	4	5	6			Di	rying Ov	en Info
morning:	0891	066	085	0835	0835	0815		Tare	wt. Initia	als/Date:	56 8/8/2-
evening: 1620	1630	161S	IWO	1545	1615	1620			Date/	Time in:	$\frac{1}{2} \frac{1}{2} \frac{1}$
									Date/T	ime out:	8/9/17 1121
									Те	mp (°C):	63.4
Comments: (R)Ho	218 1/29	11							00	Check:	Ar grahn
		- 0 - 1							-44		<u>() / / / / / / / / / / / / / / / / / / /</u>

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

B R18AC 8/9/17

Client:	IDE	Test Species: <u>A. affinis</u>
Sample ID:	Daily M-001	Start Date/Time: 8/1/2017 1415
Test No.:	1708-5030	End Date/Time: 8/8/2017 1045

		T			
	Conc. ( % )	Rep.	pan weight (mɑ)	pan + fish weight (mg)	total organism weight (mg)
			(**3)	(	noight (ilig)
	Lab Control	а	22.02	27.00	4.98
	·····	b	21.89	27.62	5.73
		с	22.64	28.05	5.41
		d	21.65	26.95	5.30
		е	22.34	27.18	4.84
	2.5	а	22.13	28.46	6.33
		b	21.96	28.20	6.24
		с	21.18	27.84	6.66
		d	21.86	27.23	5.37
		е	21.60	28.16	6.56
	5.0	a	21.28	28.29	7.01
		b	21.41	27.58	6.17
		С	22.14	26.51	4.37
		d	21.33	27.20	5.87
		е	22.29	28.61	6.32
	6.06	a	21.89	27.01	5.12
		b	21.56	27.17	5.61
-		с	22.65	29.92	7.27
		d	21.30	26.06	4.76
		е	21.99	27.01	5.02
	10	а	22.74	28.96	6.22
		b	22.68	27.21	4.53
		с	21.36	27.39	6.03
		d	21.42	27.45	6.03
-		е	23.22	28.84	5.62
ſ	15	a	20.67	26.65	5.98
		b	22.35	27.74	5.39
-		с	22.85	29.67	6.82
		d	19.47	25.65	6 18
-		е	23.36	29.44	6.08
**************************************					0.00
-					
-					
-					
$\bigcirc$	Тес	h Initials:	SG	SG	
WR18 AC 819/17	D	ate/Time:	8/8/2017 0820	8/9/2017 1135	

QC Check: AC Stal 17

Final Review: 15 8/18/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

7

Client:	DE
Sample ID:	Daily M-001
Test No:	1708-5030

Concentration		Lab Control										
Day	0	0 1 2 3 4 5 6 7										
		Initial										
рН	9.09	8.09	8.02	8.07	8.00	8.10	8.07					
DO (mg/L)	123	7.3	6.7	7.4	6.7	7.6	7.5					
Salinity (ppt)	33.8	34.2	33.9	33.9	34.0	340	34.0					
Temp (°C)	20,3	20.4	20.8	20.5	20.1	19:3	19.7					
				Fi	nal							
рН		7.94	7.90	7.39	7.84	7.84	7.84	7,84				
DO (mg/L)		6.8	6.4	6.8	6.3 6	6.6	6.2	6.4				
Salinity (ppt)		34,0	34.1	34.0	34.19	23341	33.8	34.0				
Temp (°C)		199	20.0	20.0	20.1	20.0	20.2	20.1				

Concentration		2.5%											
Day	0	0 1 2 3 4 5 6 7											
		Initial											
рН	8,10	8.10	8.02	8.06	8.00	8.10	8.00						
DO (mg/L)	7.4	7.4	6,7	7.4	-6.6	7.6	7.0						
Salinity (ppt)	134.6	349	34.3	34.70	34-23	4.0 34.1	34,0						
Temp (°C)	20.1	20.3	20.6	20 .1	20.2	19,1	19.4						
				Fi	nal								
рН		7.91	7.86	7.85	7.82	7.80	7.81	7.82					
DO (mg/L)		6.2	6.2	6.5	5.9	6.3	10.1	6.3					
Salinity (ppt)	]	34.8	34.9	34.5	34.8	34,2	34.6	34.1					
Temp (°C)		19.8	20.0	20,1	20.2	19.8	19.9	20.1					

Concentration		5.0%											
Day	0	0 1 2 3 4 5 6 7											
		Initial											
pН	18,10	8-10	8.05	8.06	800	8.10	8.00						
DO (mg/L)	17.4	7.4	6.7	7.4	11	7.6	7.5	]					
Salinity (ppt)	35.3	35.5	34.5	35.4	34.0	34.1	340	1					
Temp (°C)	19.8	20.2	20.4	20.0	19.9	19.0	19.1	]					
				Fi	nál								
рН		7.91	7.85	7.84	7.84	7.83	7.79	7,83					
DO (mg/L)	]	6.2	6.2	6.2	5.2	612	6.0	6.1					
Salinity (ppt)	1	35.5	35.6	34.9	35.5	34.3	34.1	34.2					
Temp (°C)		19.2	20.0	20.1	20:2	19.9	20.1	20.0					

theile	7.6	7.0		DO (mg/L)	7.4	7.4	6.8	7.5	6.7	7.5	7.6
7034-2:	34.0 34.1	34,0		Salinity (ppt)	36.5	36.9	35.4	37.0	34.1	3411	33.9
1 20.2	19,1	19.4		Temp (°C)	19:3	19.7	19.9	197	19.6	19.0	19.0
Final								Fi	nal		
5 7.82	7.82	7.81	7.82	pH		7.93	7.88	7.87	7.84	7.83	7.80
5 5.9	6.3	10.1	6.3	DO (mg/L)		6.3	6.2	6.2	5.7	5,9	58
5 34.8	34,2	34.0	34.1	Salinity (ppt)	]	36.6	36.9	35.9	36,9	34.9	34.3
1000	1701 8	190	30 1	Tomm (90)	7	14 9	10 C.	20 0		54 . 0.04	24 4
1 60.0	1710	1-1,-1	10.1	Temp (C)	1	CII)	11.1	100.0	2012	17.1	10.0
1 60.0	171.0	17, 1	20.1	Temp (C)		1110	111.9	100.0	20,2	19.4	70.0
5.0%	1-1-0	17,91	20.1	Concentration	· ·	11:0		@ <b>5</b>	30,2 ₩ \5 ℃	1977 2	-70.0
5.0%	5	6	7	Concentration Day	0	1	2	P56	30,2 9% i≤ °6 4	5	6
5.0%	5	6	7	Concentration Day	0	1	2	<b>50</b> 3	-20,2 9% i≲ °/∂ 4 tial	5	6
5.0% 4 Initial	5	6	7	Concentration Day pH	0	1	2	<b>5</b> <b>5</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b>	120, Z 9% 15 % 4 tial 7, 9 9	5	6 8,03
5.0% 4 Initial 6 8 0 1 1	5 3.10 7.6	6 8.00 7.5	7	Concentration Day pH DO (mg/L)	0	1 8,09 7.4	2 8.03 6.8	<b>5</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b>	120, Z 9% 15 % 4 tial 7.99	5 5 7.9	6 8,03 7,5
5.0% 4 Initial 6 8.00 10 1 4 3 1.0	5 5 7.6 34.1	6 8.06 7.5 24.0	7	Concentration Day pH DO (mg/L) Salinity (ppt)	0	1 8,09 7.4 38.5	2 8.03 6.8 35.7	<b>B</b> <b>5</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b>	120, 2 9% is % 4 tial 7,99 54,0	5 5 7.9 34.1	6 8,03 7,5 34,1

DO (IIIg/L)	1 1.2	7.7	VIG	1.2	V - 1	1-1	100	
Salinity (ppt)	38.9	38.5	35.7	38.5	34.0	34.1	3411	
Temp (°C)	19.5	20.0	19.4	194	19.4	19,0	19.0	
				Fi	nal	-		
pН		7.92	7.88	7.86	7.88	7.83	7.82	7.38
DO (mg/L)		6,2	6.1	6.1	5.7	6.0	5.8	6.1
Salinity (ppt)	]	32.3	38.5	36.4	38.2	34.9	34.2	343
Temp (°C)	]	19.7	20.0	1.05	20.2	19.9	20.0	20.0

	0	1	2	3	4	5	6	7
Analysts: Initial:	CH	PH	PM	1070	AD	RH	RH	
Final:		DM	PM	BO	DA	RH	RH	Dn
Dilutions made by:	CH	PM	DM	CG	ND	ACS	24	
Sample Used (A, B, C):	A	A	B	B	C	C	C C	

Animal Source/Date Received:	ABS /7/2	18/17
Animal Age at Initiation:	13 da	4S.
Animal Acclimation Qualifiers (c	ircle all that apply):	Q22 / Q23 / Q24 /
Sample Log-in Numbers:	A: 17-0829	C: 17-0848
	B: 17-0838	

Comments:	@A6 Q18 7/24/17	(BIAND Q18	8/5/17	(0) pha 88 6/17	D QISAC	8/9/17	
QC Check:	AC819/17	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		0	Ċ	Final Review:	18 8/18/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Test	Species:	А.	affinis
			And a state of the

Start Date/Time: 8/1/2017 1415

End Date/Time: 8/8/2017 1045

Concentration		6.06%										
Day	0	0 1 2 3 4 5 6 7										
		Initial										
рН	8.10	8.10	8.03	8.07	8.00	8.09	8.06					
DO (mg/L)	7.4	7.4	6.7	7.4	6.7	7.7	7.6					
Salinity (ppt)	35.6	359	34.8	35 A	330	341	34.0					
Temp (°C)	19.7	70.0	20.4	20.0	19.8	19.0	19:0					
	,			Fi	nal							
pН		7.95	7,91	7.89	7.88	7.85	7.84	7.85				
DO (mg/L)		6.3	6.3	6-2	5.9	6.20	5.9	5.9				
Salinity (ppt)		35.7	35.9	35.2	35,8	34:7	34.1	34.3				
Temp (°C)		19.9	20.0	20.1	20.2	19.9	20.0	19.9				

	25% 10%									
0	0 1 2 3 4 5 6 7									
	Initial									
8.10	8.10	8.02	8.08	7.99	8104	8.00				
7.4	7.4	6.8	7.5	6.7	1.15	7.6				
36.5	36.9	35.4	37.0	34.1	3411	33.9				
19:3	19.7	19.9	197	19.6	19.0	19.0				
			Fi	nal						
	7.93	7.88	7.87	7.84	7.83	7.80	7.24			
]	6.3	6.2	6.2	5.7	5,9	5.8	6.0			
1	36.6	36.9	35.9	36,9	34.9	34.3	34.2			
	19.8	19.9	20.0	20:2	19.7	20.6	20,0			
	0 7.4 36-5 19:3	0 1 8.16 8.10 7.4 7.4 36.5 769 19.3 19.7 7.93 6.3 36.6 19.8	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $			

Giant Kelp

CETIS Sum	CETIS Summary Report								07 17(	07 Aug-17 16:43 (p 1 of 2) 1708-S032   09-3400-9549	
Macrocystis G	Bermination and	l Germ	Tube Grow	th Test					Nautilu	s Environi	mental (CA)
Batch ID: Start Date: Ending Date: Duration:	02-5786-1451 01 Aug-17 15:3 03 Aug-17 12:4 45h	.0 I .5 :	Test Type: Protocol: Species: Source:	Growth-Germin EPA/600/R-95/ Macrocystis py Pt. Loma	nation 136 (1995) rifera		,     	Analyst: Diluent: N Brine: N Age:	atural Seawat ot Applicable	er	
Sample ID: Sample Date: Receive Date: Sample Age:	08-7505-9181 01 Aug-17 08:0 01 Aug-17 13:0 8h (5 °C)	0 I 7 9	Code: Material: Source: Station:	17-0829 Facility Effluent IDE M-001				Client: ID Project:	E		
Comparison S	Summary										
Analysis ID	Endpoint		NOEL	LOEL	TOEL	PMSD	τu	Method			
10-3044-5888 17-6417-1751	Germination Ra Mean Length	ıte	15 15	>15 >15	NA NA	1.24% 5.9%	∠ 6.667 < 6.667	Dunnett Dunnett	Multiple Com Multiple Com	iparison Te iparison Te	st st
Point Estimate	e Summary										
Analysis ID	Endpoint		Level	%	95% LCL	95% UCI	L TU	Method			
08-6224-6363	Germination Ra	ite	EC25	>15	N/A	N/A	<6.66	7 Linear II	nterpolation (I	CPIN)	
16-2850-4490	Mean Length		EC50	>15	N/A	N/A	< 6.66	7 7 Lincorte	torpolation (I		
10 2000 1100	mour congin		IC50	>15	N/A	N/A	<0.00 <6.66	7 Linear in 7	nerpolation (i	CPIN)	
Test Acceptab	ility										
Analysis ID	Endpoint		Attrib	ute	Test Stat	TAC Lin	nits	Overlap	Decision		
08-6224-6363	Germination Ra	ite	Contro	l Resp	0.984	0.7 - NL		Yes	Passes A	cceptability	Criteria
10-3044-5888	Germination Ra	te	Contro	Resp	0.984	0.7 - NL		Yes	Passes A	cceptability	Criteria
16-2850-4490	Mean Length		Contro	l Resp	16.4	10 - NL		Yes	Passes A	cceptability	Criteria
17-6417-1751	Mean Length	40	Contro	l Resp	16.4	10 - NL		Yes	Passes A	cceptability	Criteria
17-6417-1751	Mean Length	le	PIVISD		0.01245	NL - 0.2		No	Passes A	cceptability	Criteria
					0.05901	NL - 0.2		NO	Passes A		Criteria
Germination R	ate Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.984	0.9772	0.9908	0.98	0.99	0.00244	9 0.005477	0.56%	0.0%
2.0		5 5	0.982	0.9764	0.9876	0.98	0.99	0.002	0.004472	0.46%	0.2%
5 6.06		5	0.970	0.9644	0.9910	0.96	0.99	0.00489	9 0.01095	1.12%	0.61%
10		5	0.99	0.9812	0.9988	0.90	0.99	0.00244	9 0.005477 2 0.007071	0.50%	0.0%
15		5	0.98	0.9676	0.9924	0.97	0.99	0.00447	2 0.01	1.02%	0.41%
Mean Length S	Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0 1	Lab Control	5	16.4	15.76	17.04	15.75	17	0.2318	0.5184	3.16%	0.0%
2.5		5	17.1	16.46	17.74	16.25	17.5	0.2318	0.5184	3.03%	-4.27%
5		5	16.85	16.21	17.49	16.25	17.5	0.2318	0.5184	3.08%	-2.74%
6.06		5	17.7	16.81	18.59	16.75	18.5	0.3202	0.7159	4.05%	-7.93%
10		ວ 5	17.05 17	16.19 15.05	17.91 18.05	16.25 16.5	18 19 5	0.3102	0.6937	4.07%	-3.96%
10				10.90	10.00	10.5	C.01	0.3791	0.84/8	4.99%	-3.66%

## **CETIS Summary Report**

Macrocystis Germination and Germ Tube Growth Test

Report Date: Test Code:

07	Aug-17	16:43	(p 2 of	2)
17	08-S032	2109-3	3400-95	549

			1		
Naut	ilus	Enviro	onmer	tal	(CA)

Germination	Rate Detail							
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	0.98	0.99	0.98	0.98	0.99	19477-40-40-40-40-4	
2.5		0.98	0.99	0.98	0.98	0.98		
5		0.99	0.98	0.98	0.98	0.96		
6.06		0.99	0.98	0.98	0.98	0.99		
10		1	0.99	0.98	0.99	0.99		
15		0.98	0.97	0.99	0.99	0.97		
Mean Length	Detail					· · · · · · · · · · · · · · · · · · ·		
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5		
0	Lab Control	16.5	16	17	16.75	15.75		
2.5		17.25	17	17.5	17.5	16.25		
5		17.25	16.75	16.25	17.5	16.5		
6.06		18.5	16.75	17.25	18.25	17.75		
10		18	16.75	16.25	17.5	16.75		
15		16.5	16.5	18.5	16.75	16.75		

Analyst: AC QA: 198/10/17

CETIS An	alytical Rep	ort					Repo Test	ort Date: Code:	07 A 170	Aug-17 16: 8-S032   0	:43 (p 1 of 3) )9-3400-9549
Macrocystis	Germination an	d Germ <sup>-</sup>	Tube Growth T	est					Nautilus	s Environ	mental (CA)
Analysis ID: Analyzed:	10-3044-5888 07 Aug-17 16:	ا 42 /	Endpoint: Ge Analysis: Par	rmination Ra ametric-Cor	ate htrol vs Trea	tments	CET	IS Version: cial Results	: CETISv1 s: Yes	.8.7	
Data Transfo	orm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Angular (Cor	rected)	NA	C > T	NA	NA		1.24%	15	>15	NA	6.667
Dunnett Mul	tiple Compariso	n Test									
Control	vs C-%		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision	(α:5%)		
Lab Control	2.5		0.4514	2.362	0.044 8	0.6679	CDF	Non-Sign	ificant Effect		
	5		1.095	2.362	0.044 8	0.3785	CDF	Non-Sign	ificant Effect		
	6.06		0	2.362	0.044 8	0.8333	CDF	Non-Sign	ificant Effect		
	10		-1.445	2.362	0.044 8	0.9955	CDF	Non-Sign	ificant Effect		
	15		0.6963	2.362	0.044 8	0.5587	CDF	Non-Sign	ificant Effect		
ANOVA Tabl	e									Bally 1 10 10 10 10 10 10 10 10 10 10 10 10 1	
Source	Sum Squ	ares	Mean Squ	lare	DF	F Stat	P-Value	Decision	(α:5%)		
Between	0.006614	04	0.0013228	08	5	1.548	0.2127	Non-Sign	ificant Effect		
Error	0.020510	04	0.0008545	85	24	_					
Total	0.027124	08			29						
Distributiona	al Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision(	'α:1%)			
Variances	Bartlett E	quality o	f Variance	2.813	15.09	0.7288	Equal Var	iances	Ör 11.000		
Distribution	Shapiro-	Wilk W N	ormality	0.9566	0.9031	0.2530	Normal Di	stribution			
Germination	Rate Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.984	0.9772	0.9908	0.98	0.98	0.99	0.00245	0.56%	0.0%
2.5		5	0.982	0.9764	0.9876	0.98	0.98	0.99	0.002001	0.46%	0.2%
5		5	0.978	0.9644	0.9916	0.98	0.96	0.99	0.004899	1.12%	0.61%
6.06		5	0.984	0.9772	0.9908	0.98	0.98	0.99	0.00245	0.56%	0.0%
10		5	0.99	0.9812	0.9988	0.99	0.98	1	0.003163	0.71%	-0.61%
15		5	0.98	0.9676	0.9924	0.98	0.97	0.99	0.004472	1.02%	0.41%
Angular (Cor	rected) Transfor	med Sur	nmary								
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.446	1.417	1.474	1.429	1.429	1.471	0.01022	1.58%	0.0%
2.5		5	1.437	1.414	1.46	1.429	1.429	1.471	0.008347	1.3%	0.58%
5		5	1.425	1.381	1.47	1.429	1.369	1.471	0.01615	2.53%	1.4%
6.06		5	1.446	1.417	1.474	1.429	1.429	1.471	0.01022	1.58%	0.0%
10		5	1.472	1.432	1.513	1.471	1.429	1.521	0.01456	2.21%	-1.85%
15		5	1.433	1.387	1.479	1.429	1.397	1.471	0.01656	2.58%	0.89%

Analyst: <u>AC</u> QA: 458/18/17



Analyst: AC QA: 138/18/17

CETIS Ana	alytical Repo	ort					Repo Test	ort Date: Code:	07 / 170	Aug-17 16: )8-S032   0	43 (p 3 of 3) 9-3400-9549
Macrocystis (	Germination and	Germ <sup>-</sup>	Tube Growth To	est					Nautilu	s Environ	mental (CA)
Analysis ID: Analyzed:	17-6417-1751 07 Aug-17 16:4	.3	Endpoint: Mea Analysis: Par	an Length ametric-Cor	ntrol vs Trea	tments	CET	IS Version: ial Results:	CETISv1 Yes	1.8.7	
Data Transfor	rm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Untransformed	d	NA	C > T	NA	NA		5.9%	15	>15	NA	6.667
Dunnett Mult	iple Comparison	Test									
Control	vs C-%		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision(	α:5%)		
Lab Control	2.5		-1.708	2.362	0.968 8	0.9981	CDF	Non-Signif	icant Effec	t	
	5		-1.098	2.362	0.968 8	0.9874	CDF	Non-Signif	icant Effec	t	
	6.06		-3.172	2.362	0.968 8	1.0000	CDF	Non-Signif	icant Effec	t	
	10		-1.586	2.362	0.968 8	0.9972	CDF	Non-Signif	icant Effec	t	
	15		-1.464	2.362	0.968 8	0.9958	CDF	Non-Signif	icant Effec	t	
ANOVA Table											
Source	Sum Squa	ares	Mean Squ	are	DF	F Stat	P-Value	Decision(	a:5%)		
Between	4.416667		0.8833333		5	2.104	0.0998	Non-Signif	icant Effec	t	
Error	10.075		0.4197917		24						
Total	14.49167				29						
Distributional	Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision(	α:1%)			
Variances	Bartlett E	guality o	f Variance	1.692	15.09	0.8900	Equal Var	iances			
Distribution	Shapiro-V	Vilk VV N	lormality	0.9675	0.9031	0.4743	Normal Di	stribution			
Mean Length	Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	16.4	15.76	17.04	16.5	15.75	17	0.2318	3.16%	0.0%
2.5		5	17.1	16.46	17.74	17.25	16.25	17.5	0.2318	3.03%	-4.27%
5		5	16.85	16.21	17.49	16.75	16.25	17.5	0.2318	3.08%	-2.74%
6.06		5	17.7	16.81	18.59	17.75	16.75	18.5	0.3202	4.05%	-7.93%
10		5	17.05	16.19	17.91	16.75	16.25	18	0.3102	4.07%	-3.96%
15		5	17	15.95	18,05	16.75	16.5	18.5	0.3791	4.99%	-3.66%
Graphics											
20 15 5 0 0	DLC 2.5	5	6.06 10	Reject Null	r Centered	1.6 1.4 1.2 1.0 0.8 0.6 0.4 0.2 -0.2 -0.4 -0.2 -0.4 -0.6 -0.2 -0.4 -0.6 -0.2 -0.4 -0.6 -0.8 -0.6 -0.8 -0	-2.0 -1.5 -1		0.5 1.0	6 1.5 2.0	- 2.5
		C-%						Rankits			

Analyst:<u>AC</u>QA:<u>198</u>18]17

CETIS	S Ana	lytical Repo	ort					Repo Test	ort Date: Code:	07 . 170	Aug-17 1 )8-S032	6:43 (p 1 of 2) 09-3400-9549
Macro	cystis (	Sermination and	l Germ Tub	e Grow	rth Test					Nautilu	s Enviro	nmental (CA)
Analys	is ID:	08-6224-6363	End	point:	Germination Ra	ate		CET	IS Version:	CETISv1	1.8.7	
Analyz	ed:	07 Aug-17 16:4	3 Ana	alysis:	Linear Interpola	tion (ICPIN)		Offic	ial Results	Yes		
Linear	Interpo	plation Options							The second second second second second			
X Tran	sform	Y Transform	n See	ed	Resamples	Exp 95%	CL Met	hod				
Linear		Linear	408	645	1000	Yes	Two	-Point Interp	olation			<u></u>
Point E	stimat	es										
Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL						
EC25	>15	N/A	N/A	<6.66	7 NA	NA					14 <u>010</u>	B'
EC50	>15	N/A	N/A	<6.66	7 <b>NA</b>	NA						
Germir	nation F	Rate Summary				Calcu	ated Varia	ate(A/B)				
C-%	С	ontrol Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	в
0	L	ab Control	5	0.984	0.98	0.99	0.00245	0.005479	0.56%	0.0%	492	500
2.5			5	0.982	0.98	0.99	0.002001	0.004473	0.46%	0.2%	491	500
5			5	0.978	0.96	0.99	0.004899	0.01096	1.12%	0.61%	489	500
6.06			5	0.984	0.98	0.99	0.00245	0.005479	0.56%	0.0%	492	500
10			5	0.99	0.98	1	0.003163	0.007072	0.71%	-0.61%	495	500
15			5	0.98	0.97	0.99	0.004472	0.01	1.02%	0.41%	490	500
Graphi	cs											
	<sup>1.0</sup> @		0		®							



Analyst: 2 QA: 438/13/17

CETIS	S Ana	alytical Repo	<b>)rt</b>			·			Repo Test	ort Date: Code:	07 Aug-17 16:43 (p 2 of 2) 1708-S032   09-3400-9549
Macro	cystis (	Germination and	Germ Tub	e Grow	rth Test						Nautilus Environmental (CA)
Analys Analyz	is ID: ed:	16-2850-4490 07 Aug-17 16:4	End 3 Ana	point: lysis:	Mean Length Linear Interpol	ation (ICPIN	I)		CET Offic	S Version: ial Results:	CETISv1.8.7 Yes
Linear X Tran	Interpo sform	olation Options Y Transform	See	d	Resamples	Exp 95%	6 CL	Method			
Linear		Linear	668	567	1000	Yes	gyskiliiii isaacimaaa	Two-Point	Interp	olation	Nin a se a companya da se por la separativa da la companya da la companya da la companya da se a separativa da
Point E	Estimat	tes									
Level	%	95% LCL	95% UCL	τu	95% LCL	95% UCL					
IC25	>15	N/A	N/A	<6.66	7 NA	NA					
IC50	>15	N/A	N/A	<6.66	7 NA	NA					
Mean L	.ength	Summary				Ća	lculat	ed Variate		Waters Color	
C-%	C	Control Type	Count	Mean	Min	Max	Std	Err Std	Dev	CV%	%Effect
0	L	ab Control	5	16.4	15.75	17	0.23	318 0.5 <sup>-</sup>	184	3.16%	0.0%
2.5			5	17.1	16.25	17.5	0.23	318 0.5 <sup>-</sup>	184	3.03%	-4.27%
5			5	16.85	16.25	17.5	0.23	318 0.5 <sup>-</sup>	184	3.08%	-2.74%
6.06			5	17.7	16.75	18.5	0.32	202 0.7	159	4.05%	-7.93%
10			5	17.05	16.25	18	0.31	02 0.69	937	4.07%	-3.96%
15			5	17	16.5	18.5	0.37	′91    0.84	478	4.99%	-3.66%
Graphi	cs		•		**************************************						
	10 -										
	18		D								
	16										
	14										

12

2 4 6 8 10 12 14 16

C-%

Mean Length 10 -8 6 4 2 ٥Ł

Analyst: <u>AC</u> QA: <u>158</u> 18/17

CETIS An	alytical Rep	ort					Repo Test	ort Date: Code:	07 A 170	Nug-17 16: 8-S032   0	45 (p 1 of 1) 9-3400-9549
Macrocystis	Germination and	d Germ	Tube Growth T	est 7	ST				Nautilus	6 Environ	mental (CA)
Analysis ID: Analyzed:	04-2020-0252 07 Aug-17 16:	45 .	Endpoint: Ge Analysis: Par	mination Ra	ate equivalence	-Two Samp	CET le Offic	IS Version: cial Results:	CETISv1 Yes	.8.7	
Data Transfo	orm	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Angular (Cor	ected)	NA	C*b < T	NA	NA	0.75	1.02%	15	>15	NA	6.667
TST-Welch's	t Test										
Control	vs C-%		Test Stat	Critical	MSD DF	P-Value	Р-Туре	Decision(	α:5%)		
Lab Control	2.5*		31.15	1.895	0.021 7	<0.0001	CDF	Non-Signi	icant Effect		
	5*		19.09	2.015	0.036 5	<0.0001	CDF	Non-Signit	icant Effect		
	6.06*		28.28	1.895	0.024 7	<0.0001	CDF	Non-Signit	icant Effect		
	10*		23.58	1.943	0.032 6	<0.0001	CDF	Non-Signif	icant Effect		
	15*		19.1	2.015	0.037 5	<0.0001	CDF	Non-Signil	icant Effect		
ANOVA Tabl	e										
Source	Sum Squ	ares	Mean Squ	are	DF	F Stat	P-Value	Decision(	α:5%)		
Between	0.006614	04	0.0013228	808	5	1.548	0.2127	Non-Signif	icant Effect		
Error	0.020510	04	0.0008545	85	24						
Total	0.027124	08			29						
Distributiona	l Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision(	α:1%)			
Variances	Bartlett E	quality c	of Variance	2.813	15.09	0.7288	Equal Var	iances			
Distribution	Shapiro-	Wilk W N	lormality	0.9566	0.9031	0.2530	Normal Di	stribution			
Germination	Rate Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.984	0.9772	0.9908	0.98	0.98	0.99	0.00245	0.56%	0.0%
2.5		5	0.982	0.9764	0.9876	0.98	0.98	0.99	0.002001	0.46%	0.2%
5		5	0.978	0.9644	0.9916	0.98	0.96	0.99	0.004899	1.12%	0.61%
6.06		5	0.984	0.9772	0.9908	0.98	0.98	0.99	0.00245	0.56%	0.0%
10		5	0.99	0.9812	0.9988	0.99	0.98	1	0.003163	0.71%	-0.61%
15		5	0.98	0.9676	0.9924	0.98	0.97	0.99	0.004472	1.02%	0.41%
Angular (Cor	rected) Transfor	med Su	mmary								
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.446	1.417	1.474	1.429	1.429	1.471	0.01022	1.58%	0.0%
2.5		5	1.437	1.414	1.46	1.429	1.429	1.471	0.008347	1.3%	0.58%
5		5	1.425	1.381	1.47	1.429	1.369	1.471	0.01615	2.53%	1.4%
6.06		5	1.446	1.417	1.474	1.429	1.429	1.471	0.01022	1.58%	0.0%
10		5	1.472	1.432	1.513	1.471	1.429	1.521	0.01456	2.21%	-1.85%
15		5	1.433	1.387	1.479	1.429	1.397	1.471	0.01656	2.58%	0.89%

Analyst: AC QA: 458/18/

CETIS An	alytical	Report					Rep Tes	ort Date: t Code:	07 17	Aug-17 16 08-S032   (	:45 (p 1 of 1) 09-3400-9549
Macrocystis	Germinatio	on and Germ	Tube Growt	h Test 👘	TST				Nautilu	us Environ	mental (CA)
Analysis ID: Analyzed:	18-7151- 07 Aug-1	-9707 17 16:45	Endpoint: Analysis:	Mean Length Parametric Bi	oequivalenc	e-Two Sam	CEI ole Offi	TS Versio cial Resul	n: CETISv ts: Yes	1.8.7	
Data Transfo	rm	Zeta	Alt Hy	p Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	TU
Untransforme	d	NA	C*b < 7	T NA	NA	0.75	5.13%	15	>15	NA	6.667
TST-Welch's	t Test								*******		
Control	vs C-"	%	Test S	tat Critical	MSD E	DF P-Value	P-Type	Decisio	on(α:5%)		
Lab Control	2.5	*	16.56	1.895	0.549 7	<0.0001	CDF	Non-Sic	nificant Effec	zt	
	5*		15.7	1.895	0.549 7	< 0.0001	CDF	Non-Sid	nificant Effect	t	
	6.0	6*	14.82	1.943	0.708 6	< 0.0001	CDF	Non-Sig	nificant Effec	t	
	10'	k	13.36	1.943	0.691 6	<0.0001	CDF	Non-Sia	, Inificant Effec	t	
	15'	*	11.27	2.015	0.841 5	<0.0001	CDF	Non-Sig	inificant Effec	at in the second s	
ANOVA Table	e										
Source	Sun	n Squares	Mean	Square	DF	F Stat	P-Value	Decisio	n(α:5%)		
Between	4.41	6667	0.8833	333	5	2.104	0.0998	Non-Sig	nificant Effec	t	
Error	10.0	)75	0.4197	917	24						
Total	14.4	9167			29						
Distributiona	I Tests										
Attribute	Tes	st		Test Sta	t Critical	P-Value	Decision	(α:1%)			
Variances	Bar	tlett Equality	of Variance	1.692	15.09	0.8900	Equal Var	iances			
Distribution	Sha	apiro-Wilk W	Normality	0.9675	0.9031	0.4743	Normal D	istribution			
Mean Length	Summary			5							
C-%	Control T	ype Coun	t Mean	95% LCI	. 95% UCI	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Contr	ol 5	16.4	15.76	17.04	16.5	15.75	17	0.2318	3.16%	0.0%
2.5		5	17.1	16.46	17.74	17.25	16.25	17.5	0.2318	3.03%	-4.27%
5		5	16.85	16.21	17.49	16.75	16.25	17.5	0.2318	3.08%	-2.74%
6.06		5	17.7	16.81	18.59	17.75	16.75	18.5	0.3202	4.05%	-7.93%
10		5	. 17.05	16.19	17.91	16.75	16.25	18	0.3102	4.07%	-3.96%
15		5	17	15.95	18.05	16.75	16.5	18.5	0.3791	4.99%	-3.66%

000-089-187-3

CETIS™ v1.8.7.20

Analyst: AC QA: 43 8/18/17

Macrocysti	s Germina	tion and Gei	rm Tube (	Growth Te	st						Na	utilus Env	/ironmental	- San Diego
Start Date:	1-Aug-17	7		Species:	: Macrocyst	tis pyrifera						Test ID	: 1708-S032	
End Date:	3-Aug-17	,		Protocol	: EPA/600/F	R-95/136 (1	995 West C	Coast Manu	al)		Sam	ole Source	: IDE	
Sampled:	1-Aug-17	7	Te	st Material:	: Effluent						Samp	ole Station	: M-001	
							it on going Hangkarian ann ann ann ann an agus à 195							
Random	Number	Number					L 84		· · · · · · · · · · · · · · · · · · ·	\			Calibration	Mean Tube
Number	Counted	Germinated				i ube Lengi	n weasurer	nents (micr	ometer unit	s)			Factor	Length (um)
36	100	98	7	7	7	5	6	7	7	6	7	6	2.5	16.25
37	100	98	7	6	5	6	8	7	7	6	6	7	2.5	16.25
38	100	98	7	8	7	6	6	7	6	5	7	6	2.5	16.25
39	100	97	8	7	7	7	7	6	7	5	6	7	2.5	16.75
40	100	100	7	9	7	8	7	7	6	7	8	6	2.5	18.00
41	100	98	5	7	6	8	7	7	6	6	7	7	2.5	16.50
42	100	99	7	7	5	8	6	6	7	8	6	7	2.5	16.75
43	100	98	6	8	6	7	6	7	7	8	5	7	2.5	16.75
44	100	99	5	6	6	7	6	6	7	6	7	7	2.5	15.75
45	100	99	7	5	7	6	7	7	7	8	7	8	2.5	17.25
46	100	99	6	8	8	7	6	6	6	6	7	7	2.5	16.75
47	100	98	6	7	6	8	7	6	7	6	7	7	2.5	16.75
48	100	98	9	7	7	7	5	6	7	5	8	7	2.5	17.00
49	100	96	8	7	6	6	7	5	7	7	6	7	2.5	16.50
50	100	98	7	7	6	7	6	8	7	7	7	8	2.5	17.50
51	100	99	6	7	7	6	7	7	5	6	5	8	2.5	16.00
52	100	98	8	7	7	6	8	7	6	6	7	8 .	2.5	17.50
53	100	98	5	6	7	6	8	6	7	8	7	7	2.5	16.75
54	100	99	7	8	7	6	7	7	7	7	7	8	2.5	17.75
55	100	98	7	7	6	5	7	7	8	7	8	7	2.5	17.25
56	100	98	7	8	7	6	8	7	8	7	6	6	2.5	17.50
57	100	98	7	7	8	7	6	7	8	9	7	7	2.5	18.25
58	100	99	8	7	8	7	8	7	7	8	7	7	2.5	18.50
59	100	98	7	8	7	7	7	6	8	6	6	7	2.5	17.25
60	100	99	8	6	7	6	8	6	8	7	7	7	2.5	17.50
61	100	98	6	6	7	7	7	5	7	6	7	8	2.5	16.50
62	100	99	9	7	7	6	7	7	5	6	7	7	2.5	17.00
63	100	97	5	6	6	7	8	7	7	7	6	7	2.5	16.50
64	100	99	7	7	6	7	8	5	6	6	8	7	2.5	16.75
65	100	99	8	7	7	7	7	8	7	7	8	8	2.5	18.50

Analyst: AC

QC Check: AC 8/7/17

Final Review: <u>¥5 8/18/17</u>

Macrocysti	s Germina	tion and Ger	m Tube G	rowth Te	st						Na	utilus En	vironmental	- San Diego
Start Date:	1-Aug-17	,		Species:	Macrocyst	is pyrifera						Test ID	: 1708-50	32
End Date:	3-Aug-17	,		Protocol:	EPA/600/F	R-95/136 (1	995 West C	oast Manu	al)		Sami	ole Source	: IDE	
Sampled:	1-Aua-	111	Tes	t Matorial:	Effluent						0			
	9	. /	100	natoriai.	Endent	ble Station	: W-001							
Random	Number	Number				T I I .						and the second	Calibration	Mean Tubo
Number	Counted	Germinated				l ube Lengt	h Measuren	nents (micr	ometer units	5)			Factor	Length (um)
36	100	98	7	7	7	5	6	7	7	6	7	6	2.5	#DIV/0!
37		98	7	6	5	6	5	Ŧ	7	6	6	7	1	#DIV/0!
38		98	7	8	7	6	6	7-	6	5	7	6		#DIV/0!
39		47	8	7-	7	7	7	6	7	5	6	7		#DIV/0!
40		100	7	9	7	8	7	7	6	7	8	6		#DIV/0!
41		98	5	+	6	8	7	7	6	6	7-	7-		#DIV/0!
42		99		7	<u> </u>	8	6	6	7	8	G	7		#DIV/0!
43		78	(c	8	6	7	G	7	7	S.	5	7		#DIV/0!
44		99	5	- Ç	6	7	6	6	7-	6	7-	7		#DIV/0!
40				5	7	C	=7	7	7	8	7	8		#DIV/0!
40		99	<u> </u>	8	8	7	6	6	6	6	7	7		#DIV/0!
4/		- 48		7	6	8	7	6	7	Co	7	7		#DIV/0!
48		- 78		_7	7	7	5	6	7	5	8	7		#DIV/0!
49			<u> </u>	7	<u> </u>	6	7	5	7	7	<u> </u>	7		#DIV/0!
50		<u> </u>	7	7	6	7	6	8	7	7	7	8		#DIV/0!
51				7	7	e	7	7	5	G	5	8		#DIV/0!
52		- 78	<u> </u>			6	8	7	6	6	7	8		#DIV/0!
53		- <u>78</u>		6		6	8	6	7		7	7		#DIV/0!
54					7	6	7	7	7	7	7	8		#DIV/0!
56		40	<u></u>	7		<u> </u>	7	7-	<u> </u>	7	8	7		#DIV/0!
57		98	7	8		0	<u> </u>	7-	<u></u>	7	6	6		#DIV/0!
58	/	- 70		<del></del>	0	<u> </u>	6	7	8	9	7	7		#DIV/0!
50		- 79	<u> </u>	- + 0	0	7	8		<u> </u>	- 8	7	7		#DIV/0!
60		70					0	0	<u> </u>	<u> </u>	6	7		#DIV/0!
61		60	<u>&gt;</u>	Ø	7	0	- õ		<u> </u>	7	7	7		#DIV/0!
62		18	0	<u> </u>	-7	<u> </u>	T	_5		<u> </u>	+	8		#DIV/0!
63		97			T	6	T	7	-5	6	<u>+</u>	+	<b> </b>	#DIV/0!
64		CIG.	-5	2	<u> </u>	- 7-	0		7	7	6	+	<b> </b>	#DIV/0!
65						7	<u>১</u>	5	9	6	8	1 t	<b>_</b>	#DIV/0!
	V	-//	<u>ð</u>	7		4-	7	Ó	7	7	L <u>ठ</u>	15		#DIV/0!

Analyst: \_\_\_\_\_

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QC Check: <u>AC 8/7/17</u>

Final Review: 145 8/18/17

Macrocystis	Germi	inatio	n and	Germ Tube	Growth Test			Nautilus Environmental (CA)
Start Date: End Date: Sample Date	01 A 03 A : 01 A	Aug-1 Aug-1 Aug-17	7 7 7	Specie Protoc Materia	es: Macrocyst ol: EPA/600/F al: Facility Eff	Macrocystis pyrifera EPA/600/R-95/136 (1995) Facility Effluent Germinated Mean Length (		Sample Code: ②34 <del>2857ED</del> <i>いつつ</i> のみつ Sample Source: IDE Sample Station: M-001
C-%	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor	Notes
0	LC	1	61					
0	LC	2	51					
0	LC	3	48				1001 - 1	
0	LC	4	53					
0	LC	5	44					
2.5		1	59					
2.5		2	62					
2.5		3	50					
2.5		4	52					
2.5		5	38					· · · ·
5		1	45					
5		2	43					
5		3	36					
5		4	56					
5		5	49					
6.06		1	65					
6.06		2	47					
6.06		3	55					
6.06		4	57					
6.06		5	54					
10		1	40					
10		2	42					
10		3	37					
10		4	60		~			
10		5	64					
15		1	41					
15		2	63					
15		3	58					
15		4	46					
15		5	39					

QC:CH

@Q18AC\$7/17

Analyst: AG QA: AC 8/1/17

## Marine Chronic Bioassay

## Water Quality Measurements

Client :	IDE			Test Species: Macrocystis pyrifera					
Sample ID:	M-001			Start Date/Time:		8/1/2017	1530		
Sample Log No.:	17-0829			End Date/Time:		8/3/2017	1245		
Test No.:	1708-5032-			Dilutio	ons made by:	AG			
			Analyst:	СН			Analyst:	RT	
	Initial Readings				Final Readings				
(%)	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)	DO (mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)	
Lab Control	7.7	8.16	33.9	16.0	8.2	8.00	33.8	15.2	
2.5	7.6	8.15	34.8	16.0	8.2	8.02	35.1	14.8	
5	7.7	8.15	35.3	16.0	8.5	8.01	35.7	14.3	
6.06	7.7	8.14	35.8	16.0	8.2	8-01	36.1	14.8	
10	7.6	8.14	36.8	16.0	§ .	8.02	37.3	15.3	
15	7.5	8.13	38.3	16.0	8.3	8.03	38.9	14.9	

Comments:

QC Check: \_\_\_\_\_ AU 8/7/17

Final Review: 18/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

#### Marine Chronic Bioassay

#### Client: 11530 8/1/2017 Start Date/Time: Test No.: 8/3/2017 1245 End Date/Time: Tech. Initials: Test Species: Macrocystis pyrifera Date Collected: Kelp Collectors: Collection Location: Time of Initial Rinsing and Dessication : 08/01/17 811117 1450 Time of Rinsing and Transfer to Release Beaker: density and average motility Conditions of Zoospore Density and Motility: High Time of Blade Removal From Release Beaker: Mean: 196.8 Density Counts (target = 90): 185 201 207 197 194 Mean $\underline{196.8}$ \* 10,000 = $\underline{1,968,000}$ spores/ml (density of spore release) If spore release = 900,000 spores/ml: Inoculate with 0.25 ml If spore release > 900,000 spores/ml: Calculate a dilution factor, x, create a new spore stock of 900,000 spores/ml and inoculate with 0.25 ml. To calculate the dilution factor: $\frac{1,968,000}{1 \text{ container}} * \frac{0.25 \text{ ml}}{225,000} = \frac{492,000}{225,000}$ Density of spore release 2.19 (x) 2.19 spores dil.factor spores part spore stock 75~ - 1.0 1.19 part(s) seawater 892

If spore release < 900,000 spores/ml: The volume added should not exceed 0.5 ml. (This volume exceeds the EPA and MBP required volume of no greater than 1% of the total test solution volume. However, it may sometimes be necessary to exceed the 0.3 ml requirement in order to achieve the desired spore density.

Time of inoculation: 1530

 Amount ino

oculated: 0.25 m/

 Location in Environmental Chamber (All replicates in each test must be on the same shelf;

 do not split up tests among shelves):

 Shelf number
 Measured Light Intensity Range

Shelf number	(must be between 160 and 240 ft-c)	Range	24	24-hour germination check		
1	165 6 208	1+035	QC	C dish #	% germ.	1
2 .				ĺ	95	1
3			· <u>·····</u>		······································	
4						
5					ί. ί.	٩
6	1=8 to 206	39, 4065				
Timers Checked?	Should be on 16:8 light:dark cycle	initials: AC				
Comments:	@AB Q18 8/1/17					
						-
QC Check: <u>AC 817</u>	17	Final Re	view:	Y58 18	17	_

## Kelp Spore Germination & Growth Worksheet

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.
Red Abalone

							Tes	st Code:	170	)8-S031   09	9-3261-9016
Red Abalone	Larval Developn	nent Test							Nautilu	s Environn	nental (CA)
Batch ID: Start Date: Ending Date: Duration:	06-0338-9916 01 Aug-17 15:4 03 Aug-17 17:1 49h	Test 5 Prot 0 Spe Sou	t Type: tocol: cies: irce:	Development EPA/600/R-95/ Haliotis rufesce American Abalo	136 (1995) ens one		Ana Dili Bri Age	alyst: uent: <sup>Fillesce</sup> Natu ne: Not e:	ل ural Seawat Applicable	er	
Sample ID: Sample Date: Receive Date: Sample Age:	14-4098-3460 01 Aug-17 08:0 01 Aug-17 13:0 8h (́ട°⊂)	Cod 0 Mate 7 Sou Stat	le: erial: irce: tion:	17-0829 Facility Effluent IDE Americas, M-001	Inc.		Clie Pro	ent: IDE oject:			
Comparison S	Summary										
Analysis ID	Endpoint		NOEL	LOEL	TOEL	PMSD	тυ	Method			
19-9885-6548	Development R	ate	10	15	12.25	5.03%	10	Dunnett M	lultiple Com	parison Te	st
Point Estimate	e Summary										
Analysis ID	Endpoint		Level	%	95% LCL	95% UCL	TU	Method			
01-8586-0232	Development R	ate	EC25	12.08	11.71	12.3	8.279	Linear Inte	erpolation (I	CPIN)	
			EC50	14.18	13.7	14.64	7.054				
Test Acceptab	oility										
Analysis ID	Endpoint		Attribu	ute	Test Stat	TAC Limi	ts	Overlap	Decision		
Analysis ID 01-8586-0232	Endpoint Development R	ate	Attribu Contro	u <b>te</b> I Resp	Test Stat 0.91	TAC Limi 0.8 - NL	ts	Overlap Yes	Decision Passes A	cceptability	Criteria
Analysis ID 01-8586-0232 19-9885-6548	Endpoint Development R Development R	ate ate	Attribu Contro Contro	u <b>te</b> Il Resp Il Resp	<b>Test Stat</b> 0.91 0.91	TAC Limi 0.8 - NL 0.8 - NL	ts	Overlap Yes Yes	Decision Passes A Passes A	cceptability cceptability	Criteria Criteria
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548	Endpoint Development R Development R Development R	ate ate ate	Attribu Contro Contro PMSD	u <b>te</b> I Resp I Resp	<b>Test Stat</b> 0.91 0.91 0.05029	TAC Limi 0.8 - NL 0.8 - NL NL - 0.2	ts	Overlap Yes Yes No	Decision Passes A Passes A Passes A	cceptability cceptability cceptability	Criteria Criteria Criteria
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 Development	Endpoint Development R Development R Development R Rate Summary	ate ate 	Attribu Contro Contro PMSD	u <b>te</b> I Resp I Resp	Test Stat 0.91 0.91 0.05029	TAC Limi 0.8 - NL 0.8 - NL NL - 0.2	ts	Overlap Yes Yes No	Decision Passes A Passes A Passes A	cceptability cceptability cceptability	Criteria Criteria Criteria
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 Development C-%	Endpoint Development R Development R Development R Rate Summary Control Type	ate ate ate Count	Attribu Contro Contro PMSD Mean	ute I Resp I Resp 95% LCL	Test Stat 0.91 0.05029 95% UCL	TAC Limi 0.8 - NL 0.8 - NL NL - 0.2 Min	Max	Overlap Yes Yes No Std Err	Decision Passes Ad Passes Ad Passes Ad	cceptability cceptability cceptability CV%	Criteria Criteria Criteria %Effect
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 Development C-% 0	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control	ate ate ate <u>Count</u> 5	Attribu Contro Contro PMSD Mean 0.91	ute I Resp I Resp 95% LCL 0.8627	Test Stat           0.91           0.91           0.05029           95% UCL           0.9573	TAC Limi 0.8 - NL 0.8 - NL NL - 0.2 Min 0.87	Max 0.97	Overlap Yes No Std Err 0.01703	Decision Passes A Passes A Passes A Std Dev 0.03808	cceptability cceptability cceptability CV% 4.18%	Criteria Criteria Criteria <b>%Effect</b> 0.0%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 Development C-% 0 2.5	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control	ate ate ate <u>Count</u> 5 5	Attribu Contro Contro PMSD Mean 0.91 0.918	ute I Resp I Resp 95% LCL 0.8627 0.8911	Test Stat           0.91           0.91           0.05029           95% UCL           0.9573           0.9449	TAC Limi 0.8 - NL 0.8 - NL NL - 0.2 Min 0.87 0.89	Max 0.97 0.94	Overlap           Yes           Yes           No           Std Err           0.01703           0.009695	Decision Passes A Passes A Passes A Std Dev 0.03808 0.02168	cceptability cceptability cceptability CV% 4.18% 2.36%	Criteria Criteria Criteria %Effect 0.0% -0.88%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 Development C-% 0 2.5 5	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control	ate ate ate <b>Count</b> 5 5 5 5	Attribu Contro PMSD Mean 0.91 0.918 0.92	ute I Resp I Resp <b>95% LCL</b> 0.8627 0.8911 0.8761	Test Stat           0.91           0.920           95% UCL           0.9573           0.9449           0.9639	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.86	Max 0.97 0.94 0.95	Overlap           Yes           Yes           No           Std Err           0.01703           0.009695           0.01581	Decision Passes A Passes A Passes A Passes A Std Dev 0.03808 0.02168 0.03536	cceptability cceptability cceptability CV% 4.18% 2.36% 3.84%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 Development C-% 0 2.5 5 6.06	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control	ate ate ate <u>Count</u> 5 5 5 5 5	Attribu Contro PMSD Mean 0.91 0.918 0.92 0.912	ute I Resp I Resp 95% LCL 0.8627 0.8911 0.8761 0.8799	Test Stat           0.91           0.929           95% UCL           0.9573           0.9449           0.9639           0.9441	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.88	Max 0.97 0.94 0.95 0.95	Overlap           Yes           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01158	Decision Passes A Passes A Passes A Std Dev 0.03808 0.02168 0.03536 0.02588	CV% 4.18% 2.36% 3.84% 2.84%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 <b>Development</b> C-% 0 2.5 5 6.06 10	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control	ate ate ate 5 5 5 5 5 5 5	Attribu Contro PMSD Mean 0.91 0.918 0.92 0.912 0.916	ute I Resp I Resp <b>95% LCL</b> 0.8627 0.8911 0.8761 0.8799 0.8972	Test Stat           0.91           0.05029           95% UCL           0.9573           0.9449           0.9639           0.9441           0.9348	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.88           0.9         0.9	Max 0.97 0.94 0.95 0.95 0.94	Overlap           Yes           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01158           0.006782	Decision Passes A Passes A Passes A Std Dev 0.03808 0.02168 0.03536 0.02588 0.01517	cceptability cceptability cceptability cceptability 4.18% 2.36% 3.84% 2.84% 1.66%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 <b>Development</b> C-% 0 2.5 5 6.06 10 15	Endpoint Development R Development R Rate Summary Control Type Lab Control	ate ate 2000000000000000000000000000000000000	Attribu Contro PMSD Mean 0.91 0.918 0.92 0.912 0.916 0.368	ute I Resp <b>95% LCL</b> 0.8627 0.8911 0.8761 0.8799 0.8972 0.3027	Test Stat           0.91           0.929           95% UCL           0.9573           0.9449           0.9639           0.9348           0.9348           0.4333	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.88           0.9         0.31	Max 0.97 0.94 0.95 0.95 0.94 0.94 0.44	Overlap           Yes           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01581           0.006782           0.02354	Decision Passes A Passes A Passes A Passes A Dave 0.03808 0.02168 0.02588 0.02588 0.01517 0.05263	CCCPtability CCCPtability CCCPtability CCV% 4.18% 2.36% 3.84% 2.84% 1.66% 14.3%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66% 59.56%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 <b>Development</b> C-% 0 2.5 5 6.06 10 15 <b>Development</b>	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control	ate ate ate 5 5 5 5 5 5 5 5 5	Attribu Contro PMSD 0.91 0.918 0.92 0.912 0.916 0.368	ute I Resp I Resp <b>95% LCL</b> 0.8627 0.8911 0.8761 0.8799 0.8972 0.3027	Test Stat           0.91           0.929           95% UCL           0.9573           0.9449           0.9639           0.9441           0.9348           0.4333	TAC         Limi           0.8 - NL         0.8           NL - 0.2         0.87           0.87         0.89           0.86         0.88           0.9         0.31	Max           0.97           0.94           0.95           0.94           0.94	Overlap           Yes           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01158           0.006782           0.02354	Decision Passes A Passes A Passes A 0.03808 0.02168 0.02588 0.01517 0.05263	cceptability cceptability cceptability 4.18% 2.36% 3.84% 2.84% 1.66% 14.3%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66% 59.56%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 <b>Development</b> C-% 0 2.5 5 6.06 10 15 <b>Development</b> C-%	Endpoint Development R Development R Rate Summary Control Type Lab Control Rate Detail Control Type	ate ate Count 5 5 5 5 5 5 5 7 8 8 8 8 8 7 8 7 8 7 8 7	Attribu Contro PMSD Mean 0.91 0.918 0.92 0.912 0.916 0.368 Rep 2	ute I Resp 95% LCL 0.8627 0.8911 0.8761 0.8799 0.8972 0.3027 Rep 3	Test Stat           0.91           0.05029           95% UCL           0.9573           0.9449           0.9348           0.4333           Rep 4	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.88           0.9         0.31	Max           0.97           0.94           0.95           0.94           0.95           0.94           0.94	Overlap           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01158           0.006782           0.02354	Decision Passes A Passes A Passes A Passes A 0.03808 0.02168 0.02588 0.01517 0.05263	cceptability cceptability cceptability cceptability 4.18% 2.36% 3.84% 2.84% 1.66% 14.3%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66% 59.56%
Analysis ID           01-8586-0232           19-9885-6548           19-9885-6548           Development           C-%           0           2.5           5           6.06           10           15           Development           C-%           0           2.5           5           6.06           10           15           Development           C-%           0	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control Rate Detail Control Type Lab Control	ate ate 2000000000000000000000000000000000000	Attribu Contro PMSD Mean 0.91 0.918 0.92 0.912 0.916 0.368 Rep 2 0.97	ute I Resp 95% LCL 0.8627 0.8911 0.8761 0.8799 0.8972 0.3027 Rep 3 0.89	Test Stat           0.91           0.929           95% UCL           0.9573           0.9449           0.9348           0.4333           Rep 4           0.92	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.9           0.31         0.9           Rep 5           0.9         0.9	<b>Max</b> 0.97 0.94 0.95 0.95 0.94 0.94 0.44	Overlap           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01158           0.006782           0.02354	Decision Passes A Passes A Passes A Passes A 0.03808 0.02168 0.02588 0.01517 0.05263	cceptability cceptability cceptability 2.36% 3.84% 2.84% 1.66% 14.3%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66% 59.56%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 Development C-% 0 2.5 5 6.06 10 15 Development C-% 0 2.5	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control Rate Detail Control Type Lab Control	ate ate ate 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Attribu Contro PMSD Mean 0.91 0.918 0.92 0.912 0.916 0.368 Rep 2 0.97 0.94	ute I Resp <b>95% LCL</b> 0.8627 0.8911 0.8761 0.8799 0.8972 0.3027 <b>Rep 3</b> 0.89 0.9	Test Stat           0.91           0.929           95% UCL           0.9573           0.9449           0.9348           0.9348           0.4333           Rep 4           0.92           0.89	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.88           0.9         0.31           Rep 5           0.9         0.93	<b>Max</b> 0.97 0.94 0.95 0.95 0.94 0.94	Overlap           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01158           0.006782           0.02354	Decision Passes A Passes A Passes A 0.03808 0.02168 0.03536 0.02588 0.01517 0.05263	CCCPtability cceptability cceptability 4.18% 2.36% 3.84% 2.84% 1.66% 14.3%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66% 59.56%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 <b>Development</b> C-% 0 2.5 5 6.06 10 15 <b>Development</b> C-% 0 2.5 5 5 5 5 5 5 5 5 5 5 5 5 5	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control Rate Detail Control Type Lab Control	ate ate ate 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Attribu Contro PMSD Mean 0.91 0.918 0.92 0.912 0.916 0.368 Rep 2 0.97 0.94 0.86	ute I Resp <b>95% LCL</b> 0.8627 0.8911 0.8761 0.8799 0.8972 0.3027 <b>Rep 3</b> 0.89 0.9 0.9	Test Stat           0.91           0.929           95% UCL           0.9573           0.9449           0.9348           0.932	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.8 - NL           Min         0.87           0.89         0.86           0.88         0.9           0.31         0.9           0.9         0.93           0.95         0.95	<b>Max</b> 0.97 0.94 0.95 0.95 0.94 0.44	Overlap           Yes           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01158           0.006782           0.02354	Decision Passes A Passes A Passes A 0.03808 0.02168 0.02588 0.01517 0.05263	cceptability cceptability cceptability 4.18% 2.36% 3.84% 2.84% 1.66% 14.3%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66% 59.56%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 <b>Development</b> <b>C-%</b> 0 2.5 5 6.06 10 15 <b>Development</b> <b>C-%</b> 0 2.5 5 6.06 10 15 <b>Development</b> <b>C-%</b> 0 2.5 5 6.06 10 15 <b>Development</b> <b>C-%</b> 0 2.5 5 6.06 10 15 <b>Development</b> <b>C-%</b> 0 2.5 5 6.06 10 15 <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development</b> <b>Development Development</b> <b>Development </b>	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control Rate Detail Control Type Lab Control	ate ate ate 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Attribu Contro PMSD 0.91 0.918 0.92 0.912 0.916 0.368 Rep 2 0.97 0.94 0.86 0.91	ute I Resp I Resp <b>95% LCL</b> 0.8627 0.8911 0.8761 0.8799 0.8972 0.3027 <b>Rep 3</b> 0.89 0.9 0.9 0.94 0.95	Test Stat           0.91           0.920           95% UCL           0.9573           0.9449           0.9348           0.9348           0.4333           Rep 4           0.92           0.88	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.88           0.9         0.31           Rep 5           0.9         0.93           0.95         0.92	Max           0.97           0.94           0.95           0.94           0.95           0.94	Overlap           Yes           No           Std Err           0.01703           0.009695           0.01581           0.001582           0.002354	Decision Passes A Passes A Passes A 0.03808 0.02168 0.02588 0.01517 0.05263	CCCPtability CCCPtability CCCPtability 4.18% 2.36% 3.84% 2.84% 1.66% 14.3%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66% 59.56%
Analysis ID 01-8586-0232 19-9885-6548 19-9885-6548 <b>Development</b> <b>C-%</b> 0 2.5 5 6.06 10 15 <b>Development</b> <b>C-%</b> 0 2.5 5 6.06 10 2.5 5 6.06 10 10	Endpoint Development R Development R Development R Rate Summary Control Type Lab Control Rate Detail Control Type Lab Control	ate ate ate 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Attribu Contro PMSD 0.91 0.918 0.92 0.912 0.916 0.368 Rep 2 0.97 0.94 0.86 0.91 0.91	ute I Resp I Resp <b>95% LCL</b> 0.8627 0.8911 0.8761 0.8799 0.8972 0.3027 <b>Rep 3</b> 0.89 0.9 0.94 0.95 0.94	Test Stat           0.91           0.920           95% UCL           0.9573           0.9449           0.9348           0.9348           0.4333           Rep 4           0.92           0.88           0.91	TAC         Limi           0.8 - NL         0.8 - NL           NL - 0.2         0.87           0.87         0.89           0.86         0.9           0.31         0.9           0.31         0.9           0.9         0.31           0.9         0.91           0.93         0.95           0.92         0.92	Max           0.97           0.94           0.95           0.94           0.95           0.94	Overlap           Yes           No           Std Err           0.01703           0.009695           0.01581           0.01158           0.006782           0.02354	Decision Passes A Passes A Passes A 0.03808 0.02168 0.02588 0.01517 0.05263	cceptability cceptability cceptability 2.36% 3.84% 2.84% 1.66% 14.3%	Criteria Criteria Criteria %Effect 0.0% -0.88% -1.1% -0.22% -0.66% 59.56%

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07 Aug-17 13:17 (p 1 of 1)

Report Date:

## **CETIS Summary Report**

## **CETIS Analytical Report**

Report Date:

							Test	Code:	1708	8-S031 0	9-3261-9016
Red Abalone	Larval Develop	ment Test							Nautilus	Environ	mental (CA)
Analysis ID: Analyzed:	19-9885-6548 07 Aug-17 13:	En 12 An	i <b>dpoint:</b> Dev i <b>alysis:</b> Par	velopment R ametric-Cor	ate itrol vs Trea	tments	CET Offic	IS Version al Results	: CETISv1. s: Yes	.8.7	
Data Transfo	rm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	τυ
Angular (Corr	ected)	NA	C > T	NA	NA		5.03%	10	15	12.25	10
Dunnett Mult	iple Compariso	n Test									
Control	vs C-%		Test Stat	Critical	MSD DF	P-Value	Р-Туре	Decision	ı(α:5%)		
Lab Control	2.5		-0.2777	2.362	0.079 8	0.9024	CDF	Non-Sign	ificant Effect		
	5		-0.4669	2.362	0.079 8	0.9353	CDF	Non-Sign	ificant Effect		
	6.06		0.01746	2.362	0.079 8	0.8281	CDF	Non-Sign	ificant Effect		
	10		-0.1436	2.362	0.079 8	0.8723	CDF	Non-Sign	ificant Effect		
	15*		18.48	2.362	0.079 8	<0.0001	CDF	Significar	nt Effect		
ANOVA Table	9					an a					ali na 1999 a an a
Source	Sum Squ	iares	Mean Squ	are	DF	F Stat	P-Value	Decision	ı(α:5%)		
Between	1.641937		0.3283874		5	116.1	<0.0001	Significar	nt Effect		
Error	0.067888	99	0.0028287	08	24						
Total	1.709826				29						
Distributiona	l Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Bartlett E	Equality of N	Variance	3.914	15.09	0.5619	Equal Var	iances			
Distribution	Shapiro-	Wilk W Nor	rmality	0.9906	0.9031	0.9937	Normal D	stribution			
Development	t Rate Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.91	0.8627	0.9573	0.9	0.87	0.97	0.01703	4.18%	0.0%
2.5		5	0.918	0.8911	0.9449	0.93	0.89	0.94	0.009695	2.36%	-0.88%
5		5	0.92	0.8761	0.9639	0.93	0.86	0.95	0.01581	3.84%	-1.1%
6.06		5	0.912	0.8799	0.9441	0.91	0.88	0.95	0.01158	2.84%	-0.22%
10		5	0.916	0.8972	0.9348	0.91	0.9	0.94	0.006782	1.66%	-0.66%
15		5	0.368	0.3027	0.4333	0.36	0.31	0.44	0.02354	14.3%	59.56%
Angular (Cor	rected) Transfor	med Sumi	mary								
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.273	1.179	1.366	1.249	1.202	1.397	0.03367	5.92%	0.0%
2.5		5	1.282	1.234	1.331	1.303	1.233	1.323	0.01747	3.05%	-0.73%
5		5	1.289	1.213	1.364	1.303	1.187	1.345	0.0273	4.74%	-1.23%
6.06		5	1.272	1.213	1.332	1.266	1.217	1.345	0.02133	3.75%	0.05%
10		5	1.278	1.243	1.313	1.266	1.249	1.323	0.01267	2.22%	-0.38%
15		5	0.6512	0.5835	0.7189	0.6435	0.5905	0.7253	0.02438	8.37%	48.84%

000-089-187-3



CETIS	S Ana	alytical Repo	ort					Rep Test	ort Date: Code:	07 A 170	Aug-17 13 8-S031	3:17 (p 1 of 1) 09-3261-9016
Red Ab	palone	Larval Developm	nent Test							Nautilus	s Enviro	nmental (CA)
Analys Analyz	is ID: ed:	01-8586-0232 07 Aug-17 13:1	End 2 Ana	point: lysis:	Development R Linear Interpola	ate ation (ICPIN)		CET	IS Version: cial Results:	CETISv1 Yes	.8.7	
Linear X Tran	Interp sform	olation Options Y Transform	See	d	Resamples	Exp 95%	CL Meth	nod				
Linear		Linear	9439	950	1000	Yes	Two-	Point Interp	olation			
Point E	Estima	tes										
Level	%	95% LCL	95% UCL	τυ	95% LCL	95% UCL						
EC25	12.0	8 11.71	12.3	8.279	8.13	8.54						
EC50	14.1	8 13.7	14.64	7.054	6.831	7.299						
Develo	pmen	t Rate Summary				Calcul	ated Varia	te(A/B)				
C-%		Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	А	в
0		Lab Control	5	0.91	0.87	0.97	0.01703	0.03808	4.18%	0.0%	455	500
2.5			5	0.918	0.89	0.94	0.009695	0.02168	2.36%	-0.88%	459	500
5			5	0.92	0.86	0.95	0.01581	0.03536	3.84%	-1.1%	460	500
6.06			5	0.912	0.88	0.95	0.01158	0.02588	2.84%	-0.22%	456	500
10			5	0.916	0.9	0.94	0.006782	0.01517	1.66%	-0.66%	458	500
15			5	0.368	0.31	0.44	0.02354	0.05263	14.3%	59.56%	184	500
Graphi	cs			1000 - 1000 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 1								
	1.0											
	0.9											
	0.8 F											
te te	0.7			```	$\backslash$							
nt Ra	0.6				$\backslash$							
omer	1 0.5 E				$\backslash$							
velo	0.5				$\backslash$							
De	0.4				6							
	0.3											
	0.2											
	0.1 E											
				1.	1							
	0.0	2 4 6	5 8	10	12 14 16							
			C-%									

Analyst: AC QA: 45 8/18/17

CETIS An	alytical Rep	ort					Rep Test	ort Date: Code:	07 A 170	Aug-17 13: 8-S031   C	:13 (p 1 of 1) )9-3261-9016
Red Abalone	e Larval Develop	ment Test		TST					Nautilus	s Environ	mental (CA)
Analysis ID: Analyzed:	01-4273-4694 07 Aug-17 13:	Ene 13 Ana	dpoint: De alysis: Pa	evelopment F arametric Bio	tate equivalence	-Two Samp	CET ole Office	IS Version: cial Results:	CETISv1 Yes	.8.7	
Data Transfo	ərm	Zeta	Alt Hyp	Trials	Seed	TST b	PMSD	NOEL	LOEL	TOEL	ти
Angular (Corr	ected)	NA	C*b < T	NA	NA	0.75	4.07%	10	15	12.25	10
TST-Welch's	t Test						And a second				
Control	vs C-%		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision(	α:5%)		
Lab Control	2.5*		10.67	1.895	0.058 7	<0.0001	CDF	Non-Signif	icant Effect		
	5*		8.979	1.895	0.070 7	<0.0001	CDF	Non-Signif	icant Effect		
	6.06*		9.61	1.895	0.063 7	<0.0001	CDF	Non-Signif	icant Effect		
	10*		11.43	2.015	0.057 5	<0.0001	CDF	Non-Signif	icant Effect		
	15		-8.645	1.895	0.067 7	1.0000	CDF	Significant	Effect		
ANOVA Tabl	e						******				
Source	Sum Squ	ares	Mean Sq	uare	DF	F Stat	P-Value	Decision(	a:5%)		
Between	1.641937		0.328387	4	5	116.1	<0.0001	Significant	Effect		
Error	0.067888	99	0.002828	708	24						
Total	1.709826				29						
Distributiona	I Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Bartlett E	Equality of V	ariance	3.914	15.09	0.5619	Equal Var	iances			
Distribution	Shapiro-	Wilk W Norr	mality	0.9906	0.9031	0.9937	Normal Di	istribution			
Developmen	t Rate Summary										
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.91	0.8627	0.9573	0.9	0.87	0.97	0.01703	4.18%	0.0%
2.5		5	0.918	0.8911	0.9449	0.93	0.89	0.94	0.009695	2.36%	-0.88%
5		5	0.92	0.8761	0.9639	0.93	0.86	0.95	0.01581	3.84%	-1.1%
6.06		5	0.912	0.8799	0.9441	0.91	0.88	0.95	0.01158	2.84%	-0.22%
10		5	0.916	0.8972	0.9348	0.91	0.9	0.94	0.006782	1.66%	-0.66%
15		5	0.368	0.3027	0.4333	0.36	0.31	0.44	0.02354	14.3%	59.56%
Angular (Cor	rected) Transfor	med Summ	ary								
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.273	1.179	1.366	1.249	1.202	1.397	0.03367	5.92%	0.0%
2.5		5	1.282	1.234	1.331	1.303	1.233	1.323	0.01747	3.05%	-0.73%
5		5	1.289	1.213	1.364	1.303	1.187	1.345	0.0273	4.74%	-1.23%
6.06		5	1.272	1.213	1.332	1.266	1.217	1.345	0.02133	3.75%	0.05%
10		5	1.278	1.243	1.313	1.266	1.249	1.323	0.01267	2.22%	-0.38%
15		5	0.6512	0.5835	0.7189	0.6435	0.5905	0.7253	0.02438	8.37%	48.84%

Analyst:\_<u>AC\_</u> QA:<u>158</u>18/17

Nautilus Environmental (CA)

Red Abalone Larval Development Test

Start Date: End Date: (@ Sample Date:	01 A 03 A 29 J	Aug-17 Aug-17 Iul-17	, , 1 <del>1:24</del>	Specie Protoc Materia	s: Halioti ol: EPA/6 al: Facility	s rufescensSample Code:55E3A9A417-08-2900/R-95/136 (1995)Sample Source: IDE Americas, Inc.r EffluentSample Station: M-001
C-%	Code	Rep	Pos	# Counted	# Normal	Notes
			31	160	95	
			32	100	36	
			33	100	94	
			34	100	40	
			35	100	31	
			36	100	94	
			37	100	73	
			38	100	92	
			39	100	91	
			40	100	90	
			41	100	92	
			42	100	93	
			43	100	89	
			44	100	Sl	· · · · · · · · · · · · · · · · · · ·
			45	100	- 90	
			46	100	91	
			4/	100	94	
			48	100	92	
			49	100	91	
			50	100	91	
			51	100	44	
			52	100	13	
			54	100	20	
			55	100	10	
			56	100	$\frac{D}{a}$	
			57	100	27	
			58	100	23	
			59	100	70	
			60	100	10	
			50	100	D	

@Q18AC5/7/17

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Nautilus Environmental (CA)

**Red Abalone Larval Development Test** 

Start Date: End Date: Sample Date	01 A 03 A 29 J	Aug-1 Aug-1 Hul-17	7 7 8 <del>11:24</del>	Specie Protoc Materi	es: Haliotis ol: EPA/6 al: Facility	s rufescens 00/R-95/136 (1995) Effluent	Sample Code 55E3A9A4 17-083-7 Sample Source: IDE Americas, Inc. Sample Station: M-001
C-%	Code	Rep	Pos	# Counted	# Normal		Notes
0	LC	1	55	100	99	RH 08/03/17	
0	LC	2	46				
0	LC	3	43				·
0	LC	4	41				
0	LC	5	40				
2.5		1	52	100	99	RH 08/03/17	
2.5		2	33			•	
2.5		3	58				
2.5		4	60				
2.0		5	37	1.5	<i>a</i>		
5		2	42	100	99	RH 08/03/17	
5		2	44			· · · · · · · · · · · · · · · · · · ·	
5		4	38			· · · · · · · · · · · · · · · · · · ·	
5		5	31			1. W. L	
6.06		1	45	110	1000	RH ARLALIA	
6.06		2	49	100	100	100 08 10.0117	
6.06		3	59				
6.06		4	53				
6.06		5	48				
10		1	54	100	100	RH 08/03/17	
10		2	39	100		141 0 0/00/11	
10		3	36				
10		4	50				
10		5	56				
15		1	34	100	47	RH08/03/17	
15		2	32				
15		3	51				
15		4	35				
15		5	57				
DC P	ρ		H	S6A =	#Con 10	contract the norma	l pti 08/03/17

(1) HS12A HS15A = 100

46

RH 08/03/17

@ RH 61808/03/17 18) AC Q18 8/7/17

### Marine Chronic Bioassay

### Water Quality Measurements

Client: IDE

Sample ID: <u>M-001</u> Sample Log No.: <u>17-08</u>

Test No.: 1708-5031

H. rufescens	
8/1/2017 1545	
8/3/2017 /7/0	
/ 8 8	1. rufescens /1/2017 1545 /3/2017 17/0

Concentration	]	Salinity		T	emperatu	ire	Diss	solved Ox	ygen		pН	
(% sample)		(ppt)			(°C)			(mg/L)			(pH units	)
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	33.7	33.8	33.9	16.0	15.0	14.8	7.4	8.1	3.1	8.12	8.07	8.03
2.5	34.8	35.1	035.82	15.8	14.4	14.6	7.8	8.2	3.1	8.15	8,08	8.03
5	35.5	35.8	35.9	15.9	14.6	14.5	7.8	8.2	8.2	8.14	8.09	8.02
6.06	35.7	36.1	36.2	16.0	14.5	14,5	7.7	8.2	8.1	8.14	8.09	8.03
10	36.8	37.3	37.4	15.9	14.5	14.4	7.8	8.2	8.2	8.14	8.10	8.04
15	38.5	38.9	39.0	15,9	14.4	14.3	7.8	8.2	8.2	8.12	8.10	8.04
6.06 HSC	35.7	35.8	35.9	15.9	14,8	14.4	7.6	8.2	8.1	8.13	8.10	8.04
15 HSC	38.4	38,7	38.7	15.6	14.5	14.4	7.7	8.2	8.2	8.11	8.10	8.05
		-										

	0	24	48		
Technician Initials:	WQ Readings:	RH	PM		
	Dilutions made by:				
Comments:	0 hrs:				
	24 hrs:			 	
	48 hrs: 1 Q13 PM	3(3/17			
QC Check:	AC 8/7/17			Final Review:	VS 8/18/17

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Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Abalone Embryo-Larval Development

Client:	IDE		Τε	est Species: <u>Haliotis ru</u>	fescens
Sample ID:	M-001		Stari	t Date/Time: <u>8/1/2017</u>	1545
Test No.:	1708-So	3	End	Date/Time: <u>8/3/2017</u>	1710
Animal Source/Dat	te Received:	American	phalen	NIberto	

Number of abalone and condition upon receipt/holding:

Males:	4, 2000
Females:	4, 90000

	Males:	Females:
Tris & peroxide addition time	1200	1100
Spawn time	1415	1400
Number of spawners	4	3
Condition of spawn (light, moderate, heavy)	hears	moderate
Fertilization time	214	45

Embryo counts (per 0	.5 ml)
1	180
2	218
3	197
Mean	198

Time of test Initiation:	1545
Technician Initials:	AD

A

48 hr. QC 977 70

Comments:

QC Check:

8/117

Final Review: 75 8/18/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Appendix B

Sample Receipt Information

### Nautilus Environmental 4340 Vandever Avenue San Diego, CA 92120

Client: <u>IDE</u> Sample ID: <u>M-001</u> Test ID No(s).: <u>1709-5030 to 5032</u>

					B NO COLOR 1
Sample (A, B, C):	A	B	С	Germania and	C. NO cour a
Log-in No. (17-xxxx):	0829	0838	0848		
Sample Collection Date & Time:	31117 050C	8/3/17 0800	\$6/120832		COC Complete (X/
Sample Receipt Date & Time:	8/1/17 1307	8312 1349	8/ 5/17 1000		
Number of Containers & Container Type:	2,4LWbi	7-46 GBI	1-46 CUBI		<u>~</u>
Approx. Total Volume Received (L):	~ 8	~8-	~ 42		Eilfration2 V
Check-in Temperature (°C)	5.0	4.5	9.0		
Temperature OK? <sup>1</sup>	(Ŷ) N	(Y)N	Ý N	Y N	Pore Size:
DO (mg/L)	6.0	7.1	6.5		Organisms
pH (units)	8.01	809	7.15		0-11-14-0-11
Conductivity (µS/cm)					Salinity Adjustmen
Salinity (ppt)	64.2 B	50.2 A)	341		Test:
Alkalinity (mg/L) <sup>2</sup>	200	152	173		Test:
Hardness (mg/L) <sup>2, 3</sup>					lest:
Total Chlorine (mg/L)	20.02	20.02	60.02		pH Adjustment?
Technician Initials	elt	TA)			
Chronic topsmel	+				
Test Performed: Kep 10					Amount of HCI adde
rest renomieu.		ater: 8:2 / Lab	SW / Lab ART	Dther:	Final p
Additional Control? X N	-	Hardness of	Samily: 1 100		Cl <sub>2</sub> Adjustment?
		Aikaiiiiity	Hareness or Sa	alinity:	
Test Performed: Urchin Fert.	Control/Dilution W	later: 8.2	SWP / Lab APT	)thore	
"BA Sample only	Alkalinity:	Hardness or	Salinity 773	Uner	SIS added:
Additional Control? Y N	=	Alkalinity:	Hardness or Sa	alinity:	rindi riee Gi <sub>2</sub> .
		· · · · · · · · · · · · · · · · · · ·			Sample Aeration?
Test Performed:	Control/Dilution W	ater: 8:2 / Lab	SW / Lab ART (	Other:	oumple Aerations
	Alkalinity:	Hardness or	Salinity:		Initial D.O.
Additional Control? Y N	=	Alkalinity:	Hardness or Sa	linity:	Duration & Rat
				2	Final D.O.
Notes: 1 Temperature of sample should	be 0-6°C, if receive	d more than 24 hour	s past collection time	9	
<sup>2</sup> mg/L as CaCO3, <sup>3</sup> Measured f	or freshwater sampl	es only, NA = Not Ap	oplicable		Subsamples for Ad
	- à	C ·			NH3 Oth
Additional Comments: (A) IN DICUTION D	L & SAMPLE -	tor salini	ty measu	rement	Tech Initials

### Sample Check-In Information

NO COLOT, (L	EAR NO	ODOR, NE	DEBRIS
". NO color, cl	ENC, N	Scale L	1447 DESN
COC Complete (Y/N)	17		
а <u>7</u> в <u>7</u> с <u>7</u>			
K	$\mathbf{N}$		
Filtration? Y N			
Pore Size:	-	-	
Organisms	or	Debris	
	$\overline{\Delta}$		
Salinity Adjustment?	YN		
Test:	Source:	Targe	et ppt:
Test:	Source:	Targe	et ppt:
Test:	Source:	Targe	et ppt:
pH Adjustment? Y	N		
	A	B	C
Initial pH			
Amount of HCI added			
Final pH:			
Cl <sub>2</sub> Adjustment? Y	N		
1 14 1 1 1 1 1 1 1	A	B	C
Initial Free Cl <sub>2</sub> :			
SIS added:	-		
Final Flee Gl <sub>2</sub> .	L		
Sample Aeration? V	N		•
	Ü	B	C
Initial D.O.			
<b>Duration &amp; Rate</b>			
Final D.O.	and the second second		
Subsamples for Addi	tional Chem	istry Require	d? Y N
NH3 Other			

QC Check: <u>AC 8/7/17</u> Final Review: <u>15</u>8/18/17

10 Q 18 AC 817/17

Appendix C

Chain-of-Custody Forms

## 3 SPECIES STUDY

Project Name:	3 Species Study	Tech	DE nologies	Peter Shen	Contact	Information: (760) 20.	1-7777				CDP laorato Entahlpy La NECK Labou lautilus: AIM: Dther:	pry: iboratory: X		Turn Around Time Normal:X RUSH (24 hr): 3 Days: 5 Days: ??? Days
Special instructi End: 8/1/17 @ (	ecial instruction: Sample collected during normal plant operation at 53 MGD. Sample is to be run unadjusted. Start: 7/31/17 @ 08:00, ANALYSES												NOTES:	
		Yes=Y No=N A	Glass=G Plastic= Acid=A Base=B	P			elt Chronic	Chronic	ronic					
San	Drinkin nple ID	g Water=DW Seawat	ter=SW Soil=S Brine=	B Sample Type	Preservative ?	Container	Pacific Topsm	Red Abalone	Giant Kelp Ch					
M-001 (	(17- 2541)	7/31-8/1/17	08:00-08:00	Brine	N	2 X 4L CUBIE	X	X	х					TDS - 61.00 ppt, EC - 84.88 mS/cm
								7. 3355						
Relinquished By:	:		Date:	Time:		Received By:				Time			Samp	ple Condition Upon Receipt:
Vita	ym		8/1/17	0900		<u> </u>	87	1/17	7 (	09,10e		Iced		Ambient or <sup>0</sup> C
	<u> </u>		<u>  8/1/17</u>	13:07		Ryatt=	- 8	<u>(1) î</u>	7	1307	X	lced		Ambient or $50^{\circ}$ C

Nautilus ID= 12-0829

# 3 SPECIES STUDY: TOPSMELT RENEWAL

Project Name: <u>3 Species Study</u> Special instruction: Sample collect 08:00, End: 8/3/17 @ 08:00. KC	Tect	Project Manager:	Peter Shen D. Sample is for topsmelt	Contact chronic r	Information: (760) 202 enewal. Start: 8/2/17 @	<u>77777</u>			ANALYSES	DP laorato Entahlpy La VECK Labor lautilus: NIM: Dther:	ry: boratory: ratory: X		Turn Around Time Normal: RUSH (24 hr): 3 Days: 5 Days: ??? Days NOTES:
Drinki	Yes=Y No=N ng Water=DW Seawa	Glass=G Plastic= Acid=A Base=B ster=SW Soil=S Brine=1	P	Pres		Chronic (renewal)							
Sample ID	Date	Time	Sample Type	ervative ?	Container Type	Topsmelt					10 <sup>1</sup> 0100000000000000000000000000000000	N	
M-001 (17- 2552)	8/2-3/17	08:00-08:00	Brine	N	4L CUBIE								TDS - 45.34 ppt, EC - 66.75 mS/cm
Relinquished By:		Date:	Time:		Received By:	L	131	11	Tim Di		lood		
	<u> </u>	8/3/117	13:43		PAR	 	3/1	7	1343		lced		Ambient or <u>4.5</u> °C

NANTIUS 10: 17-0838

# 3 SPECIES (RENEWAL)

	Tech			- )					CE Er W Na Al	DP laorator ntahlpy Lab ECK Labor nutilus: M: :her:	ry: boratory: X		Turn Around Time Normal:X RUSH (24 hr): 3 Days: 5 Days: ??? Days	
Project Name: <u>3 Species Study</u> Special instruction: Sample collect	ted during plant off-sp	Project Manager: pec. Sample is for tops	Peter Shen melt chronic renewal. St	Contact art: 8/4/1	Information: (760) 20	<u>1-7777</u>		- Sanaker, sansi dan bu dibuku						-
08:30. KC						(16			ANALYSES				NOTES:	
		Glass=G Plastic=	=P			new								
	Yes=Y No=N	Acid=A Base=B			1	nic (re								
Drinkir	ng Water=DW Seawa	ter=SW Soil=S Brine=	B	Pres		Chro								
Sample ID	Date	Time	Sample Type	ervative ?	Container Type	Topsmelt								A.S.
M-001 (17- 2569)	8/4-5/17	08:30-08:30	Brine	N	4L CUBIE	X							TDS - 32.83 ppt, EC - 51.03 mS/cm	9.0
													-	
													-	
Relinquished By:		Date:	Time:	-	Received By:				Time:			Sam	ple Condition Upon Receipt:	-
Keil	~~~	8/5/17	0900			an a	lan and a	A			Iced		Ambient or0C	1
AM DSK	N C	815117	1000		Contran		-8/51	17	1000		Iced		Ambient or0C	1

NAUTILUS 10: 17-0848

Appendix D

Reference Toxicant Test Data and Statistical Analyses

Pacific Topsmelt

## **CETIS Summary Report**

18 Aug-17 13:02 (p 1 of 2) 170803aart | 16-4307-2764

Pacific Topsr	nelt 7-d Survival	and Grow	rth Test							Nautilus	s Environm	ental (CA)
Batch ID: Start Date: Ending Date: Duration:	05-0883-5547 03 Aug-17 15:3 10 Aug-17 10:1 6d 19h	Tes 0 Pro 0 Sp So	st Type: otocol: ecies: urce:	Growth-Survival (7d) EPA/600/R-95/136 (1995) Atherinops affinis Aquatic Biosystems, CO					: Dilut Not 1 15d	ted Natural Applicable	Seawater	
Sample ID: Sample Date: Receive Date Sample Age:	01-2268-9219 03 Aug-17 03 Aug-17 16b	Co Ma So	le: 170803aart erial: Copper chloride irce: Reference Toxicant tion: Copper Chloride					Client: Project	Inter :	nal		
oumpie Age.	•	010			~							
Comparison :	Summary		NOF		TOP	DMOD						
13-5096-5105	Zd Survival Rate	<u> </u>	37.5		53.03	17.5%	10	N۷ ۲	unnett M		narison Tes	+
09-4759-7692	96h Survival Ra	ite	37.5	75	53.03	18.0%		C	unnett M	lultiple Com	parison Tes	t
15-5672-1044	Mean Dry Biom	ass-mg	75	150	106.1	14.0%		D	unnett M	ultiple Com	parison Tes	t
Point Estimat	te Summary											
Analysis ID	Endpoint		Level	µg/L	95% LCL	95% UCL	τu	N	lethod			
08-5568-6728	7d Survival Rate	э	EC50	91.23	79.68	104.4		Т	rimmed S	Spearman-K	ärber	
04-7533-8597	96h Survival Ra	te	EC50	93.31	80.3	108.4		Т	rimmed S	Spearman-K	lärber	
14-2708-1509	Mean Dry Biom	ass-mg	IC25	85.46	66.06	97.89 110 0		L	inear Inte	erpolation (IC	CPIN)	
			10.50	107.8	96.06	110.0	Der Balance de Caracteria			a de la companya de l		
Test Acceptal	bility											
Analysis ID	Endpoint		Attribu	ite	Test Stat	TAC Limi	ts	C	verlap	Decision		
08-5568-6728	7d Survival Rate	Ð	Contro	l Resp	1	0.8 - NL		Y	es	Passes Ad	cceptability	Criteria
13-5096-5105	7d Survival Rate	Ð	Contro	l Resp	1	0.8 - NL		Y	'es	Passes A	cceptability	Criteria
14-2708-1509	Mean Dry Blom	ass-mg	Contro	I Resp	1.154	0.85 - NL		Y	es	Passes Ad	cceptability	Criteria
13-5096-5105	7d Survival Pat	ass-mg		Resp	1.154	0.85 - NL		Y	es	Passes A	cceptability (	Criteria
15-5672-1044	Mean Dry Biom	ass-mg	PMSD		0.1733	NL - 0.25 NL - 0.5		N	lo	Passes A	ceptability	Criteria
7d Survival R	ate Summarv	-										
C-ug/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	s	td Err	Std Dev	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	0		0	0.0%	0.0%
37.5		5	0.96	0.8489	1	0.8	1	0	.04	0.08944	9.32%	4.0%
75		5	0.76	0.488	1	0.6	1	0	.09798	0.2191	28.83%	24.0%
150		5	0.04	0	0.1511	0	0.2	0	.04	0.08944	223.6%	96.0%
300		5	0	0	0	0	0	0		0		100.0%
600		5	0	0	0	0	0	0		0		100.0%
96h Survival I	Rate Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	S	td Err	Std Dev	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	0		0	0.0%	0.0%
37.5		5	0.96	0.8489	1	0.8	1	0	.04	0.08944	9.32%	4.0%
75		5	0.76	0.488	1	0.6	1	0	.09798	0.2191	28.83%	24.0%
150		5	0.08	0	0.216	0	0.2	0	.04899	0.1095	136.9%	92.0%
300 600		ວ 5	0	U	0	U 0	0	0		U		100.0%
		J	0	U	0	U		0		0		100.0%
Mean Dry Bio	mass-mg Summ	ary	8.0	6861 · **	0	0.01						0.1 57 57
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	S	td Err	Std Dev	CV%	%Effect
0	Lab Control	5	1.154	1.06	1.248	1.036	1.22	0	.03388	0.07575	6.56%	0.0%
75		5 5	1.093	1.03	1.100	1.022	1.10	0 U 8 A	.UZZ70 08804	0.05094	4.00% 10.86%	5.34% 13.27%
150		5	0.0308	-0 05471	0 1163	0.034	1.20	υ Δ Λ	0308	0.1909	19.00% 223.6%	97 33%
300		5	0	0	0	0	0	. 0 . 0		0	220.070	100.0%
600		5	0	0	0	0	0	0		0		100.0%

Analyst: AC QA: 9812317

## **CETIS Summary Report**

0.154

75		1	0.6	0.6	0.6	1	
150		0	0.2	0	0	0	
300		0	0	0	0	0	
600		0	0	0	0	0	
96h Surviv	al Rate Detail						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	
0	Lab Control	i	1	1	1	1	
37.5		1	1	0.8	1	1	
75		1	0.6	0.6	0.6	1	
150		0	0.2	0	0	0.2	
300		0	0	0	0	0	
500		0	0	0	0	0	
Mean Dry I	Biomass-mg Detai						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	
)	Lab Control	1.22	1.036	1.174	1.214	1.128	
37.5		1.092	1.09	1.166	1.094	1.022	
75		1 174	0.024	0 070	0.000	4 050	

Pacific To	psmelt 7-d Surviva	I and Grov	wth Test				Nautilus Environmental (CA)
7d Surviva	al Rate Detail						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	
0	Lab Control	1	1	1	1	1	
37.5		1	1	0.8	1	1	
75		1	0.6	0.6	0.6	1	
150		0	0.2	0	0	0	
300		0	0	0	0	0	
600		0	0	0	0	0	
96h Surviv	val Rate Detail						
C-ua/L	Control Type	Rep 1	Rep 2	Rep 3	Ren 4	Ren 5	

Report Date: Test Code:

18 Aug-17 13:02 (p 2 of 2) 170803aart | 16-4307-2764

Analyst: <u>AC</u> QA: <u>69/23/17</u>

CETIS Ana	alytical Rep	ort			Report Date:         18 Aug-17 13:           Test Code:         170803aart   1				D1 (p 1 of 5)			
Pacific Tops	melt 7-d Surviva	al and Grow	th Test				1651	code.	Nautilus	s Environr	nental (CA)	
Analysis ID:	13-5096-5105	Enc	lpoint: 7d	Survival Rat	e		CET	IS Version:	CETISv1.8.7			
Analyzed:	18 Aug-17 13:	01 Ana	lysis: Par	ametric-Cor	ntrol vs Trea	Itments	Offic	cial Results	Yes			
Data Transfo	rm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU	
Angular (Corr	ected)	NA	C > T	NA	NA		17.5%	37.5	75	53.03		
Dunnett Mult	iple Compariso	n Test										
Control	vs C-µg/L		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision(	α:5%)			
Lab Control	37.5		0.5137	2.227	0.207 8	0.5387	CDF	Non-Signi	ficant Effect			
	75*		2.972	2.227	0.207 8	0.0118	CDF	Significant	t Effect			
	150*		11.56	2.227	0.207 8	<0.0001	CDF	Significant	Effect			
ANOVA Table	e											
Source	Sum Squ	iares	Mean Squ	are	DF	F Stat	P-Value	Decision(	α:5%)			
Between	3.704804		1.234935		3	57.48	<0.0001	Significant	Effect			
Error	0.343776	6	0.0214860	4	16							
Total	4.048581				19					Softafores and s		
Distributiona	l Tests											
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)				
Variances	Mod Lev	ene Equality	of Variance	1.59	5.953	0.2433	Equal Var	iances				
Variances	Levene E	Equality of V	ariance	15.86	5.292	<0.0001	Unequal \	/ariances				
Distribution	Shapiro-V	Wilk W Norn	nality	0.8929	0.866	0.0305	Normal Di	istribution				
7d Survival F	ate Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect	
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%	
37.5		5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	4.0%	
75		5	0.76	0.488	1	0.6	0.6	1	0.09798	28.83%	24.0%	
150		5	0.04	0	0.1511	0	0	0.2	0.04	223.6%	96.0%	
300		5	0	0	0	0	0	0	0		100.0%	
600		5	0	0	0	0	0	0	0		100.0%	
Angular (Cor	rected) Transfor	med Summ	ary									
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect	
0	Lab Control	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%	
37.5		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%	
75		5	1.07	0.7575	1.382	0.8861	0.8861	1.345	0.1125	23.51%	20.48%	
150		5	0.2731	0.1409	0.4054	0.2255	0.2255	0.4636	0.04763	38.99%	79.7%	
300		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%	
600		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%	

Analyst: K QA: 98/23/17



CETIS Ana	alytical Rep	ort			Repo Test	ort Date: Code:	18 Aug-17 13:01 (p 3 of  5) 170803aart   16-4307-2764				
Pacific Tops	melt 7-d Surviv	al and Gro	wth Test						Nautilus	Environn	nental (CA)
Analysis ID: Analyzed:	09-4759-7692 18 Aug-17 13	2 Er 8:01 Ar	n <b>dpoint</b> : 96h nalysis: Par	Survival Rate ametric-Control vs Treatments			CET	IS Version: cial Results:	CETISv1 Yes	.8.7	
Data Transfo	rm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Angular (Corr	ected)	NA	C > T	NA	NA		18.0%	37.5	75	53.03	
Dunnett Mult	iple Comparis	on Test									
Control	vs C-µg/L		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision(	a:5%)		
Lab Control	37.5		0.4976	2.227	0.213 8	0.5458	CDF	Non-Signif	icant Effect		
	75*		2.879	2.227	0.213 8	0.0142	CDF	Significant	Effect		
	150*		10.7	2.227	0.213 8	<0.0001	CDF	Significant	Effect		
ANOVA Table	9										
Source	Sum Sq	uares	Mean Squ	are	DF	F Stat	P-Value	Decision(	a:5%)		
Between	3.36881	6	1.122939		3	49.03	<0.0001	Significant	Effect		
Error	0.36645	98	0.0229037	3	16						
Total	3.73527	6			19						
Distributiona	I Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Mod Le	vene Equali	ty of Variance	1.485	5.953	0.2683	Equal Var	iances		del delar kom fra en dela fan se senare sen	
Variances	Levene	Equality of	Variance	23.07	5.292	<0.0001	Unequal \	/ariances			
Distribution	Shapiro	-Wilk W No	rmality	0.9209	0.866	0.1033	Normal D	istribution			
96h Survival	Rate Summary										
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1	1	1	1	1	1	0	0.0%	0.0%
37.5		5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	4.0%
75		5	0.76	0.488	1	0.6	0.6	1	0.09798	28.83%	24.0%
150		5	0.08	0	0.216	0	0	0.2	0.04899	136.9%	92.0%
300		5	0	0	0	0	0	0	0		100.0%
600		5	0	0	0	0	0	0	0		100.0%
Angular (Cor	rected) Transfo	ormed Sum	mary								
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
37.5		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%
75		5	1.07	0.7575	1.382	0.8861	0.8861	1.345	0.1125	23.51%	20.48%
150		5	0.3208	0.1588	0.4827	0.2255	0.2255	0.4636	0.05833	40.66%	76.16%
300		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%
600		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%

Analyst: <u>AC</u> QA: <u>> 8/33/</u>/7



Analyst: AC QA: 4-6/23/17

CETI	ETIS Analytical Report											Report Date:         18 Aug-17 13:01 (p 5 of 5)           Test Code:         170803aart   16-4307-2764			
Pacifi	c Topsi	melt 7-c	l Surviva	l and G	irowth	Test					4		Nautilus	s Environr	mental (CA)
Analys Analys	sis ID: zed:	15-56 18 Αι	i72-1044 Jg-17 13:0	01	Endpo Analys	oint: Mea sis: Par	an Dry Biom ametric-Cor	nass-mg ntrol vs 1	ſrea	tments	CET Offic	IS Version: al Results:	CETISv1 Yes	.8.7	
Data T	ransfo	rm		Zeta		Alt Hyp	Trials	Seed			PMSD	NOEL	LOEL	TOEL	TU
Untran	sforme	d		NA	(	C > T	NA	NA			14.0%	75	150	106.1	
Dunne	ett Mult	iple Co	mpariso	n Test											
Contro	ol	vs	C-µg/L		-	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(	α:5%)		
Lab Co	ontrol		37.5		(	).8491	2.227	0.162	8	0.3927	CDF	Non-Signif	icant Effect		
			75		2	2.112	2.227	0.162	8	0.0617	CDF	Non-Signif	icant Effect		
			150*			15.49	2.227	0.162	8	<0.0001	CDF	Significant	Effect		
ANOV	A Table	•													
Sourc	е	S	Sum Squ	ares	١	Viean Squ	lare	DF		F Stat	P-Value	Decision(	α:5%)		
Betwee	en	4	1.209566	_		.403189		3		106.7	<0.0001	Significant	Effect		
Total			1 420072	5	(	0.0131566		16		_					
Totar			1.420072					19							
Distrib	outiona	l Tests													
Attribu	ute	***	Test				Test Stat	Critica	l	P-Value	Decision(	α:1%)	and the support of the support		
Varian	ces		Bartlett E	quality	of Varia	ance	8.595	11.34		0.0352	Equal Var	iances			
Distrib	ution		Shapiro-\		Normal	ity	0.9521	0.866		0.3994	Normal Di	stribution			
Mean	Dry Bio	mass-n	ng Sumn	nary											
C-µg/L	-	Contro	ol Type	Coun	t P	lean	95% LCL	95% U	CL	Median	Min	Max	Std Err	CV%	%Effect
0		Lab Co	ontrol	5	1	.154	1.06	1.248		1.174	1.036	1.22	0.03388	6.56%	0.0%
37.5				5	1	.093	1.03	1.156		1.092	1.022	1.166	0.02278	4.66%	5.34%
150				5	1	.001	0.7543	1.248		0.872	0.834	1.258	0.08894	19.86%	13.27%
300				5	c c	1.0306	-0.05471 0	0.1163		0	0	0.154	0.0308	223.6%	97.33%
600				5	C	, )	0	0		0	0	0	0		100.0%
Graphi	iec									-	_	-	-		100.070
Graph	ics														
	<sup>1.4</sup>									<sup>0.30</sup> F		1			
										0.25				۵	
ē	1.2 -	-@Z								0.20					/
ass-r	1.0 -									19 015		1		•	
Biom	Ē			$ \mathcal{A} $			Reject Null		tered	storm		1		•	
Dry	0.8								Cent	10.10 L		1			
Mean	0.6									<b>5</b> 0.05		i I			
	È									0.00					
	0.4									-0.05	(				
										-0.10					
	F									-0.15	6 6 6	1			
	0.0 Ľ		37.5	75				j		-0.20			I	I	
		U LC	21.2	75 C-1107	150 /I.	300	600			-2,5	-2.0 -1.5 -1	LU -0.5 0.0	0.5 1.0	1.5 2.0	2.5
				µ9/								Kankits			

000-089-187-4

st: AC QA: 5 8/23/7

CETIS	S Ana	lytical Repo	ort Date: t Code:	18 Aug-17 13:02 (p 1 of 1) 170803aart   16-4307-2764									
Pacific	Topsm	nelt 7-d Surviva	l and G	rowth Tes	st							Nautilus Environmental (CA)	
Analys Analyz	Analysis ID:       14-2708-1509       Endpoint:       Mean Dry Biomass-mg       CETIS Version:       CETISv1.8.7         Analyzed:       18 Aug-17 13:01       Analysis:       Linear Interpolation (ICPIN)       Official Results:       Yes												
Linear	Linear Interpolation Options												
X Tran	sform	Y Transform	า	Seed	Res	amples	Exp 95	% CL	Metho	bd			
Linear		Linear		1114832	100	0	Yes		Two-P	oint Inter	olation		
Point E	stimate	es											
Level	μg/L	95% LCL	95%	UCL									
IC25	85.46	66.06	97.89										
IC50	107.8	96.06	116.6										
Mean E	ry Bior	nass-mg Summ	nary				C	alculat	ed Vari	ate			
C-µg/L	С	ontrol Type	Coun	t Mea	n	Min	Max	Std	Err	Std Dev	CV%	%Effect	
0	L	ab Control	5	1.15	4	1.036	1.22	0.03	3388	0.07575	6.56%	0.0%	
37.5			5	1.09	3	1.022	1.166	0.02	2278	0.05094	4.66%	5.34%	
75			5	1.00	1	0.834	1.258	0.08	3894	0.1989	19.86%	13.27%	
150			5	0.03	08	0	0.154	0.03	808	0.06887	223.6%	97.33%	
300			5	0		0	0	0		0		100.0%	
600			5	0		0	0	0		0		100.0%	
Graphi	cs		9980-00-00-00-00-00-00-00-00-00-00-00-00-0										
	1.2	e e											



CETIS A	nalytical Rep	port			Repo Test	ort Date: Code:	18 Aug-17 13:02 (p 1 of 2) 170803aart   16-4307-2764						
Pacific Top	osmelt 7-d Surviv	al and Grow	th Test						Nautilus	Environn	nental (CA)		
Analysis ID:       08-5568-6728       Endpoint:       7d Survival Rate       CETIS Version:       CETISv1.8.7         Analyzed:       18 Aug-17 13:01       Analysis:       Trimmed Spearman-Kärber       Official Results:       Yes													
Trimmed S	pearman-Kärber	Estimates											
Threshold	Option	Threshold	Trim	Mu	Sigma		EC50	95% LCL	95% UCL				
Control Thr	eshold	0	4.00%	1.96	0.02938		91.23	79.68	104.4				
7d Surviva	I Rate Summary				Calc	ulated Varia	te(A/B)						
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	А	в		
0	Lab Control	5	1	1	1	0	0	0.0%	0.0%	25	25		
37.5		5	0.96	0.8	1	0.04	0.08944	9.32%	4.0%	24	25		
15		5	0.76	0.6	1	0.09798	0.2191	28.83%	24.0%	19	25		
150		5	0.04	Ŭ	0.2	0.04	0.08944	223.6%	96.0%	1	25		
300		5	0	0	0	0	0		100.0%	0	25		
600		5	U	0	0	0	0		100.0%	0	25		
Graphics 1.0 0.9 0.8 0.7 0.6 0.7 0.6 0.7 0.4 0.3 0.2 0.1 0.0		00 300 C-µg/L	<u>+- 1- 1- 1- 1- 1- 1-</u> 400	<b></b> 500 600									



Analyst: KC QA: 58/23/17



000-089-187-4

C QA: 5- 8173/7

### **CETIS QC Plot**

Pacific Top	osmelt 7-d Survival and Growth		Nautilus Environmental (CA)		
Test Type:	Growth-Survival (7d)	Organism:	Atherinops affinis (Topsmelt)	Material:	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	Endpoint:	96h Survival Rate	Source:	Reference Toxicant-REF

Pacific Topsmelt 7-d Survival and Growth Test



Mean:	80.74	Count:	20	-2s Warning Limit:	41.7	-3s Action Limit:	22.18
Sigma:	19.52	CV:	24.20%	+2s Warning Limit:	119.8	+3s Action Limit:	139.3

**Quality Control Data** 

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2016	Dec	12	15:40	57.63	-23.11	-1.184			17-7655-3305	16-6823-7061
2			17	17:20	96.07	15.33	0.7852			00-4996-9669	21-0614-9848
3	2017	Jan	28	16:35	103.2	22.51	1.153			01-6638-9744	11-5682-9333
4		Feb	20	15:25	84.89	4.152	0.2127			05-4846-0287	16-3217-3399
5			21	14:30	81.79	1.048	0.05369			19-8846-5091	03-3561-6503
6			28	16:15	76.05	-4.693	-0.2404			04-9222-1970	10-5894-0944
7		Mar	7	16:05	58.05	-22.69	-1.162			03-0395-7485	17-9426-7913
8			16	14:25	50.58	-30.16	-1.545			05-0398-4991	16-9244-5293
9			20	14:30	64.63	-16.11	-0.8253			09-7903-8875	17-2606-5078
10		Apr	4	11:45	95.07	14.33	0.7341			06-7331-0006	19-2444-4194
11			18	15:10	121.8	41.1	2.105	(+)		13-9437-6434	00-9623-1288
12		May	2	15:30	92.34	11.6	0.594			13-7398-1933	17-9546-8800
13			16	16:05	66.01	-14.73	-0.7546			15-4172-8544	17-5606-0722
14		Jun	6	15:15	99.95	19.21	0.984			03-7054-9226	00-2010-1639
15			12	16:45	55.81	-24.93	-1.277			00-0401-8777	04-0036-1285
16			21	16:20	88.76	8.021	0.4109			03-3777-4896	21-3187-8661
17			26	16:35	94.93	14.19	0.727			13-6536-6279	06-9796-4972
18		Jul	11	15:20	56.28	-24.46	-1.253			09-4962-6740	04-5111-6227
19			19	15:15	78.56	-2.184	-0.1119			10-1092-2580	12-2922-8419
20			26	14:45	92.34	11.6	0.594			06-2595-4991	09-7200-4528
21		Aug	3	15:30	93.31	12.57	0.6442			16-4307-2764	04-7533-8597

#### **CETIS QC Plot**

Pacific Top	osmelt 7-d Survival and Growth 1	est			Nautilus Environmental (CA)
Test Type:	Growth-Survival (7d)	Organism:	Atherinops affinis (Topsmelt)	Material:	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	Endpoint:	7d Survival Rate	Source:	Reference Toxicant-REF

Pacific Topsmelt 7-d Survival and Growth Test



Mean:	74.61	Count:	20	-2s Warning Limit:	42.59	-3s Action Limit:	26.58
Sigma:	16.01	CV:	21.50%	+2s Warning Limit:	106.6	+3s Action Limit:	122.6

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2016	Dec	12	15:40	54.52	-20.09	-1.255			17-7655-3305	17-7126-1781
2			17	17:20	84.18	9.575	0.598			00-4996-9669	10-4981-0889
3	2017	Jan	28	16:35	89.94	15.33	0.9573			01-6638-9744	18-2514-5366
4		Feb	20	15:25	81.51	6.901	0.431			05-4846-0287	01-6018-2100
5			21	14:30	77.2	2.588	0.1616			19-8846-5091	00-1320-4242
6			28	16:15	69.98	-4.633	-0.2894			04-9222-1970	07-6617-5403
7		Mar	7	16:05	56.19	-18.42	-1.151			03-0395-7485	16-4389-6256
8			16	14:25	48.63	-25.98	-1.623			05-0398-4991	12-0821-5314
9			20	14:30	61.27	-13.34	-0.8331			09-7903-8875	16-1572-1109
10		Apr	4	11:45	87.58	12.97	0.81			06-7331-0006	02-6887-7674
11			18	15:10	106.1	31.46	1.965			13-9437-6434	06-1808-4673
12		May	2	15:30	89.81	15.2	0.9495			13-7398-1933	04-8291-2215
13			16	16:05	61.51	-13.1	-0.8185			15-4172-8544	17-6769-1097
14		Jun	6	15:15	80.87	6.259	0.3909			03-7054-9226	13-3568-8152
15			12	16:45	55.81	-18.8	-1.174			00-0401-8777	17-7276-3482
16			21	16:20	78.64	4.033	0.2519			03-3777-4896	16-8769-6501
17			26	16:35	89.81	15.2	0.9495			13-6536-6279	16-4412-2051
18		Jul	11	15:20	56.28	-18.33	-1.145			09-4962-6740	17-3186-0615
19			19	15:15	70.15	-4.46	-0.2786			10-1092-2580	04-5358-4021
20			26	14:45	92.34	17.73	1.107			06-2595-4991	04-5119-7974
21		Aug	3	15:30	91.23	16.62	1.038			16-4307-2764	08-5568-6728

Analyst: AC QA: 98/23/17

### **CETIS QC Plot**

Pacific Top	osmelt 7-d Survival and Growth	fest			Nautilus Environmental (CA)
Test Type:	Growth-Survival (7d)	Organism:	Atherinops affinis (Topsmelt)	Material:	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	Endpoint:	Mean Dry Biomass-mg	Source:	Reference Toxicant-REF

Pacific Topsmelt 7-d Survival and Growth Test



Mean:	78.07	Count:	20	-2s Warning Limit:	38.89	-3s Action Limit:	19.3
Sigma:	19.59	CV:	25.10%	+2s Warning Limit:	117.2	+3s Action Limit:	136.8

**Quality Control Data** 

Doint	Voar	Month	Dav	Time		Dalla	C: mar a	18/	A		
rom	rear	INOUGU	Day	nme	uc pata	Deita	Sigma	warning	Action	lest ID	Analysis ID
1	2016	Dec	12	15:40	56.79	-21.28	-1.086			17-7655-3305	00-7236-7753
2			17	17:20	80.95	2.875	0.1468			00-4996-9669	12-1893-6332
3	2017	Jan	28	16:35	81.29	3.223	0.1645			01-6638-9744	12-9710-8162
4		Feb	20	15:25	82.08	4.012	0.2048			05-4846-0287	19-7448-1666
5			21	14:30	74.7	-3.367	-0.1719			19-8846-5091	19-2777-1654
6			28	16:15	63.08	-14.99	-0.7653			04-9222-1970	03-5035-7915
7		Mar	7	16:05	56.92	-21.15	-1.08			03-0395-7485	01-9456-0631
8			16	14:25	53.98	-24.09	-1.23			05-0398-4991	10-5445-8137
9			20	14:30	59.06	-19.01	-0.9705			09-7903-8875	16-4704-0172
10		Apr	4	11:45	106.2	28.16	1.438			06-7331-0006	19-2651-8214
11			18	15:10	113.4	35.33	1.803			13-9437-6434	17-3851-3227
12		May	2	15:30	95.23	17.16	0.8758			13-7398-1933	01-1001-0281
13			16	16:05	59.54	-18.53	-0.9457			15-4172-8544	07-5683-6082
14		Jun	6	15:15	87.13	9.062	0.4626			03-7054-9226	02-7050-6432
15			12	16:45	56.34	-21.73	-1.109			00-0401-8777	00-0931-1405
16			21	16:20	91.03	12.96	0.6616			03-3777-4896	13-9283-9140
17			26	16:35	99.81	21.74	1.11			13-6536-6279	17-2080-9645
18		Jul	11	15:20	61.74	-16.33	-0.8334			09-4962-6740	00-1319-0468
19			19	15:15	72.22	-5.849	-0.2986			10-1092-2580	00-5345-1632
20			26	14:45	109.8	31.74	1.62			06-2595-4991	06-0715-4103
21		Aug	3	15:30	107.8	29.7	1.516			16-4307-2764	14-2708-1509



Client: Internal

Sample ID: CuCl<sub>2</sub>

Test No.: 170803aart

Test Species: A. affinis

Start Date/Time: 8/3/2017 1530

End Date/Time: 8/10/2017 / ししつ

Concentration	Ren	Rand Test Day / No. Organisms Alive								Percent	
(µg/L)	Rep.	#	0	1	2	3	4	5	6	7	Survival
Lab Control	a	3	5	5	5	5	5	5	5	5	100
	b	9	5	5	5	5	5	5	5	5	100
	с	1	5	5	5	5	5	5	5	5	100
	d	7	5	2	5	5	5	5	5	5	100
	ē	6	5	5	5	5	5	5	5	5	100
37.5	а	27	5	5	5	5	5	5	5	5	100
	b	21	5	5	5	5	5	5	5	5	100
	с	2	5	5	4	4	4	4	4	4	80
	d	22	5	5	5	5	5	5	5	5	100
	е	30	5	5	5	5	5	5	5	5	100
75	a	17	5	5	5	5	5	5	5	5	100
	b	20	5	5	5	3	3	3	3	Ŝ.	60
	c	16	5	5	5	4	3	3	3	3	60
	d	26	5	5	3	3	3	3	3	3	60
	е	29	5	5	5	5	5	5	5	5	100
150	a	15	5	5	2	2	0		, angga part	~	Bt& O
	b	25	5	5	2	2	1	١	l		20
	с	13	5	5	3	2	0	* 20 <u>03-00-0</u> -	UNDERING.	-	$\overline{\mathcal{O}}$
	d	24	5	Ч	2	60	فتتحمي	Witness -		- دېچىمىنى	0
	e	8	5	Ч	30	182	1	$\mathcal{O}$	n <sub>1625*</sub>	100000	0
300	а	19	5	4	4	1	0				D
	b	28	5	3	2	2	0		n ll		0
	с	12	5	3	3	1	6				1.0
	d	10	5	3	3	0	0		0	Las	0
	е	23	5	1	0		,			1	$\hat{O}$
600	a	11	5								0
	b	14	5		all						0
	c	5	5	(			1				0
	d	4	5			doß	ai				O
	е	18	5	-							0
Rand # QC: 17/	Tech	Initials	ACS	PD	PM	RH	CH	CG .	Dm	CH	
Initial Count QC'd by:		Time	1530	1330	1305	1120	1030	1245	(110	1010	
Initiated by: 465											
									1		
morning:	NRIST	78351	08351	ิอซิเรา	0830	(AZO)		Tare	Nt. Initia	Is/Date:	Ka all-IN
evening: 1615 1675 1615 1620 1615 1675 Date/Time in									Fime in:	3/10/17 107	
									Date/Ti	me out:	81111-1415
Commonto R Dell	100	61.7	(Do	10 1	elial.	-			Ter	np (°C):	634
Comments: MACH	1001	V/17	en	10 AC	01121				QC Final	Check:	ACO(18)
									rinal l	veriew:	111119 80

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Client:	Internal	Test Species: <u>A. affinis</u>
Sample ID:	CuCl <sub>2</sub>	Start Date/Time: 8/3/2017 1530
Test No.:	170803aart	End Date/Time: 8/10/2017 10:10

Conc. (μg/L)	Rep.	pan weight (mg)	pan + fish weight (mg)	total organism weight (mg)	
Lab Control	a	32.56	38.66	6.10	
	b	32.54	37.72	5.18	
	C C	33.54	39.41	5.87	
en andere and	d	32.30	38.37	6.07	
	e	33.07	38.71	5.64	
37.5	a	29.58	35.04	5.46	
	b	33.75	39.20	5 45	
		32.46	38.29	5.83	
	d	32.87	38.34	5.00	
		34.46	39.57	5 11	
75	a	31.03	36.90	5.87	
	h	34.32	38.49	A 17	
		32 34	36 70		
		34 48	38.82	4.30 A 3A	
		34.46	40.75	4.34	
150		0.00	40.73	0.29	
150	h	33.16	33.03	0.00	
· · · · · · · · · · · · · · · · · · ·		0.00	0.00	0.77	
		0.00	0.00	0.00	
		0.00	0.00	0.00	
300	a	0.00	0.00	0.00	
	h	0.00	0.00	0.00	
	c	0.00	0.00	0.00	
	d	0.00	0.00	0.00	
	e	0.00	0.00	0.00	
600	a	0.00	0.00	0.00	
	b	0.00	0.00	0.00	
	с	0.00	0.00	0.00	
	d	0.00	0.00	0.00	
	е	0.00	0.00	0.00	
Te	ch Initials:	SG	RL/BO		
I	Date/Time:	8/9/2017 0820	8/11/17 14:15		

QC Check: <u>AS/18/17</u> Final Review: <u>US 8/23/17</u>

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Water Quality Measurements

7

7-85

6.6

6

07

7,3

19 0

6.

19

1.87

6

7

5

7.4

29. 4 30. 2

20.

<u>6</u>. 5

9 20.1

12

Client:	Internal	Test Species: <u>/</u>	. affinis
Sample ID:	CuCl <sub>2</sub>	Start Date/Time: 8	13/2017 7530
Test No:	a 170832221 170303 aart	End Date/Time: 8	10/2017 DA
Concentration	Lab Control	Concentration	
Day	0 1 2 3 4 5 6 7	Day	0 1
pH DO (mg/L)	Initial 2,04 3,01 8,03 8,06 8,01 8,12 8,07 7,2 7,3 2, 2 7,5 7,1 7,4 7,2	pH 7 DO (mg/L)	3.04 8.03 7.2 7.3
Salinity (ppt)	30.0 29.9 30.3 29.6 29.7 29.5 30.2 26.2 20.9 19.8 19 8 20.7 20.0 19.3	Salinity (ppt)	29,9 29.91
( <b>C</b> )	Final		
рН DO (mg/L) Temp (°C)	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	pH DO (mg/L) Temp (°C)	7.86 6.5 72.0
Concentration	37.5 µg/L	Concentration	
Day	0 1 2 3 4 5 6 7	Day	0 1
	Initial		
pH DO (mm/l.)	0.04 0.04 0.04 0.04 0.01 0.16 0.01	DO (mg/l)	2,03 8,027
Salinity (nnt)	700 709 202 70.0 292 295 202	Salinity (ppt)	297 79 412
Temp (°C)	20.4 20.7 19.7 19.8 20.3 19.9 19.7	Temp (°C)	0.4 20.71
n Li			7.87
рн	(+ 0 f) / 0 = 7 07 (-7 + 7) / 0 = 1.70 (-7 + 7)	рп	T-3 -

6.4 6.2 6.2 9.9

5.9

120

6.3

19.8

Concentration	300 μg/L									
Day	0	1	2	3	4	5	6	7		
	Initial									
pН	8,03	8.02	801	8,06	7,99					
DO (mg/L)	17.2	7.3.	7.2	7.5	7.0					
Salinity (ppt)	29.7	29.9	30.2	29.5	29.6		11 /	K		
Temp (°C)	20.4	20.7	19.7	199	20.4	P	$\langle \cdot \rangle$	$\lambda$		
				Fi	nal	1	60	0		
pН		7.52	7.32	7.86	7.88		P P			
DO (mg/L)		6.3	6.3	6.5	6.4					
Temp (°C)		22.0	20.1	19.8	20.0					

2

1010

2

7.79

6. 1 6.7 20.1 9.7

150 µg/L

Initial 8.02 8.07 8.00

> Final 7.88 7.87 7.94

> > 600 μg/L

Initial

4

4

5 6

7.27571 30.229.6296 19.819.9204

4 20.6 19.8

1

0

2.02

Concentration	75 μg/L										
Day	0	1	2	3	4	5	6	7			
	Initial										
рН	18.04	8,03	8.02	8.07	8,00	8.12	2.07				
DO (mg/L)	7,2	7.3	7.2	7.5	7,1	7.4	7.3				
Salinity (ppt)	129,9	29.9	30.3	29.6	79.7	29.5	30.2				
Temp (°C)	20.4	20.7	19.8	19.9	10.3	20,0	19.7				
				Fi	nal						
pН		7-85	7.77	7.82	7.79	7.31	7.73	7.74			
DO (mg/L)		6-4	6.0	6.4	6.1	5.9	5.7	6.0			
Temp (°C)		20.1	20.1	19.9	19.8	20:1	19.9	19.7			

6. 20.0 20.0

6.6

ABS

DO (mg/L) 7.Z 29.Z Salinity (ppt) 20.4 Temp (°C) 1 at Final pН DO (mg/L) Temp (°C) 0 1 2 3 4 5 6 7 BO AD PH 2m DM 2H DM Analysts: Initial: 60 DM RH Pm om BO 0 Final CG RH Ct AD 60 RH Q22 / Q23 / Q24 / none Ars Dilutions made by -300 1300 300 200 150 150 High conc. made (µg/L): 600 3.8 3.8 15. 7.6 J. 7 7,6 Vol. Cu stock added (mL):

Cu Stock Concentration (µg/L):

Animal Source/Date Received:

Animal Age at Initiation:

DO (mg/L)

Temp (°C)

99,500

7128/1

15 d

Added to Final Volume = 2500 mL

Comments:

(DQ15 3/1\ 17AC BCHQ18 511011

QC Check:

Ś 18/17

Final Review: 8 8123/17

Animal Acclimation Qualifiers (circle all that apply):

Concentration

Day

pН

Giant Kelp

CETIS Summary Report								Report Date:         06 Aug-17 15:11 (p           Test Code:         170801mprt   02-26/			11 (p 1 of 2) 2-2688-6311
Macrocystis	Germination an	d Germ	Tube Grow	th Test					Nautilu	is Environi	nental (CA)
Batch ID: Start Date: Ending Date: Duration:	18-4068-8239 01 Aug-17 15: 03 Aug-17 12: 45h	30 45	Test Type: Protocol: Species: Source:	Growth-Germination EPA/600/R-95/136 (1995) Macrocystis pyrifera Pt. Loma				Analyst: Diluent: Na Brine: No Age:	nalyst: iluent: Natural Seawater rine: Not Applicable ge:		
Sample ID: Sample Date: Receive Date Sample Age:	04-3130-0846 : 01 Aug-17 : 01 Aug-17 16h		Code: Material: Source: Station:	170801mprt Copper chlorid Reference Tox Copper Chloric	e icant le			Client: In Project:	ernal		
Comparison	Summary										
Analysis ID	Endpoint		NOEL	LOEL	TOFI	PMSD	тн	Method			
17-1105-0363	Germination R	ate	32	100	56.57	4 81%		Dunnett	Multiple Corr	narison To	et
19-7913-1488	Mean Length		10	32	17.89	6.85%		Dunnett	Multiple Con	iparison Te	st
Point Estimat	te Summary										
Analysis ID	Endpoint		Level	μg/L	95% LCL	95% UCL	τυ	Method			
10-5845-9037	Germination R	ate	EC50	178.6	171.2	186.3		Trimmer	Snearman-	(ärher	
16-6637-7239	Mean Length		IC25	94,56	68.72	120.5		Linear Ir	terpolation (I		
	Ū.		IC50	177.6	161.2	236.5		Enfourn		01 114)	
Test Acceptal	bility										
Analysis ID	Endpoint		Attrib	ute	Test Stat	TAC Limi	its	Overlap	Decision		
10-5845-9037	Germination R	ate	Contro	ol Resp 0.938 0.7 - NL			Yes Passes Acceptability Criteria				
17-1105-0363	Germination R	ate	Contro	ol Resp 0.938 0.7 - NL			Yes	Yes Passes Acceptability Criteria			
16-6637-7239	Mean Length		Contro	ol Resp 13.5 10 - NL				Yes Passes Acceptability Criter			Criteria
19-7913-1488	Mean Length		Contro	ol Resp	10 - NL	10 - NL Yes			cceptability	Criteria	
19-7913-1488	Mean Length		NOEL		NL - 35		No	Passes A	cceptability	Criteria	
17-1105-0363	Germination R	ate	PMSE	)	NL - 0.2		No	Passes Acceptability Criteria			
19-7913-1488	Mean Length		PMSE	)	0.06849	NL - 0.2		No	Passes A	cceptability	Criteria
Germination I	Rate Summary										
C-µg/L	Control Type	Count	: Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	0.938	0.8974	0.9786	0.91	0.99	0.01463	0.03271	3.49%	0.0%
10		5	0.942	0.9198	0.9642	0.92	0.96	0.008	0.01789	1.9%	-0.43%
32		5	0.916	0.8836	0.9484	0.88	0.95	0.01166	0.02608	2.85%	2.35%
100		5	0.842	0.8033	0.8807	0.81	0.88	0.01393	0.03114	3.7%	10.23%
180		5	0.476	0.3934	0.5586	0.4	0.54	0.02977	0.06656	13.98%	49.25%
320		5	0.102	0.04831	0.1557	0.03	0.14	0.01934	0.04324	42.4%	89.13%
560		5	0.04	0.02037	0.05963	0.02	0.06	0.00707	0.01581	39.53%	95.74%
Mean Length	Summary										
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	5	13.5	12.4	14.6	12.25	14.5	0.3953	0.8839	6.55%	0.0%
10		5	13.7	13.24	14.16	13.25	14.2	5 0.1658	0.3708	2.71%	-1.48%
32		5	12.5	11.88	13.12	11.75	13	0.2236	0.5	4.0%	7.41%
100		5	10	8.839	11.16	9	11	0.4183	0.9354	9.35%	25.93%
180		5	6.7	5.927	7.473	6.25	7.75	0.2784	0.6225	9.29%	50.37%
520		5	5.45	4.99	5.91	5	6	0.1658	0.3708	6.8%	59.63%
Udc		5	5.05	4.911	5.189	5	5.25	0.05	0.1118	2.21%	62.59%

Analyst: CH QA: ACS/8/17
## **CETIS Summary Report**

Macrocystis Germination and Germ Tube Growth Tes	Macrocystis	Germination	and Germ	Tube	Growth	Test
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Report Date: Test Code: 06 Aug-17 15:11 (p 2 of 2) 170801mprt | 02-2688-6311

Nautilus Environmental (CA)

Germinatio	on Rate Detail						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	
0	Lab Control	0.92	0.95	0.91	0.99	0.92	
10		0.94	0.92	0.96	0.96	0.93	
32		0.91	0.93	0.95	0.88	0.91	
100		0.81	0.88	0.83	0.87	0.82	
180		0.54	0.4	0.5	0.41	0.53	
320		0.03	0.1	0.14	0.11	0.13	
560		0.04	0.03	0.06	0.05	0.02	
Mean Leng	yth Detail						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	
0	Lab Control	12.25	14	13.75	14.5	13	
10		13.5	13.25	14.25	13.75	13.75	
32		12.75	12.75	13	11.75	12.25	
100		10.5	11	10.5	9	9	
180		6.75	6.5	6.25	6.25	7.75	
320		5	5.5	5.5	6	5.25	
560		5	5	5	5.25	5	

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Analyst: \_\_\_\_\_ QA: AC 81 51 7

c 4 1

	ytical Rep	ort		Report Date:06 Aug-Test Code:170801m			\ug-17 15:1 01mprt   02	10 (p 1 of 3) 2-2688-6311			
Macrocystis G	ermination and	d Germ Tub	e Growth To	est					Nautilus	Environn	nental (CA)
Analysis ID: Analyzed:	17-1105-0363 06 Aug-17 15:	End 10 Ana	<b>point</b> : Ger <b>Iysis</b> : Par	mination Ra ametric-Cor	ate htrol vs Trea	tments	CET Offic	IS Version: cial Results:	CETISv1 Yes	.8.7	
Data Transforn	n	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Angular (Correc	cted)	NA	C > T	NA	NA		4.81%	32	100	56.57	
Dunnett Multip	le Comparisor	n Test									
Control	vs C-µg/L		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision(	a:5%)		
Lab Control	10		0.004239	2.407	0.093 8 0.8560		CDF	Non-Signif	icant Effect		
	32		1.311	2.407	0.093 8	0.3167	CDF	Non-Signif	icant Effect		
	100*		4.326	2.407	0.093 8	0.0005	CDF	Significant	Effect		
	180*		14.77	2.407	0.093 8	<0.0001	CDF	Significant	Effect		
	320*		26.3	2.407	0.093 8	<0.0001	CDF	CDF Significant Effect			
	560*		29.39	2.407	0.093 8	<0.0001	CDF	Significant	Effect		
ANOVA Table											
Source	Sum Squ	ares	Mean Squ	are	DF	F Stat	P-Value	Decision(	x:5%)		
Between	7.169048		1.194841		6	322.3	<0.0001	Significant	Effect		
Error	0.103808	1	0.0037074	32	28						
Total	7.272856				34						
Distributional Tests											
Attribute	Test			Test Stat	Critical	P-Value	Decision(	α:1%)			
Variances	Bartlett E	quality of Va	ariance	4.96	16.81 0.5489 Equal Variances						
Distribution	Shapiro-\	Wilk W Norm	nality	0.9751	0.9146	0.5960	Normal Di	stribution			
Germination Ra	ate Summary				,						
C-µg/L C	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0 L	_ab Control	5	0.938	0.8974	0.9786	0.92	0.91	0.99	0.01463	3.49%	0.0%
10		5	0.942	0.9198	0.9642	0.94	0.92	0.96	0.008	1.9%	-0.43%
32		5	0.916	0.8836	0.9484	0.91	0.88	0.95	0.01166	2.85%	2.35%
100		5	0.842	0.8033	0.8807	0.83	0.81	0.88	0.01393	3.7%	10.23%
180		5	0.476	0.3934	0.5586	0.5	0.4	0.54	0.02977	13.98%	49.25%
320		5	0.102	0.04831	0.1557	0.11	0.03	0.14	0.01934	42.4%	89.13%
560		5	0.04	0.02037	0.05963	0.04	0.02	0.06	0.007071	39.53%	95.74%
Angular (Correc	cted) Transfor	med Summ	ary								
C-µg/L C	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0 L	ab Control	5	1.33	1.226	1.434	1.284	1.266	1.471	0.03763	6.33%	0.0%
10		5	1.33	1.282	1.378	1.323	1.284	1.369	0.01731	2.91%	0.01%
32		5	1.28	1.22	1,339	1.266	1.217	1.345	0.02138	3.74%	3.8%
100		5	1.163	1.11	1.217	1.146	1.12	1.217	0.01939	3.73%	12.52%
180		5	0.7612	0.6781	0 8442	0.7854	0.6847	0.8254	0.02991	8.79%	42.77%
320	5		0.3173	0.2134	0.4211	0.3381	0.1741	0.3835	0.03742	26.37%	76.15%
560		5	0.1981	0.1464	0.2498	0.2014	0.1419	0.2475	0.01862	21.02%	85.11%

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CETIS™ v1.8.7.20

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Analyst: CH QA: AC 818/17



CHT OA: AC8/3/17

CETIS Ana	lytical Repo	ort			Repo Test	ort Date: Code:	06 / 1708	Aug-17 15:1 301mprt   02	10 (p 3 of 3) 2-2688-6311		
Macrocystis (	Germination and	d Germ Tub	e Growth To	est					Nautilu	s Environr	nental (CA)
Analysis ID: Analyzed:	19-7913-1488 06 Aug-17 15:*	End 10 Ana	point: Mea lysis: Par	an Length ametric-Con	itrol vs Treat	ments	CET Offic	IS Version: al Results:	CETISv^ Yes	1.8.7	
Data Transfor	rm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Untransformed	b	NA	C > T	NA	NA		6.85%	10	32	17.89	
Dunnett Multi	iple Comparisor	n Test									
Control	vs C-µg/L		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision(	a:5%)		
Lab Control	10		-0.5208	2.407	0.925 8	0.9544	CDF	Non-Signif	icant Effec	t	
	32*		2.604	2.407	0.925 8	0.0331	CDF	Significant	Effect		
	100*		9.113	2.407	Q.925 8	<0.0001	CDF	Significant	Effect		
	180*		17.71	2.407	0.925 8	<u>&lt;</u> 0.0001	CDF	Significant	Effect		
	320*		20.96	2.407	0.925 8	<0.0001	CDF	Significant	Effect		
	560*		22	2.407	0.925 8	<0.0001	CDF	Significant	Effect		
ANOVA Table	•		999-994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 1994 - 19								
Source	Sum Squ	ares	Mean Squ	are	DF .	F Stat	P-Value	Decision(	a:5%)		
Between	434.5607		72.42679		6	196.4	<0.0001	Significant	Effect		
Error	10.325		0.36875		28	_					
Total	444.8857				34						
Distributional	l Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Bartlett E	quality of Va	ariance	14.91	16.81	0.0210	Equal Var	Equal Variances			
Distribution	Shapiro-\	Wilk W Norm	nality	0.9726	0.9146	0.5171	Normal Di	al Distribution			
Mean Length	Summary										
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	13.5	12.4	14.6	13.75	12.25	14.5	0.3953	6.55%	0.0%
10		5	13.7	13.24	14.16	13.75	13.25	14.25	0.1658	2.71%	-1.48%
32		5	12.5	11.88	13.12	12.75	11.75	13	0.2236	4.0%	7.41%
100		5	10	8.839	11.16	10.5	9	11	0.4183	9.35%	25.93%
180		5	6.7	5.927	7.473	6.5	6.25	7.75	0.2784	9.29%	50.37%
320		5	5.45	4.99	5.91	5.5	5	6	0.1658	6.8%	59.63%
560		5	5.05	4.911	5.189	5	5	5.25	0.05	2.21%	62.59%
Graphics											
16 14 12 10 8 6 4 2 0 0		22 I00	180 3	Reject Null	Centered	1.4 1.2 1.0 0.8 0.4 0.4 0.2 0.4 0.0 0.4 0.2 0.4 0.0 0.4 0.2 0.4 0.6 0.4 0.6 0.4 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6					
		C-µg/L						Rankits			

Analyst: CH QA: ACS 5/17

CETIS	S Analytical Rep	ort		Report Date: Test Code:		06 Aug-17 15:11 (p 1 of  1 170801mprt   02-2688-631 <sup>/</sup>				
Macroo	cystis Germination ar	nd Germ Tub	e Grow	/th Test						Nautilus Environmental (CA
Analys Analyz	is ID: 16-6637-7239 ed: 06 Aug-17 15	End :10 Ana	lpoint: lysis:	Mean Length Linear Interpo	lation (ICPI	N)		CETIS Officia	Version: I Results:	CETISv1.8.7 Yes
Linear	Interpolation Options	5								
X Trans	sform Y Transfor	m See	d	Resamples	Exp 95	% CL	Method			
Linear	Linear	1392	2989	1000	Yes		Two-Point	Interpola	ation	
Point E	stimates									
Level	µg/L 95% LCI	- 95% UCL								
IC25	94.56 68.72	120.5								
IC50	177.6 161.2	236.5								
Mean L	ength Summary.				с	alculate	d Variate			
C-µg/L	Control Type	Count	Mean	Min	Max	Std E	Err Std	Dev (	CV%	%Effect
0	Lab Control	5	13.5	12.25	14.5	0.395	53 0.88	39 6	6.55%	0.0%
10		5	13.7	13.25	14.25	0.165	68 0.37	08 2	2.71%	-1.48%
32		5	12.5	11.75	13	0.223	6 0.5	4	1.0%	7.41%
100		5	10	9	11 <sup>.</sup>	0.418	.93 0.93	54 9	9.35%	25.93%
180		5	6.7	6.25	7.75	0.278	.62 0.62	25 9	9.29%	50.37%
320		5	5.45	5	6	0.165	68 0.37	08 6	5.8%	59.63%
560		5	5.05	5	5.25	0.05	0.11	18 2	2.21%	62.59%
Graphic	cs									
Mean Length	14 12 10 8 6 4 4 2	0								

0 100 200 300 400 500 600 C-µg/L

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Analyst: OK QA: ACS/8/17

CETIS	Analytical Re		Repo Test	ort Date: Code:	06 Aug-17 15:11 (p 1 of 1) 170801mprt   02-2688-6311							
Macrocys	stis Germination a	and Germ Tub	e Growth	n Test					Nautilus	s Enviro	nmental (CA)	
Analysis Analyzed	ID: 10-5845-903 I: 06 Aug-17 1	37 End 5:10 Ana	Ipoint: Germination Rate Ilysis: Trimmed Spearman-Kärber				CET Offic	S Version: al Results:	CETISv1 Yes	.8.7		
Trimmed	Spearman-Kärbe	r Estimates							<u>Beldelina anna anna 29 a tao ann anna 29 a</u>			
Threshol	d Option	Threshold	Trim	Mu	Sigma		EC50	95% LCL	95% UCL			
Control T	hreshold	0.062	4.26%	2.252	0.00918	9	178.6	171.2	186.3			
Germinat	tion Rate Summar	у			Cal	culated Variat	te(A/B)					
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	А	в	
0	Lab Control	5	0.938	0.91	0.99	0.01463	0.03271	3.49%	0.0%	469	500	
10		5	0.942	0.92	0.96	0.008	0.01789	1.9%	-0.43%	471	500	
32		5	0.916	0.88	0.95	0.01166	0.02608	2.85%	2.35%	458	500	
100		5	0.842	0.81	0.88	0.01393	0.03114	3.7%	10.23%	421	500	
180		5	0.476	0.4	0.54	0.02977	0.06656	13.98%	49.25%	237	500	
320		5	0.102	0.03	0.14	0.01934	0.04324	42.4%	89.13%	51	500	
560		5	0.04	0.02	0.06	0.007071	0.01581	39.53%	95.74%	20	500	
Graphics Graphics Rate	560 5 0.04 0.02 0.06 0.007071 0.01581 39.53% 95.74% 20 500 Graphics											

400 500 600

600

1.1

C-µg/L

300

200

0.3 0.2 0.1

0.0 E 0

100

Analyst: CAT QA: ACX8117

## **CETIS QC Plot**

Macrocysti	s Germination and Germ Tube G		Nautilus Environmental (CA)		
Test Type:	Growth-Germination	Organism:	Macrocystis pyrifera (Giant Kelp)	Material:	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	Endpoint:	Germination Rate	Source:	Reference Toxicant-REF

**Macrocystis Germination and Germ Tube Growth Test** 



Mean:	144.8	Count:	20	-2s Warning Limit:	48.68	-3s Action Limit:	0.62
Sigma:	48.06	CV:	33.20%	+2s Warning Limit:	240.9	+3s Action Limit:	289

### Quality Control Data

		B.P. (1	-	57780 B		~					
Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2017	Mar	15	12:20	69.28	-75.52	-1.571			08-9433-7234	14-4855-2168
2			21	11:50	91.91	-52.89	-1.101			14-6061-9718	17-8396-7517
3			29	12:00	135.6	-9.221	-0.1919			14-8970-7691	03-1277-2256
4		Apr	5	15:45	280.9	136.1	2.833	(+)		21-4594-9760	16-0860-2781
5			12	12:40	171.2	26.43	0.55			07-9013-5083	18-5961-4866
6			18	11:50	111.2	-33.57	-0.6984			00-1632-5187	02-0286-5338
7			26	14:45	196.5	51.71	1.076			19-7723-7680	17-3479-6282
8		May	2	12:15	207.5	62.7	1.305			17-6343-2965	09-2528-8827
9			9	12:15	177.7	32.93	0.6852			03-8416-7986	18-7148-0490
10			16	12:55	128.6	-16.18	-0.3367			06-8420-4893	05-9079-9787
11			24	12:55	112.7	-32.08	-0.6675			12-0858-1777	16-7263-0329
12			31	12:05	154.4	9.631	0.2004			15-2432-6389	10-6948-5513
13		Jun	6	13:00	99.01	-45.79	-0.9528			01-6234-7347	04-0305-4663
14			14	15:10	150.8	6.013	0.1251			18-4851-9646	03-4697-6569
15			21	13:15	121.6	-23.22	-0.4831			10-8490-4132	09-0211-8767
16			27	13:10	104.2	-40.61	-0.845			12-3806-6706	10-1120-2261
17		Jul	5	14:40	175.7	30.93	0.6436			00-7392-3098	00-7201-5545
18			11	11:30	122.4	-22.4	-0.4662			05-4650-0466	19-6646-2995
19			22	12:20	135.8	-8.956	-0.1864			20-4779-0823	12-6106-1892
20			25	12:30	148.8	3.957	0.08233			04-6416-4925	05-4274-1168
21		Aug	1	15:30	178.6	33.75	0.7023			02-2688-6311	10-5845-9037

Analyst: 01 QA: 468/17

### **CETIS QC Plot**

Macrocyst	Macrocystis Germination and Germ Tube Growth Test Nautilus Environmental (CA)										
Test Type:	Growth-Germination	Organism:	Macrocystis pyrifera (Giant Kelp)	Material:	Copper chloride						
Protocol:	EPA/600/R-95/136 (1995)	Endpoint:	Mean Length	Source:	Reference Toxicant-REF						

**Macrocystis Germination and Germ Tube Growth Test** 



Mean:	162.4	Count:	20	-2s Warning Limit:	81.4	-3s Action Limit:	40.88
Sigma:	40.52	CV:	25.00%	+2s Warning Limit:	243.5	+3s Action Limit:	284

**Quality Control Data** 

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2017	Mar	7	12:45	203.3	40.93	1.01			11-8967-4759	16-5869-3927
2			15	12:20	109.6	-52.8	-1.303			08-9433-7234	00-4267-8174
3			21	11:50	128.6	-33.83	-0.8349			14-6061-9718	15-1714-9609
4			29	12:00	139.2	-23.23	-0.5734			14-8970-7691	13-7878-9357
5		Apr	12	12:40	264.5	102.1	2.519	(+)		07-9013-5083	07-3841-1886
6			18	11:50	170.9	8.477	0.2092			00-1632-5187	08-1183-6659
7			26	14:45	212.5	50.05	1.235			19-7723-7680	14-1748-7361
8		May	2	12:15	171.9	9.492	0.2343			17-6343-2965	01-5407-3335
9			9	12:15	156.1	-6.271	-0.1548			03-8416-7986	00-7017-2190
10			16	12:55	176.4	14.03	0.3462			06-8420-4893	17-9919-9716
11			24	12:55	146.4	-15.99	-0.3946			12-0858-1777	06-3490-6817
12			31	12:05	213.4	51.03	1.259			15-2432-6389	03-7668-1306
13		Jun	6	13:00	108	-54.4	-1.343			01-6234-7347	05-1172-1933
14			14	15:10	179.4	17.04	0.4206			18-4851-9646	10-6869-2229
15			21	13:15	178.4	16.03	0.3956			10-8490-4132	02-4203-4684
16			27	13:10	141.2	-21.22	-0.5238			12-3806-6706	01-9336-4628
17		Jul	5	14:40	100	-62.4	-1.54			00-7392-3098	15-0988-1944
18			11	11:30	168.4	5.993	0.1479			05-4650-0466	01-7995-3328
19			22	12:20	141.4	-21.02	-0.5188			20-4779-0823	13-2902-4956
20			25	12:30	139.2	-23.18	-0.5721			04-6416-4925	01-8901-6535
21		Aug	1	15:30	177.6	15.18	0.3745			02-2688-6311	16-6637-7239

### **CETIS QC Plot**

Macrocyst	is Germination and Germ Tube G		Nautilus Environmental (CA)		
Test Type:	Growth-Germination	Organism:	Macrocystis pyrifera (Giant Kelp)	Material:	Copper chloride
Protocol:	EPA/600/R-95/136 (1995)	Endpoint:	Mean Length	Source:	Reference Toxicant-REF

Macrocystis Germination and Germ Tube Growth Test



Mean:	62.8	Count:	20	-2s Warning Limit:	14.42	-3s Action Limit:	-9.77
Sigma:	24.19	CV:	38.50%	+2s Warning Limit:	111.2	+3s Action Limit:	135.4

**Quality Control Data** 

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2017	Mar	15	12:20	48.8	-14	-0.579			08-9433-7234	00-4267-8174
2			21	11:50	41.9	-20.9	-0.8642			14-6061-9718	15-1714-9609
3			29	12:00	63.43	0.6302	0.02605			14-8970-7691	13-7878-9357
4		Apr	5	15:45	123.8	61.01	2.522	(+)		21-4594-9760	12-1406-1022
5			12	12:40	74.5	11.7	0.4837			07-9013-5083	07-3841-1886
6			18	11:50	84.48	21.68	0.8962			00-1632-5187	08-1183-6659
7			26	14:45	109.1	46.26	1.912			19-7723-7680	14-1748-7361
8		May	2	12:15	76.43	13.63	0.5635			17-6343-2965	01-5407-3335
9			9	12:15	64.05	1.249	0.05164			03-8416-7986	00-7017-2190
10			16	12:55	69.04	6.236	0.2578			06-8420-4893	17-9919-9716
11			24	12:55	46.94	-15.86	-0.6557			12-0858-1777	06-3490-6817
12			31	12:05	31.69	-31.11	-1.286			15-2432-6389	03-7668-1306
13		Jun	6	13:00	52.23	-10.57	-0.437			01-6234-7347	05-1172-1933
14			14	15:10	73.79	10.99	0.4544			18-4851-9646	10-6869-2229
15			21	13:15	74.5	11.7	0.4837			10-8490-4132	02-4203-4684
16			27	13:10	46.08	-16.72	-0.6913			12-3806-6706	01-9336-4628
17		Jul	5	14:40	29.3	-33.5	-1.385			00-7392-3098	15-0988-1944
18			11	11:30	58.26	-4.539	-0.1876			05-4650-0466	01-7995-3328
19			22	12:20	49.24	-13.56	-0.5606			20-4779-0823	13-2902-4956
20			25	12:30	38.49	-24.31	-1.005			04-6416-4925	01-8901-6535
21		Aug	1	15:30	94.56	31.76	1.313			02-2688-6311	16-6637-7239

Analyst: A QA: AC818117

Macrocystis	Germinati	on and Germ	Tube Gro	wth Test							N	autilus En	vironmental	- San Diego
Start Date:	1-Aug-17	,	Species: Macrocystis pyrifera Test ID: 170801mprt											
End Date:	3-Aug-17	,	Protocol: EPA/600/R-95/136 (1995 West Coast Manual)									ple Source	Internal	
						,		7			0		Cucl	
							in a subscription of the				Sam	ple Station		
Random	Number	Number		an a		an a					in an a subscription of the second			
Number	Counted	Germinated				Tube Leng	th Measuren	nents (micro	ometer units)				Calibration	Iviean Tube
1	100	91	4	4	5	6	5	4.	6	5	5	1 5	25	
2	100	94	4	7	5	5	6	7	7	5	4	4	2.5	13.50
3	100	88	4	4	7	5	7	4	4	4	4	4	2.5	11 75
4	100	92	6	5	5	7	4	5	5	5	5	5	2.5	13.00
5	100	10	3	2	2	2	2	2	3	2	2	2	2.5	5.50
6	100	82	3	4	3	4	5	4	4	2	4	3	2.5	9.00
7	100	81	4	4	4	5	4	5	4	4	4	4	2.5	10.50
8	100	13	2	2	2	3	2	2	2	2	2	2	2.5	5.25
9	100	93	5	4	6	6	5	5	7	7	5	5	2.5	13.75
10	100	14	2	2	3	2	2	3	2	2	2	2	2.5	5.50
11	100	91	4	7	5	5	5	4	6	5	5	5	2.5	12.75
12	100	88	5	4	4	5	5	3	4	5	5	4	2.5	11.00
13	100	3	2	2	2	2	2	2	2	2	2	2	2.5	5.00
14	100	95	5	5	6	7	6	4	4	5	4	6	2.5	13.00
15	100	53	2	5	2	2	3	3	3	4	3	4	2.5	7.75
16	100	54	2	2	3	2	3	2	2	2	4	5	2.5	6.75
17	100	5	2	2	2	2	3	2	2	2	2	2	2.5	5.25
18	100	93	4	5	5	6	5	6	5	5	5	5	2.5	12.75
19	100	40	2	2	3	2	3	3	3	4	2	2	2.5	6.50
20	100	96	/	6	8	5	6	6	7	4	4	4	2.5	14.25
21	100	41	2	3	2	2	2	2	5	3	2	2	2.5	6.25
22	100	11	3	2	2	2	3	2	3	3	2	2	2.5	6.00
23	100	95	6	/	5	/	5	6	4	5	7	4	2.5	14.00
24	100	99		5	6	4	5	6	6	5	8	7	2.5	14.50
25	100	96		5	5	/	4	6	4	5	5	7	2.5	13.75
20	100	92	0	4	5	/	5	5	5	5	5	6	2.5	13.25
27	100	3	2	2	<u> </u>	2	2	2	2	2	2	2	2.5	5.00
20	100	<u> </u>	<u> </u>	2	2	2	2	2	2	2	2	2	2.5	5.00
29	100	97	<u>/</u>		2	<u> </u>	<u> </u>		2	2	2	2	2.5	5.00
31	100	50		ー <del>イ</del> つ	<u> </u>	4 2	4	2	4	<u>ు</u>	2	3	2.5	9.00
32	100	82	<u> </u>		4 A	<u> </u>	<u> </u>	5 F	5 F	A	2	3	2.5	6.25
32	100	6	2	2	+ 2	<u></u> 4   2	2	<u>ວ</u>	2	4 2	4	3	2.5	10.50
34	100	92	<u> </u>	<u> </u>	6	5		6	<u>∠</u>	A	Z	2	2.5	5.00
35	100	91	5	 	6	6	5		6			5	2.5	12.25
	to. If there are						1 0	4		0	<u> </u>	<u> </u>	2.3	13.75

Technician Note: If there are any germinated spores in the replicate, scan the slide to measure 10 lengths if possible (regardless of number germinated).

QC Check: CH 6/6/17

Final Review: <u>AC818177</u>

CH-060 RT Analyst:

Macrocystis	Germinati	on and Germ	Tube Gr	owth Test			, , , , , , , , , , , , , , , , , , ,	Alagra ana ang kang kang kang kang kang kang	and the second		N	Jautilus Fr	vironmenta	L - San Diego
Start Date:	1_Aug 17			Cussias		• • • •				Na adalah sana kata sana yang sana sa	l natik dan manganakan menangan da		in onnenta	I - Jali Diego
	I-Aug-17	, Species. Macrocysus pymera									Test ID: 170801mprt			
End Date:	3-Aug-17	7 Protocol: EPA/600/R-95/136 (1995 West Coast Manual)									Sample Source: Internal			
											Sam	ple Station	: CuCl <sub>2</sub>	
						a an inn an Anna an Ann		a de la companya de l				- <u>-</u>		
Random	Number	Number			2.2 Contraction (1992)	Tube Lenc	th Moasuro	monte (miere	motorunito				Calibration	Mean Tube
Number	Counted	Germinated								·)			Factor	Length (µm)
1	100	91	4	4	5	6	.5	4	6	5	5	5	2.5	#DIV/0!
2	100	- 44	4	7	5	5	6	7	7	5	4	4	I	#DIV/0!
3	100	88	4	4	7	5	7	4	L)	Ч	4	Ч		#DIV/0!
4 5	100	- 92	6	2	5	7	4	5	5	5	5	5		#DIV/0!
5	100		3	2	2	2	2	2	3	2	2	2		#DIV/0!
7	100	- 84-		<u> </u>	.3	4	5	4	H	2	4	3		#DIV/0!
8	100	12			<u> </u>		4	5	4	4	4	4		#DIV/0!
9	100	03		<u> </u>	1-2-			2	Z	2	2	2		#DIV/0!
10	100	14	<u> </u>	7		<u> </u>	<u> </u>	1	7		5	5		#DIV/0!
11	100	91	 [J		<u> </u>	- <u>-</u>		<u> </u>	2	2.	2	2		#DIV/0!
12	100	20	 Ľ,		<u> </u>				6	5	5	5		#DIV/0!
13	100	2	2	2	1				4	- 2	1-3	<u>                                      </u>		#DIV/0!
14	100	95	5			2	2		L C			2		#DIV/0!
15	100	53	2	5	2	7	2		2		4	6		#DIV/0!
16	100	RH.	2	7.	2	1	2	1						#DIV/0!
17	100	.5	2-	2	2	7	2	2			+	12-		#DIV/0!
18	100	93	4	5	5	6	1 2		6	2	<u> </u>	2		#DIV/0!
19	100	40.	2	2	3	2	3	1						#DIV/0!
20	100	96	7	6	G G	5	6	6		4	11	2		#DIV/0!
21	100	41.	7-	3	2	7.	7.	7		3	1	7		#DIV/0!
22	100	1)-	3	2	2	2	3	2	2	2	+	7		#DIV/0!
23	100	95	6	7	5	7	5	G	L L	5	17	<u> </u>		#DIV/0!
24	100	99	6	5	6	4	5	6	6	S	8	7		#DIV/01
25	100	46	7	5	5	7	4	6	Ц	5	5	7		#DIV/0!
26	100	92	6	4	5	7	5	5	5	5	5	6		#DIV/0!
27	100	3	2	2	2	2	2	Z	Z	2	7	2		#DIV/0!
28	100	2	2	2	2	Z	2	2	2	2	Z	2		#DIV/0!
29	100	4	2	2	2	2	2	2	2_	2	2	2		#DIV/0!
30	100	87	4	4	3	ЦЦ	4	5	4	3	2	3		#DIV/0!
31	100	-50	2	2	Ц	2	2	3	3	2	2	3	1	#DIV/0!
32	100	83	4	4	4	Ч	.5	5	5	4	4	3		#DIV/0!
33	100	_6	2	2	2		2	2	2	2	2	2		#DIV/0!
34	100	42	6	Ц	6	<u>    5                                </u>	4	6	4	4	4	6		#DIV/0!
	100	<u> </u>	5	4	6	6	<u>    5                                </u>	<u> </u>	6	6	8	5	$\checkmark$	#DIV/0!

area spores in the replicate, scan the slide to measure 10 lengths if possible (regardless of number germinated). Final Review: ACS[8(17] Aniy y

Analyst:

## **CETIS Test Data Worksheet**

Macrocystis	lacrocystis Germination and Germ Tube Growth Test							Nautilus Environmental (CA)			
Start Date: End Date: Sample Date	01 / 03 / : 01 /	Aug-17 Aug-17 Aug-17	7 7 7	Specie Protoc Materia	s: Macrocyst ol: EPA/600/F al: Copper ch	is pyrifera R-95/136 (1995) Ioride	)	Sample Code: Sample Source: Sample Station:	170801mprt Reference Toxicant Copper Chloride		
C-µg/L	Code	Rep	Pos	# Counted	# Germinated	Mean Length	CalFactor		Notes		
0	LC	1	34								
0	LC	2	23								
0	LC	3	35								
0	LC	4	24								
0	LC	5	4								
10		1	2								
10		2	26								
10		3	20								
10		4	25								
10		5	9								
32		1	11								
32		2	18								
32		3	14								
32		4	3								
32		5	1								
100		1	7								
100		2	12								
100		3	32								
100		4	30								
100		5	6								
180		1	16								
180		2	19								
180		3	31								
180		4	21								
180		5	15								
320		1	27								
320		2	5								
320		3	10								
320		4	22								
320		5	8								
560		1	29								
560		2	13								
560		3	33								
560		4	17								
560		5	28								





### Marine Chronic Bioassay

### Water Quality Measurements

Client :	Internal	Test Species: Macrocystis pyrifera
Sample ID:	CuCl <sub>2</sub>	Start Date/Time: 8/1/2017 いらろの
Test No.:	170801mprt	End Date/Time: <u>8/3/2017 /24,5</u>
Dilutions made by:	AL	

Dilution calcs. (final volume 250 mL):									
Conc. µg/L	10	32	100	180	320	560			
Vol. Cu stock added (mL) :	2.4	O.S	2.5	4.4	٦.8	1.4			
Cu Stock Conc. (µg/L)	4040	10,200			7	99,500			
	/	,			,	,			

			Analyst:	UH			Analyst:	RT		
Concentration		Initial F	teadings	·	Final Readings					
(µg/L)	(mg/L)	pri (units)	(ppt)	l'emperature (°C)	(mg/L)	pH (units)	Salinity (ppt)	Temperature (°C)		
Lab Control	7.8	8.10	33.5	15.2	8.4	7.96	33.9	14.3		
10	8.0	8.15	33.4	14.0	8.4	7.95	33.5	14.1		
32	8,0	8.17	33.7	14.0	8.7	7.97	33.9	14.1		
100	7.9	8.18	33-5	14.0	8.5	8.00	33.8	15-1		
180	8.0	8.18	33-3	14.0	8.4	7.97	33.6	15.7		
320	8.0	8.19	32.9	14.0	8.6	7.96	33.2	15.5		
560	9.0	8,17	33.6	14.0	8,4	7.96	34.0	6.0		

Comments:

QC Check: <u>CH & 8/6/17</u> Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Final Review: AC 818117

### Marine Chronic Bioassav

Marine Chronic Bioassay	Kelp Spore Germ	ination & Gro	owth Worksheet
Client: <u>Internal</u> Test No.: <u>170801 mprt</u>	Start Date/Time: _ End Date/Time: _	8/1/2017 8/3/2017	11530
Tech. Initials: <u>100</u>	Test Species:	Macrocy	vstis pyrifera
Date Collected: Diff 7/31/17   Kelp Collectors: MH   Collection Location: Pt. Loma			
Time of Initial Rinsing and Dessication :	and average	motility	
Density Counts (target = 90): $185$ 201 207 [94 197	Mean: <u>(</u> 96, 6	8	
If spore release = 900,000 spores/ml: Inoculate with 0.25 ml			
If spore release > 900,000 spores/ml: Calculate a dilution factor, x, create a new spor	re stock of 900,000 spore	es/ml and inocu	late with 0.25 ml.

To calculate the dilution factor:

Density of spore release	1,968,000 *	<u>0.25 ml</u> =	492,000 sp	pores =	2.19(x)	2.(य dil.factor
	)	1 container	225,000 sp	pores		-1.0 part spore stock 75mL
						1,19 part(s) seawater 89.25mL

If spore release < 900,000 spores/ml: The volume added should not exceed 0.5 ml. (This volume exceeds the EPA and MBP required volume of no greater than 1% of the total test solution volume. However, it may sometimes be necessary to exceed the 0.3 ml requirement in order to achieve the desired spore density.

)

Amount inoculated: 0.25m/

Location in Environmental Chamber (All replicates in each test must be on the same shelf; do not split up tests among shelves):

Shelf number	Measured Light Intensity Range (must be between 160 and 240 ft-c)	Random Number Range		24-hour germ	nination check
1	165 6 208	1+035		QC dish #	% germ.
2				j	95
3			Ľ		
4					
5					ì,
6	168 10 206	39 7065			
Timers Checked?	Should be on 16:8 light:dark cycle	initials: AO			
Comments:	BAB Q18 8/1/17				
QC Check: <u>CH 8/6/1</u>	7	Final Re	eview: _	AC 8/8/1-	1

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Red Abalone

								Test Code:		170	301 hrdv   0	6-0143-6965
Red Abalone	Larval Develop	ment Tes	t						Na	utilu	s Environr	mental (CA)
Batch ID: Start Date: Ending Date: Duration:	19-6769-3093 01 Aug-17 15:4 03 Aug-17 17:7 49h	T 45 P 10 S S	est Type: rotocol: pecies: ource:	Development EPA/600/R-95 Haliotis rufesc American Aba	/136 (1995) ens lone			Analyst: Diluent: Brine: Age:	Filtered Na Not Applic	atural able	Seawater	
Sample ID: Sample Date: Receive Date Sample Age:	18-0020-1763 01 Aug-17 01 Aug-17 16h	C N S S	ode: laterial: ource: tation:	170801hrdv Zinc sulfate Reference Tox Zinc sulfate	ticant			Client: Project:	Internal			
Comparison	Summary					·······						
Analysis ID	Endpoint		NOEL	LOFI	TOFI	PMSD	тн	Meth	od			
20-8851-4985	Development F	Rate	32	56	42.33	5.37%		Bonfe	erroni Adj t	Test		
Point Estimat	te Summary											
Analysis ID	Endpoint		Level	μg/L	95% LCL	95% UCL	τu	Meth	od			
02-4005-1366	Development F	Rate	EC50	65.48	64.08	66.91		Spea	rman-Kärbe	er		
Test Acceptal	bility											
Analysis ID	Endpoint		Attrib	ute	Test Stat	TAC Limi	ts	Over	ap Deci	sion		
02-4005-1366	Development F	Rate	Contro	ol Resp	0.91	0.8 - NL		Yes	Pass	ses A	cceptability	Criteria
20-8851-4985	Development F	Rate	Contro	ol Resp	0.91	0.8 - NL		Yes	Pass	es A	cceptability	Criteria
20-8851-4985	Development F	Rate	NOEL		32	NL - 56		No	Pass	ses A	cceptability	Criteria
20-8851-4985	Development F	Rate	PMSD	)	0.05368	NL - 0.2		No	Pass	es A	cceptability	Criteria
Development	Rate Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std E	rr Std I	Dev	CV%	%Effect
0	Lab Control	5	0.91	0.8627	0.9573	0.87	0.97	0.017	03 0.03	808	4.18%	0.0%
10		4	0.99	0.9582	1	0.96	1	0.01	0.02		2.02%	-8.79%
18		5	1	1	1	1	1	0	0		0.0%	-9.89%
32		4	0.9975	5 0.9895	1	0.99	1	0.002	5 0.00	5	0.5%	-9.62%
56		5	0.746	0.6887	0.8033	0.69	0.8	0.020	64 0.046	515	6.19%	18.02%
100		5	0	0	0	0	0	0	0			100.0%
Development	Rate Detail											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5						
0	Lab Control	0.87	0.97	0.89	0.92	0.9						
10		1	©	0.96	1	1						
18		1	1	1	1	1						
32		1	0.99	1	(a),	1						
56		0.78	0.8	0.69	0.75	0.71						
100		0	0	0	0	0						

Creptically removed from statistical analysis due to suspected contamination of test vials. Also, lab control from concurrent test 1708-3031 substituted for analysis.

**CETIS Summary Report** 

18 Aug-17 12:44 (p 1 of 1)

Report Date:

CETIS And	alytical Rep	ort					Repo Test	ort Date: Code:	18 A 1708	ug-17 12: 01hrdv   0	44 (p 1 of 2) 6-0143-6965
Red Abalone	Larval Develo	oment T	est						Nautilus	Environ	mental (CA)
Analysis ID: Analyzed:	20-8851-4985 18 Aug-17 12	; ::44	Endpoint: Dev Analysis: Par	elopment R ametric-Mul	ate tiple Compa	irison	CET Offic	IS Version: tial Results	CETISv1 : Yes	.8.7	
Data Transfo	rm	Zeta	Alt Hyp	Trials	Seed		PMSD	NOEL	LOEL	TOEL	TU
Angular (Corr	ected)	NA	C > T	NA	NA		5.37%	32	56	42.33	
Bonferroni A	dj t Test										
Control	vs C-µg/L		Test Stat	Critical	MSD DF	P-Value	P-Type	Decision	(α:5%)		
Lab Control	10		-5.769	2.445	0.089 7	1.0000	CDF	Non-Signi	ificant Effect		
	18		-7.221	2.445	0.084 8	1.0000	CDF	Non-Signi	ificant Effect		
	32		-6.463	2.445	0.089 7	1.0000	CDF	Non-Signi	ificant Effect		
	56*		6.671	2.445	0.084 8	<0.0001	CDF	Significan	t Effect		
ANOVA Table	9										
Source	Sum Sq	uares	Mean Squ	are	DF	F Stat	P-Value	Decision	(α:5%)		
Between	0.81451	97	0.2036299		4	69.11	<0.0001	Significan	t Effect		
Error	0.05303	505	0.0029463	92	18			-			
Total	0.86755	48			22						
Distributiona	I Tests										
Attribute	Test			Test Stat	Critical	P-Value	Decision	(α:1%)			
Variances	Mod Le	vene Equ	ality of Variance	1.347	4.893	0.2984	Equal Var	iances			
Variances	Levene	Equality	of Variance	3.267	4.579	0.0352	Equal Var	iances			
Distribution	Shapiro	-Wilk W	Normality	0.9553	0.88	0.3754	Normal D	istribution			
Developmen	t Rate Summar	y									
C-µg/L	Control Type	Cour	nt Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	0.91	0.8627	0.9573	0.9	0.87	0.97	0.01703	4.18%	0.0%
10		4	0.99	0.9582	1	1	0.96	1	0.01	2.02%	-8.79%
18		5	1	1	1	1	1	1	0	0.0%	-9.89%
32		4	0.9975	0.9895	1	1	0.99	1	0.0025	0.5%	-9.62%
56		5	0.746	0.6887	0.8033	0.75	0.69	0.8	0.02064	6.19%	18.02%
100		5	0	0	0	0	0	0	0		100.0%
Angular (Cor	rected) Transfo	rmed Si	ummary								
C-µg/L	Control Type	Cour	nt Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	5	1.273	1.179	1.366	1.249	1.202	1.397	0.03367	5.92%	0.0%
10		4	1.483	1.363	1.603	1.521	1.369	1.521	0.03783	5.1%	-16.5%
18		5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	-19.47%
32		4	1.508	1.468	1.548	1.521	1.471	1.521	0.01254	1.66%	-18.49%
56		5	1.044	0.9779	1.11	1.047	0.9803	1.107	0.02377	5.09%	17.99%
100		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.07%

Analyst: AC QA: 1478/22/17



Analyst: AC QA: KFP8/22/17

	nalytical Re	port					Repo Test	ort Date: Code:	18 / 1708	Aug-17 1: 301hrdv	2:44 (p 1 of 1) 06-0143-6965
Red Abalor	ne Larval Develo	opment Test							Nautilu	s Enviro	nmental (CA)
Analysis ID Analyzed:	: 02-4005-136 18 Aug-17 1	6 End 2:44 And	dpoint: De alysis: Ur	evelopment htrimmed Sj	Rate pearman-Kär	ber	CETI Offic	S Version: ial Results:	CETISv1 Yes	.8.7	
Spearman-	Kärber Estimate	es		9 <u>99999888</u> 888	<u></u>						
Threshold	Option	Threshold	Trim	Mu	Sigma		EC50	95% LCL	95% UCL		
Control Thre	eshold	0.09	0.00%	1.816	0.004687		65.48	64.08	66.91		
Developme	nt Rate Summa	ry			Calcı	ulated Varia	ite(A/B)				
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	Α	в
0	Lab Control	5 4	0.91	0.87	0.97	0.01703	0.03808	4.18%	0.0%	455	500
18		5	1	1	1	0.01	0.02	2.02 %	-9.89%	500	400 500
32		4	0.9975	0.99	1	0.0025	0.005001	0.5%	-9.62%	399	400
56		5	0.746	0.69	0.8	0.02064	0.04615	6.19%	18.02%	373	500
100		5	0	0	0	0	0		100.0%	0	500
Graphics											
1.0 0.9 0.8 99 0.7 10 10 0.5 0.5 0.5 0.5 0.4 0.3 0.2 0.1 0.0	0 20	40	60 8	0 100							

Analyst: AC QA: MTP 8/22/17

### **Red Abalone Larval Development Test** 100-+3s 90-+2s 80-70-EC50-µg/L Zinc sulfate 60-Mean 50-40--2s 30--3s 20-10 10 Jan-17-26 Jan-17-30 Nov-16-23 Nov-16 16 Dec-16-17 Dec-16-23 Dec-16-20 Jan-17-24 Jan-17-28 Feb-17-13 Apr-17-25 Apr-17-21 Jun-17-15 Feb-17-22 Feb-17-13 Mar-17-03 Feb-17-14 Jun-17-01 Aug-17-02 May-17-16 May-17-

Mean:	59.55	Count:	20	-2s Warning Limit:	35.65	-3s Action Limit:	23.7
Sigma:	11.95	CV:	20.10%	+2s Warning Limit:	83.45	+3s Action Limit:	95.4

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2016	Nov	23	16:55	46.4	-13.15	-1.101			09-1197-4975	06-3749-2848
2			30	12:35	65.77	6.216	0.5202			16-3146-7849	11-5780-9274
3		Dec	16	14:50	52.93	-6.624	-0.5543			13-5901-1259	21-3939-0170
4			17	14:55	60.62	1.072	0.08974			05-8183-6143	13-1248-5784
5			23	20:10	43.95	-15.6	-1.305			13-9031-3483	05-2821-8870
6	2017	Jan	10	14:05	62.45	2.902	0.2428			05-5742-7911	03-8072-0152
7			20	17:05	65.42	5.869	0.4911			16-3166-0168	19-3982-1175
8			24	15:00	47.38	-12.17	-1.019			10-5507-5483	21-4360-4663
9			26	15:30	44.77	-14.78	-1.237			07-4316-0753	13-9449-0905
10		Feb	3	17:30	41.18	-18.37	-1.537			02-8512-8519	20-8356-8238
11			15	17:30	80.48	20.93	1.751			13-1931-5239	03-7815-1191
12			22	14:10	75.44	15.89	1.33			10-3726-2603	14-1158-5794
13			28	16:10	44.31	-15.24	-1.276			01-3176-6469	05-3972-7768
14		Mar	13	16:55	69.6	10.05	0.8413			05-8123-4634	17-7007-3585
15		Apr	13	14:15	71.73	12.18	1.019			02-4909-2500	04-3835-8646
16			25	15:55	54.49	-5.056	-0.4231			16-4476-4938	11-3914-9966
17		May	2	14:35	64.32	4.773	0.3994			17-5211-8295	02-6927-6107
18			16	15:30	59.28	-0.2746	-0.02298			05-3936-7383	00-2778-9377
19		Jun	14	14:35	73.04	13.49	1.129			18-8173-5865	16-3315-4643
20			21	15:20	67.38	7.833	0.6555			00-8809-0319	18-7888-3877
21		Aug	1	15:45	65.48	5.929	0.4962			06-0143-6965	02-4005-1366

## Red Abalone Larval Development Test

**CETIS QC Plot** 

Red Abalone Larval Development Test			Nautilus Environmental (CA)
Test Type: Development	Organism: Haliotis rufescens (Red Abalone)	Material:	Zinc sulfate
Protocol: EPA/600/R-95/136 (1995)	Endpoint: Development Rate	Source:	Reference Toxicant-REF

## **CETIS Test Data Worksheet**

Report Date: Test Code:

Red Abalone	Larva	al Dev	elopn	nent Test					Nautilus Environmental (CA)
Start Date: End Date: Sample Date	01 A 03 A : 01 A	Aug-1 Aug-1 Aug-1	7 7 7	Specie Protoc Materi	es: Halioti ol: EPA/6 al: Zinc su	s rufescens 00/R-95/136 Ilfate	(1995)	Sample Code: Sample Source: Sample Station:	170801hrdv Reference Toxicant Zinc sulfate
C-µg/L	Code	Rep	Pos	# Counted	# Normal			Notes	
			1	100	75	TN	8717		
			2	1	100				
			3		100				
			4		100	1777-1811-1811-1811-1811-1811-1811-1811			
			5		100				
			6		100				
			7		100				
			8		$\bigcirc$				
			9		71				
			10		69				
			11		100				
			12		78				
			13		0				
			14		80				
			15		49				
			16		100				
			17		0				
			18		M		<u> </u>		
			19		96				
			20		X				
			21						
			23		$\mathcal{O}$				
			24		(				
			25		$\mathcal{Q}$				
			26		100				
			27		100				
			28		100				
			29		0				
			30	$\checkmark$	10.0				

Analyst: TN QA: KTP8/22/17

### **CETIS Test Data Worksheet**

Report Date: Test Code:

#### Red Abalone Larval Development Test Nautilus Environmental (CA) Start Date: 01 Aug-17 Species: Haliotis rufescens 170801hrdv Sample Code: End Date: 03 Aug-17 Protocol: EPA/600/R-95/136 (1995) Sample Source: Reference Toxicant Sample Date: 01 Aug-17 Material: Zinc sulfate Sample Station: Zinc sulfate Code Rep Pos C-µg/L # Counted # Normal Notes LC RH 08/03/17 LC LC LC LC RH 08/03/17 RH 08/03/17 RH 08/03/17 RH 08/03/17 RH 08/03/17 Ö

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Analyst: AG QA: KFP 8/22/17

# Marine Chronic Bioassay

Client: Internal

Sample ID: ZnSO<sub>4</sub>

Test ID: 170801hrdv

Water Quality Measurements

Test Species:	Haliotis ru	fescens
Start Date/Time:	8/1/2017	B4S
End Date/Time:	8/3/2017	1710

Concentration		Salinity		Т	emperatur	<u>`</u> Р	Diss		ion		nЦ	
(µg/L)		(ppt)			(°C)	°		(ma/L)	Jen		(nH units)	
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	33.7	33.7	33.8	14.9	14.9	14.8	7.7	8,0	8.0	8.09	8.06	8.01
10	33.9	34.2	34.2	14.6	14.5	14.5	7.8	8.1	8.1	8.12	8.07	8.01
18	33.9	34.3	34.3	143	14.5	14.4	7.8	8.1	8.1	8.13	8.08	8.01
32	34.0	34.E	34.3	145	14.6	14.5	7.8	8.1	8.1	8.13	8.08	8.01
56	34.0	34.2	34.3	14.5	14.5	14.5	7.9	8.1	8.1	8.14	8,08	3.01
100	33,9	34.1	34.2	145	14.5	14.4	7.9	8.2	8.2	8.14	8.08	8.0)
					folitionaria and and a second							
			0	24	48		Dilution calc	s. (final vol	250 ume 500 fr	Pr.		
Technician Initials:	WQ	Readings:	20	RH	PM		Conc.	10	18	32	56	100
	Dilutions	made by:	19D				Vol. Zn stock (mL):	0.17	0.31	0.56	0.98	1.75
						7n Stock	Concentration	$(u, \sigma/l)$		11200		J
		-				ZITSLUCK	Concentration	(μg/L).		19,200		
Comments:	0 hrs:	<u>Pp</u>	B18 8	417								
	24 hrs: 48 hrs:		~ ,	<i>y</i>								
QC Check:	-N, 8	(7/17	- de da					Fin	al Review:	1050 2/2	2/17	

### **Marine Chronic Bioassay**

### **Abalone Embryo-Larval Development**

Client:	Internel	2	Test Sp	<b>becies:</b> <u>Haliotis r</u>	ufescens
Sample ID:	Zn 504		Start Date	/Time: 8/1/2017	1545
Test No.:	170801	hrdv	End Date	/Time: <u>8/3/2017</u>	1710
Animal Source/Dat	e Received:	American	Anglon -	Mbeto	

Number of abalone and condition upon receipt/holding:

Males:

4, 3000 4, 3000 Females:

	Males:	Females:
Tris & peroxide addition time	1200	1100
Spawn time	1415	1400
Number of spawners	4	3
Condition of spawn (light, moderate, heavy)	heary	moderate
Fertilization time	214	45

Embryo counts (per 0.5 ml)		
1	180	
2	218	
3	197	
Mean	198	

Time of test Initiation:		54	5
	ı		·

Technician Initials:

48 hr. QC 977

Comments:

QC Check:

AC 8/11	17
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Final Review: 199 8/22/17

Nautilus Environmental. 4340 Vandever Avenue. San Diego, CA 92120.

Appendix E 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 or ganisms r eceived at a <u>temperature</u> greater than 3°C ou tside t he r ecommended t est 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. O rganisms 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. H owever, due t o age -specific pr otocol r equirements and/ or s ample ho lding t ime 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.