aquatic bioassay & consulting laboratories, inc

August 20, 2015

Ms. Marina Robertson
Beta Offshore
111 W Ocean Blvd., Suite 1240
Long Beach, CA 90802

Dear Ms. Robertson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms EPA/600/R-95-136, 1995*. Results were as follows:

CLIENT:	Beta Offshore
SAMPLE I.D.:	Platform Elly
DATE RECEIVED:	21 July - 15
ABC LAB. NO.:	LTS0715.185

CHRONIC TOPSMELT SURVIVAL & GROWTH BIOASSAY

IWC CONCENTRATION = 0.0714%

TST RESULT

SURVIVAL	PASS
GROWTH	PASS

Yours very truly,

Scott Johnson
Laboratory Director

TST Summary Sheet

Lab Name	Aquatic Bioassay Labs.	**Client Name**	LTS- Beta Offshore
Test ID	P-2A Platform Elly	**Test Species**	*A. affinis (topsmelt)*
Test Date	7/21/2015	**Test Type**	Chronic
Test Duration	7 days	**Endpoint**	Survival
Critical Conc.	0.0714%		

Statistic	Control	Critical Concentration
Percent Mean of Raw Data	1.00	1.00
Mean used in Calcuation (transformed)	1.35	1.35
Variance used in Calcuation (transformed)	0.000	0.000
Standard Deviation of Transformed Data	0.000	0.000
CV of Transformed Data	0.000	0.000
n	5	5

Mean % Effect at Critical Conc.

0.00

Calculated t-value	Degrees of Freedom	Table t-value	Percent Difference
			0.00000

Results

Pass Sample is Non-toxic

Raw Data

Control Data		Critical Concentration Data	
No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)	No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)
5	5	5	5
5	5	5	5
5	5	5	5
5	5	5	5
5	5	5	5

TST Summary Sheet

Lab Name	Aquatic Bioassay Labs.	**Client Name**	LTS- Beta Offshore
Test ID	P-2A Platform Elly	**Test Species**	*A. affinis (topsmelt)*
Test Date	7/21/2015	**Test Type**	Chronic
Test Duration	7 days	**Endpoint**	Growth
Critical Conc.	0.0714%		

Statistic	Control	Critical Concentration
Mean of Raw Data	1.69	1.93
Mean used in Calculation (non-transformed)	1.69	1.93
Variance used in Calculation (non-transformed)	0.105	0.095
Standard Deviation of Raw Data	0.324	0.309
CV of Raw Data	0.192	0.160
n	5	5

Mean % Effect at Critical Conc.

-14.13

Calculated t-value	Degrees of Freedom	Table t-value	Percent Difference
3.7584	7	0.7111	

Results

Pass Sample is Non-toxic

Raw Data

Control Data		Critical Concentration Data	
No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)	No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)
5	1.342	5	1.544
5	1.598	5	1.79
5	2.176	5	1.922
5	1.5	5	2.388
5	1.822	5	1.986

CETIS Summary Report

Report Date: 18 Aug-15 09:38 (p 1 of 2)
Test Code: LTS0715.185tops | 13-5472-3332

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	16-0694-0894	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	21 Jul-15 16:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Jul-15 14:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	16-5583-8150	**Code:**	LTS0715.185t	**Client:**	LTS Environmental, Inc.
Sample Date:	20 Jul-15 09:00	**Material:**	Sample Water	**Project:**	Pl. Elly 3-species Toxicity
Receive Date:	21 Jul-15 11:05	**Source:**	Bioassay Report		
Sample Age:	31h (14 °C)	**Station:**	P-2A Platform Elly		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-5572-4349	7d Survival Rate	0.1071	>0.1071	NA	8.76%	933.7	Steel Many-One Rank Sum Test
07-6600-9875	Mean Dry Biomass-mg	0.1071	>0.1071	NA	21.1%	933.7	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
20-0567-2070	7d Survival Rate	EC5	>0.1071	N/A	N/A	<933.7	Linear Interpolation (ICPIN)
		EC10	>0.1071	N/A	N/A	<933.7	
		EC15	>0.1071	N/A	N/A	<933.7	
		EC20	>0.1071	N/A	N/A	<933.7	
		EC25	>0.1071	N/A	N/A	<933.7	
		EC40	>0.1071	N/A	N/A	<933.7	
		EC50	>0.1071	N/A	N/A	<933.7	
06-3936-9033	Mean Dry Biomass-mg	IC5	>0.1071	N/A	N/A	<933.7	Linear Interpolation (ICPIN)
		IC10	>0.1071	N/A	N/A	<933.7	
		IC15	>0.1071	N/A	N/A	<933.7	
		IC20	>0.1071	N/A	N/A	<933.7	
		IC25	>0.1071	N/A	N/A	<933.7	
		IC40	>0.1071	N/A	N/A	<933.7	
		IC50	>0.1071	N/A	N/A	<933.7	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
07-5572-4349	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
20-0567-2070	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
06-3936-9033	Mean Dry Biomass-mg	Control Resp	1.688	0.85 - NL	Yes	Passes Acceptability Criteria
07-6600-9875	Mean Dry Biomass-mg	Control Resp	1.688	0.85 - NL	Yes	Passes Acceptability Criteria
07-5572-4349	7d Survival Rate	PMSD	0.08762	NL - 0.25	No	Passes Acceptability Criteria
07-6600-9875	Mean Dry Biomass-mg	PMSD	0.2114	NL - 0.5	No	Passes Acceptability Criteria

7d Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	0.0%
0.0357		5	0.96	0.8489	1	0.8	1	0.04	0.08944	9.32%	4.0%
0.0714		5	1	1	1	1	1	0	0	0.0%	0.0%
0.1071		5	1	1	1	1	1	0	0	0.0%	0.0%

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1.688	1.286	2.09	1.342	2.176	0.1448	0.3238	19.18%	0.0%
0.0357		5	1.696	1.455	1.938	1.536	1.98	0.08687	0.1942	11.45%	-0.52%
0.0714		5	1.926	1.543	2.309	1.544	2.388	0.1381	0.3088	16.03%	-14.13%
0.1071		5	1.852	1.683	2.022	1.674	2.022	0.06107	0.1366	7.37%	-9.77%

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.0357		1	0.8	1	1	1
0.0714		1	1	1	1	1
0.1071		1	1	1	1	1

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.342	1.598	2.176	1.5	1.822
0.0357		1.536	1.98	1.576	1.818	1.572
0.0714		1.544	1.79	1.922	2.388	1.986
0.1071		1.916	1.76	1.89	2.022	1.674

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.0357		5/5	4/5	5/5	5/5	5/5
0.0714		5/5	5/5	5/5	5/5	5/5
0.1071		5/5	5/5	5/5	5/5	5/5

CETIS Analytical Report

Report Date: 18 Aug-15 09:38 (p 1 of 4)
Test Code: LTS0715.185tops | 13-5472-3332

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	07-5572-4349	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:37	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	8.76%	0.1071	>0.1071	NA	933.7

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.0357	25	17	1	8	0.5314	Asymp	Non-Significant Effect
		0.0714	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect
		0.1071	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.008506184	0.002835395	3	1	0.4182	Non-Significant Effect
Error	0.04536632	0.002835395	16			
Total	0.0538725		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1	5.953	0.4262	Equal Variances
Variances	Levene Equality of Variance	7.111	5.292	0.0030	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.4969	0.866	<0.0001	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.45	0.2235	<0.0001	Non-normal Distribution
Distribution	D'Agostino Skewness	4.576	2.576	<0.0001	Non-normal Distribution
Distribution	D'Agostino Kurtosis	4.175	2.576	<0.0001	Non-normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	38.38	9.21	<0.0001	Non-normal Distribution
Distribution	Anderson-Darling A2 Normality	4.585	3.878	<0.0001	Non-normal Distribution

7d Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	1	0	0.0%	0.0%
0.0357		5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	4.0%
0.0714		5	1	1	1	1	1	1	0	0.0%	0.0%
0.1071		5	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
0.0357		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%
0.0714		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
0.1071		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.0357		1	0.8	1	1	1
0.0714		1	1	1	1	1
0.1071		1	1	1	1	1

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.345	1.345	1.345	1.345	1.345
0.0357		1.345	1.107	1.345	1.345	1.345
0.0714		1.345	1.345	1.345	1.345	1.345
0.1071		1.345	1.345	1.345	1.345	1.345

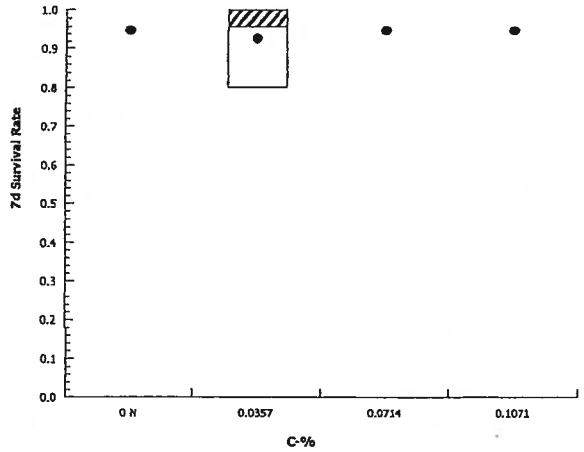
Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

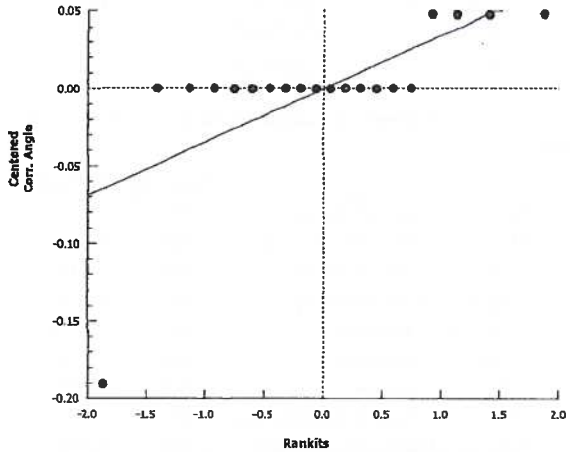
Analysis ID:	07-5572-4349	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:37	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.0357		5/5	4/5	5/5	5/5	5/5
0.0714		5/5	5/5	5/5	5/5	5/5
0.1071		5/5	5/5	5/5	5/5	5/5

Graphics





Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	07-6600-9875	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:37	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	21.1%	0.1071	>0.1071	NA	933.7

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.0357	-0.05494	2.227	0.357	8	0.7693	CDF	Non-Significant Effect
		0.0714	-1.488	2.227	0.357	8	0.9884	CDF	Non-Significant Effect
		0.1071	-1.029	2.227	0.357	8	0.9644	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.2081752	0.06939172	3	1.082	0.3849	Non-Significant Effect
Error	1.026242	0.0641401	16			
Total	1.234417		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.181	11.34	0.3645	Equal Variances
Variances	Mod Levene Equality of Variance	0.7661	5.953	0.5347	Equal Variances
Variances	Levene Equality of Variance	0.9568	5.292	0.4369	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9504	0.866	0.3729	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1501	0.2235	0.2802	Normal Distribution
Distribution	D'Agostino Skewness	1.189	2.576	0.2345	Normal Distribution
Distribution	D'Agostino Kurtosis	0.4103	2.576	0.6816	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.581	9.21	0.4535	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4446	3.878	0.2888	Normal Distribution

Mean Dry Biomass-mg Summary

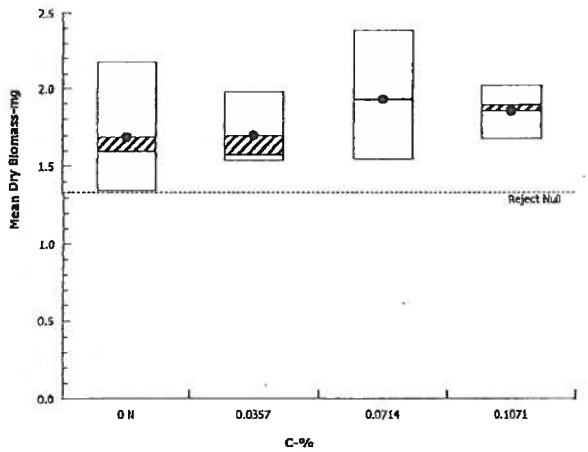
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1.688	1.286	2.09	1.598	1.342	2.176	0.1448	19.18%	0.0%
0.0357		5	1.696	1.455	1.938	1.576	1.536	1.98	0.08687	11.45%	-0.52%
0.0714		5	1.926	1.543	2.309	1.922	1.544	2.388	0.1381	16.03%	-14.13%
0.1071		5	1.852	1.683	2.022	1.89	1.674	2.022	0.06107	7.37%	-9.77%

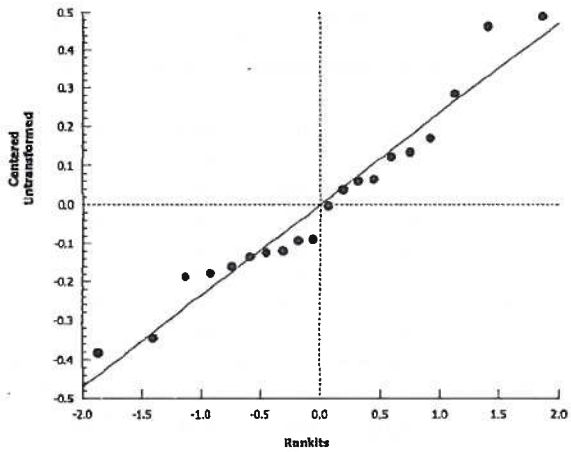
Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.342	1.598	2.176	1.5	1.822
0.0357		1.536	1.98	1.576	1.818	1.572
0.0714		1.544	1.79	1.922	2.388	1.986
0.1071		1.916	1.76	1.89	2.022	1.674

Pacific Topsmelt 7-d Survival and Growth Test					Aquatic Bioassay & Consulting Labs, Inc.
Analysis ID:	07-6600-9875	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:37	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 18 Aug-15 09:38 (p 1 of 2)
Test Code: LTS0715.185tops | 13-5472-3332

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-0567-2070	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:37	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>0.1071	N/A	N/A	<933.7	NA	NA
EC10	>0.1071	N/A	N/A	<933.7	NA	NA
EC15	>0.1071	N/A	N/A	<933.7	NA	NA
EC20	>0.1071	N/A	N/A	<933.7	NA	NA
EC25	>0.1071	N/A	N/A	<933.7	NA	NA
EC40	>0.1071	N/A	N/A	<933.7	NA	NA
EC50	>0.1071	N/A	N/A	<933.7	NA	NA

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	1	1	1	0	0	0.0%	0.0%	25	25
0.0357		5	0.96	0.8	1	0.04	0.08944	9.32%	4.0%	24	25
0.0714		5	1	1	1	0	0	0.0%	0.0%	25	25
0.1071		5	1	1	1	0	0	0.0%	0.0%	25	25

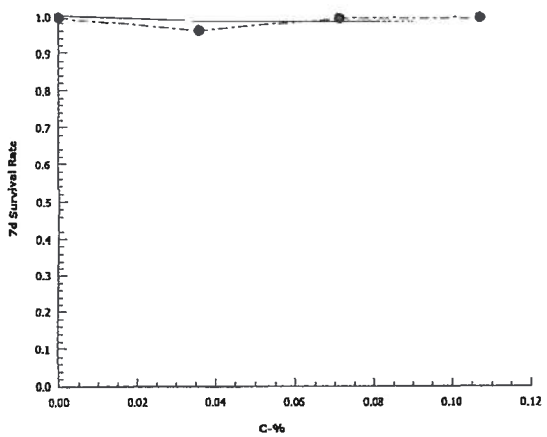
7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.0357		1	0.8	1	1	1
0.0714		1	1	1	1	1
0.1071		1	1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.0357		5/5	4/5	5/5	5/5	5/5
0.0714		5/5	5/5	5/5	5/5	5/5
0.1071		5/5	5/5	5/5	5/5	5/5

Graphics



Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	06-3936-9033	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:37	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	594924	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>0.1071	N/A	N/A	<933.7	NA	NA
IC10	>0.1071	N/A	N/A	<933.7	NA	NA
IC15	>0.1071	N/A	N/A	<933.7	NA	NA
IC20	>0.1071	N/A	N/A	<933.7	NA	NA
IC25	>0.1071	N/A	N/A	<933.7	NA	NA
IC40	>0.1071	N/A	N/A	<933.7	NA	NA
IC50	>0.1071	N/A	N/A	<933.7	NA	NA

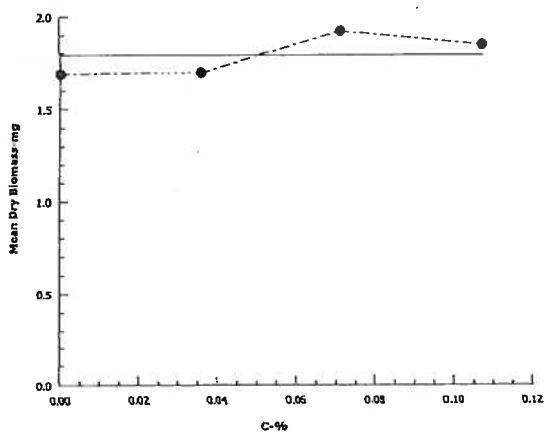
Mean Dry Biomass-mg Summary

			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1.688	1.342	2.176	0.1448	0.3238	19.18%	0.0%
0.0357		5	1.696	1.536	1.98	0.08687	0.1942	11.45%	-0.52%
0.0714		5	1.926	1.544	2.388	0.1381	0.3088	16.03%	-14.13%
0.1071		5	1.852	1.674	2.022	0.06107	0.1366	7.37%	-9.77%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.342	1.598	2.176	1.5	1.822
0.0357		1.536	1.98	1.576	1.818	1.572
0.0714		1.544	1.79	1.922	2.388	1.986
0.1071		1.916	1.76	1.89	2.022	1.674

Graphics



CETIS Measurement Report

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	16-0694-0894	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	21 Jul-15 16:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Jul-15 14:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	16-5583-8150	**Code:**	LTS0715.185t	**Client:**	LTS Environmental, Inc.
Sample Date:	20 Jul-15 09:00	**Material:**	Sample Water	**Project:**	Pl. Elly 3-species Toxicity
Receive Date:	21 Jul-15 11:05	**Source:**	Bioassay Report		
Sample Age:	31h (14 °C)	**Station:**	P-2A Platform Elly		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	6.713	6.401	7.024	6.2	7.4	0.1315	0.372	5.54%	0
0.0357		8	6.563	6.178	6.947	5.8	7.3	0.1625	0.4596	7.0%	0
0.0714		8	6.575	6.129	7.021	5.7	7.5	0.1887	0.5339	8.12%	0
0.1071		8	6.513	6.032	6.993	5.6	7.5	0.203	0.5743	8.82%	0
Overall		32	6.591			5.6	7.5				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	7.863	7.819	7.906	7.8	7.9	0.0183	0.05175	0.66%	0
0.0357		8	7.938	7.849	8.026	7.8	8.1	0.0375	0.1061	1.34%	0
0.0714		8	7.95	7.887	8.013	7.9	8.1	0.02672	0.07559	0.95%	0
0.1071		8	7.938	7.875	8	7.9	8.1	0.0263	0.07439	0.94%	0
Overall		32	7.922			7.8	8.1				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	34	34	34	34	34	0	0	0.0%	0
0.0357		8	34	34	34	34	34	0	0	0.0%	0
0.0714		8	34	34	34	34	34	0	0	0.0%	0
0.1071		8	34	34	34	34	34	0	0	0.0%	0
Overall		32	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	21	21	21	21	21	0	0	0.0%	0
0.0357		8	21	21	21	21	21	0	0	0.0%	0
0.0714		8	21	21	21	21	21	0	0	0.0%	0
0.1071		8	21	21	21	21	21	0	0	0.0%	0
Overall		32	21			21	21				0 (0%)

Pacific Topsmelt 7-d Survival and Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-%	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	6.5	7.4	6.9	6.4	6.9	6.8	6.6	6.2
0.0357		6.5	7.3	7	6.2	6.5	6.7	6.5	5.8
0.0714		6.6	7.5	7	6.2	6.4	6.7	6.5	5.7
0.1071		6.6	7.5	6.9	6	6.3	6.7	6.5	5.6

pH-Units

C-%	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	7.8	7.9	7.9	7.9	7.8	7.8	7.9	7.9
0.0357		7.9	8	8	7.9	7.8	7.8	8.1	8
0.0714		7.9	8	8	7.9	7.9	7.9	8.1	7.9
0.1071		7.9	8	7.9	7.9	7.9	7.9	8.1	7.9

Salinity-ppt

C-%	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	34	34	34	34	34	34	34	34
0.0357		34	34	34	34	34	34	34	34
0.0714		34	34	34	34	34	34	34	34
0.1071		34	34	34	34	34	34	34	34

Temperature-°C

C-%	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	21	21	21	21	21	21	21	21
0.0357		21	21	21	21	21	21	21	21
0.0714		21	21	21	21	21	21	21	21
0.1071		21	21	21	21	21	21	21	21

aquatic bioassay & consulting laboratories, inc

August 20, 2015

Ms. Marina Robertson
Beta Offshore
111 W Ocean Blvd., Suite 1240
Long Beach, CA 90802

Dear Ms. Robertson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms EPA/600/R-95-136, 1995* "All acceptability criteria were met. This is a valid test." Results were as follows:

CLIENT:	Beta Offshore
SAMPLE I.D.:	Platform Elly
DATE RECEIVED:	21 July - 15
ABC LAB. NO.:	LTS0715.185

CHRONIC ABALONE LARVAL DEVELOPMENT BIOASSAY

IWC CONCENTRATION = 0.0714%

TST RESULT

PASS

Yours very truly,

Scott Johnson
Laboratory Director

TST Summary Sheet

Lab Name	Aquatic Bioassay Labs.	**Client Name**	LTS- Beta Offshore
Test ID	P-2A Platform Elly	**Test Species**	*H. rufescens (red abalone)*
Test Date	7/21/2015	**Test Type**	Chronic
Test Duration	48 hrs.	**Endpoint**	Larval Development
Critical Conc.	0.0714%		

Statistic	Control	Critical Concentration
Percent Mean of Raw Data	1.00	1.00
Mean used in Calcuation (transformed)	1.52	1.52
Variance used in Calcuation (transformed)	0.000	0.000
Standard Deviation of Transformed Data	0.000	0.000
CV of Transformed Data	0.000	0.000
n	5	5

Mean % Effect at Critical Conc.
0.00

Calculated t-value	Degrees of Freedom	Table t-value	Percent Difference
			0.00000

Results	
Pass	Sample is Non-toxic

Raw Data

Control Data		Critical Concentration Data	
No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)	No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)
100	100	100	100
100	100	100	100
100	100	100	100
100	100	100	100
100	100	100	100

CETIS Summary Report

Report Date: 18 Aug-15 09:42 (p 1 of 1)
Test Code: LTS0715.185abs | 20-7210-9607

Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	06-2489-7401	**Test Type:**	Development	**Analyst:**	
Start Date:	21 Jul-15 12:36	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	23 Jul-15 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	02-7364-6667	**Code:**	LTS0715.185a	**Client:**	LTS Environmental, Inc.
Sample Date:	20 Jul-15 09:00	**Material:**	Sample Water	**Project:**	Pl. Elly 3-species Toxicity
Receive Date:	21 Jul-15 11:05	**Source:**	Bioassay Report		
Sample Age:	28h	**Station:**	P-2A Platform Elly		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
17-5859-2708	Proportion Normal	0.1071	>0.1071	NA	NA	933.7	Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
04-8526-1831	Proportion Normal	EC5	>0.1071	N/A	N/A	<933.7	Linear Interpolation (ICPIN)
		EC10	>0.1071	N/A	N/A	<933.7	
		EC15	>0.1071	N/A	N/A	<933.7	
		EC20	>0.1071	N/A	N/A	<933.7	
		EC25	>0.1071	N/A	N/A	<933.7	
		EC40	>0.1071	N/A	N/A	<933.7	
		EC50	>0.1071	N/A	N/A	<933.7	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
04-8526-1831	Proportion Normal	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
17-5859-2708	Proportion Normal	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria

Proportion Normal Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	0.0%
0.0357		5	1	1	1	1	1	0	0	0.0%	0.0%
0.0714		5	1	1	1	1	1	0	0	0.0%	0.0%
0.1071		5	1	1	1	1	1	0	0	0.0%	0.0%

Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.0357		1	1	1	1	1
0.0714		1	1	1	1	1
0.1071		1	1	1	1	1

Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	100/100	100/100	100/100	100/100	100/100
0.0357		100/100	100/100	100/100	100/100	100/100
0.0714		100/100	100/100	100/100	100/100	100/100
0.1071		100/100	100/100	100/100	100/100	100/100

CETIS Analytical Report

Report Date: 18 Aug-15 09:41 (p 1 of 2)
Test Code: LTS0715.185abs | 20-7210-9607

Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-5859-2708	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:41	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	0.1071	>0.1071	NA	933.7

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.0357	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect
		0.0714	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect
		0.1071	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	3	65540	<0.0001	Significant Effect
Error	0	0	16			
Total	0		19			

Proportion Normal Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	1	0	0.0%	0.0%
0.0357		5	1	1	1	1	1	1	0	0.0%	0.0%
0.0714		5	1	1	1	1	1	1	0	0.0%	0.0%
0.1071		5	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
0.0357		5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
0.0714		5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
0.1071		5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%

Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.0357		1	1	1	1	1
0.0714		1	1	1	1	1
0.1071		1	1	1	1	1

Angular (Corrected) Transformed Detail

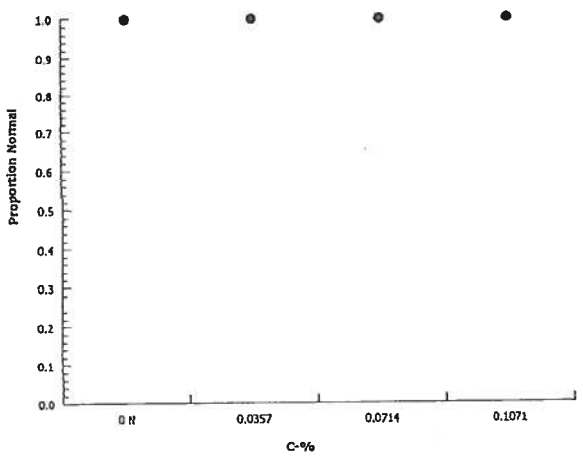
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.521	1.521	1.521	1.521	1.521
0.0357		1.521	1.521	1.521	1.521	1.521
0.0714		1.521	1.521	1.521	1.521	1.521
0.1071		1.521	1.521	1.521	1.521	1.521

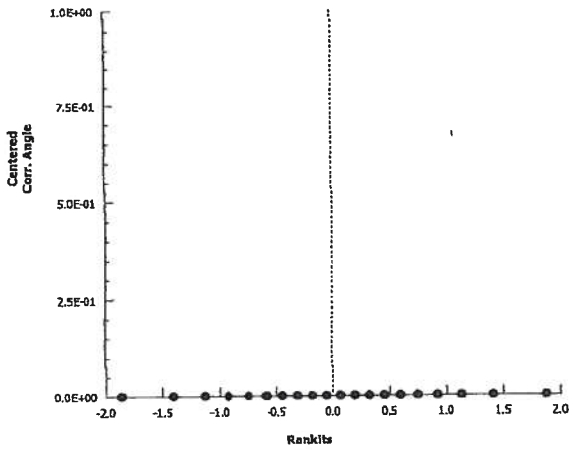
Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	100/100	100/100	100/100	100/100	100/100
0.0357		100/100	100/100	100/100	100/100	100/100
0.0714		100/100	100/100	100/100	100/100	100/100
0.1071		100/100	100/100	100/100	100/100	100/100

Red Abalone Larval Development Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	17-5859-2708	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:41	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 18 Aug-15 09:41 (p 1 of 1)
Test Code: LTS0715.185abs | 20-7210-9607

Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	04-8526-1831	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:41	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>0.1071	N/A	N/A	<933.7	NA	NA
EC10	>0.1071	N/A	N/A	<933.7	NA	NA
EC15	>0.1071	N/A	N/A	<933.7	NA	NA
EC20	>0.1071	N/A	N/A	<933.7	NA	NA
EC25	>0.1071	N/A	N/A	<933.7	NA	NA
EC40	>0.1071	N/A	N/A	<933.7	NA	NA
EC50	>0.1071	N/A	N/A	<933.7	NA	NA

Proportion Normal Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	1	1	1	0	0	0.0%	0.0%	500	500
0.0357		5	1	1	1	0	0	0.0%	0.0%	500	500
0.0714		5	1	1	1	0	0	0.0%	0.0%	500	500
0.1071		5	1	1	1	0	0	0.0%	0.0%	500	500

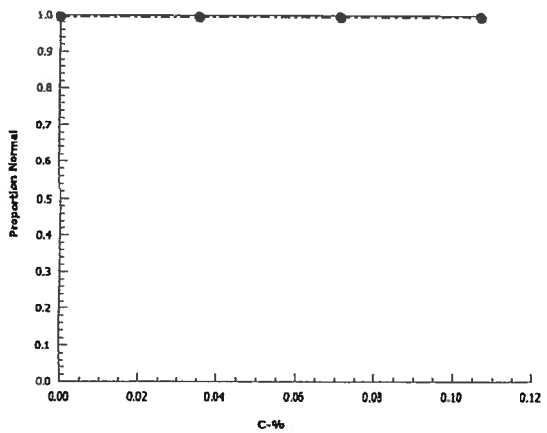
Proportion Normal Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.0357		1	1	1	1	1
0.0714		1	1	1	1	1
0.1071		1	1	1	1	1

Proportion Normal Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	100/100	100/100	100/100	100/100	100/100
0.0357		100/100	100/100	100/100	100/100	100/100
0.0714		100/100	100/100	100/100	100/100	100/100
0.1071		100/100	100/100	100/100	100/100	100/100

Graphics



CETIS Measurement Report

Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	06-2489-7401	**Test Type:**	Development	**Analyst:**	
Start Date:	21 Jul-15 12:36	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	23 Jul-15 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	02-7364-6667	**Code:**	LTS0715.185a	**Client:**	LTS Environmental, Inc.
Sample Date:	20 Jul-15 09:00	**Material:**	Sample Water	**Project:**	Pl. Elly 3-species Toxicity
Receive Date:	21 Jul-15 11:05	**Source:**	Bioassay Report		
Sample Age:	28h	**Station:**	P-2A Platform Elly		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.4	14.5	14 - 16	Yes	Results Within Limits

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.7	-0.9237	14.32	6.1	7.3	0.6	0.8485	12.66%	0
0.0357		2	6.65	-1.609	14.91	6	7.3	0.65	0.9192	13.82%	0
0.0714		2	6.65	-1.609	14.91	6	7.3	0.65	0.9192	13.82%	0
0.1071		2	6.7	-0.9237	14.32	6.1	7.3	0.6	0.8485	12.66%	0
Overall		8	6.675			6	7.3				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
0.0357		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.0714		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.1071		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		8	7.875			7.8	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
0.0357		2	34	34	34	34	34	0	0	0.0%	0
0.0714		2	34	34	34	34	34	0	0	0.0%	0
0.1071		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
0.0357		2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
0.0714		2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
0.1071		2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
Overall		8	14.45			14.4	14.5				0 (0%)

Red Abalone Larval Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	7.3	6.1
0.0357		7.3	6
0.0714		7.3	6
0.1071		7.3	6.1

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.8	7.8
0.0357		7.9	7.9
0.0714		7.9	7.9
0.1071		7.9	7.9

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
0.0357		34	34
0.0714		34	34
0.1071		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.4	14.5
0.0357		14.4	14.5
0.0714		14.4	14.5
0.1071		14.4	14.5

aquatic bioassay & consulting laboratories, inc

August 20, 2015

Ms. Marina Robertson
Beta Offshore
111 W Ocean Blvd., Suite 1240
Long Beach, CA 90802

Dear Ms. Robertson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms EPA/600/R-95-136, 1995*. Results were as follows:

CLIENT:	Beta Offshore
SAMPLE I.D.:	Platform Elly
DATE RECEIVED:	21 July - 15
ABC LAB. NO.:	LTS0715.185

CHRONIC KELP GERMINATION AND GROWTH BIOASSAY

IWC CONCENTRATION = 0.0714%

TST RESULT

Germination	PASS
Tube Length	PASS

Yours very truly,

Scott Johnson
Laboratory Director

TST Summary Sheet

Lab Name	Aquatic Bioassay Labs.	**Client Name**	LTS- Beta Offshore
Test ID	P-2A Platform Elly	**Test Species**	*M. pyrifera (giant kelp)*
Test Date	7/21/2015	**Test Type**	Chronic
Test Duration	48 hrs.	**Endpoint**	Germination
Critical Conc.	0.0714%		

Statistic	Control	Critical Concentration
Percent Mean of Raw Data	0.77	0.78
Mean used in Calcuation (transformed)	1.08	1.09
Variance used in Calcuation (transformed)	0.003	0.001
Standard Deviation of Transformed Data	0.058	0.035
CV of Transformed Data	0.054	0.032
n	5	5

Mean % Effect at Critical Conc.

-1.29

Calculated t-value	Degrees of Freedom	Table t-value	Percent Difference
11.2048	7	1.8946	

Results

Pass Sample is Non-toxic

Raw Data

Control Data		Critical Concentration Data	
No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)	No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)
100	70	100	76
100	75	100	80
100	82	100	82
100	81	100	75
100	79	100	79

TST Summary Sheet

Lab Name	Aquatic Bioassay Labs.	**Client Name**	LTS- Beta Offshore
Test ID	P-2A Platform Elly	**Test Species**	*M. pyrifera (giant kelp)*
Test Date	7/21/2015	**Test Type**	Chronic
Test Duration	48 hrs.	**Endpoint**	Germ-Tube Length
Critical Conc.	0.0714%		

Statistic	Control	Critical Concentration
Mean of Raw Data	15.28	16.04
Mean used in Calculation (non-transformed)	15.28	16.04
Variance used in Calculation (non-transformed)	0.037	0.103
Standard Deviation of Raw Data	0.192	0.321
CV of Raw Data	0.013	0.020
n	5	5

Mean % Effect at Critical Conc.

-4.97

Calculated t-value	Degrees of Freedom	Table t-value	Percent Difference
29.1050	5	2.0150	

Results

Pass Sample is Non-toxic

Raw Data

Control Data

No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)
100	15
100	15.4
100	15.5
100	15.2
100	15.3

Critical Concentration Data

No. of Organisms Exposed or Counted	Response (Final Count, Weight, Length, etc.)
100	15.6
100	16
100	16.4
100	15.9
100	16.3

CETIS Summary Report

Report Date: 18 Aug-15 09:55 (p 1 of 2)
Test Code: LTS0715.185klp | 00-1754-1835

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-8790-0694	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	21 Jul-15 15:03	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	23 Jul-15 15:03	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	07-6389-7598	**Code:**	LTS0715.185klp	**Client:**	LTS Environmental, Inc.
Sample Date:	20 Jul-15 09:00	**Material:**	Sample Water	**Project:**	Pl. Elly 3-species Toxicity
Receive Date:	21 Jul-15 11:05	**Source:**	Bioassay Report		
Sample Age:	30h (14.4 °C)	**Station:**	P-2A Platform Elly		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
03-1553-8299	Germination Rate	0.1071	>0.1071	NA	6.35%	933.7	Dunnett Multiple Comparison Test
05-1119-8013	Mean Length	0.1071	>0.1071	NA	3.64%	933.7	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
06-6684-8213	Germination Rate	EC5	>0.1071	N/A	N/A	<933.7	Linear Interpolation (ICPIN)
		EC10	>0.1071	N/A	N/A	<933.7	
		EC15	>0.1071	N/A	N/A	<933.7	
		EC20	>0.1071	N/A	N/A	<933.7	
		EC25	>0.1071	N/A	N/A	<933.7	
		EC40	>0.1071	N/A	N/A	<933.7	
		EC50	>0.1071	N/A	N/A	<933.7	
04-5933-1120	Mean Length	IC5	>0.1071	N/A	N/A	<933.7	Linear Interpolation (ICPIN)
		IC10	>0.1071	N/A	N/A	<933.7	
		IC15	>0.1071	N/A	N/A	<933.7	
		IC20	>0.1071	N/A	N/A	<933.7	
		IC25	>0.1071	N/A	N/A	<933.7	
		IC40	>0.1071	N/A	N/A	<933.7	
		IC50	>0.1071	N/A	N/A	<933.7	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
03-1553-8299	Germination Rate	Control Resp	0.774	0.7 - NL	Yes	Passes Acceptability Criteria
06-6684-8213	Germination Rate	Control Resp	0.774	0.7 - NL	Yes	Passes Acceptability Criteria
04-5933-1120	Mean Length	Control Resp	15.28	10 - NL	Yes	Passes Acceptability Criteria
05-1119-8013	Mean Length	Control Resp	15.28	10 - NL	Yes	Passes Acceptability Criteria
03-1553-8299	Germination Rate	PMSD	0.0635	NL - 0.2	No	Passes Acceptability Criteria
05-1119-8013	Mean Length	PMSD	0.03644	NL - 0.2	No	Passes Acceptability Criteria

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.774	0.7128	0.8352	0.7	0.82	0.02205	0.0493	6.37%	0.0%
0.0357		5	0.8	0.7607	0.8393	0.75	0.83	0.01414	0.03162	3.95%	-3.36%
0.0714		5	0.784	0.7482	0.8198	0.75	0.82	0.01288	0.02881	3.68%	-1.29%
0.1071		5	0.798	0.7697	0.8263	0.76	0.82	0.0102	0.0228	2.86%	-3.1%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	15.28	15.04	15.52	15	15.5	0.08602	0.1924	1.26%	0.0%
0.0357		5	16.24	15.75	16.73	15.9	16.8	0.1778	0.3975	2.45%	-6.28%
0.0714		5	16.04	15.64	16.44	15.6	16.4	0.1435	0.3209	2.0%	-4.97%
0.1071		5	15.78	15.07	16.49	14.9	16.4	0.2557	0.5718	3.62%	-3.27%

Macrocystis Germination and Germ Tube Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.7	0.75	0.82	0.81	0.79
0.0357		0.75	0.82	0.83	0.81	0.79
0.0714		0.76	0.8	0.82	0.75	0.79
0.1071		0.8	0.76	0.81	0.82	0.8

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	15	15.4	15.5	15.2	15.3
0.0357		16.1	16.5	15.9	16.8	15.9
0.0714		15.6	16	16.4	15.9	16.3
0.1071		15.9	16.4	14.9	16.1	15.6

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	70/100	75/100	82/100	81/100	79/100
0.0357		75/100	82/100	83/100	81/100	79/100
0.0714		76/100	80/100	82/100	75/100	79/100
0.1071		80/100	76/100	81/100	82/100	80/100

CETIS Analytical Report

Report Date: 18 Aug-15 09:55 (p 1 of 4)
Test Code: LTS0715.185klp | 00-1754-1835

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	03-1553-8299	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:55	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	6.35%	0.1071	>0.1071	NA	933.7

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.0357	-1.178	2.227	0.058	8	0.9749	CDF	Non-Significant Effect
		0.0714	-0.4192	2.227	0.058	8	0.8738	CDF	Non-Significant Effect
		0.1071	-1.066	2.227	0.058	8	0.9674	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.003195088	0.001065029	3	0.6176	0.6136	Non-Significant Effect
Error	0.02759193	0.001724495	16			
Total	0.03078702		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.137	11.34	0.5445	Equal Variances
Variances	Mod Levene Equality of Variance	1.098	5.953	0.3876	Equal Variances
Variances	Levene Equality of Variance	1.573	5.292	0.2349	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9499	0.866	0.3661	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1714	0.2235	0.1274	Normal Distribution
Distribution	D'Agostino Skewness	1.349	2.576	0.1773	Normal Distribution
Distribution	D'Agostino Kurtosis	0.006909	2.576	0.9945	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.82	9.21	0.4026	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4562	3.878	0.2710	Normal Distribution

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.774	0.7128	0.8352	0.79	0.7	0.82	0.02205	6.37%	0.0%
0.0357		5	0.8	0.7607	0.8393	0.81	0.75	0.83	0.01414	3.95%	-3.36%
0.0714		5	0.784	0.7482	0.8198	0.79	0.75	0.82	0.01288	3.68%	-1.29%
0.1071		5	0.798	0.7697	0.8263	0.8	0.76	0.82	0.0102	2.86%	-3.1%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.077	1.005	1.149	1.095	0.9912	1.133	0.02598	5.39%	0.0%
0.0357		5	1.108	1.06	1.156	1.12	1.047	1.146	0.01739	3.51%	-2.87%
0.0714		5	1.088	1.045	1.132	1.095	1.047	1.133	0.01569	3.22%	-1.02%
0.1071		5	1.105	1.07	1.14	1.107	1.059	1.133	0.0125	2.53%	-2.6%

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.7	0.75	0.82	0.81	0.79
0.0357		0.75	0.82	0.83	0.81	0.79
0.0714		0.76	0.8	0.82	0.75	0.79
0.1071		0.8	0.76	0.81	0.82	0.8

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.9912	1.047	1.133	1.12	1.095
0.0357		1.047	1.133	1.146	1.12	1.095
0.0714		1.059	1.107	1.133	1.047	1.095
0.1071		1.107	1.059	1.12	1.133	1.107

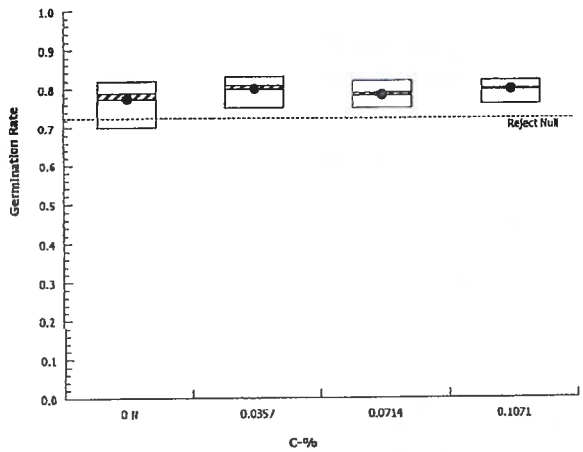
Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

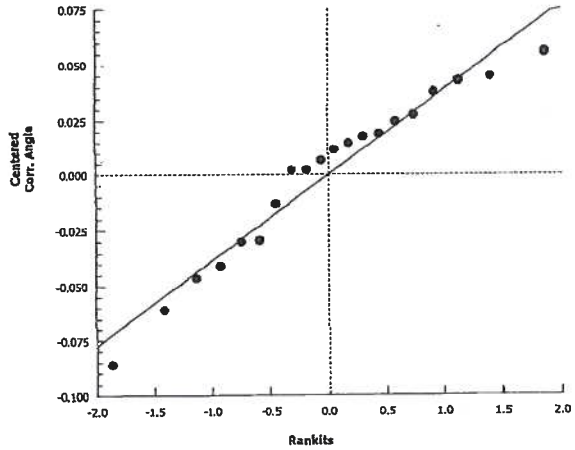
Analysis ID:	03-1553-8299	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:55	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	70/100	75/100	82/100	81/100	79/100
0.0357		75/100	82/100	83/100	81/100	79/100
0.0714		76/100	80/100	82/100	75/100	79/100
0.1071		80/100	76/100	81/100	82/100	80/100

Graphics





Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	05-1119-8013	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:55	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	3.64%	0.1071	>0.1071	NA	933.7

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.0357	-3.84	2.227	0.557	8	1.0000	CDF	Non-Significant Effect
		0.0714	-3.04	2.227	0.557	8	0.9998	CDF	Non-Significant Effect
		0.1071	-2	2.227	0.557	8	0.9970	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.585499	0.861833	3	5.516	0.0085	Significant Effect
Error	2.499999	0.1562499	16			
Total	5.085498		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.013	11.34	0.2601	Equal Variances
Variances	Mod Levene Equality of Variance	1.402	5.953	0.2902	Equal Variances
Variances	Levene Equality of Variance	1.735	5.292	0.2001	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9765	0.866	0.8815	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.07961	0.2235	1.0000	Normal Distribution
Distribution	D'Agostino Skewness	0.8437	2.576	0.3988	Normal Distribution
Distribution	D'Agostino Kurtosis	0.6815	2.576	0.4956	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.176	9.21	0.5554	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.1998	3.878	0.9282	Normal Distribution

Mean Length Summary

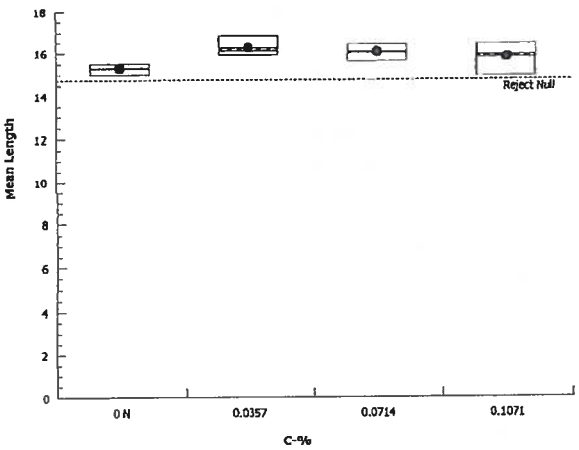
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	15.28	15.04	15.52	15.3	15	15.5	0.08602	1.26%	0.0%
0.0357		5	16.24	15.75	16.73	16.1	15.9	16.8	0.1778	2.45%	-6.28%
0.0714		5	16.04	15.64	16.44	16	15.6	16.4	0.1435	2.0%	-4.97%
0.1071		5	15.78	15.07	16.49	15.9	14.9	16.4	0.2557	3.62%	-3.27%

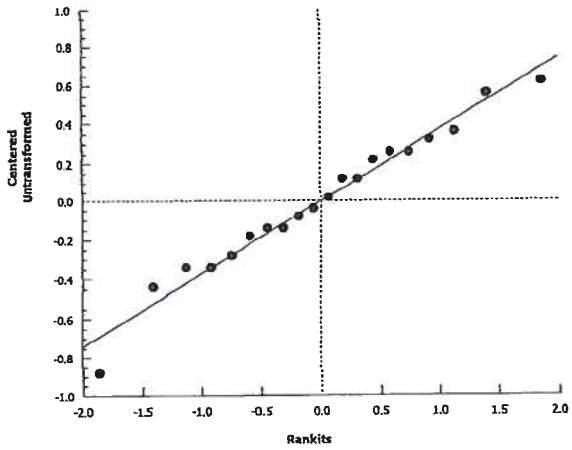
Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	15	15.4	15.5	15.2	15.3
0.0357		16.1	16.5	15.9	16.8	15.9
0.0714		15.6	16	16.4	15.9	16.3
0.1071		15.9	16.4	14.9	16.1	15.6

Macrocystis Germination and Germ Tube Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	05-1119-8013	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:55	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 18 Aug-15 09:55 (p 1 of 2)
Test Code: LTS0715.185klp | 00-1754-1835

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	06-6684-8213	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:55	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>0.1071	N/A	N/A	<933.7	NA	NA
EC10	>0.1071	N/A	N/A	<933.7	NA	NA
EC15	>0.1071	N/A	N/A	<933.7	NA	NA
EC20	>0.1071	N/A	N/A	<933.7	NA	NA
EC25	>0.1071	N/A	N/A	<933.7	NA	NA
EC40	>0.1071	N/A	N/A	<933.7	NA	NA
EC50	>0.1071	N/A	N/A	<933.7	NA	NA

Germination Rate Summary

										Calculated Variate(A/B)	
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.774	0.7	0.82	0.02205	0.04929	6.37%	0.0%	387	500
0.0357		5	0.8	0.75	0.83	0.01414	0.03162	3.95%	-3.36%	400	500
0.0714		5	0.784	0.75	0.82	0.01288	0.02881	3.68%	-1.29%	392	500
0.1071		5	0.798	0.76	0.82	0.0102	0.0228	2.86%	-3.1%	399	500

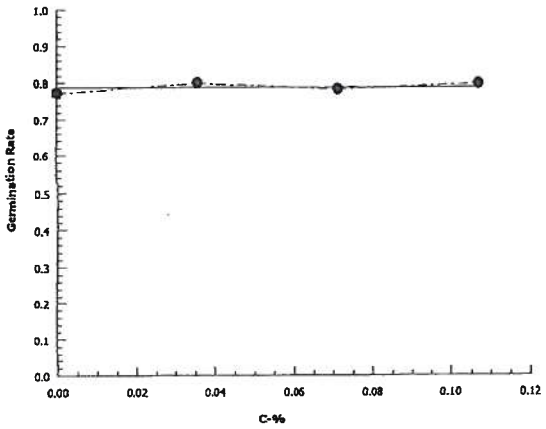
Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.7	0.75	0.82	0.81	0.79
0.0357		0.75	0.82	0.83	0.81	0.79
0.0714		0.76	0.8	0.82	0.75	0.79
0.1071		0.8	0.76	0.81	0.82	0.8

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	70/100	75/100	82/100	81/100	79/100
0.0357		75/100	82/100	83/100	81/100	79/100
0.0714		76/100	80/100	82/100	75/100	79/100
0.1071		80/100	76/100	81/100	82/100	80/100

Graphics



Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	04-5933-1120	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:55	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	586666	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>0.1071	N/A	N/A	<933.7	NA	NA
IC10	>0.1071	N/A	N/A	<933.7	NA	NA
IC15	>0.1071	N/A	N/A	<933.7	NA	NA
IC20	>0.1071	N/A	N/A	<933.7	NA	NA
IC25	>0.1071	N/A	N/A	<933.7	NA	NA
IC40	>0.1071	N/A	N/A	<933.7	NA	NA
IC50	>0.1071	N/A	N/A	<933.7	NA	NA

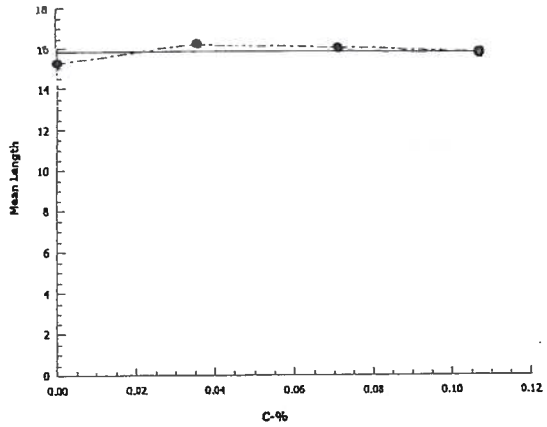
Mean Length Summary

			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	15.28	15	15.5	0.08602	0.1924	1.26%	0.0%
0.0357		5	16.24	15.9	16.8	0.1778	0.3975	2.45%	-6.28%
0.0714		5	16.04	15.6	16.4	0.1435	0.3209	2.0%	-4.97%
0.1071		5	15.78	14.9	16.4	0.2557	0.5718	3.62%	-3.27%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	15	15.4	15.5	15.2	15.3
0.0357		16.1	16.5	15.9	16.8	15.9
0.0714		15.6	16	16.4	15.9	16.3
0.1071		15.9	16.4	14.9	16.1	15.6

Graphics



CETIS Measurement Report

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-8790-0694	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	21 Jul-15 15:03	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	23 Jul-15 15:03	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	07-6389-7598	**Code:**	LTS0715.185klp	**Client:**	LTS Environmental, Inc.
Sample Date:	20 Jul-15 09:00	**Material:**	Sample Water	**Project:**	Pl. Elly 3-species Toxicity
Receive Date:	21 Jul-15 11:05	**Source:**	Bioassay Report		
Sample Age:	30h (14.4 °C)	**Station:**	P-2A Platform Elly		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
0.0357		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
0.0714		2	6.35	4.444	8.256	6.2	6.5	0.15	0.2121	3.34%	0
0.1071		2	6.4	2.588	10.21	6.1	6.7	0.3	0.4243	6.63%	0
Overall		8	6.4			6	6.8				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.0357		2	8	8	8	8	8	0	0	0.0%	0
0.0714		2	8	8	8	8	8	0	0	0.0%	0
0.1071		2	8	8	8	8	8	0	0	0.0%	0
Overall		8	7.975			7.9	8				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
0.0357		2	34	34	34	34	34	0	0	0.0%	0
0.0714		2	34	34	34	34	34	0	0	0.0%	0
0.1071		2	34	34	34	34	34	0	0	0.0%	0
Overall		8	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
0.0357		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
0.0714		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
0.1071		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		8	14.85			14.8	14.9				0 (0%)

Macrocystis Germination and Germ Tube Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6
0.0357		6.6	6.3
0.0714		6.5	6.2
0.1071		6.7	6.1

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
0.0357		8	8
0.0714		8	8
0.1071		8	8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
0.0357		34	34
0.0714		34	34
0.1071		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.8	14.9
0.0357		14.8	14.9
0.0714		14.8	14.9
0.1071		14.8	14.9

CHAIN OF CUSTODY RECORD

Client:	Project Name/Number:
Beta Offshore	Pl. Elly 3sp. Toxicity
Address: c/o Marina Robertson 1240 111 W. Ocean Blvd, Suite Long Beach Ca. 90802	Project Mgr.
	P.O. #
Phone Number: (562)-653-3497 S. Lawry: (805)-644-4560	Sampled By (signature): Cole [signature]

Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Analysis	Comments
07/20/15	0900		V		P-2A			conc: 0.0714, ~~0.0~~
								0.0357,
								0.1071
								Copies to
							Temp. deg. C = 14.0°C	S. Lawry
							Chlorine (mg/L) = <0.1	
							NH3 (mg/L) = >10	

Relinquised By: (signature)	Date: Time:	Relinquised By: (signature)	Date: Time:
Cole [signature]	07/21/15 / 1105		
Received By: (signature) [signature]	Date: Time: 7-21-15 / 1105	Received By: (signature)	Date: Time:

Upon sample reciept record the following results:

Temp (°C) _____ NH_3 (mg/L) _____ Cl (mg/L): _____

Aquatic Bioassay and Consulting Laboratories
29 N. Olive Street Ventura, CA 93001 Phone: (805) 643-5621 Fax: (805) 643-2930

aquatic bioassay & consulting laboratories, inc

CHRONIC TOPSMELT SURVIVAL AND GROWTH BIOASSAY

DATE: 21 July - 2015

STANDARD TOXICANT: Copper Chloride

ENDPOINT: SURVIVAL

NOEC = 56.00 ug/l

EC25 = 105.90 ug/l
EC50 = 135.30 ug/l

ENDPOINT: GROWTH

NOEC = 100.00 ug/l

IC25 = 124.60 ug/l
IC50 = 149.30 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

*34ppt

29 north olive st. ventura, ca 93001 (805) 643 5621 www.aquabio.org

CETIS Summary Report

Report Date: 14 Aug-15 12:21 (p 1 of 2)
Test Code: TOPS072115-34 | 12-8588-7617

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	03-7867-7336	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	21 Jul-15 15:55	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Jul-15 14:00	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	11-9026-7524	**Code:**	TOPS072115t34	**Client:**	ABC Labs
Sample Date:	21 Jul-15 14:00	**Material:**	Copper chloride	**Project:**	REF TOX
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	115m	**Station:**	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
12-9575-2009	7d Survival Rate	56	100	74.83	13.2%		Steel Many-One Rank Sum Test
18-5008-9361	Mean Dry Biomass-mg	100	180	134.2	23.2%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
08-5139-1835	7d Survival Rate	EC5	67	60.81	91.75		Linear Interpolation (ICPIN)
		EC10	78	65.63	114.2		
		EC15	89	70.44	116.6		
		EC20	100	75.25	118.9		
		EC25	105.9	82.62	123.9		
		EC40	123.5	105.4	138.8		
		EC50	135.3	120.9	148.7		
00-3197-1287	Mean Dry Biomass-mg	IC5	104.9	N/A	106.5		Linear Interpolation (ICPIN)
		IC10	109.9	14.46	113		
		IC15	114.8	94.17	119.5		
		IC20	119.7	99.93	126		
		IC25	124.6	105.9	132.5		
		IC40	139.4	124.4	152		
		IC50	149.3	135.7	165		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
08-5139-1835	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
12-9575-2009	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
00-3197-1287	Mean Dry Biomass-mg	Control Resp	1.629	0.85 - NL	Yes	Passes Acceptability Criteria
18-5008-9361	Mean Dry Biomass-mg	Control Resp	1.629	0.85 - NL	Yes	Passes Acceptability Criteria
12-9575-2009	7d Survival Rate	PMSD	0.1323	NL - 0.25	No	Passes Acceptability Criteria
18-5008-9361	Mean Dry Biomass-mg	PMSD	0.2324	NL - 0.5	No	Passes Acceptability Criteria

7d Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	0.0%
56		5	1	1	1	1	1	0	0	0.0%	0.0%
100		5	0.8	0.6244	0.9756	0.6	1	0.06325	0.1414	17.68%	20.0%
180		5	0.12	0	0.256	0	0.2	0.04899	0.1095	91.29%	88.0%
320		5	0	0	0	0	0	0	0		100.0%
560		5	0	0	0	0	0	0	0		100.0%

Mean Dry Biomass-mg Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1.629	1.145	2.113	1.338	2.31	0.1743	0.3898	23.93%	0.0%
56		5	1.681	1.475	1.887	1.42	1.856	0.07421	0.1659	9.87%	-3.19%
100		5	1.703	1.524	1.882	1.534	1.844	0.06443	0.1441	8.46%	-4.54%
180		5	0.314	-0.05589	0.6839	0	0.604	0.1332	0.2979	94.87%	80.72%
320		5	0	0	0	0	0	0	0		100.0%
560		5	0	0	0	0	0	0	0		100.0%

Pacific Topsmelt 7-d Survival and Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

7d Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
56		1	1	1	1	1
100		0.8	1	0.6	0.8	0.8
180		0	0.2	0	0.2	0.2
320		0	0	0	0	0
560		0	0	0	0	0

Mean Dry Biomass-mg Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.434	1.338	1.564	2.31	1.498
56		1.42	1.786	1.68	1.662	1.856
100		1.58	1.714	1.844	1.842	1.534
180		0	0.604	0	0.574	0.392
320		0	0	0	0	0
560		0	0	0	0	0

7d Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	5/5	5/5
100		4/5	5/5	3/5	4/5	4/5
180		0/5	1/5	0/5	1/5	1/5
320		0/5	0/5	0/5	0/5	0/5
560		0/5	0/5	0/5	0/5	0/5

CETIS Analytical Report

Report Date: 14 Aug-15 12:20 (p 1 of 4)
Test Code: TOPS072115-34 | 12-8588-7617

Pacific Topsmelt 7-d Survival and Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	12-9575-2009	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	14 Aug-15 12:20	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	13.2%	56	100	74.83	

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		56	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect
		100*	17.5	17	1	8	0.0470	Asymp	Significant Effect
		180*	15	17	0	8	0.0123	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.212031	1.070677	3	98.7	<0.0001	Significant Effect
Error	0.1735718	0.01084824	16			
Total	3.385603		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1.998	5.953	0.1681	Equal Variances
Variances	Levene Equality of Variance	4.59	5.292	0.0168	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8165	0.866	0.0015	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.3358	0.2235	<0.0001	Non-normal Distribution
Distribution	D'Agostino Skewness	0.2252	2.576	0.8218	Normal Distribution
Distribution	D'Agostino Kurtosis	1.836	2.576	0.0664	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	3.42	9.21	0.1808	Normal Distribution
Distribution	Anderson-Darling A2 Normality	2.346	3.878	<0.0001	Non-normal Distribution

7d Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	1	0	0.0%	0.0%
56		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	0.8	0.6244	0.9756	0.8	0.6	1	0.06325	17.68%	20.0%
180		5	0.12	0	0.256	0.2	0	0.2	0.04899	91.29%	88.0%
320		5	0	0	0	0	0	0	0		100.0%
560		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
56		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
100		5	1.111	0.9089	1.312	1.107	0.8861	1.345	0.07264	14.63%	17.45%
180		5	0.3684	0.2064	0.5303	0.4636	0.2255	0.4636	0.05833	35.41%	72.62%
320		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%
560		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%

7d Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
56		1	1	1	1	1
100		0.8	1	0.6	0.8	0.8
180		0	0.2	0	0.2	0.2
320		0	0	0	0	0
560		0	0	0	0	0

Pacific Topsmelt 7-d Survival and Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	12-9575-2009	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	14 Aug-15 12:20	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

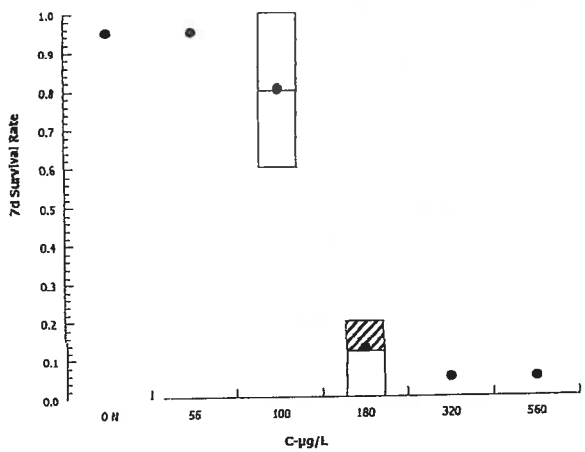
Angular (Corrected) Transformed Detail

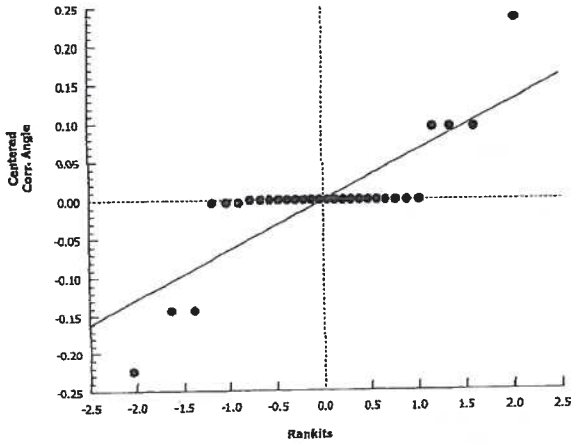
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.345	1.345	1.345	1.345	1.345
56		1.345	1.345	1.345	1.345	1.345
100		1.107	1.345	0.8861	1.107	1.107
180		0.2255	0.4636	0.2255	0.4636	0.4636
320		0.2255	0.2255	0.2255	0.2255	0.2255
560		0.2255	0.2255	0.2255	0.2255	0.2255

7d Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	5/5	5/5
100		4/5	5/5	3/5	4/5	4/5
180		0/5	1/5	0/5	1/5	1/5
320		0/5	0/5	0/5	0/5	0/5
560		0/5	0/5	0/5	0/5	0/5

Graphics





Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	18-5008-9361	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	14 Aug-15 12:20	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	23.2%	100	180	134.2	

Dunnett Multiple Comparison Test

Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		56	-0.3059	2.227	0.379	8	0.8457	CDF	Non-Significant Effect
		100	-0.4353	2.227	0.379	8	0.8775	CDF	Non-Significant Effect
		180*	7.734	2.227	0.379	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.917839	2.305946	3	31.92'	<0.0001	Significant Effect
Error	1.155974	0.07224839	16			
Total	8.073812		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.575	11.34	0.2057	Equal Variances
Variances	Mod Levene Equality of Variance	0.7198	5.953	0.5591	Equal Variances
Variances	Levene Equality of Variance	1.732	5.292	0.2007	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9296	0.866	0.1515	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1015	0.2235	0.9854	Normal Distribution
Distribution	D'Agostino Skewness	1.884	2.576	0.0596	Normal Distribution
Distribution	D'Agostino Kurtosis	1.498	2.576	0.1340	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	5.795	9.21	0.0552	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.3734	3.878	0.4223	Normal Distribution

Mean Dry Biomass-mg Summary

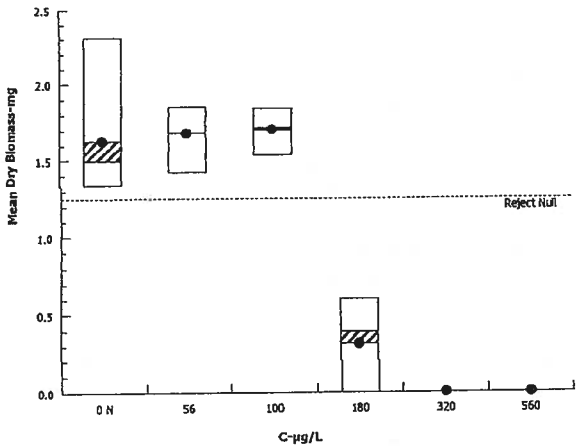
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1.629	1.145	2.113	1.498	1.338	2.31	0.1743	23.93%	0.0%
56		5	1.681	1.475	1.887	1.68	1.42	1.856	0.07421	9.87%	-3.19%
100		5	1.703	1.524	1.882	1.714	1.534	1.844	0.06443	8.46%	-4.54%
180		5	0.314	-0.05589	0.6839	0.392	0	0.604	0.1332	94.87%	80.72%
320		5	0	0	0	0	0	0	0		100.0%
560		5	0	0	0	0	0	0	0		100.0%

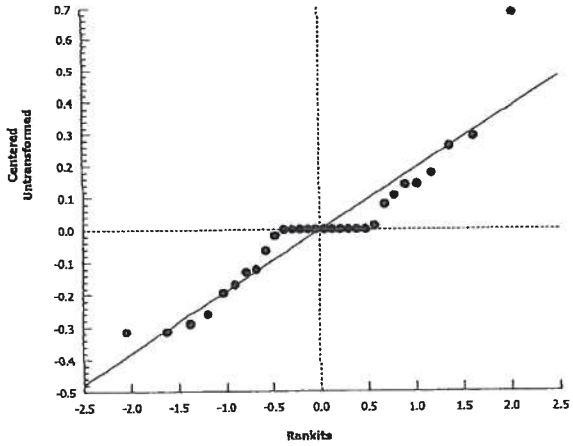
Mean Dry Biomass-mg Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.434	1.338	1.564	2.31	1.498
56		1.42	1.786	1.68	1.662	1.856
100		1.58	1.714	1.844	1.842	1.534
180		0	0.604	0	0.574	0.392
320		0	0	0	0	0
560		0	0	0	0	0

Pacific Topsmelt 7-d Survival and Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	18-5008-9361	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	14 Aug-15 12:20	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 14 Aug-15 12:20 (p 1 of 3)
Test Code: TOPS072115-34 | 12-8588-7617

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-5139-1835	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	14 Aug-15 12:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	67	60.81	91.75
EC10	78	65.63	114.2
EC15	89	70.44	116.6
EC20	100	75.25	118.9
EC25	105.9	82.62	123.9
EC40	123.5	105.4	138.8
EC50	135.3	120.9	148.7

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	1	1	1	0	0	0.0%	0.0%	25	25
56		5	1	1	1	0	0	0.0%	0.0%	25	25
100		5	0.8	0.6	1	0.06325	0.1414	17.68%	20.0%	20	25
180		5	0.12	0	0.2	0.04899	0.1095	91.29%	88.0%	3	25
320		5	0	0	0	0	0		100.0%	0	25
560		5	0	0	0	0	0		100.0%	0	25

7d Survival Rate Detail

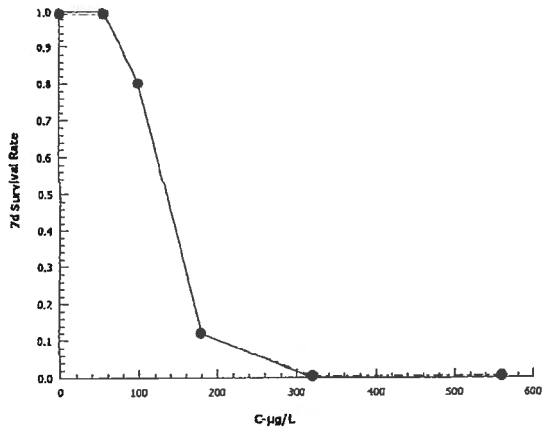
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
56		1	1	1	1	1
100		0.8	1	0.6	0.8	0.8
180		0	0.2	0	0.2	0.2
320		0	0	0	0	0
560		0	0	0	0	0

7d Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	5/5	5/5
100		4/5	5/5	3/5	4/5	4/5
180		0/5	1/5	0/5	1/5	1/5
320		0/5	0/5	0/5	0/5	0/5
560		0/5	0/5	0/5	0/5	0/5

Pacific Topsmelt 7-d Survival and Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	08-5139-1835	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	14 Aug-15 12:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Analytical Report

Report Date: 14 Aug-15 12:20 (p 3 of 3)
Test Code: TOPS072115-34 | 12-8588-7617

Pacific Topsmelt 7-d Survival and Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	00-3197-1287	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	14 Aug-15 12:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	995543	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	104.9	N/A	106.5
IC10	109.9	14.46	113
IC15	114.8	94.17	119.5
IC20	119.7	99.93	126
IC25	124.6	105.9	132.5
IC40	139.4	124.4	152
IC50	149.3	135.7	165

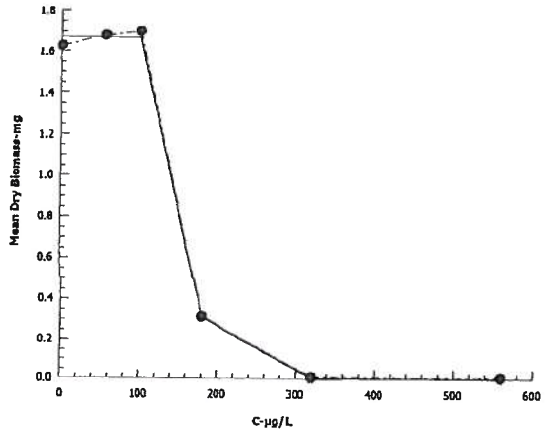
Mean Dry Biomass-mg Summary

			Calculated Variate						
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1.629	1.338	2.31	0.1743	0.3898	23.93%	0.0%
56		5	1.681	1.42	1.856	0.07421	0.1659	9.87%	-3.19%
100		5	1.703	1.534	1.844	0.06443	0.1441	8.46%	-4.54%
180		5	0.314	0	0.604	0.1332	0.2979	94.87%	80.72%
320		5	0	0	0	0	0		100.0%
560		5	0	0	0	0	0		100.0%

Mean Dry Biomass-mg Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.434	1.338	1.564	2.31	1.498
56		1.42	1.786	1.68	1.662	1.856
100		1.58	1.714	1.844	1.842	1.534
180		0	0.604	0	0.574	0.392
320		0	0	0	0	0
560		0	0	0	0	0

Graphics



Analyst: _____ QA: _____

CETIS Measurement Report

Test Code: TOPS072115-34 | 12-8588-7617

Pacific Topsmelt 7-d Survival and Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	03-7867-7336	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	21 Jul-15 15:55	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Jul-15 14:00	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	11-9026-7524	**Code:**	TOPS072115t34	**Client:**	ABC Labs
Sample Date:	21 Jul-15 14:00	**Material:**	Copper chloride	**Project:**	REF TOX
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	115m	**Station:**	REF TOX		

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	6.713	6.401	7.024	6.2	7.4	0.1315	0.372	5.54%	0
56		8	6.475	6.078	6.872	5.6	6.9	0.1677	0.4743	7.33%	0
100		8	6.663	6.395	6.93	6.2	7.2	0.1133	0.3204	4.81%	0
180		8	6.638	6.303	6.972	6.1	7.4	0.1413	0.3998	6.02%	0
320		8	6.7	6.425	6.975	6.4	7.4	0.1165	0.3295	4.92%	0
560		1	6.4			6.4	6.4	0	0	0.0%	0
Overall		41	6.598			5.6	7.4				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	7.863	7.819	7.906	7.8	7.9	0.0183	0.05175	0.66%	0
56		8	7.875	7.788	7.962	7.7	8	0.0366	0.1035	1.31%	0
100		8	7.913	7.843	7.982	7.8	8	0.0295	0.08345	1.06%	0
180		8	7.888	7.834	7.941	7.8	8	0.02266	0.06408	0.81%	0
320		8	7.9	7.855	7.945	7.8	8	0.01889	0.05344	0.68%	0
560		1	7.9			7.9	7.9	0	0	0.0%	0
Overall		41	7.89			7.7	8				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	34	34	34	34	34	0	0	0.0%	0
56		8	34	34	34	34	34	0	0	0.0%	0
100		8	34	34	34	34	34	0	0	0.0%	0
180		8	34	34	34	34	34	0	0	0.0%	0
320		8	34	34	34	34	34	0	0	0.0%	0
560		1	34			34	34	0	0	0.0%	0
Overall		41	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	21	21	21	21	21	0	0	0.0%	0
56		8	21	21	21	21	21	0	0	0.0%	0
100		8	21	21	21	21	21	0	0	0.0%	0
180		8	21	21	21	21	21	0	0	0.0%	0
320		8	21	21	21	21	21	0	0	0.0%	0
560		1	21			21	21	0	0	0.0%	0
Overall		41	21			21	21				0 (0%)

Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	6.5	7.4	6.9	6.4	6.9	6.8	6.6	6.2
56		6.5	6.9	6.9	5.6	6.9	6.7	6.2	6.1
100		6.6	7.2	7	6.2	6.7	6.7	6.5	6.4
180		6.6	7.4	6.9	6.1	6.7	6.7	6.4	6.3
320		6.4	7.4	6.9	6.4	6.7	6.7	6.5	6.6
560		6.4							

pH-Units

C-µg/L	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	7.8	7.9	7.9	7.9	7.8	7.8	7.9	7.9
56		7.9	8	7.9	7.7	7.8	7.8	8	7.9
100		7.9	8	7.9	7.9	7.8	7.8	8	8
180		7.9	8	7.9	7.9	7.8	7.8	7.9	7.9
320		7.9	8	7.9	7.9	7.9	7.8	7.9	7.9
560		7.9							

Salinity-ppt

C-µg/L	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	34	34	34	34	34	34	34	34
56		34	34	34	34	34	34	34	34
100		34	34	34	34	34	34	34	34
180		34	34	34	34	34	34	34	34
320		34	34	34	34	34	34	34	34
560		34							

Temperature-°C

C-µg/L	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	21	21	21	21	21	21	21	21
56		21	21	21	21	21	21	21	21
100		21	21	21	21	21	21	21	21
180		21	21	21	21	21	21	21	21
320		21	21	21	21	21	21	21	21
560		21							

aquatic bioassay & consulting laboratories, inc

CHRONIC ABALONE DEVELOPMENT BIOASSAY

DATE: 21 July 2015

STANDARD TOXICANT: Zinc

NOEC = 56.00 ug/l

EC25 = 67.00 ug/l
EC50 = 78.00 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 www.aquabio.org

CETIS Summary Report

Report Date: 18 Aug-15 09:45 (p 1 of 1)
Test Code: ABS072115 | 00-8128-3353

Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-2442-3127	**Test Type:**	Development	**Analyst:**	
Start Date:	21 Jul-15 12:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	23 Jul-15 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	16-1954-2862	**Code:**	ABS072115a	**Client:**	Internal Lab
Sample Date:	21 Jul-15 12:30	**Material:**	Zinc	**Project:**	REF TOX
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-8682-9316	Proportion Normal	56	100	74.83	NA		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
12-5518-3010	Proportion Normal	EC5	58.2	58.2	58.2		Linear Interpolation (ICPIN)
		EC10	60.4	60.4	60.4		
		EC15	62.6	62.6	62.6		
		EC20	64.8	64.8	64.8		
		EC25	67	67	67		
		EC40	73.6	73.6	73.6		
		EC50	78	78	78		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
12-5518-3010	Proportion Normal	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
15-8682-9316	Proportion Normal	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
15-8682-9316	Proportion Normal	NOEL	56	NL - 56	No	Above Acceptability Criteria

Proportion Normal Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	0.0%
18		5	1	1	1	1	1	0	0	0.0%	0.0%
32		5	1	1	1	1	1	0	0	0.0%	0.0%
56		5	1	1	1	1	1	0	0	0.0%	0.0%
100		5	0	0	0	0	0	0	0		100.0%
180		5	0	0	0	0	0	0	0		100.0%

Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
18		1	1	1	1	1
32		1	1	1	1	1
56		1	1	1	1	1
100		0	0	0	0	0
180		0	0	0	0	0

Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	100/100	100/100	100/100	100/100	100/100
18		100/100	100/100	100/100	100/100	100/100
32		100/100	100/100	100/100	100/100	100/100
56		100/100	100/100	100/100	100/100	100/100
100		0/100	0/100	0/100	0/100	0/100
180		0/100	0/100	0/100	0/100	0/100

Analyst: ____ QA: PASS

CETIS Analytical Report

Report Date: 18 Aug-15 09:45 (p 1 of 2)
Test Code: ABS072115 | 00-8128-3353

Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	15-8682-9316	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:44	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	56	100	74.83	

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		18	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect
		32	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect
		56	27.5	17	1	8	0.7500	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	3	65540	<0.0001	Significant Effect
Error	0	0	16			
Total	0		19			

Proportion Normal Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	1	0	0.0%	0.0%
18		5	1	1	1	1	1	1	0	0.0%	0.0%
32		5	1	1	1	1	1	1	0	0.0%	0.0%
56		5	1	1	1	1	1	1	0	0.0%	0.0%
100		5	0	0	0	0	0	0	0		100.0%
180		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
18		5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
32		5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
56		5	1.521	1.521	1.521	1.521	1.521	1.521	0	0.0%	0.0%
100		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.71%
180		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.71%

Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
18		1	1	1	1	1
32		1	1	1	1	1
56		1	1	1	1	1
100		0	0	0	0	0
180		0	0	0	0	0

Angular (Corrected) Transformed Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.521	1.521	1.521	1.521	1.521
18		1.521	1.521	1.521	1.521	1.521
32		1.521	1.521	1.521	1.521	1.521
56		1.521	1.521	1.521	1.521	1.521
100		0.05002	0.05002	0.05002	0.05002	0.05002
180		0.05002	0.05002	0.05002	0.05002	0.05002

CETIS Analytical Report

Report Date: 18 Aug-15 09:45 (p 2 of 2)
Test Code: ABS072115 | 00-8128-3353

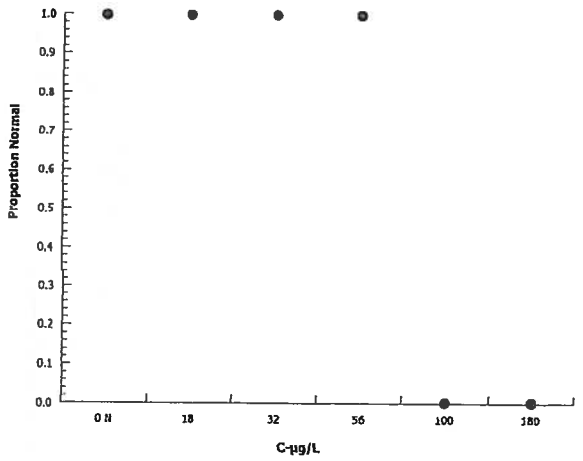
Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

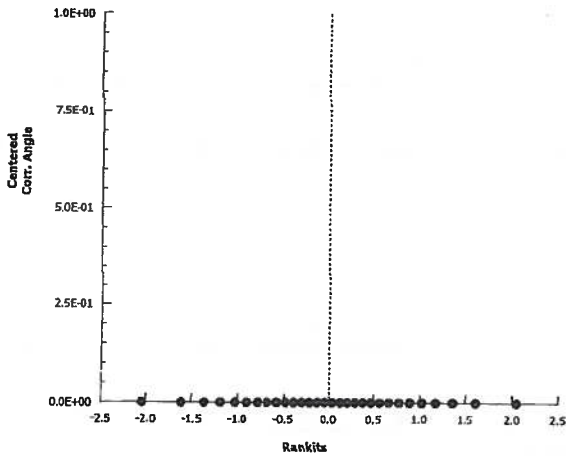
Analysis ID:	15-8682-9316	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:44	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	100/100	100/100	100/100	100/100	100/100
18		100/100	100/100	100/100	100/100	100/100
32		100/100	100/100	100/100	100/100	100/100
56		100/100	100/100	100/100	100/100	100/100
100		0/100	0/100	0/100	0/100	0/100
180		0/100	0/100	0/100	0/100	0/100

Graphics





CETIS Analytical Report

Report Date: 18 Aug-15 09:45 (p 1 of 2)
Test Code: ABS072115 | 00-8128-3353

Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	12-5518-3010	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:44	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	58.2	58.2	58.2
EC10	60.4	60.4	60.4
EC15	62.6	62.6	62.6
EC20	64.8	64.8	64.8
EC25	67	67	67
EC40	73.6	73.6	73.6
EC50	78	78	78

Proportion Normal Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	1	1	1	0	0	0.0%	0.0%	500	500
18		5	1	1	1	0	0	0.0%	0.0%	500	500
32		5	1	1	1	0	0	0.0%	0.0%	500	500
56		5	1	1	1	0	0	0.0%	0.0%	500	500
100		5	0	0	0	0	0		100.0%	0	500
180		5	0	0	0	0	0		100.0%	0	500

Proportion Normal Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
18		1	1	1	1	1
32		1	1	1	1	1
56		1	1	1	1	1
100		0	0	0	0	0
180		0	0	0	0	0

Proportion Normal Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	100/100	100/100	100/100	100/100	100/100
18		100/100	100/100	100/100	100/100	100/100
32		100/100	100/100	100/100	100/100	100/100
56		100/100	100/100	100/100	100/100	100/100
100		0/100	0/100	0/100	0/100	0/100
180		0/100	0/100	0/100	0/100	0/100

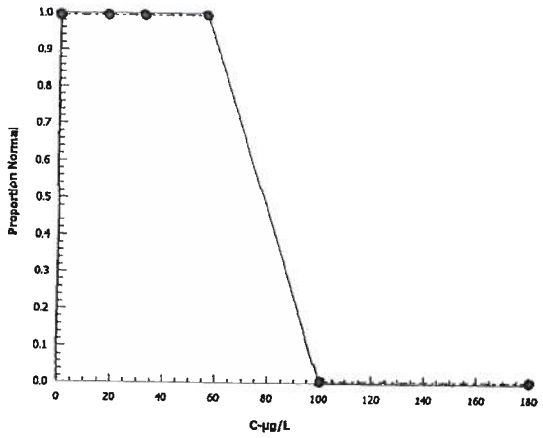
CETIS Analytical Report

Report Date: 18 Aug-15 09:45 (p 2 of 2)
Test Code: ABS072115 | 00-8128-3353

Red Abalone Larval Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	12-5518-3010	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.8.7
Analyzed:	18 Aug-15 9:44	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Red Abalone Larval Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	17-2442-3127	**Test Type:**	Development	**Analyst:**	
Start Date:	21 Jul-15 12:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	23 Jul-15 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	16-1954-2862	**Code:**	ABS072115a	**Client:**	Internal Lab
Sample Date:	21 Jul-15 12:30	**Material:**	Zinc	**Project:**	REF TOX
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.4	14.5	14 - 16	Yes	Results Within Limits

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.7	-0.9237	14.32	6.1	7.3	0.6	0.8485	12.66%	0
18		2	6.75	-0.2384	13.74	6.2	7.3	0.55	0.7778	11.52%	0
32		2	6.75	-0.2384	13.74	6.2	7.3	0.55	0.7778	11.52%	0
56		2	6.75	-0.2384	13.74	6.2	7.3	0.55	0.7778	11.52%	0
100		2	6.75	-0.2384	13.74	6.2	7.3	0.55	0.7778	11.52%	0
180		2	6.75	-0.2384	13.74	6.2	7.3	0.55	0.7778	11.52%	0
Overall		12	6.742			6.1	7.3				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
18		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
32		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
56		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
100		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
180		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
Overall		12	7.842			7.8	7.9				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
18		2	34	34	34	34	34	0	0	0.0%	0
32		2	34	34	34	34	34	0	0	0.0%	0
56		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
180		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
18		2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
32		2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
56		2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
100		2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
180		2	14.45	13.81	15.09	14.4	14.5	0.04998	0.07069	0.49%	0
Overall		12	14.45			14.4	14.5				0 (0%)

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	7.3	6.1
18		7.3	6.2
32		7.3	6.2
56		7.3	6.2
100		7.3	6.2
180		7.3	6.2

pH-Units

C-µg/L	Control Type	1	2
0	Negative Contr	7.8	7.8
18		7.8	7.9
32		7.8	7.9
56		7.8	7.9
100		7.8	7.9
180		7.8	7.9

Salinity-ppt

C-µg/L	Control Type	1	2
0	Negative Contr	34	34
18		34	34
32		34	34
56		34	34
100		34	34
180		34	34

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.4	14.5
18		14.4	14.5
32		14.4	14.5
56		14.4	14.5
100		14.4	14.5
180		14.4	14.5

aquatic bioassay & consulting laboratories, inc

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

DATE: 21 July - 15

STANDARD TOXICANT: Copper Chloride

ENDPOINT: GERMINATION

NOEC = 100.00 ug/l

EC25 = 103.40 ug/l
EC50 = 129.00 ug/l

ENDPOINT: GROWTH-LENGTH

NOEC = 100.00 ug/l

IC25 = 103.80 ug/l
IC50 = 129.20 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 www.aquabio.org

CETIS Summary Report

Report Date: 13 Aug-15 15:34 (p 1 of 2)
Test Code: KLP072115 | 05-1699-5535

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	19-1761-6818	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	21 Jul-15 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	23 Jul-15 15:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	11-3403-2505	**Code:**	KLP072115	**Client:**	Internal Lab
Sample Date:	21 Jul-15 15:00	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
01-1632-0321	Germination Rate	100	180	134.2	44.3%		Steel Many-One Rank Sum Test
03-6750-8263	Mean Length	100	180	134.2	38.0%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
10-9111-9597	Germination Rate	EC5	4.01	0.4455	150.3		Linear Interpolation (ICPIN)
		EC10	46.02	N/A	135.5		
		EC15	69.24	N/A	130.1		
		EC20	92.47	17.71	124.6		
		EC25	103.4	23.23	125.4		
		EC40	118.8	47	136.3		
		EC50	129	62.1	143.6		
18-4064-1610	Mean Length	IC5	3.986	0.4973	151.5		Linear Interpolation (ICPIN)
		IC10	46.2	N/A	136.5		
		IC15	70.08	N/A	130.7		
		IC20	93.96	24.71	124.9		
		IC25	103.8	29.87	126.1		
		IC40	119	52.32	136.9		
		IC50	129.2	65.8	144.1		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
01-1632-0321	Germination Rate	Control Resp	0.888	0.7 - NL	Yes	Passes Acceptability Criteria
10-9111-9597	Germination Rate	Control Resp	0.888	0.7 - NL	Yes	Passes Acceptability Criteria
03-6750-8263	Mean Length	Control Resp	15.8	10 - NL	Yes	Passes Acceptability Criteria
18-4064-1610	Mean Length	Control Resp	15.8	10 - NL	Yes	Passes Acceptability Criteria
03-6750-8263	Mean Length	NOEL	100	NL - 35	No	Above Acceptability Criteria
01-1632-0321	Germination Rate	PMSD	0.4432	NL - 0.2	No	Above Acceptability Criteria
03-6750-8263	Mean Length	PMSD	0.3802	NL - 0.2	No	Above Acceptability Criteria

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Germination Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.888	0.8514	0.9246	0.84	0.91	0.01319	0.0295	3.32%	0.0%
5.6		5	0.686	0.2081	1	0	0.91	0.1721	0.3849	56.1%	22.75%
10		5	0.902	0.8578	0.9462	0.87	0.95	0.01594	0.03564	3.95%	-1.58%
18		5	0.854	0.7757	0.9323	0.76	0.91	0.02821	0.06309	7.39%	3.83%
32		5	0.862	0.8128	0.9112	0.8	0.9	0.01772	0.03962	4.6%	2.93%
100		5	0.696	0.2102	1	0	0.92	0.175	0.3913	56.21%	21.62%
180		5	0	0	0	0	0	0	0		100.0%
320		5	0	0	0	0	0	0	0		100.0%

Mean Length Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	15.8	15.54	16.06	15.5	16	0.09487	0.2121	1.34%	0.0%
5.6		5	12.36	3.745	20.98	0	16.1	3.103	6.939	56.14%	21.77%
10		5	15.62	15.14	16.1	15.2	16	0.1744	0.3899	2.5%	1.14%
18		5	15.42	15.11	15.73	15	15.6	0.1114	0.249	1.62%	2.41%
32		5	15.36	14.86	15.86	14.8	15.8	0.1806	0.4037	2.63%	2.79%
100		5	12.44	3.795	21.08	0	16	3.114	6.962	55.97%	21.27%
180		5	0	0	0	0	0	0	0		100.0%
320		5	0	0	0	0	0	0	0		100.0%

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.91	0.9	0.88	0.84
5.6		0.91	0.85	0.85	0	0.82
10		0.88	0.95	0.87	0.88	0.93
18		0.82	0.9	0.91	0.88	0.76
32		0.9	0.87	0.85	0.89	0.8
100		0.92	0.84	0.9	0.82	0
180		0	0	0	0	0
320		0	0	0	0	0

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	15.7	15.8	16	16	15.5
5.6		15.7	16.1	15.6	0	14.4
10		15.8	15.2	15.2	15.9	16
18		15	15.5	15.4	15.6	15.6
32		14.8	15.5	15.1	15.8	15.6
100		16	15.7	15.4	15.1	0
180		0	0	0	0	0
320		0	0	0	0	0

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	91/100	90/100	88/100	84/100
5.6		91/100	85/100	85/100	0/100	82/100
10		88/100	95/100	87/100	88/100	93/100
18		82/100	90/100	91/100	88/100	76/100
32		90/100	87/100	85/100	89/100	80/100
100		92/100	84/100	90/100	82/100	0/100
180		0/100	0/100	0/100	0/100	0/100
320		0/100	0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 13 Aug-15 15:34 (p 1 of 4)
Test Code: KLP072115 | 05-1699-5535

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 01-1632-0321 | Endpoint: Germination Rate | CETIS Version: CETISv1.8.7
Analyzed: 13 Aug-15 15:33 | Analysis: Nonparametric-Control vs Treatments | Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	44.3%	100	180	134.2	

Steel Many-One Rank Sum Test

Control vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	5.6	21	16	2	8	0.2625	Asymp	Non-Significant Effect
	10	29	16	1	8	0.9104	Asymp	Non-Significant Effect
	18	23	16	4	8	0.4416	Asymp	Non-Significant Effect
	32	21.5	16	1	8	0.3036	Asymp	Non-Significant Effect
	100	23	16	2	8	0.4416	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.4327054	0.08654108	5	0.9464	0.4694	Non-Significant Effect
Error	2.194586	0.09144109	24			
Total	2.627292		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	38.84	15.09	<0.0001	Unequal Variances
Variances	Mod Levene Equality of Variance	0.8262	4.248	0.5474	Equal Variances
Variances	Levene Equality of Variance	4.054	3.895	0.0083	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.6848	0.9031	<0.0001	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.2778	0.1853	<0.0001	Non-normal Distribution
Distribution	D'Agostino Skewness	4.424	2.576	<0.0001	Non-normal Distribution
Distribution	D'Agostino Kurtosis	3.605	2.576	0.0003	Non-normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	32.57	9.21	<0.0001	Non-normal Distribution
Distribution	Anderson-Darling A2 Normality	3.358	3.878	<0.0001	Non-normal Distribution

Germination Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.888	0.8514	0.9246	0.9	0.84	0.91	0.01319	3.32%	0.0%
5.6		5	0.686	0.2081	1	0.85	0	0.91	0.1721	56.1%	22.75%
10		5	0.902	0.8578	0.9462	0.88	0.87	0.95	0.01594	3.95%	-1.58%
18		5	0.854	0.7757	0.9323	0.88	0.76	0.91	0.02821	7.39%	3.83%
32		5	0.862	0.8128	0.9112	0.87	0.8	0.9	0.01772	4.6%	2.93%
100		5	0.696	0.2102	1	0.84	0	0.92	0.175	56.21%	21.62%
180		5	0	0	0	0	0	0	0		100.0%
320		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.232	1.176	1.287	1.249	1.159	1.266	0.02016	3.66%	0.0%
5.6		5	0.959	0.3251	1.593	1.173	0.05002	1.266	0.2283	53.23%	22.13%
10		5	1.257	1.178	1.336	1.217	1.202	1.345	0.0284	5.05%	-2.06%
18		5	1.185	1.077	1.293	1.217	1.059	1.266	0.03897	7.36%	3.8%
32		5	1.193	1.123	1.262	1.202	1.107	1.249	0.02507	4.7%	3.15%
100		5	0.975	0.3283	1.622	1.159	0.05002	1.284	0.2329	53.42%	20.83%
180		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	95.94%
320		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	95.94%

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	01-1632-0321	Endpoint:	Germination Rate	CETIS Version:	CETISv1.8.7
Analyzed:	13 Aug-15 15:33	Analysis:	Nonparametric-Control vs Treatments	Official Results:	Yes

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.91	0.9	0.88	0.84
5.6		0.91	0.85	0.85	0	0.82
10		0.88	0.95	0.87	0.88	0.93
18		0.82	0.9	0.91	0.88	0.76
32		0.9	0.87	0.85	0.89	0.8
100		0.92	0.84	0.9	0.82	0
180		0	0	0	0	0
320		0	0	0	0	0

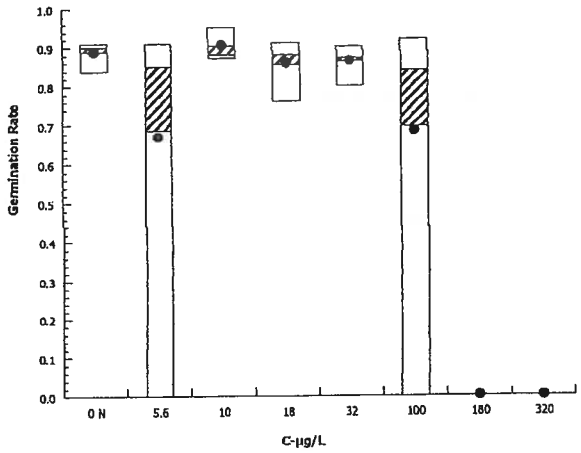
Angular (Corrected) Transformed Detail

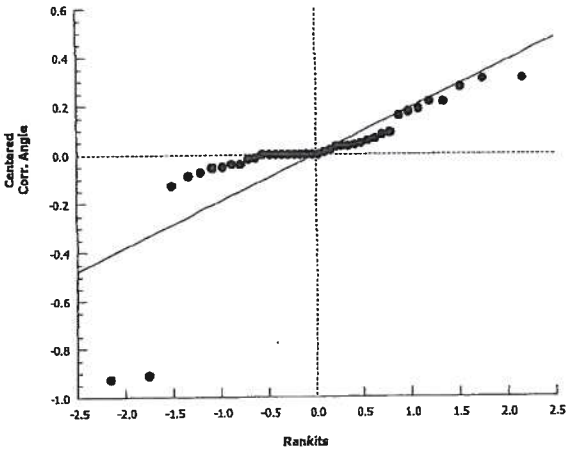
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.266	1.266	1.249	1.217	1.159
5.6		1.266	1.173	1.173	0.05002	1.133
10		1.217	1.345	1.202	1.217	1.303
18		1.133	1.249	1.266	1.217	1.059
32		1.249	1.202	1.173	1.233	1.107
100		1.284	1.159	1.249	1.133	0.05002
180		0.05002	0.05002	0.05002	0.05002	0.05002
320		0.05002	0.05002	0.05002	0.05002	0.05002

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	91/100	90/100	88/100	84/100
5.6		91/100	85/100	85/100	0/100	82/100
10		88/100	95/100	87/100	88/100	93/100
18		82/100	90/100	91/100	88/100	76/100
32		90/100	87/100	85/100	89/100	80/100
100		92/100	84/100	90/100	82/100	0/100
180		0/100	0/100	0/100	0/100	0/100
320		0/100	0/100	0/100	0/100	0/100

Graphics





CETIS Analytical Report

Report Date: 13 Aug-15 15:34 (p 3 of 4)
Test Code: KLP072115 | 05-1699-5535

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 03-6750-8263 | Endpoint: Mean Length | CETIS Version: CETISv1.8.7
Analyzed: 13 Aug-15 15:33 | Analysis: Nonparametric-Control vs Treatments | Official Results: Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	38.0%	100	180	134.2	

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		5.6	22.5	16	1	8	0.3937	Asymp	Non-Significant Effect
		10	24.5	16	3	8	0.5880	Asymp	Non-Significant Effect
		18	17.5	16	1	8	0.0695	Asymp	Non-Significant Effect
		32	19	16	2	8	0.1314	Asymp	Non-Significant Effect
		100	20.5	16	3	8	0.2245	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	66.768	13.3536	5	0.8257	0.5438	Non-Significant Effect
Error	388.152	16.173	24			
Total	454.92		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	67.53	15.09	<0.0001	Unequal Variances
Variances	Mod Levene Equality of Variance	0.8922	4.248	0.5069	Equal Variances
Variances	Levene Equality of Variance	5.048	3.895	0.0027	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.6086	0.9031	<0.0001	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.3725	0.1853	<0.0001	Non-normal Distribution
Distribution	D'Agostino Skewness	4.574	2.576	<0.0001	Non-normal Distribution
Distribution	D'Agostino Kurtosis	3.729	2.576	0.0002	Non-normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	34.82	9.21	<0.0001	Non-normal Distribution
Distribution	Anderson-Darling A2 Normality	4.68	3.878	<0.0001	Non-normal Distribution

Mean Length Summary

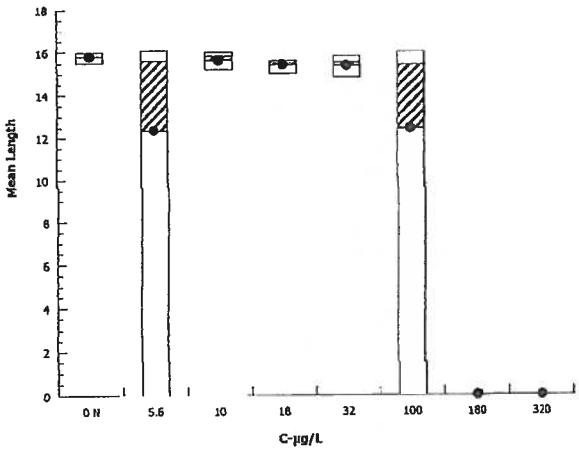
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	15.8	15.54	16.06	15.8	15.5	16	0.09487	1.34%	0.0%
5.6		5	12.36	3.745	20.98	15.6	0	16.1	3.103	56.14%	21.77%
10		5	15.62	15.14	16.1	15.8	15.2	16	0.1744	2.5%	1.14%
18		5	15.42	15.11	15.73	15.5	15	15.6	0.1114	1.62%	2.41%
32		5	15.36	14.86	15.86	15.5	14.8	15.8	0.1806	2.63%	2.79%
100		5	12.44	3.795	21.08	15.4	0	16	3.114	55.97%	21.27%
180		5	0	0	0	0	0	0	0		100.0%
320		5	0	0	0	0	0	0	0		100.0%

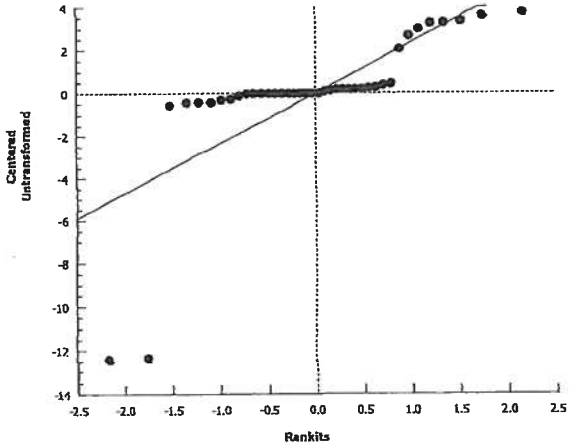
Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	15.7	15.8	16	16	15.5
5.6		15.7	16.1	15.6	0	14.4
10		15.8	15.2	15.2	15.9	16
18		15	15.5	15.4	15.6	15.6
32		14.8	15.5	15.1	15.8	15.6
100		16	15.7	15.4	15.1	0
180		0	0	0	0	0
320		0	0	0	0	0

Macrocystis Germination and Germ Tube Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	03-6750-8263	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 Aug-15 15:33	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Report Date: 13 Aug-15 15:34 (p 1 of 3)
Test Code: KLP072115 | 05-1699-5535

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	10-9111-9597	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 Aug-15 15:34	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	0	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	4.01	0.4455	150.3
EC10	46.02	N/A	135.5
EC15	69.24	N/A	130.1
EC20	92.47	17.71	124.6
EC25	103.4	23.23	125.4
EC40	118.8	47	136.3
EC50	129	62.1	143.6

Germination Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.888	0.84	0.91	0.01319	0.0295	3.32%	0.0%	444	500
5.6		5	0.686	0	0.91	0.1721	0.3849	56.1%	22.75%	343	500
10		5	0.902	0.87	0.95	0.01594	0.03564	3.95%	-1.58%	451	500
18		5	0.854	0.76	0.91	0.02821	0.06309	7.39%	3.83%	427	500
32		5	0.862	0.8	0.9	0.01772	0.03962	4.6%	2.93%	431	500
100		5	0.696	0	0.92	0.175	0.3913	56.21%	21.62%	348	500
180		5	0	0	0	0	0		100.0%	0	500
320		5	0	0	0	0	0		100.0%	0	500

Germination Rate Detail

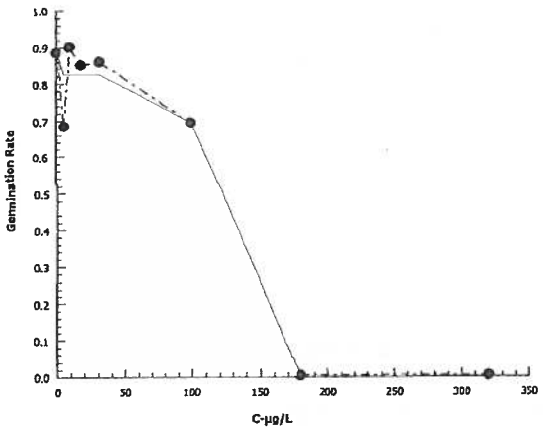
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.91	0.91	0.9	0.88	0.84
5.6		0.91	0.85	0.85	0	0.82
10		0.88	0.95	0.87	0.88	0.93
18		0.82	0.9	0.91	0.88	0.76
32		0.9	0.87	0.85	0.89	0.8
100		0.92	0.84	0.9	0.82	0
180		0	0	0	0	0
320		0	0	0	0	0

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	91/100	91/100	90/100	88/100	84/100
5.6		91/100	85/100	85/100	0/100	82/100
10		88/100	95/100	87/100	88/100	93/100
18		82/100	90/100	91/100	88/100	76/100
32		90/100	87/100	85/100	89/100	80/100
100		92/100	84/100	90/100	82/100	0/100
180		0/100	0/100	0/100	0/100	0/100
320		0/100	0/100	0/100	0/100	0/100

Macrocystis Germination and Germ Tube Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	10-9111-9597	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 Aug-15 15:34	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Analytical Report

Report Date: 13 Aug-15 15:34 (p 3 of 3)
Test Code: KLP072115 | 05-1699-5535

Macrocystis Germination and Germ Tube Growth Test — Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	18-4064-1610	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	13 Aug-15 15:33	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	970262	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	3.986	0.4973	151.5
IC10	46.2	N/A	136.5
IC15	70.08	N/A	130.7
IC20	93.96	24.71	124.9
IC25	103.8	29.87	126.1
IC40	119	52.32	136.9
IC50	129.2	65.8	144.1

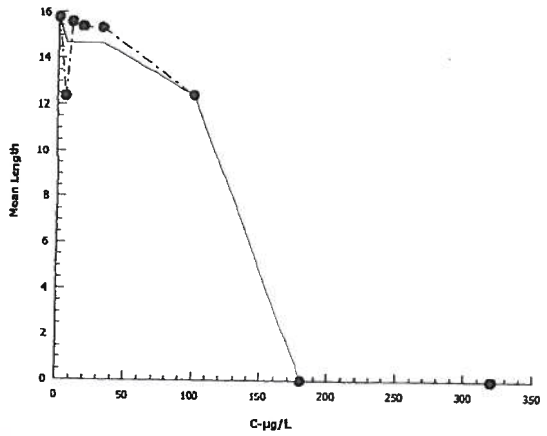
Mean Length Summary

			Calculated Variate						
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	15.8	15.5	16	0.09487	0.2121	1.34%	0.0%
5.6		5	12.36	0	16.1	3.103	6.939	56.14%	21.77%
10		5	15.62	15.2	16	0.1744	0.3899	2.5%	1.14%
18		5	15.42	15	15.6	0.1114	0.249	1.62%	2.41%
32		5	15.36	14.8	15.8	0.1806	0.4037	2.63%	2.79%
100		5	12.44	0	16	3.114	6.962	55.97%	21.27%
180		5	0	0	0	0	0		100.0%
320		5	0	0	0	0	0		100.0%

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	15.7	15.8	16	16	15.5
5.6		15.7	16.1	15.6	0	14.4
10		15.8	15.2	15.2	15.9	16
18		15	15.5	15.4	15.6	15.6
32		14.8	15.5	15.1	15.8	15.6
100		16	15.7	15.4	15.1	0
180		0	0	0	0	0
320		0	0	0	0	0

Graphics



Analyst:_____ QA:_____

CETIS Measurement Report

Test Code: KLP072115 | 05-1699-5535

Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	19-1761-6818	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	21 Jul-15 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	23 Jul-15 15:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	11-3403-2505	**Code:**	KLP072115	**Client:**	Internal Lab
Sample Date:	21 Jul-15 15:00	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
5.6		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
10		2	6.3	1.218	11.38	5.9	6.7	0.4	0.5657	8.98%	0
18		2	6.3	-0.0531	12.65	5.8	6.8	0.5	0.7071	11.22%	0
32		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
100		2	6.45	-0.5384	13.44	5.9	7	0.55	0.7778	12.06%	0
180		2	6.4	0.0469	12.75	5.9	6.9	0.5	0.7071	11.05%	0
320		2	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
Overall		16	6.369			5.8	7				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
5.6		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
10		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
18		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
32		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
180		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
320		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		16	7.9			7.9	7.9				0 (0%)

Salinity-ppt

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
5.6		2	34	34	34	34	34	0	0	0.0%	0
10		2	34	34	34	34	34	0	0	0.0%	0
18		2	34	34	34	34	34	0	0	0.0%	0
32		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
180		2	34	34	34	34	34	0	0	0.0%	0
320		2	34	34	34	34	34	0	0	0.0%	0
Overall		16	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
5.6		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
10		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
18		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
32		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
180		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
320		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		16	14.85			14.8	14.9				0 (0%)

Macrocystis Germination and Germ Tube Growth Test

Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.8	6
5.6		6.6	6.1
10		6.7	5.9
18		6.8	5.8
32		6.6	6.1
100		7	5.9
180		6.9	5.9
320		6.8	6

pH-Units

C-µg/L	Control Type	1	2
0	Negative Contr	7.9	7.9
5.6		7.9	7.9
10		7.9	7.9
18		7.9	7.9
32		7.9	7.9
100		7.9	7.9
180		7.9	7.9
320		7.9	7.9

Salinity-ppt

C-µg/L	Control Type	1	2
0	Negative Contr	34	34
5.6		34	34
10		34	34
18		34	34
32		34	34
100		34	34
180		34	34
320		34	34

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.8	14.9
5.6		14.8	14.9
10		14.8	14.9
18		14.8	14.9
32		14.8	14.9
100		14.8	14.9
180		14.8	14.9
320		14.8	14.9