aquatic bioassay & consulting laboratories, inc

April 27, 2017

Mr. Jay Rao
DCOR
290 Maple Ct., Suite 290
Ventura, CA 93003

Dear Mr. Rao:

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

CLIENT:	DCOR
SAMPLE I.D.:	Platform Edith
DATE RECEIVED:	6 April - 2017
ABC LAB. NO.:	DCO0417.049

CHRONIC TOPSMELT SURVIVAL & GROWTH BIOASSAY

IWC = 7645:1

TST RESULT

SURVIVAL = PASS % EFFECT = 0.00%

GROWTH = PASS % EFFECT = -38.45%

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 25 Apr-17 13:00 (p 1 of 1)
Test Code: DCO0417.049tops | 15-2620-0496

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

Batch ID:	09-3363-6065	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	06 Apr-17 14:35	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	13 Apr-17 14:00	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 23h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	02-5893-3614	**Code:**	DCO0417.049tops	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	8h (4.1 °C)	**Station:**	Platform Edith		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
05-7659-7866	7d Survival Rate	TST-Welch's t Test	<1.0E-37	0.01308% passed 7d survival rate
07-3885-7132	Mean Dry Biomass-mg	TST-Welch's t Test	2.5E-07	0.01308% passed mean dry biomass-mg

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
05-7659-7866	7d Survival Rate	Control Resp	1	0.8	>>	Yes	Passes Criteria
07-3885-7132	Mean Dry Biomass-mg	Control Resp	2.066	0.85	>>	Yes	Passes Criteria

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
0.01308		10	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	2.066	1.75	2.381	1.638	2.864	0.1396	0.4416	21.38%	0.00%
0.01308		10	2.86	2.564	3.155	2.248	3.502	0.1307	0.4132	14.45%	-38.45%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0.01308		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.848	1.66	1.638	1.752	1.936	1.786	2.746	2.864	2.32	2.106
0.01308		2.832	2.816	3.13	2.63	2.248	3.018	3.358	3.502	2.79	2.274

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
0.01308		5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5

CETIS Analytical Report

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

Analysis ID:	05-7659-7866	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 13:00	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch ID:	09-3363-6065	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	06 Apr-17 14:35	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	13 Apr-17 14:00	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 23h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	02-5893-3614	**Code:**	DCO0417.049tops	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	8h (4.1 °C)	**Station:**	Platform Edith		

Data Transform	Alt Hyp	TST_b	Comparison Result
Angular (Corrected)	C*b < T	0.75	0.01308% passed 7d survival rate

TST-Welch's t Test

Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:25%)
Negative Control		0.01308*	47880000	0.6901	16	CDF	<1.0E-37	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	0	1.0000	Non-Significant Effect
Error	7.105E-15	3.947E-16	18			
Total	7.105E-15		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F Test	1	6.541	1.0000	Equal Variances
Distribution	D'Agostino Kurtosis Test	7.183	2.576	<1.0E-37	Non-Normal Distribution
Distribution	D'Agostino Skewness Test	2.067	2.576	0.0387	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	55.87	9.21	<1.0E-37	Non-Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
0.01308		10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	1.345	1.345	1.345	1.345	1.345	1.345	0	0.00%	0.00%
0.01308		10	1.345	1.345	1.345	1.345	1.345	1.345	0	0.00%	0.00%

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0.01308		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.345	1.345	1.345	1.345	1.345	1.345	1.345	1.345	1.345	1.345
0.01308		1.345	1.345	1.345	1.345	1.345	1.345	1.345	1.345	1.345	1.345

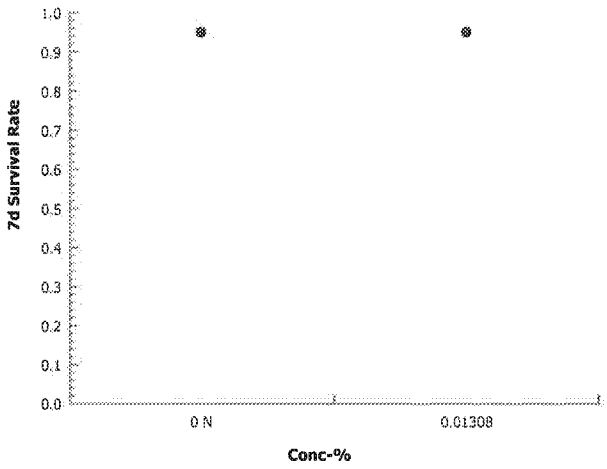
Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

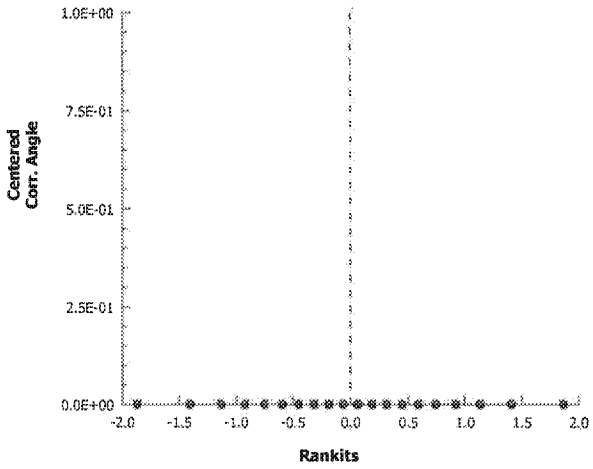
Analysis ID:	05-7659-7866	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 13:00	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
0.01308		5/5	5/5	5/5	5/5	5/5	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:	07-3885-7132	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 13:00	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch ID:	09-3363-6065	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	06 Apr-17 14:35	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	13 Apr-17 14:00	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 23h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	02-5893-3614	**Code:**	DCO0417.049tops	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	8h (4.1 °C)	**Station:**	Platform Edith		

Data Transform	Alt Hyp	TST_b	Comparison Result
Untransformed	C*b < T	0.75	0.01308% passed mean dry biomass-mg

TST-Welch's t Test

Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:25%)
Negative Control		0.01308*	7.827	0.6892	17	CDF	2.5E-07	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
Control Resp	2.066	0.85	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.15377	3.15377	1	17.25	6.0E-04	Significant Effect
Error	3.29125	0.182847	18			
Total	6.44502		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	0.144	8.285	0.7088	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.02426	8.285	0.8780	Equal Variances
Variances	Variance Ratio F Test	1.142	6.541	0.8464	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.3847	3.878	0.3982	Normal Distribution
Distribution	D'Agostino Kurtosis Test	0.6168	2.576	0.5374	Normal Distribution
Distribution	D'Agostino Skewness Test	0.9906	2.576	0.3219	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	1.362	9.21	0.5062	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1266	0.2235	0.5649	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9507	0.866	0.3784	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	2.066	1.75	2.381	1.892	1.638	2.864	0.1396	21.38%	0.00%
0.01308		10	2.86	2.564	3.155	2.824	2.248	3.502	0.1307	14.45%	-38.45%

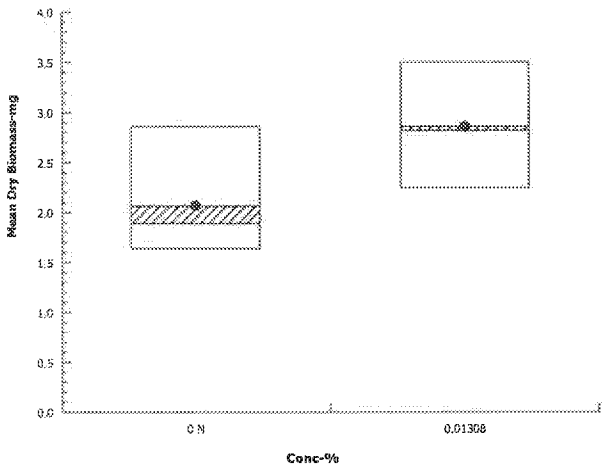
Mean Dry Biomass-mg Detail

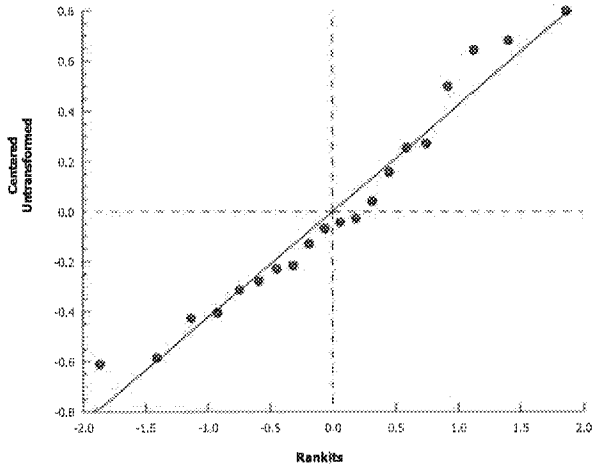
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.848	1.66	1.638	1.752	1.936	1.786	2.746	2.864	2.32	2.106
0.01308		2.832	2.816	3.13	2.63	2.248	3.018	3.358	3.502	2.79	2.274

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

Analysis ID:	07-3885-7132	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 13:00	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Graphics





CETIS Measurement Report

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

Batch ID:	09-3363-6065	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	06 Apr-17 14:35	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	13 Apr-17 14:00	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 23h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	02-5893-3614	**Code:**	DCO0417.049tops	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	8h (4.1 °C)	**Station:**	Platform Edith		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	6.875	6.735	7.015	6.7	7.2	0.05901	0.1669	2.43%	0
0.01308		8	6.575	6.207	6.943	5.9	7.1	0.1556	0.44	6.69%	0
Overall		16	6.725	6.535	6.915	5.9	7.2	0.08921	0.3568	5.31%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.425	7.328	7.522	7.2	7.6	0.04119	0.1165	1.57%	0
0.01308		8	7.662	7.554	7.771	7.4	7.8	0.04605	0.1302	1.7%	0
Overall		16	7.544	7.453	7.635	7.2	7.8	0.04279	0.1711	2.27%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	34	34	34	34	34	0	0	0.0%	0
0.01308		8	34	34	34	34	34	0	0	0.0%	0
Overall		16	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	21	21	21	21	21	0	0	0.0%	0
0.01308		8	21	21	21	21	21	0	0	0.0%	0
Overall		16	21	21	21	21	21	0	0	0.00%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	1	2	3	4	5	6	7	8
0	N	6.7	6.8	6.9	7.2	6.7	6.9	6.8	7
0.01308		6.8	6.7	7	7.1	6.7	5.9	6.4	6

pH-Units

Conc-%	Code	1	2	3	4	5	6	7	8
0	N	7.5	7.5	7.4	7.6	7.4	7.2	7.4	7.4
0.01308		7.6	7.4	7.7	7.8	7.6	7.7	7.7	7.8

Salinity-ppt

Conc-%	Code	1	2	3	4	5	6	7	8
0	N	34	34	34	34	34	34	34	34
0.01308		34	34	34	34	34	34	34	34

Temperature-°C

Conc-%	Code	1	2	3	4	5	6	7	8
0	N	21	21	21	21	21	21	21	21
0.01308		21	21	21	21	21	21	21	21

aquatic bioassay & consulting laboratories, inc

April 27, 2017

Mr. Jay Rao
DCOR
290 Maple Ct., Suite 290
Ventura, CA 93003

Dear Mr. Rao:

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

CLIENT:	DCOR
SAMPLE I.D.:	Platform Edith
DATE RECEIVED:	6 April - 2017
ABC LAB. NO.:	DCO0417.049

CHRONIC KELP GERMINATION AND GROWTH BIOASSAY

IWC = 7645:1

TST RESULT

GERMINATION = PASS % EFFECT = -1.34%

TUBE LENGTH = PASS % EFFECT = 4.46%

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 26 Apr-17 15:28 (p 1 of 1)
Test Code: DCO0417.049klp | 17-5163-1727

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

Batch ID:	17-2258-7369	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:03	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	07 Apr-17 14:03	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	n/a	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	16-7611-0878	**Code:**	DCO0417.049klp	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	31h (4.1 °C)	**Station:**	Platform Edith		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
05-2258-4307	Germination Rate	TST-Welch's t Test	5.8E-04	0.01308% passed germination rate
19-5982-8554	Mean Length	TST-Welch's t Test	0.0017	0.01308% passed mean length

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
05-2258-4307	Germination Rate	Control Resp	0.896	0.7	>>	Yes	Passes Criteria
19-5982-8554	Mean Length	Control Resp	16.16	10	>>	Yes	Passes Criteria

Germination Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.8960	0.8228	0.9692	0.8000	0.9600	0.0264	0.0590	6.58%	0.00%
0.01308		5	0.9080	0.8370	0.9790	0.8400	0.9800	0.0256	0.0572	6.30%	-1.34%

Mean Length Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	16.16	15.25	17.07	14.9	16.7	0.3265	0.7301	4.52%	0.00%
0.01308		5	15.44	13.82	17.06	13.4	17	0.5836	1.305	8.45%	4.46%

Germination Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9000	0.9200	0.8000	0.9600	0.9000
0.01308		0.9800	0.9500	0.8700	0.8400	0.9000

Mean Length Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	16.2	16.6	16.7	16.4	14.9
0.01308		13.4	15.4	17	15.5	15.9

Germination Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	90/100	92/100	80/100	96/100	90/100
0.01308		98/100	95/100	87/100	84/100	90/100

CETIS Analytical Report

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

Analysis ID:	05-2258-4307	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 15:26	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch ID:	17-2258-7369	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:03	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	07 Apr-17 14:03	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	n/a	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	16-7611-0878	**Code:**	DCO0417.049klp	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	31h (4.1 °C)	**Station:**	Platform Edith		

Data Transform	Alt Hyp	TST_b	Comparison Result
Angular (Corrected)	C*b < T	0.75	0.01308% passed germination rate

TST-Welch's t Test

Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		0.01308*	5.791	1.943	6	CDF	5.8E-04	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
Control Resp	0.896	0.7	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0015806	0.0015806	1	0.1508	0.7079	Non-Significant Effect
Error	0.0838278	0.0104785	8			
Total	0.0854084		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	0.5884	11.26	0.4651	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.4362	13.75	0.5335	Equal Variances
Variances	Variance Ratio F Test	1.34	23.15	0.7834	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.1664	3.878	0.9903	Normal Distribution
Distribution	D'Agostino Skewness Test	0.09418	2.576	0.9250	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1112	0.3025	1.0000	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9736	0.7411	0.9223	Normal Distribution

Germination Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.8960	0.8228	0.9692	0.9000	0.8000	0.9600	0.0264	6.58%	0.00%
0.01308		5	0.9080	0.8370	0.9790	0.9000	0.8400	0.9800	0.0256	6.30%	-1.34%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.252	1.134	1.369	1.249	1.107	1.369	0.04232	7.56%	0.00%
0.01308		5	1.277	1.141	1.413	1.249	1.159	1.429	0.049	8.58%	-2.01%

Germination Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9000	0.9200	0.8000	0.9600	0.9000
0.01308		0.9800	0.9500	0.8700	0.8400	0.9000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.249	1.284	1.107	1.369	1.249
0.01308		1.429	1.345	1.202	1.159	1.249

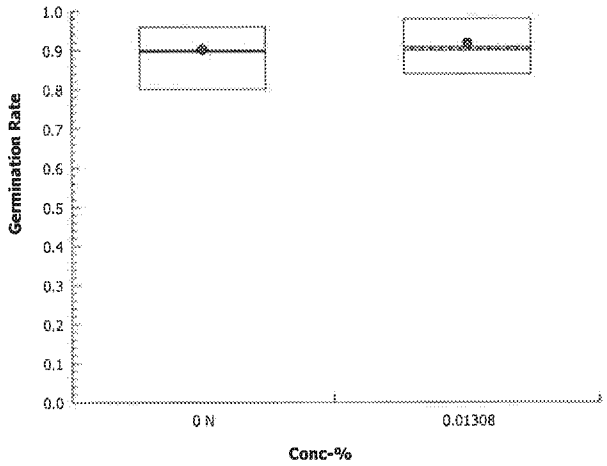
Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

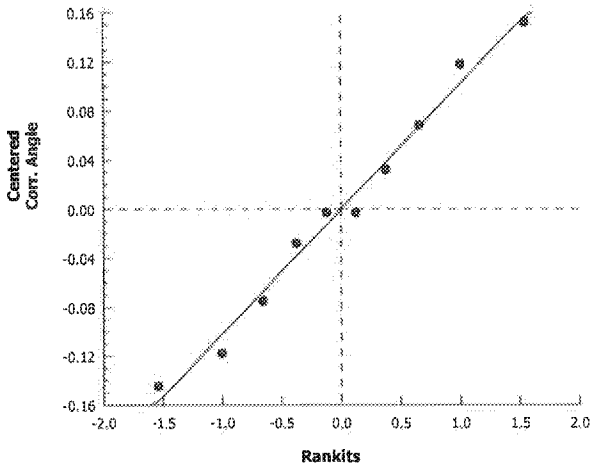
Analysis ID:	05-2258-4307	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 15:26	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Germination Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	90/100	92/100	80/100	96/100	90/100
0.01308		98/100	95/100	87/100	84/100	90/100

Graphics





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

Analysis ID:	19-5982-8554	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 15:26	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch ID:	17-2258-7369	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:03	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	07 Apr-17 14:03	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	n/a	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	16-7611-0878	**Code:**	DCO0417.049klp	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	31h (4.1 °C)	**Station:**	Platform Edith		

Data Transform	Alt Hyp	TST_b	Comparison Result
Untransformed	C*b < T	0.75	0.01308% passed mean length

TST-Welch's t Test

Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		0.01308*	5.246	2.015	5	CDF	0.0017	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	16.16	10	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.296	1.296	1	1.159	0.3130	Non-Significant Effect
Error	8.944	1.118	8			
Total	10.24		9			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	0.5107	11.26	0.4951	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.7055	13.75	0.4331	Equal Variances
Variances	Variance Ratio F Test	3.195	23.15	0.2867	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.7404	3.878	0.0535	Normal Distribution
Distribution	D'Agostino Skewness Test	1.314	2.576	0.1888	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.284	0.3025	0.0217	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.8898	0.7411	0.1686	Normal Distribution

Mean Length Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	16.16	15.25	17.07	16.4	14.9	16.7	0.3265	4.52%	0.00%
0.01308		5	15.44	13.82	17.06	15.5	13.4	17	0.5836	8.45%	4.46%

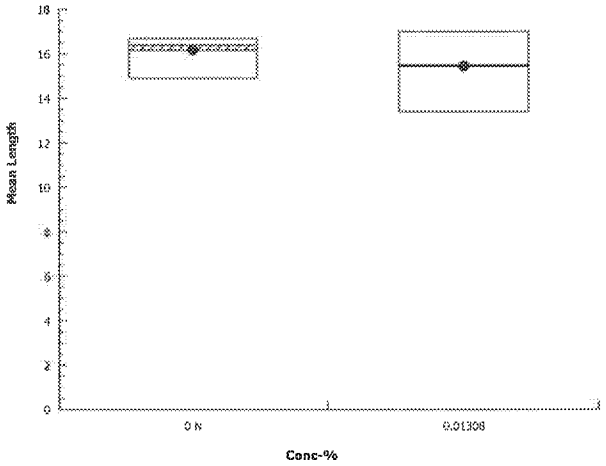
Mean Length Detail

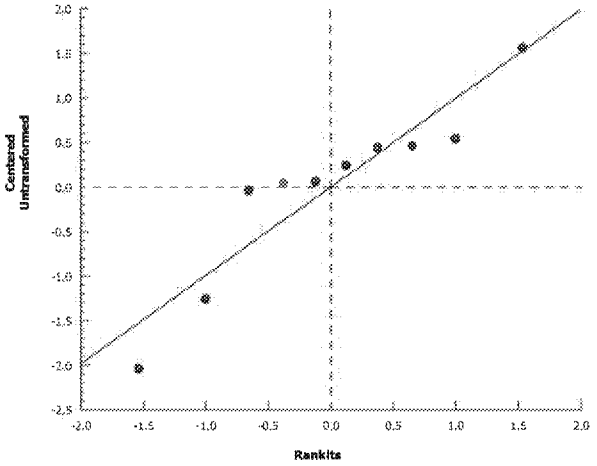
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	16.2	16.6	16.7	16.4	14.9
0.01308		13.4	15.4	17	15.5	15.9

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

Analysis ID:	19-5982-8554	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 15:26	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Graphics





CETIS Measurement Report

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

Batch ID:	17-2258-7369	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:03	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	07 Apr-17 14:03	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	n/a	**Source:**	Aquatic Bioassay Labs Collection	**Age:**	

Sample ID:	16-7611-0878	**Code:**	DCO0417.049klp	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	31h (4.1 °C)	**Station:**	Platform Edith		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
0.01308		2	6.3	3.759	8.841	6.1	6.5	0.2	0.2828	4.49%	0
Overall		4	6.325	5.907	6.743	6.1	6.6	0.1315	0.263	4.16%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.01308		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
Overall		4	7.9	7.9	7.9	7.9	7.9	0	0	0.00%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
0.01308		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.01308		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75	14.66	14.84	14.7	14.8	0.02887	0.05774	0.39%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	1	2
0	N	6.6	6.1
0.01308		6.5	6.1

pH-Units

Conc-%	Code	1	2
0	N	7.9	7.9
0.01308		7.9	7.9

Salinity-ppt

Conc-%	Code	1	2
0	N	34	34
0.01308		34	34

Temperature-°C

Conc-%	Code	1	2
0	N	14.8	14.7
0.01308		14.8	14.7

aquatic bioassay & consulting laboratories, inc

April 27, 2017

Mr. Jay Rao
DCOR
290 Maple Ct., Suite 290
Ventura, CA 93003

Dear Mr. Rao:

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 West Coast Marine and Estuarine Organisms, EPA/600/R-95/136*. Results were as follows:

CLIENT:	DCOR
SAMPLE I.D.:	Platform Edith
DATE RECEIVED:	6 April - 2017
ABC LAB. NO.:	DCO0417.049

CHRONIC ABALONE LARVAL DEVELOPMENT BIOASSAY

IWC = 7645:1

TST RESULT

LARVAL DEVELOPMENT = PASS % EFFECT = 0.20%

Yours very truly,

Scott Johnson
Laboratory Director

ED_006450_00002172-00015

CETIS Summary Report

Report Date: 25 Apr-17 15:51 (p 1 of 1)
Test Code: DCO0417.049abs | 04-3371-9945

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

Batch ID:	13-8942-4277	**Test Type:**	Development	**Analyst:**	
Start Date:	07 Apr-17 12:31	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	18-6478-3361	**Code:**	DCO0417.049abs	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	30h (4.1 °C)	**Station:**	Platform Edith		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
18-5833-4526	Proportion Normal	TST-Welch's t Test	<1.0E-37	0.01308% passed proportion normal

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
18-5833-4526	Proportion Normal	Control Resp	0.997	0.8	>>	Yes	Passes Criteria

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	10	0.9970	0.9935	1.0000	0.9900	1.0000	0.0015	0.0048	0.48%	0.00%
0.01308		10	0.9950	0.9899	1.0000	0.9800	1.0000	0.0022	0.0071	0.71%	0.20%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	0.9900	1.0000	1.0000	1.0000	0.9900	1.0000	1.0000	0.9900	1.0000	1.0000
0.01308		0.9900	1.0000	1.0000	0.9900	0.9800	1.0000	1.0000	0.9900	1.0000	1.0000

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	99/100	100/100	100/100	100/100	99/100	100/100	100/100	99/100	100/100	100/100
0.01308		99/100	100/100	100/100	99/100	98/100	100/100	100/100	99/100	100/100	100/100

CETIS Analytical Report

Test Code: DCO0417.049abs | 04-3371-9945

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

Analysis ID:	18-5833-4526	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 15:51	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

Batch ID:	13-8942-4277	**Test Type:**	Development	**Analyst:**	
Start Date:	07 Apr-17 12:31	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	18-6478-3361	**Code:**	DCO0417.049abs	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	30h (4.1 °C)	**Station:**	Platform Edith		

Data Transform	Alt Hyp	TST_b	Comparison Result
Angular (Corrected)	C*b < T	0.75	0.01308% passed proportion normal

TST-Welch's t Test

Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		0.01308*	30.46	1.771	13	CDF	<1.0E-37	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.997	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004221	0.0004221	1	0.4935	0.4914	Non-Significant Effect
Error	0.0153944	0.0008552	18			
Total	0.0158165		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	2.31	8.285	0.1459	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.4935	8.285	0.4914	Equal Variances
Variances	Variance Ratio F Test	1.915	6.541	0.3471	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	2.296	3.878	<1.0E-37	Non-Normal Distribution
Distribution	D'Agostino Kurtosis Test	0.1463	2.576	0.8836	Normal Distribution
Distribution	D'Agostino Skewness Test	1.877	2.576	0.0605	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	3.546	9.21	0.1699	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.3514	0.2235	4.9E-07	Non-Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.7778	0.866	4.1E-04	Non-Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	0.9970	0.9935	1.0000	1.0000	0.9900	1.0000	0.0015	0.48%	0.00%
0.01308		10	0.9950	0.9899	1.0000	1.0000	0.9800	1.0000	0.0022	0.71%	0.20%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	10	1.506	1.488	1.523	1.521	1.471	1.521	0.00766	1.61%	0.00%
0.01308		10	1.497	1.473	1.521	1.521	1.429	1.521	0.0106	2.24%	0.61%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	0.9900	1.0000	1.0000	1.0000	0.9900	1.0000	1.0000	0.9900	1.0000	1.0000
0.01308		0.9900	1.0000	1.0000	0.9900	0.9800	1.0000	1.0000	0.9900	1.0000	1.0000

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

Analysis ID:	18-5833-4526	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 15:51	**Analysis:**	Parametric Bioequivalence-Two Sample	**Official Results:**	Yes

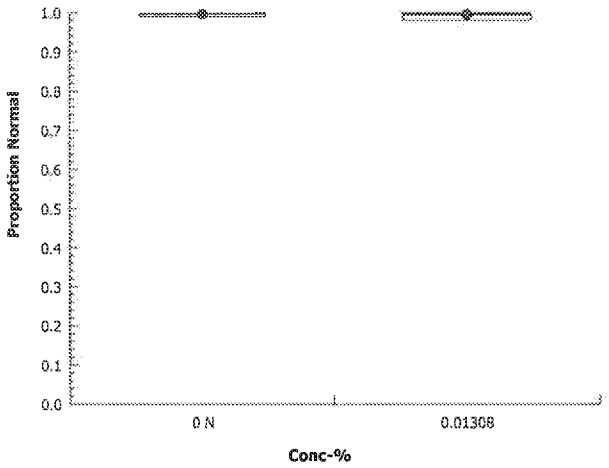
Angular (Corrected) Transformed Detail

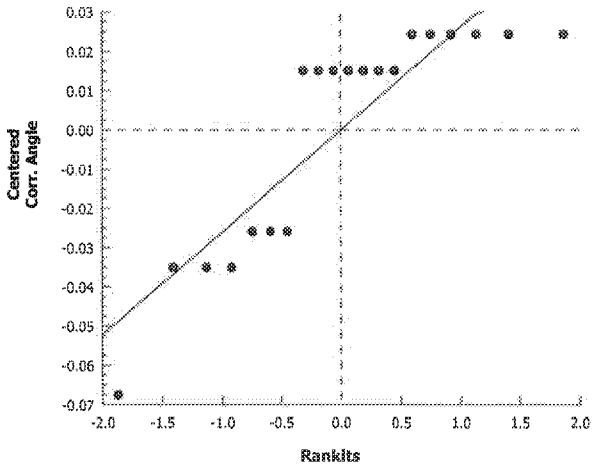
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	1.471	1.521	1.521	1.521	1.471	1.521	1.521	1.471	1.521	1.521
0.01308		1.471	1.521	1.521	1.471	1.429	1.521	1.521	1.471	1.521	1.521

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	N	99/100	100/100	100/100	100/100	99/100	100/100	100/100	99/100	100/100	100/100
0.01308		99/100	100/100	100/100	99/100	98/100	100/100	100/100	99/100	100/100	100/100

Graphics





CETIS Measurement Report

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

Batch ID:	13-8942-4277	**Test Type:**	Development	**Analyst:**	
Start Date:	07 Apr-17 12:31	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	18-6478-3361	**Code:**	DCO0417.049abs	**Client:**	DCOR, LLC.
Sample Date:	06 Apr-17 07:00	**Material:**	Sample Water	**Project:**	
Receipt Date:	06 Apr-17 11:25	**Source:**	Bioassay Report		
Sample Age:	30h (4.1 °C)	**Station:**	Platform Edith		

Parameter Acceptability Criteria

Parameter	Min	Max	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.6	14.6	14	16	Yes	Passes Criteria

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.25	0.2616	14.24	6.7	7.8	0.55	0.7778	10.73%	0
0.01308		2	7.25	1.532	12.97	6.8	7.7	0.45	0.6364	8.78%	0
Overall		4	7.25	6.327	8.173	6.7	7.8	0.2901	0.5802	8.00%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.75	5.844	9.656	7.6	7.9	0.15	0.2121	2.74%	0
0.01308		2	7.7	6.429	8.971	7.6	7.8	0.1	0.1414	1.84%	0
Overall		4	7.725	7.486	7.964	7.6	7.9	0.075	0.15	1.94%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
0.01308		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
0.01308		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
Overall		4	14.6	14.6	14.6	14.6	14.6	0	0	0.00%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	1	2
0	N	7.8	6.7
0.01308		7.7	6.8

pH-Units

Conc-%	Code	1	2
0	N	7.9	7.6
0.01308		7.8	7.6

Salinity-ppt

Conc-%	Code	1	2
0	N	34	34
0.01308		34	34

Temperature-°C

Conc-%	Code	1	2
0	N	14.6	14.6
0.01308		14.6	14.6

Aquatic Bioassay and Consulting Labs.
29 N. Olive Street
Ventura, CA 93001
Phone and Fax:(805) 643-5621
CHAIN OF CUSTODY RECORD

REPORT: e-mail to jrao@dcorllc.com
Fax (805) 535-2075
Company DCOR,LLC.
Address 290 Maple Court. Suite 290 Ventura CA. 93003
Contact Jay Rao at 805 535-2078

BILL TO:
P.O. #
Company: DCOR,LLC.
Address

PROJ. NO.

PROJECT NAME
Edith
Whole Effluent Toxicity Tests

SAMPLER'S SIGNATURE:
Print Name: Dean Mesna

CONTAINER TYPES
A=Amber B=Brass G=Glass P=Plastic V=Voa Vial O=Other

Matrix

Grab Sample NO.	Date Sampled	Time Sampled	Comp	Grab	Sample Description	Water	Soil	Sludge	Other	Container #	Container Type	Analysis	Red Abalone	Giant Kelp	Topsmelt				Remarks
1	4/5/17	10:00AM		X	Produced Water	X				1	P		X	X	X				Produced Water Temp: 13.1°
2	4/5/17	1:00PM		X	Produced Water	X													
3	4/5/17	4:00PM		X	Produced Water	X													
4	4/5/17	7:00PM		X	Produced Water	X													
5	4/5/17	10:00PM		X	Produced Water	X													
6	4/6/17	1:00AM		X	Produced Water	X													
7	4/6/17	4:00AM		X	Produced Water	X													
8	4/6/17	7:00AM		X	Produced Water	X													

Temp deg. C = 14
Chlorine (mg/L) = <0.1
NH3 (mg/L) = 107

Use EPA Method 600/R95/136

8 Grab samples in 24 hours

CHECK ONE BOX
Dispose Samples: X
Return Samples:

Relinquished by: (Signature)	Date	Received by: (Signature)	Relinquished by: (Signature)	Date	Received by: (Signature)
	4-5-17			4/6/17	
Print Name: Dean Mesna	Time 1900	Print Name: JUSTIN TEPPS	Print Name: Justin Tepps	Time 0900	Print Name: J. Stoer
Relinquished by: (Signature)	Date 4-6-17	Received by: (Signature)	Relinquished by: (Signature)	Date 4-6-17	Received by: (Signature)
Print Name: J. Stoer	Time 0730	Print Name: Lloyd Leonardo	Print Name: Lloyd Leonardo	Time 1125	Print Name: Joel Dalida

Verified by Lead Operator:(Signature)
Print Name: Dean Mesna
Date: 4-5-17
Time: 1900

Turn Around time

24Hr			5 day	
48Hr			Standard	X
72Hr			other	

ED_006450_00002172-00020

aquatic bioassay & consulting laboratories, inc

CHRONIC TOPSMELT SURVIVAL AND GROWTH BIOASSAY

DATE: 7 April - 2017

STANDARD TOXICANT: Copper Chloride

ENDPOINT: SURVIVAL

NOEC = 100.00 ug/l

EC25 = 110.70 ug/l
EC50 = 142.70 ug/l

ENDPOINT: GROWTH

NOEC = 56.00 ug/l

IC25 = 102.60 ug/l
IC50 = 132.00 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

*34ppt

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

CETIS Summary Report

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

Batch ID:	00-4965-4899	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	07 Apr-17 14:45	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Apr-17 14:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	11-6593-5663	**Code:**	TOPS040717	**Client:**	ABC Labs
Sample Date:	07 Apr-17 14:45	**Material:**	Copper chloride	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	NOEL	LOEL	TOEL	TU	PMSD	✓
05-7718-7322	7d Survival Rate	Dunnett Multiple Comparison Test	100	180	134.2		17.5%	
08-4988-6164	Mean Dry Biomass-mg	Dunnett Multiple Comparison Test	56	100	74.83		20.2%	✓

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	µg/L	95% LCL	95% UCL	TU	✓
14-8315-7274	7d Survival Rate	Linear Interpolation (ICPIN)	EC5	58.93	4.133	121.6		✓
			EC10	76.53	28.93	120.6		
			EC15	94.13	46.83	119.4		
			EC20	104.3	64.87	121.9		
			EC25	110.7	80.23	127		
			EC40	129.9	109.1	145.8		
			EC50	142.7	123.7	157.4		
07-4024-9568	Mean Dry Biomass-mg	Linear Interpolation (ICPIN)	IC5	65.66	9.57	78.55		
			IC10	75.31	46.68	101.1		✓
			IC15	84.97	55.3	112		✓
			IC20	94.62	63.14	115		✓
			IC25	102.6	72.85	118.9		✓
			IC40	120.3	94.37	133.2		✓
			IC50	132	110.1	144.2		✓

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
05-7718-7322	7d Survival Rate	Control Resp	0.96	0.8	>>	Yes	Passes Criteria
14-8315-7274	7d Survival Rate	Control Resp	0.96	0.8	>>	Yes	Passes Criteria
07-4024-9568	Mean Dry Biomass-mg	Control Resp	1.329	0.85	>>	Yes	Passes Criteria
08-4988-6164	Mean Dry Biomass-mg	Control Resp	1.329	0.85	>>	Yes	Passes Criteria
05-7718-7322	7d Survival Rate	PMSD	0.1751	<<	0.25	No	Passes Criteria
08-4988-6164	Mean Dry Biomass-mg	PMSD	0.2023	<<	0.5	No	Passes Criteria

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9600	0.8489	1.0000	0.8000	1.0000	0.0400	0.0894	9.32%	0.00%
56		5	0.9200	0.7840	1.0000	0.8000	1.0000	0.0490	0.1095	11.91%	4.17%
100		5	0.8000	0.6244	0.9756	0.6000	1.0000	0.0633	0.1414	17.68%	16.67%
180		5	0.2000	0.0244	0.3756	0.0000	0.4000	0.0633	0.1414	70.71%	79.17%
320		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
560		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Mean Dry Biomass-mg Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	1.329	0.9918	1.666	0.884	1.614	0.1214	0.2714	20.43%	0.00%
56		5	1.389	1.235	1.542	1.242	1.502	0.05526	0.1236	8.90%	-4.52%
100		5	1.049	0.7969	1.301	0.726	1.234	0.09086	0.2032	19.36%	21.04%
180		5	0.126	-0.02831	0.2803	0	0.318	0.05558	0.1243	98.63%	90.52%
320		5	0	0	0	0	0	0	0		100.00%
560		5	0	0	0	0	0	0	0		100.00%

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

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.8000	1.0000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	0.8000	0.8000
100		1.0000	0.6000	0.8000	0.8000	0.8000
180		0.0000	0.4000	0.2000	0.2000	0.2000
320		0.0000	0.0000	0.0000	0.0000	0.0000
560		0.0000	0.0000	0.0000	0.0000	0.0000

Mean Dry Biomass-mg Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.884	1.422	1.314	1.614	1.41
56		1.476	1.502	1.242	1.456	1.268
100		1.234	0.726	1.208	1.016	1.062
180		0	0.318	0.156	0.036	0.12
320		0	0	0	0	0
560		0	0	0	0	0

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	4/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	4/5	4/5
100		5/5	3/5	4/5	4/5	4/5
180		0/5	2/5	1/5	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

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

Analysis ID:	05-7718-7322	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 12:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	00-4965-4899	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	07 Apr-17 14:45	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Apr-17 14:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	11-6593-5663	**Code:**	TOPS040717	**Client:**	ABC Labs
Sample Date:	07 Apr-17 14:45	**Material:**	Copper chloride	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	180	134.2		17.51%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	56	0.5288	2.227	0.201	8	CDF	0.5320	Non-Significant Effect
	100	2.077	2.227	0.201	8	CDF	0.0656	Non-Significant Effect
	180*	9.298	2.227	0.201	8	CDF	8.1E-07	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.96	0.8	>>	Yes	Passes Criteria
PMSD	0.1751	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.25587	0.751957	3	37.08	2.0E-07	Significant Effect
Error	0.32446	0.0202788	16			
Total	2.58033		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	0.8355	11.34	0.8410	Equal Variances
Variances	Levene Equality of Variance Test	0.1367	5.292	0.9367	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.1891	5.953	0.9018	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.8395	3.878	0.0304	Normal Distribution
Distribution	D'Agostino Kurtosis Test	0.02845	2.576	0.9773	Normal Distribution
Distribution	D'Agostino Skewness Test	0.526	2.576	0.5989	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	0.2774	9.21	0.8705	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.2396	0.2235	0.0038	Non-Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9222	0.866	0.1091	Normal Distribution

7d Survival Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9600	0.8489	1.0000	1.0000	0.8000	1.0000	0.0400	9.32%	0.00%
56		5	0.9200	0.7840	1.0000	1.0000	0.8000	1.0000	0.0490	11.91%	4.17%
100		5	0.8000	0.6244	0.9756	0.8000	0.6000	1.0000	0.0633	17.68%	16.67%
180		5	0.2000	0.0244	0.3756	0.2000	0.0000	0.4000	0.0633	70.71%	79.17%
320		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
560		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

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

Analysis ID:	05-7718-7322	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 12:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	0.00%
56		5	1.25	1.088	1.412	1.345	1.107	1.345	0.05833	10.43%	3.67%
100		5	1.111	0.9089	1.312	1.107	0.8861	1.345	0.07264	14.63%	14.42%
180		5	0.4602	0.2586	0.6619	0.4636	0.2255	0.6847	0.07264	35.29%	64.53%
320		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.00%	82.62%
560		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.00%	82.62%

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.8000	1.0000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	0.8000	0.8000
100		1.0000	0.6000	0.8000	0.8000	0.8000
180		0.0000	0.4000	0.2000	0.2000	0.2000
320		0.0000	0.0000	0.0000	0.0000	0.0000
560		0.0000	0.0000	0.0000	0.0000	0.0000

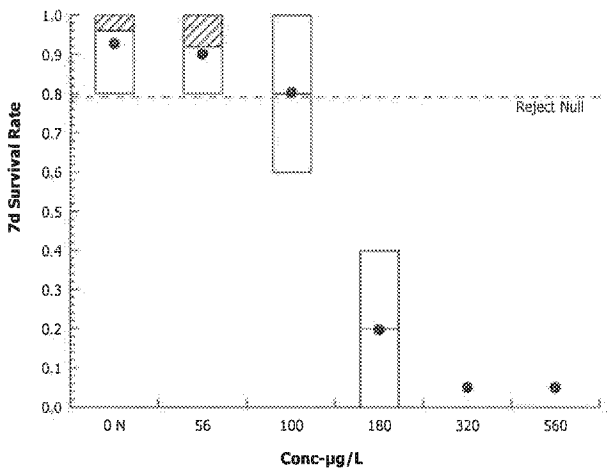
Angular (Corrected) Transformed Detail

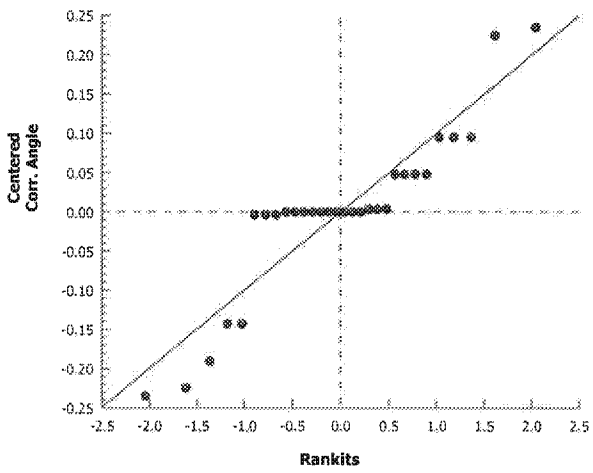
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.107	1.345	1.345	1.345	1.345
56		1.345	1.345	1.345	1.107	1.107
100		1.345	0.8861	1.107	1.107	1.107
180		0.2255	0.6847	0.4636	0.4636	0.4636
320		0.2255	0.2255	0.2255	0.2255	0.2255
560		0.2255	0.2255	0.2255	0.2255	0.2255

7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	4/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	4/5	4/5
100		5/5	3/5	4/5	4/5	4/5
180		0/5	2/5	1/5	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:	08-4988-6164	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 12:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	00-4965-4899	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	07 Apr-17 14:45	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Apr-17 14:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	11-6593-5663	**Code:**	TOPS040717	**Client:**	ABC Labs
Sample Date:	07 Apr-17 14:45	**Material:**	Copper chloride	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	56	100	74.83		20.23%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	56	-0.4971	2.227	0.269	8	CDF	0.8908	Non-Significant Effect
	100*	2.317	2.227	0.269	8	CDF	0.0423	Significant Effect
	180*	9.966	2.227	0.269	8	CDF	7.4E-07	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1.329	0.85	>>	Yes	Passes Criteria
PMSD	0.2023	<<	0.5	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.11349	1.7045	3	46.81	<1.0E-37	Significant Effect
Error	0.58263	0.0364144	16			
Total	5.69612		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	3.249	11.34	0.3547	Equal Variances
Variances	Levene Equality of Variance Test	0.6539	5.292	0.5921	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.4607	5.953	0.7149	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.4633	3.878	0.2606	Normal Distribution
Distribution	D'Agostino Kurtosis Test	1.228	2.576	0.2193	Normal Distribution
Distribution	D'Agostino Skewness Test	1.804	2.576	0.0713	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	4.763	9.21	0.0924	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1248	0.2235	0.5921	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9443	0.866	0.2893	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.329	0.9918	1.666	1.41	0.884	1.614	0.1214	20.43%	0.00%
56		5	1.389	1.235	1.542	1.456	1.242	1.502	0.05526	8.90%	-4.52%
100		5	1.049	0.7969	1.301	1.062	0.726	1.234	0.09086	19.36%	21.04%
180		5	0.126	-0.02831	0.2803	0.12	0	0.318	0.05558	98.63%	90.52%
320		5	0	0	0	0	0	0	0		100.00%
560		5	0	0	0	0	0	0	0		100.00%

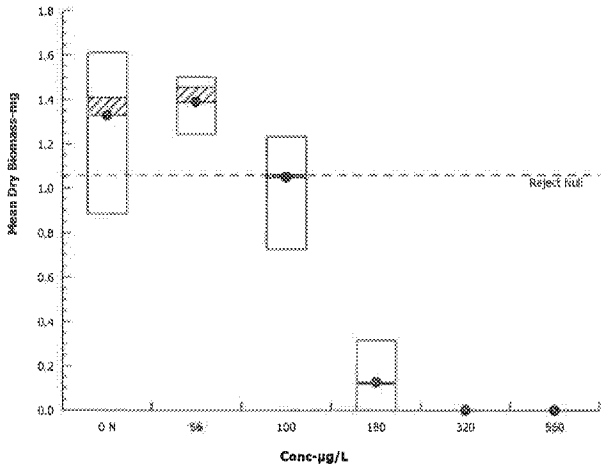
Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

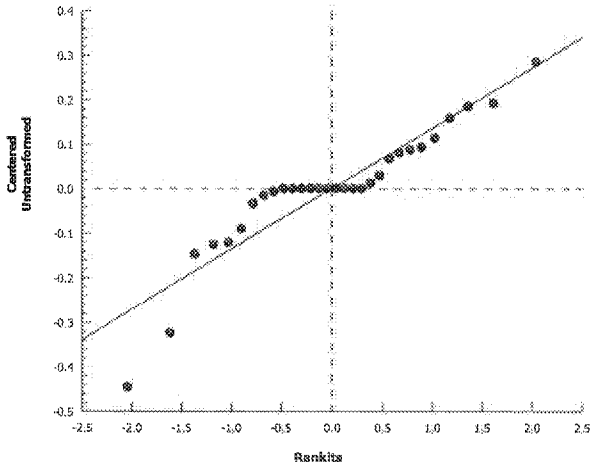
Analysis ID:	08-4988-6164	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 12:52	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Mean Dry Biomass-mg Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.884	1.422	1.314	1.614	1.41
56		1.476	1.502	1.242	1.456	1.268
100		1.234	0.726	1.208	1.016	1.062
180		0	0.318	0.156	0.036	0.12
320		0	0	0	0	0
560		0	0	0	0	0

Graphics





CETIS Analytical Report

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

Analysis ID:	14-8315-7274	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 12:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	00-4965-4899	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	07 Apr-17 14:45	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Apr-17 14:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	11-6593-5663	**Code:**	TOPS040717	**Client:**	ABC Labs
Sample Date:	07 Apr-17 14:45	**Material:**	Copper chloride	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.96	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	58.93	4.133	121.6
EC10	76.53	28.93	120.6
EC15	94.13	46.83	119.4
EC20	104.3	64.87	121.9
EC25	110.7	80.23	127
EC40	129.9	109.1	145.8
EC50	142.7	123.7	157.4

7d Survival Rate Summary

			Calculated Variate(A/B)								
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	N	5	0.9600	0.8000	1.0000	0.0400	0.0894	9.32%	0.0%	24	25
56		5	0.9200	0.8000	1.0000	0.0490	0.1095	11.91%	4.17%	23	25
100		5	0.8000	0.6000	1.0000	0.0633	0.1414	17.68%	16.67%	20	25
180		5	0.2000	0.0000	0.4000	0.0633	0.1414	70.71%	79.17%	5	25
320		5	0.0000	0.0000	0.0000	0.0000	0.0000		100.0%	0	25
560		5	0.0000	0.0000	0.0000	0.0000	0.0000		100.0%	0	25

7d Survival Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.8000	1.0000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	0.8000	0.8000
100		1.0000	0.6000	0.8000	0.8000	0.8000
180		0.0000	0.4000	0.2000	0.2000	0.2000
320		0.0000	0.0000	0.0000	0.0000	0.0000
560		0.0000	0.0000	0.0000	0.0000	0.0000

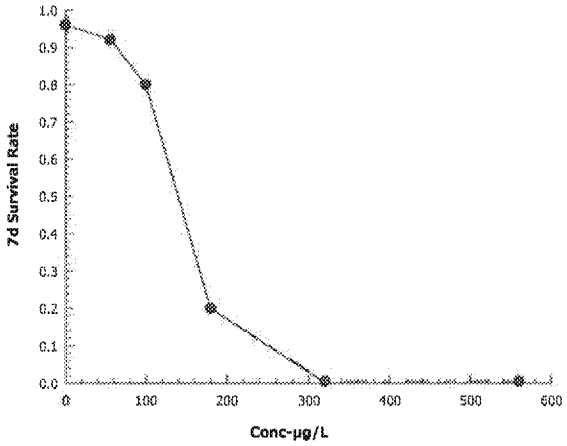
7d Survival Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	4/5	5/5	5/5	5/5	5/5
56		5/5	5/5	5/5	4/5	4/5
100		5/5	3/5	4/5	4/5	4/5
180		0/5	2/5	1/5	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:	14-8315-7274	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 12:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



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

Analysis ID:	07-4024-9568	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 12:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	00-4965-4899	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	07 Apr-17 14:45	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Apr-17 14:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	11-6593-5663	**Code:**	TOPS040717	**Client:**	ABC Labs
Sample Date:	07 Apr-17 14:45	**Material:**	Copper chloride	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1.329	0.85	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	65.66	9.57	78.55
IC10	75.31	46.68	101.1
IC15	84.97	55.3	112
IC20	94.62	63.14	115
IC25	102.6	72.85	118.9
IC40	120.3	94.37	133.2
IC50	132	110.1	144.2

Mean Dry Biomass-mg Summary

			Calculated Variate						
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**
0	N	5	1.329	0.884	1.614	0.1214	0.2714	20.43%	0.0%
56		5	1.389	1.242	1.502	0.05526	0.1236	8.90%	-4.52%
100		5	1.049	0.726	1.234	0.09086	0.2032	19.36%	21.04%
180		5	0.126	0	0.318	0.05558	0.1243	98.63%	90.52%
320		5	0	0	0	0	0		100.0%
560		5	0	0	0	0	0		100.0%

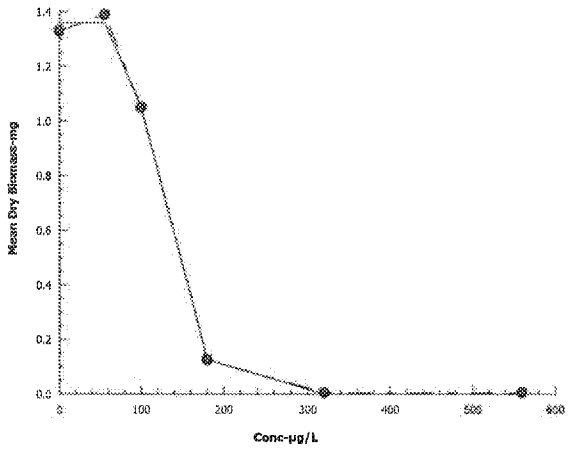
Mean Dry Biomass-mg Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.884	1.422	1.314	1.614	1.41
56		1.476	1.502	1.242	1.456	1.268
100		1.234	0.726	1.208	1.016	1.062
180		0	0.318	0.156	0.036	0.12
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:	07-4024-9568	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 12:52	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

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

Batch ID:	00-4965-4899	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	07 Apr-17 14:45	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Apr-17 14:20	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	7d	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	11-6593-5663	**Code:**	TOPS040717	**Client:**	ABC Labs
Sample Date:	07 Apr-17 14:45	**Material:**	Copper chloride	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	6.875	6.751	6.999	6.7	7.2	0.05261	0.1488	2.16%	0
56		8	6.6	6.381	6.819	6.3	6.9	0.09258	0.2619	3.97%	0
100		8	6.55	6.305	6.795	6	6.9	0.1035	0.2928	4.47%	0
180		8	6.537	6.266	6.809	5.9	6.9	0.1149	0.3249	4.97%	0
320		4	6.775	6.377	7.173	6.5	7.1	0.125	0.25	3.69%	0
560		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
Overall		38	6.647	6.554	6.74	5.9	7.2	0.04584	0.2826	4.25%	0 (0%)

pH-Units

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	8	7.438	7.329	7.546	7.2	7.6	0.04605	0.1302	1.75%	0
56		8	7.575	7.516	7.634	7.5	7.7	0.025	0.07071	0.93%	0
100		8	7.587	7.534	7.641	7.5	7.7	0.02266	0.06409	0.84%	0
180		8	7.612	7.559	7.666	7.5	7.7	0.02266	0.06409	0.84%	0
320		4	7.625	7.386	7.864	7.4	7.7	0.075	0.15	1.97%	0
560		2	7.55	5.644	9.456	7.4	7.7	0.15	0.2121	2.81%	0
Overall		38	7.561	7.523	7.598	7.2	7.7	0.01868	0.1152	1.52%	0 (0%)

Salinity-ppt

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	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		4	34	34	34	34	34	0	0	0.0%	0
560		2	34	34	34	34	34	0	0	0.0%	0
Overall		38	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	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		4	21	21	21	21	21	0	0	0.0%	0
560		2	21	21	21	21	21	0	0	0.0%	0
Overall		38	21	21	21	21	21	0	0	0.00%	0 (0%)

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

Dissolved Oxygen-mg/L

Conc-µg/L	Code	1	2	3	4	5	6	7	8
0	N	6.8	6.9	7.2	6.7	6.9	6.8	6.9	6.8
56		6.7	6.3	6.9	6.3	6.9	6.3	6.7	6.7
100		6.7	6.3	6.7	6.4	6.9	6	6.7	6.7
180		6.7	6.2	6.6	6.6	6.9	5.9	6.7	6.7
320		6.7	6.5	7.1	6.8				
560		6.7	6.3						

pH-Units

Conc-µg/L	Code	1	2	3	4	5	6	7	8
0	N	7.5	7.4	7.6	7.4	7.2	7.4	7.6	7.4
56		7.5	7.6	7.7	7.5	7.6	7.6	7.6	7.5
100		7.5	7.6	7.7	7.5	7.6	7.6	7.6	7.6
180		7.5	7.7	7.7	7.6	7.6	7.6	7.6	7.6
320		7.4	7.7	7.7	7.7				
560		7.4	7.7						

Salinity-ppt

Conc-µg/L	Code	1	2	3	4	5	6	7	8
0	N	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				
560		34	34						

Temperature-°C

Conc-µg/L	Code	1	2	3	4	5	6	7	8
0	N	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				
560		21	21						

aquatic bioassay & consulting laboratories, inc

CHRONIC ABALONE DEVELOPMENT BIOASSAY

DATE: 7 April 2017

STANDARD TOXICANT: Zinc

NOEC = 32.00 ug/l

EC25 = 38.35 ug/l
EC50 = 45.50 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

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

CETIS Summary Report

Report Date: 25 Apr-17 15:40 (p 1 of 1)
Test Code: ABS040717 | 12-2430-4241

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

Batch ID:	19-6820-3463	**Test Type:**	Development	**Analyst:**	
Start Date:	07 Apr-17 12:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	01-3696-3120	**Code:**	ABS040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 12:30	**Material:**	Zinc	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	NOEL	LOEL	TOEL	TU	PMSD ✓
14-0256-4902	Proportion Normal	Dunnett Multiple Comparison Test	32	56	42.33		3.06%

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	µg/L	95% LCL	95% UCL	TU ✓
16-1208-1053	Proportion Normal	Linear Interpolation (ICPIN)	EC5	32.62	27.71	33.63	
			EC10	34.05	32.67	34.99	
			EC15	35.48	34.18	36.41	
			EC20	36.92	35.69	37.9	
			EC25	38.35	37.17	39.38	
			EC40	42.64	41.35	43.87	
			EC50	45.5	44.14	46.85	

Test Acceptability

				TAC Limits			
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
14-0256-4902	Proportion Normal	Control Resp	0.992	0.8	>>	Yes	Passes Criteria
16-1208-1053	Proportion Normal	Control Resp	0.992	0.8	>>	Yes	Passes Criteria
14-0256-4902	Proportion Normal	NOEL	32	<<	56	No	Passes Criteria
14-0256-4902	Proportion Normal	PMSD	0.03058	<<	0.2	No	Passes Criteria

Proportion Normal Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9920	0.9784	1.0000	0.9800	1.0000	0.0049	0.0110	1.10%	0.00%
18		5	0.9900	0.9748	1.0000	0.9700	1.0000	0.0055	0.0123	1.24%	0.20%
32		5	0.9640	0.9170	1.0000	0.9000	1.0000	0.0169	0.0378	3.92%	2.82%
56		5	0.1320	0.0528	0.2112	0.0600	0.2000	0.0285	0.0638	48.33%	86.69%
100		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
180		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	0.9800	1.0000	1.0000	0.9800
18		0.9900	0.9700	1.0000	0.9900	1.0000
32		0.9800	0.9700	0.9700	1.0000	0.9000
56		0.1500	0.0600	0.1800	0.0700	0.2000
100		0.0000	0.0000	0.0000	0.0000	0.0000
180		0.0000	0.0000	0.0000	0.0000	0.0000

Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	100/100	98/100	100/100	100/100	98/100
18		99/100	97/100	100/100	99/100	100/100
32		98/100	97/100	97/100	100/100	90/100
56		15/100	6/100	18/100	7/100	20/100
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

Test Code: ABS040717 | 12-2430-4241

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

Analysis ID:	14-0256-4902	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 15:40	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	19-6820-3463	**Test Type:**	Development	**Analyst:**	
Start Date:	07 Apr-17 12:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	01-3696-3120	**Code:**	ABS040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 12:30	**Material:**	Zinc	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	32	56	42.33		3.06%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	18	0.164	2.227	0.110	8	CDF	0.6878	Non-Significant Effect
	32	1.728	2.227	0.110	8	CDF	0.1189	Non-Significant Effect
	56*	22.64	2.227	0.110	8	CDF	7.0E-07	Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.992	0.8	>>	Yes	Passes Criteria
NOEL	32	<<	56	No	Passes Criteria
PMSD	0.03058	<<	0.2	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.4764	1.49213	3	243.4	<1.0E-37	Significant Effect
Error	0.0981008	0.0061313	16			
Total	4.5745		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	3.003	11.34	0.3912	Equal Variances
Variances	Levene Equality of Variance Test	1.317	5.292	0.3035	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.8998	5.953	0.4697	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.5372	3.878	0.1724	Normal Distribution
Distribution	D'Agostino Kurtosis Test	0.1403	2.576	0.8884	Normal Distribution
Distribution	D'Agostino Skewness Test	0.9295	2.576	0.3527	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	0.8836	9.21	0.6429	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1707	0.2235	0.1306	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9544	0.866	0.4380	Normal Distribution

Proportion Normal Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9920	0.9784	1.0000	1.0000	0.9800	1.0000	0.0049	1.10%	0.00%
18		5	0.9900	0.9748	1.0000	0.9900	0.9700	1.0000	0.0055	1.24%	0.20%
32		5	0.9640	0.9170	1.0000	0.9700	0.9000	1.0000	0.0169	3.92%	2.82%
56		5	0.1320	0.0528	0.2112	0.1500	0.0600	0.2000	0.0285	48.33%	86.69%
100		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
180		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

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

Analysis ID:	14-0256-4902	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 15:40	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.484	1.422	1.547	1.521	1.429	1.521	0.02251	3.39%	0.00%
18		5	1.476	1.413	1.539	1.471	1.397	1.521	0.02275	3.45%	0.55%
32		5	1.398	1.277	1.52	1.397	1.249	1.521	0.04371	6.99%	5.77%
56		5	0.3629	0.2397	0.4862	0.3977	0.2475	0.4636	0.04438	27.34%	75.54%
100		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.00%	96.63%
180		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.00%	96.63%

Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	0.9800	1.0000	1.0000	0.9800
18		0.9900	0.9700	1.0000	0.9900	1.0000
32		0.9800	0.9700	0.9700	1.0000	0.9000
56		0.1500	0.0600	0.1800	0.0700	0.2000
100		0.0000	0.0000	0.0000	0.0000	0.0000
180		0.0000	0.0000	0.0000	0.0000	0.0000

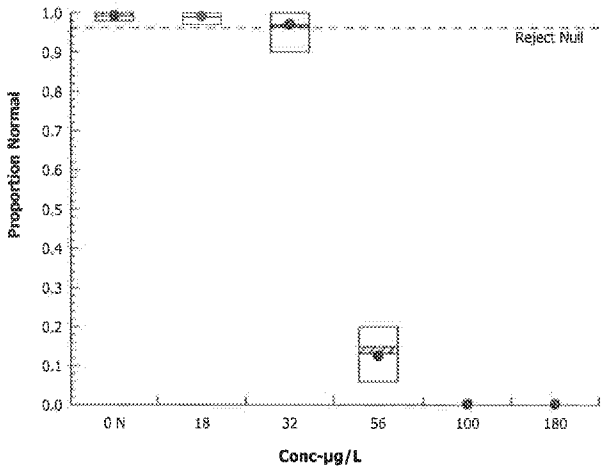
Angular (Corrected) Transformed Detail

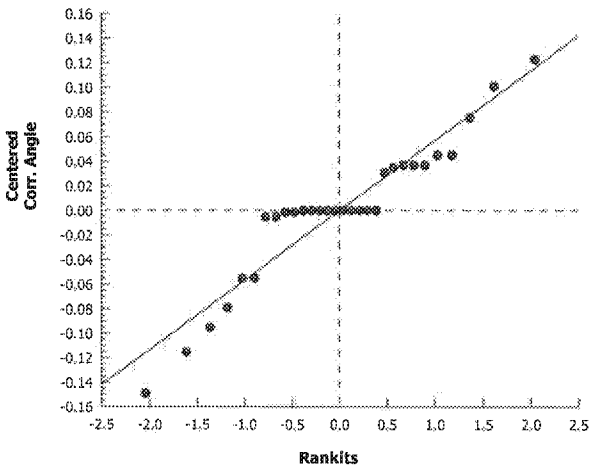
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.521	1.429	1.521	1.521	1.429
18		1.471	1.397	1.521	1.471	1.521
32		1.429	1.397	1.397	1.521	1.249
56		0.3977	0.2475	0.4381	0.2678	0.4636
100		0.05002	0.05002	0.05002	0.05002	0.05002
180		0.05002	0.05002	0.05002	0.05002	0.05002

Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	100/100	98/100	100/100	100/100	98/100
18		99/100	97/100	100/100	99/100	100/100
32		98/100	97/100	97/100	100/100	90/100
56		15/100	6/100	18/100	7/100	20/100
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

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

Analysis ID:	16-1208-1053	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 15:40	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	19-6820-3463	**Test Type:**	Development	**Analyst:**	
Start Date:	07 Apr-17 12:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	01-3696-3120	**Code:**	ABS040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 12:30	**Material:**	Zinc	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.992	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	32.62	27.71	33.63
EC10	34.05	32.67	34.99
EC15	35.48	34.18	36.41
EC20	36.92	35.69	37.9
EC25	38.35	37.17	39.38
EC40	42.64	41.35	43.87
EC50	45.5	44.14	46.85

Proportion Normal Summary

			Calculated Variate(A/B)								
Conc-µg/L	**Code**	**Count**	**Mean**	**Min**	**Max**	**Std Err**	**Std Dev**	**CV%**	**%Effect**	**A**	**B**
0	N	5	0.9920	0.9800	1.0000	0.0049	0.0110	1.10%	0.0%	496	500
18		5	0.9900	0.9700	1.0000	0.0055	0.0123	1.24%	0.2%	495	500
32		5	0.9640	0.9000	1.0000	0.0169	0.0378	3.92%	2.82%	482	500
56		5	0.1320	0.0600	0.2000	0.0285	0.0638	48.33%	86.69%	66	500
100		5	0.0000	0.0000	0.0000	0.0000	0.0000		100.0%	0	500
180		5	0.0000	0.0000	0.0000	0.0000	0.0000		100.0%	0	500

Proportion Normal Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	0.9800	1.0000	1.0000	0.9800
18		0.9900	0.9700	1.0000	0.9900	1.0000
32		0.9800	0.9700	0.9700	1.0000	0.9000
56		0.1500	0.0600	0.1800	0.0700	0.2000
100		0.0000	0.0000	0.0000	0.0000	0.0000
180		0.0000	0.0000	0.0000	0.0000	0.0000

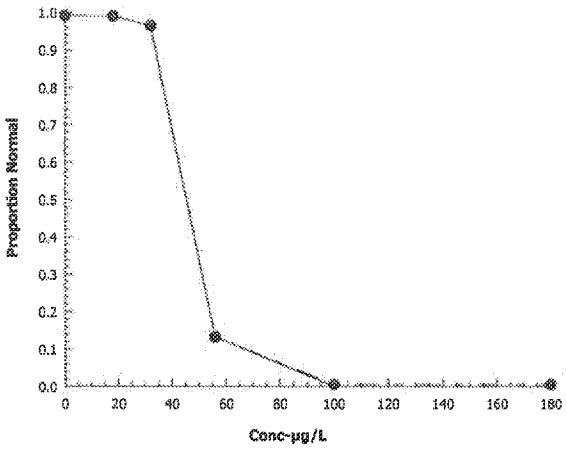
Proportion Normal Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	100/100	98/100	100/100	100/100	98/100
18		99/100	97/100	100/100	99/100	100/100
32		98/100	97/100	97/100	100/100	90/100
56		15/100	6/100	18/100	7/100	20/100
100		0/100	0/100	0/100	0/100	0/100
180		0/100	0/100	0/100	0/100	0/100

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

Analysis ID:	16-1208-1053	**Endpoint:**	Proportion Normal	**CETIS Version:**	CETISv1.9.2
Analyzed:	25 Apr-17 15:40	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

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

Batch ID:	19-6820-3463	**Test Type:**	Development	**Analyst:**	
Start Date:	07 Apr-17 12:30	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 12:30	**Species:**	Haliotis rufescens	**Brine:**	Not Applicable
Duration:	48h	**Source:**	Cultured Abalone	**Age:**	

Sample ID:	01-3696-3120	**Code:**	ABS040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 12:30	**Material:**	Zinc	**Project:**	REF TOX
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Parameter Acceptability Criteria

Parameter	Min	Max	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.6	14.6	14	16	Yes	Passes Criteria

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.25	0.2616	14.24	6.7	7.8	0.55	0.7778	10.73%	0
18		2	7.3	0.9469	13.65	6.8	7.8	0.5	0.7071	9.69%	0
32		2	7.3	0.9469	13.65	6.8	7.8	0.5	0.7071	9.69%	0
56		2	7.25	0.2616	14.24	6.7	7.8	0.55	0.7778	10.73%	0
100		2	7.3	0.9469	13.65	6.8	7.8	0.5	0.7071	9.69%	0
180		2	7.3	0.9469	13.65	6.8	7.8	0.5	0.7071	9.69%	0
Overall		12	7.283	6.94	7.627	6.7	7.8	0.1561	0.5408	7.43%	0 (0%)

pH-Units

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.75	5.844	9.656	7.6	7.9	0.15	0.2121	2.74%	0
18		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
32		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
56		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
180		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		12	7.75	7.699	7.801	7.6	7.9	0.02303	0.07977	1.03%	0 (0%)

Salinity-ppt

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	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	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
18		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
32		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
56		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
100		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
180		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
Overall		12	14.6	14.6	14.6	14.6	14.6	0	0	0.00%	0 (0%)

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

Dissolved Oxygen-mg/L

Conc-µg/L	Code	1	2
0	N	7.8	6.7
18		7.8	6.8
32		7.8	6.8
56		7.8	6.7
100		7.8	6.8
180		7.8	6.8

pH-Units

Conc-µg/L	Code	1	2
0	N	7.9	7.6
18		7.8	7.7
32		7.8	7.7
56		7.8	7.7
100		7.8	7.7
180		7.8	7.7

Salinity-ppt

Conc-µg/L	Code	1	2
0	N	34	34
18		34	34
32		34	34
56		34	34
100		34	34
180		34	34

Temperature-°C

Conc-µg/L	Code	1	2
0	N	14.6	14.6
18		14.6	14.6
32		14.6	14.6
56		14.6	14.6
100		14.6	14.6
180		14.6	14.6

aquatic bioassay & consulting laboratories, inc

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

DATE: 7 April - 17

STANDARD TOXICANT: Copper Chloride

ENDPOINT: GERMINATION

NOEC = 100.00 ug/l

EC25 = 118.70 ug/l
EC50 = 139.10 ug/l

ENDPOINT: GROWTH-LENGTH

NOEC = 100.00 ug/l

IC25 = 114.50 ug/l
IC50 = 136.40 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

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

CETIS Summary Report

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

Batch ID:	13-0562-4877	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 14:10	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	02-1134-7719	**Code:**	KLP040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 14:00	**Material:**	Copper chloride	**Project:**	
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	NOEL	LOEL	TOEL	TU	PMSD	✓
16-4181-9141	Germination Rate	Dunnett Multiple Comparison Test	100	180	134.2		9.04%	✓
01-8970-2423	Mean Length	Dunnett Multiple Comparison Test	100	180	134.2		10.4%	✓

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	µg/L	95% LCL	95% UCL	TU	✓
21-0685-9891	Germination Rate	Linear Interpolation (ICPIN)	EC5	102.4	n/a	104.4		
			EC10	106.4	100.9	108.4		
			EC15	110.5	105.3	112.4		
			EC20	114.6	109.7	116.4		
			EC25	118.7	114.1	120.3		
			EC40	131	127.3	132.3		
			EC50	139.1	136.1	140.2		
09-1126-0097	Mean Length	Linear Interpolation (ICPIN)	IC5	3.349	1.658	152.2		✓
			IC10	101.4	n/a	109.2		✓
			IC15	105.8	100.4	113.2		✓
			IC20	110.2	105.1	117.1		✓
			IC25	114.5	109.8	121		✓
			IC40	127.6	123.8	132.8		✓
			IC50	136.4	133.2	140.7		✓

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
16-4181-9141	Germination Rate	Control Resp	0.972	0.7	>>	Yes	Passes Criteria
21-0685-9891	Germination Rate	Control Resp	0.972	0.7	>>	Yes	Passes Criteria
01-8970-2423	Mean Length	Control Resp	17.32	10	>>	Yes	Passes Criteria
09-1126-0097	Mean Length	Control Resp	17.32	10	>>	Yes	Passes Criteria
01-8970-2423	Mean Length	NOEL	100	<<	35	No	Above Criteria
16-4181-9141	Germination Rate	PMSD	0.09042	<<	0.2	No	Passes Criteria
01-8970-2423	Mean Length	PMSD	0.1038	<<	0.2	No	Passes Criteria

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

Germination Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9720	0.9375	1.0000	0.9400	1.0000	0.0124	0.0278	2.85%	0.00%
5.6		5	0.9700	0.8935	1.0000	0.8600	1.0000	0.0276	0.0616	6.36%	0.21%
10		5	0.9340	0.8795	0.9885	0.8900	0.9900	0.0197	0.0439	4.70%	3.91%
18		5	0.9340	0.8270	1.0000	0.8300	1.0000	0.0386	0.0862	9.23%	3.91%
32		5	0.9840	0.9396	1.0000	0.9200	1.0000	0.0160	0.0358	3.64%	-1.23%
100		5	0.9540	0.8947	1.0000	0.9000	1.0000	0.0214	0.0478	5.01%	1.85%
180		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
320		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Mean Length Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	17.32	15.98	18.66	15.4	18	0.4831	1.08	6.24%	0.00%
5.6		5	15.04	13.42	16.66	13	16.5	0.5836	1.305	8.68%	13.16%
10		5	15.64	14.15	17.13	14.7	17.7	0.5363	1.199	7.67%	9.70%
18		5	15.82	13.7	17.94	13	17.4	0.7632	1.706	10.79%	8.66%
32		5	15.98	14.54	17.42	14.7	17.8	0.5181	1.158	7.25%	7.74%
100		5	16.88	16.44	17.32	16.6	17.4	0.1594	0.3564	2.11%	2.54%
180		5	0	0	0	0	0	0	0		100.00%
320		5	0	0	0	0	0	0	0		100.00%

Germination Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9400	0.9500	1.0000	0.9700	1.0000
5.6		1.0000	0.8600	1.0000	0.9900	1.0000
10		0.9200	0.9900	0.9700	0.9000	0.8900
18		0.9900	1.0000	1.0000	0.8300	0.8500
32		1.0000	1.0000	1.0000	0.9200	1.0000
100		1.0000	1.0000	0.9100	0.9000	0.9600
180		0.0000	0.0000	0.0000	0.0000	0.0000
320		0.0000	0.0000	0.0000	0.0000	0.0000

Mean Length Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	15.4	18	17.7	17.8	17.7
5.6		13	15.2	15.7	16.5	14.8
10		14.9	15.4	14.7	17.7	15.5
18		13	17.4	16.9	15.8	16
32		16.2	15.4	17.8	15.8	14.7
100		17.4	16.7	17.1	16.6	16.6
180		0	0	0	0	0
320		0	0	0	0	0

Germination Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	94/100	95/100	100/100	97/100	100/100
5.6		100/100	86/100	100/100	99/100	100/100
10		92/100	99/100	97/100	90/100	89/100
18		99/100	100/100	100/100	83/100	85/100
32		100/100	100/100	100/100	92/100	100/100
100		100/100	100/100	91/100	90/100	96/100
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

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

Analysis ID:	16-4181-9141	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 14:48	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	13-0562-4877	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 14:10	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	02-1134-7719	**Code:**	KLP040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 14:00	**Material:**	Copper chloride	**Project:**	
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	180	134.2		9.04%

Dunnett Multiple Comparison Test

Control vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	5.6	-0.2705	2.362	0.198	8	CDF	0.9009	Non-Significant Effect
	10	1.13	2.362	0.198	8	CDF	0.3632	Non-Significant Effect
	18	0.6581	2.362	0.198	8	CDF	0.5762	Non-Significant Effect
	32	-0.6211	2.362	0.198	8	CDF	0.9551	Non-Significant Effect
	100	0.4313	2.362	0.198	8	CDF	0.6765	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
Control Resp	0.972	0.7	>>	Yes	Passes Criteria
PMSD	0.09042	<<	0.2	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0724187	0.0144837	5	0.8247	0.5444	Non-Significant Effect
Error	0.421478	0.0175616	24			
Total	0.493897		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	2.678	15.09	0.7495	Equal Variances
Variances	Levene Equality of Variance Test	1.739	3.895	0.1640	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.6044	4.248	0.6975	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.843	3.878	0.0298	Normal Distribution
Distribution	D'Agostino Kurtosis Test	1.047	2.576	0.2951	Normal Distribution
Distribution	D'Agostino Skewness Test	1.413	2.576	0.1575	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	3.094	9.21	0.2129	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1861	0.1853	0.0095	Non-Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9257	0.9031	0.0377	Normal Distribution

Germination Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9720	0.9375	1.0000	0.9700	0.9400	1.0000	0.0124	2.85%	0.00%
5.6		5	0.9700	0.8935	1.0000	1.0000	0.8600	1.0000	0.0276	6.36%	0.21%
10		5	0.9340	0.8795	0.9885	0.9200	0.8900	0.9900	0.0197	4.70%	3.91%
18		5	0.9340	0.8270	1.0000	0.9900	0.8300	1.0000	0.0386	9.23%	3.91%
32		5	0.9840	0.9396	1.0000	1.0000	0.9200	1.0000	0.0160	3.64%	-1.23%
100		5	0.9540	0.8947	1.0000	0.9600	0.9000	1.0000	0.0214	5.01%	1.85%
180		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
320		5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

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

Analysis ID: 16-4181-9141 **Endpoint:** Germination Rate **CETIS Version:** CETISv1.9.2
Analyzed: 26 Apr-17 14:48 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.421	1.304	1.539	1.397	1.323	1.521	0.04229	6.65%	0.00%
5.6		5	1.444	1.264	1.624	1.521	1.187	1.521	0.06492	10.05%	-1.60%
10		5	1.327	1.199	1.454	1.284	1.233	1.471	0.04599	7.75%	6.67%
18		5	1.366	1.13	1.602	1.471	1.146	1.521	0.08502	13.91%	3.88%
32		5	1.473	1.342	1.605	1.521	1.284	1.521	0.04735	7.19%	-3.66%
100		5	1.385	1.221	1.549	1.369	1.249	1.521	0.05905	9.53%	2.54%
180		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.00%	96.48%
320		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.00%	96.48%

Germination Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9400	0.9500	1.0000	0.9700	1.0000
5.6		1.0000	0.8600	1.0000	0.9900	1.0000
10		0.9200	0.9900	0.9700	0.9000	0.8900
18		0.9900	1.0000	1.0000	0.8300	0.8500
32		1.0000	1.0000	1.0000	0.9200	1.0000
100		1.0000	1.0000	0.9100	0.9000	0.9600
180		0.0000	0.0000	0.0000	0.0000	0.0000
320		0.0000	0.0000	0.0000	0.0000	0.0000

Angular (Corrected) Transformed Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.323	1.345	1.521	1.397	1.521
5.6		1.521	1.187	1.521	1.471	1.521
10		1.284	1.471	1.397	1.249	1.233
18		1.471	1.521	1.521	1.146	1.173
32		1.521	1.521	1.521	1.284	1.521
100		1.521	1.521	1.266	1.249	1.369
180		0.05002	0.05002	0.05002	0.05002	0.05002
320		0.05002	0.05002	0.05002	0.05002	0.05002

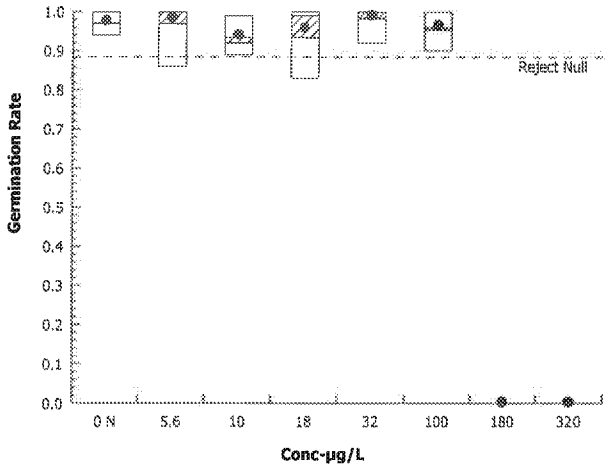
Germination Rate Binomials

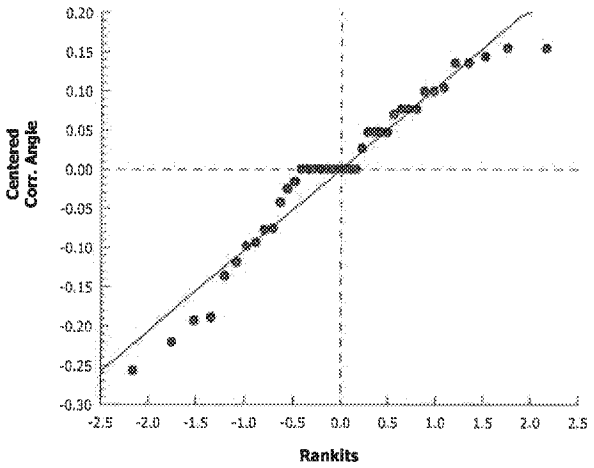
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	94/100	95/100	100/100	97/100	100/100
5.6		100/100	86/100	100/100	99/100	100/100
10		92/100	99/100	97/100	90/100	89/100
18		99/100	100/100	100/100	83/100	85/100
32		100/100	100/100	100/100	92/100	100/100
100		100/100	100/100	91/100	90/100	96/100
180		0/100	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:	16-4181-9141	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 14:48	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





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

Analysis ID:	01-8970-2423	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 14:48	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Batch ID:	13-0562-4877	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 14:10	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	02-1134-7719	**Code:**	KLP040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 14:00	**Material:**	Copper chloride	**Project:**	
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	180	134.2		10.38%

Dunnett Multiple Comparison Test

Control vs	Control II	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	5.6*	2.996	2.362	1.798	8	CDF	0.0129	Significant Effect
	10	2.207	2.362	1.798	8	CDF	0.0676	Non-Significant Effect
	18	1.971	2.362	1.798	8	CDF	0.1046	Non-Significant Effect
	32	1.761	2.362	1.798	8	CDF	0.1498	Non-Significant Effect
	100	0.5781	2.362	1.798	8	CDF	0.6124	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
Control Resp	17.32	10	>>	Yes	Passes Criteria
NOEL	100	<<	35	No	Above Criteria
PMSD	0.1038	<<	0.2	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	17.6187	3.52373	5	2.433	0.0641	Non-Significant Effect
Error	34.756	1.44817	24			
Total	52.3747		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	6.826	15.09	0.2339	Equal Variances
Variances	Levene Equality of Variance Test	0.6515	3.895	0.6632	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.6392	4.248	0.6728	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.5802	3.878	0.1349	Normal Distribution
Distribution	D'Agostino Kurtosis Test	1.073	2.576	0.2835	Normal Distribution
Distribution	D'Agostino Skewness Test	1.194	2.576	0.2327	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	2.575	9.21	0.2760	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1657	0.1853	0.0348	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9597	0.9031	0.3036	Normal Distribution

Mean Length Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	17.32	15.98	18.66	17.7	15.4	18	0.4831	6.24%	0.00%
5.6		5	15.04	13.42	16.66	15.2	13	16.5	0.5836	8.68%	13.16%
10		5	15.64	14.15	17.13	15.4	14.7	17.7	0.5363	7.67%	9.70%
18		5	15.82	13.7	17.94	16	13	17.4	0.7632	10.79%	8.66%
32		5	15.98	14.54	17.42	15.8	14.7	17.8	0.5181	7.25%	7.74%
100		5	16.88	16.44	17.32	16.7	16.6	17.4	0.1594	2.11%	2.54%
180		5	0	0	0	0	0	0	0		100.00%
320		5	0	0	0	0	0	0	0		100.00%

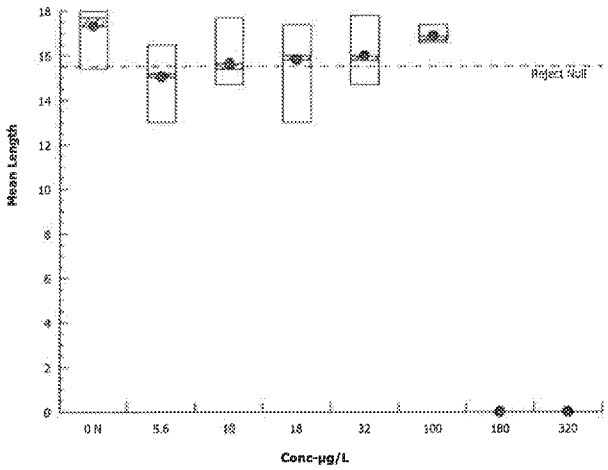
Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

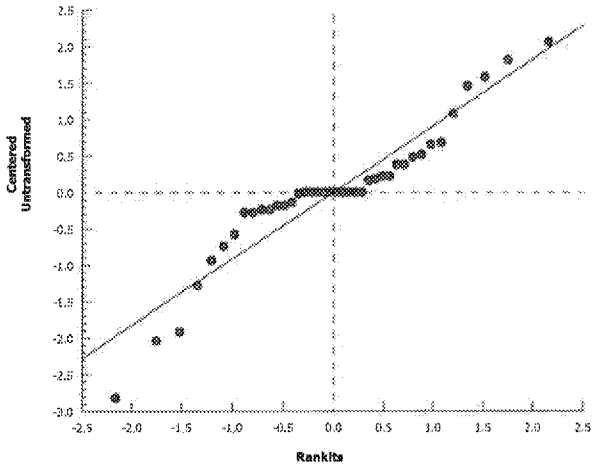
Analysis ID:	01-8970-2423	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 14:48	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Mean Length Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	15.4	18	17.7	17.8	17.7
5.6		13	15.2	15.7	16.5	14.8
10		14.9	15.4	14.7	17.7	15.5
18		13	17.4	16.9	15.8	16
32		16.2	15.4	17.8	15.8	14.7
100		17.4	16.7	17.1	16.6	16.6
180		0	0	0	0	0
320		0	0	0	0	0

Graphics





CETIS Analytical Report

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

Analysis ID:	21-0685-9891	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 14:48	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	13-0562-4877	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 14:10	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	02-1134-7719	**Code:**	KLP040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 14:00	**Material:**	Copper chloride	**Project:**	
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Linear Interpolation Options

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

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
Control Resp	0.972	0.7	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	102.4	n/a	104.4
EC10	106.4	100.9	108.4
EC15	110.5	105.3	112.4
EC20	114.6	109.7	116.4
EC25	118.7	114.1	120.3
EC40	131	127.3	132.3
EC50	139.1	136.1	140.2

Germination Rate Summary

			Calculated Variate(A/B)								
Conc-µg/L	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	N	5	0.9720	0.9400	1.0000	0.0124	0.0278	2.86%	0.0%	486	500
5.6		5	0.9700	0.8600	1.0000	0.0276	0.0616	6.36%	0.21%	485	500
10		5	0.9340	0.8900	0.9900	0.0197	0.0439	4.70%	3.91%	467	500
18		5	0.9340	0.8300	1.0000	0.0386	0.0862	9.23%	3.91%	467	500
32		5	0.9840	0.9200	1.0000	0.0160	0.0358	3.64%	-1.24%	492	500
100		5	0.9540	0.9000	1.0000	0.0214	0.0478	5.01%	1.85%	477	500
180		5	0.0000	0.0000	0.0000	0.0000	0.0000		100.0%	0	500
320		5	0.0000	0.0000	0.0000	0.0000	0.0000		100.0%	0	500

Germination Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9400	0.9500	1.0000	0.9700	1.0000
5.6		1.0000	0.8600	1.0000	0.9900	1.0000
10		0.9200	0.9900	0.9700	0.9000	0.8900
18		0.9900	1.0000	1.0000	0.8300	0.8500
32		1.0000	1.0000	1.0000	0.9200	1.0000
100		1.0000	1.0000	0.9100	0.9000	0.9600
180		0.0000	0.0000	0.0000	0.0000	0.0000
320		0.0000	0.0000	0.0000	0.0000	0.0000

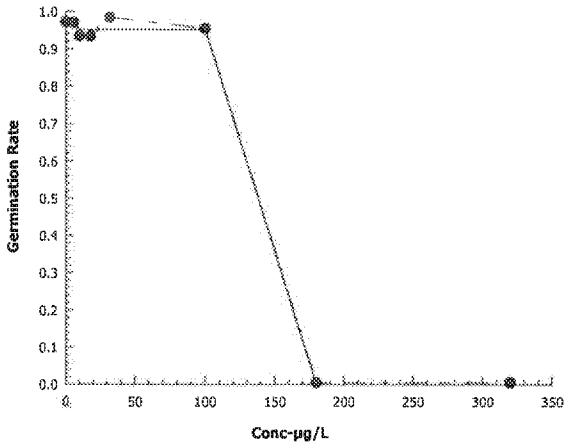
Macrocystis Germination and Germ Tube Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	21-0685-9891	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 14:48	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Germination Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	94/100	95/100	100/100	97/100	100/100
5.6		100/100	86/100	100/100	99/100	100/100
10		92/100	99/100	97/100	90/100	89/100
18		99/100	100/100	100/100	83/100	85/100
32		100/100	100/100	100/100	92/100	100/100
100		100/100	100/100	91/100	90/100	96/100
180		0/100	0/100	0/100	0/100	0/100
320		0/100	0/100	0/100	0/100	0/100

Graphics



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

Analysis ID:	09-1126-0097	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 14:48	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Batch ID:	13-0562-4877	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 14:10	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	02-1134-7719	**Code:**	KLP040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 14:00	**Material:**	Copper chloride	**Project:**	
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Linear Interpolation Options

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

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
Control Resp	17.32	10	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	3.349	1.658	152.2
IC10	101.4	n/a	109.2
IC15	105.8	100.4	113.2
IC20	110.2	105.1	117.1
IC25	114.5	109.8	121
IC40	127.6	123.8	132.8
IC50	136.4	133.2	140.7

Mean Length Summary

			Calculated Variate						
Conc-µg/L	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	17.32	15.4	18	0.4831	1.08	6.24%	0.0%
5.6		5	15.04	13	16.5	0.5836	1.305	8.68%	13.16%
10		5	15.64	14.7	17.7	0.5363	1.199	7.67%	9.7%
18		5	15.82	13	17.4	0.7632	1.706	10.79%	8.66%
32		5	15.98	14.7	17.8	0.5181	1.158	7.25%	7.74%
100		5	16.88	16.6	17.4	0.1594	0.3563	2.11%	2.54%
180		5	0	0	0	0	0		100.0%
320		5	0	0	0	0	0		100.0%

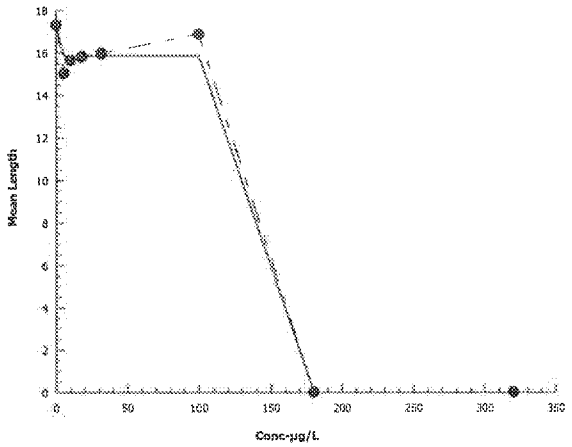
Mean Length Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	15.4	18	17.7	17.8	17.7
5.6		13	15.2	15.7	16.5	14.8
10		14.9	15.4	14.7	17.7	15.5
18		13	17.4	16.9	15.8	16
32		16.2	15.4	17.8	15.8	14.7
100		17.4	16.7	17.1	16.6	16.6
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:	09-1126-0097	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.9.2
Analyzed:	26 Apr-17 14:48	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

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

Batch ID:	13-0562-4877	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	07 Apr-17 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	09 Apr-17 14:10	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	02-1134-7719	**Code:**	KLP040717	**Client:**	Internal Lab
Sample Date:	07 Apr-17 14:00	**Material:**	Copper chloride	**Project:**	
Receipt Date:		**Source:**	Reference Toxicant		
Sample Age:	n/a	**Station:**	REF TOX		

Dissolved Oxygen-mg/L

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
5.6		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
10		2	6.45	5.815	7.085	6.4	6.5	0.05001	0.07072	1.1%	0
18		2	6.55	5.915	7.185	6.5	6.6	0.04999	0.0707	1.08%	0
32		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
100		2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
180		2	6.45	3.273	9.627	6.2	6.7	0.25	0.3536	5.48%	0
320		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
Overall		16	6.456	6.35	6.563	6.1	6.7	0.04997	0.1999	3.10%	0 (0%)

pH-Units

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	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	7.9	7.9	0	0	0.00%	0 (0%)

Salinity-ppt

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	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	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
5.6		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
10		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
18		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
32		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
180		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
320		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		16	14.75	14.72	14.78	14.7	14.8	0.01291	0.05164	0.35%	0 (0%)

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

Dissolved Oxygen-mg/L

Conc-µg/L	Code	1	2
0	N	6.6	6.1
5.6		6.6	6.3
10		6.5	6.4
18		6.6	6.5
32		6.7	6.3
100		6.6	6.2
180		6.7	6.2
320		6.7	6.3

pH-Units

Conc-µg/L	Code	1	2
0	N	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

Conc-µg/L	Code	1	2
0	N	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

Conc-µg/L	Code	1	2
0	N	14.8	14.7
5.6		14.8	14.7
10		14.8	14.7
18		14.8	14.7
32		14.8	14.7
100		14.8	14.7
180		14.8	14.7
320		14.8	14.7