Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-4279-9140	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	21 Aug-15 12:20	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

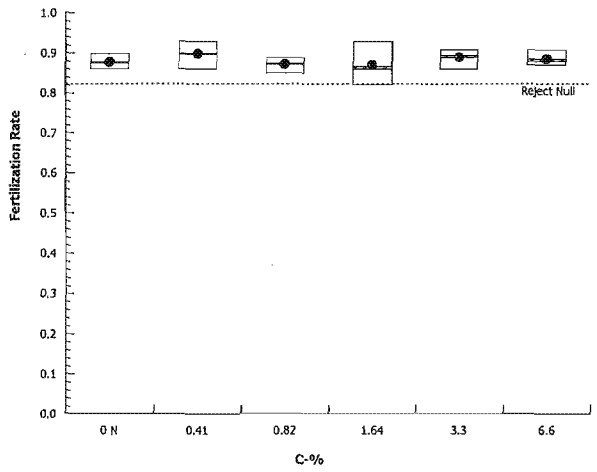
Angular (Corrected) Transformed Detail

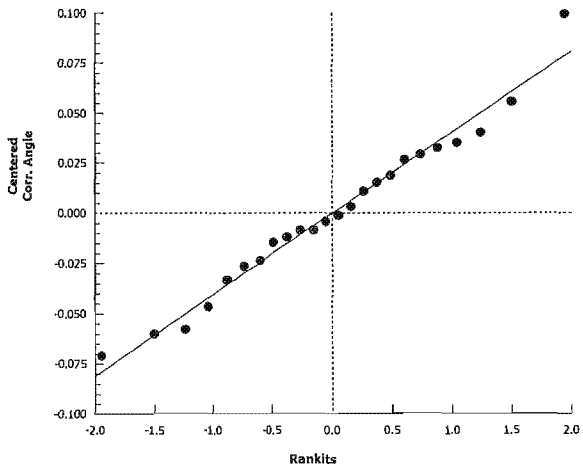
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.187	1.217	1.202	1.249
0.41		1.266	1.303	1.187	1.233
0.82		1.217	1.202	1.173	1.233
1.64		1.146	1.233	1.133	1.303
3.3		1.266	1.187	1.233	1.249
6.6		1.217	1.202	1.266	1.217

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	86/100	88/100	87/100	90/100
0.41		91/100	93/100	86/100	89/100
0.82		88/100	87/100	85/100	89/100
1.64		83/100	89/100	82/100	93/100
3.3		91/100	86/100	89/100	90/100
6.6		88/100	87/100	91/100	88/100

Graphics





CETIS Analytical Report

Report Date: 21 Aug-15 12:21 (p 1 of 2)
Test Code: AVA0715.137 | 09-2101-5363

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-5049-4877	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	21 Aug-15 12:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

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

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>6.6	N/A	N/A	<15.15	NA	NA
EC10	>6.6	N/A	N/A	<15.15	NA	NA
EC15	>6.6	N/A	N/A	<15.15	NA	NA
EC20	>6.6	N/A	N/A	<15.15	NA	NA
EC25	>6.6	N/A	N/A	<15.15	NA	NA
EC40	>6.6	N/A	N/A	<15.15	NA	NA
EC50	>6.6	N/A	N/A	<15.15	NA	NA

Fertilization Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.8775	0.86	0.9	0.008539	0.01708	1.95%	0.0%	351	400
0.41		4	0.8975	0.86	0.93	0.01493	0.02986	3.33%	-2.28%	359	400
0.82		4	0.8725	0.85	0.89	0.008539	0.01708	1.96%	0.57%	349	400
1.64		4	0.8675	0.82	0.93	0.02594	0.05188	5.98%	1.14%	347	400
3.3		4	0.89	0.86	0.91	0.0108	0.0216	2.43%	-1.43%	356	400
6.6		4	0.885	0.87	0.91	0.00866	0.01732	1.96%	-0.85%	354	400

Fertilization Rate Detail

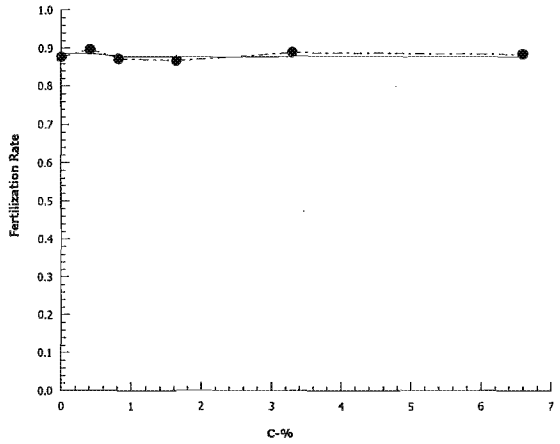
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.86	0.88	0.87	0.9
0.41		0.91	0.93	0.86	0.89
0.82		0.88	0.87	0.85	0.89
1.64		0.83	0.89	0.82	0.93
3.3		0.91	0.86	0.89	0.9
6.6		0.88	0.87	0.91	0.88

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	86/100	88/100	87/100	90/100
0.41		91/100	93/100	86/100	89/100
0.82		88/100	87/100	85/100	89/100
1.64		83/100	89/100	82/100	93/100
3.3		91/100	86/100	89/100	90/100
6.6		88/100	87/100	91/100	88/100

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	20-5049-4877	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	21 Aug-15 12:20	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	01-6052-3236	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	16 Jul-15 15:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	16 Jul-15 15:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	12-2909-7927	**Code:**	AVA0715.137	**Client:**	Avalon WWTP
Sample Date:	15 Jul-15 06:45	**Material:**	Sample Water	**Project:**	AWWTP 690A
Receive Date:	16 Jul-15 10:00	**Source:**	Bioassay Report		
Sample Age:	32h (1.8 °C)	**Station:**	Eff Comp		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.6	14.6	11 - 13	Yes	Results Above Limit

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.5	2.688	10.31	6.2	6.8	0.3	0.4243	6.53%	0
0.41		2	6.45	3.273	9.627	6.2	6.7	0.25	0.3536	5.48%	0
0.82		2	6.5	1.418	11.58	6.1	6.9	0.4	0.5657	8.7%	0
1.64		2	6.35	0.6322	12.07	5.9	6.8	0.45	0.6364	10.02%	0
3.3		2	6.25	1.803	10.7	5.9	6.6	0.35	0.495	7.92%	0
6.6		2	6.35	1.903	10.8	6	6.7	0.35	0.495	7.8%	0
Overall		12	6.4			5.9	6.9				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.41		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
0.82		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
1.64		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
3.3		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
6.6		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
Overall		12	7.842			7.8	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
0.41		2	34	34	34	34	34	0	0	0.0%	0
0.82		2	34	34	34	34	34	0	0	0.0%	0
1.64		2	34	34	34	34	34	0	0	0.0%	0
3.3		2	34	34	34	34	34	0	0	0.0%	0
6.6		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
0.41		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
0.82		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
1.64		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
3.3		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
6.6		2	14.6	14.57	14.63	14.6	14.6	0	0	0.0%	0
Overall		12	14.6			14.6	14.6				0 (0%)

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6.2
0.41		6.7	6.2
0.82		6.9	6.1
1.64		6.8	5.9
3.3		6.6	5.9
6.6		6.7	6

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
0.41		7.9	7.8
0.82		7.9	7.8
1.64		7.9	7.8
3.3		7.8	7.8
6.6		7.8	7.8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
0.41		34	34
0.82		34	34
1.64		34	34
3.3		34	34
6.6		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.6	14.6
0.41		14.6	14.6
0.82		14.6	14.6
1.64		14.6	14.6
3.3		14.6	14.6
6.6		14.6	14.6

CHAIN OF CUSTODY RECORD

Client:	Project Name/Number:
E.S. Engineering	AWWTP-690-A
Address: 123 Pebbly Beach Rd, Avalon CA. 90704	Project Mgr.: Ian Morison
	P.O. #:
Phone Number: (310) 510-0731	Sampled By (signature): Ian Morison

Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Chronic Toxicity										Comments
7/15/15	6:45	X		WW	Eff Comp	1	X										Please send Back Ice Chest + Blue Ice ASAP
												Temp. deg C				=	1.8°C
												Chlorine (mg/L)				=	<0.1
												NH3 (mg/L)				=	3.2

Relinquised By: (signature) Ian Morison — Date: Time: 7/15/15 14:30

Received By: (signature) — Date: Time: 7-16-15 1001

Relinquised By: (signature) — Date: Time:

Received By: (signature) — Date: Time:

Temp. upon sample receipt: _____ °C

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

INVOICE NO. AVA1115.1073

November 2, 2015

Accounts Payable
Avalon WWTP
ES Engineering
P.O. Box 1810
Avalon, CA 90704

SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	15 Oct - 15
DATE SAMPLED:	14 Oct - 15
ABC LAB. NO.:	AVA1015.089
P.O. NO.:	690-A

CHRONIC NPDES BIOASSAYS	
Sea Urchin – (1 @ 900.00)	$900.00
TOTAL	$900.00

Make checks payable to: Aquatic Bioassays & Consulting Labs., Inc.
29 N. Olive St.
Ventura, CA 93001

Terms are net 30 days.

aquatic bioassay & consulting laboratories, inc

November 2, 2015

Mr. Ian Morison
Avalon Wastewater Treatment Plant
ES Engineering
P.O. Box 1810
Avalon, CA 90704

Dear Mr. Morison:

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

CLIENT:	Avalon Wastewater Treatment Plant
SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	15 Oct - 15
DATE SAMPLED:	14 Oct - 15
ABC LAB. NO.:	AVA1015.089

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC	=	6.60 %
TUc	=	15.15
EC25	=	>6.60 %
EC50	=	>6.60 %

Yours very truly,

Scott Johnson
Laboratory Director

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

CETIS Summary Report

Report Date: 02 Nov-15 12:24 (p 1 of 1)
Test Code: AVA1015.089 | 09-5750-8295

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	18-6063-6440	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	15 Oct-15 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Oct-15 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	00-6126-8446	**Code:**	AVA1015.089	**Client:**	Avalon WWTP
Sample Date:	14 Oct-15 10:00	**Material:**	Sample Water	**Project:**	
Receive Date:	15 Oct-15 10:15	**Source:**	Bioassay Report		
Sample Age:	27h (4 °C)	**Station:**	Eff Comp		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
06-9962-1576	Fertilization Rate	6.6	>6.6	NA	3.49%	15.15	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
09-3359-9093	Fertilization Rate	EC5	>6.6	N/A	N/A	<15.15	Linear Interpolation (ICPIN)
		EC10	>6.6	N/A	N/A	<15.15	
		EC15	>6.6	N/A	N/A	<15.15	
		EC20	>6.6	N/A	N/A	<15.15	
		EC25	>6.6	N/A	N/A	<15.15	
		EC40	>6.6	N/A	N/A	<15.15	
		EC50	>6.6	N/A	N/A	<15.15	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
06-9962-1576	Fertilization Rate	Control Resp	0.95	0.7 - NL	Yes	Passes Acceptability Criteria
09-3359-9093	Fertilization Rate	Control Resp	0.95	0.7 - NL	Yes	Passes Acceptability Criteria
06-9962-1576	Fertilization Rate	PMSD	0.03492	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.95	0.9032	0.9968	0.91	0.98	0.01472	0.02944	3.1%	0.0%
0.41		4	0.94	0.9175	0.9625	0.93	0.96	0.007071	0.01414	1.5%	1.05%
0.82		4	0.95	0.911	0.989	0.92	0.98	0.01225	0.02449	2.58%	0.0%
1.64		4	0.9325	0.9125	0.9525	0.92	0.95	0.006291	0.01258	1.35%	1.84%
3.3		4	0.955	0.9458	0.9642	0.95	0.96	0.002887	0.005775	0.6%	-0.53%
6.6		4	0.945	0.9174	0.9726	0.93	0.96	0.00866	0.01732	1.83%	0.53%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.96	0.91	0.98	0.95
0.41		0.93	0.94	0.96	0.93
0.82		0.92	0.95	0.95	0.98
1.64		0.93	0.93	0.92	0.95
3.3		0.96	0.95	0.96	0.95
6.6		0.93	0.96	0.93	0.96

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	91/100	98/100	95/100
0.41		93/100	94/100	96/100	93/100
0.82		92/100	95/100	95/100	98/100
1.64		93/100	93/100	92/100	95/100
3.3		96/100	95/100	96/100	95/100
6.6		93/100	96/100	93/100	96/100

CETIS Analytical Report

Report Date: 02 Nov-15 12:24 (p 1 of 2)
Test Code: AVA1015.089 | 09-5750-8295

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 06-9962-1576 **Endpoint:** Fertilization Rate **CETIS Version:** CETISv1.8.7
Analyzed: 02 Nov-15 12:24 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.49%	6.6	>6.6	NA	15.15

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	0.41	0.8994	2.407	0.074	6	0.4669	CDF	Non-Significant Effect
	0.82	0.05044	2.407	0.074	6	0.8180	CDF	Non-Significant Effect
	1.64	1.414	2.407	0.074	6	0.2567	CDF	Non-Significant Effect
	3.3	-0.1599	2.407	0.074	6	0.8761	CDF	Non-Significant Effect
	6.6	0.5254	2.407	0.074	6	0.6364	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00711018	0.001422036	5	0.7484	0.5978	Non-Significant Effect
Error	0.03420348	0.001900194	18			
Total	0.04131366		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	7.291	15.09	0.1999	Equal Variances
Variances	Mod Levene Equality of Variance	0.9733	4.248	0.4602	Equal Variances
Variances	Levene Equality of Variance	1.144	4.248	0.3738	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9617	0.884	0.4734	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.141	0.2056	0.2464	Normal Distribution
Distribution	D'Agostino Skewness	0.1605	2.576	0.8725	Normal Distribution
Distribution	D'Agostino Kurtosis	0.8555	2.576	0.3923	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.7577	9.21	0.6847	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4993	3.878	0.2134	Normal Distribution

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.95	0.9032	0.9968	0.955	0.91	0.98	0.01472	3.1%	0.0%
0.41		4	0.94	0.9175	0.9625	0.935	0.93	0.96	0.007071	1.5%	1.05%
0.82		4	0.95	0.911	0.989	0.95	0.92	0.98	0.01225	2.58%	0.0%
1.64		4	0.9325	0.9125	0.9525	0.93	0.92	0.95	0.006291	1.35%	1.84%
3.3		4	0.955	0.9458	0.9642	0.955	0.95	0.96	0.002887	0.6%	-0.53%
6.6		4	0.945	0.9174	0.9726	0.945	0.93	0.96	0.00866	1.83%	0.53%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.352	1.245	1.46	1.357	1.266	1.429	0.03371	4.99%	0.0%
0.41		4	1.325	1.275	1.375	1.313	1.303	1.369	0.01566	2.36%	2.05%
0.82		4	1.351	1.256	1.446	1.345	1.284	1.429	0.02975	4.4%	0.12%
1.64		4	1.309	1.268	1.35	1.303	1.284	1.345	0.01294	1.98%	3.22%
3.3		4	1.357	1.335	1.38	1.357	1.345	1.369	0.006973	1.03%	-0.36%
6.6		4	1.336	1.275	1.397	1.336	1.303	1.369	0.01917	2.87%	1.2%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.96	0.91	0.98	0.95
0.41		0.93	0.94	0.96	0.93
0.82		0.92	0.95	0.95	0.98
1.64		0.93	0.93	0.92	0.95
3.3		0.96	0.95	0.96	0.95
6.6		0.93	0.96	0.93	0.96

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	06-9962-1576	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	02 Nov-15 12:24	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

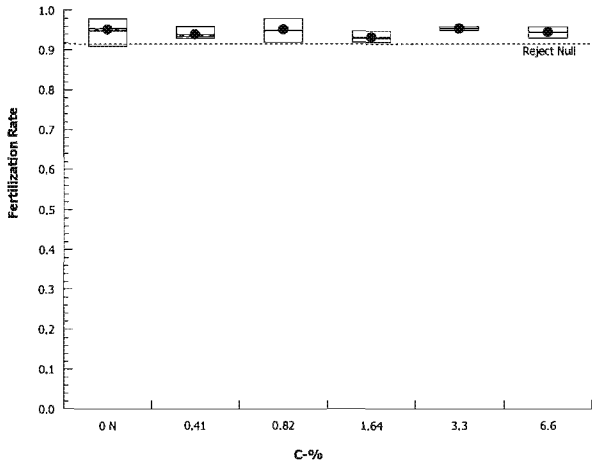
Angular (Corrected) Transformed Detail

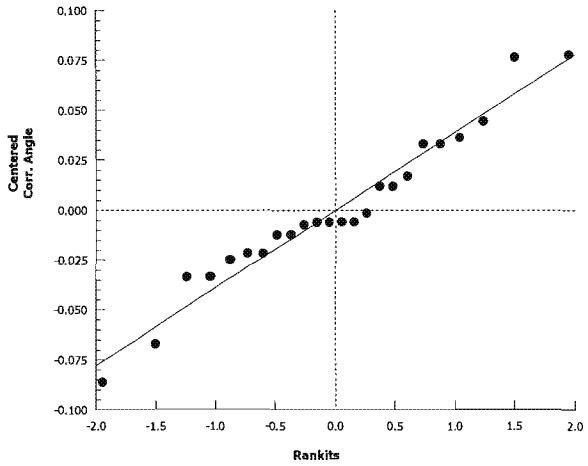
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.369	1.266	1.429	1.345
0.41		1.303	1.323	1.369	1.303
0.82		1.284	1.345	1.345	1.429
1.64		1.303	1.303	1.284	1.345
3.3		1.369	1.345	1.369	1.345
6.6		1.303	1.369	1.303	1.369

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	91/100	98/100	95/100
0.41		93/100	94/100	96/100	93/100
0.82		92/100	95/100	95/100	98/100
1.64		93/100	93/100	92/100	95/100
3.3		96/100	95/100	96/100	95/100
6.6		93/100	96/100	93/100	96/100

Graphics





CETIS Analytical Report

Test Code: AVA1015.089 | 09-5750-8295

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	09-3359-9093	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	02 Nov-15 12:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

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

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>6.6	N/A	N/A	<15.15	NA	NA
EC10	>6.6	N/A	N/A	<15.15	NA	NA
EC15	>6.6	N/A	N/A	<15.15	NA	NA
EC20	>6.6	N/A	N/A	<15.15	NA	NA
EC25	>6.6	N/A	N/A	<15.15	NA	NA
EC40	>6.6	N/A	N/A	<15.15	NA	NA
EC50	>6.6	N/A	N/A	<15.15	NA	NA

Fertilization Rate Summary

										Calculated Variate(A/B)	
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.95	0.91	0.98	0.01472	0.02944	3.1%	0.0%	380	400
0.41		4	0.94	0.93	0.96	0.007071	0.01414	1.5%	1.05%	376	400
0.82		4	0.95	0.92	0.98	0.01225	0.02449	2.58%	0.0%	380	400
1.64		4	0.9325	0.92	0.95	0.006291	0.01258	1.35%	1.84%	373	400
3.3		4	0.955	0.95	0.96	0.002887	0.005775	0.6%	-0.53%	382	400
6.6		4	0.945	0.93	0.96	0.00866	0.01732	1.83%	0.53%	378	400

Fertilization Rate Detail

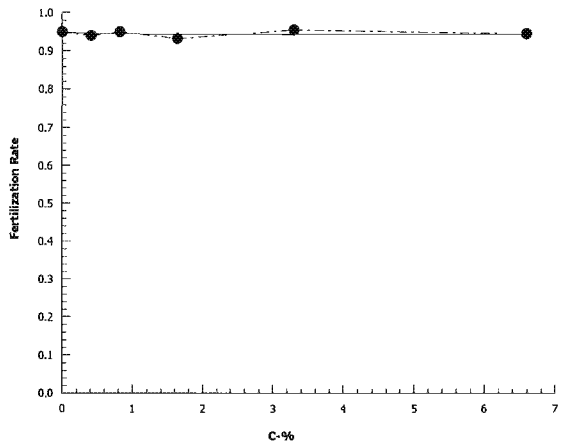
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.96	0.91	0.98	0.95
0.41		0.93	0.94	0.96	0.93
0.82		0.92	0.95	0.95	0.98
1.64		0.93	0.93	0.92	0.95
3.3		0.96	0.95	0.96	0.95
6.6		0.93	0.96	0.93	0.96

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	91/100	98/100	95/100
0.41		93/100	94/100	96/100	93/100
0.82		92/100	95/100	95/100	98/100
1.64		93/100	93/100	92/100	95/100
3.3		96/100	95/100	96/100	95/100
6.6		93/100	96/100	93/100	96/100

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	09-3359-9093	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	02 Nov-15 12:24	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	18-6063-6440	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	15 Oct-15 13:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Oct-15 13:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	00-6126-8446	**Code:**	AVA1015.089	**Client:**	Avalon WWTP
Sample Date:	14 Oct-15 10:00	**Material:**	Sample Water	**Project:**	
Receive Date:	15 Oct-15 10:15	**Source:**	Bioassay Report		
Sample Age:	27h (4 °C)	**Station:**	Eff Comp		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.7	14.8	11 - 13	Yes	Results Above Limit

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
0.41		2	6.75	6.115	7.385	6.7	6.8	0.04999	0.07069	1.05%	0
0.82		2	6.75	6.115	7.385	6.7	6.8	0.04999	0.07069	1.05%	0
1.64		2	6.65	6.015	7.285	6.6	6.7	0.04998	0.07069	1.06%	0
3.3		2	6.75	6.115	7.385	6.7	6.8	0.04999	0.07069	1.05%	0
6.6		2	6.75	6.115	7.385	6.7	6.8	0.04999	0.07069	1.05%	0
Overall		12	6.725			6.6	6.8				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.41		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
0.82		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
1.64		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
3.3		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
6.6		2	7.8	7.787	7.813	7.8	7.8	0	0	0.0%	0
Overall		12	7.833			7.8	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
0.41		2	34	34	34	34	34	0	0	0.0%	0
0.82		2	34	34	34	34	34	0	0	0.0%	0
1.64		2	34	34	34	34	34	0	0	0.0%	0
3.3		2	34	34	34	34	34	0	0	0.0%	0
6.6		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.41		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.82		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
1.64		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
3.3		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
6.6		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		12	14.75			14.7	14.8				0 (0%)

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6.6
0.41		6.8	6.7
0.82		6.7	6.8
1.64		6.6	6.7
3.3		6.7	6.8
6.6		6.7	6.8

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
0.41		7.9	7.8
0.82		7.9	7.8
1.64		7.8	7.8
3.3		7.8	7.8
6.6		7.8	7.8

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
0.41		34	34
0.82		34	34
1.64		34	34
3.3		34	34
6.6		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.7	14.8
0.41		14.7	14.8
0.82		14.7	14.8
1.64		14.7	14.8
3.3		14.7	14.8
6.6		14.7	14.8

CHAIN OF CUSTODY RECORD

Client: E.S.

Project Name/Number: AWWTP

Address 123 Pebbly Beach Rd Avalon CA. 90704

Project Mgr. Ian Morison

P.O. # 690-A

Phone Number: (310)510-0731

Sampled By *(signature)* (Ian Morison) Ian Morison

Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Chronic Toxicity										Comments
																	Return Ice Chest ASAP
10/14/15	10:00	X		WW	Eff Comp/	1	X										Return Ice Chest ASAP

Analysis

Temp. deg. C = 4.0 °C

Chlorine (mg/L) = <0.1

NH3 (mg/L) = 0.0

Relinquised By:*(signature)* (Ian Morison) Ian Morison — Date: Time: 10/14/15 14:30

Received By:*(signature)* [illegible] — Date: Time: 10/15/15

Relinquised By:*(signature)* — Date: Time:

Received By:*(signature)* — Date: Time:

Temp. upon sample receipt: _____ °C

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

aquatic bioassay & consulting laboratories, inc

CHRONIC SEA URCHIN FRETILIZATION BIOASSAY

DATE: 10/15/2015

STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 34.90 ug/l
EC50 = 45.42 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

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

CETIS Summary Report

Report Date: 02 Nov-15 12:16 (p 1 of 1)
Test Code: URC101515 | 03-4154-1255

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	05-8421-9741	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	15 Oct-15 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Oct-15 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	14-0987-2907	**Code:**	URC101515	**Client:**	Internal Lab
Sample Date:	15 Oct-15 13:00	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
01-1794-7459	Fertilization Rate	18	32	24	6.16%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
14-0756-5217	Fertilization Rate	EC5	21.87	21.31	22.4		Linear Interpolation (ICPIN)
		EC10	25.74	24.92	26.8		
		EC15	29.6	28.48	31.2		
		EC20	32.8	32.03	33.72		
		EC25	34.9	34.18	35.8		
		EC40	41.21	40.34	42.06		
		EC50	45.42	44.33	46.51		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
01-1794-7459	Fertilization Rate	Control Resp	0.935	0.7 - NL	Yes	Passes Acceptability Criteria
14-0756-5217	Fertilization Rate	Control Resp	0.935	0.7 - NL	Yes	Passes Acceptability Criteria
01-1794-7459	Fertilization Rate	PMSD	0.06163	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.935	0.9045	0.9655	0.91	0.95	0.009574	0.01915	2.05%	0.0%
18		4	0.9575	0.9157	0.9993	0.92	0.98	0.01315	0.0263	2.75%	-2.41%
32		4	0.775	0.7591	0.7909	0.77	0.79	0.005	0.01	1.29%	17.11%
56		4	0.235	0.1891	0.2809	0.21	0.26	0.01443	0.02887	12.28%	74.87%
100		4	0.045	0	0.1066	0	0.09	0.01936	0.03873	86.07%	95.19%
180		4	0	0	0	0	0	0	0		100.0%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.95	0.93	0.91	0.95
18		0.97	0.98	0.96	0.92
32		0.77	0.79	0.77	0.77
56		0.26	0.21	0.26	0.21
100		0.06	0	0.03	0.09
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	95/100	93/100	91/100	95/100
18		97/100	98/100	96/100	92/100
32		77/100	79/100	77/100	77/100
56		26/100	21/100	26/100	21/100
100		6/100	0/100	3/100	9/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 02 Nov-15 12:16 (p 1 of 2)
Test Code: URC101515 | 03-4154-1255

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	01-1794-7459	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	02 Nov-15 12:16	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	6.16%	18	32	24	

Dunnett Multiple Comparison Test

Control vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	18	-1.268	2.356	0.102	6	0.9875	CDF	Non-Significant Effect
	32*	5.51	2.356	0.102	6	0.0001	CDF	Significant Effect
	56*	18.72	2.356	0.102	6	<0.0001	CDF	Significant Effect
	100*	25.92	2.356	0.102	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.310733	1.077683	4	288.1	<0.0001	Significant Effect
Error	0.05610103	0.003740069	15			
Total	4.366834		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	11	13.28	0.0266	Equal Variances
Variances	Mod Levene Equality of Variance	2.784	4.893	0.0652	Equal Variances
Variances	Levene Equality of Variance	3.073	4.893	0.0492	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.944	0.866	0.2854	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1435	0.2235	0.3474	Normal Distribution
Distribution	D'Agostino Skewness	1.419	2.576	0.1560	Normal Distribution
Distribution	D'Agostino Kurtosis	1.713	2.576	0.0867	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	4.947	9.21	0.0843	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.5702	3.878	0.1429	Normal Distribution

Fertilization Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.935	0.9045	0.9655	0.94	0.91	0.95	0.009574	2.05%	0.0%
18		4	0.9575	0.9157	0.9993	0.965	0.92	0.98	0.01315	2.75%	-2.41%
32		4	0.775	0.7591	0.7909	0.77	0.77	0.79	0.005	1.29%	17.11%
56		4	0.235	0.1891	0.2809	0.235	0.21	0.26	0.01443	12.28%	74.87%
100		4	0.045	0	0.1066	0.045	0	0.09	0.01936	86.07%	95.19%
180		4	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.315	1.254	1.376	1.324	1.266	1.345	0.01908	2.9%	0.0%
18		4	1.37	1.271	1.469	1.383	1.284	1.429	0.03105	4.53%	-4.17%
32		4	1.077	1.057	1.096	1.071	1.071	1.095	0.006037	1.12%	18.12%
56		4	0.5056	0.4513	0.5598	0.5056	0.476	0.5351	0.01704	6.74%	61.55%
100		4	0.1941	0.01918	0.369	0.2108	0.05002	0.3047	0.05495	56.63%	85.24%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.2%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.95	0.93	0.91	0.95
18		0.97	0.98	0.96	0.92
32		0.77	0.79	0.77	0.77
56		0.26	0.21	0.26	0.21
100		0.06	0	0.03	0.09
180		0	0	0	0

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	01-1794-7459	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	02 Nov-15 12:16	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

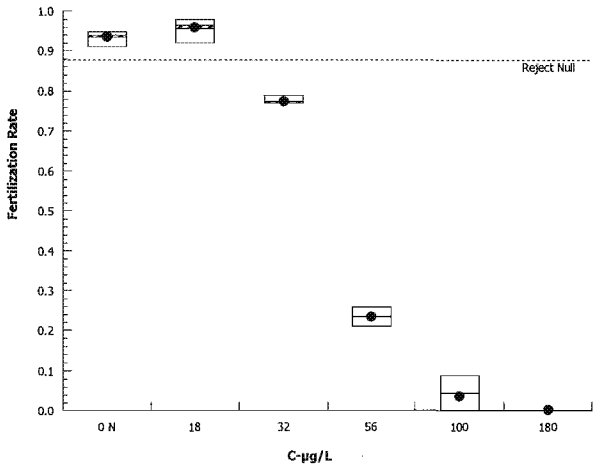
Angular (Corrected) Transformed Detail

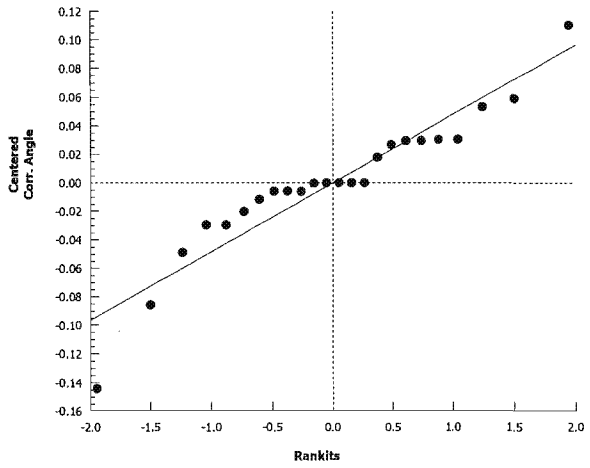
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.345	1.303	1.266	1.345
18		1.397	1.429	1.369	1.284
32		1.071	1.095	1.071	1.071
56		0.5351	0.476	0.5351	0.476
100		0.2475	0.05002	0.1741	0.3047
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	95/100	93/100	91/100	95/100
18		97/100	98/100	96/100	92/100
32		77/100	79/100	77/100	77/100
56		26/100	21/100	26/100	21/100
100		6/100	0/100	3/100	9/100
180		0/100	0/100	0/100	0/100

Graphics





CETIS Analytical Report

Test Code: URC101515 | 03-4154-1255

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	14-0756-5217	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	02 Nov-15 12:16	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

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

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	21.87	21.31	22.4
EC10	25.74	24.92	26.8
EC15	29.6	28.48	31.2
EC20	32.8	32.03	33.72
EC25	34.9	34.18	35.8
EC40	41.21	40.34	42.06
EC50	45.42	44.33	46.51

Fertilization Rate Summary

										Calculated Variate(A/B)	
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.935	0.91	0.95	0.009574	0.01915	2.05%	0.0%	374	400
18		4	0.9575	0.92	0.98	0.01315	0.0263	2.75%	-2.41%	383	400
32		4	0.775	0.77	0.79	0.005	0.01	1.29%	17.11%	310	400
56		4	0.235	0.21	0.26	0.01443	0.02887	12.28%	74.87%	94	400
100		4	0.045	0	0.09	0.01936	0.03873	86.07%	95.19%	18	400
180		4	0	0	0	0	0		100.0%	0	400

Fertilization Rate Detail

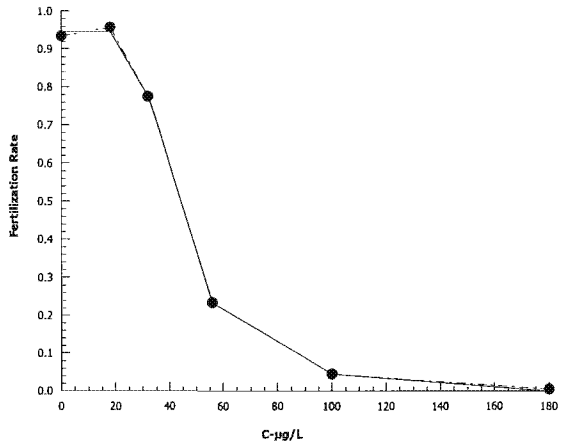
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.95	0.93	0.91	0.95
18		0.97	0.98	0.96	0.92
32		0.77	0.79	0.77	0.77
56		0.26	0.21	0.26	0.21
100		0.06	0	0.03	0.09
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	95/100	93/100	91/100	95/100
18		97/100	98/100	96/100	92/100
32		77/100	79/100	77/100	77/100
56		26/100	21/100	26/100	21/100
100		6/100	0/100	3/100	9/100
180		0/100	0/100	0/100	0/100

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	14-0756-5217	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	02 Nov-15 12:16	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	05-8421-9741	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	15 Oct-15 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	15 Oct-15 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	14-0987-2907	**Code:**	URC101515	**Client:**	Internal Lab
Sample Date:	15 Oct-15 13:00	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.7	14.8	11 - 13	Yes	Results Above Limit

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.65	4.744	8.556	6.5	6.8	0.15	0.2121	3.19%	0
18		2	6.65	4.744	8.556	6.5	6.8	0.15	0.2121	3.19%	0
32		2	6.6	6.586	6.614	6.6	6.6	0	0	0.0%	0
56		2	6.7	6.683	6.717	6.7	6.7	0	0	0.0%	0
100		2	6.65	6.015	7.285	6.6	6.7	0.04998	0.07069	1.06%	0
180		2	6.75	6.115	7.385	6.7	6.8	0.04999	0.07069	1.05%	0
Overall		12	6.667			6.5	6.8				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
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
56		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
Overall		12	7.9			7.9	7.9				0 (0%)

Salinity-ppt

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

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	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
56		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
Overall		12	14.75			14.7	14.8				0 (0%)

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.8	6.5
18		6.8	6.5
32		6.6	6.6
56		6.7	6.7
100		6.6	6.7
180		6.7	6.8

pH-Units

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

Salinity-ppt

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

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.7	14.8
18		14.7	14.8
32		14.7	14.8
56		14.7	14.8
100		14.7	14.8
180		14.7	14.8

INVOICE NO. AVA0216.0113

February 12, 2016

Accounts Payable
Avalon WWTP
ES Engineering
P.O. Box 1810
Avalon, CA 90704

CLIENT:	Avalon Wastewater Treatment Plant
SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	20 Jan - 16
DATE SAMPLED:	19 Jan - 16
ABC LAB. NO.:	AVA0116.149

CHRONIC NPDES BIOASSAYS	
Topsmelt - (1 @ $1,125.00)	$ 1,125.00
Kelp Germination – (1 @ 1,040.00)	1,040.00
Sea Urchin – (1 @ 900.00)	900.00
TOTAL	$ 3,065.00

Make checks payable to: Aquatic Bioassays & Consulting Labs., Inc.
29 N. Olive St.
Ventura, CA 93001

Terms are net 30 days.

aquatic bioassay & consulting laboratories, inc

February 12, 2016

Mr. Ian Morison
Avalon Wastewater Treatment Plant
ES Engineering
P.O. Box 1810
Avalon, CA 90704

Dear Mr. Morison:

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

CLIENT:	Avalon Wastewater Treatment Plant
SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	20 Jan - 16
DATE SAMPLED:	19 Jan - 16
ABC LAB. NO.:	AVA0116.149

CHRONIC TOSPMELT SURVIVAL & GROWTH BIOASSAY

SURVIVAL	NOEC	=	6.60 %
	TUc	=	15.15
	EC25	=	>6.60 %
	EC50	=	>6.60 %
GROWTH	NOEC	=	6.6 %
	TUc	=	15.15
	IC25	=	>6.60 %
	IC50	=	>6.60 %

Yours very truly,

Scott Johnson
Laboratory Director

ED_002551_00000729-00343

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

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.41		1	1	1	1	1
0.82		1	1	1	1	1
1.64		1	1	1	1	1
3.3		1	1	1	1	1
6.6		1	1	1	1	1

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.136	0.91	1.126	1.004	1.146
0.41		1.408	1.398	1.312	1.482	1.638
0.82		1.498	1.898	1.824	1.442	1.562
1.64		1.166	1.65	1.826	1.674	1.634
3.3		1.222	1.804	1.218	1.884	1.77
6.6		1.644	1.864	2.06	1.524	1.772

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.41		5/5	5/5	5/5	5/5	5/5
0.82		5/5	5/5	5/5	5/5	5/5
1.64		5/5	5/5	5/5	5/5	5/5
3.3		5/5	5/5	5/5	5/5	5/5
6.6		5/5	5/5	5/5	5/5	5/5

CETIS Summary Report

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

Batch ID:	00-4717-2417	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	20 Jan-16 14:22	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	27 Jan-16 12:30	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	15-4990-1662	**Code:**	AVA0116.149tops	**Client:**	E.S. Engineering -Avalon WWTP
Sample Date:	19 Jan-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP
Receive Date:	20 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	32h (3 °C)	**Station:**	Eff Comp		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
14-7246-7344	7d Survival Rate	6.6	>6.6	NA	NA	15.15	Steel Many-One Rank Sum Test
09-8773-2192	Mean Dry Biomass-mg	6.6	>6.6	NA	30.4%	15.15	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
04-6384-7083	7d Survival Rate	EC5	>6.6	N/A	N/A	<15.15	Linear Interpolation (ICPIN)
		EC10	>6.6	N/A	N/A	<15.15	
		EC15	>6.6	N/A	N/A	<15.15	
		EC20	>6.6	N/A	N/A	<15.15	
		EC25	>6.6	N/A	N/A	<15.15	
		EC40	>6.6	N/A	N/A	<15.15	
		EC50	>6.6	N/A	N/A	<15.15	
20-1672-6491	Mean Dry Biomass-mg	IC5	>6.6	N/A	N/A	<15.15	Linear Interpolation (ICPIN)
		IC10	>6.6	N/A	N/A	<15.15	
		IC15	>6.6	N/A	N/A	<15.15	
		IC20	>6.6	N/A	N/A	<15.15	
		IC25	>6.6	N/A	N/A	<15.15	
		IC40	>6.6	N/A	N/A	<15.15	
		IC50	>6.6	N/A	N/A	<15.15	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
04-6384-7083	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
14-7246-7344	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
09-8773-2192	Mean Dry Biomass-mg	Control Resp	1.064	0.85 - NL	Yes	Passes Acceptability Criteria
20-1672-6491	Mean Dry Biomass-mg	Control Resp	1.064	0.85 - NL	Yes	Passes Acceptability Criteria
09-8773-2192	Mean Dry Biomass-mg	PMSD	0.3037	NL - 0.5	No	Passes Acceptability Criteria

7d Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	0.0%
0.41		5	1	1	1	1	1	0	0	0.0%	0.0%
0.82		5	1	1	1	1	1	0	0	0.0%	0.0%
1.64		5	1	1	1	1	1	0	0	0.0%	0.0%
3.3		5	1	1	1	1	1	0	0	0.0%	0.0%
6.6		5	1	1	1	1	1	0	0	0.0%	0.0%

Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1.064	0.9356	1.193	0.91	1.146	0.0464	0.1038	9.75%	0.0%
0.41		5	1.448	1.296	1.599	1.312	1.638	0.0547	0.1223	8.45%	-36.0%
0.82		5	1.645	1.392	1.898	1.442	1.898	0.09104	0.2036	12.38%	-54.53%
1.64		5	1.59	1.281	1.899	1.166	1.826	0.1114	0.249	15.66%	-49.38%
3.3		5	1.58	1.169	1.99	1.218	1.884	0.148	0.3309	20.95%	-48.4%
6.6		5	1.773	1.517	2.028	1.524	2.06	0.092	0.2057	11.6%	-66.55%

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

Analysis ID:	14-7246-7344	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:45	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	6.6	>6.6	NA	15.15

Steel Many-One Rank Sum Test

Control	vs	C-%	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.41	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		0.82	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		1.64	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		3.3	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect
		6.6	27.5	16	1	8	0.8333	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	5	65540	<0.0001	Significant Effect
Error	0	0	24			
Total	0		29			

7d Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	1	0	0.0%	0.0%
0.41		5	1	1	1	1	1	1	0	0.0%	0.0%
0.82		5	1	1	1	1	1	1	0	0.0%	0.0%
1.64		5	1	1	1	1	1	1	0	0.0%	0.0%
3.3		5	1	1	1	1	1	1	0	0.0%	0.0%
6.6		5	1	1	1	1	1	1	0	0.0%	0.0%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
0.41		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
0.82		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
1.64		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
3.3		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
6.6		5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%

7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.41		1	1	1	1	1
0.82		1	1	1	1	1
1.64		1	1	1	1	1
3.3		1	1	1	1	1
6.6		1	1	1	1	1

Angular (Corrected) Transformed Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.345	1.345	1.345	1.345	1.345
0.41		1.345	1.345	1.345	1.345	1.345
0.82		1.345	1.345	1.345	1.345	1.345
1.64		1.345	1.345	1.345	1.345	1.345
3.3		1.345	1.345	1.345	1.345	1.345
6.6		1.345	1.345	1.345	1.345	1.345

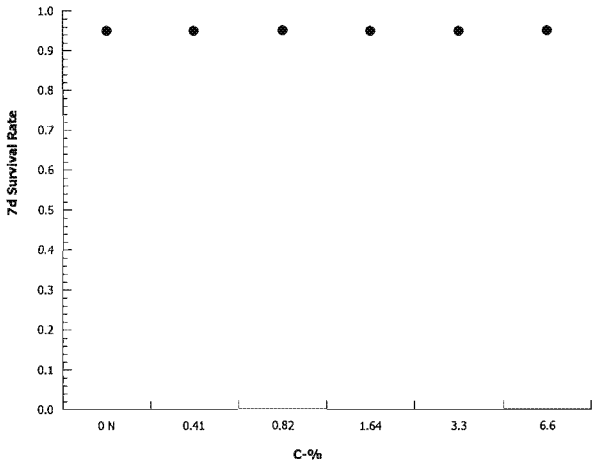
Pacific Topsmelt 7-d Survival and Growth Test — **Aquatic Bioassay & Consulting Labs, Inc.**

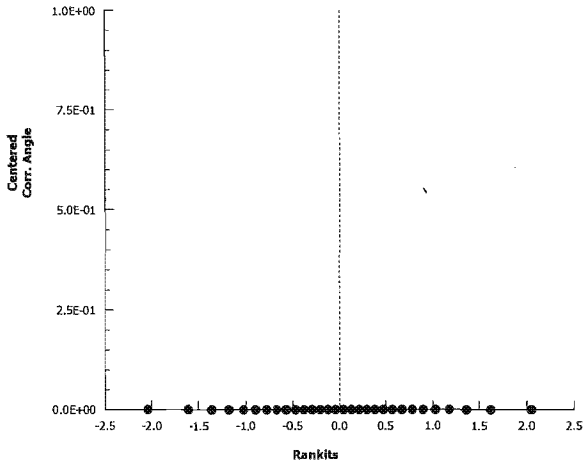
Analysis ID:	14-7246-7344	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:45	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.41		5/5	5/5	5/5	5/5	5/5
0.82		5/5	5/5	5/5	5/5	5/5
1.64		5/5	5/5	5/5	5/5	5/5
3.3		5/5	5/5	5/5	5/5	5/5
6.6		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: 09-8773-2192 **Endpoint:** Mean Dry Biomass-mg **CETIS Version:** CETISv1.8.7
Analyzed: 10 Feb-16 9:45 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	30.4%	6.6	>6.6	NA	15.15

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.41	-2.8	2.362	0.323	8	1.0000	CDF	Non-Significant Effect
		0.82	-4.241	2.362	0.323	8	1.0000	CDF	Non-Significant Effect
		1.64	-3.84	2.362	0.323	8	1.0000	CDF	Non-Significant Effect
		3.3	-3.764	2.362	0.323	8	1.0000	CDF	Non-Significant Effect
		6.6	-5.176	2.362	0.323	8	1.0000	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.50338	0.300676	5	6.421	0.0006	Significant Effect
Error	1.123931	0.04683047	24			
Total	2.627311		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.214	15.09	0.2860	Equal Variances
Variances	Mod Levene Equality of Variance	0.9055	4.248	0.4990	Equal Variances
Variances	Levene Equality of Variance	2.886	3.895	0.0353	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9621	0.9031	0.3503	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1027	0.1853	0.5764	Normal Distribution
Distribution	D'Agostino Skewness	1.065	2.576	0.2868	Normal Distribution
Distribution	D'Agostino Kurtosis	0.4597	2.576	0.6457	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.346	9.21	0.5102	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.3543	3.878	0.4662	Normal Distribution

Mean Dry Biomass-mg Summary

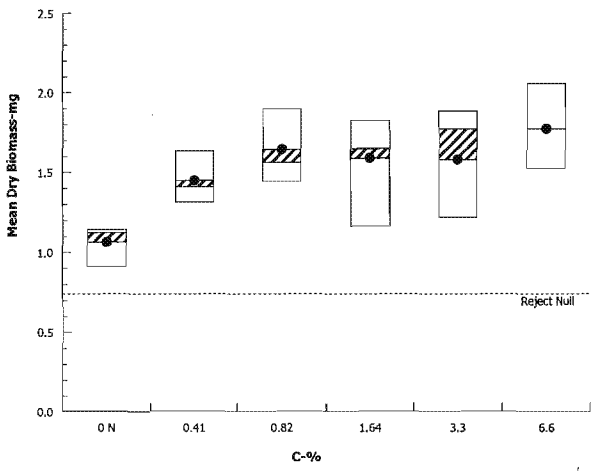
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1.064	0.9356	1.193	1.126	0.91	1.146	0.0464	9.75%	0.0%
0.41		5	1.448	1.296	1.599	1.408	1.312	1.638	0.0547	8.45%	-36.0%
0.82		5	1.645	1.392	1.898	1.562	1.442	1.898	0.09104	12.38%	-54.53%
1.64		5	1.59	1.281	1.899	1.65	1.166	1.826	0.1114	15.66%	-49.38%
3.3		5	1.58	1.169	1.99	1.77	1.218	1.884	0.148	20.95%	-48.4%
6.6		5	1.773	1.517	2.028	1.772	1.524	2.06	0.092	11.6%	-66.55%

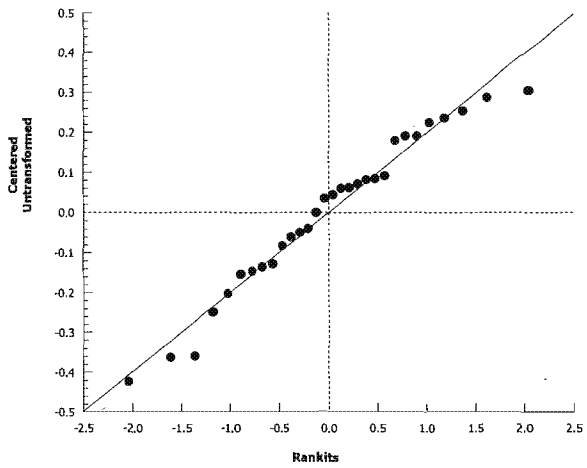
Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.136	0.91	1.126	1.004	1.146
0.41		1.408	1.398	1.312	1.482	1.638
0.82		1.498	1.898	1.824	1.442	1.562
1.64		1.166	1.65	1.826	1.674	1.634
3.3		1.222	1.804	1.218	1.884	1.77
6.6		1.644	1.864	2.06	1.524	1.772

Pacific Topsmelt 7-d Survival and Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	09-8773-2192	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:45	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





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

Analysis ID:	04-6384-7083	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:45	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

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

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>6.6	N/A	N/A	<15.15	NA	NA
EC10	>6.6	N/A	N/A	<15.15	NA	NA
EC15	>6.6	N/A	N/A	<15.15	NA	NA
EC20	>6.6	N/A	N/A	<15.15	NA	NA
EC25	>6.6	N/A	N/A	<15.15	NA	NA
EC40	>6.6	N/A	N/A	<15.15	NA	NA
EC50	>6.6	N/A	N/A	<15.15	NA	NA

7d Survival Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	1	1	1	0	0	0.0%	0.0%	25	25
0.41		5	1	1	1	0	0	0.0%	0.0%	25	25
0.82		5	1	1	1	0	0	0.0%	0.0%	25	25
1.64		5	1	1	1	0	0	0.0%	0.0%	25	25
3.3		5	1	1	1	0	0	0.0%	0.0%	25	25
6.6		5	1	1	1	0	0	0.0%	0.0%	25	25

7d Survival Rate Detail

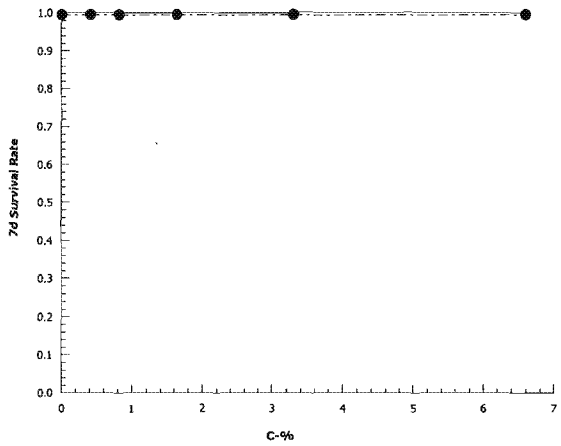
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
0.41		1	1	1	1	1
0.82		1	1	1	1	1
1.64		1	1	1	1	1
3.3		1	1	1	1	1
6.6		1	1	1	1	1

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
0.41		5/5	5/5	5/5	5/5	5/5
0.82		5/5	5/5	5/5	5/5	5/5
1.64		5/5	5/5	5/5	5/5	5/5
3.3		5/5	5/5	5/5	5/5	5/5
6.6		5/5	5/5	5/5	5/5	5/5

Pacific Topsmelt 7-d Survival and Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	04-6384-7083	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:45	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



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

Analysis ID:	20-1672-6491	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:45	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	710720	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>6.6	N/A	N/A	<15.15	NA	NA
IC10	>6.6	N/A	N/A	<15.15	NA	NA
IC15	>6.6	N/A	N/A	<15.15	NA	NA
IC20	>6.6	N/A	N/A	<15.15	NA	NA
IC25	>6.6	N/A	N/A	<15.15	NA	NA
IC40	>6.6	N/A	N/A	<15.15	NA	NA
IC50	>6.6	N/A	N/A	<15.15	NA	NA

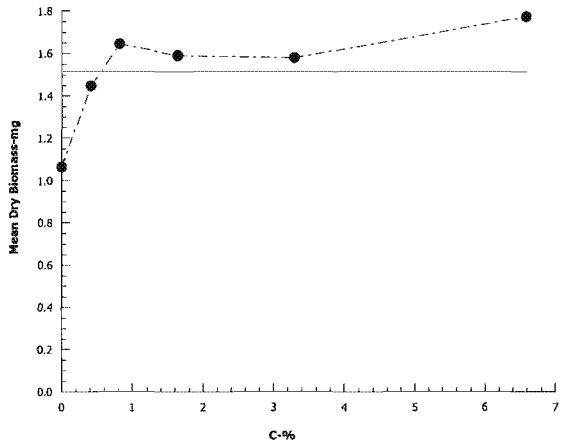
Mean Dry Biomass-mg Summary

			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1.064	0.91	1.146	0.0464	0.1038	9.75%	0.0%
0.41		5	1.448	1.312	1.638	0.0547	0.1223	8.45%	-36.0%
0.82		5	1.645	1.442	1.898	0.09104	0.2036	12.38%	-54.53%
1.64		5	1.59	1.166	1.826	0.1114	0.249	15.66%	-49.38%
3.3		5	1.58	1.218	1.884	0.148	0.3309	20.95%	-48.4%
6.6		5	1.773	1.524	2.06	0.092	0.2057	11.6%	-66.55%

Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.136	0.91	1.126	1.004	1.146
0.41		1.408	1.398	1.312	1.482	1.638
0.82		1.498	1.898	1.824	1.442	1.562
1.64		1.166	1.65	1.826	1.674	1.634
3.3		1.222	1.804	1.218	1.884	1.77
6.6		1.644	1.864	2.06	1.524	1.772

Graphics



CETIS Measurement Report

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

Batch ID:	00-4717-2417	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	20 Jan-16 14:22	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	27 Jan-16 12:30	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	15-4990-1662	**Code:**	AVA0116.149tops	**Client:**	E.S. Engineering -Avalon WWTP
Sample Date:	19 Jan-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP
Receive Date:	20 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	32h (3 °C)	**Station:**	Eff Comp		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	6.95	6.571	7.329	6.1	7.5	0.1604	0.4536	6.53%	0
0.41		8	6.663	6.331	6.994	5.9	7	0.1401	0.3962	5.95%	0
0.82		8	6.821	6.559	7.084	6.3	7.2	0.1111	0.3143	4.61%	0
1.64		8	7.025	6.859	7.191	6.8	7.3	0.07008	0.1982	2.82%	0
3.3		8	7.1	6.729	7.471	6.7	8.1	0.157	0.444	6.25%	0
6.6		8	7.038	6.797	7.278	6.6	7.5	0.1017	0.2875	4.09%	0
Overall		48	6.933			5.9	8.1				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	7.638	7.561	7.714	7.5	7.8	0.03239	0.09161	1.2%	0
0.41		8	7.85	7.805	7.895	7.8	7.9	0.0189	0.05345	0.68%	0
0.82		8	7.875	7.836	7.914	7.8	7.9	0.01636	0.04628	0.59%	0
1.64		8	7.888	7.858	7.917	7.8	7.9	0.01249	0.03533	0.45%	0
3.3		8	7.888	7.858	7.917	7.8	7.9	0.01249	0.03533	0.45%	0
6.6		8	7.888	7.858	7.917	7.8	7.9	0.01249	0.03533	0.45%	0
Overall		48	7.838			7.5	7.9				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	34	34	34	34	34	0	0	0.0%	0
0.41		8	34	34	34	34	34	0	0	0.0%	0
0.82		8	34	34	34	34	34	0	0	0.0%	0
1.64		8	34	34	34	34	34	0	0	0.0%	0
3.3		8	34	34	34	34	34	0	0	0.0%	0
6.6		8	34	34	34	34	34	0	0	0.0%	0
Overall		48	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	21	21	21	21	21	0	0	0.0%	0
0.41		8	21	21	21	21	21	0	0	0.0%	0
0.82		8	21	21	21	21	21	0	0	0.0%	0
1.64		8	21	21	21	21	21	0	0	0.0%	0
3.3		8	21	21	21	21	21	0	0	0.0%	0
6.6		8	21	21	21	21	21	0	0	0.0%	0
Overall		48	21			21	21				0 (0%)

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

Dissolved Oxygen-mg/L

C-%	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	6.9	6.8	6.9	6.1	7.5	7.3	7.4	6.7
0.41		7	6.9	6.8	5.9	6.7	6.9	6.9	6.2
0.82		6.9	6.9	6.87	6.3	7.2	7.1	6.9	6.4
1.64		7.1	7	6.8	6.8	7.3	7.3	7	6.9
3.3		7.1	7	6.7	6.8	8.1	7.3	6.9	6.9
6.6		7	7	6.9	6.8	7.5	7.3	7.2	6.6

pH-Units

C-%	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	7.7	7.8	7.7	7.6	7.5	7.6	7.6	7.6
0.41		7.9	7.8	7.8	7.9	7.8	7.9	7.8	7.9
0.82		7.9	7.9	7.8	7.9	7.9	7.9	7.8	7.9
1.64		7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.9
3.3		7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.9
6.6		7.9	7.9	7.9	7.9	7.9	7.9	7.8	7.9

Salinity-ppt

C-%	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	34	34	34	34	34	34	34	34
0.41		34	34	34	34	34	34	34	34
0.82		34	34	34	34	34	34	34	34
1.64		34	34	34	34	34	34	34	34
3.3		34	34	34	34	34	34	34	34
6.6		34	34	34	34	34	34	34	34

Temperature-°C

C-%	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	21	21	21	21	21	21	21	21
0.41		21	21	21	21	21	21	21	21
0.82		21	21	21	21	21	21	21	21
1.64		21	21	21	21	21	21	21	21
3.3		21	21	21	21	21	21	21	21
6.6		21	21	21	21	21	21	21	21

aquatic bioassay & consulting laboratories, inc

February 12, 2016

Mr. Ian Morison
Avalon Wastewater Treatment Plant
ES Engineering
P.O. Box 1810
Avalon, CA 90704

Dear Mr. Morison:

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

CLIENT:	Avalon Wastewater Treatment Plant
SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	20 Jan - 16
DATE SAMPLED:	19 Jan - 16
ABC LAB. NO.:	AVA0116.149

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC	=	6.60 %
TUc	=	15.15
EC25	=	>6.60 %
EC50	=	>6.60 %

Yours very truly,

Scott Johnson
Laboratory Director

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

CETIS Summary Report

Report Date: 12 Feb-16 12:32 (p 1 of 1)
Test Code: AVA0116.149urc | 08-6028-1846

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-5301-1516	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	20 Jan-16 14:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	20 Jan-16 14:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	06-1693-2725	**Code:**	AVA0116.149urc	**Client:**	E.S. Engineering -Avalon WWTP
Sample Date:	19 Jan-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP
Receive Date:	20 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	32h (3 °C)	**Station:**	Eff Comp		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
00-3093-3878	Fertilization Rate	6.6	>6.6	NA	6.61%	15.15	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
18-8250-7355	Fertilization Rate	EC5	>6.6	N/A	N/A	<15.15	Linear Interpolation (ICPIN)
		EC10	>6.6	N/A	N/A	<15.15	
		EC15	>6.6	N/A	N/A	<15.15	
		EC20	>6.6	N/A	N/A	<15.15	
		EC25	>6.6	N/A	N/A	<15.15	
		EC40	>6.6	N/A	N/A	<15.15	
		EC50	>6.6	N/A	N/A	<15.15	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-3093-3878	Fertilization Rate	Control Resp	0.9525	0.7 - NL	Yes	Passes Acceptability Criteria
18-8250-7355	Fertilization Rate	Control Resp	0.9525	0.7 - NL	Yes	Passes Acceptability Criteria
00-3093-3878	Fertilization Rate	PMSD	0.0661	NL - 0.25	No	Passes Acceptability Criteria

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	4	0.9525	0.9016	1	0.92	0.98	0.01601	0.03202	3.36%	0.0%
0.42		4	0.9825	0.9625	1	0.97	1	0.006291	0.01258	1.28%	-3.15%
0.82		4	0.9575	0.9049	1	0.92	1	0.01652	0.03304	3.45%	-0.52%
1.64		4	0.985	0.9545	1	0.96	1	0.009574	0.01915	1.94%	-3.41%
3.3		4	0.9675	0.9322	1	0.95	1	0.01109	0.02217	2.29%	-1.58%
6.6		4	0.98	0.9575	1	0.97	1	0.007071	0.01414	1.44%	-2.89%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.98	0.92	0.98	0.93
0.42		0.97	0.98	1	0.98
0.82		0.92	0.95	0.96	1
1.64		0.96	1	1	0.98
3.3		1	0.96	0.95	0.96
6.6		0.97	0.98	1	0.97

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	98/100	92/100	98/100	93/100
0.42		97/100	98/100	100/100	98/100
0.82		92/100	95/100	96/100	100/100
1.64		96/100	100/100	100/100	98/100
3.3		100/100	96/100	95/100	96/100
6.6		97/100	98/100	100/100	97/100

CETIS Analytical Report

Report Date: 12 Feb-16 12:32 (p 1 of 2)
Test Code: AVA0116.149urc | 08-6028-1846

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID: 00-3093-3878 **Endpoint:** Fertilization Rate **CETIS Version:** CETISv1.8.7
Analyzed: 12 Feb-16 12:31 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	6.61%	6.6	>6.6	NA	15.15

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.42	-1.539	2.407	0.129	6	0.9963	CDF	Non-Significant Effect
		0.82	-0.3477	2.407	0.129	6	0.9155	CDF	Non-Significant Effect
		1.64	-1.84	2.407	0.129	6	0.9985	CDF	Non-Significant Effect
		3.3	-0.7454	2.407	0.129	6	0.9665	CDF	Non-Significant Effect
		6.6	-1.389	2.407	0.129	6	0.9943	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.03035617	0.006071235	5	1.053	0.4178	Non-Significant Effect
Error	0.1037553	0.005764186	18			
Total	0.1341115		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	1.36	15.09	0.9286	Equal Variances
Variances	Mod Levene Equality of Variance	0.3657	4.248	0.8653	Equal Variances
Variances	Levene Equality of Variance	0.5361	4.248	0.7464	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9147	0.884	0.0447	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.2074	0.2056	0.0089	Non-normal Distribution
Distribution	D'Agostino Skewness	1.302	2.576	0.1927	Normal Distribution
Distribution	D'Agostino Kurtosis	0.846	2.576	0.3975	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	2.412	9.21	0.2994	Normal Distribution
Distribution	Anderson-Darling A2 Normality	1.056	3.878	0.0091	Non-normal Distribution

Fertilization Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.9525	0.9016	1	0.955	0.92	0.98	0.01601	3.36%	0.0%
0.42		4	0.9825	0.9625	1	0.98	0.97	1	0.006291	1.28%	-3.15%
0.82		4	0.9575	0.9049	1	0.955	0.92	1	0.01652	3.45%	-0.52%
1.64		4	0.985	0.9545	1	0.99	0.96	1	0.009574	1.94%	-3.41%
3.3		4	0.9675	0.9322	1	0.96	0.95	1	0.01109	2.29%	-1.58%
6.6		4	0.98	0.9575	1	0.975	0.97	1	0.007071	1.44%	-2.89%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.361	1.236	1.486	1.366	1.284	1.429	0.03927	5.77%	0.0%
0.42		4	1.444	1.359	1.529	1.429	1.397	1.521	0.02675	3.71%	-6.07%
0.82		4	1.38	1.22	1.54	1.357	1.284	1.521	0.05028	7.29%	-1.37%
1.64		4	1.46	1.342	1.578	1.475	1.369	1.521	0.03714	5.09%	-7.26%
3.3		4	1.401	1.273	1.529	1.369	1.345	1.521	0.04025	5.75%	-2.94%
6.6		4	1.436	1.342	1.529	1.413	1.397	1.521	0.02933	4.09%	-5.48%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.98	0.92	0.98	0.93
0.42		0.97	0.98	1	0.98
0.82		0.92	0.95	0.96	1
1.64		0.96	1	1	0.98
3.3		1	0.96	0.95	0.96
6.6		0.97	0.98	1	0.97

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	00-3093-3878	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:31	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

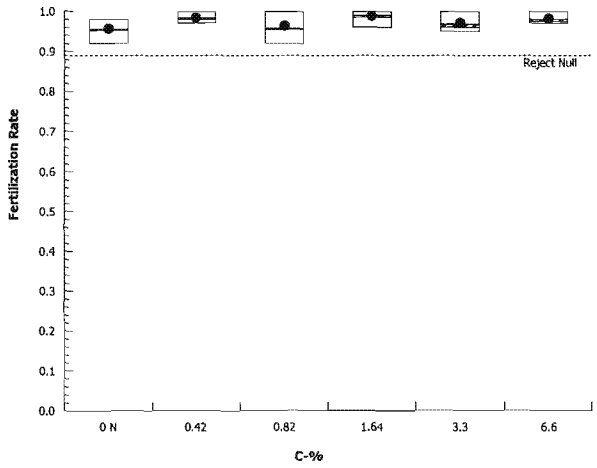
Angular (Corrected) Transformed Detail

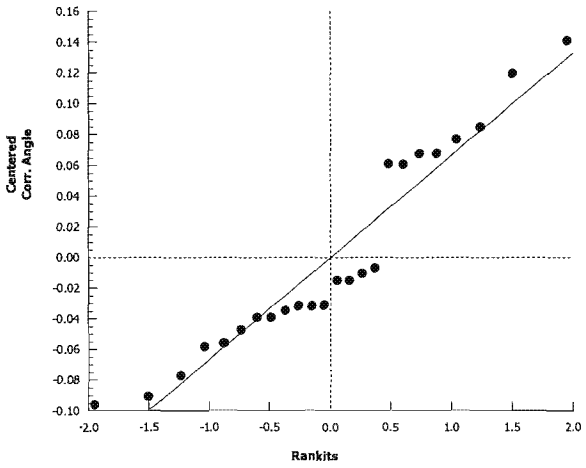
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.429	1.284	1.429	1.303
0.42		1.397	1.429	1.521	1.429
0.82		1.284	1.345	1.369	1.521
1.64		1.369	1.521	1.521	1.429
3.3		1.521	1.369	1.345	1.369
6.6		1.397	1.429	1.521	1.397

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	98/100	92/100	98/100	93/100
0.42		97/100	98/100	100/100	98/100
0.82		92/100	95/100	96/100	100/100
1.64		96/100	100/100	100/100	98/100
3.3		100/100	96/100	95/100	96/100
6.6		97/100	98/100	100/100	97/100

Graphics





CETIS Analytical Report

Report Date: 12 Feb-16 12:32 (p 1 of 2)
Test Code: AVA0116.149urc | 08-6028-1846

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	18-8250-7355	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:32	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

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

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>6.6	N/A	N/A	<15.15	NA	NA
EC10	>6.6	N/A	N/A	<15.15	NA	NA
EC15	>6.6	N/A	N/A	<15.15	NA	NA
EC20	>6.6	N/A	N/A	<15.15	NA	NA
EC25	>6.6	N/A	N/A	<15.15	NA	NA
EC40	>6.6	N/A	N/A	<15.15	NA	NA
EC50	>6.6	N/A	N/A	<15.15	NA	NA

Fertilization Rate Summary

										Calculated Variate(A/B)	
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	4	0.9525	0.92	0.98	0.01601	0.03202	3.36%	0.0%	381	400
0.42		4	0.9825	0.97	1	0.006291	0.01258	1.28%	-3.15%	393	400
0.82		4	0.9575	0.92	1	0.01652	0.03304	3.45%	-0.52%	383	400
1.64		4	0.985	0.96	1	0.009574	0.01915	1.94%	-3.41%	394	400
3.3		4	0.9675	0.95	1	0.01109	0.02217	2.29%	-1.58%	387	400
6.6		4	0.98	0.97	1	0.007071	0.01414	1.44%	-2.89%	392	400

Fertilization Rate Detail

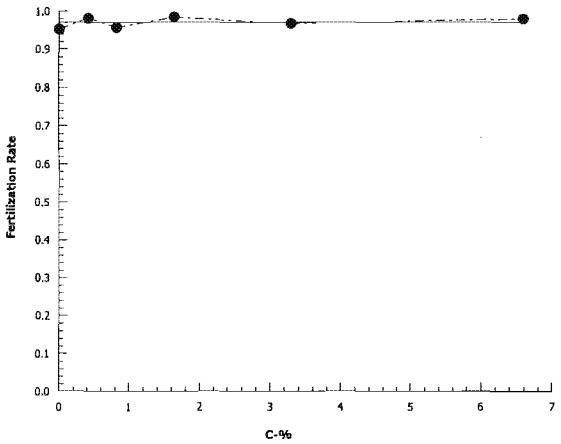
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.98	0.92	0.98	0.93
0.42		0.97	0.98	1	0.98
0.82		0.92	0.95	0.96	1
1.64		0.96	1	1	0.98
3.3		1	0.96	0.95	0.96
6.6		0.97	0.98	1	0.97

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	98/100	92/100	98/100	93/100
0.42		97/100	98/100	100/100	98/100
0.82		92/100	95/100	96/100	100/100
1.64		96/100	100/100	100/100	98/100
3.3		100/100	96/100	95/100	96/100
6.6		97/100	98/100	100/100	97/100

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	18-8250-7355	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:32	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



CETIS Measurement Report

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	15-5301-1516	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	20 Jan-16 14:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	20 Jan-16 14:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	06-1693-2725	**Code:**	AVA0116.149urc	**Client:**	E.S. Engineering -Avalon WWTP
Sample Date:	19 Jan-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP
Receive Date:	20 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	32h (3 °C)	**Station:**	Eff Comp		

Parameter Acceptability Criteria

Parameter	Min	Max	Acceptability Limits	Overlap	Decision
Salinity-ppt	34	34	32 - 36	Yes	Results Within Limits
Temperature-°C	14.7	14.8	11 - 13	Yes	Results Above Limit

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
0.42		2	6.15	4.244	8.056	6	6.3	0.15	0.2121	3.45%	0
0.82		2	6.1	4.829	7.371	6	6.2	0.1	0.1414	2.32%	0
1.64		2	6.05	5.415	6.685	6	6.1	0.05	0.07071	1.17%	0
3.3		2	6.2	4.929	7.471	6.1	6.3	0.1	0.1414	2.28%	0
6.6		2	6.1	4.829	7.371	6	6.2	0.1	0.1414	2.32%	0
Overall		12	6.125			6	6.3				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.42		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.82		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
1.64		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
3.3		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
6.6		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
Overall		12	7.925			7.9	8				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
0.42		2	34	34	34	34	34	0	0	0.0%	0
0.82		2	34	34	34	34	34	0	0	0.0%	0
1.64		2	34	34	34	34	34	0	0	0.0%	0
3.3		2	34	34	34	34	34	0	0	0.0%	0
6.6		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.42		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.82		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
1.64		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
3.3		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
6.6		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		12	14.75			14.7	14.8				0 (0%)

Purple Sea Urchin Sperm Cell Fertilization Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.2	6.1
0.42		6.3	6
0.82		6.2	6
1.64		6.1	6
3.3		6.3	6.1
6.6		6.2	6

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
0.42		7.9	7.9
0.82		7.9	7.9
1.64		8	7.9
3.3		8	7.9
6.6		8	7.9

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
0.42		34	34
0.82		34	34
1.64		34	34
3.3		34	34
6.6		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.7	14.8
0.42		14.7	14.8
0.82		14.7	14.8
1.64		14.7	14.8
3.3		14.7	14.8
6.6		14.7	14.8

aquatic bioassay & consulting laboratories, inc

February 12, 2016

Mr. Ian Morison
Avalon Wastewater Treatment Plant
ES Engineering
P.O. Box 1810
Avalon, CA 90704

Dear Mr. Morison:

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 Receving Waters to West Coast Estuarine Organisms, EPA/R-95/136.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Avalon Wastewater Treatment Plant
SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	20 Jan - 16
DATE SAMPLED:	19 Jan - 16
ABC LAB. NO.:	AVA0116.149

CHRONIC KELP GERMINATION AND GROWTH BIOASSAY

Germination	NOEC	=	6.60 %
	TUc	=	15.15
	EC25	=	>6.60 %
	EC50	=	>6.60 %
Tube Length	NOEC	=	6.60 %
	TUc	=	15.15
	IC25	=	>6.60 %
	IC50	=	>6.60 %

Yours very truly,

Scott Johnson
Laboratory Director

ED_002551_00000729-00363

CETIS Summary Report

Report Date: 12 Feb-16 14:05 (p 1 of 2)
Test Code: AVA0116.149klp | 17-5048-4115

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

Batch ID:	13-3916-3613	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	20 Jan-16 14:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	22 Jan-16 14:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	11-0823-3612	**Code:**	AVA0116.149klp	**Client:**	E.S. Engineering -Avalon WWTP
Sample Date:	19 Jan-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP
Receive Date:	20 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	32h (3 °C)	**Station:**	Eff Comp		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
01-2219-1451	Germination Rate	6.6	>6.6	NA	3.29%	15.15	Dunnett Multiple Comparison Test
08-7230-1806	Mean Length	6.6	>6.6	NA	1.86%	15.15	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
09-2081-2342	Germination Rate	EC5	>6.6	N/A	N/A	<15.15	Linear Interpolation (ICPIN)
		EC10	>6.6	N/A	N/A	<15.15	
		EC15	>6.6	N/A	N/A	<15.15	
		EC20	>6.6	N/A	N/A	<15.15	
		EC25	>6.6	N/A	N/A	<15.15	
		EC40	>6.6	N/A	N/A	<15.15	
		EC50	>6.6	N/A	N/A	<15.15	
11-4106-1233	Mean Length	IC5	>6.6	N/A	N/A	<15.15	Linear Interpolation (ICPIN)
		IC10	>6.6	N/A	N/A	<15.15	
		IC15	>6.6	N/A	N/A	<15.15	
		IC20	>6.6	N/A	N/A	<15.15	
		IC25	>6.6	N/A	N/A	<15.15	
		IC40	>6.6	N/A	N/A	<15.15	
		IC50	>6.6	N/A	N/A	<15.15	

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
01-2219-1451	Germination Rate	Control Resp	0.932	0.7 - NL	Yes	Passes Acceptability Criteria
09-2081-2342	Germination Rate	Control Resp	0.932	0.7 - NL	Yes	Passes Acceptability Criteria
08-7230-1806	Mean Length	Control Resp	14.58	10 - NL	Yes	Passes Acceptability Criteria
11-4106-1233	Mean Length	Control Resp	14.58	10 - NL	Yes	Passes Acceptability Criteria
01-2219-1451	Germination Rate	PMSD	0.03288	NL - 0.2	No	Passes Acceptability Criteria
08-7230-1806	Mean Length	PMSD	0.01861	NL - 0.2	No	Passes Acceptability Criteria

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.932	0.8954	0.9686	0.9	0.96	0.01319	0.0295	3.17%	0.0%
0.42		5	0.936	0.9152	0.9568	0.91	0.95	0.007483	0.01673	1.79%	-0.43%
0.82		5	0.93	0.9124	0.9476	0.91	0.95	0.006325	0.01414	1.52%	0.21%
1.64		5	0.926	0.9003	0.9517	0.91	0.96	0.009274	0.02074	2.24%	0.64%
3.3		5	0.928	0.9041	0.9519	0.91	0.96	0.008602	0.01924	2.07%	0.43%
6.6		5	0.936	0.9172	0.9548	0.92	0.96	0.006782	0.01517	1.62%	-0.43%

Mean Length Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.58	14.28	14.88	14.3	14.9	0.1068	0.2387	1.64%	0.0%
0.42		5	14.6	14.48	14.72	14.5	14.7	0.04472	0.1	0.68%	-0.14%
0.82		5	14.44	14.23	14.65	14.3	14.7	0.07483	0.1673	1.16%	0.96%
1.64		5	14.44	14.23	14.65	14.2	14.6	0.07483	0.1673	1.16%	0.96%
3.3		5	14.44	14.2	14.68	14.3	14.7	0.08718	0.1949	1.35%	0.96%
6.6		5	14.48	14.24	14.72	14.2	14.7	0.08602	0.1924	1.33%	0.69%

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

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.95	0.96	0.9	0.95	0.9
0.42		0.95	0.91	0.95	0.94	0.93
0.82		0.93	0.91	0.93	0.93	0.95
1.64		0.91	0.92	0.93	0.91	0.96
3.3		0.92	0.93	0.96	0.92	0.91
6.6		0.96	0.94	0.93	0.93	0.92

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.7	14.9	14.6	14.3	14.4
0.42		14.5	14.5	14.6	14.7	14.7
0.82		14.3	14.3	14.7	14.5	14.4
1.64		14.4	14.4	14.2	14.6	14.6
3.3		14.7	14.3	14.6	14.3	14.3
6.6		14.6	14.2	14.5	14.7	14.4

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	95/100	96/100	90/100	95/100	90/100
0.42		95/100	91/100	95/100	94/100	93/100
0.82		93/100	91/100	93/100	93/100	95/100
1.64		91/100	92/100	93/100	91/100	96/100
3.3		92/100	93/100	96/100	92/100	91/100
6.6		96/100	94/100	93/100	93/100	92/100

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

Analysis ID: 01-2219-1451 **Endpoint:** Germination Rate **CETIS Version:** CETISv1.8.7
Analyzed: 12 Feb-16 14:04 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	3.29%	6.6	>6.6	NA	15.15

Dunnett Multiple Comparison Test

Control	vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.42	-0.1953	2.362	0.060	8	0.8846	CDF	Non-Significant Effect
		0.82	0.2946	2.362	0.060	8	0.7320	CDF	Non-Significant Effect
		1.64	0.5435	2.362	0.060	8	0.6278	CDF	Non-Significant Effect
		3.3	0.403	2.362	0.060	8	0.6883	CDF	Non-Significant Effect
		6.6	-0.1941	2.362	0.060	8	0.8843	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.001627967	0.0003255934	5	0.1998	0.9594	Non-Significant Effect
Error	0.03911225	0.001629677	24			
Total	0.04074021		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.56	15.09	0.7674	Equal Variances
Variances	Mod Levene Equality of Variance	0.4929	4.248	0.7773	Equal Variances
Variances	Levene Equality of Variance	1.475	3.895	0.2349	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9649	0.9031	0.4102	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.127	0.1853	0.2420	Normal Distribution
Distribution	D'Agostino Skewness	0.7052	2.576	0.4807	Normal Distribution
Distribution	D'Agostino Kurtosis	0.7027	2.576	0.4822	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.9911	9.21	0.6092	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4033	3.878	0.3607	Normal Distribution

Germination Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.932	0.8954	0.9686	0.95	0.9	0.96	0.01319	3.17%	0.0%
0.42		5	0.936	0.9152	0.9568	0.94	0.91	0.95	0.007483	1.79%	-0.43%
0.82		5	0.93	0.9124	0.9476	0.93	0.91	0.95	0.006324	1.52%	0.21%
1.64		5	0.926	0.9003	0.9517	0.92	0.91	0.96	0.009273	2.24%	0.64%
3.3		5	0.928	0.9041	0.9519	0.92	0.91	0.96	0.008602	2.07%	0.43%
6.6		5	0.936	0.9172	0.9548	0.93	0.92	0.96	0.006782	1.62%	-0.43%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.312	1.24	1.384	1.345	1.249	1.369	0.02592	4.42%	0.0%
0.42		5	1.317	1.275	1.358	1.323	1.266	1.345	0.01487	2.53%	-0.38%
0.82		5	1.304	1.269	1.339	1.303	1.266	1.345	0.01254	2.15%	0.57%
1.64		5	1.298	1.244	1.351	1.284	1.266	1.369	0.01918	3.31%	1.06%
3.3		5	1.301	1.251	1.351	1.284	1.266	1.369	0.018	3.09%	0.78%
6.6		5	1.317	1.276	1.357	1.303	1.284	1.369	0.0146	2.48%	-0.38%

Germination Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.95	0.96	0.9	0.95	0.9
0.42		0.95	0.91	0.95	0.94	0.93
0.82		0.93	0.91	0.93	0.93	0.95
1.64		0.91	0.92	0.93	0.91	0.96
3.3		0.92	0.93	0.96	0.92	0.91
6.6		0.96	0.94	0.93	0.93	0.92

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

Analysis ID:	01-2219-1451	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 14:04	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

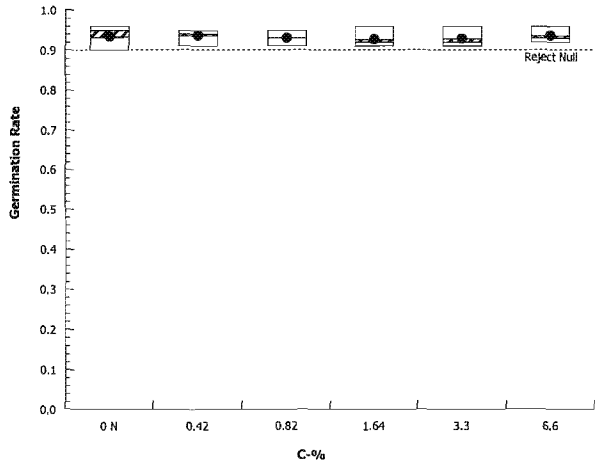
Angular (Corrected) Transformed Detail

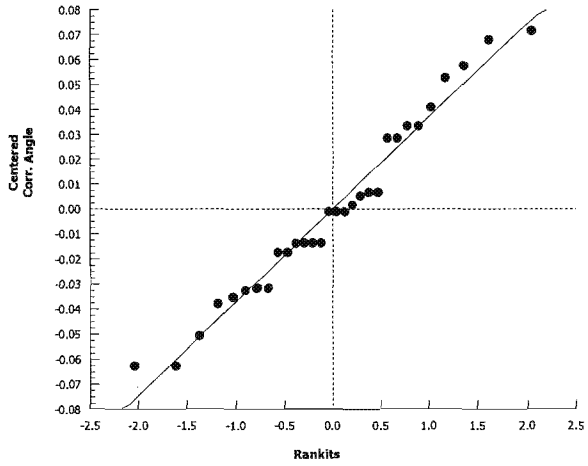
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.345	1.369	1.249	1.345	1.249
0.42		1.345	1.266	1.345	1.323	1.303
0.82		1.303	1.266	1.303	1.303	1.345
1.64		1.266	1.284	1.303	1.266	1.369
3.3		1.284	1.303	1.369	1.284	1.266
6.6		1.369	1.323	1.303	1.303	1.284

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	95/100	96/100	90/100	95/100	90/100
0.42		95/100	91/100	95/100	94/100	93/100
0.82		93/100	91/100	93/100	93/100	95/100
1.64		91/100	92/100	93/100	91/100	96/100
3.3		92/100	93/100	96/100	92/100	91/100
6.6		96/100	94/100	93/100	93/100	92/100

Graphics





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

Analysis ID: 08-7230-1806 **Endpoint:** Mean Length **CETIS Version:** CETISv1.8.7
Analyzed: 12 Feb-16 14:04 **Analysis:** Parametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	1.86%	6.6	>6.6	NA	15.15

Dunnett Multiple Comparison Test

Control vs	C-%	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	0.42	-0.1741	2.362	0.271	8	0.8796	CDF	Non-Significant Effect
	0.82	1.219	2.362	0.271	8	0.3268	CDF	Non-Significant Effect
	1.64	1.219	2.362	0.271	8	0.3268	CDF	Non-Significant Effect
	3.3	1.219	2.362	0.271	8	0.3268	CDF	Non-Significant Effect
	6.6	0.8704	2.362	0.271	8	0.4786	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1376666	0.02753332	5	0.8343	0.5382	Non-Significant Effect
Error	0.7919999	0.033	24			
Total	0.9296665		29			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.627	15.09	0.7573	Equal Variances
Variances	Mod Levene Equality of Variance	0.501	4.248	0.7715	Equal Variances
Variances	Levene Equality of Variance	0.8717	3.895	0.5146	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9667	0.9031	0.4520	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1015	0.1853	0.5964	Normal Distribution
Distribution	D'Agostino Skewness	0.3362	2.576	0.7367	Normal Distribution
Distribution	D'Agostino Kurtosis	1.33	2.576	0.1835	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.882	9.21	0.3901	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.3741	3.878	0.4208	Normal Distribution

Mean Length Summary

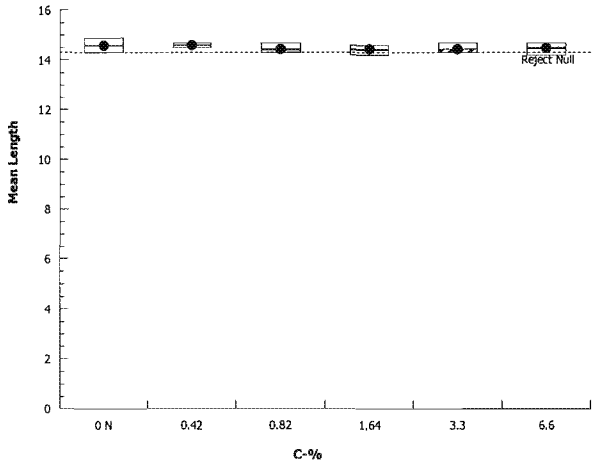
C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	14.58	14.28	14.88	14.6	14.3	14.9	0.1068	1.64%	0.0%
0.42		5	14.6	14.48	14.72	14.6	14.5	14.7	0.04472	0.68%	-0.14%
0.82		5	14.44	14.23	14.65	14.4	14.3	14.7	0.07483	1.16%	0.96%
1.64		5	14.44	14.23	14.65	14.4	14.2	14.6	0.07483	1.16%	0.96%
3.3		5	14.44	14.2	14.68	14.3	14.3	14.7	0.08718	1.35%	0.96%
6.6		5	14.48	14.24	14.72	14.5	14.2	14.7	0.08602	1.33%	0.69%

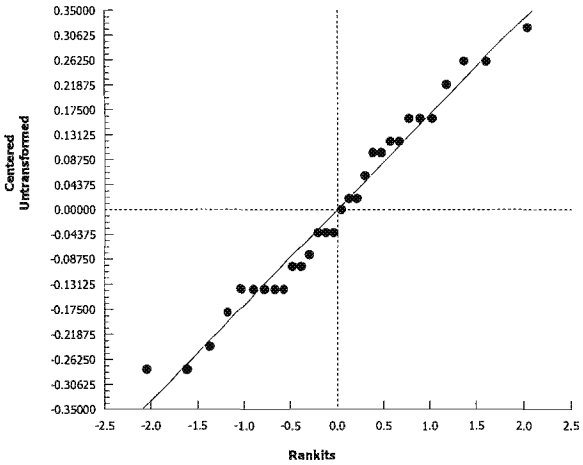
Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.7	14.9	14.6	14.3	14.4
0.42		14.5	14.5	14.6	14.7	14.7
0.82		14.3	14.3	14.7	14.5	14.4
1.64		14.4	14.4	14.2	14.6	14.6
3.3		14.7	14.3	14.6	14.3	14.3
6.6		14.6	14.2	14.5	14.7	14.4

Macrocystis Germination and Germ Tube Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	08-7230-1806	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 14:04	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Test Code: AVA0116.149klp | 17-5048-4115

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

Analysis ID:	09-2081-2342	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 14:04	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

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

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>6.6	N/A	N/A	<15.15	NA	NA
EC10	>6.6	N/A	N/A	<15.15	NA	NA
EC15	>6.6	N/A	N/A	<15.15	NA	NA
EC20	>6.6	N/A	N/A	<15.15	NA	NA
EC25	>6.6	N/A	N/A	<15.15	NA	NA
EC40	>6.6	N/A	N/A	<15.15	NA	NA
EC50	>6.6	N/A	N/A	<15.15	NA	NA

Germination Rate Summary

			Calculated Variate(A/B)								
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.932	0.9	0.96	0.01319	0.0295	3.17%	0.0%	466	500
0.42		5	0.936	0.91	0.95	0.007483	0.01673	1.79%	-0.43%	468	500
0.82		5	0.93	0.91	0.95	0.006324	0.01414	1.52%	0.21%	465	500
1.64		5	0.926	0.91	0.96	0.009273	0.02074	2.24%	0.64%	463	500
3.3		5	0.928	0.91	0.96	0.008602	0.01924	2.07%	0.43%	464	500
6.6		5	0.936	0.92	0.96	0.006782	0.01517	1.62%	-0.43%	468	500

Germination Rate Detail

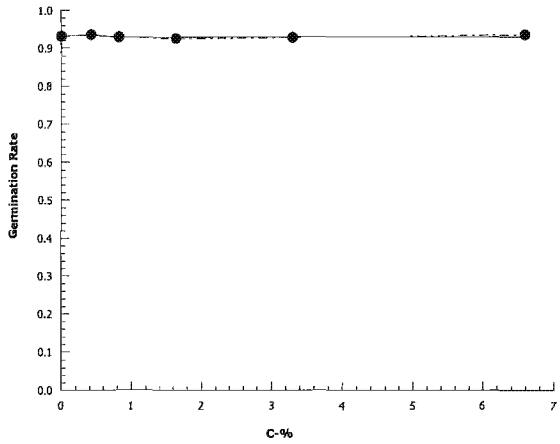
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.95	0.96	0.9	0.95	0.9
0.42		0.95	0.91	0.95	0.94	0.93
0.82		0.93	0.91	0.93	0.93	0.95
1.64		0.91	0.92	0.93	0.91	0.96
3.3		0.92	0.93	0.96	0.92	0.91
6.6		0.96	0.94	0.93	0.93	0.92

Germination Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	95/100	96/100	90/100	95/100	90/100
0.42		95/100	91/100	95/100	94/100	93/100
0.82		93/100	91/100	93/100	93/100	95/100
1.64		91/100	92/100	93/100	91/100	96/100
3.3		92/100	93/100	96/100	92/100	91/100
6.6		96/100	94/100	93/100	93/100	92/100

Macrocystis Germination and Germ Tube Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	09-2081-2342	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 14:04	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



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

Analysis ID:	11-4106-1233	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 14:04	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1133289	280	Yes	Two-Point Interpolation

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC5	>6.6	N/A	N/A	<15.15	NA	NA
IC10	>6.6	N/A	N/A	<15.15	NA	NA
IC15	>6.6	N/A	N/A	<15.15	NA	NA
IC20	>6.6	N/A	N/A	<15.15	NA	NA
IC25	>6.6	N/A	N/A	<15.15	NA	NA
IC40	>6.6	N/A	N/A	<15.15	NA	NA
IC50	>6.6	N/A	N/A	<15.15	NA	NA

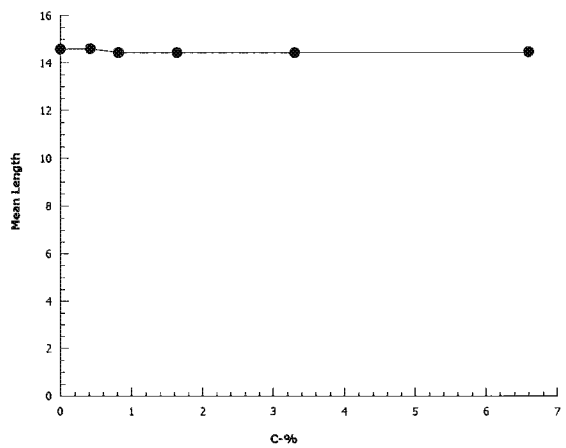
Mean Length Summary

			Calculated Variate						
C-%	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.58	14.3	14.9	0.1068	0.2387	1.64%	0.0%
0.42		5	14.6	14.5	14.7	0.04472	0.1	0.68%	-0.14%
0.82		5	14.44	14.3	14.7	0.07483	0.1673	1.16%	0.96%
1.64		5	14.44	14.2	14.6	0.07483	0.1673	1.16%	0.96%
3.3		5	14.44	14.3	14.7	0.08718	0.1949	1.35%	0.96%
6.6		5	14.48	14.2	14.7	0.08602	0.1924	1.33%	0.69%

Mean Length Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.7	14.9	14.6	14.3	14.4
0.42		14.5	14.5	14.6	14.7	14.7
0.82		14.3	14.3	14.7	14.5	14.4
1.64		14.4	14.4	14.2	14.6	14.6
3.3		14.7	14.3	14.6	14.3	14.3
6.6		14.6	14.2	14.5	14.7	14.4

Graphics



CETIS Measurement Report

Test Code: AVA0116.149klp | 17-5048-4115

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

Batch ID:	13-3916-3613	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	20 Jan-16 14:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	22 Jan-16 14:01	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	11-0823-3612	**Code:**	AVA0116.149klp	**Client:**	E.S. Engineering -Avalon WWTP
Sample Date:	19 Jan-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP
Receive Date:	20 Jan-16 10:00	**Source:**	Bioassay Report		
Sample Age:	32h (3 °C)	**Station:**	Eff Comp		

Dissolved Oxygen-mg/L

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
0.42		2	6.15	4.244	8.056	6	6.3	0.15	0.2121	3.45%	0
0.82		2	6.1	4.829	7.371	6	6.2	0.1	0.1414	2.32%	0
1.64		2	6.05	5.415	6.685	6	6.1	0.05	0.07071	1.17%	0
3.3		2	6.2	4.929	7.471	6.1	6.3	0.1	0.1414	2.28%	0
6.6		2	6.1	4.829	7.371	6	6.2	0.1	0.1414	2.32%	0
Overall		12	6.125			6	6.3				0 (0%)

pH-Units

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.42		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.82		2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
1.64		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
3.3		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
6.6		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
Overall		12	7.925			7.9	8				0 (0%)

Salinity-ppt

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	34	34	34	34	34	0	0	0.0%	0
0.42		2	34	34	34	34	34	0	0	0.0%	0
0.82		2	34	34	34	34	34	0	0	0.0%	0
1.64		2	34	34	34	34	34	0	0	0.0%	0
3.3		2	34	34	34	34	34	0	0	0.0%	0
6.6		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34			34	34				0 (0%)

Temperature-°C

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.42		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
0.82		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
1.64		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
3.3		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
6.6		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		12	14.75			14.7	14.8				0 (0%)

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

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.2	6.1
0.42		6.3	6
0.82		6.2	6
1.64		6.1	6
3.3		6.3	6.1
6.6		6.2	6

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
0.42		7.9	7.9
0.82		7.9	7.9
1.64		8	7.9
3.3		8	7.9
6.6		8	7.9

Salinity-ppt

C-%	Control Type	1	2
0	Negative Contr	34	34
0.42		34	34
0.82		34	34
1.64		34	34
3.3		34	34
6.6		34	34

Temperature-°C

C-%	Control Type	1	2
0	Negative Contr	14.7	14.8
0.42		14.7	14.8
0.82		14.7	14.8
1.64		14.7	14.8
3.3		14.7	14.8
6.6		14.7	14.8

CHAIN OF CUSTODY RECORD

Client: E.S. Engineering

Project Name/Number: AWWTP

Address: 123 pebbly beach Rd. Avalon CA 90704

Project Mgr.: Ian Morison

P.O. # 690-A

Phone Number: (310)510-0731

Sampled By (signature) (Ian Morison)

Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Chronic Toxicity	Most Sensitive Species	Comments
1/19/16	6:30	X		WW	Eff Comp	1	X		
1/19/16	6:30	X		WW	Eff Comp	1		X	

Temp. d... C = 3.0°C

Chlorine (mg/L) = <0.1

NH3 (mg/L) = 0.1

Relinquised By: (signature) (Ian Morison) Date: Time: 1/19/16 2:45

Received By: (signature) Date: Time: 1/20/16 1000

Relinquised By: (signature) Date: Time:

Received By: (signature) Date: Time:

Temp. upon sample receipt: _____°C

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

CHAIN OF CUSTODY RECORD

Client: E.S. Engineering

Address 123 Pebbly Beach Rd. Avalon CA 90704

Phone Number: (310)510-0231

Project Name/Number: AWWTP

Project Mgr. Ian Morison

P.O. # 690-A

Sampled By *(signature)* Ian Morison

Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Most Sensitive Species										Comments
1/20/16	06:35	X		WW	Eff Comp	1 Gal	X										

Analysis

Temp. deg. C = 1.6 °C

Chlorine (mg/L) = <0.1

NH3 (mg/L) = 0.2

Relinquished By: *(signature)* (Ian Morison) Date: 1/20/16 Time: 2:45

Received By: *(signature)* Date: Time: (21 16 | 1207

Relinquished By: *(signature)* Date: Time:

Received By: *(signature)* Date: Time:

Temp. upon sample receipt: _____ °C

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

CHAIN OF CUSTODY RECORD

Client: E.S. Engineering

Address: 123 Pebbly Beach Rd. Avalon CA. 90704

Phone Number: (310) 510-0731

Project Name/Number: AWWTP

Project Mgr. IAN Morison

P.O. # 690-A

Sampled By (signature): Ian Morison

Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Most Sensitive Species										Comments
11/21/16	0625	X		WW	Eff Comp	1 Gal.	X										
													Temp. deg. C				= 2.2°C
													Chlorine (mg/L)				= <0.1
													NH3 (mg/L)				= 20

Relinquised By: (signature) Ian Morison (Ian Morison) Date: Time: 11/21/16 2:45

Received By: (signature) Date: Time: 11/22/16 1155

Relinquised By: (signature) Date: Time:

Received By: (signature) Date: Time:

Temp. upon sample receipt: _____ °C

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

aquatic bioassay & consulting laboratories, inc

CHRONIC TOPSMELT SURVIVAL AND GROWTH BIOASSAY

DATE: 20 January - 2016

STANDARD TOXICANT: Copper Chloride

ENDPOINT: SURVIVAL

NOEC = 100.00 ug/l

EC25 = 113.00 ug/l
EC50 = 138.00 ug/l

ENDPOINT: GROWTH

NOEC = 100.00 ug/l

IC25 = 122.70 ug/l
IC50 = 145.40 ug/l

Yours very truly,

Scott Johnson
Laboratory Director

*34ppt

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CETIS Summary Report

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

Batch ID:	11-1457-0889	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	20 Jan-16 14:10	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	27 Jan-16 12:21	**Species:**	Atherinops affinis	**Brine:**	Not Applicable
Duration:	6d 22h	**Source:**	Aquatic Biosystems, CO	**Age:**	

Sample ID:	20-7003-3678	**Code:**	TOPS012016	**Client:**	ABC Labs
Sample Date:	20 Jan-16 14:10	**Material:**	Copper chloride	**Project:**	REF TOX
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
21-3194-2413	7d Survival Rate	100	180	134.2	16.1%		Steel Many-One Rank Sum Test
06-2960-3948	Mean Dry Biomass-mg	100	180	134.2	27.8%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
13-5236-4957	7d Survival Rate	EC5	61.5	4.25	120.5		Linear Interpolation (ICPIN)
		EC10	89	25.5	113		
		EC15	103	77.88	113.5		
		EC20	108	96	117.8		
		EC25	113	101.8	122.7		
		EC40	128	119.3	138.5		
		EC50	138	129.6	152.3		
01-4441-6220	Mean Dry Biomass-mg	IC5	104.5	94.84	107		Linear Interpolation (ICPIN)
		IC10	109.1	101.8	113.9		
		IC15	113.6	105.9	120.9		
		IC20	118.1	109.9	127.9		
		IC25	122.7	114.3	134.9		
		IC40	136.3	127.5	155.8		
		IC50	145.4	135.4	169.7		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
13-5236-4957	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
21-3194-2413	7d Survival Rate	Control Resp	1	0.8 - NL	Yes	Passes Acceptability Criteria
01-4441-6220	Mean Dry Biomass-mg	Control Resp	0.974	0.85 - NL	Yes	Passes Acceptability Criteria
06-2960-3948	Mean Dry Biomass-mg	Control Resp	0.974	0.85 - NL	Yes	Passes Acceptability Criteria
21-3194-2413	7d Survival Rate	PMSD	0.1608	NL - 0.25	No	Passes Acceptability Criteria
06-2960-3948	Mean Dry Biomass-mg	PMSD	0.278	NL - 0.5	No	Passes Acceptability Criteria

7d Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	0	0	0.0%	0.0%
56		5	0.96	0.8489	1	0.8	1	0.04	0.08944	9.32%	4.0%
100		5	0.88	0.744	1	0.8	1	0.04899	0.1095	12.45%	12.0%
180		5	0.08	0	0.3021	0	0.4	0.08	0.1789	223.6%	92.0%
320		5	0	0	0	0	0	0	0		100.0%
560		5	0	0	0	0	0	0	0		100.0%

Mean Dry Biomass-mg Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.974	0.7931	1.155	0.804	1.134	0.06514	0.1457	14.96%	0.0%
56		5	1.184	1.004	1.363	1.034	1.372	0.06466	0.1446	12.22%	-21.52%
100		5	1.156	0.9774	1.335	0.972	1.356	0.06433	0.1438	12.44%	-18.69%
180		5	0.1304	-0.2316	0.4924	0	0.652	0.1304	0.2916	223.6%	86.61%
320		5	0	0	0	0	0	0	0		100.0%
560		5	0	0	0	0	0	0	0		100.0%

7d Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
56		1	0.8	1	1	1
100		0.8	1	0.8	1	0.8
180		0	0	0.4	0	0
320		0	0	0	0	0
560		0	0	0	0	0

Mean Dry Biomass-mg Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.104	0.804	0.97	1.134	0.858
56		1.202	1.046	1.034	1.372	1.264
100		0.972	1.356	1.074	1.19	1.188
180		0	0	0.652	0	0
320		0	0	0	0	0
560		0	0	0	0	0

7d Survival Rate Binomials

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

CETIS Analytical Report

Report Date: 10 Feb-16 09:18 (p 1 of 4)
Test Code: TOPS012016 | 14-7959-2473

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

Analysis ID: 21-3194-2413 **Endpoint:** 7d Survival Rate **CETIS Version:** CETISv1.8.7
Analyzed: 10 Feb-16 9:18 **Analysis:** Nonparametric-Control vs Treatments **Official Results:** Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Angular (Corrected)	NA	C > T	NA	NA	16.1%	100	180	134.2	

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		56	25	17	1	8	0.5314	Asymp	Non-Significant Effect
		100	20	17	1	8	0.1365	Asymp	Non-Significant Effect
		180*	15	17	0	8	0.0123	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.540867	1.180289	3	66.94	<0.0001	Significant Effect
Error	0.2821118	0.01763199	16			
Total	3.822979		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.583	5.953	0.6374	Equal Variances
Variances	Levene Equality of Variance	4.01	5.292	0.0264	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8657	0.866	0.0099	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.198	0.2235	0.0388	Normal Distribution
Distribution	D'Agostino Skewness	2.555	2.576	0.0106	Normal Distribution
Distribution	D'Agostino Kurtosis	2.301	2.576	0.0214	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	11.82	9.21	0.0027	Non-normal Distribution
Distribution	Anderson-Darling A2 Normality	1.08	3.878	0.0080	Non-normal Distribution

7d Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	1	1	1	1	1	1	0	0.0%	0.0%
56		5	0.96	0.8489	1	1	0.8	1	0.04	9.32%	4.0%
100		5	0.88	0.744	1	0.8	0.8	1	0.04899	12.45%	12.0%
180		5	0.08	0	0.3021	0	0	0.4	0.08	223.6%	92.0%
320		5	0	0	0	0	0	0	0		100.0%
560		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.345	1.345	1.346	1.345	1.345	1.345	0	0.0%	0.0%
56		5	1.298	1.165	1.43	1.345	1.107	1.345	0.04763	8.21%	3.54%
100		5	1.202	1.04	1.364	1.107	1.107	1.345	0.05833	10.85%	10.62%
180		5	0.3174	0.06236	0.5723	0.2255	0.2255	0.6847	0.09184	64.71%	76.41%
320		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%
560		5	0.2255	0.2255	0.2256	0.2255	0.2255	0.2255	0	0.0%	83.24%

7d Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
56		1	0.8	1	1	1
100		0.8	1	0.8	1	0.8
180		0	0	0.4	0	0
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:	21-3194-2413	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:18	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

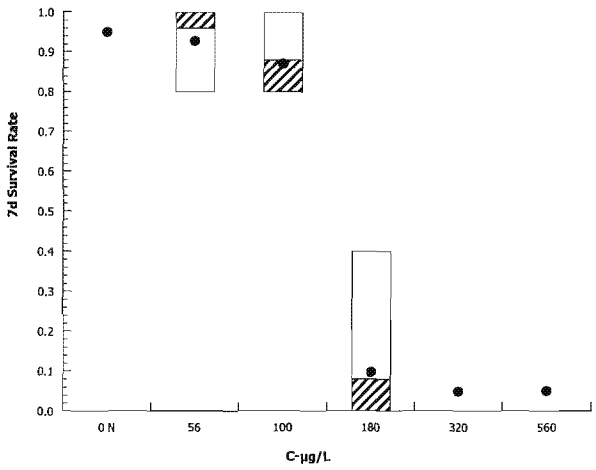
Angular (Corrected) Transformed Detail

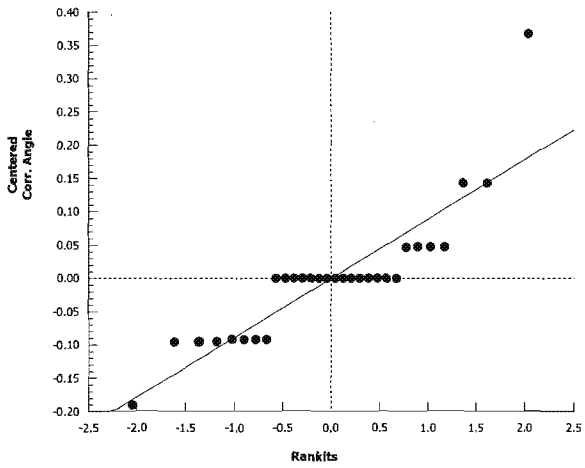
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.345	1.345	1.345	1.345	1.345
56		1.345	1.107	1.345	1.345	1.345
100		1.107	1.345	1.107	1.345	1.107
180		0.2255	0.2255	0.6847	0.2255	0.2255
320		0.2255	0.2255	0.2255	0.2255	0.2255
560		0.2255	0.2255	0.2255	0.2255	0.2255

7d Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
56		5/5	4/5	5/5	5/5	5/5
100		4/5	5/5	4/5	5/5	4/5
180		0/5	0/5	2/5	0/5	0/5
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:	06-2960-3948	**Endpoint:**	Mean Dry Biomass-mg	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:18	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	27.8%	100	180	134.2	

Steel Many-One Rank Sum Test

Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		56	36	17	0	8	0.9968	Asymp	Non-Significant Effect
		100	36	17	0	8	0.9968	Asymp	Non-Significant Effect
		180*	15	17	0	8	0.0123	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.688206	1.229402	3	33.26	<0.0001	Significant Effect
Error	0.5913264	0.0369579	16			
Total	4.279532		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.158	11.34	0.3678	Equal Variances
Variances	Mod Levene Equality of Variance	0.03346	5.953	0.9914	Equal Variances
Variances	Levene Equality of Variance	1.015	5.292	0.4118	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8491	0.866	0.0051	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1946	0.2235	0.0457	Normal Distribution
Distribution	D'Agostino Skewness	2.62	2.576	0.0088	Non-normal Distribution
Distribution	D'Agostino Kurtosis	2.004	2.576	0.0451	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	10.88	9.21	0.0043	Non-normal Distribution
Distribution	Anderson-Darling A2 Normality	1.072	3.878	0.0083	Non-normal Distribution

Mean Dry Biomass-mg Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.974	0.7931	1.155	0.97	0.804	1.134	0.06514	14.96%	0.0%
56		5	1.184	1.004	1.363	1.202	1.034	1.372	0.06466	12.22%	-21.52%
100		5	1.156	0.9774	1.335	1.188	0.972	1.356	0.06433	12.44%	-18.69%
180		5	0.1304	-0.2316	0.4924	0	0	0.652	0.1304	223.6%	86.61%
320		5	0	0	0	0	0	0	0		100.0%
560		5	0	0	0	0	0	0	0		100.0%

Mean Dry Biomass-mg Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.104	0.804	0.97	1.134	0.858
56		1.202	1.046	1.034	1.372	1.264
100		0.972	1.356	1.074	1.19	1.188
180		0	0	0.652	0	0
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:	13-5236-4957	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

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

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	61.5	4.25	120.5
EC10	89	25.5	113
EC15	103	77.88	113.5
EC20	108	96	117.8
EC25	113	101.8	122.7
EC40	128	119.3	138.5
EC50	138	129.6	152.3

7d Survival Rate Summary

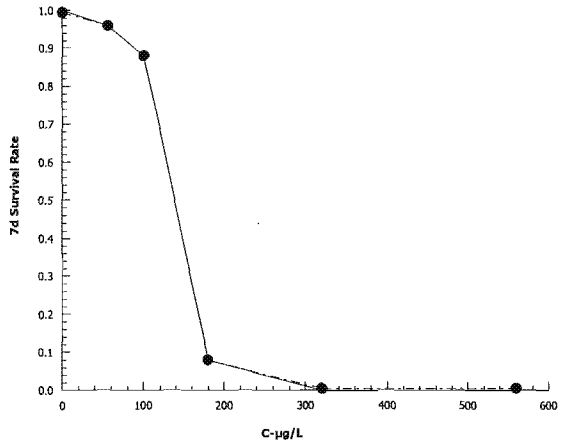
			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	1	1	1	0	0	0.0%	0.0%	25	25
56		5	0.96	0.8	1	0.04	0.08944	9.32%	4.0%	24	25
100		5	0.88	0.8	1	0.04899	0.1095	12.45%	12.0%	22	25
180		5	0.08	0	0.4	0.08	0.1789	223.6%	92.0%	2	25
320		5	0	0	0	0	0		100.0%	0	25
560		5	0	0	0	0	0		100.0%	0	25

7d Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1	1	1	1	1
56		1	0.8	1	1	1
100		0.8	1	0.8	1	0.8
180		0	0	0.4	0	0
320		0	0	0	0	0
560		0	0	0	0	0

7d Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	5/5	5/5	5/5	5/5	5/5
56		5/5	4/5	5/5	5/5	5/5
100		4/5	5/5	4/5	5/5	4/5
180		0/5	0/5	2/5	0/5	0/5
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:	13-5236-4957	**Endpoint:**	7d Survival Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	10 Feb-16 9:18	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

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