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

Analysis ID:	01-4441-6220	**Endpoint:**	Mean Dry Biomass-mg	**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	906272	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	104.5	94.84	107
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

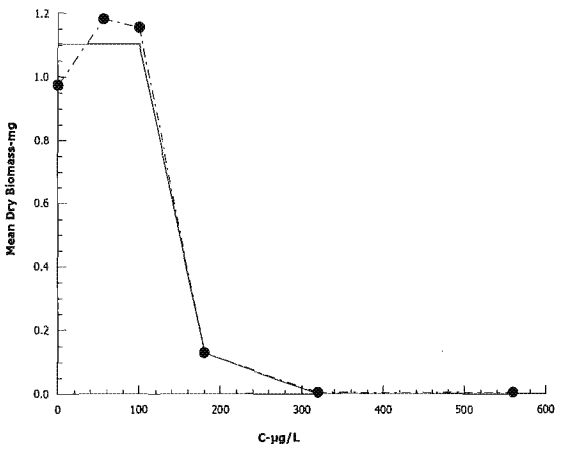
Mean Dry Biomass-mg Summary

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

Mean Dry Biomass-mg Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.104	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

Graphics



CETIS Measurement 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		

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	6.95	6.571	7.329	6.1	7.5	0.1604	0.4536	6.53%	0
56		8	6.913	6.605	7.22	6.3	7.5	0.1302	0.3682	5.33%	0
100		8	6.863	6.606	7.119	6.4	7.3	0.1085	0.3068	4.47%	0
180		8	6.913	6.701	7.124	6.7	7.4	0.08952	0.2532	3.66%	0
320		7	6.843	6.599	7.087	6.4	7.2	0.09966	0.2637	3.85%	0
560		2	6.6	0.2469	12.95	6.1	7.1	0.5	0.7071	10.71%	0
Overall		41	6.847			6.1	7.5				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	7.638	7.561	7.714	7.5	7.8	0.03239	0.09161	1.2%	0
56		8	7.738	7.675	7.8	7.6	7.8	0.02631	0.07441	0.96%	0
100		8	7.75	7.673	7.827	7.6	7.9	0.03273	0.09258	1.2%	0
180		8	7.775	7.668	7.882	7.5	7.9	0.04532	0.1282	1.65%	0
320		7	7.729	7.601	7.856	7.5	7.9	0.05216	0.138	1.79%	0
560		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		41	7.73			7.5	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	8	34	34	34	34	34	0	0	0.0%	0
56		8	34	34	34	34	34	0	0	0.0%	0
100		8	34	34	34	34	34	0	0	0.0%	0
180		8	34	34	34	34	34	0	0	0.0%	0
320		7	34	34	34	34	34	0	0	0.0%	0
560		2	34	34	34	34	34	0	0	0.0%	0
Overall		41	34			34	34				0 (0%)

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	8	21	21	21	21	21	0	0	0.0%	0
56		8	21	21	21	21	21	0	0	0.0%	0
100		8	21	21	21	21	21	0	0	0.0%	0
180		8	21	21	21	21	21	0	0	0.0%	0
320		7	21	21	21	21	21	0	0	0.0%	0
560		2	21	21	21	21	21	0	0	0.0%	0
Overall		41	21			21	21				0 (0%)

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

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2	3	4	5	6	7	8
0	Negative Contr	6.9	6.8	6.9	6.1	7.5	7.3	7.4	6.7
56		6.7	6.9	6.8	6.3	7.5	7	7.3	6.8
100		7.1	6.9	6.7	6.4	7	7	7.3	6.5
180		7.2	6.9	6.7	6.8	6.8	6.7	7.4	6.8
320		7.1	6.9	6.7	6.4	6.8	6.8	7.2	
560		7.1	6.1						

pH-Units

C-µg/L	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
56		7.8	7.8	7.7	7.8	7.6	7.7	7.8	7.7
100		7.7	7.8	7.6	7.9	7.7	7.7	7.8	7.8
180		7.7	7.8	7.5	7.9	7.8	7.8	7.9	7.8
320		7.7	7.8	7.5	7.9	7.8	7.8	7.6	
560		7.7	7.8						

Salinity-ppt

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

Temperature-°C

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

aquatic bioassay & consulting laboratories, inc

CHRONIC SEA URCHIN FRETILIZATION BIOASSAY

DATE: 1/20/2016

STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 35.23 ug/l
EC50 = 45.94 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: 12 Feb-16 12:23 (p 1 of 1)
Test Code: URC012016 | 12-4333-8372

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

Batch ID:	00-3642-2978	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	20 Jan-16 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	20 Jan-16 14:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	19-7741-9331	**Code:**	URC012016	**Client:**	Internal Lab
Sample Date:	20 Jan-16 14:00	**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
10-1658-5199	Fertilization Rate	18	32	24	5.7%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
07-8254-3127	Fertilization Rate	EC5	22.01	19.55	22.62		Linear Interpolation (ICPIN)
		EC10	26.01	23.9	27.23		
		EC15	30.02	28.04	31.85		
		EC20	33.08	31.87	34.13		
		EC25	35.23	34.11	36.24		
		EC40	41.66	40.48	42.73		
		EC50	45.94	44.56	47.07		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
07-8254-3127	Fertilization Rate	Control Resp	0.9475	0.7 - NL	Yes	Passes Acceptability Criteria
10-1658-5199	Fertilization Rate	Control Resp	0.9475	0.7 - NL	Yes	Passes Acceptability Criteria
10-1658-5199	Fertilization Rate	PMSD	0.05701	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	0.9475	0.9057	0.9893	0.91	0.97	0.01315	0.0263	2.78%	0.0%
18		4	0.955	0.9219	0.9881	0.93	0.98	0.01041	0.02082	2.18%	-0.79%
32		4	0.785	0.7691	0.8009	0.77	0.79	0.005	0.01	1.27%	17.15%
56		4	0.2525	0.205	0.3	0.21	0.28	0.01493	0.02986	11.83%	73.35%
100		4	0.0275	0	0.08757	0	0.08	0.01887	0.03775	137.3%	97.1%
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	0.91	0.95	0.97	0.96
18		0.95	0.93	0.98	0.96
32		0.77	0.79	0.79	0.79
56		0.26	0.28	0.26	0.21
100		0	0.03	0.08	0
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	95/100	97/100	96/100
18		95/100	93/100	98/100	96/100
32		77/100	79/100	79/100	79/100
56		26/100	28/100	26/100	21/100
100		0/100	3/100	8/100	0/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 12 Feb-16 12:23 (p 1 of 2)
Test Code: URC012016 | 12-4333-8372

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

Analysis ID:	10-1658-5199	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:23	**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	5.7%	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	-0.3839	2.356	0.106	6	0.9001	CDF	Non-Significant Effect
		32*	5.68	2.356	0.106	6	<0.0001	CDF	Significant Effect
		56*	18.18	2.356	0.106	6	<0.0001	CDF	Significant Effect
		100*	26.75	2.356	0.106	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.652426	1.163107	4	287.1	<0.0001	Significant Effect
Error	0.06077002	0.004051334	15			
Total	4.713196		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	10.57	13.28	0.0319	Equal Variances
Variances	Mod Levene Equality of Variance	3.168	4.893	0.0449	Equal Variances
Variances	Levene Equality of Variance	4.077	4.893	0.0197	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9332	0.866	0.1782	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1563	0.2235	0.2256	Normal Distribution
Distribution	D'Agostino Skewness	0.9231	2.576	0.3559	Normal Distribution
Distribution	D'Agostino Kurtosis	1.295	2.576	0.1953	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	2.529	9.21	0.2823	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.6257	3.878	0.1038	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	0.9475	0.9057	0.9893	0.955	0.91	0.97	0.01315	2.78%	0.0%
18		4	0.955	0.9219	0.9881	0.955	0.93	0.98	0.01041	2.18%	-0.79%
32		4	0.785	0.7691	0.8009	0.79	0.77	0.79	0.005	1.27%	17.15%
56		4	0.2525	0.205	0.3	0.26	0.21	0.28	0.01493	11.83%	73.35%
100		4	0.0275	0	0.08757	0.015	0	0.08	0.01887	137.3%	97.1%
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	1.344	1.255	1.434	1.357	1.266	1.397	0.02813	4.19%	0.0%
18		4	1.362	1.278	1.445	1.357	1.303	1.429	0.02628	3.86%	-1.29%
32		4	1.089	1.07	1.108	1.095	1.071	1.095	0.006036	1.11%	19.02%
56		4	0.5259	0.4704	0.5815	0.5351	0.476	0.5576	0.01746	6.64%	60.88%
100		4	0.1402	-0.04095	0.3214	0.1121	0.05002	0.2868	0.05693	81.2%	89.57%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.28%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.91	0.95	0.97	0.96
18		0.95	0.93	0.98	0.96
32		0.77	0.79	0.79	0.79
56		0.26	0.28	0.26	0.21
100		0	0.03	0.08	0
180		0	0	0	0

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

Analysis ID:	10-1658-5199	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:23	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

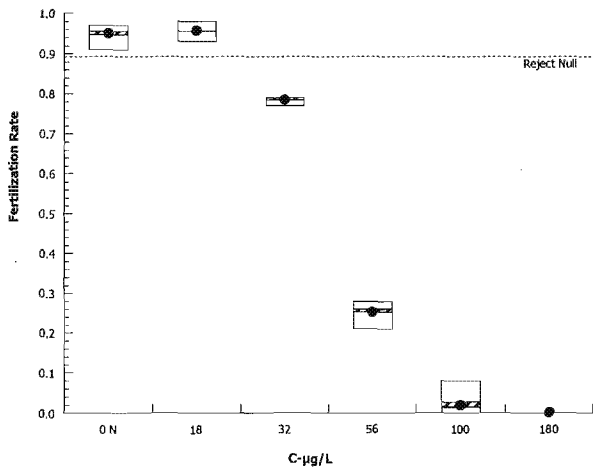
Angular (Corrected) Transformed Detail

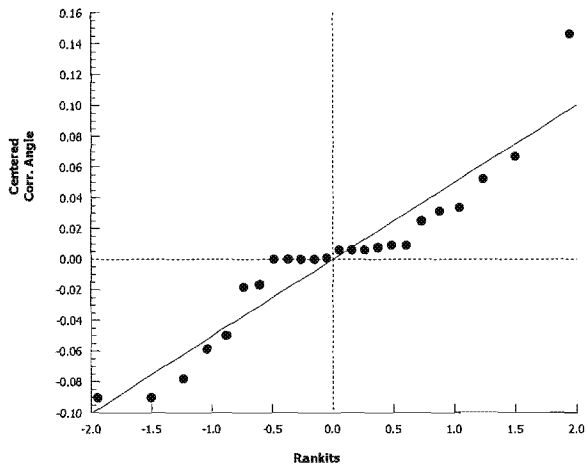
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.266	1.345	1.397	1.369
18		1.345	1.303	1.429	1.369
32		1.071	1.095	1.095	1.095
56		0.5351	0.5576	0.5351	0.476
100		0.05002	0.1741	0.2868	0.05002
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	95/100	97/100	96/100
18		95/100	93/100	98/100	96/100
32		77/100	79/100	79/100	79/100
56		26/100	28/100	26/100	21/100
100		0/100	3/100	8/100	0/100
180		0/100	0/100	0/100	0/100

Graphics





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

Analysis ID:	07-8254-3127	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:23	**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	22.01	19.55	22.62
EC10	26.01	23.9	27.23
EC15	30.02	28.04	31.85
EC20	33.08	31.87	34.13
EC25	35.23	34.11	36.24
EC40	41.66	40.48	42.73
EC50	45.94	44.56	47.07

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	0.9475	0.91	0.97	0.01315	0.0263	2.78%	0.0%	379	400
18		4	0.955	0.93	0.98	0.01041	0.02082	2.18%	-0.79%	382	400
32		4	0.785	0.77	0.79	0.005	0.01	1.27%	17.15%	314	400
56		4	0.2525	0.21	0.28	0.01493	0.02986	11.83%	73.35%	101	400
100		4	0.0275	0	0.08	0.01887	0.03775	137.3%	97.1%	11	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	0.91	0.95	0.97	0.96
18		0.95	0.93	0.98	0.96
32		0.77	0.79	0.79	0.79
56		0.26	0.28	0.26	0.21
100		0	0.03	0.08	0
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	95/100	97/100	96/100
18		95/100	93/100	98/100	96/100
32		77/100	79/100	79/100	79/100
56		26/100	28/100	26/100	21/100
100		0/100	3/100	8/100	0/100
180		0/100	0/100	0/100	0/100

CETIS Measurement Report

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

Batch ID:	00-3642-2978	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	20 Jan-16 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	20 Jan-16 14:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	19-7741-9331	**Code:**	URC012016	**Client:**	Internal Lab
Sample Date:	20 Jan-16 14:00	**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	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
18		2	6.15	2.973	9.327	5.9	6.4	0.25	0.3536	5.75%	0
32		2	6.1	3.559	8.641	5.9	6.3	0.2	0.2828	4.64%	0
56		2	6.05	4.144	7.956	5.9	6.2	0.15	0.2121	3.51%	0
100		2	6.15	4.244	8.056	6	6.3	0.15	0.2121	3.45%	0
180		2	6.05	5.415	6.685	6	6.1	0.05	0.07071	1.17%	0
Overall		12	6.108			5.9	6.4				0 (0%)

pH-Units

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	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	6.2	6.1
18		6.4	5.9
32		6.3	5.9
56		6.2	5.9
100		6.3	6
180		6.1	6

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

aquatic bioassay & consulting laboratories, inc

CHRONIC KELP GERMINATION & GROWTH BIOASSAY

DATE: 20 January - 16

STANDARD TOXICANT: Copper Chloride

ENDPOINT: GERMINATION

NOEC = 100.00 ug/l

EC25 = 123.10 ug/l
EC50 = 147.80 ug/l

ENDPOINT: GROWTH-LENGTH

NOEC = 180.00 ug/l

IC25 = 183.60 ug/l
IC50 = 229.10 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: 12 Feb-16 12:39 (p 1 of 2)
Test Code: KLP012016 | 13-3099-1551

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

Batch ID:	01-6549-5619	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	20 Jan-16 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	22 Jan-16 14:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	05-1709-2661	**Code:**	KLP012016	**Client:**	Internal Lab
Sample Date:	20 Jan-16 14:00	**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
20-7199-4015	Germination Rate	100	180	134.2	3.8%		Dunnett Multiple Comparison Test
05-0608-8964	Mean Length	180	320	240	9.08%		Steel Many-One Rank Sum Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
05-1953-2003	Germination Rate	EC5	103.5	99.5	105.4		Linear Interpolation (ICPIN)
		EC10	108.4	104.7	110.3		
		EC15	113.3	109.8	115.1		
		EC20	118.2	114.8	120		
		EC25	123.1	119.7	124.8		
		EC40	137.9	134.4	139.8		
		EC50	147.8	144.3	150.1		
18-3987-4836	Mean Length	IC5	117.4	108.2	155.2		Linear Interpolation (ICPIN)
		IC10	134.8	117	204		
		IC15	152.2	126.8	206.9		
		IC20	169.6	135.7	209.8		
		IC25	183.6	146.3	214.4		
		IC40	210.9	183.5	235.5		
		IC50	229.1	206.3	249.6		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
05-1953-2003	Germination Rate	Control Resp	0.938	0.7 - NL	Yes	Passes Acceptability Criteria
20-7199-4015	Germination Rate	Control Resp	0.938	0.7 - NL	Yes	Passes Acceptability Criteria
05-0608-8964	Mean Length	Control Resp	14.46	10 - NL	Yes	Passes Acceptability Criteria
18-3987-4836	Mean Length	Control Resp	14.46	10 - NL	Yes	Passes Acceptability Criteria
05-0608-8964	Mean Length	NOEL	180	NL - 35	No	Above Acceptability Criteria
20-7199-4015	Germination Rate	PMSD	0.03797	NL - 0.2	No	Passes Acceptability Criteria
05-0608-8964	Mean Length	PMSD	0.09081	NL - 0.2	No	Passes Acceptability Criteria

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

Germination Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	0.938	0.9176	0.9584	0.92	0.96	0.007348	0.01643	1.75%	0.0%
5.6		5	0.934	0.9054	0.9626	0.9	0.95	0.0103	0.02302	2.47%	0.43%
10		5	0.928	0.9026	0.9534	0.91	0.96	0.009165	0.02049	2.21%	1.07%
18		5	0.944	0.9273	0.9607	0.93	0.96	0.006	0.01342	1.42%	-0.64%
32		5	0.924	0.9052	0.9428	0.9	0.94	0.006782	0.01517	1.64%	1.49%
100		5	0.924	0.8851	0.9629	0.91	0.98	0.014	0.0313	3.39%	1.49%
180		5	0.162	0.1233	0.2007	0.11	0.19	0.01393	0.03114	19.23%	82.73%
320		5	0	0	0	0	0	0	0		100.0%

Mean Length Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.46	14.32	14.6	14.3	14.6	0.05099	0.114	0.79%	0.0%
5.6		5	14.44	14.25	14.63	14.2	14.6	0.06782	0.1517	1.05%	0.14%
10		5	14.42	14.15	14.69	14.2	14.7	0.09695	0.2168	1.5%	0.28%
18		5	14.48	14.38	14.58	14.4	14.6	0.03742	0.08367	0.58%	-0.14%
32		5	14.42	14.22	14.62	14.2	14.6	0.07348	0.1643	1.14%	0.28%
100		5	14.58	14.21	14.95	14.3	15	0.1319	0.295	2.02%	-0.83%
180		5	11.14	8.363	13.92	9.1	14.6	1	2.237	20.08%	22.96%
320		5	0	0	0	0	0	0	0		100.0%

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.93	0.95	0.96	0.92	0.93
5.6		0.95	0.95	0.9	0.95	0.92
10		0.91	0.96	0.93	0.93	0.91
18		0.95	0.96	0.93	0.95	0.93
32		0.92	0.93	0.94	0.93	0.9
100		0.98	0.91	0.91	0.91	0.91
180		0.16	0.18	0.17	0.19	0.11
320		0	0	0	0	0

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.3	14.4	14.5	14.5	14.6
5.6		14.2	14.4	14.5	14.6	14.5
10		14.2	14.7	14.5	14.5	14.2
18		14.4	14.4	14.5	14.6	14.5
32		14.2	14.3	14.5	14.5	14.6
100		15	14.3	14.7	14.3	14.6
180		14.6	12.1	10.2	9.1	9.7
320		0	0	0	0	0

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	93/100	95/100	96/100	92/100	93/100
5.6		95/100	95/100	90/100	95/100	92/100
10		91/100	96/100	93/100	93/100	91/100
18		95/100	96/100	93/100	95/100	93/100
32		92/100	93/100	94/100	93/100	90/100
100		98/100	91/100	91/100	91/100	91/100
180		16/100	18/100	17/100	19/100	11/100
320		0/100	0/100	0/100	0/100	0/100

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

Analysis ID: 20-7199-4015 **Endpoint:** Germination Rate **CETIS Version:** CETISv1.8.7
Analyzed: 12 Feb-16 12:38 **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	3.8%	100	180	134.2	

Dunnett Multiple Comparison Test

Control vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	5.6	0.2544	2.407	0.068	8	0.7771	CDF	Non-Significant Effect
	10	0.6884	2.407	0.068	8	0.5968	CDF	Non-Significant Effect
	18	-0.4341	2.407	0.068	8	0.9437	CDF	Non-Significant Effect
	32	1.009	2.407	0.068	8	0.4481	CDF	Non-Significant Effect
	100	0.7905	2.407	0.068	8	0.5496	CDF	Non-Significant Effect
	180*	32.19	2.407	0.068	8	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.457007	0.5761678	6	289.5	<0.0001	Significant Effect
Error	0.0557248	0.001990171	28			
Total	3.512732		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.065	16.81	0.5355	Equal Variances
Variances	Mod Levene Equality of Variance	0.08751	3.812	0.9969	Equal Variances
Variances	Levene Equality of Variance	0.8874	3.528	0.5172	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.939	0.9146	0.0521	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1402	0.1723	0.0793	Normal Distribution
Distribution	D'Agostino Skewness	2.041	2.576	0.0413	Normal Distribution
Distribution	D'Agostino Kurtosis	1.86	2.576	0.0629	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	7.622	9.21	0.0221	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.69	3.878	0.0716	Normal Distribution

Germination Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	0.938	0.9176	0.9584	0.93	0.92	0.96	0.007348	1.75%	0.0%
5.6		5	0.934	0.9054	0.9626	0.95	0.9	0.95	0.0103	2.47%	0.43%
10		5	0.928	0.9026	0.9534	0.93	0.91	0.96	0.009165	2.21%	1.07%
18		5	0.944	0.9273	0.9607	0.95	0.93	0.96	0.006	1.42%	-0.64%
32		5	0.924	0.9052	0.9428	0.93	0.9	0.94	0.006782	1.64%	1.49%
100		5	0.924	0.8851	0.9629	0.91	0.91	0.98	0.014	3.39%	1.49%
180		5	0.162	0.1233	0.2007	0.17	0.11	0.19	0.01393	19.23%	82.73%
320		5	0	0	0	0	0	0	0		100.0%

Angular (Corrected) Transformed Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	5	1.321	1.277	1.365	1.303	1.284	1.369	0.01573	2.66%	0.0%
5.6		5	1.314	1.258	1.369	1.345	1.249	1.345	0.02007	3.42%	0.54%
10		5	1.302	1.249	1.354	1.303	1.266	1.369	0.01888	3.24%	1.47%
18		5	1.333	1.297	1.37	1.345	1.303	1.369	0.01309	2.2%	-0.93%
32		5	1.292	1.258	1.327	1.303	1.249	1.323	0.01251	2.17%	2.16%
100		5	1.299	1.208	1.389	1.266	1.266	1.429	0.03256	5.61%	1.69%
180		5	0.4127	0.3578	0.4677	0.425	0.3381	0.451	0.0198	10.73%	68.75%
320		5	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.21%

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

Analysis ID:	20-7199-4015	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:38	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

Germination Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.93	0.95	0.96	0.92	0.93
5.6		0.95	0.95	0.9	0.95	0.92
10		0.91	0.96	0.93	0.93	0.91
18		0.95	0.96	0.93	0.95	0.93
32		0.92	0.93	0.94	0.93	0.9
100		0.98	0.91	0.91	0.91	0.91
180		0.16	0.18	0.17	0.19	0.11
320		0	0	0	0	0

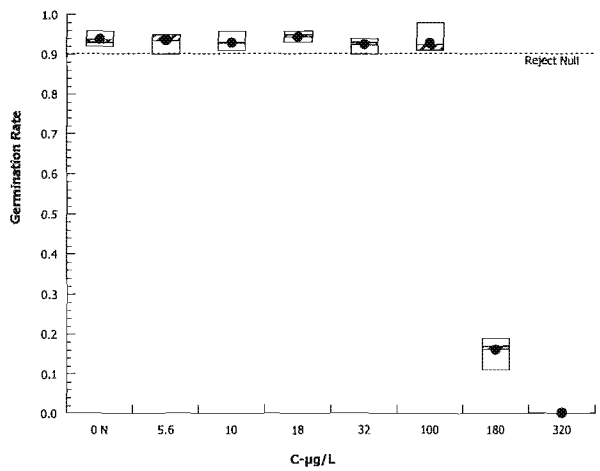
Angular (Corrected) Transformed Detail

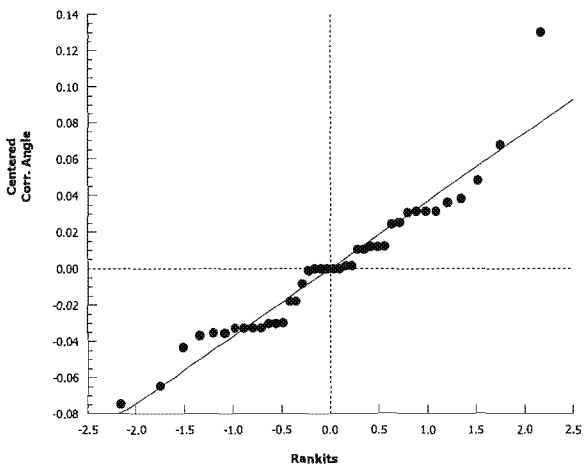
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	1.303	1.345	1.369	1.284	1.303
5.6		1.345	1.345	1.249	1.345	1.284
10		1.266	1.369	1.303	1.303	1.266
18		1.345	1.369	1.303	1.345	1.303
32		1.284	1.303	1.323	1.303	1.249
100		1.429	1.266	1.266	1.266	1.266
180		0.4115	0.4381	0.425	0.451	0.3381
320		0.05002	0.05002	0.05002	0.05002	0.05002

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	93/100	95/100	96/100	92/100	93/100
5.6		95/100	95/100	90/100	95/100	92/100
10		91/100	96/100	93/100	93/100	91/100
18		95/100	96/100	93/100	95/100	93/100
32		92/100	93/100	94/100	93/100	90/100
100		98/100	91/100	91/100	91/100	91/100
180		16/100	18/100	17/100	19/100	11/100
320		0/100	0/100	0/100	0/100	0/100

Graphics





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

Analysis ID: 05-0608-8964 **Endpoint:** Mean Length **CETIS Version:** CETISv1.8.7
Analyzed: 12 Feb-16 12:38 **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	9.08%	180	320	240	

Steel Many-One Rank Sum Test

Control vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	5.6	27	16	3	8	0.8267	Asymp	Non-Significant Effect
	10	26	16	1	8	0.7547	Asymp	Non-Significant Effect
	18	28.5	16	3	8	0.9067	Asymp	Non-Significant Effect
	32	26	16	3	8	0.7547	Asymp	Non-Significant Effect
	100	30.5	16	2	8	0.9664	Asymp	Non-Significant Effect
	180	19.5	16	1	8	0.1778	Asymp	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	47.51942	7.919904	6	10.65	<0.0001	Significant Effect
Error	20.828	0.7438573	28			
Total	68.34743		34			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	67.59	16.81	<0.0001	Unequal Variances
Variances	Mod Levene Equality of Variance	4.433	3.812	0.0048	Unequal Variances
Variances	Levene Equality of Variance	11.76	3.528	<0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.6573	0.9146	<0.0001	Non-normal Distribution
Distribution	Kolmogorov-Smirnov D	0.2948	0.1723	<0.0001	Non-normal Distribution
Distribution	D'Agostino Skewness	3.947	2.576	<0.0001	Non-normal Distribution
Distribution	D'Agostino Kurtosis	4.419	2.576	<0.0001	Non-normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	35.11	9.21	<0.0001	Non-normal Distribution
Distribution	Anderson-Darling A2 Normality	4.836	3.878	<0.0001	Non-normal Distribution

Mean Length Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	5	14.46	14.32	14.6	14.5	14.3	14.6	0.05098	0.79%	0.0%
5.6		5	14.44	14.25	14.63	14.5	14.2	14.6	0.06782	1.05%	0.14%
10		5	14.42	14.15	14.69	14.5	14.2	14.7	0.09696	1.5%	0.28%
18		5	14.48	14.38	14.58	14.5	14.4	14.6	0.03741	0.58%	-0.14%
32		5	14.42	14.22	14.62	14.5	14.2	14.6	0.07348	1.14%	0.28%
100		5	14.58	14.21	14.95	14.6	14.3	15	0.1319	2.02%	-0.83%
180		5	11.14	8.363	13.92	10.2	9.1	14.6	1	20.08%	22.96%
320		5	0	0	0	0	0	0	0		100.0%

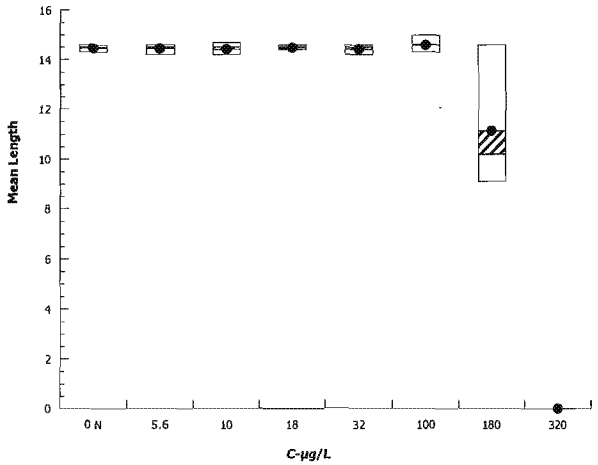
Mean Length Detail

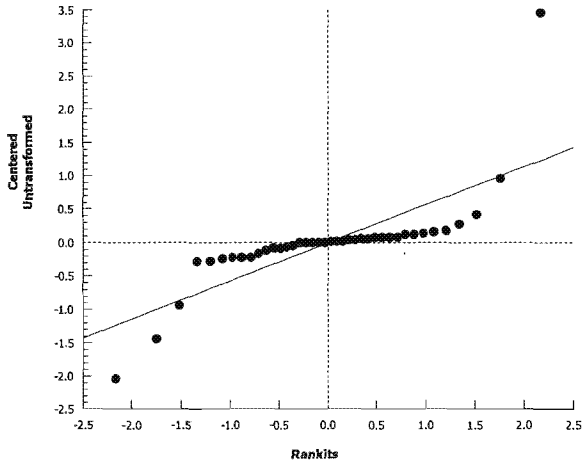
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.3	14.4	14.5	14.5	14.6
5.6		14.2	14.4	14.5	14.6	14.5
10		14.2	14.7	14.5	14.5	14.2
18		14.4	14.4	14.5	14.6	14.5
32		14.2	14.3	14.5	14.5	14.6
100		15	14.3	14.7	14.3	14.6
180		14.6	12.1	10.2	9.1	9.7
320		0	0	0	0	0

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

Analysis ID:	05-0608-8964	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:38	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

Graphics





CETIS Analytical Report

Test Code: KLP012016 | 13-3099-1551

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

Analysis ID:	05-1953-2003	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:38	**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	103.5	99.5	105.4
EC10	108.4	104.7	110.3
EC15	113.3	109.8	115.1
EC20	118.2	114.8	120
EC25	123.1	119.7	124.8
EC40	137.9	134.4	139.8
EC50	147.8	144.3	150.1

Germination Rate Summary

			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Negative Control	5	0.938	0.92	0.96	0.007348	0.01643	1.75%	0.0%	469	500
5.6		5	0.934	0.9	0.95	0.0103	0.02302	2.47%	0.43%	467	500
10		5	0.928	0.91	0.96	0.009165	0.02049	2.21%	1.07%	464	500
18		5	0.944	0.93	0.96	0.006	0.01342	1.42%	-0.64%	472	500
32		5	0.924	0.9	0.94	0.006782	0.01517	1.64%	1.49%	462	500
100		5	0.924	0.91	0.98	0.014	0.0313	3.39%	1.49%	462	500
180		5	0.162	0.11	0.19	0.01393	0.03114	19.23%	82.73%	81	500
320		5	0	0	0	0	0		100.0%	0	500

Germination Rate Detail

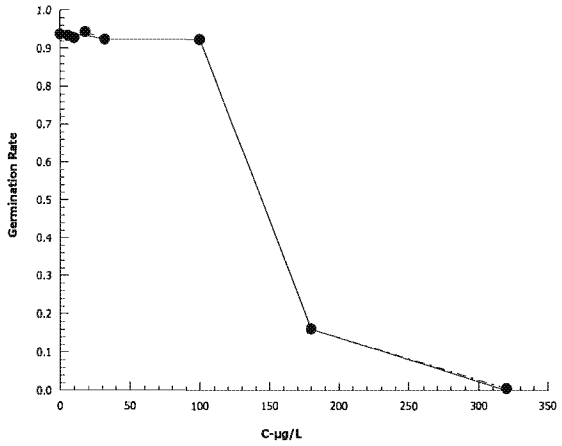
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	0.93	0.95	0.96	0.92	0.93
5.6		0.95	0.95	0.9	0.95	0.92
10		0.91	0.96	0.93	0.93	0.91
18		0.95	0.96	0.93	0.95	0.93
32		0.92	0.93	0.94	0.93	0.9
100		0.98	0.91	0.91	0.91	0.91
180		0.16	0.18	0.17	0.19	0.11
320		0	0	0	0	0

Germination Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	93/100	95/100	96/100	92/100	93/100
5.6		95/100	95/100	90/100	95/100	92/100
10		91/100	96/100	93/100	93/100	91/100
18		95/100	96/100	93/100	95/100	93/100
32		92/100	93/100	94/100	93/100	90/100
100		98/100	91/100	91/100	91/100	91/100
180		16/100	18/100	17/100	19/100	11/100
320		0/100	0/100	0/100	0/100	0/100

Macrocystis Germination and Germ Tube Growth Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	05-1953-2003	**Endpoint:**	Germination Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:38	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



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

Analysis ID:	18-3987-4836	**Endpoint:**	Mean Length	**CETIS Version:**	CETISv1.8.7
Analyzed:	12 Feb-16 12:38	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1424228	280	Yes	Two-Point Interpolation

Point Estimates

Level	µg/L	95% LCL	95% UCL
IC5	117.4	108.2	155.2
IC10	134.8	117	204
IC15	152.2	126.8	206.9
IC20	169.6	135.7	209.8
IC25	183.6	146.3	214.4
IC40	210.9	183.5	235.5
IC50	229.1	206.3	249.6

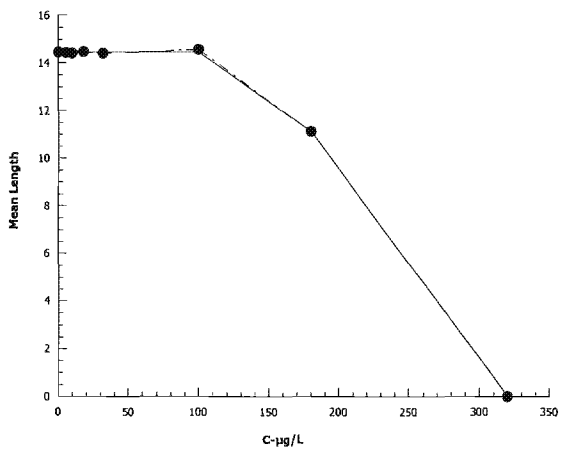
Mean Length Summary

			Calculated Variate						
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Negative Control	5	14.46	14.3	14.6	0.05098	0.114	0.79%	0.0%
5.6		5	14.44	14.2	14.6	0.06782	0.1517	1.05%	0.14%
10		5	14.42	14.2	14.7	0.09696	0.2168	1.5%	0.28%
18		5	14.48	14.4	14.6	0.03741	0.08364	0.58%	-0.14%
32		5	14.42	14.2	14.6	0.07348	0.1643	1.14%	0.28%
100		5	14.58	14.3	15	0.1319	0.295	2.02%	-0.83%
180		5	11.14	9.1	14.6	1	2.237	20.08%	22.96%
320		5	0	0	0	0	0		100.0%

Mean Length Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Negative Control	14.3	14.4	14.5	14.5	14.6
5.6		14.2	14.4	14.5	14.6	14.5
10		14.2	14.7	14.5	14.5	14.2
18		14.4	14.4	14.5	14.6	14.5
32		14.2	14.3	14.5	14.5	14.6
100		15	14.3	14.7	14.3	14.6
180		14.6	12.1	10.2	9.1	9.7
320		0	0	0	0	0

Graphics



CETIS Measurement Report

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

Batch ID:	01-6549-5619	**Test Type:**	Growth-Germination	**Analyst:**	
Start Date:	20 Jan-16 14:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	22 Jan-16 14:00	**Species:**	Macrocystis pyrifera	**Brine:**	Not Applicable
Duration:	48h	**Source:**	David Gutoff	**Age:**	

Sample ID:	05-1709-2661	**Code:**	KLP012016	**Client:**	Internal Lab
Sample Date:	20 Jan-16 14:00	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Dissolved Oxygen-mg/L

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	6.15	5.515	6.785	6.1	6.2	0.05001	0.07072	1.15%	0
5.6		2	6.25	3.073	9.427	6	6.5	0.25	0.3536	5.66%	0
10		2	6.1	3.559	8.641	5.9	6.3	0.2	0.2828	4.64%	0
18		2	6.15	2.973	9.327	5.9	6.4	0.25	0.3536	5.75%	0
32		2	6.1	3.559	8.641	5.9	6.3	0.2	0.2828	4.64%	0
100		2	6.15	4.244	8.056	6	6.3	0.15	0.2121	3.45%	0
180		2	6.05	5.415	6.685	6	6.1	0.05	0.07071	1.17%	0
320		2	6.15	4.244	8.056	6	6.3	0.15	0.2121	3.45%	0
Overall		16	6.137			5.9	6.5				0 (0%)

pH-Units

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

Salinity-ppt

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

Temperature-°C

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	Negative Contr	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
5.6		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
10		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
18		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
32		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
180		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
320		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		16	14.75			14.7	14.8				0 (0%)

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.2	6.1
5.6		6.5	6
10		6.3	5.9
18		6.4	5.9
32		6.3	5.9
100		6.3	6
180		6.1	6
320		6.3	6

pH-Units

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

Salinity-ppt

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

Temperature-°C

C-µg/L	Control Type	1	2
0	Negative Contr	14.7	14.8
5.6		14.7	14.8
10		14.7	14.8
18		14.7	14.8
32		14.7	14.8
100		14.7	14.8
180		14.7	14.8
320		14.7	14.8

INVOICE NO. AVA0416.0382

April 28, 2016

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

SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	5 April - 16
DATE SAMPLED:	4 April - 16
ABC LAB. NO.:	AVA0416.018
P.O. NO.:	1810

CHRONIC NPDES BIOASSAYS	
Sea Urchin – (1 @ 945.00)	$945.00
TOTAL	$945.00

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

April 28, 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:	5 April - 16
DATE SAMPLED:	4 April - 16
ABC LAB. NO.:	AVA0416.018

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

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

Yours very truly,

Scott Johnson
Laboratory Director

ED_002551_00000729-00409

CETIS Summary Report

Report Date: 28 Apr-16 14:19 (p 1 of 1)
Test Code: AVA0416.018 | 15-2601-5198

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

Batch ID:	07-5317-9993	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	05 Apr-16 13:02	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	05 Apr-16 13:42	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	10-1907-0533	**Code:**	AVA0416.018	**Client:**	Avalon WWTP
Sample Date:	04 Apr-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP #690-A
Receive Date:	05 Apr-16 11:30	**Source:**	Bioassay Report		
Sample Age:	31h (3.2 °C)	**Station:**	Eff Comp		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
09-4753-7454	Fertilization Rate	6.6	>6.6	NA	3.22%	15.15	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
12-3701-0530	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
09-4753-7454	Fertilization Rate	Control Resp	0.95	0.7 - NL	Yes	Passes Acceptability Criteria
12-3701-0530	Fertilization Rate	Control Resp	0.95	0.7 - NL	Yes	Passes Acceptability Criteria
09-4753-7454	Fertilization Rate	PMSD	0.03221	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	0.9275	0.9725	0.93	0.96	0.007071	0.01414	1.49%	0.0%
0.41		4	0.9525	0.9127	0.9923	0.92	0.98	0.0125	0.025	2.63%	-0.26%
0.82		4	0.93	0.917	0.943	0.92	0.94	0.004082	0.008164	0.88%	2.11%
1.64		4	0.94	0.9082	0.9718	0.91	0.95	0.01	0.02	2.13%	1.05%
3.3		4	0.955	0.9345	0.9755	0.94	0.97	0.006455	0.01291	1.35%	-0.53%
6.6		4	0.93	0.904	0.956	0.91	0.95	0.008165	0.01633	1.76%	2.11%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.96	0.96	0.93	0.95
0.41		0.98	0.96	0.95	0.92
0.82		0.92	0.93	0.93	0.94
1.64		0.95	0.95	0.95	0.91
3.3		0.97	0.95	0.94	0.96
6.6		0.91	0.93	0.95	0.93

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	96/100	93/100	95/100
0.41		98/100	96/100	95/100	92/100
0.82		92/100	93/100	93/100	94/100
1.64		95/100	95/100	95/100	91/100
3.3		97/100	95/100	94/100	96/100
6.6		91/100	93/100	95/100	93/100

CETIS Analytical Report

Test Code: AVA0416.018 | 15-2601-5198

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

Analysis ID:	09-4753-7454	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	28 Apr-16 14:18	**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	3.22%	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	-0.3814	2.407	0.064	6	0.9214	CDF	Non-Significant Effect
		0.82	1.637	2.407	0.064	6	0.1867	CDF	Non-Significant Effect
		1.64	0.8033	2.407	0.064	6	0.5107	CDF	Non-Significant Effect
		3.3	-0.4483	2.407	0.064	6	0.9321	CDF	Non-Significant Effect
		6.6	1.6	2.407	0.064	6	0.1975	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01270599	0.002541198	5	1.805	0.1625	Non-Significant Effect
Error	0.02533497	0.001407498	18			
Total	0.03804096		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	4.395	15.09	0.4940	Equal Variances
Variances	Mod Levene Equality of Variance	0.6651	4.248	0.6547	Equal Variances
Variances	Levene Equality of Variance	1.008	4.248	0.4413	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9677	0.884	0.6100	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1485	0.2056	0.1844	Normal Distribution
Distribution	D'Agostino Skewness	0.6874	2.576	0.4919	Normal Distribution
Distribution	D'Agostino Kurtosis	0.6043	2.576	0.5456	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.8377	9.21	0.6578	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4745	3.878	0.2450	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	0.9275	0.9725	0.955	0.93	0.96	0.007071	1.49%	0.0%
0.41		4	0.9525	0.9127	0.9923	0.955	0.92	0.98	0.0125	2.63%	-0.26%
0.82		4	0.93	0.917	0.943	0.93	0.92	0.94	0.004082	0.88%	2.11%
1.64		4	0.94	0.9082	0.9718	0.95	0.91	0.95	0.01	2.13%	1.05%
3.3		4	0.955	0.9345	0.9755	0.955	0.94	0.97	0.006455	1.35%	-0.53%
6.6		4	0.93	0.904	0.956	0.93	0.91	0.95	0.008165	1.76%	2.11%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.347	1.297	1.397	1.357	1.303	1.369	0.01566	2.33%	0.0%
0.41		4	1.357	1.262	1.452	1.357	1.284	1.429	0.02998	4.42%	-0.75%
0.82		4	1.303	1.278	1.329	1.303	1.284	1.323	0.008021	1.23%	3.23%
1.64		4	1.325	1.262	1.388	1.345	1.266	1.345	0.01979	2.99%	1.58%
3.3		4	1.359	1.308	1.409	1.357	1.323	1.397	0.01579	2.32%	-0.88%
6.6		4	1.304	1.253	1.356	1.303	1.266	1.345	0.01618	2.48%	3.15%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.96	0.96	0.93	0.95
0.41		0.98	0.96	0.95	0.92
0.82		0.92	0.93	0.93	0.94
1.64		0.95	0.95	0.95	0.91
3.3		0.97	0.95	0.94	0.96
6.6		0.91	0.93	0.95	0.93

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

Analysis ID:	09-4753-7454	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	28 Apr-16 14:18	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

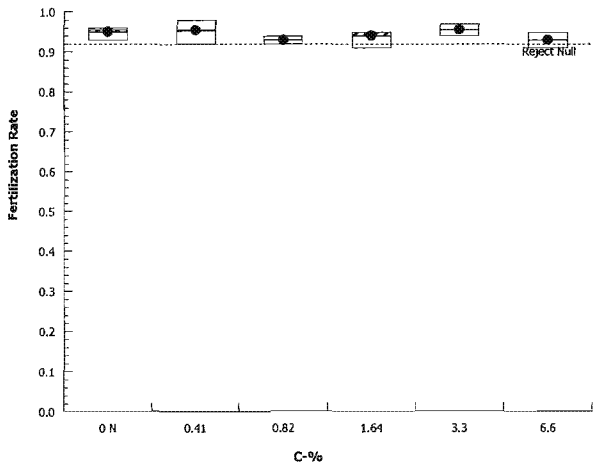
Angular (Corrected) Transformed Detail

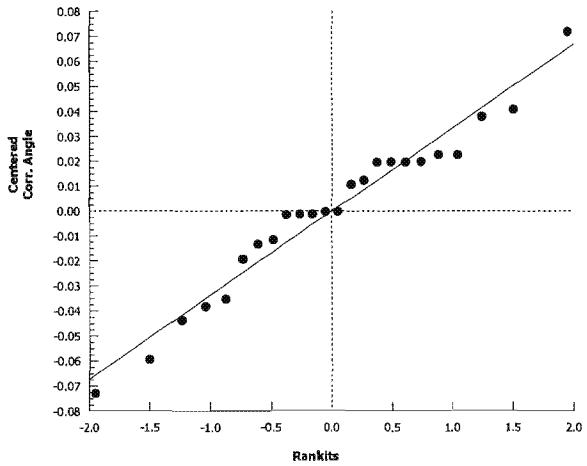
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.369	1.369	1.303	1.345
0.41		1.429	1.369	1.345	1.284
0.82		1.284	1.303	1.303	1.323
1.64		1.345	1.345	1.345	1.266
3.3		1.397	1.345	1.323	1.369
6.6		1.266	1.303	1.345	1.303

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	96/100	93/100	95/100
0.41		98/100	96/100	95/100	92/100
0.82		92/100	93/100	93/100	94/100
1.64		95/100	95/100	95/100	91/100
3.3		97/100	95/100	94/100	96/100
6.6		91/100	93/100	95/100	93/100

Graphics





CETIS Analytical Report

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

Analysis ID:	12-3701-0530	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	28 Apr-16 14:18	**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	%	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	0.93	0.96	0.007071	0.01414	1.49%	0.0%	380	400
0.41		4	0.9525	0.92	0.98	0.0125	0.025	2.63%	-0.26%	381	400
0.82		4	0.93	0.92	0.94	0.004082	0.008164	0.88%	2.11%	372	400
1.64		4	0.94	0.91	0.95	0.01	0.02	2.13%	1.05%	376	400
3.3		4	0.955	0.94	0.97	0.006455	0.01291	1.35%	-0.53%	382	400
6.6		4	0.93	0.91	0.95	0.008165	0.01633	1.76%	2.11%	372	400

Fertilization Rate Detail

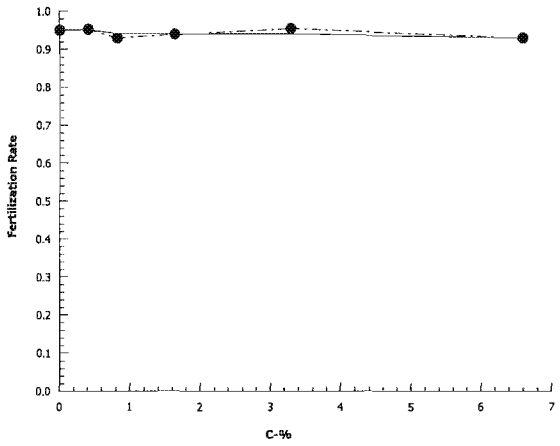
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.96	0.96	0.93	0.95
0.41		0.98	0.96	0.95	0.92
0.82		0.92	0.93	0.93	0.94
1.64		0.95	0.95	0.95	0.91
3.3		0.97	0.95	0.94	0.96
6.6		0.91	0.93	0.95	0.93

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	96/100	93/100	95/100
0.41		98/100	96/100	95/100	92/100
0.82		92/100	93/100	93/100	94/100
1.64		95/100	95/100	95/100	91/100
3.3		97/100	95/100	94/100	96/100
6.6		91/100	93/100	95/100	93/100

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	12-3701-0530	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	28 Apr-16 14:18	**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:	07-5317-9993	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	05 Apr-16 13:02	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	05 Apr-16 13:42	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	10-1907-0533	**Code:**	AVA0416.018	**Client:**	Avalon WWTP
Sample Date:	04 Apr-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP #690-A
Receive Date:	05 Apr-16 11:30	**Source:**	Bioassay Report		
Sample Age:	31h (3.2 °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	14.8	14.9	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	6.2	4.929	7.471	6.1	6.3	0.1	0.1414	2.28%	0
0.82		2	6.35	5.715	6.985	6.3	6.4	0.05001	0.07072	1.11%	0
1.64		2	6.2	4.929	7.471	6.1	6.3	0.1	0.1414	2.28%	0
3.3		2	6.25	3.073	9.427	6	6.5	0.25	0.3536	5.66%	0
6.6		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
Overall		12	6.342			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	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	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	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		12	7.842			7.7	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	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
0.41		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
0.82		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
1.64		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
3.3		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
6.6		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		12	14.85			14.8	14.9				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		6.3	6.1
0.82		6.4	6.3
1.64		6.3	6.1
3.3		6.5	6
6.6		6.6	6.1

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
0.41		7.9	7.9
0.82		7.8	7.9
1.64		7.8	7.9
3.3		7.8	7.8
6.6		7.7	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	14.9	14.8
0.41		14.9	14.8
0.82		14.9	14.8
1.64		14.9	14.8
3.3		14.9	14.8
6.6		14.9	14.8

CHAIN OF CUSTODY RECORD

Client: E.S. Engineering (Environ strategy)	**Project Name/Number:** AWWTP #690-A
Address 123 Pebbly Bch. Rd Avalon CA. 90704	**Project Mgr.** IAN Morison
	P.O. # 1810
Phone Number: (310) 510-0731	**Sampled By** *(signature)* [signature]

Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Analysis: Chronic toxicity	Comments
4/4/16	0630	X		WW	Eff Comp	1	1	Return Ice chest A.S.A.P. E.S. Engineering 123 Pebbly Beach Rd Avalon CA 90704

Temp. deg. C = 3.2 °C

~~Chlorine (mg/L)~~ = (2.)

NH3 (mg/L) = 0.0

Relinquised By: *(signature)* [signature] (IAN Morison)	Date: Time: 4/4/16 1400
Received By: *(signature)* [signature]	Date: Time: 4/5/16 (1130)
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: 4/5/2016

STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 36.07 ug/l
EC50 = 47.27 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: 28 Apr-16 14:12 (p 1 of 1)
Test Code: URC040516 | 17-1312-8789

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

Batch ID:	18-3659-1623	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	05 Apr-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	05 Apr-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	04-4851-1144	**Code:**	URC040516	**Client:**	Internal Lab
Sample Date:	05 Apr-16 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
14-1746-4167	Fertilization Rate	18	32	24	6.0%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
16-0223-7819	Fertilization Rate	EC5	22.39	21.28	23.04		Linear Interpolation (ICPIN)
		EC10	26.79	25.65	28.08		
		EC15	31.18	29.68	32.79		
		EC20	33.82	32.92	34.7		
		EC25	36.07	35.1	37		
		EC40	42.79	41.47	44.55		
		EC50	47.27	45.7	49.88		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
14-1746-4167	Fertilization Rate	Control Resp	0.925	0.7 - NL	Yes	Passes Acceptability Criteria
16-0223-7819	Fertilization Rate	Control Resp	0.925	0.7 - NL	Yes	Passes Acceptability Criteria
14-1746-4167	Fertilization Rate	PMSD	0.05999	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	0.925	0.8945	0.9555	0.91	0.95	0.009574	0.01915	2.07%	0.0%
18		4	0.9425	0.9072	0.9778	0.91	0.96	0.01109	0.02217	2.35%	-1.89%
32		4	0.785	0.7691	0.8009	0.77	0.79	0.005	0.01	1.27%	15.14%
56		4	0.285	0.2054	0.3646	0.26	0.36	0.025	0.05	17.54%	69.19%
100		4	0.035	0	0.08777	0	0.08	0.01658	0.03317	94.76%	96.22%
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	0.91	0.91	0.95	0.93
18		0.96	0.95	0.91	0.95
32		0.77	0.79	0.79	0.79
56		0.26	0.26	0.36	0.26
100		0.03	0.08	0	0.03
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	91/100	95/100	93/100
18		96/100	95/100	91/100	95/100
32		77/100	79/100	79/100	79/100
56		26/100	26/100	36/100	26/100
100		3/100	8/100	0/100	3/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 28 Apr-16 14:12 (p 1 of 2)
Test Code: URC040516 | 17-1312-8789

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

Analysis ID:	14-1746-4167	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	28 Apr-16 14:11	**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	6.0%	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	-0.9131	2.356	0.094	6	0.9692	CDF	Non-Significant Effect
		32*	5.178	2.356	0.094	6	0.0002	CDF	Significant Effect
		56*	18.39	2.356	0.094	6	<0.0001	CDF	Significant Effect
		100*	28.19	2.356	0.094	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.090631	1.022658	4	321.8	<0.0001	Significant Effect
Error	0.04766818	0.003177879	15			
Total	4.138299		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	8.822	13.28	0.0657	Equal Variances
Variances	Mod Levene Equality of Variance	0.7544	4.893	0.5706	Equal Variances
Variances	Levene Equality of Variance	1.142	4.893	0.3744	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9364	0.866	0.2044	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1918	0.2235	0.0521	Normal Distribution
Distribution	D'Agostino Skewness	0.08772	2.576	0.9301	Normal Distribution
Distribution	D'Agostino Kurtosis	1.633	2.576	0.1025	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	2.673	9.21	0.2627	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.7635	3.878	0.0468	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	0.925	0.8945	0.9555	0.92	0.91	0.95	0.009574	2.07%	0.0%
18		4	0.9425	0.9072	0.9778	0.95	0.91	0.96	0.01109	2.35%	-1.89%
32		4	0.785	0.7691	0.8009	0.79	0.77	0.79	0.005	1.27%	15.14%
56		4	0.285	0.2054	0.3646	0.26	0.26	0.36	0.025	17.54%	69.19%
100		4	0.035	0	0.08777	0.03	0	0.08	0.01658	94.76%	96.22%
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	1.295	1.235	1.355	1.285	1.266	1.345	0.01885	2.91%	0.0%
18		4	1.332	1.26	1.403	1.345	1.266	1.369	0.02254	3.39%	-2.81%
32		4	1.089	1.07	1.108	1.095	1.071	1.095	0.006036	1.11%	15.94%
56		4	0.5622	0.4759	0.6484	0.5351	0.5351	0.6435	0.02711	9.64%	56.59%
100		4	0.1712	0.01736	0.3251	0.1741	0.05002	0.2868	0.04835	56.47%	86.78%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.14%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.91	0.91	0.95	0.93
18		0.96	0.95	0.91	0.95
32		0.77	0.79	0.79	0.79
56		0.26	0.26	0.36	0.26
100		0.03	0.08	0	0.03
180		0	0	0	0

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

Analysis ID:	14-1746-4167	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	28 Apr-16 14:11	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

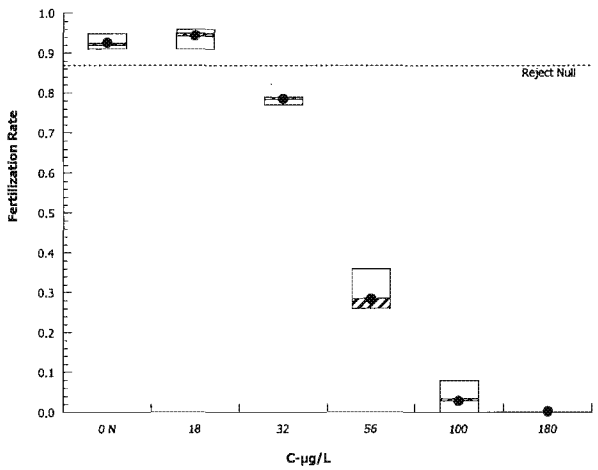
Angular (Corrected) Transformed Detail

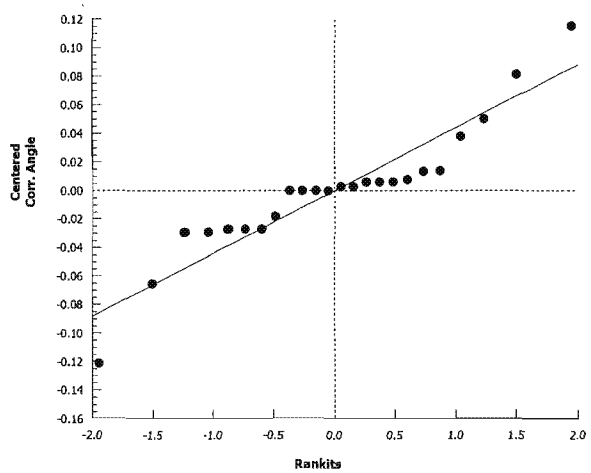
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.266	1.266	1.345	1.303
18		1.369	1.345	1.266	1.345
32		1.071	1.095	1.095	1.095
56		0.5351	0.5351	0.6435	0.5351
100		0.1741	0.2868	0.05002	0.1741
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	91/100	95/100	93/100
18		96/100	95/100	91/100	95/100
32		77/100	79/100	79/100	79/100
56		26/100	26/100	36/100	26/100
100		3/100	8/100	0/100	3/100
180		0/100	0/100	0/100	0/100

Graphics





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

Analysis ID:	16-0223-7819	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	28 Apr-16 14:11	**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	22.39	21.28	23.04
EC10	26.79	25.65	28.08
EC15	31.18	29.68	32.79
EC20	33.82	32.92	34.7
EC25	36.07	35.1	37
EC40	42.79	41.47	44.55
EC50	47.27	45.7	49.88

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	0.925	0.91	0.95	0.009574	0.01915	2.07%	0.0%	370	400
18		4	0.9425	0.91	0.96	0.01109	0.02217	2.35%	-1.89%	377	400
32		4	0.785	0.77	0.79	0.005	0.01	1.27%	15.14%	314	400
56		4	0.285	0.26	0.36	0.025	0.05	17.54%	69.19%	114	400
100		4	0.035	0	0.08	0.01658	0.03317	94.76%	96.22%	14	400
180		4	0	0	0	0	0		100.0%	0	400

Fertilization Rate Detail

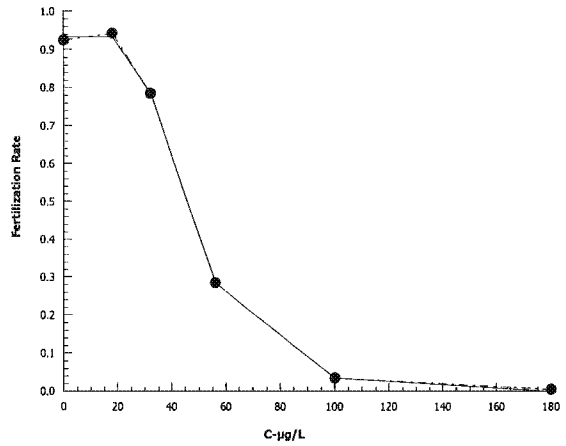
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.91	0.91	0.95	0.93
18		0.96	0.95	0.91	0.95
32		0.77	0.79	0.79	0.79
56		0.26	0.26	0.36	0.26
100		0.03	0.08	0	0.03
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	91/100	91/100	95/100	93/100
18		96/100	95/100	91/100	95/100
32		77/100	79/100	79/100	79/100
56		26/100	26/100	36/100	26/100
100		3/100	8/100	0/100	3/100
180		0/100	0/100	0/100	0/100

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	16-0223-7819	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	28 Apr-16 14:11	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



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

Batch ID:	18-3659-1623	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	05 Apr-16 13:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	05 Apr-16 13:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	04-4851-1144	**Code:**	URC040516	**Client:**	Internal Lab
Sample Date:	05 Apr-16 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	14.8	14.9	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	6.7	5.429	7.971	6.6	6.8	0.09999	0.1414	2.11%	0
18		2	6.4	0.0469	12.75	5.9	6.9	0.5	0.7071	11.05%	0
32		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
56		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
100		2	6.3	3.759	8.841	6.1	6.5	0.2	0.2828	4.49%	0
180		2	6.3	6.298	6.302	6.3	6.3	0	0	0.0%	0
Overall		12	6.425			5.9	6.9				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	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
18		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
32		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
56		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
180		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		12	14.85			14.8	14.9				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	6.6
18		6.9	5.9
32		6.6	6.1
56		6.7	6.3
100		6.5	6.1
180		6.3	6.3

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	14.9	14.8
18		14.9	14.8
32		14.9	14.8
56		14.9	14.8
100		14.9	14.8
180		14.9	14.8

INVOICE NO. AVA0816.0704

August 16, 2016

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

SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	21 July - 16
DATE SAMPLED:	20 July - 16
ABC LAB. NO.:	AVA0716.176
P.O. NO.:	690-A

CHRONIC NPDES BIOASSAYS	
Sea Urchin – (1 @ 945.00)	$945.00
TOTAL	$945.00

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

August 16, 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:	21 July - 16
DATE SAMPLED:	20 July - 16
ABC LAB. NO.:	AVA0716.176

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

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

Yours very truly,

Scott Johnson
Laboratory Director

ED_002551_00000729-00427

CETIS Summary Report

Report Date: 16 Aug-16 16:10 (p 1 of 1)
Test Code: AVA0716.176 | 21-2369-0471

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

Batch ID:	02-8703-2603	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	21 Jul-16 15:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	21 Jul-16 15:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	17-4133-5775	**Code:**	AVA0716.176	**Client:**	E.S. Engineering -Avalon WWTP
Sample Date:	20 Jul-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP
Receive Date:	21 Jul-16 10:45	**Source:**	Bioassay Report		
Sample Age:	33h (1.7 °C)	**Station:**	Eff Comp		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
13-9149-2175	Fertilization Rate	6.6	>6.6	NA	3.37%	15.15	Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
15-8790-8670	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
13-9149-2175	Fertilization Rate	Control Resp	0.9475	0.7 - NL	Yes	Passes Acceptability Criteria
15-8790-8670	Fertilization Rate	Control Resp	0.9475	0.7 - NL	Yes	Passes Acceptability Criteria
13-9149-2175	Fertilization Rate	PMSD	0.03369	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	0.9475	0.9275	0.9675	0.93	0.96	0.006292	0.01258	1.33%	0.0%
0.41		4	0.93	0.885	0.975	0.91	0.97	0.01414	0.02828	3.04%	1.85%
0.82		4	0.9325	0.8997	0.9653	0.91	0.95	0.01031	0.02062	2.21%	1.58%
1.64		4	0.9525	0.9286	0.9764	0.93	0.96	0.0075	0.015	1.58%	-0.53%
3.3		4	0.93	0.9075	0.9525	0.91	0.94	0.007071	0.01414	1.52%	1.85%
6.6		4	0.94	0.9216	0.9584	0.93	0.95	0.005773	0.01155	1.23%	0.79%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.93	0.95	0.96	0.95
0.41		0.97	0.91	0.93	0.91
0.82		0.92	0.95	0.95	0.91
1.64		0.96	0.93	0.96	0.96
3.3		0.91	0.94	0.93	0.94
6.6		0.93	0.95	0.95	0.93

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	93/100	95/100	96/100	95/100
0.41		97/100	91/100	93/100	91/100
0.82		92/100	95/100	95/100	91/100
1.64		96/100	93/100	96/100	96/100
3.3		91/100	94/100	93/100	94/100
6.6		93/100	95/100	95/100	93/100

CETIS Analytical Report

Report Date: 16 Aug-16 16:11 (p 1 of 2)
Test Code: AVA0716.176 | 21-2369-0471

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

Analysis ID: 13-9149-2175 **Endpoint:** Fertilization Rate **CETIS Version:** CETISv1.8.7
Analyzed: 16 Aug-16 16:10 **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	3.37%	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	1.218	2.407	0.065	6	0.3299	CDF	Non-Significant Effect
		0.82	1.137	2.407	0.065	6	0.3631	CDF	Non-Significant Effect
		1.64	-0.4489	2.407	0.065	6	0.9322	CDF	Non-Significant Effect
		3.3	1.368	2.407	0.065	6	0.2728	CDF	Non-Significant Effect
		6.6	0.617	2.407	0.065	6	0.5957	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007836455	0.001567291	5	1.083	0.4030	Non-Significant Effect
Error	0.02605907	0.001447726	18			
Total	0.03389553		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	3.628	15.09	0.6041	Equal Variances
Variances	Mod Levene Equality of Variance	0.6665	4.248	0.6537	Equal Variances
Variances	Levene Equality of Variance	1.258	4.248	0.3243	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9266	0.884	0.0819	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1474	0.2056	0.1924	Normal Distribution
Distribution	D'Agostino Skewness	0.9754	2.576	0.3293	Normal Distribution
Distribution	D'Agostino Kurtosis	0.681	2.576	0.4959	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	1.415	9.21	0.4928	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.6973	3.878	0.0686	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	0.9475	0.9275	0.9675	0.95	0.93	0.96	0.006292	1.33%	0.0%
0.41		4	0.93	0.885	0.975	0.92	0.91	0.97	0.01414	3.04%	1.85%
0.82		4	0.9325	0.8997	0.9653	0.935	0.91	0.95	0.01031	2.21%	1.58%
1.64		4	0.9525	0.9286	0.9764	0.96	0.93	0.96	0.0075	1.58%	-0.53%
3.3		4	0.93	0.9075	0.9525	0.935	0.91	0.94	0.007071	1.52%	1.85%
6.6		4	0.94	0.9216	0.9584	0.94	0.93	0.95	0.005773	1.23%	0.79%

Angular (Corrected) Transformed Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Contr	4	1.341	1.297	1.385	1.345	1.303	1.369	0.0138	2.06%	0.0%
0.41		4	1.308	1.21	1.406	1.285	1.266	1.397	0.03083	4.71%	2.44%
0.82		4	1.31	1.245	1.376	1.315	1.266	1.345	0.0206	3.14%	2.28%
1.64		4	1.353	1.3	1.406	1.369	1.303	1.369	0.0166	2.45%	-0.9%
3.3		4	1.304	1.261	1.347	1.313	1.266	1.323	0.01349	2.07%	2.75%
6.6		4	1.324	1.285	1.363	1.324	1.303	1.345	0.0122	1.84%	1.24%

Fertilization Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.93	0.95	0.96	0.95
0.41		0.97	0.91	0.93	0.91
0.82		0.92	0.95	0.95	0.91
1.64		0.96	0.93	0.96	0.96
3.3		0.91	0.94	0.93	0.94
6.6		0.93	0.95	0.95	0.93

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

Analysis ID:	13-9149-2175	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Aug-16 16:10	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

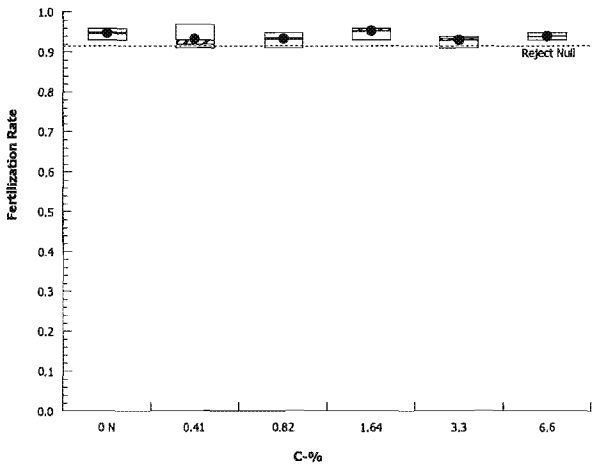
Angular (Corrected) Transformed Detail

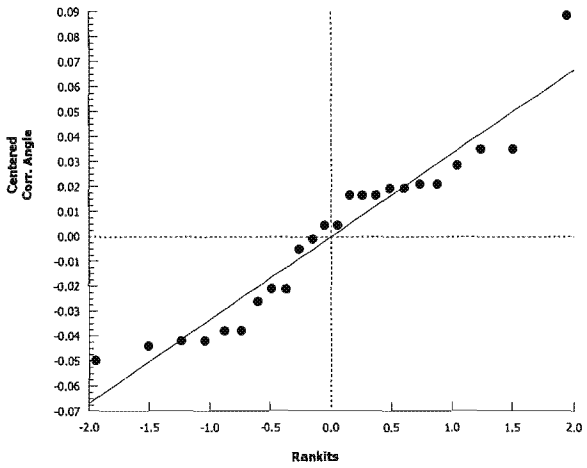
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.303	1.345	1.369	1.345
0.41		1.397	1.266	1.303	1.266
0.82		1.284	1.345	1.345	1.266
1.64		1.369	1.303	1.369	1.369
3.3		1.266	1.323	1.303	1.323
6.6		1.303	1.345	1.345	1.303

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	93/100	95/100	96/100	95/100
0.41		97/100	91/100	93/100	91/100
0.82		92/100	95/100	95/100	91/100
1.64		96/100	93/100	96/100	96/100
3.3		91/100	94/100	93/100	94/100
6.6		93/100	95/100	95/100	93/100

Graphics





CETIS Analytical Report

Test Code: AVA0716.176 | 21-2369-0471

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

Analysis ID:	15-8790-8670	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Aug-16 16:10	**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	0.9475	0.93	0.96	0.006292	0.01258	1.33%	0.0%	379	400
0.41		4	0.93	0.91	0.97	0.01414	0.02828	3.04%	1.85%	372	400
0.82		4	0.9325	0.91	0.95	0.01031	0.02062	2.21%	1.58%	373	400
1.64		4	0.9525	0.93	0.96	0.0075	0.015	1.58%	-0.53%	381	400
3.3		4	0.93	0.91	0.94	0.007071	0.01414	1.52%	1.85%	372	400
6.6		4	0.94	0.93	0.95	0.005773	0.01155	1.23%	0.79%	376	400

Fertilization Rate Detail

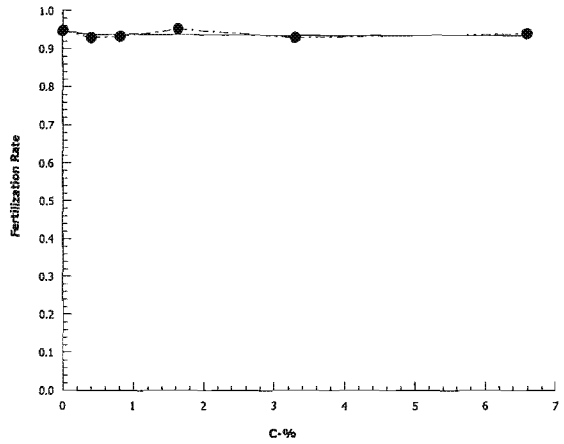
C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.93	0.95	0.96	0.95
0.41		0.97	0.91	0.93	0.91
0.82		0.92	0.95	0.95	0.91
1.64		0.96	0.93	0.96	0.96
3.3		0.91	0.94	0.93	0.94
6.6		0.93	0.95	0.95	0.93

Fertilization Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	93/100	95/100	96/100	95/100
0.41		97/100	91/100	93/100	91/100
0.82		92/100	95/100	95/100	91/100
1.64		96/100	93/100	96/100	96/100
3.3		91/100	94/100	93/100	94/100
6.6		93/100	95/100	95/100	93/100

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	15-8790-8670	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Aug-16 16:10	**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:	02-8703-2603	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	21 Jul-16 15:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	21 Jul-16 15:41	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	17-4133-5775	**Code:**	AVA0716.176	**Client:**	E.S. Engineering -Avalon WWTP
Sample Date:	20 Jul-16 06:30	**Material:**	Sample Water	**Project:**	AWWTP
Receive Date:	21 Jul-16 10:45	**Source:**	Bioassay Report		
Sample Age:	33h (1.7 °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	14.8	14.9	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	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
0.82		2	6.6	5.329	7.871	6.5	6.7	0.1	0.1414	2.14%	0
1.64		2	6.5	1.418	11.58	6.1	6.9	0.4	0.5657	8.7%	0
3.3		2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
6.6		2	6.4	5.129	7.671	6.3	6.5	0.1	0.1414	2.21%	0
Overall		12	6.475			6.1	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	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
3.3		2	7.7	7.698	7.702	7.7	7.7	0	0	0.0%	0
6.6		2	7.7	7.698	7.702	7.7	7.7	0	0	0.0%	0
Overall		12	7.792			7.7	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	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
0.41		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
0.82		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
1.64		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
3.3		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
6.6		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		12	14.85			14.8	14.9				0 (0%)

Dissolved Oxygen-mg/L

C-%	Control Type	1	2
0	Negative Contr	6.8	6.2
0.41		6.6	6.3
0.82		6.7	6.5
1.64		6.9	6.1
3.3		6.6	6.2
6.6		6.5	6.3

pH-Units

C-%	Control Type	1	2
0	Negative Contr	7.9	7.9
0.41		7.8	7.9
0.82		7.8	7.9
1.64		7.7	7.8
3.3		7.7	7.7
6.6		7.7	7.7

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	14.8	14.9
0.41		14.8	14.9
0.82		14.8	14.9
1.64		14.8	14.9
3.3		14.8	14.9
6.6		14.8	14.9

CHAIN OF CUSTODY RECORD

Client: ES. 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	Analysis: Chronic Toxicity	Comments
7/20/16	0630	X		WW	Eff Comp	1	X	

Temp. deg. C = 1.7°C

Chlorine (mg/L) = <0.1

NH3 (mg/L) = 0.0

Relinquised By: (signature) Ian Morison Date: Time: 7/20/16 2150

Received By: (signature) [illegible] Date: Time: 7/21/16 0945

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 FERTILIZATION BIOASSAY

DATE: 7/21/2016

STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 35.26 ug/l
EC50 = 45.64 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: 16 Aug-16 16:02 (p 1 of 1)
Test Code: URC072116 | 08-8342-9488

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

Batch ID:	06-0433-2204	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	21 Jul-16 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	21 Jul-16 15:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	18-1018-4018	**Code:**	URC072116	**Client:**	Internal Lab
Sample Date:	21 Jul-16 15:00	**Material:**	Copper chloride	**Project:**	
Receive Date:		**Source:**	Reference Toxicant		
Sample Age:	NA	**Station:**	REF TOX		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
09-9127-3022	Fertilization Rate	18	32	24	3.4%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
19-8506-8658	Fertilization Rate	EC5	21.43	18.06	23.06		Linear Interpolation (ICPIN)
		EC10	25.78	23.2	27.57		
		EC15	30.13	27.85	32.12		
		EC20	33.18	32.14	34.13		
		EC25	35.26	34.27	36.2		
		EC40	41.49	40.49	42.47		
		EC50	45.64	44.57	46.78		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
09-9127-3022	Fertilization Rate	Control Resp	0.9475	0.7 - NL	Yes	Passes Acceptability Criteria
19-8506-8658	Fertilization Rate	Control Resp	0.9475	0.7 - NL	Yes	Passes Acceptability Criteria
09-9127-3022	Fertilization Rate	PMSD	0.03402	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	0.9475	0.9174	0.9776	0.92	0.96	0.009465	0.01893	2.0%	0.0%
18		4	0.9375	0.9022	0.9728	0.91	0.96	0.01109	0.02217	2.37%	1.06%
32		4	0.785	0.7691	0.8009	0.77	0.79	0.005	0.01	1.27%	17.15%
56		4	0.2375	0.1957	0.2793	0.21	0.26	0.01315	0.0263	11.07%	74.93%
100		4	0.0425	0.002719	0.08228	0.03	0.08	0.0125	0.025	58.82%	95.51%
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	0.96	0.92	0.95	0.96
18		0.95	0.91	0.93	0.96
32		0.77	0.79	0.79	0.79
56		0.26	0.26	0.22	0.21
100		0.03	0.03	0.08	0.03
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	92/100	95/100	96/100
18		95/100	91/100	93/100	96/100
32		77/100	79/100	79/100	79/100
56		26/100	26/100	22/100	21/100
100		3/100	3/100	8/100	3/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 16 Aug-16 16:02 (p 1 of 2)
Test Code: URC072116 | 08-8342-9488

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

Analysis ID: 09-9127-3022 **Endpoint:** Fertilization Rate **CETIS Version:** CETISv1.8.7
Analyzed: 16 Aug-16 16:02 **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	3.4%	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	0.7457	2.356	0.067	6	0.4943	CDF	Non-Significant Effect
		32*	8.959	2.356	0.067	6	<0.0001	CDF	Significant Effect
		56*	29.48	2.356	0.067	6	<0.0001	CDF	Significant Effect
		100*	40.31	2.356	0.067	6	<0.0001	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.19203	1.048008	4	655.4	<0.0001	Significant Effect
Error	0.02398489	0.001598993	15			
Total	4.216015		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	5.125	13.28	0.2747	Equal Variances
Variances	Mod Levene Equality of Variance	0.5476	4.893	0.7036	Equal Variances
Variances	Levene Equality of Variance	1.883	4.893	0.1657	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9561	0.866	0.4697	Normal Distribution
Distribution	Kolmogorov-Smirnov D	0.1431	0.2235	0.3515	Normal Distribution
Distribution	D'Agostino Skewness	0.8757	2.576	0.3812	Normal Distribution
Distribution	D'Agostino Kurtosis	0.4543	2.576	0.6496	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus	0.9733	9.21	0.6147	Normal Distribution
Distribution	Anderson-Darling A2 Normality	0.4373	3.878	0.3005	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	0.9475	0.9174	0.9776	0.955	0.92	0.96	0.009465	2.0%	0.0%
18		4	0.9375	0.9022	0.9728	0.94	0.91	0.96	0.01109	2.37%	1.06%
32		4	0.785	0.7691	0.8009	0.79	0.77	0.79	0.005	1.27%	17.15%
56		4	0.2375	0.1957	0.2793	0.24	0.21	0.26	0.01315	11.07%	74.93%
100		4	0.0425	0.002719	0.08228	0.03	0.03	0.08	0.0125	58.82%	95.51%
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	1.342	1.278	1.406	1.357	1.284	1.369	0.02016	3.0%	0.0%
18		4	1.321	1.248	1.394	1.324	1.266	1.369	0.02286	3.46%	1.57%
32		4	1.089	1.07	1.108	1.095	1.071	1.095	0.006036	1.11%	18.88%
56		4	0.5086	0.4593	0.5579	0.5116	0.476	0.5351	0.01549	6.09%	62.1%
100		4	0.2023	0.1126	0.2919	0.1741	0.1741	0.2868	0.02817	27.85%	84.93%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.0%	96.27%

Fertilization Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.96	0.92	0.95	0.96
18		0.95	0.91	0.93	0.96
32		0.77	0.79	0.79	0.79
56		0.26	0.26	0.22	0.21
100		0.03	0.03	0.08	0.03
180		0	0	0	0

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

Analysis ID:	09-9127-3022	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Aug-16 16:02	**Analysis:**	Parametric-Control vs Treatments	**Official Results:**	Yes

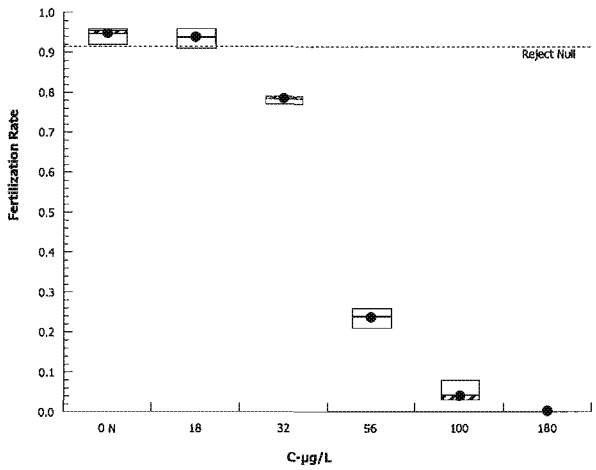
Angular (Corrected) Transformed Detail

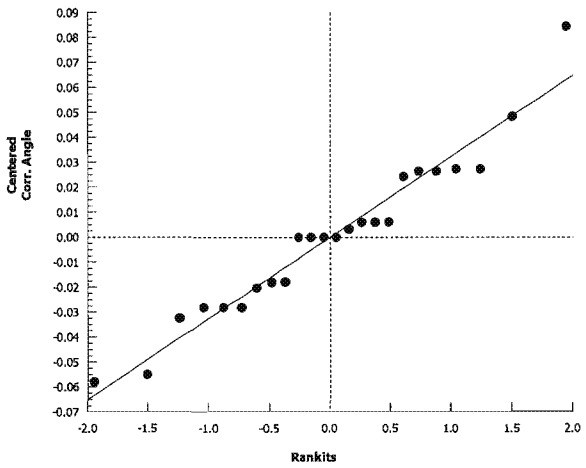
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	1.369	1.284	1.345	1.369
18		1.345	1.266	1.303	1.369
32		1.071	1.095	1.095	1.095
56		0.5351	0.5351	0.4882	0.476
100		0.1741	0.1741	0.2868	0.1741
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	92/100	95/100	96/100
18		95/100	91/100	93/100	96/100
32		77/100	79/100	79/100	79/100
56		26/100	26/100	22/100	21/100
100		3/100	3/100	8/100	3/100
180		0/100	0/100	0/100	0/100

Graphics





CETIS Analytical Report

Report Date: 16 Aug-16 16:02 (p 1 of 2)
Test Code: URC072116 | 08-8342-9488

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

Analysis ID:	19-8506-8658	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Aug-16 16:02	**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	21.43	18.06	23.06
EC10	25.78	23.2	27.57
EC15	30.13	27.85	32.12
EC20	33.18	32.14	34.13
EC25	35.26	34.27	36.2
EC40	41.49	40.49	42.47
EC50	45.64	44.57	46.78

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	0.9475	0.92	0.96	0.009465	0.01893	2.0%	0.0%	379	400
18		4	0.9375	0.91	0.96	0.01109	0.02217	2.37%	1.06%	375	400
32		4	0.785	0.77	0.79	0.005	0.01	1.27%	17.15%	314	400
56		4	0.2375	0.21	0.26	0.01315	0.0263	11.07%	74.93%	95	400
100		4	0.0425	0.03	0.08	0.0125	0.025	58.82%	95.51%	17	400
180		4	0	0	0	0	0		100.0%	0	400

Fertilization Rate Detail

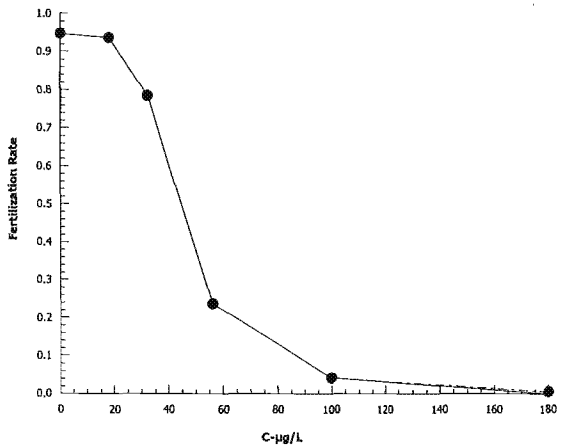
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	0.96	0.92	0.95	0.96
18		0.95	0.91	0.93	0.96
32		0.77	0.79	0.79	0.79
56		0.26	0.26	0.22	0.21
100		0.03	0.03	0.08	0.03
180		0	0	0	0

Fertilization Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Negative Control	96/100	92/100	95/100	96/100
18		95/100	91/100	93/100	96/100
32		77/100	79/100	79/100	79/100
56		26/100	26/100	22/100	21/100
100		3/100	3/100	8/100	3/100
180		0/100	0/100	0/100	0/100

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	19-8506-8658	**Endpoint:**	Fertilization Rate	**CETIS Version:**	CETISv1.8.7
Analyzed:	16 Aug-16 16:02	**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:	06-0433-2204	**Test Type:**	Fertilization	**Analyst:**	
Start Date:	21 Jul-16 15:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Seawater
Ending Date:	21 Jul-16 15:40	**Species:**	Strongylocentrotus purpuratus	**Brine:**	Not Applicable
Duration:	40m	**Source:**	David Gutoff	**Age:**	

Sample ID:	18-1018-4018	**Code:**	URC072116	**Client:**	Internal Lab
Sample Date:	21 Jul-16 15:00	**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	14.8	14.9	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	6.5	2.688	10.31	6.2	6.8	0.3	0.4243	6.53%	0
18		2	6.65	4.744	8.556	6.5	6.8	0.15	0.2121	3.19%	0
32		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
56		2	6.55	4.644	8.456	6.4	6.7	0.15	0.2121	3.24%	0
100		2	6.75	4.844	8.656	6.6	6.9	0.15	0.2121	3.14%	0
180		2	6.5	2.688	10.31	6.2	6.8	0.3	0.4243	6.53%	0
Overall		12	6.567			6.2	6.9				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	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
18		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
32		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
56		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
100		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
180		2	14.85	14.21	15.49	14.8	14.9	0.05004	0.07077	0.48%	0
Overall		12	14.85			14.8	14.9				0 (0%)

Dissolved Oxygen-mg/L

C-µg/L	Control Type	1	2
0	Negative Contr	6.8	6.2
18		6.8	6.5
32		6.6	6.3
56		6.7	6.4
100		6.9	6.6
180		6.8	6.2

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	14.8	14.9
18		14.8	14.9
32		14.8	14.9
56		14.8	14.9
100		14.8	14.9
180		14.8	14.9

INVOICE NO. AVA1116.1030

November 14, 2016

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

SAMPLE I.D.:	Effluent Comp
DATE RECEIVED:	18 Oct - 16
DATE SAMPLED:	17 Oct - 16
ABC LAB. NO.:	AVA1016.285
P.O. NO.:	690-A

CHRONIC NPDES BIOASSAYS	
Sea Urchin – (1 @ 945.00)	$945.00
TOTAL	$945.00

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 14, 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:	18 Oct - 16
DATE SAMPLED:	17 Oct - 16
ABC LAB. NO.:	AVA1016.285

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: 09 Nov-16 14:53 (p 1 of 1)
Test Code: AVA1016.285 | 12-8181-0108

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

Batch ID:	00-5516-0241	Test Type:	Development	Analyst:	
Start Date:	18 Oct-16 13:21	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	18 Oct-16 14:01	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	21-4248-8945	Code:	AVA1016.285	Client:	E.S. Engineering -Avalon WWTP
Sample Date:	17 Oct-16 07:10	Material:	Sample Water	Project:	AWWTF 690A
Receipt Date:	18 Oct-16 10:30	Source:	Bioassay Report		
Sample Age:	30h (3.4 °C)	Station:	Eff Comp		

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	NOEL	LOEL	TOEL	TU	PMSD ✓
06-9058-0105	Proportion Normal	Dunnett Multiple Comparison Test	6.6	> 6.6	n/a	15.15	7.1%

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	%	95% LCL	95% UCL	TU ✓
16-3906-7550	Proportion Normal	Linear Interpolation (ICPIN)	EC5	>6.6	n/a	n/a	<15.15
			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 Lower	TAC Limits Upper	Overlap	Decision
06-9058-0105	Proportion Normal	Control Resp	0.935	0.8	>>	Yes	Passes Criteria
16-3906-7550	Proportion Normal	Control Resp	0.935	0.8	>>	Yes	Passes Criteria

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.9350	0.8929	0.9771	0.9000	0.9600	0.0132	0.0265	2.83%	0.00%
0.41		4	0.9550	0.9345	0.9755	0.9400	0.9700	0.0065	0.0129	1.35%	-2.14%
0.82		4	0.9675	0.9347	1.0000	0.9400	0.9900	0.0103	0.0206	2.13%	-3.48%
1.64		4	0.9450	0.8613	1.0000	0.8700	0.9900	0.0263	0.0526	5.57%	-1.07%
3.3		4	0.9800	0.9670	0.9930	0.9700	0.9900	0.0041	0.0082	0.83%	-4.81%
6.6		4	0.9200	0.8431	0.9969	0.8500	0.9600	0.0242	0.0483	5.25%	1.60%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9300	0.9000	0.9500	0.9600
0.41		0.9500	0.9700	0.9600	0.9400
0.82		0.9700	0.9400	0.9700	0.9900
1.64		0.9500	0.9900	0.8700	0.9700
3.3		0.9800	0.9900	0.9800	0.9700
6.6		0.8500	0.9600	0.9300	0.9400

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	93/100	90/100	95/100	96/100
0.41		95/100	97/100	96/100	94/100
0.82		97/100	94/100	97/100	99/100
1.64		95/100	99/100	87/100	97/100
3.3		98/100	99/100	98/100	97/100
6.6		85/100	96/100	93/100	94/100

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

Analysis ID:	06-9058-0105	Endpoint:	Proportion Normal	CETIS Version:	CETISv1.9.2
Analyzed:	08 Nov-16 21:41	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Batch ID:	00-5516-0241	Test Type:	Development	Analyst:	
Start Date:	18 Oct-16 13:21	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	18 Oct-16 14:01	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	21-4248-8945	Code:	AVA1016.285	Client:	E.S. Engineering -Avalon WWTP
Sample Date:	17 Oct-16 07:10	Material:	Sample Water	Project:	AWWTF 690A
Receipt Date:	18 Oct-16 10:30	Source:	Bioassay Report		
Sample Age:	30h (3.4 °C)	Station:	Eff Comp		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	6.6	> 6.6	n/a	15.15	7.10%

Dunnett Multiple Comparison Test

Control vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control	0.41	-0.8651	2.407	0.117	6	CDF	0.9753	Non-Significant Effect
	0.82	-1.651	2.407	0.117	6	CDF	0.9974	Non-Significant Effect
	1.64	-0.761	2.407	0.117	6	CDF	0.9678	Non-Significant Effect
	3.3	-2.361	2.407	0.117	6	CDF	0.9997	Non-Significant Effect
	6.6	0.5042	2.407	0.117	6	CDF	0.6457	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
Control Resp	0.935	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0517241	0.0103448	5	2.195	0.1001	Non-Significant Effect
Error	0.084821	0.0047123	18			
Total	0.136545		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	6.815	15.09	0.2347	Equal Variances
Variances	Levene Equality of Variance Test	1.279	4.248	0.3159	Equal Variances
Variances	Mod Levene Equality of Variance Test	1.025	4.248	0.4322	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.4927	3.878	0.2215	Normal Distribution
Distribution	D'Agostino Kurtosis Test	1.129	2.576	0.2587	Normal Distribution
Distribution	D'Agostino Skewness Test	1.428	2.576	0.1533	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	3.315	9.21	0.1907	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.161	0.2056	0.1082	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9592	0.884	0.4222	Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9350	0.8929	0.9771	0.9400	0.9000	0.9600	0.0132	2.83%	0.00%
0.41		4	0.9550	0.9345	0.9755	0.9550	0.9400	0.9700	0.0065	1.35%	-2.14%
0.82		4	0.9675	0.9347	1.0000	0.9700	0.9400	0.9900	0.0103	2.13%	-3.48%
1.64		4	0.9450	0.8613	1.0000	0.9600	0.8700	0.9900	0.0263	5.57%	-1.07%
3.3		4	0.9800	0.9670	0.9930	0.9800	0.9700	0.9900	0.0041	0.83%	-4.81%
6.6		4	0.9200	0.8431	0.9969	0.9350	0.8500	0.9600	0.0242	5.25%	1.60%

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

Analysis ID:	06-9058-0105	Endpoint:	Proportion Normal	CETIS Version:	CETISv1.9.2
Analyzed:	08 Nov-16 21:41	Analysis:	Parametric-Control vs Treatments	Official Results:	Yes

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.317	1.233	1.401	1.324	1.249	1.369	0.0264	4.01%	0.00%
0.41		4	1.359	1.308	1.409	1.357	1.323	1.397	0.01579	2.32%	-3.19%
0.82		4	1.397	1.301	1.493	1.397	1.323	1.471	0.03007	4.31%	-6.09%
1.64		4	1.354	1.173	1.534	1.371	1.202	1.471	0.05674	8.38%	-2.81%
3.3		4	1.431	1.383	1.48	1.429	1.397	1.471	0.01515	2.12%	-8.70%
6.6		4	1.292	1.158	1.426	1.313	1.173	1.369	0.04207	6.51%	1.86%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9300	0.9000	0.9500	0.9600
0.41		0.9500	0.9700	0.9600	0.9400
0.82		0.9700	0.9400	0.9700	0.9900
1.64		0.9500	0.9900	0.8700	0.9700
3.3		0.9800	0.9900	0.9800	0.9700
6.6		0.8500	0.9600	0.9300	0.9400

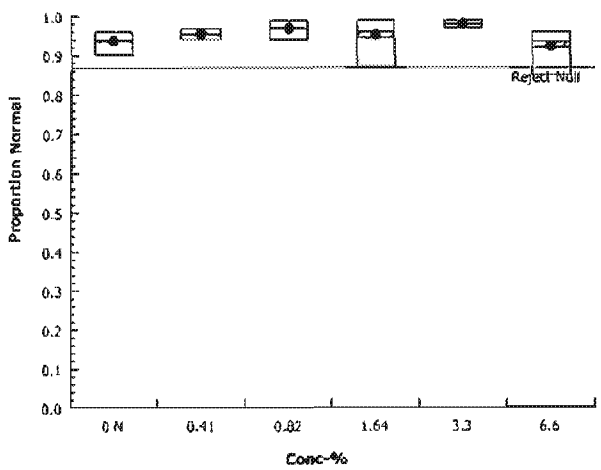
Angular (Corrected) Transformed Detail

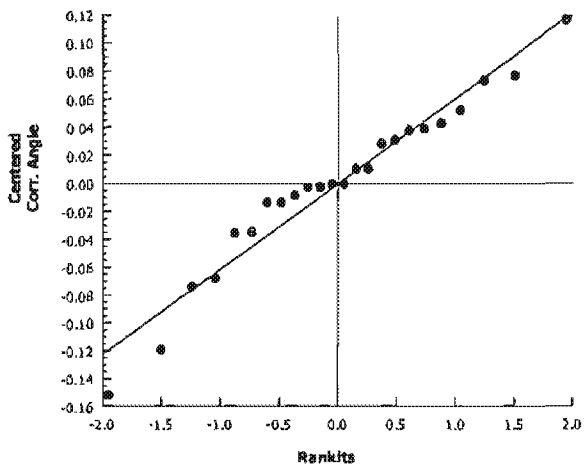
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.303	1.249	1.345	1.369
0.41		1.345	1.397	1.369	1.323
0.82		1.397	1.323	1.397	1.471
1.64		1.345	1.471	1.202	1.397
3.3		1.429	1.471	1.429	1.397
6.6		1.173	1.369	1.303	1.323

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	93/100	90/100	95/100	96/100
0.41		95/100	97/100	96/100	94/100
0.82		97/100	94/100	97/100	99/100
1.64		95/100	99/100	87/100	97/100
3.3		98/100	99/100	98/100	97/100
6.6		85/100	96/100	93/100	94/100

Graphics





CETIS Analytical Report

Report Date: 09 Nov-16 14:53 (p 1 of 2)
Test Code: AVA1016.285 | 12-8181-0108

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

Analysis ID:	16-3906-7550	Endpoint:	Proportion Normal	CETIS Version:	CETISv1.9.2
Analyzed:	08 Nov-16 21:41	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Batch ID:	00-5516-0241	Test Type:	Development	Analyst:	
Start Date:	18 Oct-16 13:21	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	18 Oct-16 14:01	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	21-4248-8945	Code:	AVA1016.285	Client:	E.S. Engineering -Avalon WWTP
Sample Date:	17 Oct-16 07:10	Material:	Sample Water	Project:	AWWTF 690A
Receipt Date:	18 Oct-16 10:30	Source:	Bioassay Report		
Sample Age:	30h (3.4 °C)	Station:	Eff Comp		

Linear Interpolation Options

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

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.935	0.8	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
EC5	>6.6	n/a	n/a	<15.15	n/a	n/a
EC10	>6.6	n/a	n/a	<15.15	n/a	n/a
EC15	>6.6	n/a	n/a	<15.15	n/a	n/a
EC20	>6.6	n/a	n/a	<15.15	n/a	n/a
EC25	>6.6	n/a	n/a	<15.15	n/a	n/a
EC40	>6.6	n/a	n/a	<15.15	n/a	n/a
EC50	>6.6	n/a	n/a	<15.15	n/a	n/a

Proportion Normal Summary

			Calculated Variate(A/B)								
Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	N	4	0.9350	0.9000	0.9600	0.0132	0.0265	2.83%	0.0%	374	400
0.41		4	0.9550	0.9400	0.9700	0.0065	0.0129	1.35%	-2.14%	382	400
0.82		4	0.9675	0.9400	0.9900	0.0103	0.0206	2.13%	-3.48%	387	400
1.64		4	0.9450	0.8700	0.9900	0.0263	0.0526	5.57%	-1.07%	378	400
3.3		4	0.9800	0.9700	0.9900	0.0041	0.0082	0.83%	-4.81%	392	400
6.6		4	0.9200	0.8500	0.9600	0.0242	0.0483	5.25%	1.6%	368	400

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9300	0.9000	0.9500	0.9600
0.41		0.9500	0.9700	0.9600	0.9400
0.82		0.9700	0.9400	0.9700	0.9900
1.64		0.9500	0.9900	0.8700	0.9700
3.3		0.9800	0.9900	0.9800	0.9700
6.6		0.8500	0.9600	0.9300	0.9400

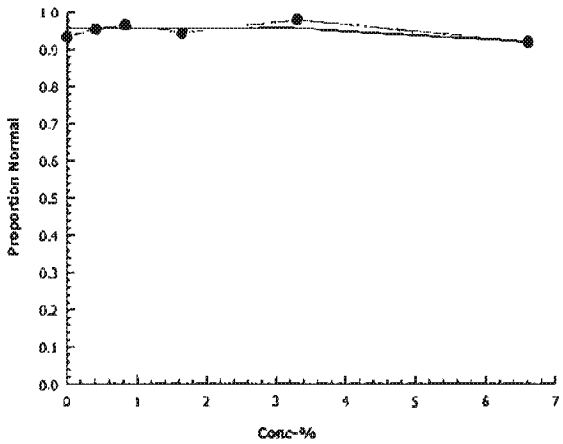
Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	93/100	90/100	95/100	96/100
0.41		95/100	97/100	96/100	94/100
0.82		97/100	94/100	97/100	99/100
1.64		95/100	99/100	87/100	97/100
3.3		98/100	99/100	98/100	97/100
6.6		85/100	96/100	93/100	94/100

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

Analysis ID:	16-3906-7550	Endpoint:	Proportion Normal	CETIS Version:	CETISv1.9.2
Analyzed:	08 Nov-16 21:41	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:	00-5516-0241	Test Type:	Development	Analyst:	
Start Date:	18 Oct-16 13:21	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	18 Oct-16 14:01	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	

Sample ID:	21-4248-8945	Code:	AVA1016.285	Client:	E.S. Engineering -Avalon WWTP
Sample Date:	17 Oct-16 07:10	Material:	Sample Water	Project:	AWWTF 690A
Receipt Date:	18 Oct-16 10:30	Source:	Bioassay Report		
Sample Age:	30h (3.4 °C)	Station:	Eff Comp		

Parameter Acceptability Criteria

Parameter	Min	Max	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.6	14.8	11	13	Yes	Above Criteria

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
0.41		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
0.82		2	6.45	3.273	9.627	6.2	6.7	0.25	0.3536	5.48%	0
1.64		2	6.6	2.788	10.41	6.3	6.9	0.3	0.4243	6.43%	0
3.3		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
6.6		2	6.4	2.588	10.21	6.1	6.7	0.3	0.4243	6.63%	0
Overall		12	6.45	6.261	6.639	6.1	6.9	0.08572	0.297	4.60%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
0.41		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	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	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	7.917	7.892	7.941	7.9	8	0.01124	0.03892	0.49%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
0.41		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	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
0.41		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
0.82		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
1.64		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
3.3		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
6.6		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
Overall		12	14.7	14.63	14.77	14.6	14.8	0.03015	0.1044	0.71%	0 (0%)

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

Conc-%	Code	1	2
0	N	6.8	6.1
0.41		6.6	6.1
0.82		6.7	6.2
1.64		6.9	6.3
3.3		6.6	6.3
6.6		6.7	6.1

pH-Units

Conc-%	Code	1	2
0	N	7.9	7.9
0.41		7.9	7.9
0.82		7.9	7.9
1.64		7.9	7.9
3.3		8	7.9
6.6		8	7.9

Salinity-ppt

Conc-%	Code	1	2
0	N	34	34
0.41		34	34
0.82		34	34
1.64		34	34
3.3		34	34
6.6		34	34

Temperature-°C

Conc-%	Code	1	2
0	N	14.8	14.6
0.41		14.8	14.6
0.82		14.8	14.6
1.64		14.8	14.6
3.3		14.8	14.6
6.6		14.8	14.6