



April 18, 2018

Mr. Chris Wessel
Geosyntec
6167 Bristol Parkway, Suite 390
Culver City, CA 90230

Dear Mr. Wessel:

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

CLIENT:	Geosyntec
SAMPLE I.D.:	RW-BCEG01-007
DATE RECEIVED:	4 Dec - 18
ABC LAB. NO.:	GST1218.020

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

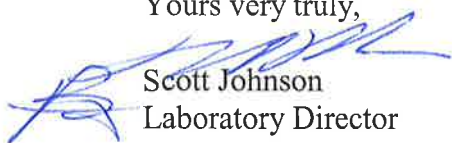
IWC CONCENTRATION = 100%

TST RESULT

PASS

% EFFECT = -1.48 %

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 20 Dec-18 15:04 (p 1 of 1)
Test Code: GST1218.020 | 08-7392-1813

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 13-7552-0611	Test Type: Fertilization	Analyst:
Start Date: 04 Dec-18 13:07	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 04 Dec-18 13:47	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 11-5656-6500	Code: GST1218.020	Client: GeoSyntec Consultants
Sample Date: 03 Dec-18 10:30	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 04 Dec-18 11:07	Source: Bioassay Report	
Sample Age: 27h (4.8 °C)	Station: RW-BCEG01-007	

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
02-2885-2415	Fertilization Rate	TST-Welch's t Test	<1.0E-37	100% passed fertilization rate

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
02-2885-2415	Fertilization Rate	Control Resp	0.9312	0.7	>>	Yes	Passes Criteria

Fertilization Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	8	0.9313	0.9161	0.9464	0.9100	0.9600	0.0064	0.0181	1.94%	0.00%
100		8	0.9450	0.9283	0.9617	0.9100	0.9700	0.0071	0.0200	2.12%	-1.48%

Fertilization Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	0.9100	0.9300	0.9600	0.9500	0.9200	0.9300	0.9400	0.9100
100		0.9600	0.9500	0.9300	0.9700	0.9600	0.9500	0.9300	0.9100

Fertilization Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	91/100	93/100	96/100	95/100	92/100	93/100	94/100	91/100
100		96/100	95/100	93/100	97/100	96/100	95/100	93/100	91/100

CETIS Analytical Report

Report Date: 20 Dec-18 15:04 (p 1 of 2)
Test Code: GST1218.020 | 08-7392-1813

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 02-2885-2415	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 20 Dec-18 15:03	Analysis: Parametric Bioequivalence-Two Sample	Official Results: Yes
Batch ID: 13-7552-0611	Test Type: Fertilization	Analyst:
Start Date: 04 Dec-18 13:07	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 04 Dec-18 13:47	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 11-5656-6500	Code: GST1218.020	Client: GeoSyntec Consultants
Sample Date: 03 Dec-18 10:30	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 04 Dec-18 11:07	Source: Bioassay Report	
Sample Age: 27h (4.8 °C)	Station: RW-BCEG01-007	

Data Transform	Alt Hyp	TST_b	Comparison Result
Angular (Corrected)	C*b < T	0.75	100% passed fertilization rate

TST-Welch's t Test

Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100*	19.62	1.796	11	CDF	<1.0E-37	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.9312	0.7	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0035391	0.0035391	1	2.185	0.1615	Non-Significant Effect
Error	0.0226726	0.0016195	14			
Total	0.0262117		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	0.3301	8.862	0.5747	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.1778	8.862	0.6797	Equal Variances
Variances	Variance Ratio F Test	1.379	8.885	0.6825	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.2767	3.878	0.6838	Normal Distribution
Distribution	D'Agostino Skewness Test	0.05991	2.576	0.9522	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1234	0.2471	0.8382	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9643	0.8408	0.7394	Normal Distribution

Fertilization Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	8	0.9313	0.9161	0.9464	0.9300	0.9100	0.9600	0.0064	1.94%	0.00%
100		8	0.9450	0.9283	0.9617	0.9500	0.9100	0.9700	0.0071	2.12%	-1.48%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	8	1.308	1.277	1.338	1.303	1.266	1.369	0.01305	2.82%	0.00%
100		8	1.337	1.301	1.374	1.345	1.266	1.397	0.01532	3.24%	-2.27%

Fertilization Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	0.9100	0.9300	0.9600	0.9500	0.9200	0.9300	0.9400	0.9100
100		0.9600	0.9500	0.9300	0.9700	0.9600	0.9500	0.9300	0.9100

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	1.266	1.303	1.369	1.345	1.284	1.303	1.323	1.266
100		1.369	1.345	1.303	1.397	1.369	1.345	1.303	1.266

CETIS Analytical Report

Report Date: 20 Dec-18 15:04 (p 2 of 2)

Test Code: GST1218.020 | 08-7392-1813

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 02-2885-2415

Endpoint: Fertilization Rate

CETIS Version: CETISv1.9.2

Analyzed: 20 Dec-18 15:03

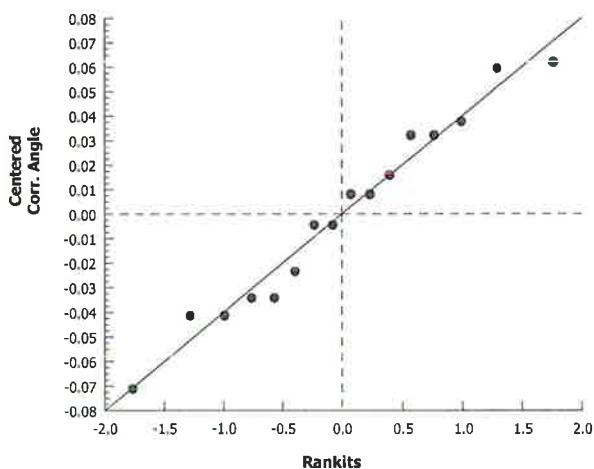
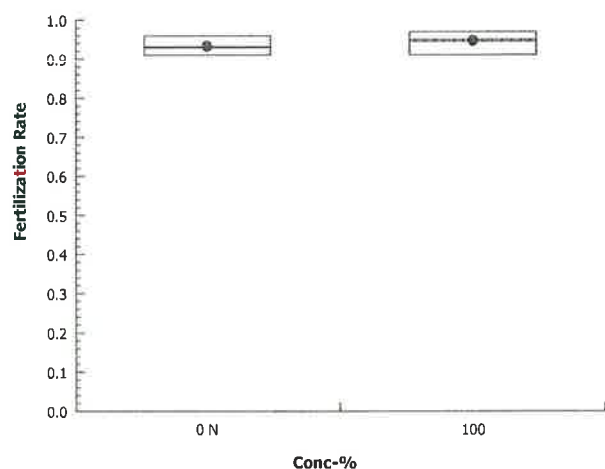
Analysis: Parametric Bioequivalence-Two Sample

Official Results: Yes

Fertilization Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	91/100	93/100	96/100	95/100	92/100	93/100	94/100	91/100
100		96/100	95/100	93/100	97/100	96/100	95/100	93/100	91/100

Graphics



CETIS Measurement Report

Report Date: 20 Dec-18 15:04 (p 1 of 1)
Test Code: GST1218.020 | 08-7392-1813

Purple Sea Urchin Sperm Cell Fertilization Test						Aquatic Bioassay & Consulting Labs, Inc.					
Batch ID: 13-7552-0611		Test Type: Fertilization				Analyst:					
Start Date: 04 Dec-18 13:07		Protocol: EPA/600/R-95/136 (1995)				Diluent: Laboratory Seawater					
Ending Date: 04 Dec-18 13:47		Species: Strongylocentrotus purpuratus				Brine: Not Applicable					
Duration: 40m		Source: Ventura Dive				Age:					
Sample ID: 11-5656-6500		Code: GST1218.020				Client: GeoSyntec Consultants					
Sample Date: 03 Dec-18 10:30		Material: Sample Water				Project: Beach Cities CIMP (LA0380)					
Receipt Date: 04 Dec-18 11:07		Source: Bioassay Report									
Sample Age: 27h (4.8 °C)		Station: RW-BCEG01-007									

Parameter Acceptability Criteria			TAC Limits							
Parameter	Min	Max	Lower	Upper	Overlap	Decision				
Salinity	34	34	32	36	Yes	Passes Criteria				
Temperature	14.7	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	6.55	3.373	9.727	6.3	6.8	0.25	0.3536	5.4%	0
100		2	6.4	3.859	8.941	6.2	6.6	0.2	0.2828	4.42%	0
Overall		4	6.475	6.037	6.913	6.2	6.8	0.1377	0.2754	4.25%	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
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		4	7.825	7.673	7.977	7.7	7.9	0.04787	0.09574	1.22%	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
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75	14.66	14.84	14.7	14.8	0.02887	0.05774	0.39%	0 (0%)

Dissolved Oxygen-mg/L			
Conc-%	Code	1	2
0	N	6.8	6.3
100		6.6	6.2

pH-Units			
Conc-%	Code	1	2
0	N	7.9	7.9
100		7.8	7.7

Salinity-ppt			
Conc-%	Code	1	2
0	N	34	34
100		34	34

Temperature-°C			
Conc-%	Code	1	2
0	N	14.8	14.7
100		14.8	14.7

April 18, 2018

Mr. Chris Wessel
Geosyntec
6167 Bristol Parkway, Suite 390
Culver City, CA 90230

Dear Mr. Wessel:

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

CLIENT:	Geosyntec
SAMPLE I.D.:	RW-BCEG02-007
DATE RECEIVED:	4 Dec - 18
ABC LAB. NO.:	GST1218.021

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

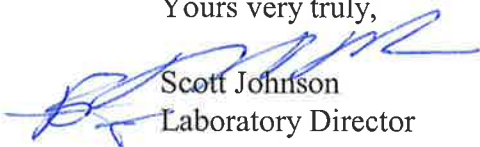
IWC CONCENTRATION = 100%

TST RESULT

PASS

% EFFECT = -1.21 %

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 20 Dec-18 15:10 (p 1 of 1)
Test Code: GST1218.021 | 13-8056-1591

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 07-6163-8316	Test Type: Fertilization	Analyst:
Start Date: 04 Dec-18 13:08	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 04 Dec-18 13:48	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 07-1641-8076	Code: GST1218.021	Client: GeoSyntec Consultants
Sample Date: 03 Dec-18 11:00	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 04 Dec-18 11:07	Source: Bioassay Report	
Sample Age: 26h (4.8 °C)	Station: RW-BCEG02-007	

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
03-0697-3398	Fertilization Rate	TST-Welch's t Test	<1.0E-37	100% passed fertilization rate

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
03-0697-3398	Fertilization Rate	Control Resp	0.9312	0.7	>>	Yes	Passes Criteria

Fertilization Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	8	0.9313	0.9161	0.9464	0.9100	0.9600	0.0064	0.0181	1.94%	0.00%
100		8	0.9425	0.9237	0.9613	0.9000	0.9700	0.0080	0.0225	2.39%	-1.21%

Fertilization Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	0.9100	0.9300	0.9600	0.9500	0.9200	0.9300	0.9400	0.9100
100		0.9000	0.9300	0.9600	0.9400	0.9700	0.9300	0.9500	0.9600

Fertilization Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	91/100	93/100	96/100	95/100	92/100	93/100	94/100	91/100
100		90/100	93/100	96/100	94/100	97/100	93/100	95/100	96/100

CETIS Analytical Report

Report Date: 20 Dec-18 15:10 (p 1 of 2)
Test Code: GST1218.021 | 13-8056-1591

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	03-0697-3398	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.9.2
Analyzed:	20 Dec-18 15:10	Analysis:	Parametric Bioequivalence-Two Sample	Official Results:	Yes
Batch ID:	07-6163-8316	Test Type:	Fertilization	Analyst:	
Start Date:	04 Dec-18 13:08	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	04 Dec-18 13:48	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	Ventura Dive	Age:	
Sample ID:	07-1641-8076	Code:	GST1218.021	Client:	GeoSyntec Consultants
Sample Date:	03 Dec-18 11:00	Material:	Sample Water	Project:	Beach Cities CIMP (LA0380)
Receipt Date:	04 Dec-18 11:07	Source:	Bioassay Report		
Sample Age:	26h (4.8 °C)	Station:	RW-BCEG02-007		

Data Transform	Alt Hyp	TST_b	Comparison Result
Angular (Corrected)	C*b < T	0.75	100% passed fertilization rate

TST-Welch's t Test								
Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100*	18.09	1.796	11	CDF	<1.0E-37	Non-Significant Effect

Test Acceptability Criteria						TAC Limits	
Attribute	Test Stat	Lower	Upper	Overlap	Decision		
Control Resp	0.9312	0.7	>>	Yes	Passes Criteria		

ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0024738	0.0024738	1	1.367	0.2618	Non-Significant Effect
Error	0.025333	0.0018095	14			
Total	0.0278068		15			

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Levene Equality of Variance Test	0.6197	8.862	0.4443	Equal Variances	
Variances	Mod Levene Equality of Variance Test	0.7163	8.862	0.4116	Equal Variances	
Variances	Variance Ratio F Test	1.658	8.885	0.5209	Equal Variances	
Distribution	Anderson-Darling A2 Normality Test	0.28	3.878	0.6733	Normal Distribution	
Distribution	D'Agostino Skewness Test	0.2516	2.576	0.8014	Normal Distribution	
Distribution	Kolmogorov-Smirnov D Test	0.1287	0.2471	0.7530	Normal Distribution	
Distribution	Shapiro-Wilk W Normality Test	0.9651	0.8408	0.7550	Normal Distribution	

Fertilization Rate Summary											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	8	0.9313	0.9161	0.9464	0.9300	0.9100	0.9600	0.0064	1.94%	0.00%
100		8	0.9425	0.9237	0.9613	0.9450	0.9000	0.9700	0.0080	2.39%	-1.21%

Angular (Corrected) Transformed Summary											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	8	1.308	1.277	1.338	1.303	1.266	1.369	0.01305	2.82%	0.00%
100		8	1.332	1.293	1.372	1.334	1.249	1.397	0.0168	3.57%	-1.90%

Fertilization Rate Detail									
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	0.9100	0.9300	0.9600	0.9500	0.9200	0.9300	0.9400	0.9100
100		0.9000	0.9300	0.9600	0.9400	0.9700	0.9300	0.9500	0.9600

Angular (Corrected) Transformed Detail									
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	1.266	1.303	1.369	1.345	1.284	1.303	1.323	1.266
100		1.249	1.303	1.369	1.323	1.397	1.303	1.345	1.369

CETIS Analytical Report

Report Date: 20 Dec-18 15:10 (p 2 of 2)

Test Code: GST1218.021 | 13-8056-1591

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 03-0697-3398

Endpoint: Fertilization Rate

CETIS Version: CETISv1.9.2

Analyzed: 20 Dec-18 15:10

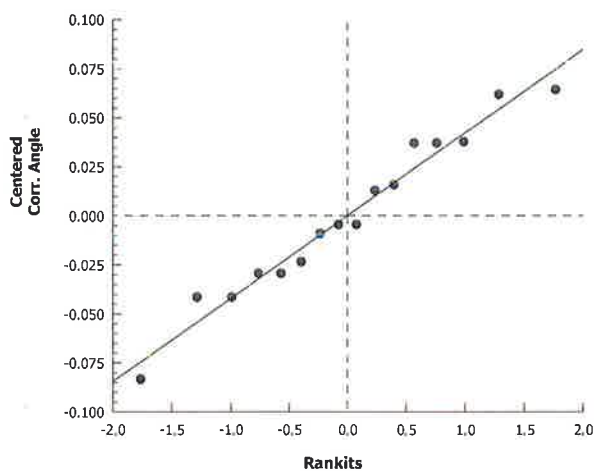
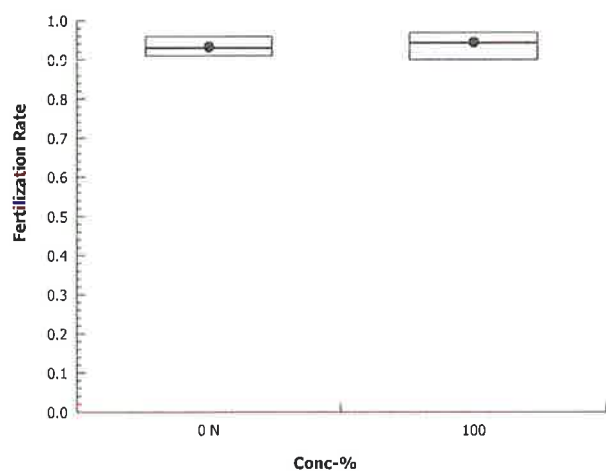
Analysis: Parametric Bioequivalence-Two Sample

Official Results: Yes

Fertilization Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	91/100	93/100	96/100	95/100	92/100	93/100	94/100	91/100
100		90/100	93/100	96/100	94/100	97/100	93/100	95/100	96/100

Graphics



CETIS Measurement Report

Report Date: 20 Dec-18 15:10 (p 1 of 1)

Test Code: GST1218.021 | 13-8056-1591

Purple Sea Urchin Sperm Cell Fertilization Test						Aquatic Bioassay & Consulting Labs, Inc.					
Batch ID: 07-6163-8316		Test Type: Fertilization				Analyst:					
Start Date: 04 Dec-18 13:08		Protocol: EPA/600/R-95/136 (1995)				Diluent: Laboratory Seawater					
Ending Date: 04 Dec-18 13:48		Species: Strongylocentrotus purpuratus				Brine: Not Applicable					
Duration: 40m		Source: Ventura Dive				Age:					
Sample ID: 07-1641-8076		Code: GST1218.021				Client: GeoSyntec Consultants					
Sample Date: 03 Dec-18 11:00		Material: Sample Water				Project: Beach Cities CIMP (LA0380)					
Receipt Date: 04 Dec-18 11:07		Source: Bioassay Report									
Sample Age: 26h (4.8 °C)		Station: RW-BCEG02-007									

Parameter Acceptability Criteria		TAC Limits				Overlap	Decision
		Min	Max	Lower	Upper		
Salinity		34	34	32	36	Yes	Passes Criteria
Temperature		14.7	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	6.55	3.373	9.727	6.3	6.8	0.25	0.3536	5.4%	0
100		2	6.7	4.159	9.241	6.5	6.9	0.2	0.2828	4.22%	0
Overall		4	6.625	6.187	7.063	6.3	6.9	0.1377	0.2754	4.16%	0 (0%)

pH-Units											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975	7.823	8.127	7.9	8.1	0.04787	0.09574	1.20%	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
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75	14.66	14.84	14.7	14.8	0.02887	0.05774	0.39%	0 (0%)

Dissolved Oxygen-mg/L			
Conc-%	Code	1	2
0	N	6.8	6.3
100		6.9	6.5

pH-Units			
Conc-%	Code	1	2
0	N	7.9	7.9
100		8.1	8

Salinity-ppt			
Conc-%	Code	1	2
0	N	34	34
100		34	34

Temperature-°C			
Conc-%	Code	1	2
0	N	14.8	14.7
100		14.8	14.7

[illegible]

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

DATE: 4 December 2018

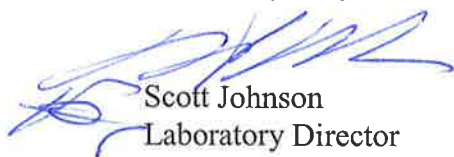
STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 34.60 ug/l

EC50 = 45.43 ug/l

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 20 Dec-18 14:30 (p 1 of 1)

Test Code: URC120418 | 03-7982-6268

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 03-2389-8247	Test Type: Fertilization	Analyst:
Start Date: 04 Dec-18 13:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 04 Dec-18 13:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 15-9523-6055	Code: URC120418	Client: Internal Lab
Sample Date: 04 Dec-18 13:00	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	NOEL	LOEL	TOEL	TU	PMSD	✓
17-5565-7225	Fertilization Rate	Dunnett Multiple Comparison Test	18	32	24		3.97%	

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	µg/L	95% LCL	95% UCL	TU	✓
07-1591-1012	Fertilization Rate	Linear Interpolation (ICPIN)	EC5	20.91	17.32	23.03		
			EC10	24.87	21.65	27.5		
			EC15	28.83	25.56	32.22		
			EC20	32.43	29.21	34.27		
			EC25	34.6	32.61	36.35		
			EC40	41.1	39.75	42.6		
			EC50	45.43	44.02	46.96		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
07-1591-1012	Fertilization Rate	Control Resp	0.9475	0.7	>>	Yes	Passes Criteria
17-5565-7225	Fertilization Rate	Control Resp	0.9475	0.7	>>	Yes	Passes Criteria
17-5565-7225	Fertilization Rate	PMSD	0.03974	<<	0.25	No	Passes Criteria

Fertilization Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.9475	0.9057	0.9893	0.9100	0.9700	0.0132	0.0263	2.78%	0.00%
18		4	0.9350	0.8950	0.9750	0.9100	0.9700	0.0126	0.0252	2.69%	1.32%
32		4	0.7675	0.7218	0.8132	0.7300	0.7900	0.0144	0.0287	3.74%	19.00%
56		4	0.2425	0.1899	0.2951	0.2100	0.2800	0.0165	0.0330	13.62%	74.41%
100		4	0.0575	0.0247	0.0903	0.0300	0.0800	0.0103	0.0206	35.85%	93.93%
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9700	0.9500	0.9600
18		0.9100	0.9300	0.9700	0.9300
32		0.7900	0.7300	0.7900	0.7600
56		0.2600	0.2800	0.2200	0.2100
100		0.0600	0.0300	0.0800	0.0600
180		0.0000	0.0000	0.0000	0.0000

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	97/100	95/100	96/100
18		91/100	93/100	97/100	93/100
32		79/100	73/100	79/100	76/100
56		26/100	28/100	22/100	21/100
100		6/100	3/100	8/100	6/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 20 Dec-18 14:30 (p 1 of 2)

Test Code: URC120418 | 03-7982-6268

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 17-5565-7225	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 20 Dec-18 14:30	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 03-2389-8247	Test Type: Fertilization	Analyst:
Start Date: 04 Dec-18 13:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 04 Dec-18 13:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 15-9523-6055	Code: URC120418	Client: Internal Lab
Sample Date: 04 Dec-18 13:00	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	18	32	24		3.97%

Dunnett Multiple Comparison Test

Control	vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		18	0.8149	2.356	0.079	6	CDF	0.4634	Non-Significant Effect
		32*	8.286	2.356	0.079	6	CDF	1.8E-06	Significant Effect
		56*	24.9	2.356	0.079	6	CDF	7.9E-07	Significant Effect
		100*	33.16	2.356	0.079	6	CDF	7.9E-07	Significant Effect

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.9475	0.7	>>	Yes	Passes Criteria
PMSD	0.03974	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.94238	0.985596	4	443.5	<1.0E-37	Significant Effect
Error	0.0333369	0.0022225	15			
Total	3.97572		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	1.023	13.28	0.9062	Equal Variances
Variances	Levene Equality of Variance Test	0.1858	4.893	0.9421	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.08834	4.893	0.9847	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.1718	3.878	0.9844	Normal Distribution
Distribution	D'Agostino Kurtosis Test	0.5111	2.576	0.6093	Normal Distribution
Distribution	D'Agostino Skewness Test	0.2473	2.576	0.8047	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	0.3224	9.21	0.8511	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.09062	0.2235	1.0000	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9841	0.866	0.9759	Normal Distribution

Fertilization Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9475	0.9057	0.9893	0.9550	0.9100	0.9700	0.0132	2.78%	0.00%
18		4	0.9350	0.8950	0.9750	0.9300	0.9100	0.9700	0.0126	2.69%	1.32%
32		4	0.7675	0.7218	0.8132	0.7750	0.7300	0.7900	0.0144	3.74%	19.00%
56		4	0.2425	0.1899	0.2951	0.2400	0.2100	0.2800	0.0165	13.62%	74.41%
100		4	0.0575	0.0247	0.0903	0.0600	0.0300	0.0800	0.0103	35.85%	93.93%
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

CETIS Analytical Report

Report Date: 20 Dec-18 14:30 (p 2 of 2)

Test Code: URC120418 | 03-7982-6268

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 17-5565-7225

Endpoint: Fertilization Rate

CETIS Version: CETISv1.9.2

Analyzed: 20 Dec-18 14:30

Analysis: Parametric-Control vs Treatments

Official Results: Yes

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.344	1.255	1.434	1.357	1.266	1.397	0.02813	4.18%	0.00%
18		4	1.317	1.228	1.406	1.303	1.266	1.397	0.02789	4.23%	2.02%
32		4	1.068	1.014	1.122	1.077	1.024	1.095	0.01688	3.16%	20.54%
56		4	0.5142	0.4529	0.5755	0.5116	0.476	0.5576	0.01926	7.49%	61.75%
100		4	0.2389	0.1641	0.3138	0.2475	0.1741	0.2868	0.02352	19.69%	82.23%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.00%	96.28%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9700	0.9500	0.9600
18		0.9100	0.9300	0.9700	0.9300
32		0.7900	0.7300	0.7900	0.7600
56		0.2600	0.2800	0.2200	0.2100
100		0.0600	0.0300	0.0800	0.0600
180		0.0000	0.0000	0.0000	0.0000

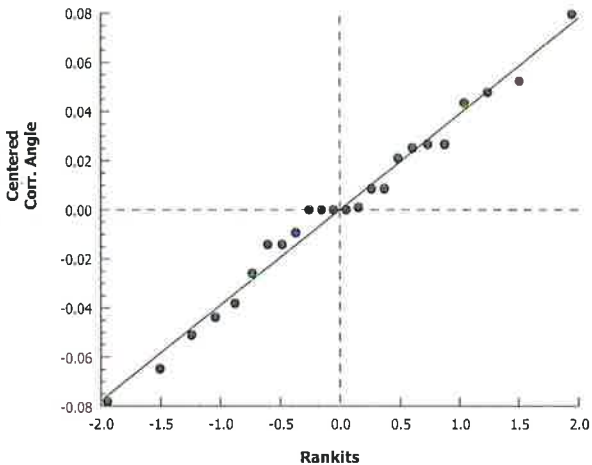
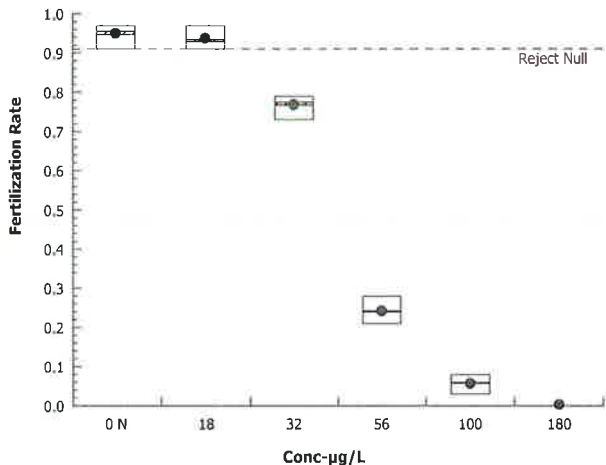
Angular (Corrected) Transformed Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.266	1.397	1.345	1.369
18		1.266	1.303	1.397	1.303
32		1.095	1.024	1.095	1.059
56		0.5351	0.5576	0.4882	0.476
100		0.2475	0.1741	0.2868	0.2475
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	97/100	95/100	96/100
18		91/100	93/100	97/100	93/100
32		79/100	73/100	79/100	76/100
56		26/100	28/100	22/100	21/100
100		6/100	3/100	8/100	6/100
180		0/100	0/100	0/100	0/100

Graphics



CETIS Analytical Report

Report Date: 20 Dec-18 14:30 (p 1 of 2)
Test Code: URC120418 | 03-7982-6268

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 07-1591-1012	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 20 Dec-18 14:30	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 03-2389-8247	Test Type: Fertilization	Analyst:
Start Date: 04 Dec-18 13:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 04 Dec-18 13:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 15-9523-6055	Code: URC120418	Client: Internal Lab
Sample Date: 04 Dec-18 13:00	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Linear Interpolation Options

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

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.9475	0.7	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	20.91	17.32	23.03
EC10	24.87	21.65	27.5
EC15	28.83	25.56	32.22
EC20	32.43	29.21	34.27
EC25	34.6	32.61	36.35
EC40	41.1	39.75	42.6
EC50	45.43	44.02	46.96

Fertilization Rate Summary

Calculated Variate(A/B)

Conc-µg/L	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	N	4	0.9475	0.9100	0.9700	0.0132	0.0263	2.78%	0.0%	379	400
18		4	0.9350	0.9100	0.9700	0.0126	0.0252	2.69%	1.32%	374	400
32		4	0.7675	0.7300	0.7900	0.0144	0.0287	3.74%	19.0%	307	400
56		4	0.2425	0.2100	0.2800	0.0165	0.0330	13.62%	74.41%	97	400
100		4	0.0575	0.0300	0.0800	0.0103	0.0206	35.85%	93.93%	23	400
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	100.0%		0	400

Fertilization Rate Detail

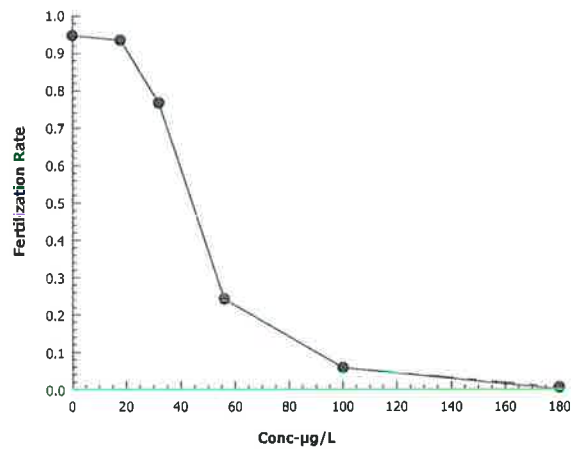
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9700	0.9500	0.9600
18		0.9100	0.9300	0.9700	0.9300
32		0.7900	0.7300	0.7900	0.7600
56		0.2600	0.2800	0.2200	0.2100
100		0.0600	0.0300	0.0800	0.0600
180		0.0000	0.0000	0.0000	0.0000

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	97/100	95/100	96/100
18		91/100	93/100	97/100	93/100
32		79/100	73/100	79/100	76/100
56		26/100	28/100	22/100	21/100
100		6/100	3/100	8/100	6/100
180		0/100	0/100	0/100	0/100

Purple Sea Urchin Sperm Cell Fertilization Test			Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	07-1591-1012	Endpoint:	Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed:	20 Dec-18 14:30	Analysis:	Linear Interpolation (ICPIN)	Official Results: Yes

Graphics



CETIS Measurement Report

Report Date: 20 Dec-18 14:30 (p 1 of 2)
 Test Code: URC120418 | 03-7982-6268

Purple Sea Urchin Sperm Cell Fertilization Test						Aquatic Bioassay & Consulting Labs, Inc.					
Batch ID:	03-2389-8247		Test Type:	Fertilization			Analyst:				
Start Date:	04 Dec-18 13:00		Protocol:	EPA/600/R-95/136 (1995)			Diluent:	Laboratory Seawater			
Ending Date:	04 Dec-18 13:40		Species:	Strongylocentrotus purpuratus			Brine:	Not Applicable			
Duration:	40m		Source:	Ventura Dive			Age:				
Sample ID:	15-9523-6055		Code:	URC120418			Client:	Internal Lab			
Sample Date:	04 Dec-18 13:00		Material:	Copper chloride			Project:				
Receipt Date:			Source:	Reference Toxicant							
Sample Age:	n/a		Station:	REF TOX							
Parameter Acceptability Criteria											
			TAC Limits								
Parameter	Min	Max	Lower	Upper	Overlap	Decision					
Salinity	34	34	32	36	Yes	Passes Criteria					
Temperature	14.7	14.8	11	13	Yes	Above Criteria					
Dissolved Oxygen-mg/L											
Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	6.55	3.373	9.727	6.3	6.8	0.25	0.3536	5.4%	0
18		2	6.55	3.373	9.727	6.3	6.8	0.25	0.3536	5.4%	0
32		2	6.5	5.229	7.771	6.4	6.6	0.1	0.1414	2.18%	0
56		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
100		2	6.55	3.373	9.727	6.3	6.8	0.25	0.3536	5.4%	0
180		2	6.4	6.384	6.416	6.4	6.4	0	0	0.0%	0
Overall		12	6.508	6.372	6.645	6.3	6.8	0.06211	0.2151	3.31%	0 (0%)
pH-Units											
Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
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	7.9	7.9	0	0	0.00%	0 (0%)
Salinity-ppt											
Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
18		2	34	34	34	34	34	0	0	0.0%	0
32		2	34	34	34	34	34	0	0	0.0%	0
56		2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
180		2	34	34	34	34	34	0	0	0.0%	0
Overall		12	34	34	34	34	34	0	0	0.00%	0 (0%)
Temperature-°C											
Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	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	14.72	14.78	14.7	14.8	0.01508	0.05222	0.35%	0 (0%)

CETIS Measurement Report

Report Date: 20 Dec-18 14:30 (p 2 of 2)

Test Code: URC120418 | 03-7982-6268

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.			
Dissolved Oxygen-mg/L							
Conc-µg/L	Code	1	2				
0	N	6.8	6.3				
18		6.8	6.3				
32		6.6	6.4				
56		6.7	6.3				
100		6.8	6.3				
180		6.4	6.4				
pH-Units							
Conc-µg/L	Code	1	2				
0	N	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							
Conc-µg/L	Code	1	2				
0	N	34	34				
18		34	34				
32		34	34				
56		34	34				
100		34	34				
180		34	34				
Temperature-°C							
Conc-µg/L	Code	1	2				
0	N	14.8	14.7				
18		14.8	14.7				
32		14.8	14.7				
56		14.8	14.7				
100		14.8	14.7				
180		14.8	14.7				

January 4, 2019

Mr. Chris Wessel
Geosyntec
6167 Bristol Parkway, Suite 390
Culver City, CA 90230

Dear Mr. Wessel:

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

CLIENT:	Geosyntec
SAMPLE I.D.:	RW-BCEG01-008
DATE RECEIVED:	10 Dec - 18
ABC LAB. NO.:	GST1218.067

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

IWC CONCENTRATION = 100%

TST RESULT

PASS

% EFFECT = -0.66 %

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 04 Jan-19 15:19 (p 1 of 1)
Test Code: GST1218.067 | 14-9190-0886

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.			
Batch ID:	15-2820-0402	Test Type:	Fertilization	Analyst:			
Start Date:	10 Dec-18 13:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater		
Ending Date:	10 Dec-18 13:41	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable		
Duration:	40m	Source:	Ventura Dive	Age:			
Sample ID:	01-7882-6882	Code:	GST1218.067	Client:	GeoSyntec Consultants		
Sample Date:	08 Dec-18 10:25	Material:	Sample Water	Project:	Beach Cities CIMP (LA0380)		
Receipt Date:	10 Dec-18 09:30	Source:	Bioassay Report				
Sample Age:	51h (0.5 °C)	Station:	RW-BCEG01-008				

Single Comparison Summary				
Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
07-1428-8741	Fertilization Rate	TST-Welch's t Test	<1.0E-37	100% passed fertilization rate

Test Acceptability		TAC Limits					
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
07-1428-8741	Fertilization Rate	Control Resp	0.94	0.7	>>	Yes	Passes Criteria

Fertilization Rate Summary											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	8	0.9400	0.9210	0.9590	0.9100	0.9800	0.0080	0.0227	2.41%	0.00%
100		8	0.9463	0.9268	0.9657	0.9100	0.9800	0.0082	0.0233	2.46%	-0.66%

Fertilization Rate Detail									
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	0.9300	0.9600	0.9400	0.9100	0.9500	0.9800	0.9200	0.9300
100		0.9400	0.9100	0.9300	0.9700	0.9800	0.9600	0.9500	0.9300

Fertilization Rate Binomials									
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	93/100	96/100	94/100	91/100	95/100	98/100	92/100	93/100
100		94/100	91/100	93/100	97/100	98/100	96/100	95/100	93/100

CETIS Analytical Report

Report Date: 04 Jan-19 15:18 (p 1 of 2)
Test Code: GST1218.067 | 14-9190-0886

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 07-1428-8741	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 04 Jan-19 15:18	Analysis: Parametric Bioequivalence-Two Sample	Official Results: Yes
Batch ID: 15-2820-0402	Test Type: Fertilization	Analyst:
Start Date: 10 Dec-18 13:01	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 10 Dec-18 13:41	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 01-7882-6882	Code: GST1218.067	Client: GeoSyntec Consultants
Sample Date: 08 Dec-18 10:25	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 10 Dec-18 09:30	Source: Bioassay Report	
Sample Age: 51h (0.5 °C)	Station: RW-BCEG01-008	

Data Transform	Alt Hyp	TST_b	Comparison Result
Angular (Corrected)	C*b < T	0.75	100% passed fertilization rate

TST-Welch's t Test

Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100*	14.64	1.782	12	CDF	<1.0E-37	Non-Significant Effect

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.94	0.7	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0007935	0.0007935	1	0.2799	0.6050	Non-Significant Effect
Error	0.039683	0.0028345	14			
Total	0.0404764		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	0.04533	8.862	0.8345	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.06803	8.862	0.7980	Equal Variances
Variances	Variance Ratio F Test	1.064	8.885	0.9371	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.337	3.878	0.5094	Normal Distribution
Distribution	D'Agostino Skewness Test	1.066	2.576	0.2863	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1415	0.2471	0.5631	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9547	0.8408	0.5670	Normal Distribution

Fertilization Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	8	0.9400	0.9210	0.9590	0.9350	0.9100	0.9800	0.0080	2.41%	0.00%
100		8	0.9463	0.9268	0.9657	0.9450	0.9100	0.9800	0.0082	2.46%	-0.66%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	8	1.328	1.284	1.372	1.313	1.266	1.429	0.01853	3.95%	0.00%
100		8	1.342	1.297	1.387	1.334	1.266	1.429	0.01911	4.03%	-1.06%

Fertilization Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	0.9300	0.9600	0.9400	0.9100	0.9500	0.9800	0.9200	0.9300
100		0.9400	0.9100	0.9300	0.9700	0.9800	0.9600	0.9500	0.9300

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	1.303	1.369	1.323	1.266	1.345	1.429	1.284	1.303
100		1.323	1.266	1.303	1.397	1.429	1.369	1.345	1.303

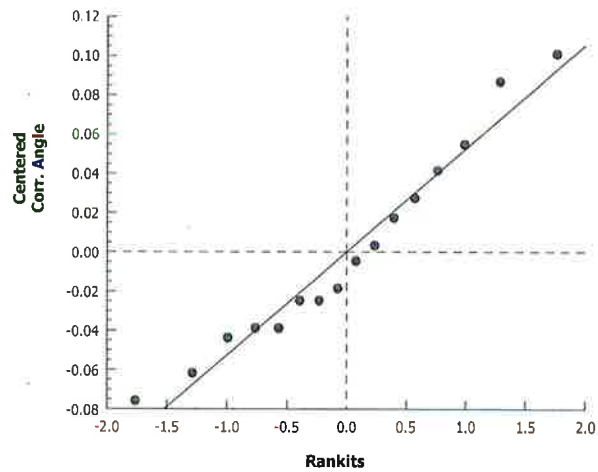
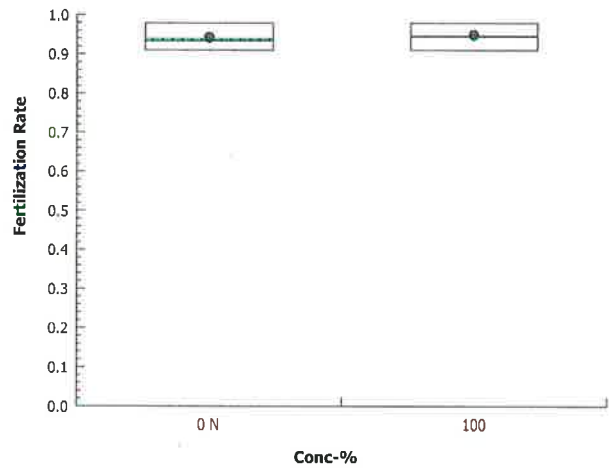
Purple Sea Urchin Sperm Cell Fertilization Test Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 07-1428-8741	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 04 Jan-19 15:18	Analysis: Parametric Bioequivalence-Two Sample	Official Results: Yes

Fertilization Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	93/100	96/100	94/100	91/100	95/100	98/100	92/100	93/100
100		94/100	91/100	93/100	97/100	98/100	96/100	95/100	93/100

Graphics



CETIS Measurement Report

Report Date: 04 Jan-19 15:18 (p 1 of 1)
Test Code: GST1218.067 | 14-9190-0886

Purple Sea Urchin Sperm Cell Fertilization Test						Aquatic Bioassay & Consulting Labs, Inc.					
Batch ID: 15-2820-0402		Test Type: Fertilization				Analyst:					
Start Date: 10 Dec-18 13:01		Protocol: EPA/600/R-95/136 (1995)				Diluent: Laboratory Seawater					
Ending Date: 10 Dec-18 13:41		Species: Strongylocentrotus purpuratus				Brine: Not Applicable					
Duration: 40m		Source: Ventura Dive				Age:					
Sample ID: 01-7882-6882		Code: GST1218.067				Client: GeoSyntec Consultants					
Sample Date: 08 Dec-18 10:25		Material: Sample Water				Project: Beach Cities CIMP (LA0380)					
Receipt Date: 10 Dec-18 09:30		Source: Bioassay Report									
Sample Age: 51h (0.5 °C)		Station: RW-BCEG01-008									

Parameter Acceptability Criteria						
Parameter	Min	Max	TAC Limits		Overlap	Decision
			Lower	Upper		
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.8	14.9	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
100		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
Overall		4	6.45	5.955	6.945	6.1	6.8	0.1555	0.3109	4.82%	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
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		4	7.825	7.673	7.977	7.7	7.9	0.04787	0.09574	1.22%	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
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.85	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
Overall		4	14.85	14.76	14.94	14.8	14.9	0.02887	0.05773	0.39%	0 (0%)

Dissolved Oxygen-mg/L			
Conc-%	Code	1	2
0	N	6.8	6.1
100		6.6	6.3

pH-Units			
Conc-%	Code	1	2
0	N	7.9	7.9
100		7.8	7.7

Salinity-ppt			
Conc-%	Code	1	2
0	N	34	34
100		34	34

Temperature-°C			
Conc-%	Code	1	2
0	N	14.8	14.9
100		14.8	14.9

January 4, 2019

Mr. Chris Wessel
Geosyntec
6167 Bristol Parkway, Suite 390
Culver City, CA 90230

Dear Mr. Wessel:

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

CLIENT:	Geosyntec
SAMPLE I.D.:	RW-BCEG02-008
DATE RECEIVED:	10 Dec - 18
ABC LAB. NO.:	GST1218.068

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

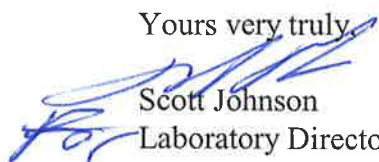
IWC CONCENTRATION = 100%

TST RESULT

PASS

% EFFECT = -0.53 %

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 04 Jan-19 15:22 (p 1 of 1)
Test Code: GST1218.068 | 05-3207-2117

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Batch ID:	12-5414-9370	Test Type:	Fertilization	Analyst:	
Start Date:	10 Dec-18 13:02	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	10 Dec-18 13:42	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	Ventura Dive	Age:	
Sample ID:	08-9968-4944	Code:	GST1218.068	Client:	GeoSyntec Consultants
Sample Date:	08 Dec-18 10:45	Material:	Sample Water	Project:	Beach Cities CIMP (LA0380)
Receipt Date:	10 Dec-18 09:30	Source:	Bioassay Report		
Sample Age:	50h (1 °C)	Station:	RW-BCEG02-008		

Single Comparison Summary				
Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
12-1257-8803	Fertilization Rate	TST-Welch's t Test	<1.0E-37	100% passed fertilization rate

Test Acceptability		TAC Limits					
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
12-1257-8803	Fertilization Rate	Control Resp	0.9438	0.7	>>	Yes	Passes Criteria

Fertilization Rate Summary											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	8	0.9438	0.9243	0.9632	0.9100	0.9800	0.0082	0.0233	2.46%	0.00%
100		8	0.9488	0.9301	0.9674	0.9100	0.9800	0.0079	0.0223	2.35%	-0.53%

Fertilization Rate Detail									
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	0.9300	0.9600	0.9400	0.9100	0.9500	0.9800	0.9200	0.9600
100		0.9400	0.9100	0.9700	0.9300	0.9800	0.9600	0.9500	0.9500

Fertilization Rate Binomials									
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	93/100	96/100	94/100	91/100	95/100	98/100	92/100	96/100
100		94/100	91/100	97/100	93/100	98/100	96/100	95/100	95/100

CETIS Measurement Report

Report Date: 04 Jan-19 15:22 (p 1 of 1)
Test Code: GST1218.068 | 05-3207-2117

Purple Sea Urchin Sperm Cell Fertilization Test						Aquatic Bioassay & Consulting Labs, Inc.					
Batch ID: 12-5414-9370	Test Type: Fertilization		Analyst:								
Start Date: 10 Dec-18 13:02	Protocol: EPA/600/R-95/136 (1995)		Diluent: Laboratory Seawater								
Ending Date: 10 Dec-18 13:42	Species: Strongylocentrotus purpuratus		Brine: Not Applicable								
Duration: 40m	Source: Ventura Dive		Age:								
Sample ID: 08-9968-4944	Code: GST1218.068		Client: GeoSyntec Consultants								
Sample Date: 08 Dec-18 10:45	Material: Sample Water		Project: Beach Cities CIMP (LA0380)								
Receipt Date: 10 Dec-18 09:30	Source: Bioassay Report										
Sample Age: 50h (1 °C)	Station: RW-BCEG02-008										
Parameter Acceptability Criteria											
				TAC Limits							
Parameter	Min	Max	Lower	Upper	Overlap	Decision					
Salinity	34	34	32	36	Yes	Passes Criteria					
Temperature	14.8	14.9	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
100		2	6.25	5.615	6.885	6.2	6.3	0.05001	0.07072	1.13%	0
Overall		4	6.35	5.855	6.845	6.1	6.8	0.1555	0.3109	4.90%	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
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975	7.823	8.127	7.9	8.1	0.04787	0.09574	1.20%	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
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)
Temperature-°C											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.85	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
Overall		4	14.85	14.76	14.94	14.8	14.9	0.02887	0.05773	0.39%	0 (0%)
Dissolved Oxygen-mg/L											
Conc-%	Code	1	2								
0	N	6.8	6.1								
100		6.3	6.2								
pH-Units											
Conc-%	Code	1	2								
0	N	7.9	7.9								
100		8.1	8								
Salinity-ppt											
Conc-%	Code	1	2								
0	N	34	34								
100		34	34								
Temperature-°C											
Conc-%	Code	1	2								
0	N	14.8	14.9								
100		14.8	14.9								

CETIS Analytical Report

Report Date: 04 Jan-19 15:22 (p 1 of 2)
Test Code: GST1218.068 | 05-3207-2117

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 12-1257-8803	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 04 Jan-19 15:22	Analysis: Parametric Bioequivalence-Two Sample	Official Results: Yes
Batch ID: 12-5414-9370	Test Type: Fertilization	Analyst:
Start Date: 10 Dec-18 13:02	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 10 Dec-18 13:42	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 08-9968-4944	Code: GST1218.068	Client: GeoSyntec Consultants
Sample Date: 08 Dec-18 10:45	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 10 Dec-18 09:30	Source: Bioassay Report	
Sample Age: 50h (1 °C)	Station: RW-BCEG02-008	

Data Transform	Alt Hyp	TST_b	Comparison Result
Angular (Corrected)	C*b < T	0.75	100% passed fertilization rate

TST-Welch's t Test

Control	vs	Control II	Test Stat	Critical	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100*	14.95	1.771	13	CDF	<1.0E-37	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.9438	0.7	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004897	0.0004897	1	0.178	0.6795	Non-Significant Effect
Error	0.0385105	0.0027508	14			
Total	0.0390002		15			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	0.06252	8.862	0.8062	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.07786	8.862	0.7843	Equal Variances
Variances	Variance Ratio F Test	1.057	8.885	0.9440	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.1476	3.878	0.9994	Normal Distribution
Distribution	D'Agostino Skewness Test	0.4245	2.576	0.6712	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.07807	0.2471	1.0000	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9775	0.8408	0.9409	Normal Distribution

Fertilization Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	8	0.9438	0.9243	0.9632	0.9450	0.9100	0.9800	0.0082	2.46%	0.00%
100		8	0.9488	0.9301	0.9674	0.9500	0.9100	0.9800	0.0079	2.35%	-0.53%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	8	1.336	1.292	1.381	1.334	1.266	1.429	0.0188	3.98%	0.00%
100		8	1.347	1.304	1.391	1.345	1.266	1.429	0.01829	3.84%	-0.83%

Fertilization Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	0.9300	0.9600	0.9400	0.9100	0.9500	0.9800	0.9200	0.9600
100		0.9400	0.9100	0.9700	0.9300	0.9800	0.9600	0.9500	

Angular (Corrected) Transformed Detail

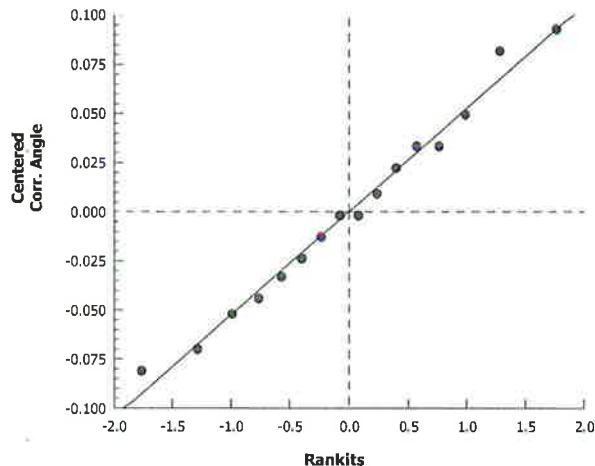
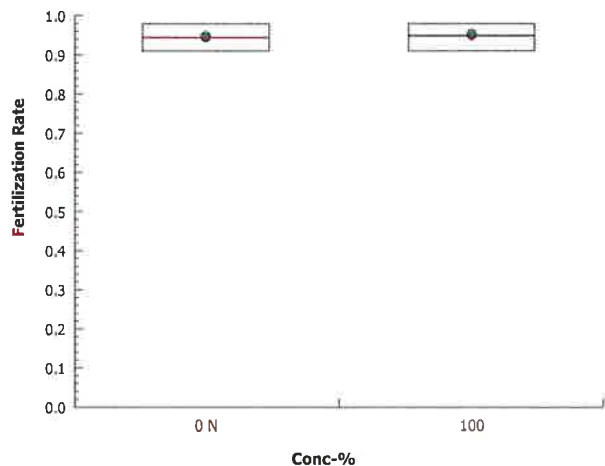
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	1.303	1.369	1.323	1.266	1.345	1.429	1.284	1.369
100		1.323	1.266	1.397	1.303	1.429	1.369	1.345	1.345

Purple Sea Urchin Sperm Cell Fertilization Test					Aquatic Bioassay & Consulting Labs, Inc.				
Analysis ID:	12-1257-8803	Endpoint:	Fertilization Rate	CETIS Version:	CETISv1.9.2				
Analyzed:	04 Jan-19 15:22	Analysis:	Parametric Bioequivalence-Two Sample	Official Results:	Yes				

Fertilization Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	N	93/100	96/100	94/100	91/100	95/100	98/100	92/100	96/100
100		94/100	91/100	97/100	93/100	98/100	96/100	95/100	95/100

Graphics



[illegible]

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

DATE: 10 December 2018

STANDARD TOXICANT: Copper Chloride

NOEC = 18.00 ug/l

EC25 = 35.34 ug/l

EC50 = 46.11 ug/l

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 04 Jan-19 15:28 (p 1 of 1)
Test Code: URC121018 | 13-5090-1855

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 18-3992-2287	Test Type: Fertilization	Analyst:
Start Date: 10 Dec-18 13:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 10 Dec-18 13:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 06-3936-6503	Code: URC121018	Client: Internal Lab
Sample Date: 10 Dec-18 13:00	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	NOEL	LOEL	TOEL	TU	PMSD	✓
05-1366-9890	Fertilization Rate	Dunnett Multiple Comparison Test	18	32	24		4.41%	

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	µg/L	95% LCL	95% UCL	TU	✓
04-5585-7704	Fertilization Rate	Linear Interpolation (ICPIN)	EC5	22.06	21.68	22.49		
			EC10	26.12	25.36	26.97		
			EC15	30.18	29.04	31.46		
			EC20	33.19	32.44	33.93		
			EC25	35.34	34.6	36.09		
			EC40	41.81	40.94	42.76		
			EC50	46.11	44.84	47.25		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
04-5585-7704	Fertilization Rate	Control Resp	0.92	0.7	>>	Yes	Passes Criteria
05-1366-9890	Fertilization Rate	Control Resp	0.92	0.7	>>	Yes	Passes Criteria
05-1366-9890	Fertilization Rate	PMDS	0.04408	<<	0.25	No	Passes Criteria

Fertilization Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	0.9200	0.9016	0.9384	0.9100	0.9300	0.0058	0.0116	1.25%	0.00%
18		4	0.9650	0.9445	0.9855	0.9500	0.9800	0.0065	0.0129	1.34%	-4.89%
32		4	0.7800	0.7616	0.7984	0.7700	0.7900	0.0058	0.0116	1.48%	15.22%
56		4	0.2550	0.2022	0.3078	0.2100	0.2900	0.0166	0.0332	13.01%	72.28%
100		4	0.0550	0.0022	0.1078	0.0300	0.1000	0.0166	0.0332	60.30%	94.02%
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9300	0.9300	0.9100
18		0.9800	0.9600	0.9500	0.9700
32		0.7700	0.7900	0.7900	0.7700
56		0.2600	0.2100	0.2900	0.2600
100		0.0300	0.0600	0.1000	0.0300
180		0.0000	0.0000	0.0000	0.0000

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	93/100	93/100	91/100
18		98/100	96/100	95/100	97/100
32		77/100	79/100	79/100	77/100
56		26/100	21/100	29/100	26/100
100		3/100	6/100	10/100	3/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 04 Jan-19 15:28 (p 1 of 2)
 Test Code: URC121018 | 13-5090-1855

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 05-1366-9890	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 04 Jan-19 15:13	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 18-3992-2287	Test Type: Fertilization	Analyst:
Start Date: 10 Dec-18 13:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 10 Dec-18 13:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 06-3936-6503	Code: URC121018	Client: Internal Lab
Sample Date: 10 Dec-18 13:00	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	18	32	24		4.41%

Dunnett Multiple Comparison Test

Control	vs	Conc-µg/L	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		18	-3.464	2.356	0.068	6	CDF	1.0000	Non-Significant Effect
		32*	6.957	2.356	0.068	6	CDF	9.3E-06	Significant Effect
		56*	26.05	2.356	0.068	6	CDF	7.9E-07	Significant Effect
		100*	36.37	2.356	0.068	6	CDF	7.9E-07	Significant Effect

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.92	0.7	>>	Yes	Passes Criteria
PMSD	0.04408	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.01674	1.00418	4	596.3	<1.0E-37	Significant Effect
Error	0.0252586	0.0016839	15			
Total	4.04199		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	7.335	13.28	0.1192	Equal Variances
Variances	Levene Equality of Variance Test	3.118	4.893	0.0471	Equal Variances
Variances	Mod Levene Equality of Variance Test	2.238	4.893	0.1137	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.4772	3.878	0.2414	Normal Distribution
Distribution	D'Agostino Kurtosis Test	1.047	2.576	0.2949	Normal Distribution
Distribution	D'Agostino Skewness Test	0.9693	2.576	0.3324	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	2.037	9.21	0.3612	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1563	0.2235	0.2260	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.942	0.866	0.2617	Normal Distribution

Fertilization Rate Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9200	0.9016	0.9384	0.9200	0.9100	0.9300	0.0058	1.25%	0.00%
18		4	0.9650	0.9445	0.9855	0.9650	0.9500	0.9800	0.0065	1.34%	-4.89%
32		4	0.7800	0.7616	0.7984	0.7800	0.7700	0.7900	0.0058	1.48%	15.22%
56		4	0.2550	0.2022	0.3078	0.2600	0.2100	0.2900	0.0166	13.01%	72.28%
100		4	0.0550	0.0022	0.1078	0.0450	0.0300	0.1000	0.0166	60.30%	94.02%
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

CETIS Analytical Report

Report Date: 04 Jan-19 15:28 (p 2 of 2)

Test Code: URC121018 | 13-5090-1855

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 05-1366-9890

Endpoint: Fertilization Rate

CETIS Version: CETISv1.9.2

Analyzed: 04 Jan-19 15:13

Analysis: Parametric-Control vs Treatments

Official Results: Yes

Angular (Corrected) Transformed Summary

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.285	1.251	1.318	1.285	1.266	1.303	0.01066	1.66%	0.00%
18		4	1.385	1.328	1.442	1.383	1.345	1.429	0.01799	2.60%	-7.82%
32		4	1.083	1.061	1.105	1.083	1.071	1.095	0.00697	1.29%	15.72%
56		4	0.5287	0.4674	0.59	0.5351	0.476	0.5687	0.01926	7.29%	58.84%
100		4	0.2293	0.1169	0.3418	0.2108	0.1741	0.3218	0.03533	30.81%	82.15%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.00%	96.11%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9300	0.9300	0.9100
18		0.9800	0.9600	0.9500	0.9700
32		0.7700	0.7900	0.7900	0.7700
56		0.2600	0.2100	0.2900	0.2600
100		0.0300	0.0600	0.1000	0.0300
180		0.0000	0.0000	0.0000	0.0000

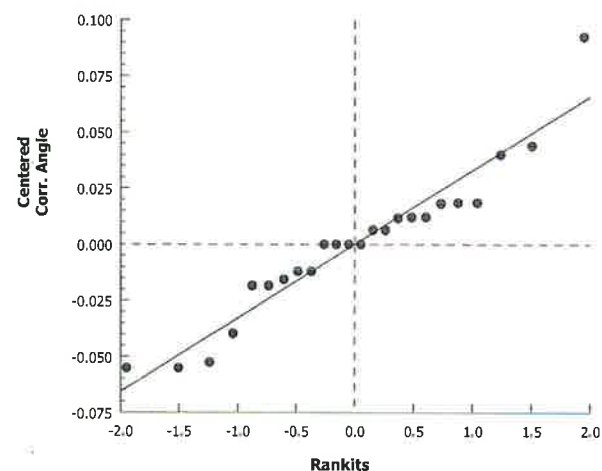
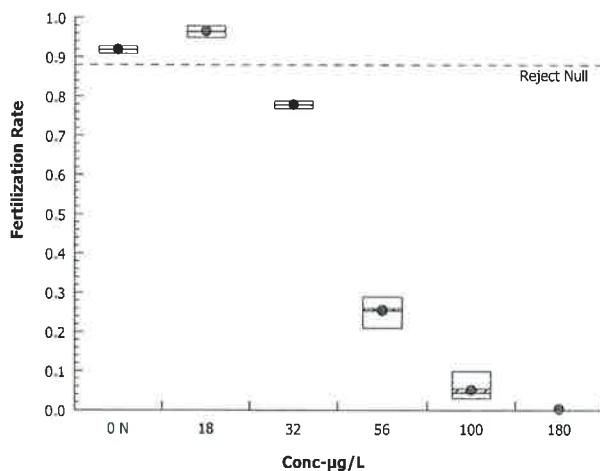
Angular (Corrected) Transformed Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.266	1.303	1.303	1.266
18		1.429	1.369	1.345	1.397
32		1.071	1.095	1.095	1.071
56		0.5351	0.476	0.5687	0.5351
100		0.1741	0.2475	0.3218	0.1741
180		0.05002	0.05002	0.05002	0.05002

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	93/100	93/100	91/100
18		98/100	96/100	95/100	97/100
32		77/100	79/100	79/100	77/100
56		26/100	21/100	29/100	26/100
100		3/100	6/100	10/100	3/100
180		0/100	0/100	0/100	0/100

Graphics



CETIS Analytical Report

Report Date: 04 Jan-19 15:28 (p 1 of 2)
Test Code: URC121018 | 13-5090-1855

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 04-5585-7704	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 04 Jan-19 15:27	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 18-3992-2287	Test Type: Fertilization	Analyst:
Start Date: 10 Dec-18 13:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 10 Dec-18 13:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: Ventura Dive	Age:
Sample ID: 06-3936-6503	Code: URC121018	Client: Internal Lab
Sample Date: 10 Dec-18 13:00	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Linear Interpolation Options

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

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.92	0.7	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	22.06	21.68	22.49
EC10	26.12	25.36	26.97
EC15	30.18	29.04	31.46
EC20	33.19	32.44	33.93
EC25	35.34	34.6	36.09
EC40	41.81	40.94	42.76
EC50	46.11	44.84	47.25

Fertilization Rate Summary

Calculated Variate(A/B)

Conc-µg/L	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	N	4	0.9200	0.9100	0.9300	0.0058	0.0116	1.26%	0.0%	368	400
18		4	0.9650	0.9500	0.9800	0.0065	0.0129	1.34%	-4.89%	386	400
32		4	0.7800	0.7700	0.7900	0.0058	0.0116	1.48%	15.22%	312	400
56		4	0.2550	0.2100	0.2900	0.0166	0.0332	13.01%	72.28%	102	400
100		4	0.0550	0.0300	0.1000	0.0166	0.0332	60.30%	94.02%	22	400
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	100.0%		0	400

Fertilization Rate Detail

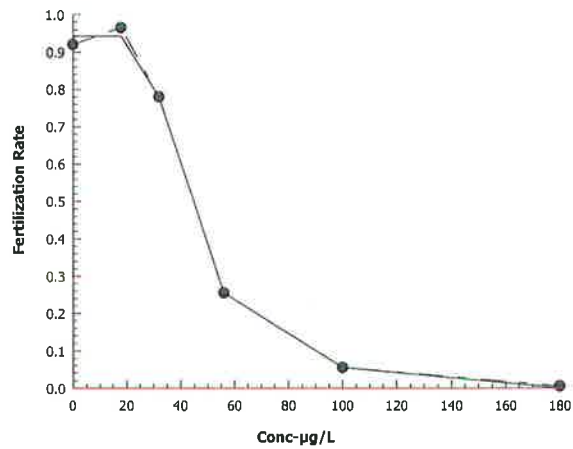
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9100	0.9300	0.9300	0.9100
18		0.9800	0.9600	0.9500	0.9700
32		0.7700	0.7900	0.7900	0.7700
56		0.2600	0.2100	0.2900	0.2600
100		0.0300	0.0600	0.1000	0.0300
180		0.0000	0.0000	0.0000	0.0000

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	91/100	93/100	93/100	91/100
18		98/100	96/100	95/100	97/100
32		77/100	79/100	79/100	77/100
56		26/100	21/100	29/100	26/100
100		3/100	6/100	10/100	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:	04-5585-7704	Endpoint:	Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed:	04 Jan-19 15:27	Analysis:	Linear Interpolation (ICPIN)	Official Results: Yes

Graphics



CETIS Measurement Report

Report Date: 04 Jan-19 15:28 (p 1 of 2)
 Test Code: URC121018 | 13-5090-1855

Purple Sea Urchin Sperm Cell Fertilization Test						Aquatic Bioassay & Consulting Labs, Inc.					
Batch ID:	18-3992-2287	Test Type:	Fertilization	Analyst:							
Start Date:	10 Dec-18 13:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater						
Ending Date:	10 Dec-18 13:40	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable						
Duration:	40m	Source:	Ventura Dive	Age:							
Sample ID:	06-3936-6503	Code:	URC121018	Client:	Internal Lab						
Sample Date:	10 Dec-18 13:00	Material:	Copper chloride	Project:							
Receipt Date:		Source:	Reference Toxicant								
Sample Age:	n/a	Station:	REF TOX								
Parameter Acceptability Criteria											
		TAC Limits									
Parameter	Min	Max	Lower	Upper	Overlap						
Salinity	34	34	32	36	Yes						
Temperature	14.8	14.9	11	13	Yes						
Dissolved Oxygen-mg/L											
Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL						
0	N	2	6.45	2.003	10.9						
18		2	6.4	5.129	7.671						
32		2	6.7	4.159	9.241						
56		2	6.7	2.888	10.51						
100		2	6.55	3.373	9.727						
180		2	6.3	2.488	10.11						
Overall		12	6.517	6.316	6.717						
pH-Units											
Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL						
0	N	2	7.9	7.884	7.916						
18		2	7.9	7.884	7.916						
32		2	7.9	7.884	7.916						
56		2	7.9	7.884	7.916						
100		2	7.9	7.884	7.916						
180		2	7.9	7.884	7.916						
Overall		12	7.9	7.9	7.9						
Salinity-ppt											
Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL						
0	N	2	34	34	34						
18		2	34	34	34						
32		2	34	34	34						
56		2	34	34	34						
100		2	34	34	34						
180		2	34	34	34						
Overall		12	34	34	34						
Temperature-°C											
Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL						
0	N	2	14.85	14.21	15.49						
18		2	14.85	14.21	15.49						
32		2	14.85	14.21	15.49						
56		2	14.85	14.21	15.49						
100		2	14.85	14.21	15.49						
180		2	14.85	14.21	15.49						
Overall		12	14.85	14.82	14.88						

CETIS Measurement Report

Report Date: 04 Jan-19 15:28 (p 2 of 2)
 Test Code: URC121018 | 13-5090-1855

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.			
Dissolved Oxygen-mg/L							
Conc-µg/L	Code	1	2				
0	N	6.8	6.1				
18		6.5	6.3				
32		6.9	6.5				
56		7	6.4				
100		6.8	6.3				
180		6.6	6				
pH-Units							
Conc-µg/L	Code	1	2				
0	N	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							
Conc-µg/L	Code	1	2				
0	N	34	34				
18		34	34				
32		34	34				
56		34	34				
100		34	34				
180		34	34				
Temperature-°C							
Conc-µg/L	Code	1	2				
0	N	14.8	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				