

December 21, 2016

Mr. Chris Wessel
Geosyntec Consultants
3415 S. Sepulveda Blvd., Suite 500
Los Angeles, CA 90034

Dear Mr. Wessel:

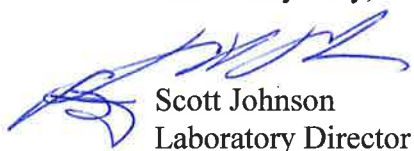
We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136*. "All acceptability criteria were met and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

CLIENT:	Geosyntec Consultants
SAMPLE I.D.:	RW-BCEG01-001
DATE RECEIVED:	22 Nov - 16
ABC LAB. NO.:	GST1116.257

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC =	100.00 %
TUc =	1.00
EC25 =	N/A
EC50 =	N/A

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 21 Dec-16 11:44 (p 1 of 1)
 Test Code: GST1116.257 | 07-7835-2638

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 18-5775-1240
 Start Date: 22 Nov-16 15:01
 Ending Date: 22 Nov-16 15:41
 Duration: 40m
 Test Type: Development
 Protocol: EPA/600/R-95/136 (1995)
 Species: Strongylocentrotus purpuratus
 Source: David Guttoff

Analyst:
 Diluent: Laboratory Seawater
 Brine: Not Applicable
 Age:

Sample ID: 18-6864-0807
 Sample Date: 22 Nov-16 11:00
 Receipt Date: 22 Nov-16 14:15
 Sample Age: 4h (13.5 °C)
 Code: GST1116.257
 Material: Sample Water
 Source: Bioassay Report
 Station: RW-BCEG01-001

Client: GeoSyntec Consultants
 Project: Beach Cities CIMP (LA0380)

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
21-4336-7423	Proportion Normal	Equal Variance t Two-Sample Test	0.0951	100% passed proportion normal

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
21-4336-7423	Proportion Normal	Control Resp	0.96	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	0.9600	0.9256	0.9944	0.9300	0.9800	0.0108	0.0216	2.25%	0.00%
100		4	0.9325	0.8850	0.9800	0.9000	0.9700	0.0149	0.0299	3.20%	2.86%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9700	0.9300	0.9800	0.9600
100		0.9000	0.9700	0.9400	0.9200

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	97/100	93/100	98/100	96/100
100		90/100	97/100	94/100	92/100

CETIS Analytical Report

Report Date: 21 Dec-16 11:44 (p 1 of 2)
Test Code: GST1116.257 | 07-7835-2638

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	21-4336-7423	Endpoint:	Proportion Normal	CETIS Version:	CETISv1.9.2
Analyzed:	21 Dec-16 11:44	Analysis:	Parametric-Two Sample	Official Results:	Yes
Batch ID:	18-5775-1240	Test Type:	Development	Analyst:	
Start Date:	22 Nov-16 15:01	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	22 Nov-16 15:41	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	
Sample ID:	18-6864-0807	Code:	GST1116.257	Client:	GeoSyntec Consultants
Sample Date:	22 Nov-16 11:00	Material:	Sample Water	Project:	Beach Cities CIMP (LA0380)
Receipt Date:	22 Nov-16 14:15	Source:	Bioassay Report		
Sample Age:	4h (13.5 °C)	Station:	RW-BCEG01-001		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed proportion normal	3.62%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	1.477	1.943	0.081	6	CDF	0.0951	Non-Significant Effect

Test Acceptability Criteria

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

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0075004	0.0075004	1	2.182	0.1901	Non-Significant Effect
Error	0.020629	0.0034382	6			
Total	0.0281294		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	0.1423	13.75	0.7190	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.1282	13.75	0.7325	Equal Variances
Variances	Variance Ratio F Test	1.403	47.47	0.7876	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.1756	3.878	0.9792	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1317	0.3313	1.0000	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.9653	0.6451	0.8589	Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9600	0.9256	0.9944	0.9650	0.9300	0.9800	0.0108	2.25%	0.00%
100		4	0.9325	0.8850	0.9800	0.9300	0.9000	0.9700	0.0149	3.20%	2.86%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.375	1.289	1.46	1.383	1.303	1.429	0.02675	3.89%	0.00%
100		4	1.313	1.212	1.414	1.304	1.249	1.397	0.03168	4.82%	4.46%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9700	0.9300	0.9800	0.9600
100		0.9000	0.9700	0.9400	0.9200

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.397	1.303	1.429	1.369
100		1.249	1.397	1.323	1.284

CETIS Analytical Report

Report Date: 21 Dec-16 11:44 (p 2 of 2)
Test Code: GST1116.257 | 07-7835-2638

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

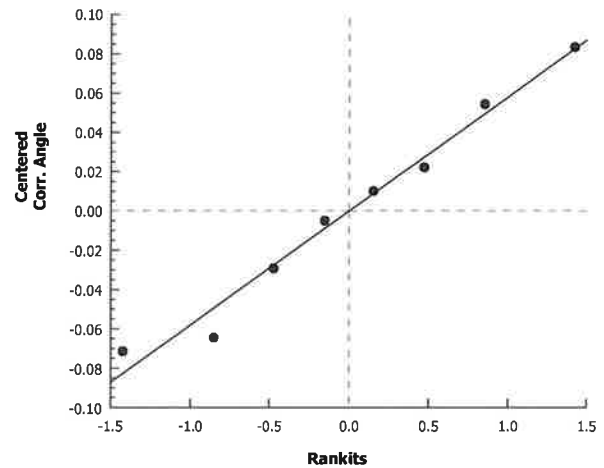
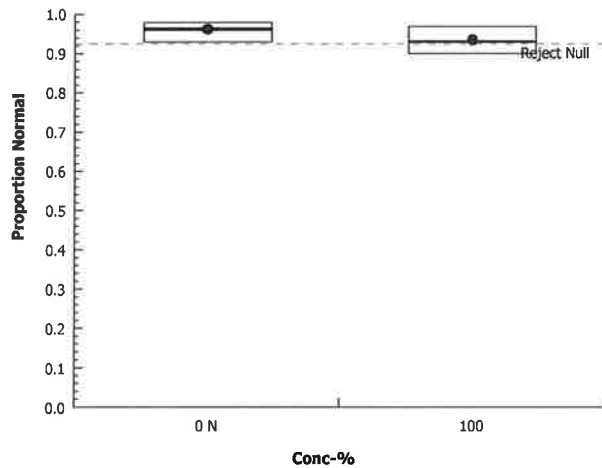
Analysis ID:	21-4336-7423	Endpoint:	Proportion Normal
Analyzed:	21 Dec-16 11:44	Analysis:	Parametric-Two Sample

CETIS Version: CETISv1.9.2
Official Results: Yes

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	97/100	93/100	98/100	96/100
100		90/100	97/100	94/100	92/100

Graphics



CETIS Measurement Report

Report Date: 21 Dec-16 11:44 (p 1 of 1)

Test Code: GST1116.257 | 07-7835-2638

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 18-5775-1240 Test Type: Development
 Start Date: 22 Nov-16 15:01 Protocol: EPA/600/R-95/136 (1995)
 Ending Date: 22 Nov-16 15:41 Species: Strongylocentrotus purpuratus
 Duration: 40m Source: David Gutoff

Analyst:
 Diluent: Laboratory Seawater
 Brine: Not Applicable
 Age:

Sample ID: 18-6864-0807 Code: GST1116.257
 Sample Date: 22 Nov-16 11:00 Material: Sample Water
 Receipt Date: 22 Nov-16 14:15 Source: Bioassay Report
 Sample Age: 4h (13.5 °C) Station: RW-BCEG01-001

Client: GeoSyntec Consultants
 Project: Beach Cities CIMP (LA0380)

Parameter Acceptability Criteria

Parameter	TAC Limits				Overlap	Decision
	Min	Max	Lower	Upper		
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.7	14.7	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	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
100		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
Overall		4	6.375	5.76	6.99	6	6.8	0.1931	0.3862	6.06%	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	6.729	9.271	7.9	8.1	0.1	0.1414	1.77%	0
Overall		4	7.95	7.791	8.109	7.9	8.1	0.05	0.1	1.26%	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	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
100		2	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
Overall		4	14.7	14.7	14.7	14.7	14.7	0	0	0.00%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	1	2
0	N	6.8	6
100		6.6	6.1

pH-Units

Conc-%	Code	1	2
0	N	7.9	7.9
100		7.9	8.1

Salinity-ppt

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

Temperature-°C

Conc-%	Code	1	2
0	N	14.7	14.7
100		14.7	14.7

December 21, 2016

Mr. Chris Wessel
Geosyntec Consultants
3415 S. Sepulveda Blvd., Suite 500
Los Angeles, CA 90034

Dear Mr. Wessel:

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

CLIENT:	Geosyntec Consultants
SAMPLE I.D.:	RW-BCEG02-001
DATE RECEIVED:	22 Nov - 16
ABC LAB. NO.:	GST1116.258

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC = 100.00 %
TU_c = 1.00

EC₂₅ = N/A
EC₅₀ = N/A

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 21 Dec-16 11:49 (p 1 of 1)

Test Code: GST1116.258 | 07-9894-6181

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.			
Batch ID:	17-0885-4361	Test Type:	Development	Analyst:			
Start Date:	22 Nov-16 15:02	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater		
Ending Date:	22 Nov-16 15:42	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable		
Duration:	40m	Source:	David Gutoff	Age:			
Sample ID:	04-5778-8548	Code:	GST1116.258	Client:	GeoSyntec Consultants		
Sample Date:	22 Nov-16 10:30	Material:	Sample Water	Project:	Beach Cities CIMP (LA0380)		
Receipt Date:	22 Nov-16 14:15	Source:	Bioassay Report				
Sample Age:	5h (13.5 °C)	Station:	RW-BCEG02-001				

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
04-9519-5169	Proportion Normal	Equal Variance t Two-Sample Test	0.1819	100% passed proportion normal

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
04-9519-5169	Proportion Normal	Control Resp	0.96	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	0.9600	0.9256	0.9944	0.9300	0.9800	0.0108	0.0216	2.25%	0.00%
100		4	0.9300	0.8650	0.9950	0.9000	0.9900	0.0204	0.0408	4.39%	3.12%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9700	0.9300	0.9800	0.9600
100		0.9900	0.9000	0.9200	0.9100

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	97/100	93/100	98/100	96/100
100		99/100	90/100	92/100	91/100

CETIS Analytical Report

Report Date: 21 Dec-16 11:49 (p 1 of 2)
Test Code: GST1116.258 | 07-9894-6181

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 04-9519-5169	Endpoint: Proportion Normal	CETIS Version: CETISv1.9.2
Analyzed: 21 Dec-16 11:48	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 17-0885-4361	Test Type: Development	Analyst:
Start Date: 22 Nov-16 15:02	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 22 Nov-16 15:42	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 04-5778-8548	Code: GST1116.258	Client: GeoSyntec Consultants
Sample Date: 22 Nov-16 10:30	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 22 Nov-16 14:15	Source: Bioassay Report	
Sample Age: 5h (13.5 °C)	Station: RW-BCEG02-001	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed proportion normal	5.48%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	0.9825	1.943	0.113	6	CDF	0.1819	Non-Significant Effect

Test Acceptability Criteria

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

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0065132	0.0065132	1	0.9654	0.3638	Non-Significant Effect
Error	0.0404815	0.0067469	6			
Total	0.0469946		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	1.578	13.75	0.2557	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.2016	13.75	0.6692	Equal Variances
Variances	Variance Ratio F Test	3.715	47.47	0.3097	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.4329	3.878	0.3077	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.1736	0.3313	0.8710	Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.8847	0.6451	0.2089	Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9600	0.9256	0.9944	0.9650	0.9300	0.9800	0.0108	2.25%	0.00%
100		4	0.9300	0.8650	0.9950	0.9150	0.9000	0.9900	0.0204	4.39%	3.13%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.375	1.289	1.46	1.383	1.303	1.429	0.02675	3.89%	0.00%
100		4	1.317	1.153	1.482	1.275	1.249	1.471	0.05156	7.83%	4.15%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9700	0.9300	0.9800	0.9600
100		0.9900	0.9000	0.9200	0.9100

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.397	1.303	1.429	1.369
100		1.471	1.249	1.284	1.266

CETIS Analytical Report

Report Date: 21 Dec-16 11:49 (p 2 of 2)

Test Code: GST1116.258 | 07-9894-6181

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 04-9519-5169

Endpoint: Proportion Normal

CETIS Version: CETISv1.9.2

Analyzed: 21 Dec-16 11:48

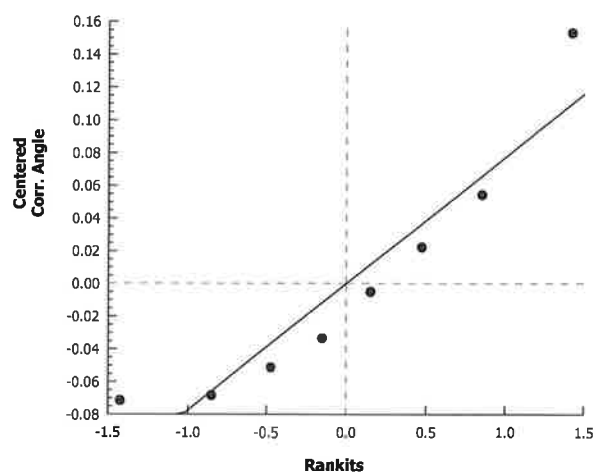
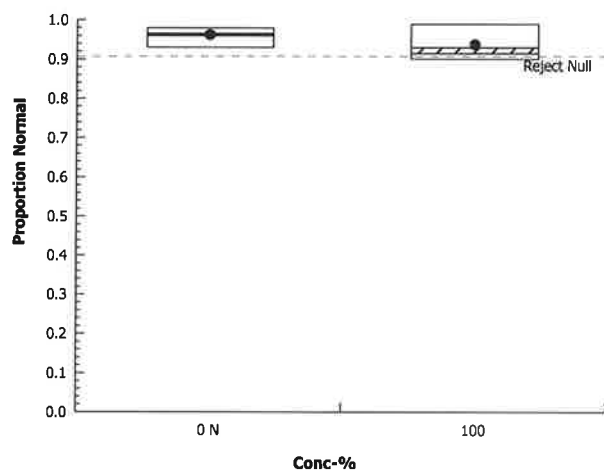
Analysis: Parametric-Two Sample

Official Results: Yes

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	97/100	93/100	98/100	96/100
100		99/100	90/100	92/100	91/100

Graphics



CETIS Measurement Report

Report Date: 21 Dec-16 11:49 (p 1 of 1)
 Test Code: GST1116.258 | 07-9894-6181

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 17-0885-4361	Test Type: Development	Analyst:
Start Date: 22 Nov-16 15:02	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 22 Nov-16 15:42	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 04-5778-8548	Code: GST1116.258	Client: GeoSyntec Consultants
Sample Date: 22 Nov-16 10:30	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 22 Nov-16 14:15	Source: Bioassay Report	
Sample Age: 5h (13.5 °C)	Station: RW-BCEG02-001	

Parameter Acceptability Criteria

Parameter	TAC Limits				Overlap	Decision
	Min	Max	Lower	Upper		
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.7	14.7	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	6.4	1.318	11.48	6	6.8	0.4	0.5657	8.84%	0
100		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
Overall		4	6.375	5.76	6.99	6	6.8	0.1931	0.3862	6.06%	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	8.15	6.244	10.06	8	8.3	0.15	0.2121	2.6%	0
Overall		4	8.025	7.724	8.326	7.9	8.3	0.09465	0.1893	2.36%	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	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
100		2	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
Overall		4	14.7	14.7	14.7	14.7	14.7	0	0	0.00%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	1	2
0	N	6.8	6
100		6.6	6.1

pH-Units

Conc-%	Code	1	2
0	N	7.9	7.9
100		8.3	8

Salinity-ppt

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

Temperature-°C

Conc-%	Code	1	2
0	N	14.7	14.7
100		14.7	14.7

Client:

Geosyntec

Project Name/Number:
Beach Cities CIMP (LA0380)

Address

Project Mgr.
Chris Wessel

3415 S. Sepulveda Blvd. St 500
Los Angeles, CA 90034

P.O. #
LA0390

Phone Number:

Sampled By (signature)

(714) 606-6215

[illegible]

Upon sample receipt record the following results:

Temp (°C)

NH₃ (mg/L)

Cl (mg/L):

Aquatic Bioassay and Consulting Laboratories
29 N. Olive Street Ventura, CA 93001 Phone: (805) 644-1111

29 N. Olive Street Ventura, CA 93001 Phone: (805) 643-5621 Fax: (805) 643-2930

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

DATE: 11/22/2016

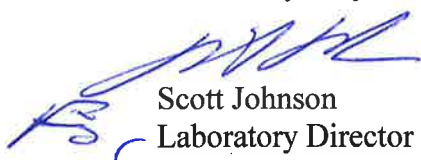
STANDARD TOXICANT: Copper Chloride

NOEC = 100.00 ug/l

EC25 = 90.40 ug/l

EC50 = 122.50 ug/l

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 21 Dec-16 11:42 (p 1 of 1)

Test Code: URC112216 | 04-1887-9393

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.			
Batch ID:	02-3624-5144	Test Type:	Fertilization	Analyst:			
Start Date:	22 Nov-16 15:00	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater		
Ending Date:	22 Nov-16 15:40	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable		
Duration:	40m	Source:	David Gutoff	Age:			
Sample ID:	06-8170-0896	Code:	URC112216	Client:	Internal Lab		
Sample Date:	22 Nov-16 15:00	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	✓
12-8308-3174	Fertilization Rate	Steel Many-One Rank Sum Test	100	180	134.2		34.7%	

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	µg/L	95% LCL	95% UCL	TU	✓
10-4206-0129	Fertilization Rate	Linear Interpolation (ICPIN)	EC5	53.34	34.41	130.3		
			EC10	63.77	43.36	130.6		
			EC15	72.65	51.53	131.9		
			EC20	81.53	55.82	133.2		
			EC25	90.4	58.33	134.5		
			EC40	111	66.34	142		
			EC50	122.5	72.83	148.3		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
10-4206-0129	Fertilization Rate	Control Resp	0.9325	0.7	>>	Yes	Passes Criteria
12-8308-3174	Fertilization Rate	Control Resp	0.9325	0.7	>>	Yes	Passes Criteria
12-8308-3174	Fertilization Rate	PMSD	0.3473	<<	0.25	No	Above 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	0.9325	0.8927	0.9723	0.9000	0.9600	0.0125	0.0250	2.68%	0.00%
18		4	0.9350	0.8734	0.9966	0.9000	0.9900	0.0194	0.0387	4.14%	-0.27%
32		4	0.9775	0.9474	1.0000	0.9500	0.9900	0.0095	0.0189	1.94%	-4.83%
56		4	0.8950	0.7584	1.0000	0.8000	0.9900	0.0429	0.0858	9.59%	4.02%
100		4	0.6600	0.0000	1.0000	0.0600	0.9800	0.2085	0.4170	63.18%	29.22%
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	0.9300	0.9400	0.9000	0.9600
18		0.9900	0.9300	0.9000	0.9200
32		0.9900	0.9800	0.9500	0.9900
56		0.9400	0.8500	0.8000	0.9900
100		0.7000	0.9000	0.9800	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	93/100	94/100	90/100	96/100
18		99/100	93/100	90/100	92/100
32		99/100	98/100	95/100	99/100
56		94/100	85/100	80/100	99/100
100		70/100	90/100	98/100	6/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 21 Dec-16 11:42 (p 1 of 2)

Test Code: URC112216 | 04-1887-9393

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 12-8308-3174	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 21 Dec-16 11:41	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 02-3624-5144	Test Type: Fertilization	Analyst:
Start Date: 22 Nov-16 15:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 22 Nov-16 15:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 06-8170-0896	Code: URC112216	Client: Internal Lab
Sample Date: 22 Nov-16 15:00	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	180	134.2		34.73%

Steel Many-One Rank Sum Test

Control	vs	Conc-µg/L	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		18	17	10	2	6	Asymp	0.6926	Non-Significant Effect
		32	25	10	0	6	Asymp	0.9994	Non-Significant Effect
		56	16.5	10	1	6	Asymp	0.6311	Non-Significant Effect
		100	14.5	10	1	6	Asymp	0.3688	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.9325	0.7	>>	Yes	Passes Criteria
PMSD	0.3473	<<	0.25	No	Above Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.457984	0.114496	4	1.834	0.1749	Non-Significant Effect
Error	0.936689	0.062446	15			
Total	1.39467		19			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	19.5	13.28	6.3E-04	Unequal Variances
Variances	Levene Equality of Variance Test	3.754	4.893	0.0262	Equal Variances
Variances	Mod Levene Equality of Variance Test	2.696	4.893	0.0711	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.521	3.878	1.2E-04	Non-Normal Distribution
Distribution	D'Agostino Kurtosis Test	3.174	2.576	0.0015	Non-Normal Distribution
Distribution	D'Agostino Skewness Test	2.664	2.576	0.0077	Non-Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	17.17	9.21	1.9E-04	Non-Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.2336	0.2235	0.0055	Non-Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.816	0.866	0.0015	Non-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	0.9325	0.8927	0.9723	0.9350	0.9000	0.9600	0.0125	2.68%	0.00%
18		4	0.9350	0.8734	0.9966	0.9250	0.9000	0.9900	0.0194	4.14%	-0.27%
32		4	0.9775	0.9474	1.0000	0.9850	0.9500	0.9900	0.0095	1.94%	-4.83%
56		4	0.8950	0.7584	1.0000	0.8950	0.8000	0.9900	0.0429	9.59%	4.02%
100		4	0.6600	0.0000	1.0000	0.8000	0.0600	0.9800	0.2085	63.18%	29.22%
180		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

CETIS Analytical Report

Report Date: 21 Dec-16 11:42 (p 2 of 2)

Test Code: URC112216 | 04-1887-9393

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 12-8308-3174

Endpoint: Fertilization Rate

CETIS Version: CETISv1.9.2

Analyzed: 21 Dec-16 11:41

Analysis: Nonparametric-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	1.311	1.232	1.391	1.313	1.249	1.369	0.02495	3.81%	0.00%
18		4	1.327	1.17	1.483	1.294	1.249	1.471	0.04927	7.43%	-1.18%
32		4	1.429	1.335	1.523	1.45	1.345	1.471	0.02954	4.14%	-8.97%
56		4	1.269	1.01	1.527	1.248	1.107	1.471	0.08114	12.79%	3.25%
100		4	0.9791	0.152	1.806	1.12	0.2475	1.429	0.2599	53.09%	25.33%
180		4	0.05002	0.05001	0.05003	0.05002	0.05002	0.05002	0	0.00%	96.19%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9300	0.9400	0.9000	0.9600
18		0.9900	0.9300	0.9000	0.9200
32		0.9900	0.9800	0.9500	0.9900
56		0.9400	0.8500	0.8000	0.9900
100		0.7000	0.9000	0.9800	0.0600
180		0.0000	0.0000	0.0000	0.0000

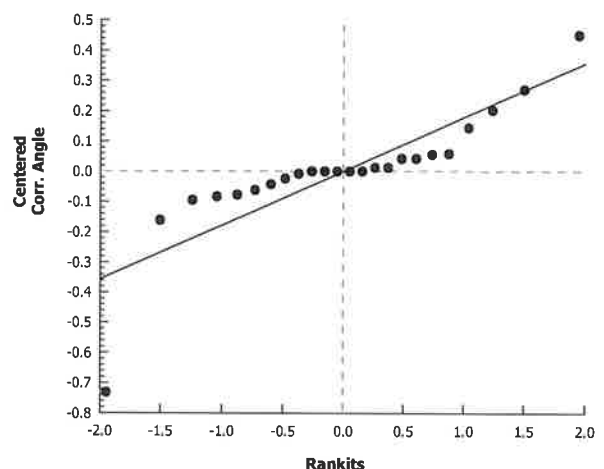
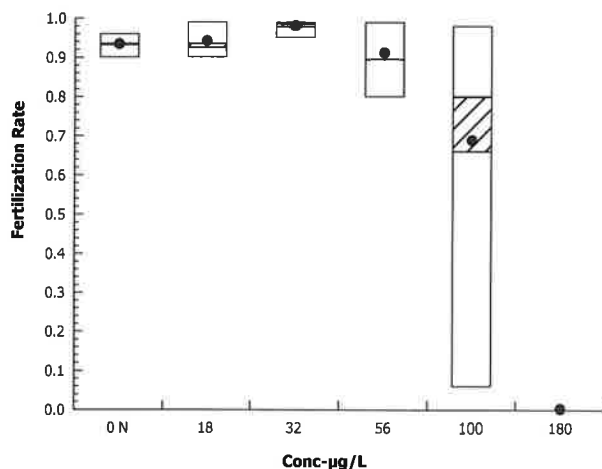
Angular (Corrected) Transformed Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.303	1.323	1.249	1.369
18		1.471	1.303	1.249	1.284
32		1.471	1.429	1.345	1.471
56		1.323	1.173	1.107	1.471
100		0.9912	1.249	1.429	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	93/100	94/100	90/100	96/100
18		99/100	93/100	90/100	92/100
32		99/100	98/100	95/100	99/100
56		94/100	85/100	80/100	99/100
100		70/100	90/100	98/100	6/100
180		0/100	0/100	0/100	0/100

Graphics



CETIS Analytical Report

Report Date: 21 Dec-16 11:42 (p 1 of 2)

Test Code: URC112216 | 04-1887-9393

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 10-4206-0129	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 21 Dec-16 11:41	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 02-3624-5144	Test Type: Fertilization	Analyst:
Start Date: 22 Nov-16 15:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 22 Nov-16 15:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 06-8170-0896	Code: URC112216	Client: Internal Lab
Sample Date: 22 Nov-16 15:00	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	0.9325	0.7	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	53.34	34.41	130.3
EC10	63.77	43.36	130.6
EC15	72.65	51.53	131.9
EC20	81.53	55.82	133.2
EC25	90.4	58.33	134.5
EC40	111	66.34	142
EC50	122.5	72.83	148.3

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	0.9325	0.9000	0.9600	0.0125	0.0250	2.68%	0.0%	373	400
18		4	0.9350	0.9000	0.9900	0.0194	0.0387	4.14%	-0.27%	374	400
32		4	0.9775	0.9500	0.9900	0.0095	0.0189	1.94%	-4.83%	391	400
56		4	0.8950	0.8000	0.9900	0.0429	0.0858	9.59%	4.02%	358	400
100		4	0.6600	0.0600	0.9800	0.2085	0.4170	63.18%	29.22%	264	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	0.9300	0.9400	0.9000	0.9600
18		0.9900	0.9300	0.9000	0.9200
32		0.9900	0.9800	0.9500	0.9900
56		0.9400	0.8500	0.8000	0.9900
100		0.7000	0.9000	0.9800	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	93/100	94/100	90/100	96/100
18		99/100	93/100	90/100	92/100
32		99/100	98/100	95/100	99/100
56		94/100	85/100	80/100	99/100
100		70/100	90/100	98/100	6/100
180		0/100	0/100	0/100	0/100

CETIS Analytical Report

Report Date: 21 Dec-16 11:42 (p 2 of 2)

Test Code: URC112216 | 04-1887-9393

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 10-4206-0129

Endpoint: Fertilization Rate

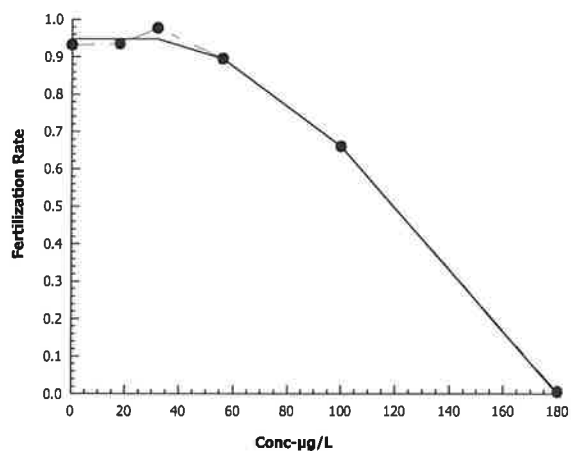
CETIS Version: CETISv1.9.2

Analyzed: 21 Dec-16 11:41

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Graphics



CETIS Measurement Report

Report Date: 21 Dec-16 11:42 (p 1 of 2)

Test Code: URC112216 | 04-1887-9393

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 02-3624-5144	Test Type: Fertilization	Analyst:
Start Date: 22 Nov-16 15:00	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 22 Nov-16 15:40	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 06-8170-0896	Code: URC112216	Client: Internal Lab
Sample Date: 22 Nov-16 15:00	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Parameter Acceptability Criteria

Parameter	TAC Limits				Overlap	Decision
	Min	Max	Lower	Upper		
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.7	14.7	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	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
18		2	6.35	0.6322	12.07	5.9	6.8	0.45	0.6364	10.02%	0
32		2	6.15	4.244	8.056	6	6.3	0.15	0.2121	3.45%	0
56		2	6.1	6.094	6.106	6.1	6.1	0	0	0.0%	0
100		2	6.35	4.444	8.256	6.2	6.5	0.15	0.2121	3.34%	0
180		2	6.05	5.415	6.685	6	6.1	0.05	0.07071	1.17%	0
Overall		12	6.242	6.049	6.434	5.9	6.8	0.08744	0.3029	4.85%	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	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
18		2	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
32		2	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
56		2	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
100		2	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
180		2	14.7	14.68	14.72	14.7	14.7	0	0	0.0%	0
Overall		12	14.7	14.7	14.7	14.7	14.7	0	0	0.00%	0 (0%)

CETIS Measurement Report

Report Date: 21 Dec-16 11:42 (p 2 of 2)

Test Code: URC112216 | 04-1887-9393

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		6.8	5.9
32		6.3	6
56		6.1	6.1
100		6.5	6.2
180		6.1	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	14.7	14.7
18		14.7	14.7
32		14.7	14.7
56		14.7	14.7
100		14.7	14.7
180		14.7	14.7

January 20, 2017

Mr. Chris Wessel
Geosyntec Consultants
3415 S. Sepulveda Blvd., Suite 500
Los Angeles, CA 90034

Dear Mr. Wessel:

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

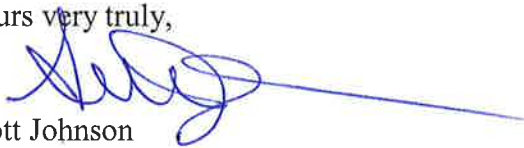
CLIENT:	Geosyntec Consultants
SAMPLE I.D.:	RW-BCEG01-002
DATE RECEIVED:	19 Dec - 16
ABC LAB. NO.:	GST1216.187

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC = 100.00 %
TU_c = 1.00

EC25 = N/A
EC50 = N/A

Yours very truly,


Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 20 Jan-17 09:16 (p 1 of 1)
 Test Code: GST1216.187 | 19-5355-8530

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.			
Batch ID:	15-7545-4723	Test Type:	Development	Analyst:			
Start Date:	19 Dec-16 14:11	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater		
Ending Date:	19 Dec-16 14:51	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable		
Duration:	40m	Source:	David Gutoff	Age:			
Sample ID:	01-0315-7673	Code:	GST1216.187	Client:	GeoSyntec Consultants		
Sample Date:	18 Dec-16 08:50	Material:	Sample Water	Project:	Beach Cities CIMP (LA0380)		
Receipt Date:	19 Dec-16 10:30	Source:	Bioassay Report				
Sample Age:	29h (8.5 °C)	Station:	RW-BCEG01-002				

Single Comparison Summary				
Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
05-6698-8535	Proportion Normal	Wilcoxon Rank Sum Two-Sample Test	0.5000	100% passed proportion normal

Test Acceptability		TAC Limits					
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
05-6698-8535	Proportion Normal	Control Resp	0.9975	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	0.9975	0.9895	1.0000	0.9900	1.0000	0.0025	0.0050	0.50%	0.00%
100		4	0.9950	0.9791	1.0000	0.9800	1.0000	0.0050	0.0100	1.01%	0.25%

Proportion Normal Detail					
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	0.9900	1.0000	1.0000
100		0.9800	1.0000	1.0000	1.0000

Proportion Normal Binomials					
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	100/100	99/100	100/100	100/100
100		98/100	100/100	100/100	100/100

CETIS Analytical Report

Report Date: 20 Jan-17 09:16 (p 1 of 2)

Test Code: GST1216.187 | 19-5355-8530

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 05-6698-8535	Endpoint: Proportion Normal	CETIS Version: CETISv1.9.2
Analyzed: 19 Jan-17 22:09	Analysis: Nonparametric-Two Sample	Official Results: Yes
Batch ID: 15-7545-4723	Test Type: Development	Analyst:
Start Date: 19 Dec-16 14:11	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 19 Dec-16 14:51	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Guttoff	Age:
Sample ID: 01-0315-7673	Code: GST1216.187	Client: GeoSyntec Consultants
Sample Date: 18 Dec-16 08:50	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 19 Dec-16 10:30	Source: Bioassay Report	
Sample Age: 29h (8.5 °C)	Station: RW-BCEG01-002	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed proportion normal	1.03%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	17.5	n/a	1	6	Exact	0.5000	Non-Significant Effect

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.9975	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002177	0.0002177	1	0.1589	0.7039	Non-Significant Effect
Error	0.0082169	0.0013695	6			
Total	0.0084346		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	1.43	13.75	0.2768	Equal Variances
Variances	Mod Levene Equality of Variance Test	0.1589	13.75	0.7039	Equal Variances
Variances	Variance Ratio F Test	3.357	47.47	0.3465	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.223	3.878	0.0033	Non-Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.3928	0.3313	6.3E-04	Non-Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.7137	0.6451	0.0032	Non-Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9975	0.9895	1.0000	1.0000	0.9900	1.0000	0.0025	0.50%	0.00%
100		4	0.9950	0.9791	1.0000	1.0000	0.9800	1.0000	0.0050	1.01%	0.25%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.508	1.468	1.548	1.521	1.471	1.521	0.01254	1.66%	0.00%
100		4	1.498	1.425	1.571	1.521	1.429	1.521	0.02297	3.07%	0.69%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	0.9900	1.0000	1.0000
100		0.9800	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.521	1.471	1.521	1.521
100		1.429	1.521	1.521	1.521

CETIS Analytical Report

Report Date: 20 Jan-17 09:16 (p 2 of 2)

Test Code: GST1216.187 | 19-5355-8530

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 05-6698-8535

Endpoint: Proportion Normal

CETIS Version: CETISv1.9.2

Analyzed: 19 Jan-17 22:09

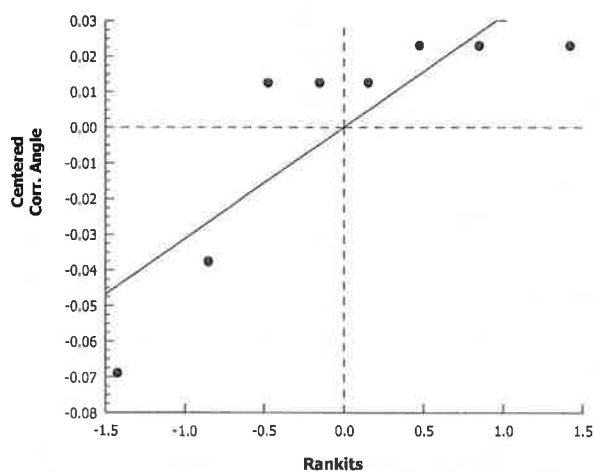
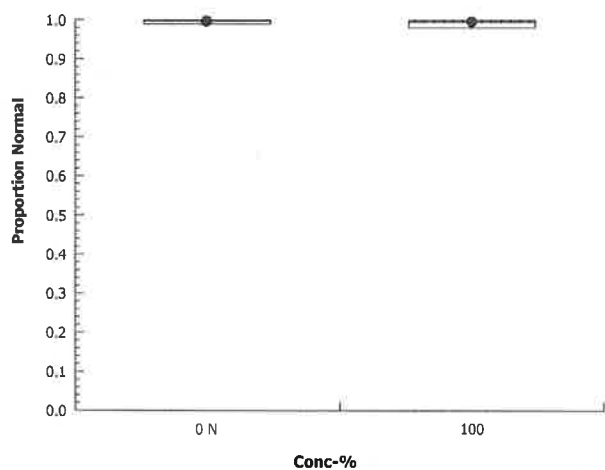
Analysis: Nonparametric-Two Sample

Official Results: Yes

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	100/100	99/100	100/100	100/100
100		98/100	100/100	100/100	100/100

Graphics



CETIS Measurement Report

Report Date: 20 Jan-17 09:16 (p 1 of 1)

Test Code: GST1216.187 | 19-5355-8530

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 15-7545-4723
 Start Date: 19 Dec-16 14:11
 Ending Date: 19 Dec-16 14:51
 Duration: 40m
 Test Type: Development
 Protocol: EPA/600/R-95/136 (1995)
 Species: Strongylocentrotus purpuratus
 Source: David Gutoff

Analyst:
 Diluent: Laboratory Seawater
 Brine: Not Applicable
 Age:

Sample ID: 01-0315-7673
 Sample Date: 18 Dec-16 08:50
 Receipt Date: 19 Dec-16 10:30
 Sample Age: 29h (8.5 °C)
 Code: GST1216.187
 Material: Sample Water
 Source: Bioassay Report
 Station: RW-BCEG01-002

Client: GeoSyntec Consultants
 Project: Beach Cities CIMP (LA0380)

Parameter Acceptability Criteria

Parameter	TAC Limits				Overlap	Decision
	Min	Max	Lower	Upper		
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.8	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
100		2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
Overall		4	6.45	5.807	7.093	6.1	6.8	0.2021	0.4041	6.27%	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	7.8	6.529	9.071	7.7	7.9	0.1	0.1414	1.81%	0
Overall		4	7.85	7.691	8.009	7.7	7.9	0.05	0.1	1.27%	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	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
100		2	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
Overall		4	14.8	14.8	14.8	14.8	14.8	0	0	0.00%	0 (0%)

Dissolved Oxygen-mg/L

Conc-%	Code	1	2
0	N	6.8	6.1
100		6.8	6.1

pH-Units

Conc-%	Code	1	2
0	N	7.9	7.9
100		7.9	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	14.8
100		14.8	14.8

January 20, 2017

Mr. Chris Wessel
Geosyntec Consultants
3415 S. Sepulveda Blvd., Suite 500
Los Angeles, CA 90034

Dear Mr. Wessel:

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

CLIENT:	Geosyntec Consultants
SAMPLE I.D.:	RW-BCEG02-002
DATE RECEIVED:	19 Dec - 16
ABC LAB. NO.:	GST1216.188

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

NOEC =	100.00 %
TUc =	1.00

EC25 =	N/A
EC50 =	N/A

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 20 Jan-17 09:16 (p 1 of 1)

Test Code: GST1216.188 | 09-2155-4834

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID:	16-2731-6568	Test Type:	Development	Analyst:	
Start Date:	19 Dec-16 14:12	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	19 Dec-16 14:52	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable
Duration:	40m	Source:	David Gutoff	Age:	
Sample ID:	08-5408-0123	Code:	GST1216.188	Client:	GeoSyntec Consultants
Sample Date:	18 Dec-16 09:10	Material:	Sample Water	Project:	Beach Cities CIMP (LA0380)
Receipt Date:	19 Dec-16 10:30	Source:	Bioassay Report		
Sample Age:	29h (8.3 °C)	Station:	RW-BCEG02-002		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result
07-2181-4728	Proportion Normal	Wilcoxon Rank Sum Two-Sample Test	0.7857	100% passed proportion normal

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
07-2181-4728	Proportion Normal	Control Resp	0.9975	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	0.9975	0.9895	1.0000	0.9900	1.0000	0.0025	0.0050	0.50%	0.00%
100		4	0.9975	0.9895	1.0000	0.9900	1.0000	0.0025	0.0050	0.50%	0.00%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9900	1.0000	1.0000	1.0000
100		0.9900	1.0000	1.0000	1.0000

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	99/100	100/100	100/100	100/100
100		99/100	100/100	100/100	100/100

CETIS Analytical Report

Report Date: 20 Jan-17 09:16 (p 1 of 2)

Test Code: GST1216.188 | 09-2155-4834

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 07-2181-4728	Endpoint: Proportion Normal	CETIS Version: CETISv1.9.2
Analyzed: 19 Jan-17 22:11	Analysis: Nonparametric-Two Sample	Official Results: Yes
Batch ID: 16-2731-6568	Test Type: Development	Analyst:
Start Date: 19 Dec-16 14:12	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 19 Dec-16 14:52	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Guttoff	Age:
Sample ID: 08-5408-0123	Code: GST1216.188	Client: GeoSyntec Consultants
Sample Date: 18 Dec-16 09:10	Material: Sample Water	Project: Beach Cities CIMP (LA0380)
Receipt Date: 19 Dec-16 10:30	Source: Bioassay Report	
Sample Age: 29h (8.3 °C)	Station: RW-BCEG02-002	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed proportion normal	0.69%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	18	n/a	2	6	Exact	0.7857	Non-Significant Effect

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.9975	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	0	1.0000	Non-Significant Effect
Error	0.0037720	0.0006287	6			
Total	0.0037720		7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Levene Equality of Variance Test	0	13.75	1.0000	Equal Variances
Variances	Mod Levene Equality of Variance Test	0	13.75	1.0000	Equal Variances
Variances	Variance Ratio F Test	1	47.47	1.0000	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.973	3.878	<1.0E-37	Non-Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.4554	0.3313	2.1E-05	Non-Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.5659	0.6451	6.3E-05	Non-Normal Distribution

Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	0.9975	0.9895	1.0000	1.0000	0.9900	1.0000	0.0025	0.50%	0.00%
100		4	0.9975	0.9895	1.0000	1.0000	0.9900	1.0000	0.0025	0.50%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.508	1.468	1.548	1.521	1.471	1.521	0.01254	1.66%	0.00%
100		4	1.508	1.468	1.548	1.521	1.471	1.521	0.01254	1.66%	0.00%

Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9900	1.0000	1.0000	1.0000
100		0.9900	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.471	1.521	1.521	1.521
100		1.471	1.521	1.521	1.521

CETIS Analytical Report

Report Date: 20 Jan-17 09:16 (p 2 of 2)
Test Code: GST1216.188 | 09-2155-4834

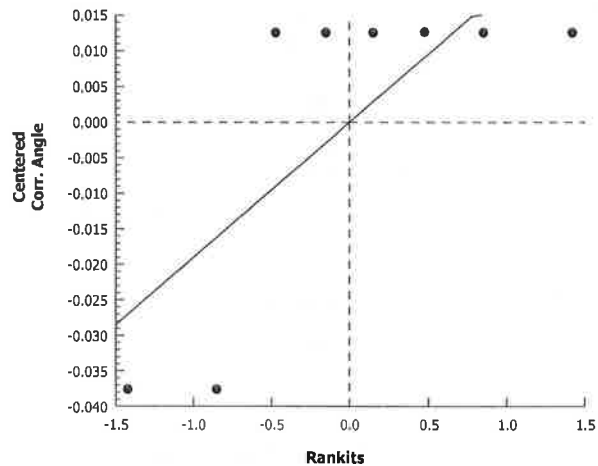
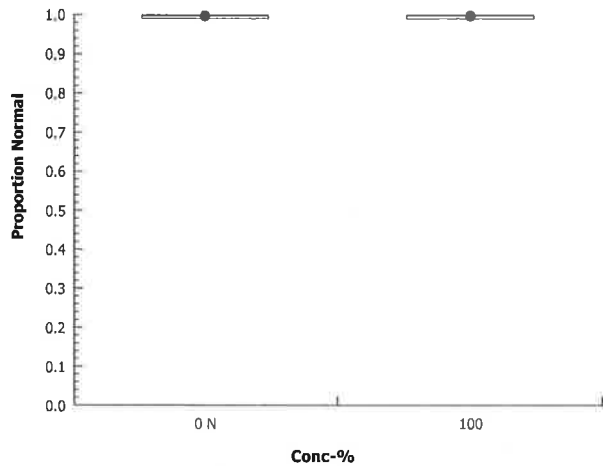
Purple Sea Urchin Sperm Cell Fertilization Test Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 07-2181-4728 Endpoint: Proportion Normal CETIS Version: CETISv1.9.2
Analyzed: 19 Jan-17 22:11 Analysis: Nonparametric-Two Sample Official Results: Yes

Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	99/100	100/100	100/100	100/100
100		99/100	100/100	100/100	100/100

Graphics



CETIS Measurement Report

Report Date: 20 Jan-17 09:16 (p 1 of 1)
 Test Code: GST1216.188 | 09-2155-4834

Purple Sea Urchin Sperm Cell Fertilization Test				Aquatic Bioassay & Consulting Labs, Inc.			
Batch ID:	16-2731-6568	Test Type:	Development	Analyst:			
Start Date:	19 Dec-16 14:12	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater		
Ending Date:	19 Dec-16 14:52	Species:	Strongylocentrotus purpuratus	Brine:	Not Applicable		
Duration:	40m	Source:	David Gutoff	Age:			
Sample ID:	08-5408-0123	Code:	GST1216.188	Client:	GeoSyntec Consultants		
Sample Date:	18 Dec-16 09:10	Material:	Sample Water	Project:	Beach Cities CIMP (LA0380)		
Receipt Date:	19 Dec-16 10:30	Source:	Bioassay Report				
Sample Age:	29h (8.3 °C)	Station:	RW-BCEG02-002				

Parameter Acceptability Criteria		TAC Limits				Overlap	Decision
Parameter		Min	Max	Lower	Upper		
Salinity		34	34	32	36	Yes	Passes Criteria
Temperature		14.8	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
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	7.8	6.529	9.071	7.7	7.9	0.1	0.1414	1.81%	0
Overall		4	7.85	7.691	8.009	7.7	7.9	0.05	0.1	1.27%	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	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
100		2	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
Overall		4	14.8	14.8	14.8	14.8	14.8	0	0	0.00%	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		7.9	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	14.8								
100		14.8	14.8								

Client:

Geosyntec

Project Name/Number:
Beach Cities CIMP (LA0380)

Address

3415 S. Sepulveda Blvd. St 500
Los Angeles, CA 90034

Project Mgr.
Chris Wessel

P.O. #
LA0380

Phone Number:

Sampled By (signature)

(714) 606-6215

[illegible]

Relinquished By: (signature)

Date: Time:

Relinquished By: (signature)

Date: Time

Received By: (signature)

Date: Time:

Received BY: (signature)

Date: Time

Upon sample receipt record the following results:

Temp (°C)

NH₃ (mg/L)

Cl (mg/L):

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

CHRONIC SEA URCHIN FERTILIZATION BIOASSAY

DATE: 12/19/2016

STANDARD TOXICANT: Copper Chloride

NOEC = 32.00 ug/l

EC25 = 61.50 ug/l

EC50 = 90.37 ug/l

Yours very truly,



Scott Johnson
Laboratory Director

CETIS Summary Report

Report Date: 20 Jan-17 09:16 (p 1 of 1)
Test Code: URC121916 | 07-5503-2402

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 14-4679-2087	Test Type: Fertilization	Analyst:
Start Date: 19 Dec-16 14:10	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 19 Dec-16 14:50	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 08-3391-2834	Code: URC121916	Client: Internal Lab
Sample Date: 19 Dec-16 14:10	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	✓
15-9878-7713	Fertilization Rate	Steel Many-One Rank Sum Test	32	56	42.33		12.6%	

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	Level	µg/L	95% LCL	95% UCL	TU	✓
16-8975-8649	Fertilization Rate	Linear Interpolation (ICPIN)	EC5	37.93	34.46	43.24		
			EC10	43.86	36.91	54.47		
			EC15	49.79	39.37	63.04		
			EC20	55.72	41.83	73.95		
			EC25	61.5	44.37	90.36		
			EC40	78.82	58.78	126.3		
			EC50	90.37	65.84	141.4		

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
15-9878-7713	Fertilization Rate	Control Resp	0.98	0.7	>>	Yes	Passes Criteria
16-8975-8649	Fertilization Rate	Control Resp	0.98	0.7	>>	Yes	Passes Criteria
15-9878-7713	Fertilization Rate	PMSD	0.126	<<	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	0.9800	0.9456	1.0000	0.9500	1.0000	0.0108	0.0216	2.20%	0.00%
18		4	0.9800	0.9540	1.0000	0.9600	1.0000	0.0082	0.0163	1.67%	0.00%
32		4	0.9925	0.9773	1.0000	0.9800	1.0000	0.0048	0.0096	0.96%	-1.28%
56		4	0.7850	0.5974	0.9726	0.6100	0.8600	0.0590	0.1179	15.02%	19.90%
100		4	0.4100	0.0000	0.8875	0.1500	0.8000	0.1501	0.3001	73.20%	58.16%
180		4	0.0750	0.0291	0.1209	0.0400	0.1100	0.0144	0.0289	38.49%	92.35%

Fertilization Rate Detail

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	0.9500	0.9800	0.9900
18		0.9800	0.9800	1.0000	0.9600
32		0.9800	1.0000	1.0000	0.9900
56		0.6100	0.8200	0.8500	0.8600
100		0.4900	0.1500	0.2000	0.8000
180		0.0700	0.0800	0.1100	0.0400

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	100/100	95/100	98/100	99/100
18		98/100	98/100	100/100	96/100
32		98/100	100/100	100/100	99/100
56		61/100	82/100	85/100	86/100
100		49/100	15/100	20/100	80/100
180		7/100	8/100	11/100	4/100

CETIS Analytical Report

Report Date: 20 Jan-17 09:16 (p 1 of 2)
Test Code: URC121916 | 07-5503-2402

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 15-9878-7713	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 19 Jan-17 22:04	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 14-4679-2087	Test Type: Fertilization	Analyst:
Start Date: 19 Dec-16 14:10	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 19 Dec-16 14:50	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 08-3391-2834	Code: URC121916	Client: Internal Lab
Sample Date: 19 Dec-16 14:10	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	32	56	42.33		12.60%

Steel Many-One Rank Sum Test

Control	vs	Conc-µg/L	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		18	17.5	10	2	6	Asymp	0.7867	Non-Significant Effect
		32	21	10	3	6	Asymp	0.9778	Non-Significant Effect
		56*	10	10	0	6	Asymp	0.0417	Significant Effect
		100*	10	10	0	6	Asymp	0.0417	Significant Effect
		180*	10	10	0	6	Asymp	0.0417	Significant Effect

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	0.98	0.7	>>	Yes	Passes Criteria
PMSD	0.126	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.91094	0.982188	5	42.38	<1.0E-37	Significant Effect
Error	0.417168	0.023176	18			
Total	5.32811		23			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance Test	16.91	15.09	0.0047	Unequal Variances
Variances	Levene Equality of Variance Test	6.115	4.248	0.0018	Unequal Variances
Variances	Mod Levene Equality of Variance Test	4.026	4.248	0.0125	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.205	3.878	0.0037	Non-Normal Distribution
Distribution	D'Agostino Kurtosis Test	2.611	2.576	0.0090	Non-Normal Distribution
Distribution	D'Agostino Skewness Test	1.399	2.576	0.1617	Normal Distribution
Distribution	D'Agostino-Pearson K2 Omnibus Test	8.778	9.21	0.0124	Normal Distribution
Distribution	Kolmogorov-Smirnov D Test	0.2104	0.2056	0.0074	Non-Normal Distribution
Distribution	Shapiro-Wilk W Normality Test	0.8755	0.884	0.0068	Non-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	0.9800	0.9456	1.0000	0.9850	0.9500	1.0000	0.0108	2.20%	0.00%
18		4	0.9800	0.9540	1.0000	0.9800	0.9600	1.0000	0.0082	1.67%	0.00%
32		4	0.9925	0.9773	1.0000	0.9950	0.9800	1.0000	0.0048	0.96%	-1.28%
56		4	0.7850	0.5974	0.9726	0.8350	0.6100	0.8600	0.0590	15.02%	19.90%
100		4	0.4100	0.0000	0.8875	0.3450	0.1500	0.8000	0.1501	73.20%	58.16%
180		4	0.0750	0.0291	0.1209	0.0750	0.0400	0.1100	0.0144	38.49%	92.35%

Report Date: 20 Jan-17 09:16 (p 2 of 2)
Test Code: URC121916 | 07-5503-2402

Aquatic Bioassay & Consulting Labs, Inc.

CETIS Version: CETISv1.9.2
Official Results: Yes

Conc-µg/L	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	4	1.441	1.323	1.56	1.45	1.345	1.521	0.03714	5.15%	0.00%
18		4	1.437	1.338	1.536	1.429	1.369	1.521	0.03124	4.35%	0.30%
32		4	1.485	1.415	1.556	1.496	1.429	1.521	0.0222	2.99%	-3.04%
56		4	1.097	0.8809	1.314	1.153	0.8963	1.187	0.068	12.39%	23.87%
100		4	0.686	0.168	1.204	0.6195	0.3977	1.107	0.1628	47.46%	52.41%
180		4	0.2735	0.1836	0.3634	0.2773	0.2014	0.3381	0.02826	20.66%	81.03%

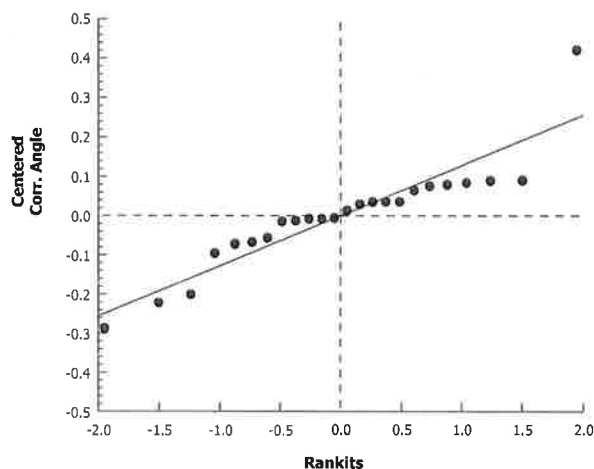
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	0.9500	0.9800	0.9900
18		0.9800	0.9800	1.0000	0.9600
32		0.9800	1.0000	1.0000	0.9900
56		0.6100	0.8200	0.8500	0.8600
100		0.4900	0.1500	0.2000	0.8000
180		0.0700	0.0800	0.1100	0.0400

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.521	1.345	1.429	1.471
18		1.429	1.429	1.521	1.369
32		1.429	1.521	1.521	1.471
56		0.8963	1.133	1.173	1.187
100		0.7754	0.3977	0.4636	1.107
180		0.2678	0.2868	0.3381	0.2014

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	100/100	95/100	98/100	99/100
18		98/100	98/100	100/100	96/100
32		98/100	100/100	100/100	99/100
56		61/100	82/100	85/100	86/100
100		49/100	15/100	20/100	80/100
180		7/100	8/100	11/100	4/100

Box plot showing the effect of 2,4-D concentration on the fertilization rate of the sea urchin, *Paracentrotus lividus*. The y-axis represents the Fertilization Rate (0.0 to 1.0), and the x-axis represents the concentration of 2,4-D in µg/L (0 N, 18, 32, 56, 100, 180). The plot shows that fertilization rate is high (near 1.0) for concentrations up to 32 µg/L, then decreases significantly at 56, 100, and 180 µg/L. The 56 and 100 µg/L groups show a shaded box indicating a specific range of fertilization rates.

Conc-µg/L	Median Fertilization Rate	Q1	Q3	Min	Max
0 N	~0.98	~0.95	~1.00	~0.95	~1.00
18	~0.98	~0.95	~1.00	~0.95	~1.00
32	~0.98	~0.95	~1.00	~0.95	~1.00
56	~0.78	~0.61	~0.86	~0.61	~0.86
100	~0.40	~0.15	~0.80	~0.15	~0.80
180	~0.08	~0.05	~0.10	~0.05	~0.10



CETIS Analytical Report

Report Date: 20 Jan-17 09:16 (p 1 of 2)

Test Code: URC121916 | 07-5503-2402

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID: 16-8975-8649	Endpoint: Fertilization Rate	CETIS Version: CETISv1.9.2
Analyzed: 19 Jan-17 22:04	Analysis: Linear Interpolation (ICPIN)	Official Results: Yes
Batch ID: 14-4679-2087	Test Type: Fertilization	Analyst:
Start Date: 19 Dec-16 14:10	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 19 Dec-16 14:50	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 08-3391-2834	Code: URC121916	Client: Internal Lab
Sample Date: 19 Dec-16 14:10	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	0.98	0.7	>>	Yes	Passes Criteria

Point Estimates

Level	µg/L	95% LCL	95% UCL
EC5	37.93	34.46	43.24
EC10	43.86	36.91	54.47
EC15	49.79	39.37	63.04
EC20	55.72	41.83	73.95
EC25	61.5	44.37	90.36
EC40	78.82	58.78	126.3
EC50	90.37	65.84	141.4

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	0.9800	0.9500	1.0000	0.0108	0.0216	2.20%	0.0%	392	400
18		4	0.9800	0.9600	1.0000	0.0082	0.0163	1.67%	0.0%	392	400
32		4	0.9925	0.9800	1.0000	0.0048	0.0096	0.96%	-1.28%	397	400
56		4	0.7850	0.6100	0.8600	0.0590	0.1179	15.02%	19.9%	314	400
100		4	0.4100	0.1500	0.8000	0.1501	0.3001	73.20%	58.16%	164	400
180		4	0.0750	0.0400	0.1100	0.0144	0.0289	38.49%	92.35%	30	400

Fertilization Rate Detail

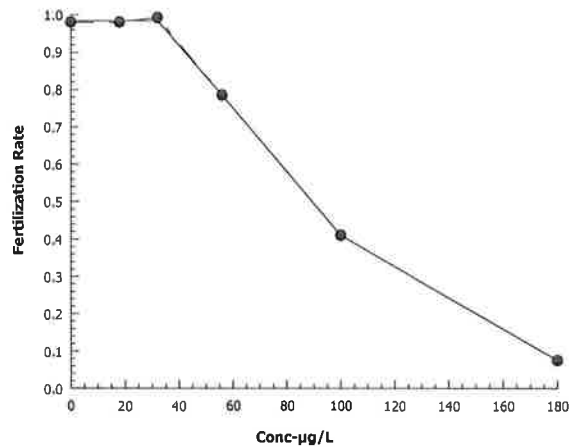
Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	0.9500	0.9800	0.9900
18		0.9800	0.9800	1.0000	0.9600
32		0.9800	1.0000	1.0000	0.9900
56		0.6100	0.8200	0.8500	0.8600
100		0.4900	0.1500	0.2000	0.8000
180		0.0700	0.0800	0.1100	0.0400

Fertilization Rate Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	100/100	95/100	98/100	99/100
18		98/100	98/100	100/100	96/100
32		98/100	100/100	100/100	99/100
56		61/100	82/100	85/100	86/100
100		49/100	15/100	20/100	80/100
180		7/100	8/100	11/100	4/100

Purple Sea Urchin Sperm Cell Fertilization Test		Aquatic Bioassay & Consulting Labs, Inc.	
Analysis ID:	16-8975-8649	Endpoint:	Fertilization Rate
Analized:	19 Jan-17 22:04	Analysis:	Linear Interpolation (ICPIN)
		CETIS Version:	CETISv1.9.2
		Official Results:	Yes

Graphics



CETIS Measurement Report

Report Date: 20 Jan-17 09:16 (p 1 of 2)
Test Code: URC121916 | 07-5503-2402

Purple Sea Urchin Sperm Cell Fertilization Test

Aquatic Bioassay & Consulting Labs, Inc.

Batch ID: 14-4679-2087	Test Type: Fertilization	Analyst:
Start Date: 19 Dec-16 14:10	Protocol: EPA/600/R-95/136 (1995)	Diluent: Laboratory Seawater
Ending Date: 19 Dec-16 14:50	Species: Strongylocentrotus purpuratus	Brine: Not Applicable
Duration: 40m	Source: David Gutoff	Age:
Sample ID: 08-3391-2834	Code: URC121916	Client: Internal Lab
Sample Date: 19 Dec-16 14:10	Material: Copper chloride	Project:
Receipt Date:	Source: Reference Toxicant	
Sample Age: n/a	Station: REF TOX	

Parameter Acceptability Criteria

Parameter	TAC Limits				Overlap	Decision
	Min	Max	Lower	Upper		
Salinity	34	34	32	36	Yes	Passes Criteria
Temperature	14.8	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	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
18		2	6.35	3.173	9.527	6.1	6.6	0.25	0.3536	5.57%	0
32		2	6.5	3.959	9.041	6.3	6.7	0.2	0.2828	4.35%	0
56		2	6.55	2.103	11	6.2	6.9	0.35	0.495	7.56%	0
100		2	6.45	2.003	10.9	6.1	6.8	0.35	0.495	7.67%	0
180		2	6.45	4.544	8.356	6.3	6.6	0.15	0.2121	3.29%	0
Overall		12	6.458	6.264	6.653	6.1	6.9	0.0883	0.3059	4.74%	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	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
32		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
56		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
100		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
180		2	7.95	7.315	8.585	7.9	8	0.04999	0.0707	0.89%	0
Overall		12	7.942	7.909	7.974	7.9	8	0.01486	0.05149	0.65%	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	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
18		2	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
32		2	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
56		2	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
100		2	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
180		2	14.8	14.78	14.82	14.8	14.8	0	0	0.0%	0
Overall		12	14.8	14.8	14.8	14.8	14.8	0	0	0.00%	0 (0%)

CETIS Measurement Report

Report Date: 20 Jan-17 09:16 (p 2 of 2)

Test Code: URC121916 | 07-5503-2402

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		6.6	6.1
32		6.7	6.3
56		6.9	6.2
100		6.8	6.1
180		6.6	6.3

pH-Units

Conc-µg/L	Code	1	2
0	N	7.9	7.9
18		7.9	8
32		7.9	8
56		7.9	8
100		7.9	8
180		7.9	8

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