

Appendix A

Test Data and Statistical Summaries

Mediterranean Mussel

Mytilus galloprovincialis

CETIS Summary Report

Report Date: 28 Jul-11 17:45 (p 1 of 1)
 Test Code: 475F78CB | 11-9743-9179

Bivalve Larval Survival and Development Test								SPAWAR Systems Center			
Batch ID:	11-0713-8919	Test Type:	Development-Survival			Analyst:					
Start Date:	03 May-11 20:00	Protocol:	EPA/600/R-95/136 (1995)			Diluent:	Laboratory Seawater				
Ending Date:	05 May-11 18:00	Species:	Mytilis galloprovincialis			Brine:	Not Applicable				
Duration:	46h	Source:	Carlsbad Aquafarm			Age:	na				
Sample ID:	11-3926-0850	Code:	43E7BDB2			Client:	SPAWAR				
Sample Date:	28 Apr-11	Material:	Ambient Sediment Sample			Project:	Sediment Copper Tools - Round 1				
Receive Date:	29 Apr-11 09:00	Source:	Sediment Copper Tools								
Sample Age:	5d 20h	Station:	PSNS PS03								
Batch Note:	SWI - Sediment Water Interface Test. Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.										
Sample Note:	Both bulk sediment and core sediment collected. Bulk sediment sieved to 2mm upon receipt in lab. Homogenized sediment distributed to test chambers on 5/2/2011. (alternate ID: B-1 or PSNS-1); Sample Conc 100 = Intact Core; 101 = Homogenized										
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
15-6941-8339	Combined Proportion Norm	101	>101	N/A	27.4%		Dunnett Multiple Comparison Test				
15-6702-5543	Proportion Normal	101	>101	N/A	15.6%		Dunnett Multiple Comparison Test				
Combined Proportion Normal Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.7559	0.7044	0.8074	0.5607	0.8598	0.06894	0.1379	18.24%	0.0%
100		4	0.8577	0.816	0.8994	0.729	0.9735	0.0558	0.1116	13.01%	-13.46%
101		4	0.9736	0.9609	0.9863	0.9286	1	0.01703	0.03407	3.5%	-28.79%
Proportion Normal Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.8038	0.7764	0.8311	0.6983	0.8598	0.03665	0.07329	9.12%	0.0%
100		4	0.8941	0.8638	0.9245	0.7818	0.9735	0.04066	0.08133	9.1%	-11.24%
101		4	0.9578	0.9504	0.9652	0.9286	0.9727	0.009913	0.01983	2.07%	-19.16%
Combined Proportion Normal Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4						
0	Lab Control	0.757	0.8598	0.8462	0.5607						
100		0.9735	0.9247	0.8037	0.729						
101		0.9286	0.9658	1	1						
Proportion Normal Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4						
0	Lab Control	0.6983	0.8598	0.8462	0.8108						
100		0.9735	0.9247	0.7818	0.8966						
101		0.9286	0.9658	0.964	0.9727						

CETIS Analytical Report

Report Date: 28 Jul-11 17:44 (p 1 of 2)
Test Code: 475F78CB | 11-9743-9179

Bivalve Larval Survival and Development Test SPAWAR Systems Center

Analysis ID: 15-6702-5543 Endpoint: Proportion Normal
Analyzed: 28 Jul-11 17:44 Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.1
Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run	101	>101	N/A		15.6%

Dunnett Multiple Comparison Test								
Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	-2.063	2.18	6	0.1488	0.9909	Non-Significant Effect
		101	-3.681	2.18	6	0.1488	0.9996	Non-Significant Effect

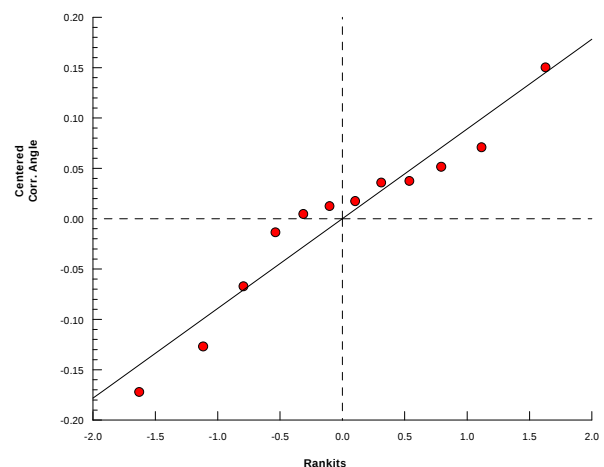
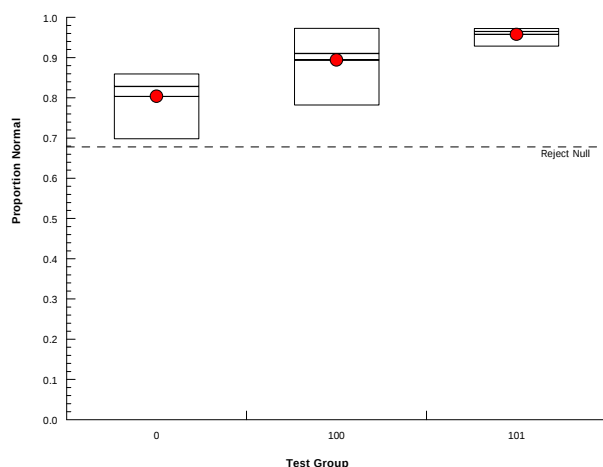
ANOVA Table							
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)	
Between	0.126847	0.06342348	2	6.809	0.0158	Significant Effect	
Error	0.08383599	0.00931511	9				
Total	0.210683	0.0727386	11				

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Bartlett Equality of Variance	2.577	9.21	0.2757	Equal Variances	
Distribution	Shapiro-Wilk W Normality	0.9434	0.8025	0.5427	Normal Distribution	

Proportion Normal Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.8038	0.7759	0.8316	0.6983	0.8598	0.03665	0.07329	9.12%	0.0%
100		4	0.8941	0.8632	0.9251	0.7818	0.9735	0.04066	0.08133	9.1%	-11.24%
101		4	0.9578	0.9502	0.9653	0.9286	0.9727	0.009914	0.01983	2.07%	-19.16%

Angular (Corrected) Transformed Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1.116	1.082	1.15	0.9893	1.187	0.04454	0.08908	7.98%	0.0%
100		4	1.257	1.206	1.308	1.085	1.407	0.06687	0.1337	10.64%	-12.61%
101		4	1.367	1.35	1.385	1.3	1.405	0.02304	0.04609	3.37%	-22.51%

Graphics



CETIS Analytical Report

Report Date: 28 Jul-11 17:44 (p 2 of 2)
Test Code: 475F78CB | 11-9743-9179

Bivalve Larval Survival and Development Test SPAWAR Systems Center

Analysis ID: 15-6941-8339 Endpoint: Combined Proportion Normal
Analyzed: 28 Jul-11 17:44 Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.1
Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run	101	>101	N/A		27.4%

Dunnnett Multiple Comparison Test								
Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	-1.374	2.18	6	0.2295	0.9642	Non-Significant Effect
		101	-3.499	2.18	6	0.2295	0.9994	Non-Significant Effect

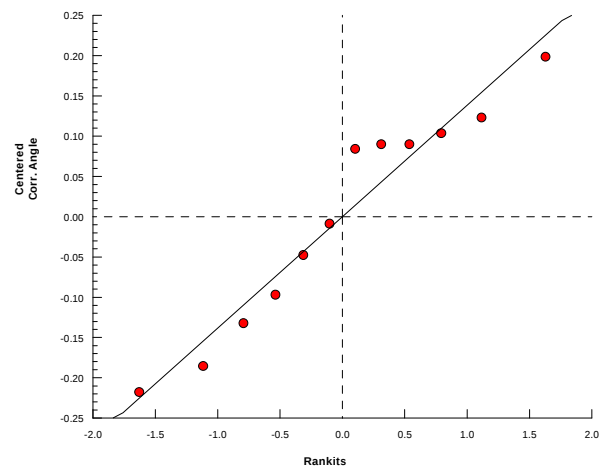
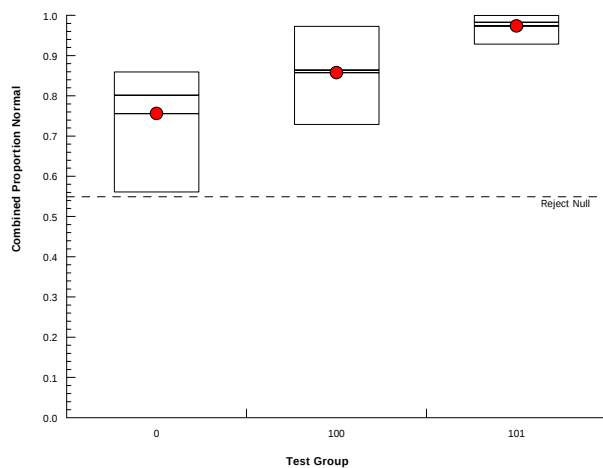
ANOVA Table							
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)	
Between	0.2755946	0.1377973	2	6.216	0.0202	Significant Effect	
Error	0.1995258	0.02216953	9				
Total	0.4751204	0.1599668	11				

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Bartlett Equality of Variance	0.5549	9.21	0.7577	Equal Variances	
Distribution	Shapiro-Wilk W Normality	0.9308	0.8025	0.3890	Normal Distribution	

Combined Proportion Normal Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.7559	0.7035	0.8084	0.5607	0.8598	0.06894	0.1379	18.24%	0.0%
100		4	0.8577	0.8153	0.9002	0.729	0.9735	0.0558	0.1116	13.01%	-13.46%
101		4	0.9736	0.9606	0.9866	0.9286	1	0.01703	0.03407	3.5%	-28.79%

Angular (Corrected) Transformed Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1.064	1.005	1.124	0.8463	1.187	0.07819	0.1564	14.7%	0.0%
100		4	1.209	1.143	1.275	1.023	1.407	0.08671	0.1734	14.35%	-13.59%
101		4	1.432	1.391	1.474	1.3	1.522	0.05473	0.1095	7.64%	-34.62%

Graphics



CETIS Summary Report

Report Date: 28 Jul-11 17:46 (p 1 of 1)
 Test Code: 3CF27BB9 | 10-2252-4345

Bivalve Larval Survival and Development Test								SPAWAR Systems Center			
Batch ID:	11-0713-8919	Test Type:	Development-Survival			Analyst:					
Start Date:	03 May-11 20:00	Protocol:	EPA/600/R-95/136 (1995)			Diluent:	Laboratory Seawater				
Ending Date:	05 May-11 18:00	Species:	Mytilis galloprovincialis			Brine:	Not Applicable				
Duration:	46h	Source:	Carlsbad Aquafarm			Age:	na				
Sample ID:	04-9494-1312	Code:	1D803480			Client:	SPAWAR				
Sample Date:	28 Apr-11	Material:	Ambient Sediment Sample			Project:	Sediment Copper Tools - Round 1				
Receive Date:	29 Apr-11 09:00	Source:	Sediment Copper Tools								
Sample Age:	5d 20h	Station:	PSNS PS09								
Batch Note: SWI - Sediment Water Interface Test. Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.											
Sample Note: Both bulk sediment and core sediment collected. Bulk sediment sieved to 2mm upon receipt in lab. Homogenized sediment distributed to test chambers on 5/2/2011. (alternate ID: B-2 or PSNS-2); Sample Conc 100 = Intact Core; 101 = Homogenized											
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
15-1236-3644	Combined Proportion Norm	101	>101	N/A	29.3%		Dunnett Multiple Comparison Test				
05-7543-3244	Proportion Normal	101	>101	N/A	13.2%		Dunnett Multiple Comparison Test				
Combined Proportion Normal Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.7559	0.7044	0.8074	0.5607	0.8598	0.06894	0.1379	18.24%	0.0%
100		4	0.7906	0.7461	0.8351	0.6355	0.9194	0.05954	0.1191	15.06%	-4.58%
101		4	0.8341	0.7915	0.8767	0.729	0.9626	0.05702	0.114	13.67%	-10.34%
Proportion Normal Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.8038	0.7764	0.8311	0.6983	0.8598	0.03665	0.07329	9.12%	0.0%
100		4	0.9197	0.9026	0.9368	0.8641	0.9765	0.02294	0.04589	4.99%	-14.42%
101		4	0.9249	0.9125	0.9373	0.8889	0.9626	0.0166	0.03319	3.59%	-15.07%
Combined Proportion Normal Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4						
0	Lab Control	0.757	0.8598	0.8462	0.5607						
100		0.7757	0.8318	0.6355	0.9194						
101		0.9626	0.729	0.8972	0.7477						
Proportion Normal Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4						
0	Lab Control	0.6983	0.8598	0.8462	0.8108						
100		0.9765	0.8641	0.9189	0.9194						
101		0.9626	0.907	0.9412	0.8889						

CETIS Analytical Report

Report Date: 28 Jul-11 17:46 (p 1 of 2)
Test Code: 3CF27BB9 | 10-2252-4345

Bivalve Larval Survival and Development Test SPAWAR Systems Center

Analysis ID: 05-7543-3244 Endpoint: Proportion Normal CETIS Version: CETISv1.8.1
Analyzed: 28 Jul-11 17:46 Analysis: Parametric-Control vs Treatments Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run	101	>101	N/A		13.2%

Dunnnett Multiple Comparison Test								
Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	-3.023	2.18	6	0.128	0.9986	Non-Significant Effect
		101	-3.104	2.18	6	0.128	0.9988	Non-Significant Effect

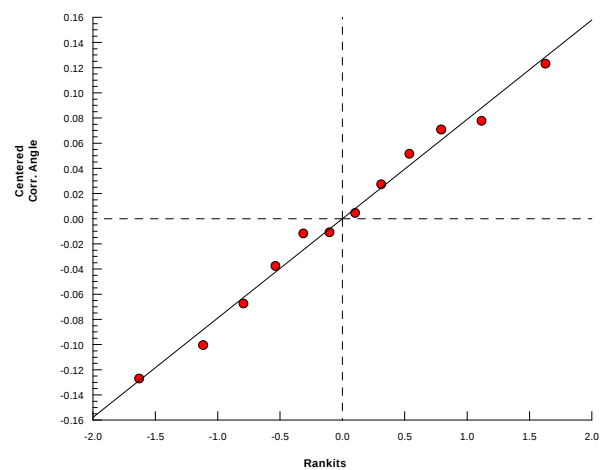
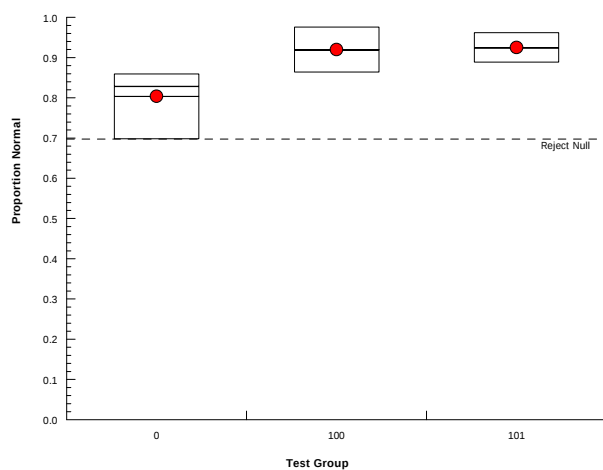
ANOVA Table							
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)	
Between	0.08633389	0.04316695	2	6.259	0.0198	Significant Effect	
Error	0.06207319	0.006897021	9				
Total	0.1484071	0.05006397	11				

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Bartlett Equality of Variance	0.3493	9.21	0.8398	Equal Variances	
Distribution	Shapiro-Wilk W Normality	0.9815	0.8025	0.9889	Normal Distribution	

Proportion Normal Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.8038	0.7759	0.8316	0.6983	0.8598	0.03665	0.07329	9.12%	0.0%
100		4	0.9197	0.9023	0.9372	0.8641	0.9765	0.02294	0.04589	4.99%	-14.42%
101		4	0.9249	0.9123	0.9375	0.8889	0.9626	0.0166	0.03319	3.59%	-15.07%

Angular (Corrected) Transformed Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1.116	1.082	1.15	0.9893	1.187	0.04454	0.08908	7.98%	0.0%
100		4	1.294	1.259	1.329	1.193	1.417	0.0461	0.0922	7.13%	-15.9%
101		4	1.298	1.274	1.323	1.231	1.376	0.03262	0.06523	5.02%	-16.33%

Graphics



CETIS Analytical Report

Report Date: 28 Jul-11 17:46 (p 2 of 2)
Test Code: 3CF27BB9 | 10-2252-4345

Bivalve Larval Survival and Development Test SPAWAR Systems Center

Analysis ID: 15-1236-3644 Endpoint: Combined Proportion Normal
Analyzed: 28 Jul-11 17:45 Analysis: Parametric-Control vs Treatments
CETIS Version: CETISv1.8.1
Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run	101	>101	N/A		29.3%

Dunnnett Multiple Comparison Test								
Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	-0.3896	2.18	6	0.2444	0.8005	Non-Significant Effect
		101	-0.9634	2.18	6	0.2444	0.9225	Non-Significant Effect

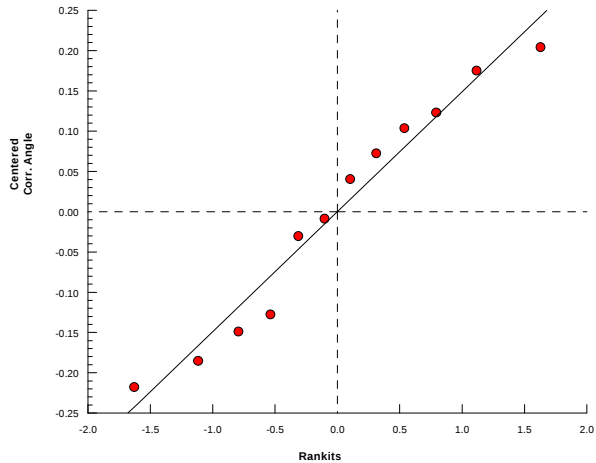
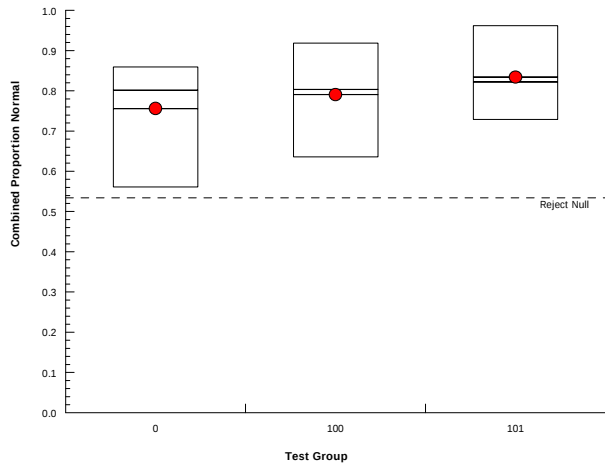
ANOVA Table							
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)	
Between	0.02360935	0.01180467	2	0.4697	0.6397	Non-Significant Effect	
Error	0.2261879	0.02513199	9				
Total	0.2497972	0.03693666	11				

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Bartlett Equality of Variance	0.03732	9.21	0.9815	Equal Variances	
Distribution	Shapiro-Wilk W Normality	0.9446	0.8025	0.5605	Normal Distribution	

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.7559	0.7035	0.8084	0.5607	0.8598	0.06894	0.1379	18.24%	0.0%
100		4	0.7906	0.7453	0.8359	0.6355	0.9194	0.05954	0.1191	15.06%	-4.58%
101		4	0.8341	0.7907	0.8775	0.729	0.9626	0.05702	0.114	13.67%	-10.34%

Angular (Corrected) Transformed Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1.064	1.005	1.124	0.8463	1.187	0.07819	0.1564	14.7%	0.0%
100		4	1.108	1.051	1.165	0.9226	1.283	0.07499	0.15	13.54%	-4.1%
101		4	1.172	1.108	1.236	1.023	1.376	0.08433	0.1687	14.39%	-10.15%

Graphics



Embryo Larval Bioassay

48-hour Development

Project: Internal - Cu Availability Study

Test Species: *M. galloprovincialis*

Sample ID: Ambient Sediment Samples

Start Date: 5/3/2011

End Date: 5/5/2011

Sample ID	Replicate	Number Normal	Number Abnormal	Technician Initials
Water Only Control CORE BLANK	A	81	38	GR
	B	92	15	GR
	C	110	20	MC
	D	60	14	GR
Shelter Island - Intact Core	A	42	16	GR
	B	97	11	GR
	C	98	10	GR
	D	102	2	MC
Shelter Island - Homogenized	A	101	5	GR
	B	85	31	GR
	C	127	6	GR
	D	117	0	GR
Naval Base SD - Intact Core	A	71	7	MC
	B	83	17	GR
	C	80	9	MC
	D	41	26	MC
Naval Base SD - Homogenized	A	100	11	GR
	B	108	8	MC
	C	102	8	GR
	D	91	5	MC
Bremerton PS03 (B1) - Intact Core	A	110	3	GR
	B	135	11	GR
	C	86	24	GR
	D	me 78-78	9	MC
Bremerton PS03 (B1) - Homogenized	A	117	9	GR
	B	113	4	GR
	C	107	4	GR
	D	107	3	MC
Bremerton PS09 (B2) - Intact Core	A	83	2	MC
	B	89	14	GR
	C	46 (68)	5 (6)	MC (MC-filtered)
	D	114	10	GR
Bremerton PS09 (B2) - Homogenized	A	103	4	MC
	B	78	8	MC
	C	96	6	MC
	D	80	10	MC

* term. early

* LOTS OF DEBRIS

Filtered

Filtered

Filtered

QC Check: _____

Final Review: _____

fine zero counts - A: 194

B: 198

C: 216

E: 209

D: 187

Marine Chronic Bioassay

Water Quality Measurements

Project: Internal - Cu Availability Study

Test Species: *M. galloprovincialis*

Sample ID: Ambient Sediment Samples

Start Date/Time: 5/3/2011 2000

End Date/Time: 5/5/2011 1800

Sample ID	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Water Only Control	30.1	30.0	29.10	14.4	15.8	15.8	7.9	6.8	6.6	8.03	8.08	8.09
Shelter Island - Core	30.2	30.3	30.6	15.1	15.8	15.9	7.7	7.4	7.2	8.07	8.15	8.21
Shelter Island - Hom.	30.8	30.9	30.8	15.1	15.5	16.0	7.6	7.1	7.0	8.10	8.14	8.21
Naval Base SD - Core	30.4	30.9	30.4	14.8	15.9	15.8	7.1	7.4	7.3	8.05	8.15	8.23
Naval Base SD - Hom.	30.6	30.8	30.8	15.2	15.9	15.9	7.9	7.2	7.2	8.10	8.16	8.21
B1 Bivalve - Bremerton PS03 - Core	30.0	30.3	30.3	14.1	15.8	15.7	7.5	7.3	7.2	8.05	8.13	8.21
B1 Bivalve - Bremerton PS03 - Hom.	30.1	30.2	30.2	14.8	15.7	15.8	7.3	7.0	7.4	8.09	8.16	8.21
B2 Bivalve - Bremerton PS09 - Core	30.1	30.2	30.1	15.0	15.6	15.1	7.8	7.5	7.1	8.05	8.11	8.16
B2 Bivalve - Bremerton PS09 - Hom.	30.3	30.3	30.3	14.5	15.4	15.7	7.9	7.1	7.0	8.08	8.15	8.20

Technician Initials:

WQ Readings:

Dilutions made by:

0 24 48

ML	ML	ML
MC	MC	MC

Animal Source/Date Received:

Carlsbad Aquafarms 5/3/2011

Comments:

0 hrs:

24 hrs:

48 hrs:

QC Check:

Final Review:

CuSO₄ Reference Toxicant Concentration Calculations
Mar-11

Bivalve: 1ppm

Volume / concentration needed= 100 mL
C1 V1 C2 V2
(below) 100 1000 (below)

Conc's:	Volume (mL) of 1000 µg/L stock	Volume (mL) of SW
0	0.000	100.0
2.9	0.290	99.7
4.1	0.410	99.6
5.8	0.580	99.4
8.4	0.840	99.2
12	1.200	98.8
17.2	1.720	98.3
24	2.400	97.6
36	3.500	96.5
50	5.000	95.0

15.94 mL of stock needed

SUBSTOCK CALCULATIONS

Stock 1 g/L
substock 1 mg/L 1000 µg/L 100

1PPM 1000 µg/L: 0.1 mL of 1 g/L stock into 100 mL

Cu Stock Date

Cu Stock Date

QC:

Embryo-Larval Development Test – SPAWNING CHECKLIST & CALCULATIONS

Batch ID: 050311Mg Spawn/Test Date: 05/03/11 Test Species M. galloprovincialis
Analyst: GR

Task	Time
Spawning Inducement Initiated	1400 HR
Spawning Begins	1500 HR 5 ♂, 0 ♀
Females/Males Isolated in Incubator	1820 HR
Fertilization Initiated	1825 HR
Fertilization Terminated/eggs rinsed	1835 HR
Embryo Counts	1900 HR
Embryo addition to vials	2000 HR

1815 HR : 1 ♀

Embryo Counts:

Embryo Stock #1: 59, 52, 59 Mean = $\frac{56.7}{20}$ uL * 1000 uL/mL = 2,833 cells/mL

Embryo Stock #2: , , Mean = $\frac{ }{ }$ uL * 1000 uL/mL = cells/mL

Embryo Stock #3: , , Mean = $\frac{ }{ }$ uL * 1000 uL/mL = cells/mL

Adjust selected embryo stock to 2000 embryos/ml. Confirm density:

Selected Stock : 50, 40, 36 Mean = $\frac{42}{60} \frac{120}{20}$ uL * 1000 uL/mL = 2,100 cells/mL

Add 100 µl of 2000 embryo/ml stock to obtain 20 embryos/ml in test vials.

Notes: Only 1 ♀ spawner out of ~100 mussels.

Sperm solution was composite of 4 viable males.

Add 100 µl suspension for ~200 embryos/core.

This was a SWI exposure for sediment Copper Tools project (Phase I).

Marine Amphipod

Leptocheirus plumulosus

CETIS Summary Report

Report Date: 28 Jul-11 18:50 (p 1 of 1)
 Test Code: 360F16F4 | 09-0695-8580

Leptocheirus 10-d Survival and Reburial Sediment Test							SPAWAR Systems Center				
Batch ID:	14-5299-7720	Test Type:	Survival-Reburial				Analyst:				
Start Date:	03 May-11 10:30	Protocol:	EPA/600/R-94/025 (1994)				Diluent:	Laboratory Seawater			
Ending Date:	13 May-11 09:00	Species:	Leptocheirus plumulosus				Brine:	Not Applicable			
Duration:	9d 22h	Source:	Chesapeake Cultures				Age:				
Sample ID:	11-3926-0850	Code:	43E7BDB2				Client:	SPAWAR			
Sample Date:	28 Apr-11	Material:	Ambient Sediment Sample				Project:	Sediment Copper Tools - Round 1			
Receive Date:	29 Apr-11 09:00	Source:	Sediment Copper Tools								
Sample Age:	5d 10h	Station:	PSNS PS03								
Batch Note:	Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.										
Sample Note:	Both bulk sediment and core sediment collected. Bulk sediment sieved to 2mm upon receipt in lab. Homogenized sediment distributed to test chambers on 5/2/2011. (alternate ID: B-1 or PSNS-1)										
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
04-3540-0521	Survival Rate	100	>100	N/A	12.8%		Equal Variance t Two-Sample Test				
Survival Rate Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	3	0.9	0.8677	0.9323	0.8	0.95	0.05	0.0866	9.62%	0.0%
100		3	0.8667	0.8559	0.8774	0.85	0.9	0.01667	0.02887	3.33%	3.7%
Survival Rate Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3							
0	Lab Control	0.95	0.8	0.95							
100		0.85	0.85	0.9							

CETIS Analytical Report

Report Date: 28 Jul-11 18:50 (p 1 of 1)
Test Code: 360F16F4 | 09-0695-8580

Leptocheirus 10-d Survival and Reburial Sediment Test SPAWAR Systems Center

Analysis ID: 04-3540-0521 Endpoint: Survival Rate CETIS Version: CETISv1.8.1
Analyzed: 28 Jul-11 18:48 Analysis: Parametric-Two Sample Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	12.8%

Equal Variance t Two-Sample Test

Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	0.8101	2.132	4	0.1776	0.2317	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.006832685	0.006832685	1	0.6562	0.4633	Non-Significant Effect
Error	0.04165075	0.01041269	4			
Total	0.04848344	0.01724537	5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	9.831	199	0.1847	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8595	0.43	0.1874	Normal Distribution

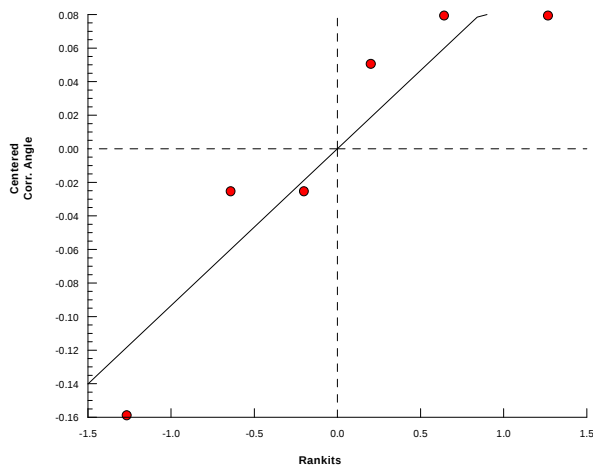
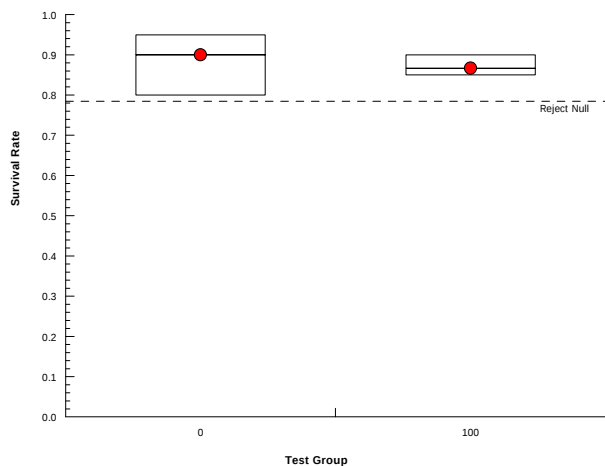
Survival Rate Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	3	0.9	0.8671	0.9329	0.8	0.95	0.05	0.0866	9.62%	0.0%
100		3	0.8667	0.8557	0.8776	0.85	0.9	0.01667	0.02887	3.33%	3.7%

Angular (Corrected) Transformed Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	3	1.266	1.214	1.318	1.107	1.345	0.07938	0.1375	10.86%	0.0%
100		3	1.198	1.182	1.215	1.173	1.249	0.02532	0.04385	3.66%	5.33%

Graphics



CETIS Summary Report

Report Date: 28 Jul-11 18:51 (p 1 of 1)
Test Code: 75B9DE53 | 19-7511-5347

Leptocheirus 10-d Survival and Reburial Sediment Test							SPAWAR Systems Center				
Batch ID:	14-5299-7720	Test Type:	Survival-Reburial				Analyst:				
Start Date:	03 May-11 10:30	Protocol:	EPA/600/R-94/025 (1994)				Diluent:	Laboratory Seawater			
Ending Date:	13 May-11 09:00	Species:	Leptocheirus plumulosus				Brine:	Not Applicable			
Duration:	9d 22h	Source:	Chesapeake Cultures				Age:				
Sample ID:	04-9494-1312	Code:	1D803480				Client:	SPAWAR			
Sample Date:	28 Apr-11	Material:	Ambient Sediment Sample				Project:	Sediment Copper Tools - Round 1			
Receive Date:	29 Apr-11 09:00	Source:	Sediment Copper Tools								
Sample Age:	5d 10h	Station:	PSNS PS09								
Batch Note: Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.											
Sample Note: Both bulk sediment and core sediment collected. Bulk sediment sieved to 2mm upon receipt in lab. Homogenized sediment distributed to test chambers on 5/2/2011. (alternate ID: B-2 or PSNS-2)											
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
00-3721-3818	Survival Rate	100	>100	N/A	17.3%		Equal Variance t Two-Sample Test				
Survival Rate Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	3	0.9	0.8677	0.9323	0.8	0.95	0.05	0.0866	9.62%	0.0%
100		3	0.9333	0.9118	0.9549	0.9	1	0.03333	0.05774	6.19%	-3.7%
Survival Rate Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3							
0	Lab Control	0.95	0.8	0.95							
100		0.9	0.9	1							

CETIS Analytical Report

Report Date: 28 Jul-11 18:51 (p 1 of 1)
Test Code: 75B9DE53 | 19-7511-5347

Leptocheirus 10-d Survival and Reburial Sediment Test SPAWAR Systems Center

Analysis ID: 00-3721-3818 Endpoint: Survival Rate CETIS Version: CETISv1.8.1
Analyzed: 28 Jul-11 18:51 Analysis: Parametric-Two Sample Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	17.3%

Equal Variance t Two-Sample Test

Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	-0.5015	2.132	4	0.2255	0.6788	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.004220693	0.004220693	1	0.2515	0.6424	Non-Significant Effect
Error	0.06712493	0.01678123	4			
Total	0.07134563	0.02100193	5			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.289	199	0.8736	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9092	0.43	0.4314	Normal Distribution

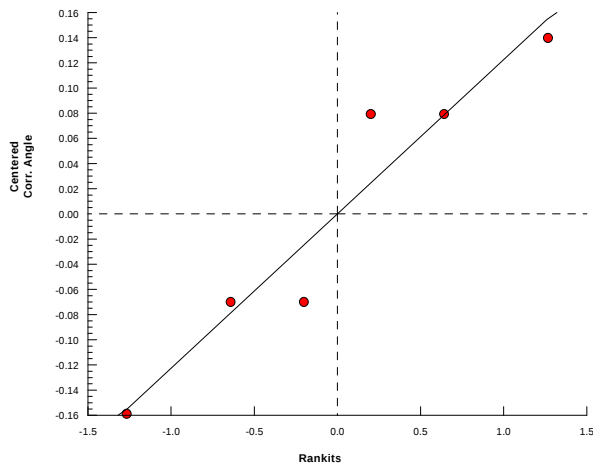
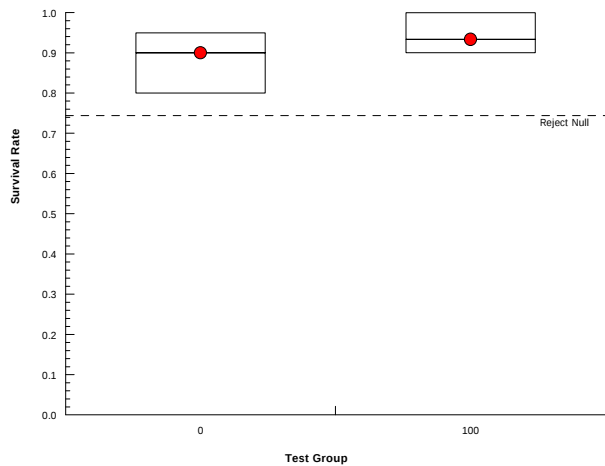
Survival Rate Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	3	0.9	0.8671	0.9329	0.8	0.95	0.05	0.0866	9.62%	0.0%
100		3	0.9333	0.9114	0.9553	0.9	1	0.03333	0.05773	6.19%	-3.7%

Angular (Corrected) Transformed Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	3	1.266	1.214	1.318	1.107	1.345	0.07938	0.1375	10.86%	0.0%
100		3	1.319	1.273	1.365	1.249	1.459	0.0699	0.1211	9.18%	-4.19%

Graphics



Marine Sediment Bioassay

Organism Survival

Client: Internal - Cu Availability Study

Test Species: *Leptocheirus plumulosus*

Ambient Sediment Samples

Start Date/Time: 5/3/2011 1030

End Date/Time: 1:15pm 5/13/2011

Sample ID	Replicate	Initial No.	No. Recovered	Technician Initials
Lab Control	A	20		
	B	20		
	C	20		
	D	20		
Shelter Island	A	20	9	7 bodies BLS
	B	20	9	4 bodies BLS
	C	20	11	6 bodies BLS
	D	20		
Naval Base SD	A	20	15	5 bodies BLS
	B	20	13	2 bodies BLS
	C	20	12	5 bodies BLS
	D	20		
PSNS - 1	A	20	17	b/s
	B	20	17	1 body BLS
	C	20	18	0 BLS
	D	20		
PSNS - 2	A	20	18	6R, 1 polychaete, looked strong.
	B	20	18	6R, look strong.
	C	20	20	6R, " "
	D	20		
	A	20		
	B	20		
	C	20		
	D	20		

} generally in poor condition

} looked strong

} looked strong.

QC Check: 11/5/25/2011 Final Review: _____

Naval Base - only one rep used for sediment (Lepto) collection; too fine.

BR 1 - only one rep for sediment.

10-Day Marine Sediment Bioassay Static Conditions

Water Quality Measurements

Client: Internal - Cu Availability Study

Test Species: Leptocheirus plumulosus

Sample ID: Bremerton P509 - BZ

Start Date/Time: 5/3/2011 1030

End Date/Time: 5/15/2011 1315

Test Day	Salinity (ppt)	Temperature (°C)	Dissolved Oxygen (mg/L)	pH (units)	Technician Initials	Comments
0	30.1	19.7	6.1	7.93	MC	
1	30.2	20.1	6.4	8.09	MC	
2	30.4	20.1	6.7	8.12	MC	
3		20.0		8.07	MC	
4		19.9		8.09	MC	
5		20.1		8.10	MC	
6	30.5	19.7	6.1	8.08	MC	
7	30.4	19.9	6.2	8.12	MC	
8	30.6	19.7	6.9	8.08	MC	
9		20.1		8.01	MC	
10	30.7	19.9	6.5	8.09	MC	

QC Check: MC 5/25/2011

Final Review: _____

10-Day Marine Sediment Bioassay Static Conditions

Water Quality Measurements

Client: Internal - Cu Availability Study

Test Species: *Leptochierus plumulosus*

Sample ID: Bremerton PSD3 - B1

Start Date/Time: 5/3/2011 1030

End Date/Time: 5/13/2011 1315

Test Day	Salinity (ppt)	Temperature (°C)	Dissolved Oxygen (mg/L)	pH (units)	Technician Initials	Comments
0	30.1	19.5	6.4	7.94	MC	
1	30.3	19.9	6.7	8.05	MC	
2	30.5	20.2	6.8	8.09	MC	
3		20.3		8.17	OC	
4		20.2		8.34	OC	
5		20.3		8.45	OC	
6	30.4	20.0	6.0	8.59	MC	
7	30.4	19.9	6.1	8.61	MC	
8	30.7	20.0	6.7	8.69	MC	
9		20.3		8.66	OC	
10	30.7	19.8	6.4	8.76	MC	

QC Check: MC 5/25/2011

Final Review:

Marine Amphipod

Ampelisca abdita

CETIS Summary Report

Report Date: 28 Jul-11 18:25 (p 1 of 1)
 Test Code: 18D4DAAB | 04-1660-2795

Ampelisca 10-d Survival Sediment Test							SPAWAR Systems Center				
Batch ID:	04-6863-0121		Test Type:	Survival		Analyst:					
Start Date:	03 May-11 19:00		Protocol:	EPA/600/R-94/025 (1994)		Diluent:	Laboratory Seawater				
Ending Date:	13 May-11 13:00		Species:	Ampelisca abdita		Brine:	Not Applicable				
Duration:	9d 18h		Source:	Aquatic Research Organisms, NH		Age:					
Sample ID:	11-3926-0850		Code:	43E7BDB2		Client:	SPAWAR				
Sample Date:	28 Apr-11		Material:	Ambient Sediment Sample		Project:	Sediment Copper Tools - Round 1				
Receive Date:	29 Apr-11 09:00		Source:	Sediment Copper Tools							
Sample Age:	5d 19h		Station:	PSNS PS03							
Batch Note: Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.											
Sample Note: Both bulk sediment and core sediment collected. Bulk sediment sieved to 2mm upon receipt in lab. Homogenized sediment distributed to test chambers on 5/2/2011. (alternate ID: B-1 or PSNS-1)											
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
08-7267-7946	Survival Rate	100	>100	N/A	28.1%		Equal Variance t Two-Sample Test				
Survival Rate Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.7849	0.7179	0.8518	0.5625	1	0.08967	0.1793	22.85%	0.0%
100		4	0.5925	0.5475	0.6376	0.5	0.7692	0.06028	0.1206	20.35%	24.5%
Survival Rate Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4						
0	Lab Control	0.8077	0.7692	0.5625	1						
100		0.7692	0.5385	0.5	0.5625						

CETIS Analytical Report

Report Date: 28 Jul-11 18:24 (p 1 of 1)
Test Code: 18D4DAAB | 04-1660-2795

Ampelisca 10-d Survival Sediment Test SPAWAR Systems Center

Analysis ID: 08-7267-7946 Endpoint: Survival Rate CETIS Version: CETISv1.8.1
Analyzed: 28 Jul-11 18:24 Analysis: Parametric-Two Sample Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes survival rate endpoint	28.1%

Equal Variance t Two-Sample Test

Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	1.715	1.943	6	0.2699	0.0686	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.113528	0.113528	1	2.942	0.1371	Non-Significant Effect
Error	0.2315116	0.03858527	6			
Total	0.3450396	0.1521132	7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.716	47.47	0.3096	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.9216	0.6451	0.4429	Normal Distribution

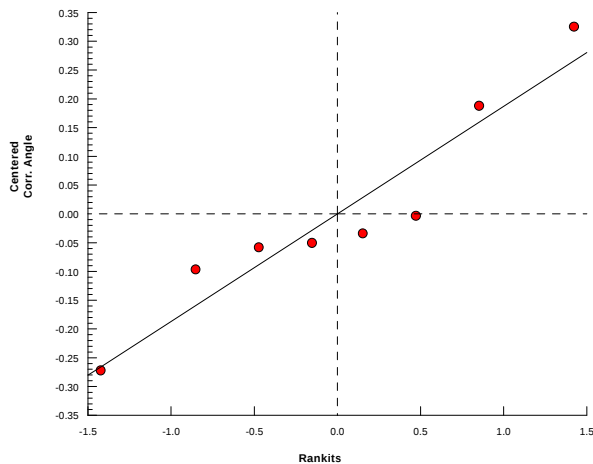
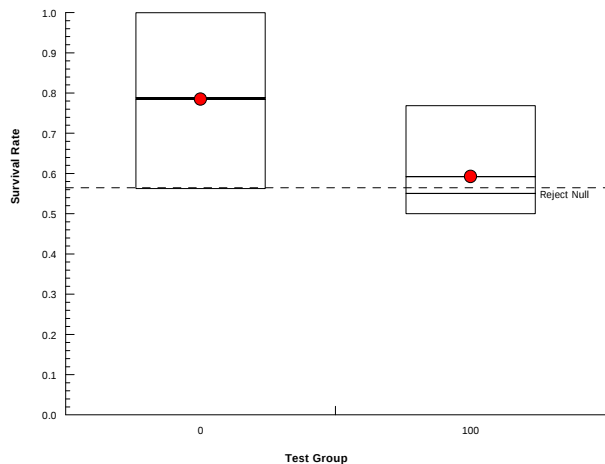
Survival Rate Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.7849	0.7166	0.8531	0.5625	1	0.08967	0.1793	22.85%	0.0%
100		4	0.5925	0.5467	0.6384	0.5	0.7692	0.06028	0.1206	20.35%	24.5%

Angular (Corrected) Transformed Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1.12	1.026	1.214	0.8481	1.445	0.1233	0.2466	22.02%	0.0%
100		4	0.8818	0.8331	0.9304	0.7854	1.07	0.06396	0.1279	14.51%	21.27%

Graphics



CETIS Summary Report

Report Date: 28 Jul-11 18:28 (p 1 of 1)
Test Code: 2E5F3F2C | 07-7799-4028

Ampelisca 10-d Survival Sediment Test							SPAWAR Systems Center				
Batch ID:	04-6863-0121	Test Type:	Survival				Analyst:				
Start Date:	03 May-11 19:00	Protocol:	EPA/600/R-94/025 (1994)				Diluent:	Laboratory Seawater			
Ending Date:	13 May-11 13:00	Species:	Ampelisca abdita				Brine:	Not Applicable			
Duration:	9d 18h	Source:	Aquatic Research Organisms, NH				Age:				
Sample ID:	04-9494-1312	Code:	1D803480				Client:	SPAWAR			
Sample Date:	28 Apr-11	Material:	Ambient Sediment Sample				Project:	Sediment Copper Tools - Round 1			
Receive Date:	29 Apr-11 09:00	Source:	Sediment Copper Tools								
Sample Age:	5d 19h	Station:	PSNS PS09								
Batch Note: Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.											
Sample Note: Both bulk sediment and core sediment collected. Bulk sediment sieved to 2mm upon receipt in lab. Homogenized sediment distributed to test chambers on 5/2/2011. (alternate ID: B-2 or PSNS-2)											
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
10-2926-6458	Survival Rate	<100	100	N/A	24.8%		Equal Variance t Two-Sample Test				
Point Estimate Summary											
Analysis ID	Endpoint	Level		95% LCL	95% UCL	TU	Method				
17-7521-7542	Survival Rate	LC50	>100	N/A	N/A		Linear Interpolation (ICPIN)				
Survival Rate Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.7849	0.7179	0.8518	0.5625	1	0.08967	0.1793	22.85%	0.0%
100		4	0.5889	0.5726	0.6053	0.5625	0.6538	0.0219	0.0438	7.44%	24.96%
Survival Rate Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4						
0	Lab Control	0.8077	0.7692	0.5625	1						
100		0.5769	0.6538	0.5625	0.5625						

CETIS Analytical Report

Report Date: 28 Jul-11 18:28 (p 1 of 1)
Test Code: 2E5F3F2C | 07-7799-4028

Ampelisca 10-d Survival Sediment Test SPAWAR Systems Center

Analysis ID: 10-2926-6458 Endpoint: Survival Rate CETIS Version: CETISv1.8.1
Analyzed: 28 Jul-11 18:26 Analysis: Parametric-Two Sample Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample fails survival rate endpoint	24.8%

Equal Variance t Two-Sample Test

Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100*	1.954	1.943	6	0.2435	0.0493	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.1199362	0.1199362	1	3.818	0.0985	Non-Significant Effect
Error	0.1884838	0.03141397	6			
Total	0.30842	0.1513502	7			

Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	30.08	47.47	0.0194	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8637	0.6451	0.1306	Normal Distribution

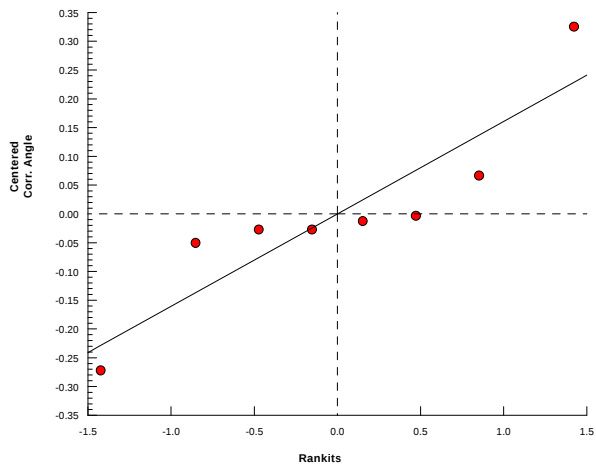
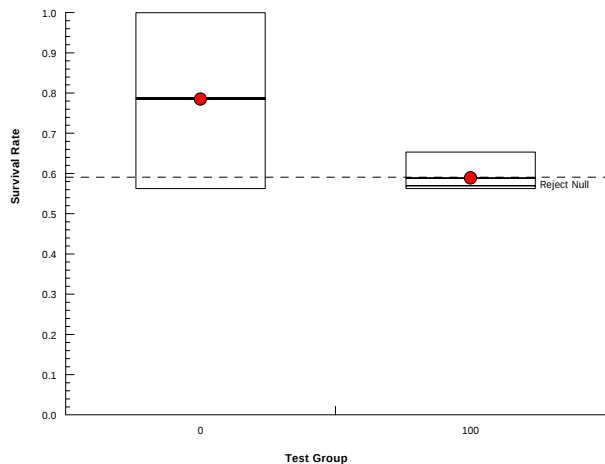
Survival Rate Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.7849	0.7166	0.8531	0.5625	1	0.08967	0.1793	22.85%	0.0%
100		4	0.5889	0.5723	0.6056	0.5625	0.6538	0.0219	0.0438	7.44%	24.96%

Angular (Corrected) Transformed Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	1.12	1.026	1.214	0.8481	1.445	0.1233	0.2466	22.02%	0.0%
100		4	0.8751	0.858	0.8922	0.8481	0.9418	0.02248	0.04496	5.14%	21.86%

Graphics



Ampelisca 10-d Survival Sediment Test

SPAWAR Systems Center

Analysis ID: 17-7521-7542

Endpoint: Survival Rate

CETIS Version: CETISv1.8.1

Analized: 28 Jul-11 18:26

Analysis: Linear Interpolation (ICPIN)

Official Results: Yes

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X+1)	Linear	41733800	200	Yes	Two-Point Interpolation

Point Estimates

Level	95% LCL	95% UCL
LC50 >100	N/A	N/A

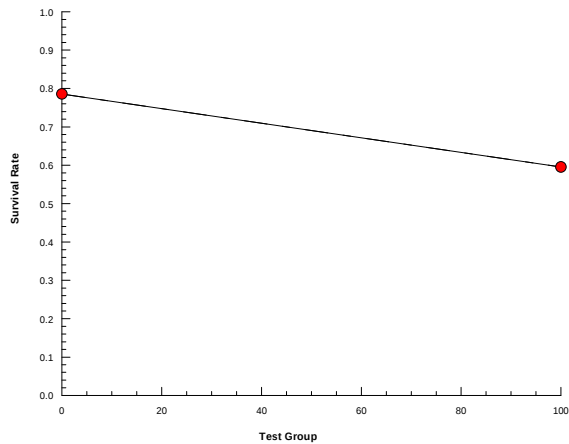
Survival Rate Summary

Test Group	Control Type	Count	Calculated Variate(A/B)							A	B
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect		
0	Lab Control	4	0.7849	0.5625	1	0.08967	0.1793	22.85%	0.0%	66	84
100		4	0.5889	0.5625	0.6538	0.0219	0.0438	7.44%	24.96%	50	84

Survival Rate Detail

Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Control	0.8077	0.7692	0.5625	1
100		0.5769	0.6538	0.5625	0.5625

Graphics



Marine Sediment Bioassay

Organism Survival

Client: Internal - Cu Availability Study

Test Species: *Ampelisca abdita*

Ambient Sediment Samples

Start Date/Time: 5/3/2011

End Date/Time: 5/13/2011 1300

Sample ID	Replicate	Initial No.	No. Recovered	Technician Initials # on Surface Sediment (mud)
Lab Control <i>Ampelisca</i> Home Sed.	A	20 30	21	Ø look good.
	B	20 30	20	3
	C	20	9	3
	D	20	18	1
Shelter Island	A	20 30	17 17	7
	B	20 30	13	16 - Black Spots → deep amphipods on sediment surface
	C	20	11	6
	D	20	9	9 - Black Spots → ↑ (BS)
Naval Base SD	A	20 30	9	8 - Black Spots
	B	20 30	12	13 - Black Spots
	C	20	6	12 Black Spots
	D	20	7	8 - BS
PSNS - 1 (B1) 8503	A	20 30	20	2 (P)
	B	20 30	14	10
	C	20	8	6
	D	20	9	
PSNS - 2 (B2) 8509	A	20 30	15	2
	B	20 30	17	4
	C	20	9	5
	D	20	9	3
	A	20	21	
	B	20		
	C	20		
	D	20		

QC Check: Lee Spishall Final Review: _____

10-Day Marine Sediment Bioassay Static Conditions

Water Quality Measurements

Client: Internal - Cu Availability Study

Test Species: *Ampelisca abdita*

Sample ID: Amp. Control

Start Date/Time: 5/3/2011 1900

End Date/Time: 5/13/2011 1300

Test Day	Salinity (ppt)	Temperature (°C)	Dissolved Oxygen (mg/L)	pH (units)	Technician Initials	Comments
0	30.2	15.7	6.9	8.00	MC	
1	29.3	14.7	6.3	7.65	MC	
2	29.1	15.3	5.8	7.72	MC	5 A > # dead/shill 3 B @ sediment 4 B surface 10 added to w/ constant A+B
3		12.7		7.73	OC	
4		13.7		7.82	OC	
5		13.7		7.90	OC	
6	29.3	13.2	6.8	7.92	MC	
7	29.5	15.0	7.1	7.98	MC	
8	29.5	14.0	7.1	8.20	MC	
9		15.3		8.14	OC	
10	29.5	15.3	6.5	8.20	MC	

QC Check:

Final Review:

10-Day Urine Sediment Bioassay Static Conditions

Water Quality Measurements

Client: Internal - Cu Availability Study

Test Species: *Ampelisca abdita*

Sample ID: Bremerton PS03 - B1

Start Date/Time: 5/3/2011 1900

End Date/Time: 5/13/11 1300

Test Day	Salinity (ppt)	Temperature (°C)	Dissolved Oxygen (mg/L)	pH (units)	Technician Initials	Comments
0	30.0	14.9	7.3	8.03	MC	
1	30.0	14.3	7.5	8.00	MC	
2	30.2	14.2	7.3	8.00	MC	A-10 B-10 C-4 D-4 # dead shell @ sediment surface 10 Alkaloids A+B
3		12.9		8.03	MC	
4		13.7		8.10	MC	
5		13.7		8.13	MC	
6	30.5	13.7	7.6	8.17	MC	
7	30.4	14.7	7.8	8.12	MC	
8	30.5	14.1	7.5	8.35	MC	
9		15.0		8.39	MC	
10	30.8 30.8 MC	15.2	7.0	8.48	MC	

QC Check:

Final Review:

10-Day Marine Sediment Bioassay Static Conditions

Water Quality Measurements

Client: Internal - Cu Availability Study

Test Species: Ampelisca abdita

Sample ID: Bremerton P509- B2

Start Date/Time: 5/3/2011 1900

End Date/Time: 5/13/2011 1300

Test Day	Salinity (ppt)	Temperature (°C)	Dissolved Oxygen (mg/L)	pH (units)	Technician Initials	Comments
0	30.2	14.3	7.8	8.01	MC	
1	30.3	14.4	7.9	8.01	MC	
2	30.3	14.3	8.0	8.02	MC	D = A d = B 2 = D # dead/shile sediment surface 10 added to A+B
3		12.5		8.04	CC	
4		13.4		8.08	CC	
5		13.6		8.08	CC	
6	30.4	13.2	7.7	8.09	MC	
7	30.3	14.6	7.9	8.10	MC	
8	30.4	14.3	8.0	8.11	MC	
9		15.3		8.11	CC	
10	30.6	14.6	7.7	8.19	MC	

QC Check: _____

Final Review: _____

Marine Ploychaete

Neanthes arenaceodentata

CETIS Summary Report

Report Date: 27 Jul-11 15:51 (p 1 of 1)
 Test Code: 58FE136 | 00-9331-5382

Neanthes Survival and Growth Test						SPAWAR Systems Center					
Batch ID:	19-1064-5197	Test Type:	Survival-Growth				Analyst:				
Start Date:	03 May-11 14:30	Protocol:	Farrar and Bridges 2011				Diluent:	Seawater			
Ending Date:	31 May-11 09:00	Species:	Neanthes arenaceodentata				Brine:	Not Applicable			
Duration:	27d 19h	Source:	Aquatic Toxicology Support				Age:	6d			
Sample ID:	11-3926-0850	Code:	43E7BDB2				Client:	SPAWAR			
Sample Date:	28 Apr-11	Material:	Ambient Sediment Sample				Project:	Sediment Copper Tools - Round 1			
Receive Date:	29 Apr-11 09:00	Source:	Sediment Copper Tools								
Sample Age:	5d 14h	Station:	PSNS PS03								
Sample Note:	Both bulk sediment and core sediment collected. Bulk sediment sieved to 2mm upon receipt in lab. Homogenized sediment distributed to test chambers on 5/2/2011. (alternate ID: B-1 or PSNS-1)										
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
05-2197-3227	Mean Dry Weight-mg	100	>100	N/A	28.1%		Unequal Variance t Two-Sample Test				
13-0542-9912	Survival Rate	100	>100	N/A	N/A		Fisher Exact Test				
Mean Dry Weight-mg Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	9	0.004928	0.004129	0.005727	0.00076	0.00747	0.0007134	0.00214	43.43%	0.0%
100		10	0.005106	0.004811	0.005401	0.00394	0.00611	0.0002502	0.0007912	15.5%	-3.62%
Survival Rate Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	10	0.9	0.7819	1	0	1	0.1	0.3162	35.14%	0.0%
100		10	1	1	1	1	1	0	0	0.0%	-11.11%
Mean Dry Weight-mg Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Control	0.00247	0.00545	0.00519	0.00419	0.00647	0.00573	0.00747	0.00662	0.00076	
100		0.00445	0.00502	0.00577	0.00396	0.00518	0.00611	0.00394	0.0056	0.00601	0.00502
Survival Rate Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Control	1	1	0	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 27 Jul-11 15:51 (p 1 of 1)
Test Code: 58FE136 | 00-9331-5382

Neanthes Survival and Growth Test SPAWAR Systems Center

Analysis ID: 13-0542-9912 Endpoint: Survival Rate CETIS Version: CETISv1.8.1
Analyzed: 27 Jul-11 14:37 Analysis: Single 2x2 Contingency Table Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result
Untransformed		C > T	Not Run	Sample passes survival rate endpoint

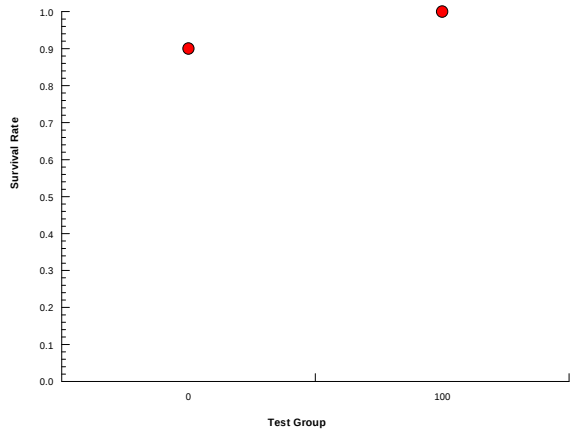
Fisher Exact Test

Control	vs	Test Group	Test Stat	P-Value	Decision(0.05)
Lab Control		100	1	1.0000	Non-Significant Effect

Data Summary

Test Group	Control Type	No-Resp	Resp	Total
0	Lab Control	9	1	10
100		10	0	10

Graphics



CETIS Analytical Report

Report Date: 27 Jul-11 15:50 (p 1 of 1)
Test Code: 58FE136 | 00-9331-5382

Neanthes Survival and Growth Test SPAWAR Systems Center

Analysis ID: 05-2197-3227 Endpoint: Mean Dry Weight-mg CETIS Version: CETISv1.8.1
Analyzed: 27 Jul-11 14:38 Analysis: Parametric-Two Sample Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean dry weight-mg endpoint	28.1%

Unequal Variance t Two-Sample Test

Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	-0.2357	1.833	9	0.001386	0.5905	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.504654E-07	1.504654E-07	1	0.0605	0.8087	Non-Significant Effect
Error	4.227953E-05	2.487031E-06	17			
Total	0.00004243	2.637497E-06	18			

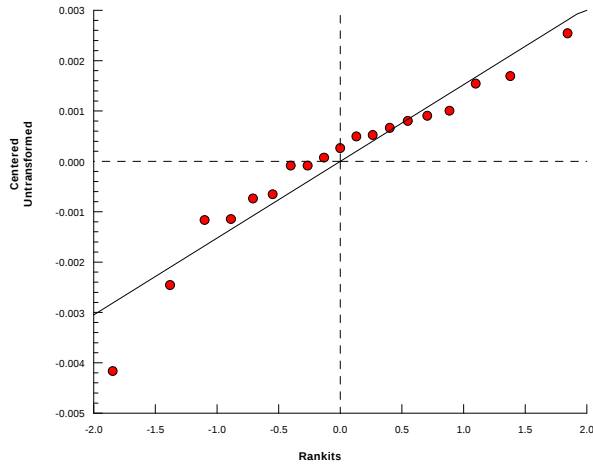
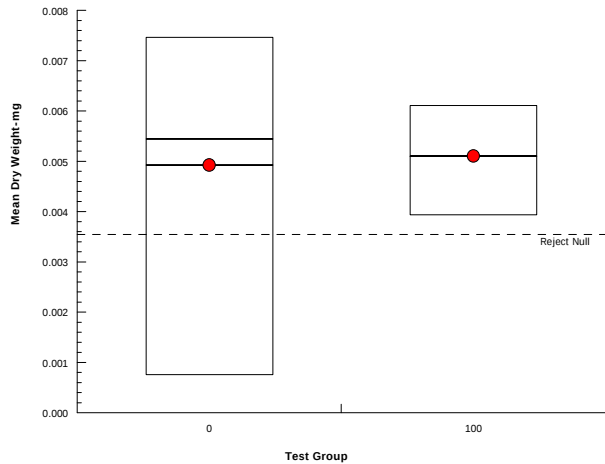
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	7.318	6.693	0.0073	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9323	0.8605	0.1913	Normal Distribution

Mean Dry Weight-mg Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	9	0.004928	0.004114	0.005742	0.00076	0.00747	0.0007134	0.00214	43.43%	0.0%
100		10	0.005106	0.004805	0.005407	0.00394	0.00611	0.0002502	0.0007912	15.5%	-3.62%

Graphics



CETIS Summary Report

Report Date: 27 Jul-11 15:52 (p 1 of 1)
 Test Code: 10B86867 | 02-8052-0807

Neanthes Survival and Growth Test						SPAWAR Systems Center					
Batch ID:	19-1064-5197	Test Type:	Survival-Growth				Analyst:				
Start Date:	03 May-11 14:30	Protocol:	Farrar and Bridges 2011				Diluent:	Seawater			
Ending Date:	31 May-11 09:00	Species:	Neanthes arenaceodentata				Brine:	Not Applicable			
Duration:	27d 19h	Source:	Aquatic Toxicology Support				Age:	6d			
Sample ID:	04-9494-1312	Code:	1D803480				Client:	SPAWAR			
Sample Date:	28 Apr-11	Material:	Ambient Sediment Sample				Project:	Sediment Copper Tools - Round 1			
Receive Date:	29 Apr-11 09:00	Source:	Sediment Copper Tools								
Sample Age:	5d 14h	Station:	PSNS PS09								
Sample Note:	Both bulk sediment and core sediment collected. Bulk sediment sieved to 2mm upon receipt in lab. Homogenized sediment distributed to test chambers on 5/2/2011. (alternate ID: B-2 or PSNS-2)										
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
13-3531-0838	Mean Dry Weight-mg	100	>100	N/A	29.0%		Equal Variance t Two-Sample Test				
15-6033-2933	Survival Rate	100	>100	N/A	N/A		Fisher Exact Test				
Mean Dry Weight-mg Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	9	0.004928	0.004129	0.005727	0.00076	0.00747	0.0007134	0.00214	43.43%	0.0%
100		10	0.004682	0.004161	0.005203	0.00105	0.00604	0.0004413	0.001395	29.81%	4.99%
Survival Rate Summary											
Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	10	0.9	0.7819	1	0	1	0.1	0.3162	35.14%	0.0%
100		10	1	1	1	1	1	0	0	0.0%	-11.11%
Mean Dry Weight-mg Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Control	0.00247	0.00545	0.00519	0.00419	0.00647	0.00573	0.00747	0.00662	0.00076	
100		0.00604	0.00563	0.00444	0.00437	0.00545	0.00545	0.00494	0.00442	0.00503	0.00105
Survival Rate Detail											
Test Group	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Control	1	1	0	1	1	1	1	1	1	1
100		1	1	1	1	1	1	1	1	1	1

CETIS Analytical Report

Report Date: 27 Jul-11 15:52 (p 1 of 1)
Test Code: 10B86867 | 02-8052-0807

Neanthes Survival and Growth Test SPAWAR Systems Center

Analysis ID: 15-6033-2933 Endpoint: Survival Rate CETIS Version: CETISv1.8.1
Analyzed: 27 Jul-11 15:36 Analysis: Single 2x2 Contingency Table Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result
Untransformed		C > T	Not Run	Sample passes survival rate endpoint

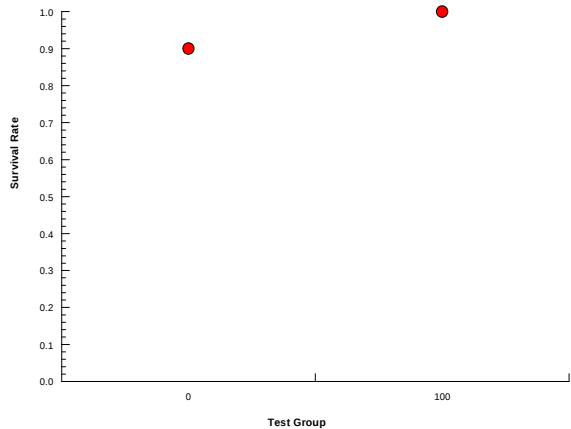
Fisher Exact Test

Control	vs	Test Group	Test Stat	P-Value	Decision(0.05)
Lab Control		100	1	1.0000	Non-Significant Effect

Data Summary

Test Group	Control Type	No-Resp	Resp	Total
0	Lab Control	9	1	10
100		10	0	10

Graphics



CETIS Analytical Report

Report Date: 27 Jul-11 15:52 (p 1 of 1)
Test Code: 10B86867 | 02-8052-0807

Neanthes Survival and Growth Test SPAWAR Systems Center

Analysis ID: 13-3531-0838 Endpoint: Mean Dry Weight-mg CETIS Version: CETISv1.8.1
Analyzed: 27 Jul-11 15:36 Analysis: Parametric-Two Sample Official Results: Yes

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Untransformed	0	C > T	Not Run	Sample passes mean dry weight-mg endpoint	29.0%

Equal Variance t Two-Sample Test

Control	vs	Test Group	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
Lab Control		100	0.2997	1.74	17	0.001427	0.3840	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.861617E-07	2.861617E-07	1	0.0898	0.7681	Non-Significant Effect
Error	5.417202E-05	3.18659E-06	17			
Total	5.445819E-05	3.472751E-06	18			

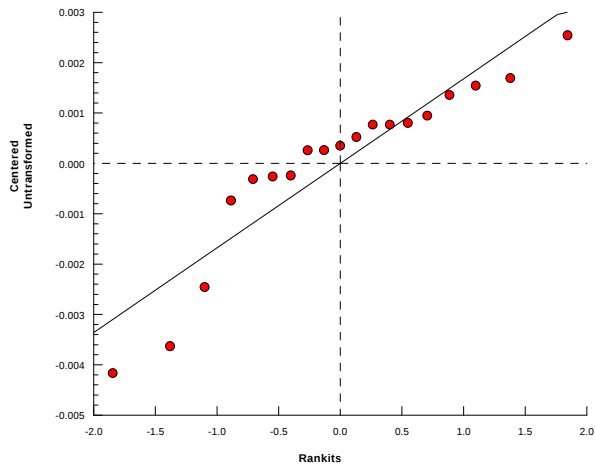
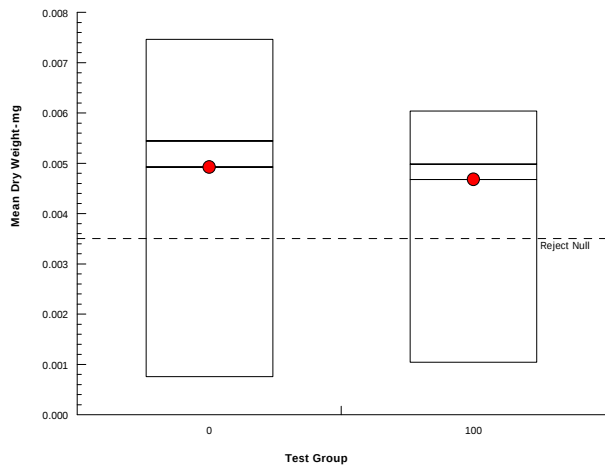
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	2.352	6.693	0.2244	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8732	0.8605	0.0164	Normal Distribution

Mean Dry Weight-mg Summary

Test Group	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	9	0.004928	0.004114	0.005742	0.00076	0.00747	0.0007134	0.00214	43.43%	0.0%
100		10	0.004682	0.004151	0.005213	0.00105	0.00604	0.0004413	0.001395	29.81%	4.99%

Graphics



Marine Sediment Bioassay

Organism Survival

Client: Internal - Cu Availability Study

Test Species: *N. arenaceodentata*

Ambient Sediment Samples

Start Date/Time: _____

End Date/Time: _____

Sample ID	Replicate	Initial No.	No. Recovered	Pan Weight (mg)	Pan + Org. Weight (mg) WET	Pan + Org. Weight (mg) DRY	Technician Initials
Shelter Island (SI)	A	1	1	1.20179		1.20542	
	B	1	1	1.05324		1.05683	
	C	1	1	1.15351		1.15545	
	D	1	1	1.19365		1.19414	
	E	1	1	1.09436		1.09898	
	F	1	1	1.13763		1.14173	
	G	1	1	0.99341		0.99725	
	H	1	1	1.23698		1.23922	
	I	1	1	1.24023		1.24339	
	J	1	1	1.16114		1.16520	
Naval Base SD (NB)	A	1	1	1.20162		1.20498	
	B	1	1	1.15929		1.16368	
	C	1	1	1.13636		1.13928	
	D	1	1	1.11471		1.11644	
	E	1	1	1.13801		1.14160	
	F	1	1	1.17650		1.18066	
	G	1	1	1.18646		1.19144	
	H	1	1	1.13461		1.13897	
	I	1	1	1.16520		1.16813	
	J	1	1	1.16015		1.16416	
PSNS - 1 (B1)	A	1	1	1.17409	1.17854	1.19686	
	B	1	1	1.15708	1.16210	1.20029	
	C	1	1	1.20240	1.20817	1.14042	
	D	1	1	1.05658	1.06054		
	E	1	1	1.13384	1.13902		
	F	1	1	1.11611	1.12222		
	G	1	1	1.17535	1.17929		
	H	1	1	1.25224	1.25784		
	I	1	1	1.11449	1.12090		
	J	1	1	1.11407	1.11909		
PSNS - 2 (B2)	A	1	1	1.19082		1.19686	
	B	1	1	1.19466		1.20029	
	C	1	1	1.13608		1.14042	
	D	1	1	1.13247		1.13684	
	E	1	1	1.17211		1.17756	
	F	1	1	1.12455		1.13000	
	G	1	1	1.18611		1.19105	
	H	1	1	1.12150		1.12592	
	I	1	1	1.12573		1.13076	
	J	1	1	1.08371		1.08482	

very small

QC Check: _____

Final Review: _____

ECT

P id 1 Neanthres Metals Analysis - 6/2/11

combined 3 reps (each w/ 1 worm) into 2 mL acid-cleaned microcentrifuge tubes (2 mL)

Treatment	Empty Tube (g)	Tube + Dry Worms (g)	Comment
LCB/1 W	1.00390	1.01847	clean guts
LCB/2 W	1.00298	1.01399	clean guts
LCB/3 W	1.00227	1.01336	a couple of sediment particles
100/1 100	1.00043	1.01013	clean
100/2	1.00251	1.01430	clean
100/3	1.00333	1.01898	4 worms, possible 1-2 ^{sed} particles
300/1	0.99953	1.01055	clean
300/2	1.00186	1.01317	clean
300/3	1.00043	1.01206	clean
500/1	1.00196	1.01041	possible minor sed.
500/2	0.99845	1.00482	possible minor sed.
500/3	1.00008	1.00602	possible minor sed.
SI/1	0.99994	1.00749	2 worms, clean
SI/2	1.00023	1.01023	minor sed.
SI/3	0.99812	1.00699	minor sed.
NB/1	1.00191	1.01187	clean (small)
NB2	1.00034	1.00684	clean
NB3	1.00165	1.01683	4 worms, minor sed.
B1/1	1.00034	1.01467	minor sed
B1/2	1.00028	1.01000	minor sed
B1/3	1.00091	1.01338	medium sed
B2/1	1.00153	1.01508	clean
B2/2	1.00028	1.01884	clean
B2/3	1.00024	1.00843	minor sed

Read and Understood By _____

(PS03) (PS09)
B1 = PSNS1, B2 = PSNS2

Signed _____

Date _____

Signed _____

Date _____

28-Day Marine Sediment Bioassay
Static-Renewal Conditions

Water Quality Measurements

Client: Internal - Cu Availability Study

Test Species: *N. arenaceodentata*

Sample ID: Bremerton PS03 - B1

Start Date/Time: 5/3/2011 1600

End Date/Time:

Test Day	Salinity (ppt)	Temperature (°C)	Dissolved Oxygen (mg/L)	pH (units)	Fed	Water Change	NH ₃ Analysis	Technician Initials	Comments
0	30.1	19.8	5.8	7.84	Y	N	✓	MC	
1	30.4	19.9	6.0	7.93				MC	
2	30.5	19.9	6.4	8.16				MC	
3		19.9		8.15	Y	N	BL	CC	
4		20.0		8.24	N	N		CC	
5		19.9		8.59	N	N		CC	
6	30.8	19.8	5.6	8.80	N	N		MC	
7	30.7	19.9	5.8	8.89	Y	Y		MC	
8	30.5	19.8	6.5	9.00	N	N		MC	
9	30.7	19.9	6.72	9.05	N	N		CC	
10	30.4	19.8	6.4	9.18	Y	N		MC	
11	30.5	19.3	6.7	8.83	N	Y		MC	
12		19.9		8.91	N	N		CC	
13	30.9	19.9	6.8	8.94	N	N		MC	
14	27.8	20.0	5.59	8.82	Y	Y		CC	
15			7.60						
16	28.0	19.7	7.6	8.68	N	N		CC	
17		20.1		8.38				CC	
18	28.7	19.9	6.7	8.38	Y	MC Y N		MC	
19	28.5	19.8	6.9	8.36				MC	
20	28.6	19.9	7.2	8.41				MC	
21	29.1	20.0	6.3	8.23	Y	Y		MC	
22	30.1	19.9	6.8	8.10				MC	
23	29.5	20.1	6.9	8.36	N	N		CC	
24	29.8	20.0	6.9	8.24	Y	N		MC	
25									
26	30.1	20.1	7.2	8.32				MC	
27									
28	30.0	19.9	6.5	8.36			Y	MC	

QC Check:

Final Review:

28-Day Marine Sediment Bioassay
Static-Renewal Conditions

Water Quality Measurements

Client: Internal - Cu Availability Study

Test Species: *N. arenaceodentata*

Sample ID: Bremerton B509 - B2

Start Date/Time: 5/3/2011 1600

End Date/Time:

Test Day	Salinity (ppt)	Temperature (°C)	Dissolved Oxygen (mg/L)	pH (units)	Fed	Water Change	NH ₃ Analysis	Technician Initials	Comments
0	30.2	19.7	5.4	7.83	Y	N	✓	MC	
1	30.8	19.9	6.2	8.08				MC	
2	30.5	20.1	6.4	8.03				MC	
3		19.7		7.91	Y	N		CC	
4		19.9		7.86	N	N		CC	
5		19.8		8.03	N	N		CC	
6	30.8	19.7	6.1	8.17	N	N		MC	
7	30.7	19.9	6.3	8.21	Y	Y		MC	
8	29.9	19.7	6.7	8.21	N	N		MC	
9	30.7	19.7	6.62	8.21	N	N		CC	
10	30.8	19.7	6.5	8.31	Y	N		MC	
11	30.9	19.5	6.7	8.20	N	N		MC	
12		19.8		8.32	N	N		CC	
13	31.2	19.8	7.1	8.27	N	N		MC	
14	28.4	19.8	5.01	8.29	Y	Y		CC	
15	—	—	—	—	—	—			
16	28.6	19.5	6.5	8.16	N	N		CC	
17		20.0		8.08				CC	
18	29.3	19.9	6.6	8.13	Y	MC Y N		MC	
19	29.1	19.9	6.8	8.14				MC	
20	29.1	20.0	6.9	8.17				MC	
21	29.0	19.8	6.5	8.26	Y	Y		MC	
22	29.9	20.1	6.7	8.14				MC	
23	29.30.0	19.9	6.5	8.22	N	N		CC	
24	30.1	20.1	6.8	8.18	Y	N		MC	
25									
26	30.3	20.0	6.9	8.21				MC	
27									
28	31.1	19.8	6.4	8.28			Y	MC	

QC Check:

Final Review:

Appendix B

Reference Toxicant Test Data and Statistical Summaries

CETIS Summary Report

Report Date: 27 Oct-16 15:29 (p 1 of 2)
Test Code: 3DF06D2F | 10-3916-6767

Bivalve Larval Survival and Development Test							SPAWAR Systems Center				
Batch ID:	11-0713-8919		Test Type: Development-Survival			Analyst:		Marianne A Colvin			
Start Date:	03 May-11 20:00		Protocol: EPA/600/R-95/136 (1995)			Diluent:		Laboratory Seawater			
Ending Date:	05 May-11 18:00		Species: Mytilis galloprovincialis			Brine:		Not Applicable			
Duration:	46h		Source: Carlsbad Aquafarm			Age:		na			
Sample ID:	21-1579-3046		Code: 7E1C7096			Client:		NAVSEA			
Sample Date:	03 May-11		Material: Copper sulfate			Project:		Sediment Copper Tools - Round 1			
Receive Date:			Source: Reference Toxicant								
Sample Age:	20h		Station: Reference Toxicant								
Batch Note:	SWI - Sediment Water Interface Test. Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.										
Comparison Summary											
Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method				
15-4993-3967	Combined Proportion Norm	8.4	12	10.04	20.6%		Bonferroni Adj t Test				
02-9314-7267	Proportion Normal	8.4	12	10.04	13.5%		Wilcoxon/Bonferroni Adj Test				
Point Estimate Summary											
Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method				
01-3687-9098	Combined Proportion Norm	EC50	10.22	8.939	10.79		Linear Regression (MLE)				
16-9997-0667	Proportion Normal	EC50	9.86	9.484	10.23		Linear Regression (MLE)				
Test Acceptability											
Analysis ID	Endpoint	Attribute		Test Stat	TAC Limits		Overlap	Decision			
02-9314-7267	Proportion Normal	Control Resp		0.8321	0.9 - NL		Yes	Below Acceptability Criteria			
16-9997-0667	Proportion Normal	Control Resp		0.8321	0.9 - NL		Yes	Below Acceptability Criteria			
15-4993-3967	Combined Proportion Norm	PMSD		0.2056	NL - 0.25		No	Passes Acceptability Criteria			
Combined Proportion Normal Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.5087	0.4375	0.5799	0.4627	0.5622	0.02238	0.04475	8.8%	0.0%
2.9		5	0.5522	0.4945	0.61	0.4826	0.602	0.02081	0.04654	8.43%	-8.56%
4.1		5	0.5821	0.5342	0.6299	0.5373	0.6269	0.01723	0.03854	6.62%	-14.43%
5.8		5	0.6189	0.5403	0.6975	0.5124	0.6716	0.0283	0.06328	10.23%	-21.66%
8.4		5	0.5493	0.4565	0.642	0.4925	0.6766	0.0334	0.07468	13.6%	-7.97%
12		5	0.03881	0	0.08147	0.01493	0.08955	0.01537	0.03436	88.55%	92.37%
17.2		4	0	0	0	0	0	0	0		100.0%
Proportion Normal Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Lab Control	4	0.8321	0.7681	0.8962	0.7737	0.8661	0.02014	0.04027	4.84%	0.0%
2.9		5	0.9388	0.9142	0.9633	0.9151	0.9646	0.00883	0.01974	2.1%	-12.81%
4.1		5	0.9551	0.9161	0.9942	0.9153	0.9919	0.01406	0.03144	3.29%	-14.78%
5.8		5	0.9351	0.9283	0.9419	0.9279	0.9403	0.002448	0.005474	0.59%	-12.38%
8.4		5	0.8055	0.6837	0.9273	0.6897	0.9	0.04387	0.09809	12.18%	3.2%
12		5	0.07037	0	0.1431	0.0283	0.1607	0.02621	0.05861	83.29%	91.54%
17.2		4	0	0	0	0	0	0	0		100.0%

CETIS Summary Report

Report Date: 27 Oct-16 15:29 (p 2 of 2)
 Test Code: 3DF06D2F | 10-3916-6767

Bivalve Larval Survival and Development Test					SPAWAR Systems Center	
Combined Proportion Normal Detail						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.5622	0.4826	0.5274	0.4627	
2.9		0.5423	0.5871	0.602	0.5473	0.4826
4.1		0.5473	0.6269	0.607	0.592	0.5373
5.8		0.6716	0.6617	0.6219	0.5124	0.6269
8.4		0.4975	0.6766	0.4925	0.5373	0.5423
12		0.01493	0.01493	0.0597	0.01493	0.08955
17.2		0	0	0	0	
Proportion Normal Detail						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	0.8433	0.8661	0.7737	0.8455	
2.9		0.9646	0.9291	0.9528	0.9322	0.9151
4.1		0.9322	0.9767	0.9919	0.9597	0.9153
5.8		0.931	0.9366	0.9398	0.9279	0.9403
8.4		0.6897	0.8947	0.7174	0.9	0.8258
12		0.0303	0.0283	0.09917	0.03333	0.1607
17.2		0	0	0	0	
Combined Proportion Normal Binomials						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	113/201	97/201	106/201	93/201	
2.9		109/201	118/201	121/201	110/201	97/201
4.1		110/201	126/201	122/201	119/201	108/201
5.8		135/201	133/201	125/201	103/201	126/201
8.4		100/201	136/201	99/201	108/201	109/201
12		3/201	3/201	12/201	3/201	18/201
17.2		0/201	0/201	0/201	0/201	
Proportion Normal Binomials						
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Lab Control	113/134	97/112	106/137	93/110	
2.9		109/113	118/127	121/127	110/118	97/106
4.1		110/118	126/129	122/123	119/124	108/118
5.8		135/145	133/142	125/133	103/111	126/134
8.4		100/145	136/152	99/138	108/120	109/132
12		3/99	3/106	12/121	3/90	18/112
17.2		0/74	0/82	0/90	0/79	

CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 4 of 6)
Test Code: 3DF06D2F | 10-3916-6767

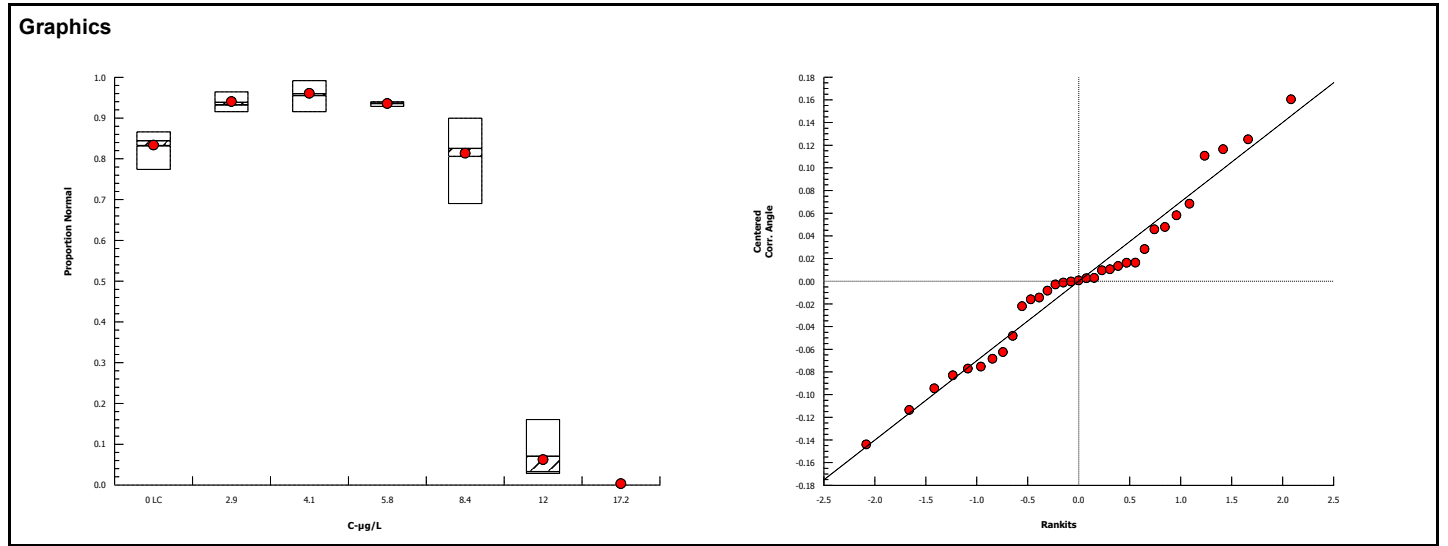
Bivalve Larval Survival and Development Test						SPAWAR Systems Center					
Analysis ID: 02-9314-7267		Endpoint: Proportion Normal		CETIS Version: CETISv1.8.7							
Analyzed: 27 Oct-16 15:28		Analysis: Nonparametric-Multiple Comparison		Official Results: Yes							
Batch ID: 11-0713-8919		Test Type: Development-Survival		Analyst: Marianne A Colvin							
Start Date: 03 May-11 20:00		Protocol: EPA/600/R-95/136 (1995)		Diluent: Laboratory Seawater							
Ending Date: 05 May-11 18:00		Species: Mytilis galloprovincialis		Brine: Not Applicable							
Duration: 46h		Source: Carlsbad Aquafarm		Age: na							
Sample ID: 21-1579-3046		Code: 7E1C7096		Client: NAVSEA							
Sample Date: 03 May-11		Material: Copper sulfate		Project: Sediment Copper Tools - Round 1							
Receive Date:		Source: Reference Toxicant									
Sample Age: 20h		Station: Reference Toxicant									
Batch Note: SWI - Sediment Water Interface Test. Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.											
Data Transform		Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU	
Angular (Corrected)		NA	C > T	NA	NA	13.5%	8.4	12	10.04		
Wilcoxon/Bonferroni Adj Test											
Control	vs	C-µg/L	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)		
Lab Control		2.9	35	NA	0	7	1.0000	Exact	Non-Significant Effect		
		4.1	35	NA	0	7	1.0000	Exact	Non-Significant Effect		
		5.8	35	NA	0	7	1.0000	Exact	Non-Significant Effect		
		8.4	24	NA	0	7	1.0000	Exact	Non-Significant Effect		
		12*	15	NA	0	7	0.0397	Exact	Significant Effect		
Test Acceptability Criteria											
Attribute	Test Stat	TAC Limits		Overlap	Decision						
Control Resp	0.8321	0.9 - NL		Yes	Below Acceptability Criteria						
ANOVA Table											
Source	Sum Squares		Mean Square		DF	F Stat	P-Value	Decision(α:5%)			
Between	4.444386		0.8888772		5	132.4	<0.0001	Significant Effect			
Error	0.154369		0.006711697		23						
Total	4.598755				28						
Distributional Tests											
Attribute	Test			Test Stat	Critical	P-Value	Decision(α:1%)				
Variances	Bartlett Equality of Variance			16.44	15.09	0.0057	Unequal Variances				
Distribution	Shapiro-Wilk W Normality			0.98	0.9004	0.8390	Normal Distribution				
Proportion Normal Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	0.8321	0.7681	0.8962	0.8444	0.7737	0.8661	0.02014	4.84%	0.0%
2.9		5	0.9388	0.9142	0.9633	0.9322	0.9151	0.9646	0.00883	2.1%	-12.81%
4.1		5	0.9551	0.9161	0.9942	0.9597	0.9153	0.9919	0.01406	3.29%	-14.78%
5.8		5	0.9351	0.9284	0.9419	0.9366	0.9279	0.9403	0.002448	0.59%	-12.38%
8.4		5	0.8055	0.6837	0.9273	0.8258	0.6897	0.9	0.04387	12.18%	3.2%
12		5	0.07037	0	0.1431	0.03333	0.0283	0.1607	0.02621	83.29%	91.54%
17.2		4	0	0	0	0	0	0	0		100.0%

CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 5 of 6)
 Test Code: 3DF06D2F | 10-3916-6767

Bivalve Larval Survival and Development Test								SPAWAR Systems Center			
Analysis ID: 02-9314-7267		Endpoint: Proportion Normal		CETIS Version: CETISv1.8.7							
Analyzed: 27 Oct-16 15:28		Analysis: Nonparametric-Multiple Comparison		Official Results: Yes							
Angular (Corrected) Transformed Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	1.15	1.067	1.234	1.165	1.075	1.196	0.02617	4.55%	0.0%
2.9		5	1.323	1.271	1.376	1.307	1.275	1.382	0.01904	3.22%	-15.04%
4.1		5	1.37	1.267	1.473	1.369	1.275	1.481	0.03698	6.04%	-19.08%
5.8		5	1.313	1.3	1.327	1.316	1.299	1.324	0.004946	0.84%	-14.17%
8.4		5	1.124	0.968	1.28	1.14	0.9799	1.249	0.05618	11.18%	2.3%
12		5	0.2521	0.1162	0.388	0.1836	0.169	0.4125	0.04895	43.42%	78.09%
17.2		4	0.0556	0.052	0.05921	0.05576	0.05273	0.05816	0.001132	4.07%	95.17%
Proportion Normal Detail											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	0.8433	0.8661	0.7737	0.8455						
2.9		0.9646	0.9291	0.9528	0.9322	0.9151					
4.1		0.9322	0.9767	0.9919	0.9597	0.9153					
5.8		0.931	0.9366	0.9398	0.9279	0.9403					
8.4		0.6897	0.8947	0.7174	0.9	0.8258					
12		0.0303	0.0283	0.09917	0.03333	0.1607					
17.2		0	0	0	0						
Angular (Corrected) Transformed Detail											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	1.164	1.196	1.075	1.167						
2.9		1.382	1.301	1.352	1.307	1.275					
4.1		1.307	1.418	1.481	1.369	1.275					
5.8		1.305	1.316	1.323	1.299	1.324					
8.4		0.9799	1.24	1.01	1.249	1.14					
12		0.175	0.169	0.3204	0.1836	0.4125					
17.2		0.05816	0.05524	0.05273	0.05628						
Proportion Normal Binomials											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	113/134	97/112	106/137	93/110						
2.9		109/113	118/127	121/127	110/118	97/106					
4.1		110/118	126/129	122/123	119/124	108/118					
5.8		135/145	133/142	125/133	103/111	126/134					
8.4		100/145	136/152	99/138	108/120	109/132					
12		3/99	3/106	12/121	3/90	18/112					
17.2		0/74	0/82	0/90	0/79						

Bivalve Larval Survival and Development Test			SPAWAR Systems Center
Analysis ID: 02-9314-7267	Endpoint: Proportion Normal	CETIS Version: CETISv1.8.7	
Analyzed: 27 Oct-16 15:28	Analysis: Nonparametric-Multiple Comparison	Official Results: Yes	



CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 1 of 6)
Test Code: 3DF06D2F | 10-3916-6767

Bivalve Larval Survival and Development Test						SPAWAR Systems Center					
Analysis ID: 15-4993-3967		Endpoint: Combined Proportion Normal		CETIS Version: CETISv1.8.7							
Analyzed: 27 Oct-16 15:28		Analysis: Parametric-Multiple Comparison		Official Results: Yes							
Batch ID: 11-0713-8919		Test Type: Development-Survival		Analyst: Marianne A Colvin							
Start Date: 03 May-11 20:00		Protocol: EPA/600/R-95/136 (1995)		Diluent: Laboratory Seawater							
Ending Date: 05 May-11 18:00		Species: Mytilis galloprovincialis		Brine: Not Applicable							
Duration: 46h		Source: Carlsbad Aquafarm		Age: na							
Sample ID: 21-1579-3046		Code: 7E1C7096		Client: NAVSEA							
Sample Date: 03 May-11		Material: Copper sulfate		Project: Sediment Copper Tools - Round 1							
Receive Date:		Source: Reference Toxicant									
Sample Age: 20h		Station: Reference Toxicant									
Batch Note: SWI - Sediment Water Interface Test. Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.											
Data Transform		Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU	
Angular (Corrected)		NA	C > T	NA	NA	20.6%	8.4	12	10.04		
Bonferroni Adj t Test											
Control	vs	C-µg/L	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)		
Lab Control		2.9	-1.039	2.5	0.105	7	1.0000	CDF	Non-Significant Effect		
		4.1	-1.756	2.5	0.105	7	1.0000	CDF	Non-Significant Effect		
		5.8	-2.66	2.5	0.105	7	1.0000	CDF	Non-Significant Effect		
		8.4	-0.9813	2.5	0.105	7	1.0000	CDF	Non-Significant Effect		
		12*	14.5	2.5	0.105	7	<0.0001	CDF	Significant Effect		
Test Acceptability Criteria											
Attribute	Test Stat	TAC Limits		Overlap	Decision						
PMSD	0.2056	NL - 0.25		No	Passes Acceptability Criteria						
ANOVA Table											
Source	Sum Squares		Mean Square		DF	F Stat	P-Value	Decision(α:5%)			
Between	1.872349		0.3744698		5	95.08	<0.0001	Significant Effect			
Error	0.09058353		0.003938414		23						
Total	1.962932				28						
Distributional Tests											
Attribute	Test			Test Stat	Critical	P-Value	Decision(α:1%)				
Variances	Bartlett Equality of Variance			3.464	15.09	0.6288	Equal Variances				
Distribution	Shapiro-Wilk W Normality			0.9672	0.9004	0.4857	Normal Distribution				
Combined Proportion Normal Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	0.5087	0.4375	0.5799	0.505	0.4627	0.5622	0.02238	8.8%	0.0%
2.9		5	0.5522	0.4945	0.61	0.5473	0.4826	0.602	0.02081	8.43%	-8.56%
4.1		5	0.5821	0.5342	0.6299	0.592	0.5373	0.6269	0.01723	6.62%	-14.43%
5.8		5	0.6189	0.5403	0.6975	0.6269	0.5124	0.6716	0.0283	10.23%	-21.66%
8.4		5	0.5493	0.4565	0.642	0.5373	0.4925	0.6766	0.0334	13.6%	-7.97%
12		5	0.03881	0	0.08147	0.01493	0.01493	0.08955	0.01537	88.55%	92.37%
17.2		4	0	0	0	0	0	0	0		100.0%

CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 2 of 6)
 Test Code: 3DF06D2F | 10-3916-6767

Bivalve Larval Survival and Development Test									SPAWAR Systems Center		
Analysis ID: 15-4993-3967		Endpoint: Combined Proportion Normal					CETIS Version: CETISv1.8.7				
Analyzed: 27 Oct-16 15:28		Analysis: Parametric-Multiple Comparison					Official Results: Yes				
Angular (Corrected) Transformed Summary											
C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Lab Control	4	0.7941	0.7228	0.8655	0.7904	0.7481	0.8477	0.02242	5.65%	0.0%
2.9		5	0.8379	0.7798	0.896	0.8327	0.768	0.8881	0.02093	5.59%	-5.51%
4.1		5	0.8681	0.8195	0.9166	0.878	0.8227	0.9137	0.01748	4.5%	-9.31%
5.8		5	0.9061	0.8259	0.9863	0.9137	0.7978	0.9606	0.02888	7.13%	-14.1%
8.4		5	0.8354	0.7407	0.9302	0.8227	0.7779	0.9659	0.03414	9.14%	-5.2%
12		5	0.1836	0.07667	0.2906	0.1225	0.1225	0.3039	0.03852	46.91%	76.88%
17.2		4	0.03527	0.03526	0.03529	0.03527	0.03527	0.03527	0	0.0%	95.56%
Combined Proportion Normal Detail											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	0.5622	0.4826	0.5274	0.4627						
2.9		0.5423	0.5871	0.602	0.5473	0.4826					
4.1		0.5473	0.6269	0.607	0.592	0.5373					
5.8		0.6716	0.6617	0.6219	0.5124	0.6269					
8.4		0.4975	0.6766	0.4925	0.5373	0.5423					
12		0.01493	0.01493	0.0597	0.01493	0.08955					
17.2		0	0	0	0						
Angular (Corrected) Transformed Detail											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	0.8477	0.768	0.8128	0.7481						
2.9		0.8277	0.8729	0.8881	0.8327	0.768					
4.1		0.8327	0.9137	0.8932	0.878	0.8227					
5.8		0.9606	0.95	0.9085	0.7978	0.9137					
8.4		0.7829	0.9659	0.7779	0.8227	0.8277					
12		0.1225	0.1225	0.2468	0.1225	0.3039					
17.2		0.03527	0.03527	0.03527	0.03527						
Combined Proportion Normal Binomials											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	113/201	97/201	106/201	93/201						
2.9		109/201	118/201	121/201	110/201	97/201					
4.1		110/201	126/201	122/201	119/201	108/201					
5.8		135/201	133/201	125/201	103/201	126/201					
8.4		100/201	136/201	99/201	108/201	109/201					
12		3/201	3/201	12/201	3/201	18/201					
17.2		0/201	0/201	0/201	0/201						

CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 3 of 6)
Test Code: 3DF06D2F | 10-3916-6767

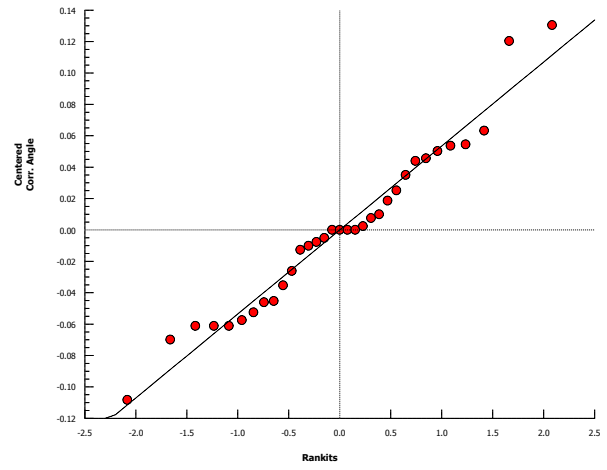
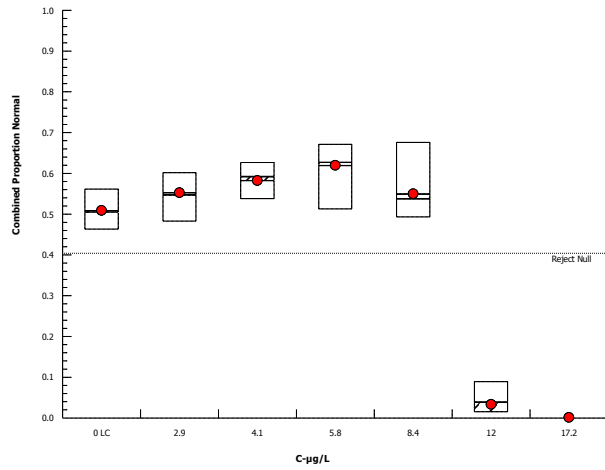
Bivalve Larval Survival and Development Test

SPAWAR Systems Center

Analysis ID: 15-4993-3967 Endpoint: Combined Proportion Normal
Analyzed: 27 Oct-16 15:28 Analysis: Parametric-Multiple Comparison

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 3 of 5)
Test Code: 3DF06D2F | 10-3916-6767

Bivalve Larval Survival and Development Test						SPAWAR Systems Center				
Analysis ID: 16-9997-0667		Endpoint: Proportion Normal		CETIS Version: CETISv1.8.7						
Analyzed: 27 Oct-16 15:28		Analysis: Linear Regression (MLE)		Official Results: Yes						
Batch ID: 11-0713-8919		Test Type: Development-Survival		Analyst: Marianne A Colvin						
Start Date: 03 May-11 20:00		Protocol: EPA/600/R-95/136 (1995)		Diluent: Laboratory Seawater						
Ending Date: 05 May-11 18:00		Species: Mytilis galloprovincialis		Brine: Not Applicable						
Duration: 46h		Source: Carlsbad Aquafarm		Age: na						
Sample ID: 21-1579-3046		Code: 7E1C7096		Client: NAVSEA						
Sample Date: 03 May-11		Material: Copper sulfate		Project: Sediment Copper Tools - Round 1						
Receive Date:		Source: Reference Toxicant								
Sample Age: 20h		Station: Reference Toxicant								
Batch Note: SWI - Sediment Water Interface Test. Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.										
Linear Regression Options										
Model Function		Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted			
Log-Normal [NED=A+B*log(X)]		Control Threshold	0.170385	Yes	No	Yes	Yes			
Regression Summary										
Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)
5	-1140	2288	2291	0.9939	0.06077	0.9369	5.976	2.743	0.0015	Significant Lack of Fit
Point Estimates										
Level	µg/L	95% LCL	95% UCL							
EC50	9.86	9.484	10.23							
Test Acceptability Criteria										
Attribute		Test Stat	TAC Limits	Overlap	Decision					
Control Resp		0.8321	0.9 - NL	Yes	Below Acceptability Criteria					
Regression Parameters										
Parameter		Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)		
Threshold		0.08047	0.01224	0.05547	0.1055	6.574	<0.0001	Significant Parameter		
Slope		16.46	1.649	13.09	19.83	9.978	<0.0001	Significant Parameter		
Intercept		-16.36	1.652	-19.73	-12.98	-9.9	<0.0001	Significant Parameter		
ANOVA Table										
Source		Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)			
Model		2277.623	2277.623	1	477.1	<0.0001	Significant			
Lack of Fit		68.60464	17.15116	4	5.976	0.0015	Significant			
Pure Error		74.62022	2.870008	26						
Residual		143.2249	4.774162	30						
Residual Analysis										
Attribute		Method		Test Stat	Critical	P-Value	Decision(α:5%)			
Goodness-of-Fit		Pearson Chi-Sq GOF		143.2	43.77	<0.0001	Significant Heterogeneity			
		Likelihood Ratio GOF		135.9	43.77	<0.0001	Significant Heterogeneity			
Variances		Bartlett Equality of Variance		51.52	12.59	<0.0001	Unequal Variances			
		Mod Levene Equality of Variance		3.313	2.573	0.0187	Unequal Variances			
Distribution		Shapiro-Wilk W Normality		0.9443	0.9354	0.0908	Normal Distribution			
		Anderson-Darling A2 Normality		0.7333	2.492	0.0557	Normal Distribution			

CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 4 of 5)
 Test Code: 3DF06D2F | 10-3916-6767

Bivalve Larval Survival and Development Test										SPAWAR Systems Center	
Analysis ID: 16-9997-0667		Endpoint: Proportion Normal					CETIS Version: CETISv1.8.7				
Analyzed: 27 Oct-16 15:28		Analysis: Linear Regression (MLE)					Official Results: Yes				
Proportion Normal Summary			Calculated Variate(A/B)								
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	4	0.8321	0.7737	0.8661	0.02014	0.04027	4.84%	0.0%	409	493
2.9		5	0.9388	0.9151	0.9646	0.00883	0.01974	2.1%	-12.81%	555	591
4.1		5	0.9551	0.9153	0.9919	0.01406	0.03144	3.29%	-14.78%	585	612
5.8		5	0.9351	0.9279	0.9403	0.002448	0.005473	0.59%	-12.38%	622	665
8.4		5	0.8055	0.6897	0.9	0.04387	0.09809	12.18%	3.2%	552	687
12		5	0.07037	0.0283	0.1607	0.02621	0.05861	83.29%	91.54%	39	528
17.2		4	0	0	0	0	0		100.0%	0	325
Proportion Normal Detail											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	0.8433	0.8661	0.7737	0.8455						
2.9		0.9646	0.9291	0.9528	0.9322	0.9151					
4.1		0.9322	0.9767	0.9919	0.9597	0.9153					
5.8		0.931	0.9366	0.9398	0.9279	0.9403					
8.4		0.6897	0.8947	0.7174	0.9	0.8258					
12		0.0303	0.0283	0.09917	0.03333	0.1607					
17.2		0	0	0	0						
Proportion Normal Binomials											
C-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5					
0	Lab Control	113/201	97/201	106/201	93/201						
2.9		109/201	118/201	121/201	110/201	97/201					
4.1		110/201	126/201	122/201	119/201	108/201					
5.8		135/201	133/201	125/201	103/201	126/201					
8.4		100/201	136/201	99/201	108/201	109/201					
12		3/201	3/201	12/201	3/201	18/201					
17.2		0/201	0/201	0/201	0/201						

Bivalve Larval Survival and Development Test

SPAWAR Systems Center

Analysis ID: 16-9997-0667

Endpoint: Proportion Normal

CETIS Version: CETISv1.8.7

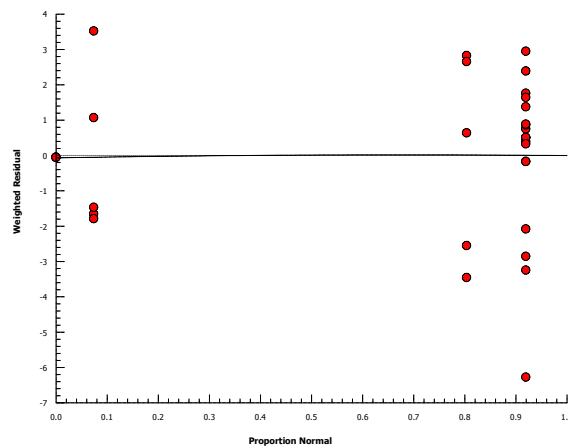
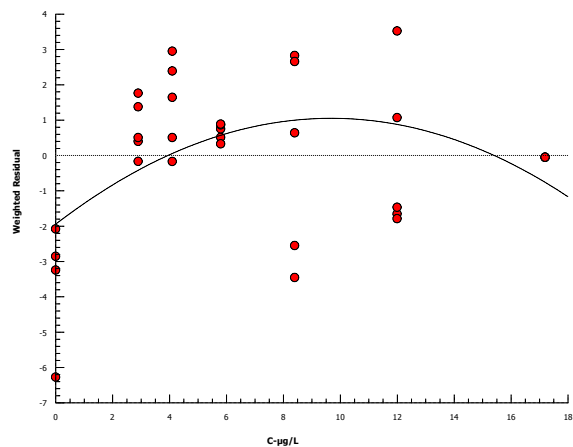
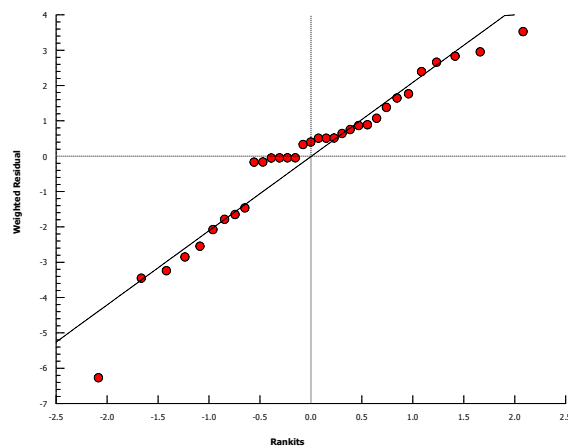
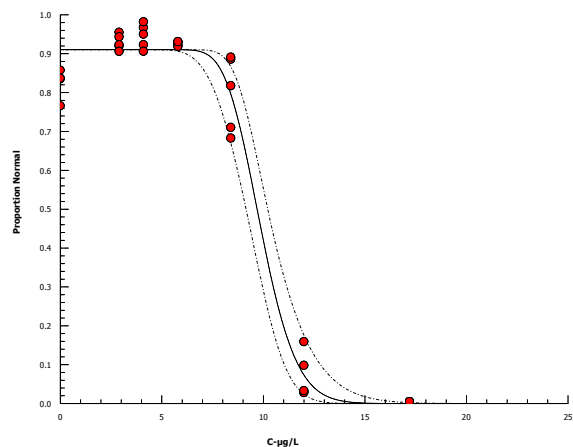
Analyzed: 27 Oct-16 15:28

Analysis: Linear Regression (MLE)

Official Results: Yes

Graphics

Log-Normal [NED=A+B*log(X)]



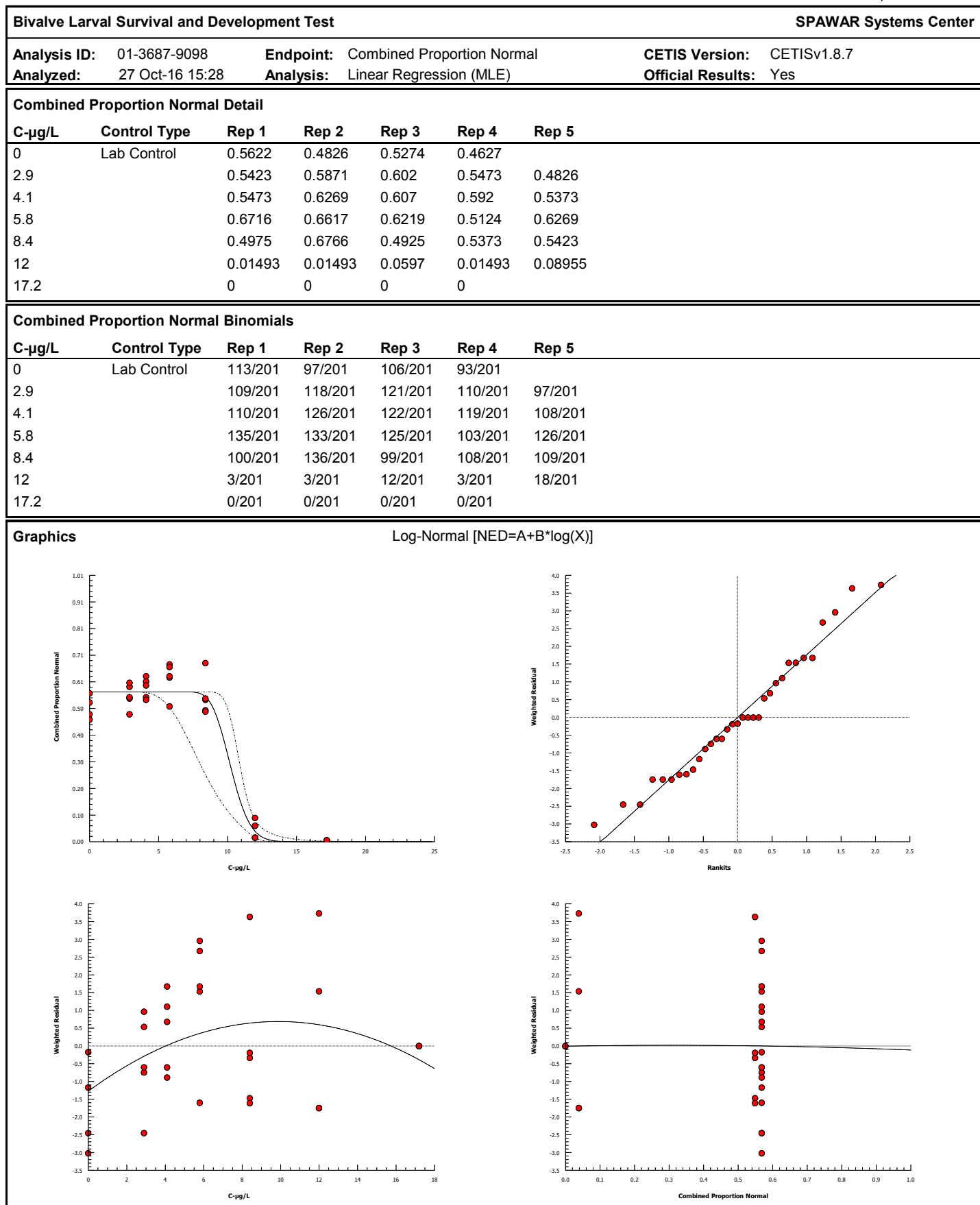
CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 1 of 5)
Test Code: 3DF06D2F | 10-3916-6767

Bivalve Larval Survival and Development Test							SPAWAR Systems Center				
Analysis ID: 01-3687-9098		Endpoint: Combined Proportion Normal		CETIS Version: CETISv1.8.7							
Analyzed: 27 Oct-16 15:28		Analysis: Linear Regression (MLE)		Official Results: Yes							
Batch ID: 11-0713-8919		Test Type: Development-Survival		Analyst: Marianne A Colvin							
Start Date: 03 May-11 20:00		Protocol: EPA/600/R-95/136 (1995)		Diluent: Laboratory Seawater							
Ending Date: 05 May-11 18:00		Species: Mytilis galloprovincialis		Brine: Not Applicable							
Duration: 46h		Source: Carlsbad Aquafarm		Age: na							
Sample ID: 21-1579-3046		Code: 7E1C7096		Client: NAVSEA							
Sample Date: 03 May-11		Material: Copper sulfate		Project: Sediment Copper Tools - Round 1							
Receive Date:		Source: Reference Toxicant									
Sample Age: 20h		Station: Reference Toxicant									
Batch Note: SWI - Sediment Water Interface Test. Overlying Water consisted of 0.45µm filter laboratory seawater diluted to 30ppt with Nano-pure DI water.											
Linear Regression Options											
Model Function				Threshold Option	Threshold	Optimized	Pooled	Het Corr	Weighted		
Log-Normal [NED=A+B*log(X)]				Control Threshold	0.491294	Yes	No	Yes	Yes		
Regression Summary											
Iters	LL	AICc	BIC	Mu	Sigma	Adj R2	F Stat	Critical	P-Value	Decision(α:5%)	
7	-3468	6943	6946	1.01	0.0467	0.9379	2.069	2.743	0.1140	Non-Significant Lack of Fit	
Point Estimates											
Level	µg/L	95% LCL	95% UCL								
EC50	10.22	8.939	10.79								
Regression Parameters											
Parameter		Estimate	Std Error	95% LCL	95% UCL	t Stat	P-Value	Decision(α:5%)			
Threshold		0.4315	0.01445	0.402	0.461	29.86	<0.0001	Significant Parameter			
Slope		21.41	4.828	11.55	31.27	4.435	0.0001	Significant Parameter			
Intercept		-21.62	5.177	-32.19	-11.04	-4.176	0.0002	Significant Parameter			
ANOVA Table											
Source		Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)				
Model		1579.036	1579.036	1	485.6	<0.0001	Significant				
Lack of Fit		23.54807	5.887017	4	2.069	0.1140	Non-Significant				
Pure Error		73.99361	2.845908	26							
Residual		97.54169	3.25139	30							
Residual Analysis											
Attribute		Method			Test Stat	Critical	P-Value	Decision(α:5%)			
Goodness-of-Fit		Pearson Chi-Sq GOF			97.54	43.77	<0.0001	Significant Heterogenity			
		Likelihood Ratio GOF			96.95	43.77	<0.0001	Significant Heterogenity			
Variances		Mod Levene Equality of Variance			0.9946	2.573	0.4544	Equal Variances			
Distribution		Shapiro-Wilk W Normality			0.9642	0.9354	0.3378	Normal Distribution			
		Anderson-Darling A2 Normality			0.4114	2.492	0.3454	Normal Distribution			
Combined Proportion Normal Summary											
		Calculated Variate(A/B)									
C-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Control	4	0.5087	0.4627	0.5622	0.02238	0.04475	8.8%	0.0%	409	804
2.9		5	0.5522	0.4826	0.602	0.02081	0.04654	8.43%	-8.56%	555	1005
4.1		5	0.5821	0.5373	0.6269	0.01723	0.03854	6.62%	-14.43%	585	1005
5.8		5	0.6189	0.5124	0.6716	0.0283	0.06328	10.23%	-21.66%	622	1005
8.4		5	0.5493	0.4925	0.6766	0.0334	0.07468	13.6%	-7.97%	552	1005
12		5	0.03881	0.01493	0.08955	0.01537	0.03436	88.55%	92.37%	39	1005
17.2		4	0	0	0	0	0	100.0%	0	0	804

CETIS Analytical Report

Report Date: 27 Oct-16 15:29 (p 2 of 5)
Test Code: 3DF06D2F | 10-3916-6767



Embryo Larval Bioassay

48-hour Development

Project: SPAWAR

Test Species: *M. galloprovincialis*Sample ID: Reference Toxicant CuSO₄

Start Date: 5/3/2011

End Date: 5/5/2011

Random #	Number Normal	Number Abnormal	Technician Initials
1	103	8	BR
2	106	31	BR
3			
4	133	9	MC
5	125	8	BR
6	97	15	MC
7	18	94	MC
8	0	74	MC
9	3	96	BR
10	97	1	MC
11	122	1	MC
12	108	10	MC
13	136	16	MC
14	0	79	MC
15	110	8	MC
16	135	10	MC
17	109	4	MC
18	118	9	MC
19	0	90	MC
20	99	39	BR
21	2 0 MC	79	MC
22	126	8	MC
23	0	82	MC
24	12	109	MC
25	119	5	MC
26	110	8	MC
27	109	23	MC
28	100	45	MC
29	121	6	MC
30	1210	3	MC
31	3	103	MC
32	MC 0 93	MC 110 17	MC
33	108	12	MC
34	113	21	MC
35	3	87	MC

term. early

QC Check: _____

Final Review: _____

Marine Chronic Bioassay

Water Quality Measurements

Project: **SPAWAR**

Sample ID: Copper Sulfate Reflux

Test Species: M. galloprovincialis

Start Date/Time: 5/3/2011 2000

End Date/Time: 5/5/2011 1800

Concentration (%)	Salinity (ppt)			Temperature (°C)			Dissolved Oxygen (mg/L)			pH (pH units)		
	0	24	48	0	24	48	0	24	48	0	24	48
Lab Control	29.9	30.5	31.2	15.0	15.3	14.7	7.4 7.3	7.3	7.4	8.04	8.05	8.11
2.9	29.6	30.3	32.0	15.0	15.4	15.4	7.3	7.4	7.5	8.06	8.09	8.13
4.1	30.0	30.5	31.8	15.0	15.6	14.8	7.3	7.4	7.4	8.07	8.09	8.15
5.8	30.5	30.8	31.8	15.0	15.6	14.9	7.4	7.3	7.2	8.07	8.10	8.15
8.4	30.5	30.7	31.6	15.0	15.5	14.9	7.3	7.2	7.1	8.07	8.11	8.15
12	30.6	30.7	31.5	15.0	15.6	15.2	7.4	7.3	7.3	8.07	8.11	8.15
17.2	30.6	30.8	31.8	15.0	15.6	15.5	7.4	7.4	7.2	8.07	8.10	8.15

Technician Initials: _____ WQ Readings:

0	24	48
WC	WC	WC

Dilutions made by:

WC		
----	--	--

Animal Source/Date Received: _____

Carlsbad Aquafarms 5/3/2011

Comments: _____

0 hrs: _____

24 hrs: _____

48 hrs: _____

QC Check: _____

Final Review: _____

Appendix C
Sample Information

SAMPLE COLLECTION AND ARRIVAL LOG

Project	Sample ID	Sampling			Matrix	Received By	Receipt at Lab		
		Date	Time	Temp. (°C)			Date	Time	Temp. (°C)
PSNS Amboule	M3.1	3/23/11	1434	9.0	Sed	SD	3/23/11	1020	0.8
↓	M4	↓	1403	8.9	↓	↓	↓	↓	0.8
	WJEST	↓	1421	9.0	↓	↓	↓	↓	0.6
PS03 - bulk sed.	↓ Cu Sed. Project	4/27/2011	1125	NR	Sed	MC	4/29/11	0900	6.1
PS04 - bulk sed.	↓	↓	1235	↓	↓	↓	↓	↓	6.1
PS03 - core sed.	↓	↓	1050	↓	↓	↓	↓	↓	6.1
PS08 - core sed.	↓	↓	NR	↓	↓	↓	↓	↓	6.1
PS09 - core sed.	↓	↓	1120	↓	↓	↓	↓	↓	6.1
Cu tools	Sediment Sed	3/31/11	1005	4	Sed	MC/HM	6/14/11	1005	2.5
PSNS Amboule	NPDES 18	4/21/11	1300	4.0	Sed	SD	10/22/11	0950	4.1
↓	NPDES 15	↓	1200	4.0	↓	↓	↓	↓	4.1
↓	NPDES 2	↓	1200	4.0	↓	↓	↓	↓	4.1
↓	PS01	↓	1127	13.8	↓	↓	↓	↓	1.6
↓	PS03	↓	0938	13.9	↓	↓	↓	↓	2.9
↓	PS08	↓	1010	13.2	↓	↓	↓	↓	2.9
↓	PS09	↓	1028	13.2	↓	↓	↓	↓	1.6
↓	PS14	↓	0925	13.5	↓	↓	↓	↓	2.9
↓	PS15	↓	1019	13.2	↓	↓	↓	↓	2.9
↓	M3.1	↓	1233	12.6	↓	↓	↓	↓	1.6
↓	M4	↓	1203	15.5	↓	↓	↓	↓	1.6
↓	WJEST	↓	1215	15.0	↓	↓	↓	↓	3.9

Comments: Sample leaked during shipment

**Total Ammonia Analysis
Marine Samples**

Client: Internal - Cu Availability Study
Initial Measurements of Overlying
Water

Test Type: Sediment Toxicity Exposure

N x 1.22

Sample ID	Sample Date	Test Day	pH (units)	Salinity (ppt)	Nitrogen (mg/L)	Ammonia (mg/L)	Technician Initials
Blank Spike (10 mg/L NH ₃)	NA	NA	NA	NA	9.8	12.0	GR
Neanthes:							
Shelter Island	5/3/2011	0			0.6	0.7	
Naval Base SD	5/3/2011	0			0.4	0.5	
Neanthes - Bremerton PS03 <i>BI</i>	5/3/2011	0			0.9	1.1	
Neanthes - Bremerton PS09 <i>BI</i>	5/3/2011	0			0.3	0.4	
Cu - Lab control	5/3/2011	0			0.9	1.1	
Cu - 100 mg/kg	5/3/2011	0			1.1	1.3	
Cu - 500 mg/kg	5/3/2011	0			0.7	0.9	
Cu - 4500 mg/kg	5/3/2011	0			1.2	1.5	
Ampelisca:					SEE		
Shelter Island	5/3/2011	0			LEPTOCHEIRUS		
Naval Base SD	5/3/2011	0			DATA		
Neanthes - Bremerton PS03	5/3/2011	0					
Neanthes - Bremerton PS09	5/3/2011	0					
Cu - Lab control	5/3/2011	0					
Cu - 100 mg/kg	5/3/2011	0					
Cu - 500 mg/kg	5/3/2011	0					
Cu - 4500 mg/kg	5/3/2011	0					
Leptocheirus:							
Shelter Island	5/3/2011	0			0.4	0.5	
Naval Base SD	5/3/2011	0			0.3	0.4	
Neanthes - Bremerton PS03	5/3/2011	0			0.6	0.7	
Neanthes - Bremerton PS09	5/3/2011	0			ND	ND	
Cu - Lab control	5/3/2011	0			ND	ND	
Cu - 100 mg/kg	5/3/2011	0			0.5	0.6	
Cu - 500 mg/kg	5/3/2011	0			0.3	0.4	
Cu - 4500 mg/kg	5/3/2011	0			0.1	0.1	

QC Check:

ME 6/6/11

Total Ammonia Analysis
Marine Samples

Client: Internal - Cu Availability Study

Initial Measurements of Overlying Water

Test Type: Sediment Toxicity Exposure

N x 1.22

Sample ID	Sample Date	Test Day	pH (units)	Salinity (ppt)	Nitrogen (mg/L)	Ammonia (mg/L)	Technician Initials
Blank Spike (10 mg/L NH ₃)	NA	NA	NA	NA	9.8	12.0	BP
Bivalve:							
Shelter Island - Core	5/3/2011	0			ND	ND	
Shelter Island - Hom.	5/3/2011	0			ND	ND	
Naval Base SD - Core	5/3/2011	0			ND	ND	
Naval Base SD - Hom.	5/3/2011	0		0.7	ND	0.9	
Bivalve - Bremerton PS03 - Core	5/3/2011	0			1.8	2.2	
Bivalve - Bremerton PS03 - Hom.	5/3/2011	0			0.2	0.2	
Bivalve - Bremerton PS09 - Core	5/3/2011	0			0.4	0.5	
Bivalve - Bremerton PS09 - Hom.	5/3/2011	0			1.1	1.3	
Cu - Lab control	5/3/2011	0			0.4	0.5	
Cu - 100 mg/kg	5/3/2011	0			0.9	1.1	
Cu - 500 mg/kg	5/3/2011	0			0.3	0.4	
Cu - 1500 mg/kg	5/3/2011	0			0.2	0.9	
					0.7		
Ampelisca control	5/4/2011	1			1.3	1.6	ME
spike					10.0	12.2	ME

QC Check: ME 6/6/11

Total Copper Analysis
Marine Samples

Client: Internal - Cu Availability Study

Pre-Testing Measurements of Overlying
Water within Neanthes Test Chambers

Test Type: Sediment Toxicity Exposure

Sample ID	Sample Date	Test Day	pH (units)	Total Copper (mg/kg)	Technician Initials
Blank Spike (10 mg/L NH₃)	NA	NA	NA		
Lab control	5/2/2011		8.14	ND	ML
100 mg/kg	5/2/2011		8.24	ND	
300 mg/kg	5/2/2011		8.28	ND	
500 mg/kg	5/2/2011		8.24	4	
1500 mg/kg	5/2/2011		8.24	34	
4500 mg/kg	5/2/2011		8.20	234	
Lab control	5/3/2011				
100 mg/kg	5/3/2011				
300 mg/kg	5/3/2011				
500 mg/kg	5/3/2011				
1500 mg/kg	5/3/2011				
4500 mg/kg	5/3/2011				
Naval Base SD	5/3/2011	0		5	
Shelter Island SWI				4	
PS03 (B1)				4	
PS09 (B2)				11	ML
67 Homogenized					

QC Check: _____

5/2/11 SWI 1500 - 18 pH 8.21
SWI 4500 - 85 pH 8.19

Total Ammonia and Copper Analysis Marine Samples

Client: **Internal - Cu Availability Study**

Final Measurements of Overlying Water

Test Type: **Sediment Water Interface Toxicity Exposure**

N x 1.22

[illegible]

ND = Non-Detect

QC Check: all within

Total Ammonia and Copper Analysis
Marine Samples

Client: Internal - Cu Availability Study

Final Measurements of Overlying Water

Test Type: Sediment Toxicity Exposure

N x 1.22

Sample ID	Sample Date	Test Day	pH (units)	Salinity (ppt)	Nitrogen (mg/L)	Ammonia (mg/L)	Technician Initials
Blank Spike (10 mg/L NH ₃)	NA	NA	NA	NA	8.0	9.8	MC
Leptocheirus:							
Shelter Island	5/13/2011	10			0.3	0.4	
Naval Base SD	5/13/2011	10			0.2	0.2	
Bremerton 1 PS03	5/13/2011	10			1.3	1.6	
Bremerton 2 PS09	5/13/2011	10			1.3	1.6	
Cu - Lab control	5/13/2011	10			0.6	0.7	
Cu - 100 mg/kg	5/13/2011	10			ND	ND	
Cu - 300 mg/kg	5/13/2011	10			0.5	0.6	
Cu - 500 mg/kg	5/13/2011	10			0.2	0.2	
Cu - 1500 mg/kg	5/13/2011	10			0.4	0.5	
Cu - 4500 mg/kg	5/13/2011	10			0.0	0.0	
Ampelisca:							
Shelter Island	5/13/2011	10			0.9	1.1	
Naval Base SD	5/13/2011	10			0.1	.1	
Bremerton 1 PS03	5/13/2011	10			ND	ND	
Bremerton 2 PS09	5/13/2011	10			ND	ND	
Cu - Lab control	5/13/2011	10			0.5	0.6	
Cu - 100 mg/kg	5/13/2011	10			ND	ND	
Cu - 300 mg/kg	5/13/2011	10			0.7	0.9	
Cu - 500 mg/kg	5/13/2011	10			0.7	0.9	
Cu - 1500 mg/kg	5/13/2011	10			0.2	0.2	
Cu - 4500 mg/kg	5/13/2011	10			0.7	0.9	
Ampelisca hom. sediment control	5/13/2011	10			1.5	1.8	
Ech 260 Ca	Shelter	11			4.4	5.4	MC
Ech 500 Ca					2.9	3.5	
Ech 1500 Ca					2.2	2.7	
Ech Spike					9.7	11.8	

QC Check:

MC 6/6/11

lepto, Amp + Ech - 10 days
 day 10

Total Ammonia Analysis Marine Samples

Client: Internal - Cu Availability Study

Final Measurements of Pore Water

Test Type: Eohaustorius 10-day Termination Day (16May11)

$N \times 1.22$

[illegible]

QC Check: MM 6/6/2011

Ech - 10 day - day 10

~~6/1/2017~~
me

Client: Internal - Cu Availability Study

Final Measurements of Overlying Water

Test Type: Sediment Toxicity Exposure

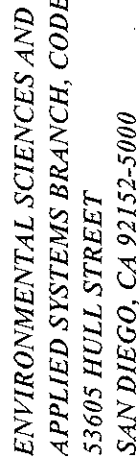
$$N \times 1.22$$
[illegible]

llc 6/16/2011

Nevertheless - 28 day - day 28

Appendix D

Chain-of-Custody Forms



Chain of Custody Record

Date: 4/29/2011

Page 1 of 1

Systems Center
San Diego

[illegible]

Appendix E
Glossary of Qualifier Codes

Glossary of Qualifier Codes:

- Q1 – pH out of recommended range; refer to CAR
- Q2 – Temperatures out of recommended range; corrective action taken and recorded in Test Temperature Correction Log
- Q3 – Temperatures out of recommended range; no action taken, test terminated same day
- Q4 – Sample aerated prior to initiation or renewal
- Q5 – Salinity out of recommended range; refer to QA section of report
- Q6 – Spilled test chamber/ Lost test animal
- Q7 – Instrumentation Error/Failure; refer to CAR
- Q8 – Inadequate sample volume, 50% renewal performed
- Q9 – Inadequate sample volume, no renewal performed
- Q10 – Sample out of holding time; refer to QA section of report
- Q11 – Refer to QA section of report for explanation
- Q12 – Supplemental information is footnoted
- Q13 – Test initiated with an incorrect number of test organisms
- Q14 – Replicate(s) not initiated; excluded from data analysis
- Q15 – Survival counts not recorded due to poor visibility or heavy debris
- Q16 – Test aerated due to dissolved oxygen levels dropping below 4.0 mg/L
- Q17 – Test initiated with aeration due to an anticipated drop in dissolved oxygen
- Q18 – Airline obstructed or fell out of replicate and replaced, drop in dissolved oxygen occurred
- Q19 – Animals out of appropriate age range at test initiation
- Q20 – Readings not taken, tech error
- Q21 – Organisms in replicate not counted, tech error
- Q22 – Dissolved oxygen above recommended range, but remained within the 100% $\pm 10\%$ saturation requirement