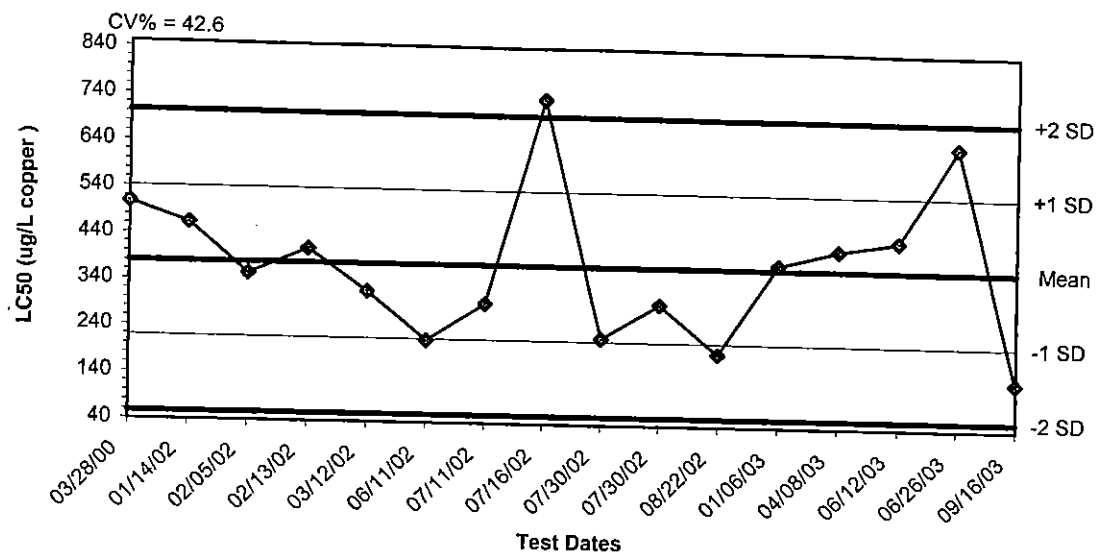


Appendix C

Reference Toxicant Test Data and Statistical Summaries

***Atherinops affinis* 96 h Survival**

Reference Toxicant Control Chart - *Atherinops affinis* 96 h Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/28/00	507.0420	380.0200	218.0215	56.0229	542.0185	704.0171
01/14/02	464.0476	380.0200	218.0215	56.0229	542.0185	704.0171
02/05/02	354.8769	380.0200	218.0215	56.0229	542.0185	704.0171
02/13/02	409.8121	380.0200	218.0215	56.0229	542.0185	704.0171
03/12/02	319.1384	380.0200	218.0215	56.0229	542.0185	704.0171
06/11/02	215.5209	380.0200	218.0215	56.0229	542.0185	704.0171
07/11/02	296.4516	380.0200	218.0215	56.0229	542.0185	704.0171
07/16/02	740.2548	380.0200	218.0215	56.0229	542.0185	704.0171
07/30/02	225.1942	380.0200	218.0215	56.0229	542.0185	704.0171
07/30/02	300.2589	380.0200	218.0215	56.0229	542.0185	704.0171
08/22/02	195.9181	380.0200	218.0215	56.0229	542.0185	704.0171
01/06/03	389.8256	380.0200	218.0215	56.0229	542.0185	704.0171
04/08/03	423.7291	380.0200	218.0215	56.0229	542.0185	704.0171
06/12/03	444.7705	380.0200	218.0215	56.0229	542.0185	704.0171
06/26/03	652.1158	380.0200	218.0215	56.0229	542.0185	704.0171
09/16/03	141.3636	380.0200	218.0215	56.0229	542.0185	704.0171

Acute Fish Test-96 Hr Survival

Start Date: 6/12/03	Test ID: RA061203AA	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/16/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/12/03	Protocol: EPAF 93-EPA Acute	Test Species: AA-Atherinops affinis
Comments:		

Conc-ug/L	1	2	3	4
D-Control	0.8000	1.0000	1.0000	0.8000
50	1.0000	0.8000	0.6000	0.8000
100	0.6000	0.4000	1.0000	1.0000
200	0.6000	0.8000	0.8000	0.8000
400	0.8000	0.6000	0.4000	1.0000
800	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%	N				
D-Control	0.9000	1.0000	1.2262	1.1071	1.3453	11.212	4			2	20
50	0.8000	0.8889	1.1114	0.8861	1.3453	16.874	4	15.00	10.00	4	20
100	0.7500	0.8333	1.0653	0.6847	1.3453	31.308	4	16.00	10.00	5	20
200	0.7500	0.8333	1.0519	0.8861	1.1071	10.508	4	13.00	10.00	5	20
400	0.7000	0.7778	1.0058	0.6847	1.3453	28.293	4	14.00	10.00	6	20
*800	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20

Auxiliary Tests

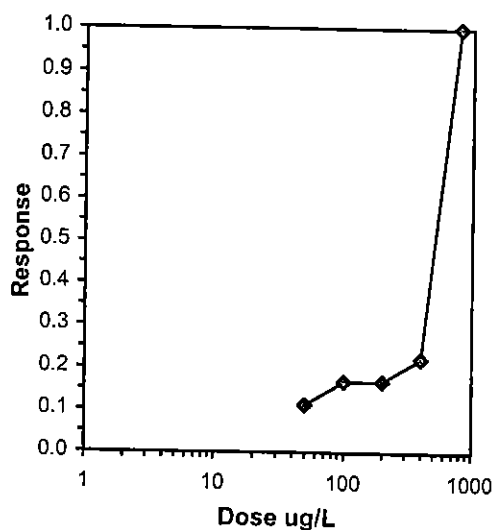
	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.97049	0.884	-0.1102	-0.1733
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)

	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	400	800	565.685	

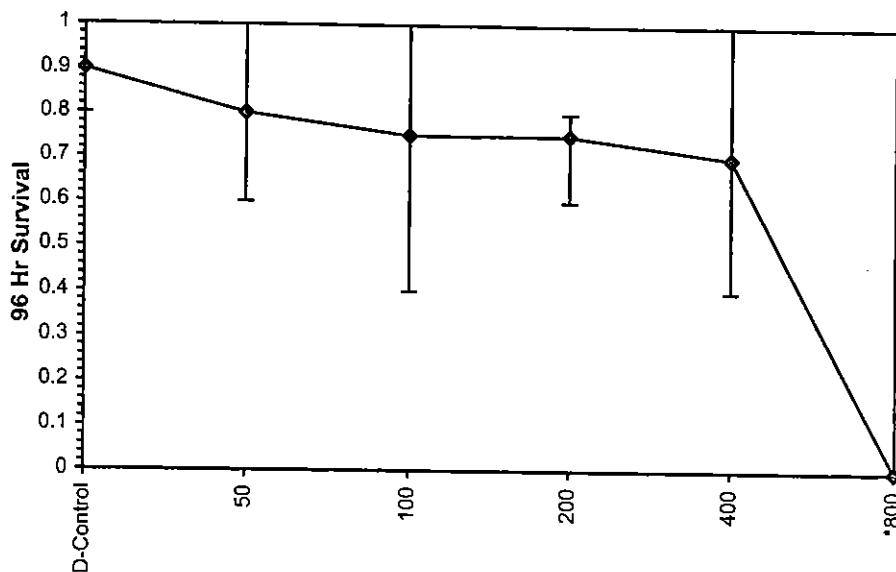
Trimmed Spearman-Kärber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%	509.92	398.39	652.68
Auto-11.1%	444.77	338.26	584.83



Acute Fish Test-96 Hr Survival				
Start Date: 6/12/03	Test ID: RA061203AA	Sample ID:	REF-REFERENCE TOXICANT	
End Date: 6/16/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride	
Sample Date: 6/12/03	Protocol: EPAF 93-EPA Acute	Test Species:	AA-Atherinops affinis	
Comments:				

Dose-Response Plot



AMEC Earth & Environmental

Northwest Bioassay Lab

5009 Pacific Hwy. E., Suite 2

Fife, WA 98424

Client: Reference Toxicant
 Sample ID: 800 µg/L CuCl₂
 Contact: _____
 Test #: RA061203AA

96 Hour Toxicity Test Data Sheet

Saltwater 96-hr Acute with Renewal

Start Date & Time: 6/12/03 1130
 End Date & Time: 6/16/03 11:15
 Test Organism: Atheinops affinis
 Test Protocol: _____

Sample Conc. or % µg/L	D.O. (mg/L)						pH (mg/L)					
	Init.						Fin.					
	0	24	48	48	72	96	0	24	48	48	72	96
CON	7.0	7.4	6.6	7.0	7.2	6.5	8.37	8.14	8.10	8.35	8.15	8.09
50	7.0	7.2	6.5	6.9	6.7	6.6	8.37	8.16	8.10	8.44	8.08	8.10
100	6.9	7.1	6.6	7.2	7.3	6.6	8.38	8.17	8.10	8.45	8.16	8.16
200	7.0	7.3	6.8	7.5	7.3	6.7	8.39	8.19	8.09	8.44	8.18	8.11
400	7.0	7.4	6.7	7.0	7.2	6.6	8.39	8.19	8.11	8.44	8.18	8.12
800	7.0	7.6	6.5	7.2	✓	✓	8.39	8.20	8.11	8.44	✓	✓

Sample Conc. or % µg/L	Salinity ppt				Test Temperature (°C)					
	Init.				Fin.					
	0	48	48	96	0	24	48	48	72	96
CON	29.5	30.0	30.5	30.9	19.8	19.5	20.2	19.3	19.9	19.1
50	29.5	30.2	29.8	30.7	19.8	19.7	20.2	19.6	20.0	19.3
100	29.5	30.1	29.9	30.7	20.0	19.6	20.2	19.6	19.9	19.7
200	29.5	30.6	29.9	30.5	20.2	19.6	20.2	19.0	19.8	19.3
400	29.5	30.0	29.9	30.3	19.9	19.5	20.2	19.0	19.9	19.5
800	29.4	30.0	29.9	✓	20.0	19.5	20.2	19.2	✓	✓

Conc.	Alkalinity* (mg/L as CaCO ₃)	Chlorine Resid. (mg/L)	Ammonia (mg/L)
control	164	—	—
highest conc.	—	—	—

Sample Description: _____

Comments: _____

Analysts: SM, ME, et

µg/L Sample Conc. or %	Rep #	Cont #	Number of Live Organisms				
			0	24	48	72	96
			0	24	48	72	96
CON	1	3	5	5	5	4	4
	2	9	5	5	5	5	5
	3	15	5	5	5	5	5
	4	8	5	5	5	4	4
50	1	10	5	5	5	5	5
	2	22	5	5	5	5	4
	3	12	5	5	4	3	3
	4	23	5	5	5	5	4
100	1	6	5	5	4	3	3
	2	4	5	5	2	2	2
	3	20	5	5	5	5	5
	4	16	5	5	5	5	5
200	1	5	5	5	4	4	3
	2	19	5	5	5	5	4
	3	11	5	5	4	4	4
	4	14	5	5	5	5	4
400	1	13	5	4	4	4	4
	2	17	5	4	3	3	3
	3	18	5	4	3	3	2
	4	21	5	5	5	5	5
800	1	7	5	0	—	—	—
	2	1	5	0	—	—	—
	3	2	5	1	0	—	—
	4	24	5	0	—	—	—
Tech. Initials			SM	et	ME	NF	et

Animal Source: ABS
 Date Received: 6/10/03
 Date of Hatch: 5/30/03

Acute Fish Test-96 Hr Survival

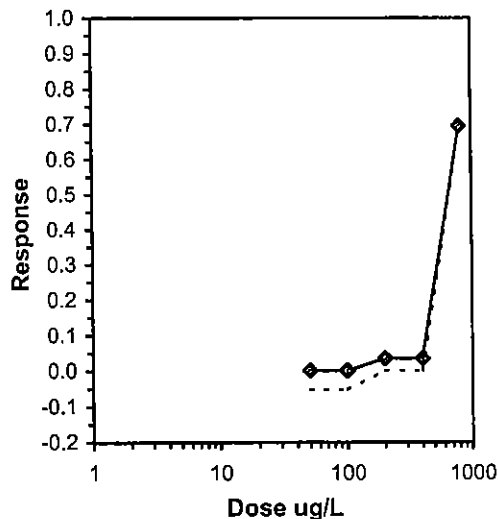
Start Date: 6/26/03	Test ID: RA062603AA	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/30/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/26/03	Protocol: EPA 02-EPA Acute	Test Species: AA-Atherinops affinis
Comments:		

Conc-ug/L	1	2	3	4
D-Control	1.0000	0.8000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000
200	1.0000	1.0000	0.8000	1.0000
400	1.0000	1.0000	1.0000	0.8000
800	0.2000	0.2000	0.4000	0.4000

Conc-ug/L	Transform: Arcsin Square Root							Rank Sum	1-Tailed Critical	Number Resp	Total Number
	Mean	N-Mean	Mean	Min	Max	CV%	N				
D-Control	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4			1	20
50	1.0000	1.0526	1.3453	1.3453	1.3453	0.000	4	20.00	10.00	0	20
100	1.0000	1.0526	1.3453	1.3453	1.3453	0.000	4	20.00	10.00	0	20
200	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4	18.00	10.00	1	20
400	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4	18.00	10.00	1	20
*800	0.3000	0.3158	0.5742	0.4636	0.6847	22.229	4	10.00	10.00	14	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.81627	0.884	-1.0722	0.17416
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	400	800	565.685	

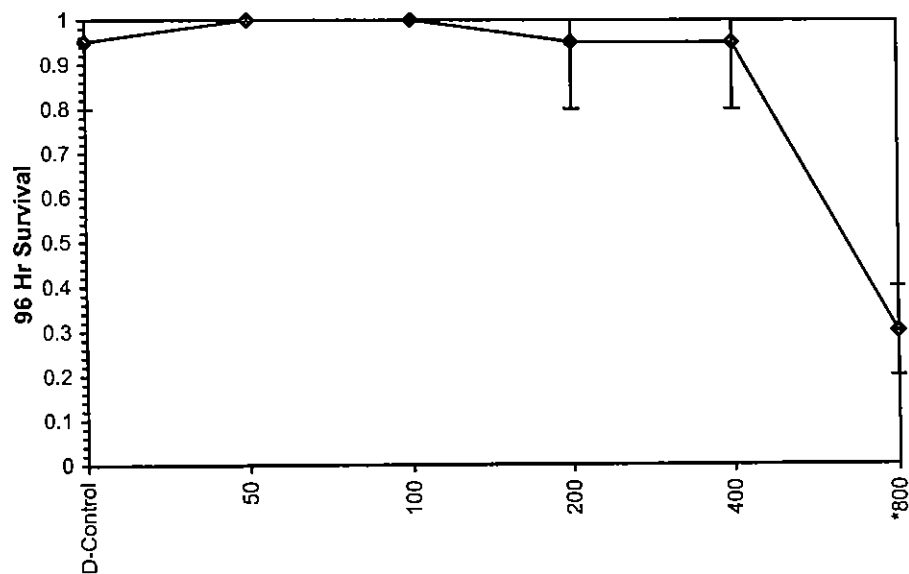
Trimmed Spearman-Kärber			
Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%			
Auto-30.5%	652.12	558.87	760.91



Acute Fish Test-96 Hr Survival

Start Date: 6/26/03	Test ID: RA062603AA	Sample ID:	REF-REFERENCE TOXICANT
End Date: 6/30/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 6/26/03	Protocol: EPA 02-EPA Acute	Test Species:	AA-Atherinops affinis
Comments:			

Dose-Response Plot



AMEC Earth & Environmental
Northwest Bioassay Lab
 5009 Pacific Hwy. E., Suite 2
 Fife, WA 98424

Client: Reference Toxicant
 Sample ID: 800 µg/L CuCl₂
 Contact: _____
 Test #: RA062603AA

96 Hour Toxicity Test Data Sheet
 Saltwater 96-hr Acute with Renewal

Start Date & Time: 6/26/03 14:45
 End Date & Time: 6/30/03 14:15
 Test Organism: Atherinops affinis
 Test Protocol: _____

Sample Conc. or % µg/L	D.O. (mg/L)						pH (mg/L)					
	Init.		Fin.	Init.		Fin.	Init.		Fin.	Init.		Fin.
	0	24	48	48	72	96	0	24	48	48	72	96
CON	6.8	7.3	6.5	7.0	7.5	6.7	8.35	8.29	8.16	8.20	8.21	8.10
50	6.7	7.5	6.2	7.1	7.5	6.6	8.36	8.31	8.18	8.24	8.22	8.12
100	6.7	7.6	6.4	6.8	7.3	6.6	8.37	8.32	8.18	8.20	8.23	8.16
200	6.7	7.5	6.5	6.8	7.5	6.5	8.38	8.33	8.19	8.27	8.26	8.13
400	6.7	7.6	6.3	6.8	7.4	6.5	8.39	8.33	8.21	8.25	8.24	8.14
800	6.7	7.5	6.5	6.7	7.4	6.6	8.39	8.33	8.21	8.26	8.26	8.16

Sample Conc. or % µg/L	Salinity ppt				Test Temperature (°C)					
	Init.	Fin.	Init.	Fin.	Init.		Fin.	Init.		Fin.
	0	48	48	96	0	24	48	48	72	96
CON	29.1	29.3	29.0	29.2	20.1		20.1	20.0	19.6	20.3
50	29.1	29.5	29.0	29.4	20.1		20.0	19.9	19.4	20.0
100	29.2	29.3	29.2	29.0	20.0		20.0	19.9	19.7	20.4
200	29.0	29.3	29.1	29.1	19.8		20.0	19.8	19.6	20.3
400	29.1	29.4	29.0	29.3	20.1		20.0	20.1	19.7	20.6
800	29.1	29.3	29.0	29.0	20.1		20.0	20.0	19.8	20.2

	Alkalinity*	Chlorine Resid.	Ammonia
Conc.	*(mg/L as CaCO ₃)	(mg/L)	(mg/L)
control	148		
highest conc.			

Sample Description: _____

Comments: _____

Analysts: et

µg/L Sample Conc. or %	Rep #	Cont #	Number of Live Organisms				
			0	24	48	72	96
CON	1	12	5	5	5	5	5
	2	21	5	4	4	5	4
	3	11	5	5	5	5	5
	4	2	5	5	5	5	5
50	1	20	5	5	5	5	5
	2	19	5	5	5	5	5
	3	9	5	5	5	5	5
	4	8	5	5	5	5	5
100	1	16	5	5	5	5	5
	2	14	5	5	5	5	5
	3	1	5	5	5	5	5
	4	24	5	5	5	5	5
200	1	5	5	5	5	5	5
	2	23	5	5	5	5	5
	3	18	5	5	4	4	4
	4	15	5	5	5	5	5
400	1	4	5	5	5	5	5
	2	17	5	5	5	5	5
	3	10	5	5	5	5	5
	4	13	5	4	4	4	4
800	1	22	5	1	1	1	1
	2	7	5	1	1	1	1
	3	3	5	2	2	2	2
	4	6	5	2	2	2	2
Tech. Initials			et	SM	mm	mm	et

Animal Source: ABS
 Date Received: 6/24/03
 Date of Hatch: 6/14/03

Acute Fish Test-96 Hr Survival

Start Date: 9/16/03	Test ID: RA091303AA	Sample ID: REF-REFERENCE TOXICANT
End Date: 9/20/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 9/16/03	Protocol: EPA 02-EPA Acute	Test Species: AA-Atherinops affinis

Comments:

Conc-ug/L	1	2	3	4
D-Control	0.8000	1.0000	1.0000	1.0000
50	0.8000	0.6000	1.0000	1.0000
100	0.8000	0.6000	1.0000	0.8000
200	0.2000	0.0000	0.2000	0.0000
400	0.0000	0.0000	0.0000	0.0000
800	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%	N				
D-Control	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4			1	20
50	0.8500	0.8947	1.1709	0.8861	1.3453	18.840	4	15.50	10.00	3	20
100	0.8000	0.8421	1.1114	0.8861	1.3453	16.874	4	13.50	10.00	4	20
*200	0.1000	0.1053	0.3446	0.2255	0.4636	39.900	4	10.00	10.00	18	20
*400	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20
*800	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	4	10.00	10.00	20	20

Auxiliary Tests

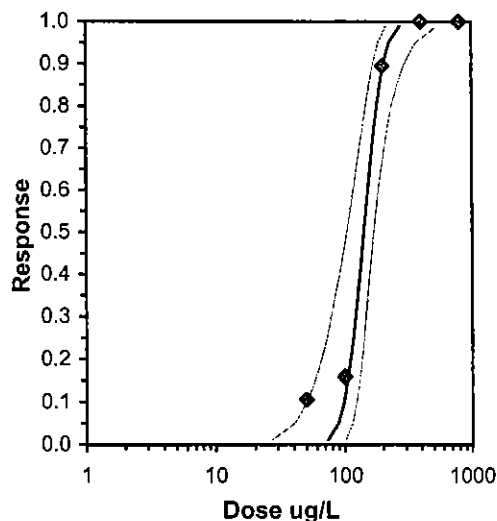
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$) Statistic: 0.93963 Critical: 0.884 Skew: -0.4154 Kurt: 0.42008

Equality of variance cannot be confirmed

Hypothesis Test (1-tail, 0.05)

Steel's Many-One Rank Test NOEC: 100 LOEC: 200 ChV: 141.421 TU:

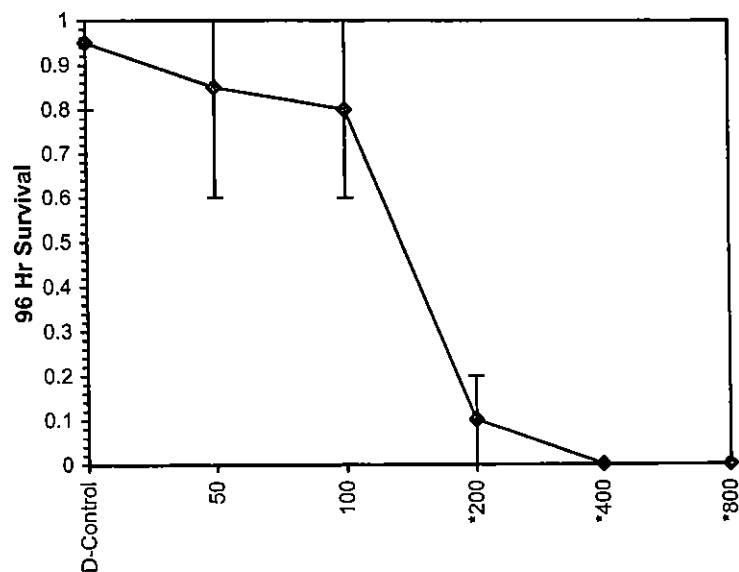
Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.11354	2.26517	3.67381	12.5533	0.05	0.55813	7.81472	0.91	2.15034	0.12325	6
Intercept	-12.447	4.98032	-22.208	-2.6854							
TSCR	0.09989	0.04749	0.0068	0.19298							
Point	Probits	ug/L	95% Fiducial Limits								
EC01	2.674	73.0489	26.905	100.501							
EC05	3.355	88.6356	40.7855	115.156							
EC10	3.718	98.2619	50.7614	124.191							
EC15	3.964	105.341	58.7244	130.934							
EC20	4.158	111.329	65.8322	136.766							
EC25	4.326	116.736	72.5059	142.184							
EC40	4.747	131.556	91.6576	158.211							
EC50	5.000	141.364	104.555	170.296							
EC60	5.253	151.902	118.021	185.239							
EC75	5.674	171.186	140.127	219.457							
EC80	5.842	179.501	148.435	237.215							
EC85	6.036	189.705	157.726	261.41							
EC90	6.282	203.371	168.923	297.702							
EC95	6.645	225.459	184.943	364.975							
EC99	7.326	273.566	214.983	545.364							



Acute Fish Test-96 Hr Survival

Start Date: 9/16/03	Test ID: RA091303AA	Sample ID:	REF-REFERENCE TOXICANT
End Date: 9/20/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 9/16/03	Protocol: EPA 02-EPA Acute	Test Species:	AA-Atherinops affinis
Comments:			

Dose-Response Plot



AMEC Earth & Environmental
Northwest Bioassay Lab
 5009 Pacific Hwy. E., Suite 2
 Fife, WA 98424

96 Hour Toxicity Test Data Sheet
 Saltwater 96-hr Acute with Renewal

Client: Reference Toxicant
 Sample ID: 800 µg/L CuCl₂
 Contact: _____
 Test #: RA091303AA

Start Date & Time: 9/16/03 1430
 End Date & Time: 9/20/03 1400
 Test Organism: A. affinis
 Test Protocol: _____

Sample Conc. or % µg/L	D.O. (mg/L)						pH (mg/L)					
	Init.			Fin.			Init.			Fin.		
	0	24	48	48	72	96	0	24	48	48	72	96
CON	6.8	7.1	6.5	6.8	6.5	5.9	8.42	8.27	8.10	8.26	8.15	8.03
50	6.7	7.0	6.6	6.8	6.6	6.2	8.43	8.27	8.13	8.29	8.21	8.07
100	6.7	7.0	7.0	6.9	6.6	6.0	8.44	8.27	8.14	8.29	8.20	8.12
200	6.7	7.0	6.6	6.7	6.7	6.6	8.44	8.27	8.17	8.30	8.20	8.15
400	6.7	6.9					8.44	8.28				
800	6.8	7.0					8.44	8.27				

Sample Conc. or % µg/L	Salinity ppt				Test Temperature (°C)					
	Init.		Fin.		Init.		Fin.		Init.	
	0	48	48	96	0	24	48	48	72	96
CON	29.3	30.1	29.9	30.3	19.0	20.2	19.8	20.3	19.8	19.9
50	29.4	30.5	29.9	30.5	19.2	20.1	19.7	20.1	19.7	19.9
100	29.4	30.8	29.9	30.0	19.4	20.0	19.8	20.0	19.8	20.0
200	29.4	30.4	29.9	30.6	19.0	20.5	19.8	20.1	20.1	20.0
400	29.4				19.3	20.6				
800	29.4				19.5	20.3				

Conc.	Alkalinity* (mg/L as CaCO ₃)	Chlorine Resid. (mg/L)	Ammonia (mg/L)
control	184	—	—
highest conc.	—	—	—

Sample Description: _____

Comments: Fed @ 48 hours.

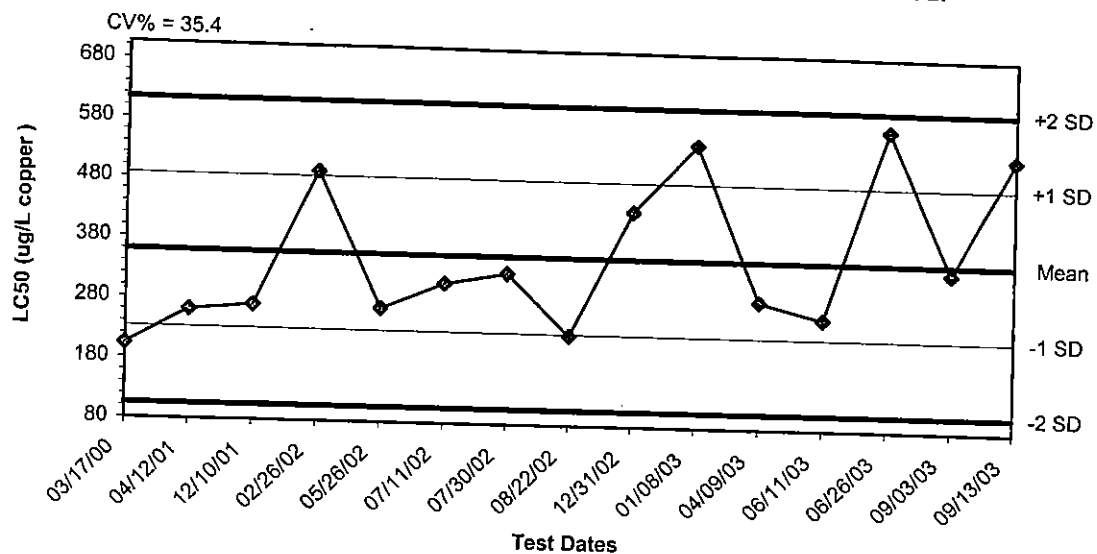
Analysts: SM ET

µg/L Sample Conc. or %	Rep #	Cont #	Number of Live Organisms				
			0	24	48	72	96
CON	1	20	5	5	5	5	4
	2	4	5	5	5	5	5
	3	13	5	5	5	5	5
	4	15	5	5	5	5	5
50	1	22	5	5	4	4	4
	2	11	5	5	4	3	3
	3	24	5	5	5	5	5
	4	9	5	5	5	5	5
100	1	8	5	5	4	4	4
	2	2	5	4	3	3	3
	3	16	5	5	5	5	5
	4	3	5	4	4	4	4
200	1	7	5	1	1	1	1
	2	12	5	0			
	3	23	5	1	1	1	1
	4	17	5	0			
400	1	14	5	0			
	2	21	5	0			
	3	5	5	0			
	4	10	5	0			
800	1	1	5	0			
	2	18	5	0			
	3	6	5	0			
	4	19	5	0			
Tech. Initials			SM	ET	ET	ET	ET

Animal Source: ABS
 Date Received: 9/12/03
 Date of Hatch: 9/4/03

***Mysidopsis bahia* 48 h Survival**

Reference Toxicant Control Chart - Mysidopsis bahia 48 h Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/17/00	203.5511	359.2728	231.9118	104.5508	486.6338	613.9948
04/12/01	261.1384	359.2728	231.9118	104.5508	486.6338	613.9948
12/10/01	270.4387	359.2728	231.9118	104.5508	486.6338	613.9948
02/26/02	494.4123	359.2728	231.9118	104.5508	486.6338	613.9948
05/26/02	268.9830	359.2728	231.9118	104.5508	486.6338	613.9948
07/11/02	312.2571	359.2728	231.9118	104.5508	486.6338	613.9948
07/30/02	331.4830	359.2728	231.9118	104.5508	486.6338	613.9948
08/22/02	230.3339	359.2728	231.9118	104.5508	486.6338	613.9948
12/31/02	438.4654	359.2728	231.9118	104.5508	486.6338	613.9948
01/08/03	552.6631	359.2728	231.9118	104.5508	486.6338	613.9948
04/09/03	292.8791	359.2728	231.9118	104.5508	486.6338	613.9948
06/11/03	265.7755	359.2728	231.9118	104.5508	486.6338	613.9948
06/26/03	583.8233	359.2728	231.9118	104.5508	486.6338	613.9948
09/03/03	345.1397	359.2728	231.9118	104.5508	486.6338	613.9948
09/13/03	537.7488	359.2728	231.9118	104.5508	486.6338	613.9948

Mysid Acute-48 Hr Survival

Start Date: 6/11/03	Test ID: RA061103MY	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/13/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/11/03	Protocol: EPAF 93-EPA Acute	Test Species: MY-Mysidopsis bahia
Comments:		

Conc-ug/L	1	2	3	4
D-Control	1.0000	1.0000	1.0000	0.8000
50	1.0000	0.8000	0.8000	0.8000
100	1.0000	0.8000	0.6000	1.0000
200	0.2000	0.6000	0.4000	0.6000
400	0.4000	0.2000	0.2000	0.4000
800	0.2000	0.2000	0.2000	0.4000

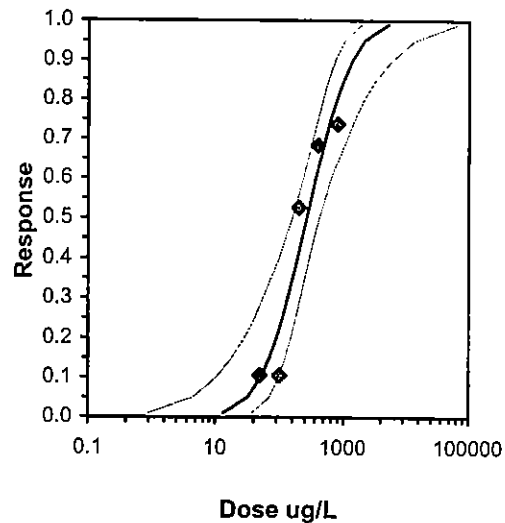
Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Number Resp	Total Number
			Mean	Min	Max	CV%	N					
D-Control	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4				1	20
50	0.8500	0.8947	1.1667	1.1071	1.3453	10.206	4	1.079	2.410	0.2659	3	20
100	0.8500	0.8947	1.1709	0.8861	1.3453	18.840	4	1.040	2.410	0.2659	3	20
*200	0.4500	0.4737	0.7301	0.4636	0.8861	27.587	4	5.035	2.410	0.2659	11	20
*400	0.3000	0.3158	0.5742	0.4636	0.6847	22.229	4	6.449	2.410	0.2659	14	20
*800	0.2500	0.2632	0.5189	0.4636	0.6847	21.301	4	6.950	2.410	0.2659	15	20

Auxiliary Tests

Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					Statistic	Critical		Skew	Kurt	
Bartlett's Test indicates equal variances (p = 0.76)					0.91359	0.884		-0.3635	-0.6099	
					2.57728	15.0863				
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	200	141.421		0.19499	0.21174	0.45857	0.02435	1.4E-06	5, 18

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	1.7937	0.42304	0.96454	2.62285	0.05	3.07997	7.81472	0.38	2.42451	0.55751	4
Intercept	0.65116	1.02331	-1.3545	2.65684							
TSCR	0.04646	0.04619	-0.0441	0.137							
Point	Probits	ug/L	95% Fiducial Limits								
EC01	2.674	13.414	0.90397	37.6556							
EC05	3.355	32.1733	4.49012	70.1623							
EC10	3.718	51.2908	10.4595	98.6333							
EC15	3.964	70.2578	18.3808	124.955							
EC20	4.158	90.2203	28.5885	151.766							
EC25	4.326	111.81	41.4737	180.548							
EC40	4.747	191.987	100.484	294.755							
EC50	5.000	265.776	160.176	422.875							
EC60	5.253	367.924	237.575	652.02							
EC75	5.674	631.755	400.658	1529.26							
EC80	5.842	782.935	479.715	2204.29							
EC85	6.036	1005.39	585.566	3411.34							
EC90	6.282	1377.18	744.799	5970.98							
EC95	6.645	2195.5	1050.59	13861.9							
EC99	7.326	5265.91	1963.28	68652							



Mysid Acute-48 Hr Survival

Start Date: 6/11/03

Test ID: RA061103MY

Sample ID:

REF-REFERENCE TOXICANT

End Date: 6/13/03

Lab ID: WAAEE-AMEC NW Bioassay

Sample Type:

CUCL-Copper chloride

Sample Date: 6/11/03

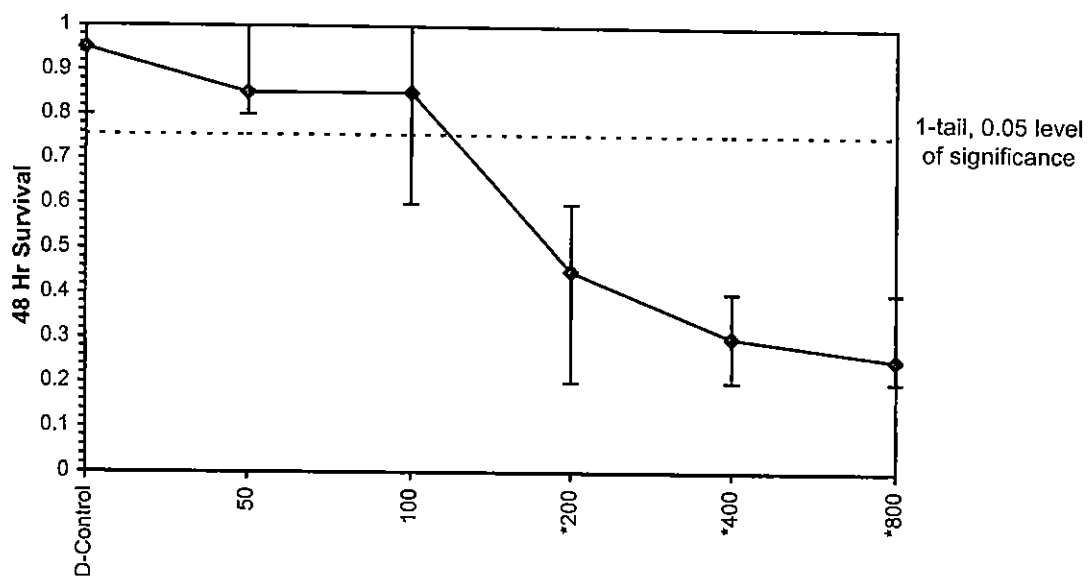
Protocol: EPAF 93-EPA Acute

Test Species:

MY-Mysidopsis bahia

Comments:

Dose-Response Plot



**Saltwater Acute
48 Hour Toxicity Test Data Sheet**
AMEC Earth & Environmental - NW Bioassay Lab

Client: Reference Toxicant
Sample ID: 800 µg/L CuCl₂
Contact: _____
Test #: RA061103MY

Start Date & Time: 6/11/03 1400
End Date & Time: 6/13/03 1400
Test Organisms: Mysidopsis bahia
Test Protocol: _____

Conc. or µg/L %	Rep #	Cont. #	Number of Live Organisms			Dissolved Oxygen (mg/L)				pH (units)				Salinity (ppt)				Temperature (°C)				Mean Percent Survival
			0	24	48	0	Fin.	Init.	48	0	Fin.	Init.	48	0	Fin.	Init.	48	0	Fin.	Init.	48	
CON	1	22	5	5	5	6.8	6.2	7.0	5.9	8.39	8.20	8.31	8.17	29.2	29.9	29.5	30.2	26.0	26.8	26.4	25.5	95%
	2	15	5	5	5																	
	3	16	5	5	5																	
	4	16	5	4	4																	
50	1	18	5	5	5	6.8	6.0	7.0	5.6	8.40	8.18	8.37	8.17	29.4	30.0	29.5	30.6	26.2	26.9	26.4	25.8	85%
	2	20	5	5	4																	
	3	19	5	5	4																	
	4	12	5	5	4																	
100	1	1	5	5	5	6.8	6.0	6.9	5.9	8.40	8.19	8.38	8.15	29.4	30.2	29.5	31.0	27.0	26.7	26.0	25.6	85%
	2	24	5	5	4																	
	3	3	5	5	3																	
	4	11	5	5	5																	
200	1	5	5	4	1	6.8	6.1	7.0	5.8	8.40	8.20	8.39	8.17	29.4	30.2	29.5	30.5	26.8	26.5	26.2	25.5	45%
	2	7	5	5	3																	
	3	14	5	5	2																	
	4	4	5	5	3																	
400	1	2	5	4	2	6.8	6.0	7.0	5.8	8.41	8.20	8.39	8.18	29.4	30.5	29.5	30.1	26.0	26.6	26.0	25.4	30%
	2	17	5	5	1																	
	3	10	5	3	1																	
	4	23	5	5	2																	
800	1	9	5	4	1	6.8	6.0	7.0	5.8	8.40	8.21	8.39	8.17	29.3	30.1	29.4	30.6	25.5	26.8	25.8	25.4	25%
	2	21	5	4	1																	
	3	8	5	3	1																	
	4	13	5	4	2																	

Technician Initials			SM	SM	SM
Conc.	Alkalinity* (mg/L as CaCO ₃)	Chlorine (mg/L)	Ammonia (mg/L)		
control	184	—	—		
highest conc.	—	—	—		

Sample Description: _____

Analyst Initials: SM

Comments: 0 hrs: Animal Source: ABS Date Received 6/10/03 Date Hatched: 6/7/03
24 hrs: Fed @ 0830.
48 hrs: _____

Reviewed: RO

QA check: RO

AMEC Northwest Bioassay Lab
5009 Pacific Hwy. E. Suite 2
Fife, WA 98424
(253) 922-4296

Mysid Acute-48 Hr Survival

Start Date: 6/26/03	Test ID: RA062603MY	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/28/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/26/03	Protocol: EPA 02-EPA Acute	Test Species: MY-Mysidopsis bahia

Comments:

Conc-ug/L	1	2	3	4
D-Control	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000
200	0.8000	1.0000	0.8000	1.0000
400	0.4000	0.6000	0.2000	0.6000
800	0.6000	0.6000	0.6000	0.2000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%	N				
D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			0	20
50	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
100	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
200	0.9000	0.9000	1.2262	1.1071	1.3453	11.212	4	14.00	10.00	2	20
*400	0.4500	0.4500	0.7301	0.4636	0.8861	27.587	4	10.00	10.00	11	20
*800	0.5000	0.5000	0.7805	0.4636	0.8861	27.063	4	10.00	10.00	10	20

Auxiliary Tests

Shapiro-Wilk's Test indicates non-normal distribution ($p \leq 0.01$) Statistic: 0.83816 Critical: 0.884 Skew: -1.1904 Kurt: 1.92063

Equality of variance cannot be confirmed

Hypothesis Test (1-tail, 0.05)

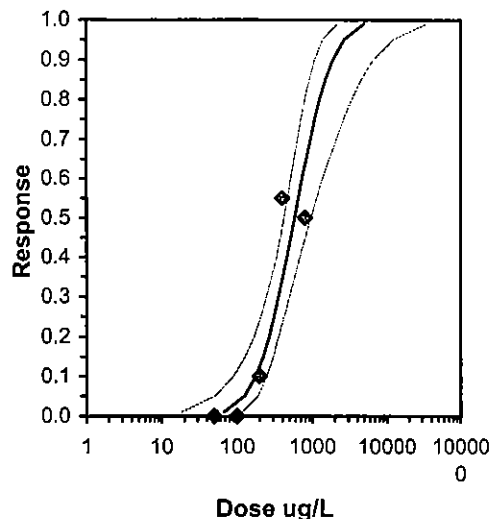
Steel's Many-One Rank Test NOEC: 200 LOEC: 400 ChV: 282.843 TU:

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	2.48297	0.53753	1.42941	3.53653	0	6.1529	7.81472	0.1	2.76628	0.40274	5
Intercept	-1.8686	1.39165	-4.5962	0.85905							

TSCR

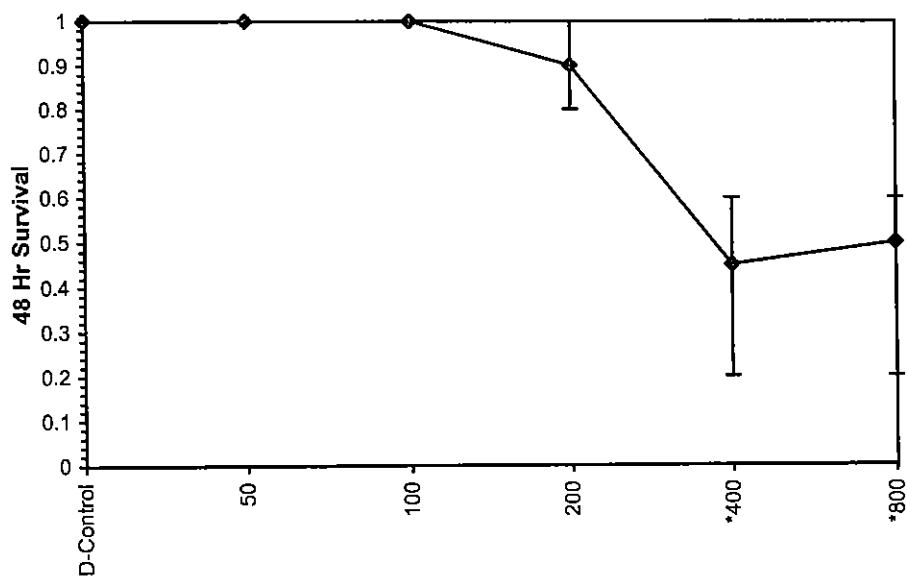
Point	Probits	ug/L	95% Fiducial Limits	
EC01	2.674	67.5088	18.0509	119.368
EC05	3.355	127.007	52.4098	192.063
EC10	3.718	177.887	91.0219	251.537
EC15	3.964	223.288	130.248	306.033
EC20	4.158	267.5	170.756	362.691
EC25	4.326	312.345	212.314	425.713
EC40	4.747	461.581	339.683	689.815
EC50	5.000	583.823	428.154	970.696
EC60	5.253	738.44	526.526	1400.04
EC75	5.674	1091.26	721.104	2650.16
EC80	5.842	1274.2	812.345	3433.3
EC85	6.036	1526.5	931.099	4654.04
EC90	6.282	1916.1	1102.55	6842.56
EC95	6.645	2683.71	1411.28	12158.9
EC99	7.326	5048.97	2227.3	35991.4



Mysid Acute-48 Hr Survival

Start Date: 6/26/03	Test ID: RA062603MY	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/28/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/26/03	Protocol: EPA 02-EPA Acute	Test Species: MY-Mysidopsis bahia
Comments:		

Dose-Response Plot



Saltwater Acute
48 Hour Toxicity Test Data Sheet
AMEC Earth & Environmental - NW Bioassay Lab

Client: Reference Toxicant
 Sample ID: 800 µg/L CuCl₂
 Contact: _____
 Test #: RA062603MY

Start Date & Time: 6/26/03 14:00
 End Date & Time: 6/28/03 15:00
 Test Organisms: Mysidopsis bahia
 Test Protocol: _____

Conc. or µg/L %	Rep #	Cont. #	Number of Live Organisms			Dissolved Oxygen (mg/L)				pH (units)				Salinity (ppt)				Temperature (°C)				Mean Percent Survival
CON	1	3	5	5	5	6.8	5.9	7.0	6.5	8.35	8.28	8.35	8.30	29.1	29.4	29.9	29.7	25.5	25.5	26.8	25.7	100%
	2	23	5	5	5											29.0						
	3	17	5	5	5																	
	4	10	5	5	5																	
50	1	1	5	5	5	6.7	5.8	6.9	6.4	8.31	8.26	8.35	8.31	29.1	29.9	29.0	29.3	25.5	25.6	26.3	25.6	100%
	2	14	5	5	5																	
	3	2	5	5	5																	
	4	11	5	5	5																	
100	1	5	5	5	5	6.7	6.0	6.8	6.2	8.37	8.28	8.35	8.31	29.2	29.7	29.0	29.7	25.5	25.5	26.3	25.4	100%
	2	4	5	5	5																	
	3	8	5	5	5																	
	4	12	5	5	5																	
200	1	6	5	4	4	6.7	5.9	6.8	6.4	8.38	8.28	8.35	8.33	29.0	29.6	29.0	29.2	25.5	25.7	26.4	25.4	90%
	2	20	5	5	5																	
	3	9	5	5	4																	
	4	24	5	5	5																	
400	1	13	5	3	2	6.7	6.1	6.9	6.2	8.39	8.30	8.35	8.31	29.1	29.3	29.0	29.3	25.5	25.6	26.2	25.3	45%
	2	19	5	4	3																25.4	
	3	18	5	5	1																	
	4	21	5	5	3																	
800	1	7	5	4	3	6.7	6.1	6.9	6.4	8.39	8.31	8.34	8.33	29.1	29.3	29.0	29.5	25.5	25.6	26.2	25.4	50%
	2	16	5	4	3																	
	3	15	5	5	3																	
	4	22	5	3	1																	

Technician Initials: et sm mv

Conc.	Alkalinity* (mg/L as CaCO ₃)	Chlorine (mg/L)	Ammonia (mg/L)
control	184	—	—
highest conc.	—	—	—

Sample Description: _____

Analyst Initials: et sm

Comments: 0 hrs: Animal Source: ABS Date Received: 6/24/03 Del: 6/21/03
 24 hrs: Fed @ 0830.
 48 hrs: _____

Reviewed: KS

QA check: K

AMEC Northwest Bioassay Lab
 5009 Pacific Hwy. E., Suite 2
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Mysid Acute-48 Hr Survival

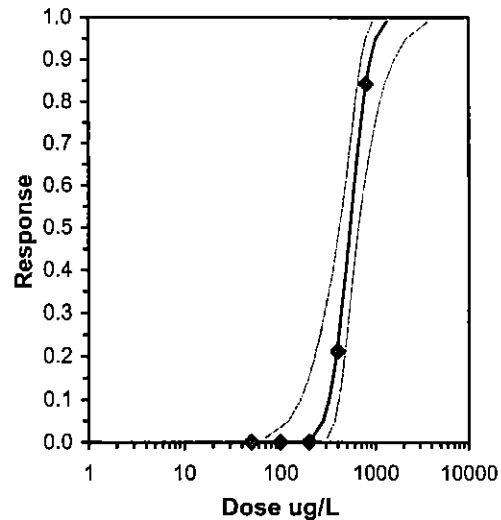
Start Date: 9/13/03	Test ID: RA091303MY	Sample ID: REF-REFERENCE TOXICANT
End Date: 9/15/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 9/13/03	Protocol: EPA 02-EPA Acute	Test Species: MY-Mysidopsis bahia
Comments:		

Conc-ug/L	1	2	3	4
D-Control	0.8000	1.0000	1.0000	1.0000
50	1.0000	1.0000	0.8000	1.0000
100	1.0000	1.0000	1.0000	1.0000
200	1.0000	0.8000	1.0000	1.0000
400	0.8000	0.8000	0.8000	0.6000
800	0.4000	0.0000	0.0000	0.2000

Conc-ug/L	Transform: Arcsin Square Root							Rank Sum	1-Tailed Critical	Number Resp	Total Number
	Mean	N-Mean	Mean	Min	Max	CV%	N				
D-Control	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4			1	20
50	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4	18.00	10.00	1	20
100	1.0000	1.0526	1.3453	1.3453	1.3453	0.000	4	20.00	10.00	0	20
200	0.9500	1.0000	1.2857	1.1071	1.3453	9.261	4	18.00	10.00	1	20
400	0.7500	0.7895	1.0519	0.8861	1.1071	10.508	4	11.50	10.00	5	20
*800	0.1500	0.1579	0.3998	0.2255	0.6847	55.174	4	10.00	10.00	17	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.77986	0.884	-0.1957	0.41246
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	400	800	565.685	

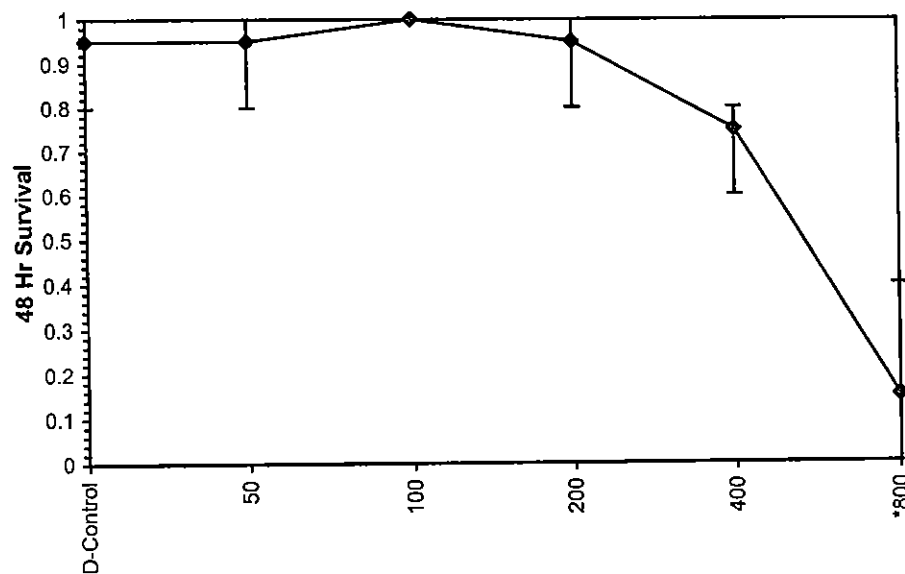
Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	5.82356	1.57698	2.73268	8.91443	0.05	0.89803	7.81472	0.83	2.73058	0.17172	4
Intercept	-10.902	4.33452	-19.397	-2.406							
TSCR	0.03557	0.02163	-0.0068	0.07795							
Point	Probits	ug/L	95% Fiducial Limits								
EC01	2.674	214.342	69.5298	309.917							
EC05	3.355	280.628	121.968	374.117							
EC10	3.718	323.978	163.889	415.341							
EC15	3.964	356.95	199.434	447.042							
EC20	4.158	385.531	232.472	475.249							
EC25	4.326	411.868	264.405	502.262							
EC40	4.747	486.492	358.707	588.596							
EC50	5.000	537.749	421.593	661.901							
EC60	5.253	594.406	484.137	761.812							
EC75	5.674	702.102	580.75	1009.68							
EC80	5.842	750.066	617.032	1142.28							
EC85	6.036	810.125	658.835	1325.71							
EC90	6.282	892.571	711.717	1607.36							
EC95	6.645	1030.45	792.706	2152.83							
EC99	7.326	1349.12	959.701	3765.48							



Mysid Acute-48 Hr Survival

Start Date: 9/13/03	Test ID: RA091303MY	Sample ID:	REF-REFERENCE TOXICANT
End Date: 9/15/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 9/13/03	Protocol: EPA 02-EPA Acute	Test Species:	MY-Mysidopsis bahia
Comments:			

Dose-Response Plot



**Saltwater Acute
48 Hour Toxicity Test Data Sheet
AMEC Earth & Environmental - NW Bioassay Lab**

Client: Reference Toxicant
Sample ID: 800 µg/L CuCl₂
Contact: _____
Test #: RA091303MY

Start Date & Time: 9/13/03 11:50
End Date & Time: 9/15/03 17:15
Test Organisms: M. bahia
Test Protocol: _____

Conc. or µg/L	Rep #	Cont. #	Number of Live Organisms			Dissolved Oxygen (mg/L)				pH (units)				Salinity (ppt)				Temperature (°C)				Mean Percent Survival
			0	24	48	0	Fin.	Init.	48	0	24	24	48	0	24	24	48	0	24	24	48	
CON	1	20	5	5	4	6.8	6.2	8.2	6.2	8.42	8.16	8.25	8.18	29.3	30.1	29.2	29.3	27.0	25.0	25.0	25.1	95%
	2	2	5	5	5																	
	3	15	5	5	5																	
	4	14	5	5	5																	
50	1	17	5	5	5	6.7	6.3	8.3	6.2	8.43	8.17	8.25	8.18	29.4	30.1	29.4	29.6	27.0	25.2	25.0	25.1	95%
	2	1	5	5	5																	
	3	4	5	5	4																	
	4	11	5	5	5																	
100	1	10	5	5	5	6.7	6.4	8.6	6.3	8.44	8.16	8.25	8.16	29.4	30.1	29.3	30.2	27.0	25.6	25.2	25.1	100%
	2	13	5	5	5																	
	3	9	5	5	5																	
	4	24	5	5	5																	
200	1	5	5	5	5	6.7	6.6	8.4	6.0	8.44	8.20	8.26	8.18	29.4	30.4	29.3	29.9	27.0	25.1	25.0	25.5	95%
	2	19	5	4	4																	
	3	12	5	5	5																	
	4	18	5	5	5																	
400	1	23	5	4	4	6.7	6.2	8.4	6.2	8.44	8.19	8.27	8.20	29.4	30.3	29.3	29.6	27.0	25.2	25.4	25.0	75%
	2	6	5	5	4																	
	3	21	5	5	4																	
	4	3	5	5	3																	
800	1	8	5	5	2	6.8	6.5	8.6	6.4	8.44	8.20	8.27	8.19	29.4	30.1	29.2	29.4	27.0	25.4	25.2	25.0	50%
	2	7	5	5	0																	
	3	16	5	4	0																	
	4	22	5	5	1																	

Technician Initials

SM MF NF

Conc.	Alkalinity* (mg/L as CaCO ₃)	Chlorine (mg/L)	Ammonia (mg/L)
control			
highest conc.			

Sample Description: _____

Analyst Initials: SM MF et

Comments: 0 hrs:
24 hrs:
48 hrs:

Animal Source: ABS Received: 9/12/03 Date Hatched: 9/9/03
Red @ 24 hrs

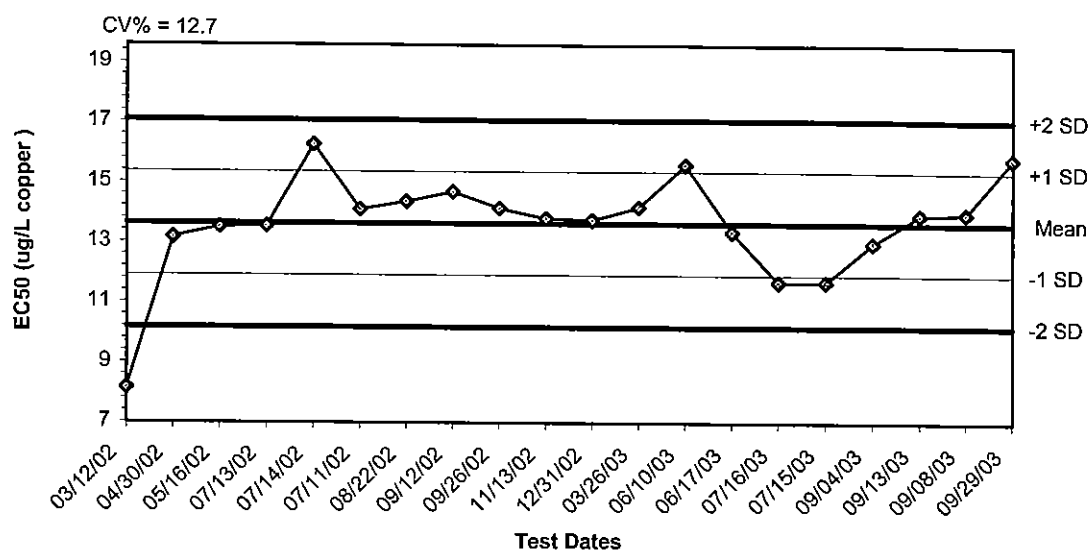
Reviewed: ✓

QA check: ✓

AMEC Northwest Bioassay Lab
5009 Pacific Hwy. E. Suite 2
Fife, WA 98424
(253) 922-4296

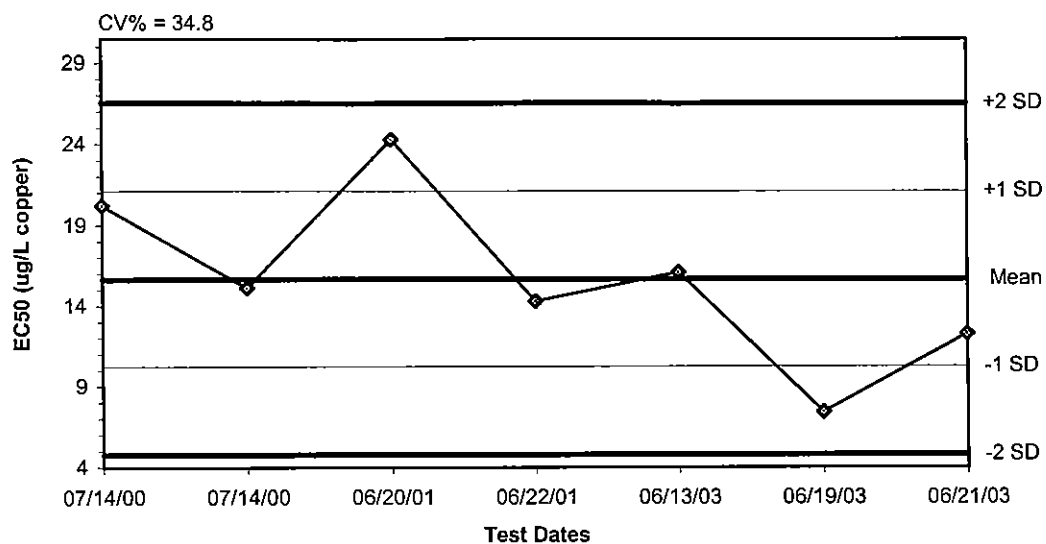
Bivalve Larval Development

Reference Toxicant Control Chart - Mussel Larval Development



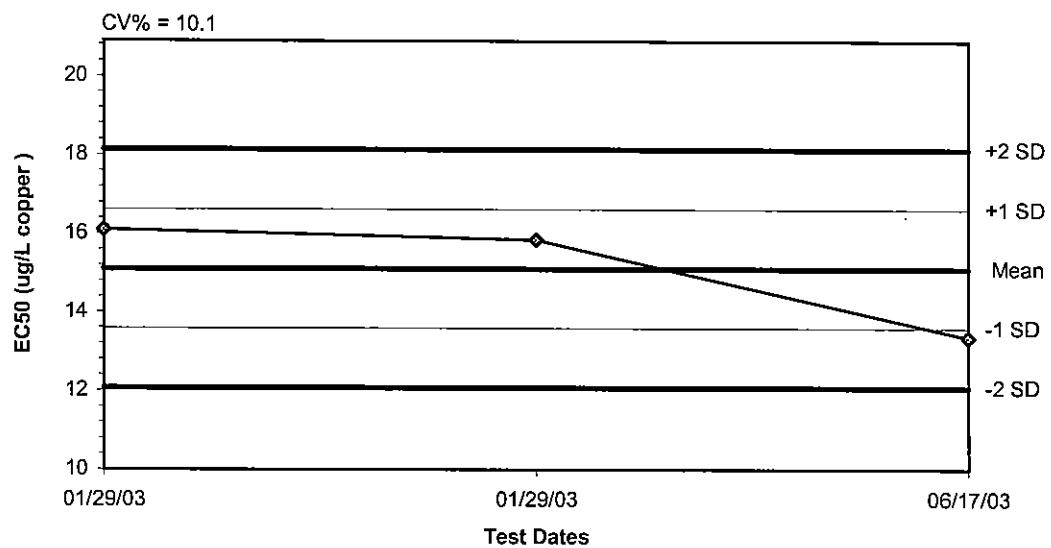
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/12/02	8.1360	13.6253	11.8993	10.1733	15.3512	17.0772
04/30/02	13.1581	13.6253	11.8993	10.1733	15.3512	17.0772
05/16/02	13.4955	13.6253	11.8993	10.1733	15.3512	17.0772
07/13/02	13.5257	13.6253	11.8993	10.1733	15.3512	17.0772
07/14/02	16.2490	13.6253	11.8993	10.1733	15.3512	17.0772
07/11/02	14.0904	13.6253	11.8993	10.1733	15.3512	17.0772
08/22/02	14.3469	13.6253	11.8993	10.1733	15.3512	17.0772
09/12/02	14.6806	13.6253	11.8993	10.1733	15.3512	17.0772
09/26/02	14.1323	13.6253	11.8993	10.1733	15.3512	17.0772
11/13/02	13.7900	13.6253	11.8993	10.1733	15.3512	17.0772
12/31/02	13.7363	13.6253	11.8993	10.1733	15.3512	17.0772
03/26/03	14.1763	13.6253	11.8993	10.1733	15.3512	17.0772
06/10/03	15.5839	13.6253	11.8993	10.1733	15.3512	17.0772
06/17/03	13.3494	13.6253	11.8993	10.1733	15.3512	17.0772
07/16/03	11.6793	13.6253	11.8993	10.1733	15.3512	17.0772
07/15/03	11.6793	13.6253	11.8993	10.1733	15.3512	17.0772
09/04/03	12.9783	13.6253	11.8993	10.1733	15.3512	17.0772
09/13/03	13.9259	13.6253	11.8993	10.1733	15.3512	17.0772
09/08/03	13.9839	13.6253	11.8993	10.1733	15.3512	17.0772
09/29/03	15.8081	13.6253	11.8993	10.1733	15.3512	17.0772

Reference Toxicant Control Chart - Oyster Larval Development



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/14/00	20.2047	15.6473	10.2070	4.7666	21.0877	26.5281
07/14/00	15.1019	15.6473	10.2070	4.7666	21.0877	26.5281
06/20/01	24.2796	15.6473	10.2070	4.7666	21.0877	26.5281
06/22/01	14.2708	15.6473	10.2070	4.7666	21.0877	26.5281
06/13/03	16.0597	15.6473	10.2070	4.7666	21.0877	26.5281
06/19/03	7.3861	15.6473	10.2070	4.7666	21.0877	26.5281
06/21/03	12.2283	15.6473	10.2070	4.7666	21.0877	26.5281

Reference Toxicant Control Chart - Echinoderm Larval Development



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
01/29/03	16.0980	15.0954	13.5778	12.0601	16.6131	18.1307
01/29/03	15.8388	15.0954	13.5778	12.0601	16.6131	18.1307
06/17/03	13.3494	15.0954	13.5778	12.0601	16.6131	18.1307

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date: 6/10/03 Test ID: RT061003MS Sample ID: REF-REFERENCE TOXICANT
End Date: 6/12/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: CUCL-Copper chloride
Sample Date: 6/9/03 Protocol: ASTM 94 Test Species: MS-Mytilis species
Comments:

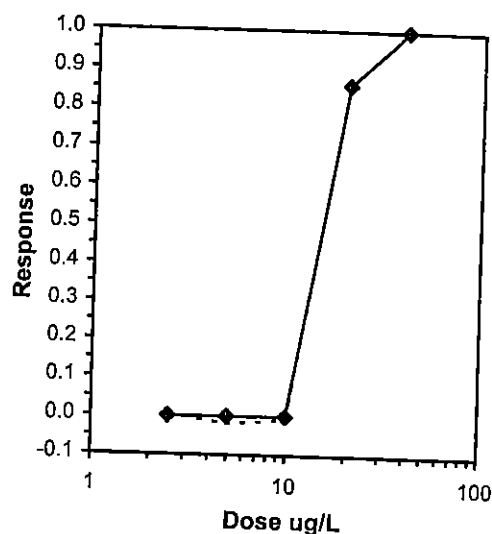
Conc-ug/L	1	2	3	4	5
D-Control	0.9497	0.9536	0.9289	0.9469	0.9462
2.5	0.9529	0.9206	0.9563	0.9316	0.9378
5	0.9668	0.9610	0.9624	0.9509	0.9706
10	0.9578	0.9689	0.9401	0.9468	0.9414
20	0.2941	0.2186	0.0000	0.1130	0.0101
40	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%	N				
D-Control	0.9451	1.0000	1.3348	1.3008	1.3537	1.510	5			62	1118
2.5	0.9399	0.9945	1.3245	1.2852	1.3603	2.375	5	26.00	16.00	69	1133
5	0.9623	1.0183	1.3762	1.3474	1.3984	1.394	5	39.00	16.00	39	1060
10	0.9510	1.0063	1.3491	1.3235	1.3935	2.187	5	29.00	16.00	54	1106
*20	0.1272	0.1346	0.3073	0.0330	0.5732	76.681	5	15.00	16.00	1004	1158
*40	0.0000	0.0000	0.0337	0.0318	0.0370	5.944	5	15.00	16.00	1109	1109

Auxiliary Tests

Shapiro-Wilk's Test indicates non-normal distribution ($p \leq 0.01$)	Statistic	Critical	Skew	Kurt
Bartlett's Test indicates unequal variances ($p = 3.48E-12$)	0.74577	0.9	-0.2477	5.58384
Hypothesis Test (1-tail, 0.05)	62.6239	15.0863		
Steel's Many-One Rank Test	NOEC	LOEC	ChV	TU
	10	20	14.1421	

Trim Level	EC50	95% CL		Trimmed Spearman-Kärber
0.0%	15.584	15.365	15.806	
5.0%	15.245	15.022	15.472	
10.0%	15.026	14.827	15.227	
20.0%	14.963	14.821	15.107	
Auto-0.0%	15.584	15.365	15.806	



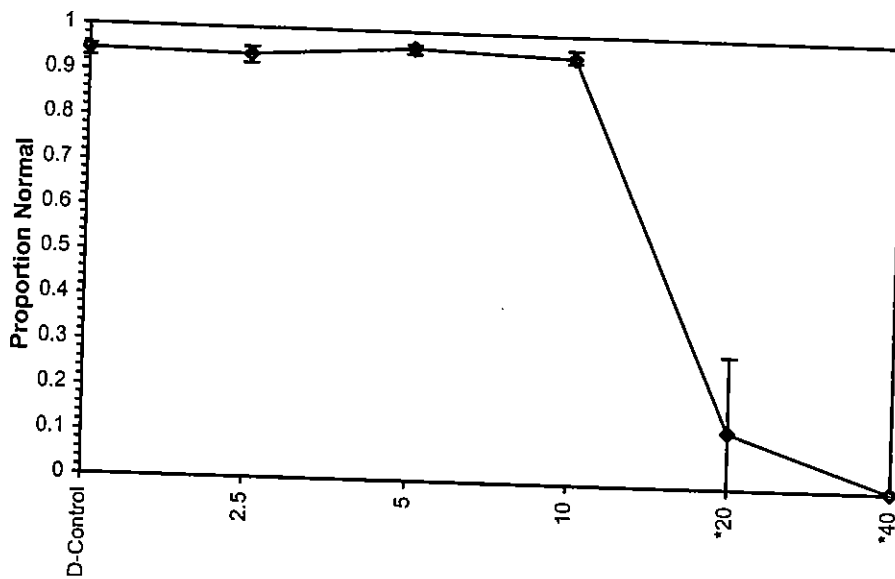
Start Date: 6/10/03
End Date: 6/12/03
Sample Date: 6/9/03
Comments:

Bivalve Larval Survival and Development Test-Proportion Normal

Test ID: RT061003MS
Lab ID: WAAEE-AMEC NW Bioassa
Protocol: ASTM 94

Sample ID: REF-REFERENCE TOXICANT
Sample Type: CUCL-Copper chloride
Test Species: MS-Mytilis species

Dose-Response Plot



Test: BV-Bivalve Larval Survival and Development Test						Test ID: RT061003MS		
Species: MS-Mytilis species						Protocol: ASTM 94		
Sample ID: REF-REFERENCE TOXICANT						Sample Type: CUCL-Copper chloride		
Start Date: 06/10/2003			End Date: 06/12/2003			Lab ID: WAAEE-AMEC NW Bioassay		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
81						234	218	6/25/03 PR
82						239	0	
83						230	0	
84						213	205	
85						205	197	
86						188	178	V
87						170	162	
88						198	2	
89						225	211	
90						241	233	6/27/03 PR
91						217	204	
92						183	0	
93						199	189	
94						239	225	
95						239	222	
96						221	0	
97						237	227	
98						247	0	
99						230	26	
100						279	61	
101						219	0	
102						238 238	231	
103						232 232	232	
104						194	185	
105						279	264	
106						207	196	
107						252	241	
108						221	65	
109						163	155	
110						225	218	V

Comments:

Day 0

1 ~~238~~ (246) PR
 2 ~~232~~ (240) PR
 3 ~~235~~ (235) PR
 4 ~~237~~ 247 PR
 5 ~~260~~ 260 PR
 6 ~~224~~ 224 PR

Mean = 242
 St. Dev = 12.2
 CV = 5.0 %

Test: BV-Bivalve Larval Survival and Development Test

Test ID: RT061003MS

Species: MS-Mytilis species

Protocol: ASTM 94

Sample ID: REF-REFERENCE TOXICANT

Sample Type: CUCL-Copper chloride

Start Date: 06/10/2003

End Date: 06/12/2003

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
93	1	1	D-Control					
104	2	2	D-Control					
95	3	3	D-Control					
106	4	4	D-Control					
105	5	5	D-Control					
87	6	1	2.500					
103	7	2	2.500					
107	8	3	2.500					
81	9	4	2.500					
89	10	5	2.500					
90	11	1	5.000					
85	12	2	5.000					
84	13	3	5.000					
109	14	4	5.000					
102	15	5	5.000					
97	16	1	10.000					
110	17	2	10.000					
91	18	3	10.000					
86	19	4	10.000					
94	20	5	10.000					
108	21	1	20.000					
100	22	2	20.000					
83	23	3	20.000					
99	24	4	20.000					
88	25	5	20.000					
92	26	1	40.000					
96	27	2	40.000					
101	28	3	40.000					
98	29	4	40.000					
82	30	5	40.000					

Comments:

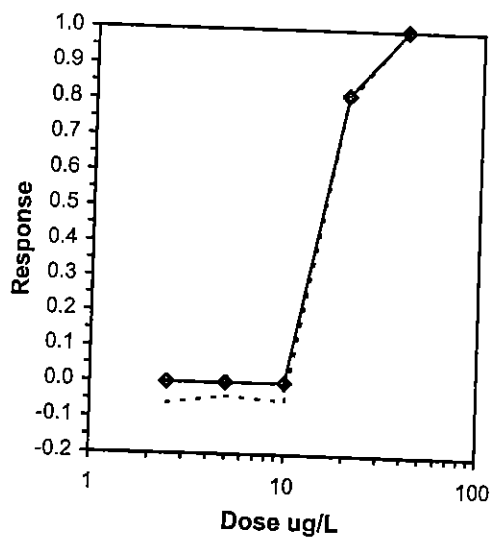
Bivalve Larval Survival and Development Test-Proportion Normal
 Start Date: 6/13/03 Test ID: RT061003CG Sample ID: REF-REFERENCE TOXICANT
 End Date: 6/15/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: CUCL-Copper chloride
 Sample Date: 6/13/03 Protocol: ASTM 87 Test Species: CG-Crassostrea gigas
 Comments:

Conc-ug/L	1	2	3	4	5
D-Control	0.8806	0.9293	0.9000	0.9469	0.8246
2.5	0.9529	0.9507	0.9444	0.9886	0.9096
5	0.9538	1.0000	0.8286	0.9448	0.9144
10	0.9192	0.9110	0.9318	0.9578	0.9877
20	0.3481	0.1180	0.2682	0.1300	0.0112
40	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%	N				
D-Control	0.8963	1.0000	1.2491	1.1386	1.3382	6.185	5			111	1054
2.5	0.9493	1.0591	1.3523	1.2654	1.4640	5.286	5	37.00	16.00	48	935
5	0.9283	1.0358	1.3278	1.1439	1.5331	10.624	5	33.00	16.00	64	896
10	0.9415	1.0505	1.3361	1.2678	1.4595	5.844	5	35.00	16.00	54	893
*20	0.1751	0.1954	0.4002	0.1062	0.6311	50.586	5	15.00	16.00	741	893
*40	0.0000	0.0000	0.0396	0.0386	0.0411	2.533	5	15.00	16.00	798	798

Auxiliary Tests				
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	Statistic	Critical	Skew	Kurt
Bartlett's Test indicates unequal variances ($p = 4.16E-07$)	0.93514	0.9	-0.2104	1.92294
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	10	20	14.1421	

Trim Level	EC50	95% CL	Trimmed Spearman-Kärber	
0.0%	16.060	15.774 16.351		
5.0%	15.737	15.437 16.043		
10.0%	15.483	15.188 15.785		
20.0%	15.287	15.083 15.494		
Auto-0.0%	16.060	15.774 16.351		



Start Date: 6/13/03
End Date: 6/15/03
Sample Date: 6/13/03
Comments:

Bivalve Larval Survival and Development Test-Proportion Normal

Test ID: RT061003CG

Sample ID:

REF-REFERENCE TOXICANT

Lab ID: WAAEE-AMEC NW Bioassay

Sample Type:

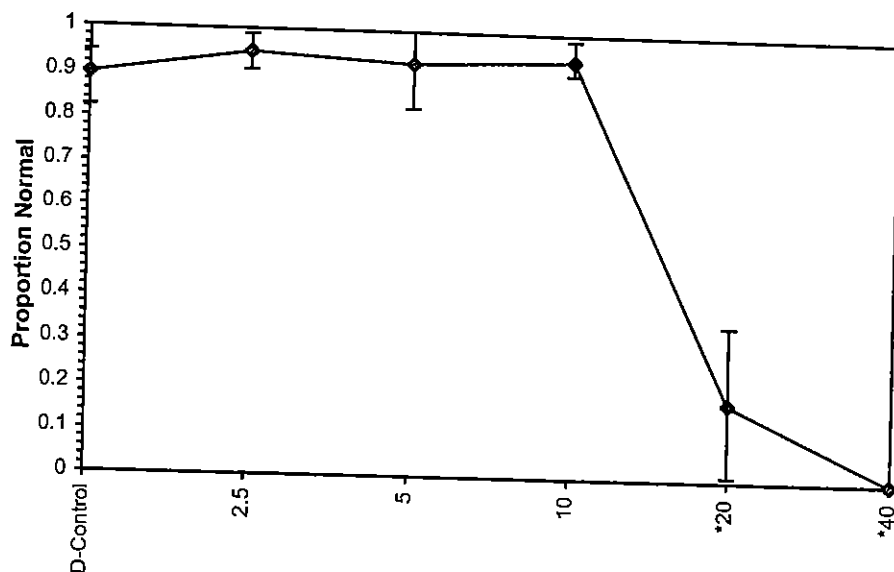
CUCL-Copper chloride

Protocol: ASTM 87

Test Species:

CG-Crassostrea gigas

Dose-Response Plot



Test: BV-Bivalve Larval Survival and Development Test

Species: CG-Crassostrea gigas

Sample ID: REF-REFERENCE TOXICANT

Start Date: 6/13/03

End Date: 6/15/03

Test ID: RT061003CG

Protocol: ASTM 87

Sample Type: CUCL-Copper chloride

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
93	1	1	D-Control	221	201	201	177	
104	2	2	D-Control	221	198	198	184	
95	3	3	D-Control	221	220	220	198	
106	4	4	D-Control	221	207	207	196	
105	5	5	D-Control	221	228	228	188	
87	6	1	2.500	221	170	170	162	
103	7	2	2.500	221	203	203	193	
107	8	3	2.500	221	198	198	187	
81	9	4	2.500	221	176	176	174	
89	10	5	2.500	221	188	188	171	
90	11	1	5.000	221	195	195	186	
85	12	2	5.000	221	176	176	185	
84	13	3	5.000	221	175	175	145	
109	14	4	5.000	221	163	163	154	
102	15	5	5.000	221	187	187	171	
97	16	1	10.000	221	198	198	182	
110	17	2	10.000	221	191	191	174	
91	18	3	10.000	221	176	176	164	
86	19	4	10.000	221	166	166	159	
94	20	5	10.000	221	162	162	160	
108	21	1	20.000	221	158	158	55	
100	22	2	20.000	221	178	178	21	
83	23	3	20.000	221	179	179	48	
99	24	4	20.000	221	200	200	26	
88	25	5	20.000	221	178	178	2	
92	26	1	40.000	221	168	168	0	
96	27	2	40.000	221	166	166	0	
101	28	3	40.000	221	157	157	0	
98	29	4	40.000	221	148	148	0	
82	30	5	40.000	221	159	159	0	

Comments:

Test: BV-Bivalve Larval Survival and Development Test

Test ID: RT061003CG

Species: CG-Crassostrea gigas

Protocol: ASTM 87

Sample ID: REF-REFERENCE TOXICANT

Sample Type: CUCL-Copper chloride

Start Date: 6/13/03

End Date: 6/15/03

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
93	1	1	D-Control	221	201	201	177	
104	2	2	D-Control	221	198	198	184	
95	3	3	D-Control	221	220	220	198	
106	4	4	D-Control	221	207	207	196	
105	5	5	D-Control	221	228	228	188	
87	6	1	2.500	221	170	170	162	
103	7	2	2.500	221	203	203	193	
107	8	3	2.500	221	198	198	187	
81	9	4	2.500	221	176	176	174	
89	10	5	2.500	221	188	188	171	
90	11	1	5.000	221	195	195	186	
85	12	2	5.000	221	176	176	185	
84	13	3	5.000	221	175	175	145	
109	14	4	5.000	221	163	163	154	
102	15	5	5.000	221	187	187	171	
97	16	1	10.000	221	198	198	182	
110	17	2	10.000	221	191	191	174	
91	18	3	10.000	221	176	176	164	
86	19	4	10.000	221	166	166	159	
94	20	5	10.000	221	162	162	160	
108	21	1	20.000	221	158	158	55	
100	22	2	20.000	221	178	178	21	
83	23	3	20.000	221	179	179	48	
99	24	4	20.000	221	200	200	26	
88	25	5	20.000	221	178	178	2	
92	26	1	40.000	221	168	168	0	
96	27	2	40.000	221	166	166	0	
101	28	3	40.000	221	157	157	0	
98	29	4	40.000	221	148	148	0	
82	30	5	40.000	221	159	159	0	

Comments:

Bivalve Larval Survival and Development Test-Proportion Normal

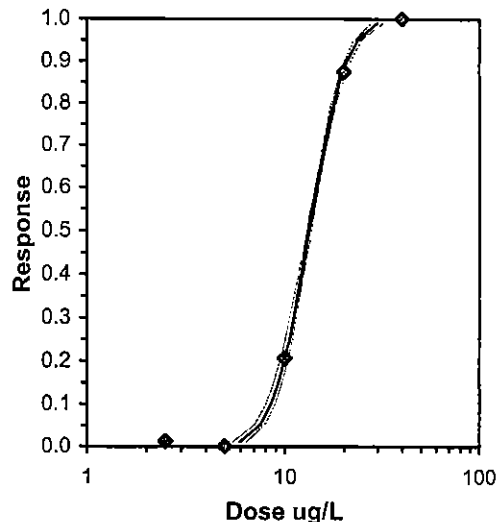
Start Date: 6/17/03 Test ID: RT061703SP Sample ID: REF-REFERENCE TOXICANT
 End Date: 6/19/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: CUCL-Copper chloride
 Sample Date: 6/17/03 Protocol: ASTM 94 Test Species: SP-Strongylocentrotus purpuratus
 Comments:

Conc-ug/L	1	2	3	4	5
D-Control	0.9277	0.9357	0.8944	0.9119	0.9080
2.5	0.9257	0.9342	0.9078	0.8710	0.8805
5	0.9492	0.8862	0.9091	0.9617	0.9317
10	0.7584	0.9000	0.5393	0.5645	0.9063
20	0.4254	0.0595	0.0000	0.1227	0.0470
40	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Transform: Arcsin Square Root							Rank Sum	1-Tailed Critical	Number Resp	Total Number
	Mean	N-Mean	Mean	Min	Max	CV%	N				
D-Control	0.9156	1.0000	1.2770	1.2399	1.3145	2.318	5			70	819
2.5	0.9038	0.9872	1.2579	1.2034	1.3114	3.731	5	23.00	16.00	73	755
5	0.9276	1.0131	1.3030	1.2267	1.3739	4.535	5	31.00	16.00	57	783
10	0.7337	0.8014	1.0481	0.8248	1.2596	19.916	5	17.00	16.00	231	843
*20	0.1309	0.1430	0.3139	0.0361	0.7105	79.666	5	15.00	16.00	728	823
*40	0.0000	0.0000	0.0407	0.0370	0.0481	11.589	5	15.00	16.00	779	779

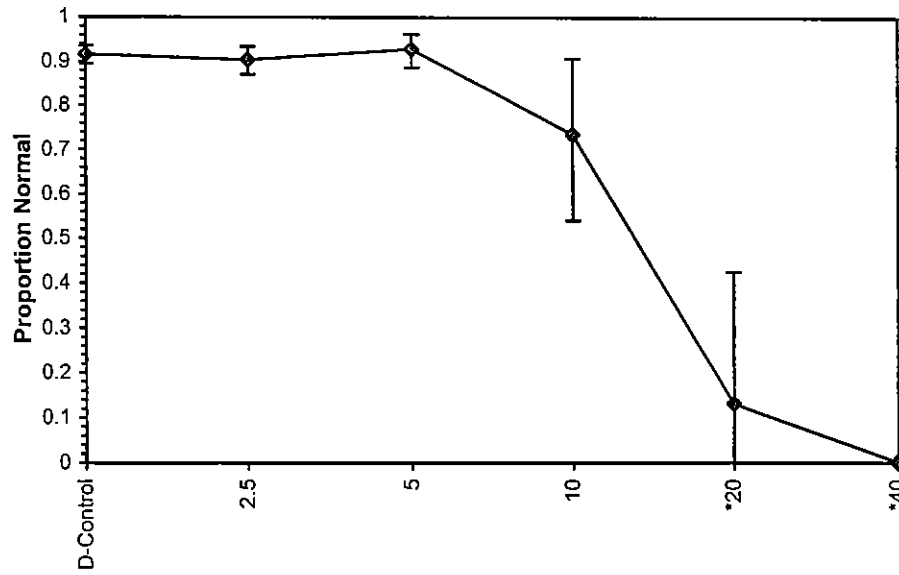
Auxiliary Tests		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)		0.88321	0.9	0.73348	3.43346
Bartlett's Test indicates unequal variances (p = 5.27E-08)		42.2394	15.0863		
Hypothesis Test (1-tail, 0.05)		NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test		10	20	14.1421	

Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.61822	0.26946	6.09007	7.14636	0.08547	4.06391	7.81472	0.25	1.12546	0.1511	5
Intercept	-2.4485	0.31428	-3.0645	-1.8325							
TSCR	0.08455	0.00583	0.07312	0.09597							
Point	Probits	ug/L	95% Fiducial Limits								
EC01	2.674	5.94229	5.46514	6.38712							
EC05	3.355	7.53228	7.05838	7.97015							
EC10	3.718	8.54714	8.08547	8.97342							
EC15	3.964	9.30803	8.85856	9.72408							
EC20	4.158	9.96078	9.52268	10.3682							
EC25	4.326	10.5572	10.1293	10.9575							
EC40	4.747	12.2231	11.8162	12.6153							
EC50	5.000	13.3494	12.9434	13.7524							
EC60	5.253	14.5795	14.1562	15.0152							
EC75	5.674	16.8801	16.3688	17.4398							
EC80	5.842	17.8907	17.3206	18.5279							
EC85	6.036	19.1454	18.4887	19.8945							
EC90	6.282	20.8498	20.0562	21.774							
EC95	6.645	23.6589	22.604	24.917							
EC99	7.326	29.9894	28.2347	32.1486							



Bivalve Larval Survival and Development Test-Proportion Normal			
Start Date: 6/17/03	Test ID: RT061703SP	Sample ID:	REF-REFERENCE TOXICANT
End Date: 6/19/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 6/17/03	Protocol: ASTM 94	Test Species:	SP-Strongylocentrotus purpuratus
Comments:			

Dose-Response Plot



Test: BV-Bivalve Larval Survival and Development Test						Test ID: RT061303MS R7061705 MS		
Species: MS Mytilus species <i>S. purpuratus</i>						Protocol: ASTM 94		
Sample ID: REF-REFERENCE TOXICANT						Sample Type: CUCL-Copper chloride		
Start Date: 06/13/2003			End Date: 06/14/2003			Lab ID: WAAEE-AMEC NW Bioassay		
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
41						185	11	me 7/21/03
42						178	96	
43						174	158	
44						186	105	
45						155	135	me 7/21/03
46						142	0	
47						180	161	
48						152	142	et 8/14/03
49						108	0	
50						134	57	
51						149	113	
52						166	154	
53						139	0	
54						141	128	
55						118	112	
56						183	176	
57						169	0	
58						183	0	
59						140	131	
60						161	150	
61						163	20	
62						159	145	
63						167	148	
64						159	140	
65						180	0	
66						160	145	
67						149	7	
68						170	153	
69						148	137	
70						154	140	

Comments:

Day 0

1 195
2 180
3 171
4 180
5 198
6 224

Mean = 191.3
St. dev. = 18.95
C.V. = 9.9%

Test: BV-Bivalve Larval Survival and Development Test Test ID: RT061303MS RT061703MS
 Species: MS-Mytilis species Protocol: ASTM 94 SP
 Sample ID: REF-REFERENCE TOXICANT 6/19/03 Sample Type: CUCL-Copper chloride
 Start Date: 06/13/2003 6/17/03 End Date: 06/14/2003 Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
52	1	1	D-Control					
59	2	2	D-Control					
47	3	3	D-Control					
62	4	4	D-Control					
43	5	5	D-Control					
69	6	1	2.500					
48	7	2	2.500					
54	8	3	2.500					
45	9	4	2.500					
64	10	5	2.500					
55	11	1	5.000					
63	12	2	5.000					
70	13	3	5.000					
56	14	4	5.000					
60	15	5	5.000					
51	16	1	10.000					
68	17	2	10.000					
42	18	3	10.000					
44	19	4	10.000					
66	20	5	10.000					
50	21	1	20.000					
41	22	2	20.000					
46	23	3	20.000					
61	24	4	20.000					
67	25	5	20.000					
58	26	1	40.000					
57	27	2	40.000					
49	28	3	40.000					
53	29	4	40.000					
65	30	5	40.000					

Comments:

Bivalve Larval Survival and Development Test-Proportion Normal			
Start Date: 6/19/03	Test ID: RT061903CV	Sample ID:	REF-REFERENCE TOXICANT
End Date: 6/21/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 6/19/03	Protocol: ASTM 87	Test Species:	CG-Crassostrea gigas
Comments:			

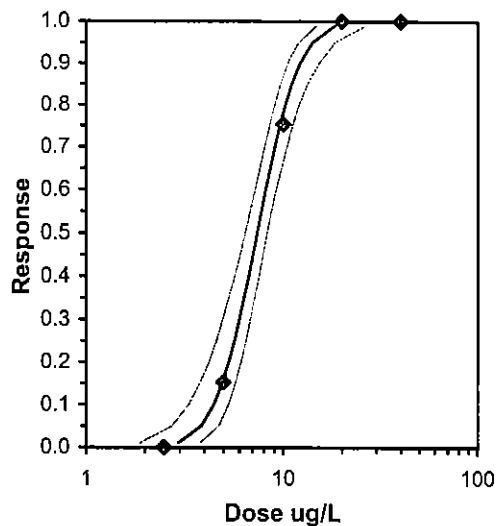
Conc-ug/L	1	2	3	4	5
D-Control	0.8904	0.9143	0.9110	0.8943	
2.5	0.9250	0.9462	0.9683	0.9617	0.9690
5	0.7009	0.5149	0.8621	0.8498	0.8739
10	0.0573	0.0824	0.2339	0.2976	0.4604
20	0.0000	0.0000	0.0000	0.0000	
40	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Number Resp	Total Number
			Mean	Min	Max	CV%	N					
D-Control	0.9025	1.0000	1.2537	1.2334	1.2737	1.602	4				92	946
2.5	0.9541	1.0571	1.3579	1.2934	1.3939	3.149	5	-1.322	2.508	0.1979	52	1119
*5	0.7603	0.8424	1.0726	0.8003	1.2078	16.337	5	2.295	2.508	0.1979	262	1119
**10	0.2263	0.2508	0.4721	0.2417	0.7458	44.028	5	9.908	2.508	0.1979	798	1027
*20	0.0000	0.0000	0.0329	0.0300	0.0353	7.265	4	14.682	2.508	0.2086	935	935
*40	0.0000	0.0000	0.0360	0.0328	0.0392	6.414	5	15.437	2.508	0.1979	976	976

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)					0.88211	0.896	-0.4098	2.40071
Bartlett's Test indicates unequal variances (p = 1.65E-11)					59.3553	15.0863		
Hypothesis Test (1-tail, 0.05)					NOEC	LOEC	ChV	TU
Bonferroni t Test					5	10	7.07107	
					MSDu	MSDp	MSB	MSE
					0.14534	0.161	1.66546	0.01383
					F-Prob	df		
					3.2E-15	5, 22		

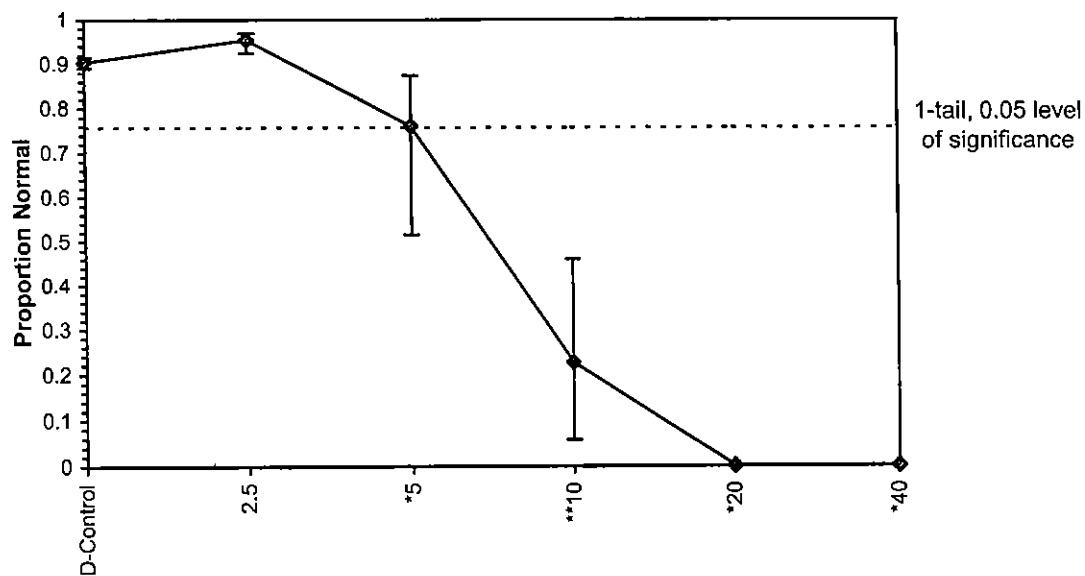
Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	5.8615	0.54404	4.13011	7.59289	0.09725	20.3121	7.81472	1.5E-04	0.86842	0.1706	4
Intercept	-0.0902	0.49625	-1.6695	1.48909							
TSCR	0.07069	0.01523	0.02221	0.11917							
Point	Probits	ug/L	95% Fiducial Limits								
EC01	2.674	2.96162	1.89197	3.81769							
EC05	3.355	3.87076	2.74658	4.72804							
EC10	3.718	4.46454	3.34325	5.31028							
EC15	3.964	4.91581	3.81202	5.75126							
EC20	4.158	5.30678	4.22601	6.13499							
EC25	4.326	5.66689	4.61158	6.49191							
EC40	4.747	6.68642	5.7063	7.5388							
EC50	5.000	7.38611	6.43962	8.30815							
EC60	5.253	8.15902	7.21277	9.22509							
EC75	5.674	9.62691	8.55297	11.1787							
EC80	5.842	10.2802	9.10208	12.1295							
EC85	6.036	11.0978	9.7586	13.379							
EC90	6.282	12.2195	10.6173	15.1856							
EC95	6.645	14.0941	11.9765	18.4046							
EC99	7.326	18.4205	14.8939	26.6077							

Significant heterogeneity detected (p = 1.46E-04)



Bivalve Larval Survival and Development Test-Proportion Normal

Start Date: 6/19/03	Test ID: RT061903CV	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/21/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/19/03	Protocol: ASTM 87	Test Species: CG-Crassostrea gigas
Comments:		

Dose-Response Plot

Test: BV-Bivalve Larval Survival and Development Test					Test ID: RT061903MS RT061903C9			
Species: MS-Mytilus species CVA oyster					Protocol: ASTM 94			
Sample ID: REF-REFERENCE TOXICANT					Sample Type: CUCL-Copper chloride			
Start Date: 06/19/2003		End Date: 06/21/2003			Lab ID: WAAEE-AMEC NW Bioassay			
Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
41						241	3	
42						213	181	
43						318 218	4	
44						248	58	
45						221	214	
46						232	200	
47						168	50	
48						240	222	
49						238	208	
50						202	93	
51						277	0	KS 7/1/03
52						211	0	
53						245	224	
54						209	201	
55						223	211	
56						246	0	
57						163	0	
58						233	0	
59						236	215	
60						227	13	
61						190	0	
62						189	0	
63						246	220	7/2/03
64						211	0	
65						182	15	
66						219	195	
67						202	104	
68						201	0	
69						226	219	
70						234	164	

Comments:

Day 0 Counted 7/2/03 7/8/03
KS

#1 230
#2 228
#3 230
#4 236
#5 211
#6 206

Mean = 224
st. dev. = 12
CV = 5.4%

Test: BV-Bivalve Larval Survival and Development Test

Test ID: RT061903MS

Species: MS-Mytilis species

Protocol: ASTM 94

Sample ID: REF-REFERENCE TOXICANT

Sample Type: CUCL-Copper chloride

Start Date: 06/19/2003

End Date: 06/21/2003

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
41	1	1	D-Control					
66	2	2	D-Control					
53	3	3	D-Control					
59	4	4	D-Control					
63	5	5	D-Control					
48	6	1	2.500					
55	7	2	2.500					
45	8	3	2.500					
54	9	4	2.500					
69	10	5	2.500					
70	11	1	5.000					
67	12	2	5.000					
46	13	3	5.000					
42	14	4	5.000					
49	15	5	5.000					
60	16	1	10.000					
65	17	2	10.000					
44	18	3	10.000					
47	19	4	10.000					
50	20	5	10.000					
64	21	1	20.000					
52	22	2	20.000					
43	23	3	20.000					
56	24	4	20.000					
51	25	5	20.000					
62	26	1	40.000					
58	27	2	40.000					
68	28	3	40.000					
57	29	4	40.000					
61	30	5	40.000					

Comments:

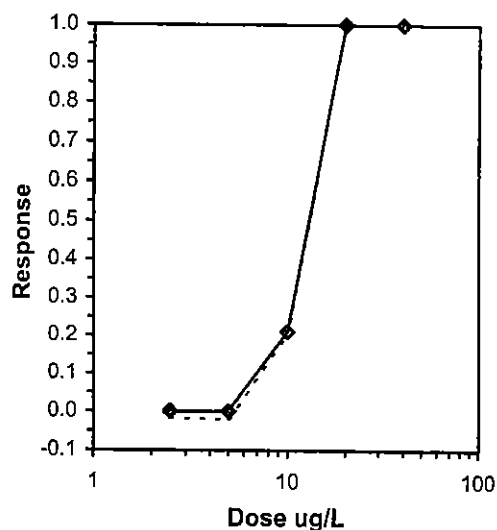
Bivalve Larval Survival and Development Test-Proportion Normal			
Start Date: 6/21/03	Test ID: RT062103CG	Sample ID:	REF-REFERENCE TOXICANT
End Date: 6/23/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 6/21/03	Protocol: ASTM 87	Test Species:	CG-Crassostrea gigas
Comments:			

Conc-ug/L	1	2	3	4	5
D-Control	0.9558	0.9416	0.8494	0.9438	0.9950
2.5	0.9565	0.9854	0.8846	0.9897	0.9598
5	1.0000	0.9551	0.9749	0.9545	0.9021
10	0.9526	0.7863	0.8741	0.4465	0.6859
20	0.0000	0.0000	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%	N				
D-Control	0.9371	1.0000	1.3379	1.1723	1.5002	8.716	5			52	863
2.5	0.9552	1.0193	1.3746	1.2242	1.4693	7.041	5	32.00	16.00	42	966
5	0.9573	1.0215	1.3820	1.2526	1.5326	7.379	5	31.00	16.00	35	867
10	0.7491	0.7993	1.0715	0.7318	1.3514	21.980	5	19.00	16.00	191	771
*20	0.0000	0.0000	0.0412	0.0399	0.0432	3.833	5	15.00	16.00	740	740
*40	0.0000	0.0000	0.0424	0.0353	0.0459	10.231	5	15.00	16.00	716	716

Auxiliary Tests		Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p \leq 0.01$)		0.88681	0.9	-0.4552	3.08688
Bartlett's Test indicates unequal variances ($p = 1.70E-10$)		54.4431	15.0863		
Hypothesis Test (1-tail, 0.05)		NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test		10	20	14.1421	

Trimmed Spearman-Kärber			
Trim Level	EC50	95% CL	
0.0%	12.228	11.982	12.479
5.0%	12.463	12.177	12.755
10.0%	12.665	12.315	13.026
20.0%	12.897	12.290	13.533
Auto-0.0%	12.228	11.982	12.479



Start Date: 6/21/03
End Date: 6/23/03
Sample Date: 6/21/03
Comments:

Bivalve Larval Survival and Development Test-Proportion Normal

Test ID: RT062103CG

Sample ID:

REF-REFERENCE TOXICANT

Lab ID: WAAEE-AMEC NW Bioassay

Sample Type:

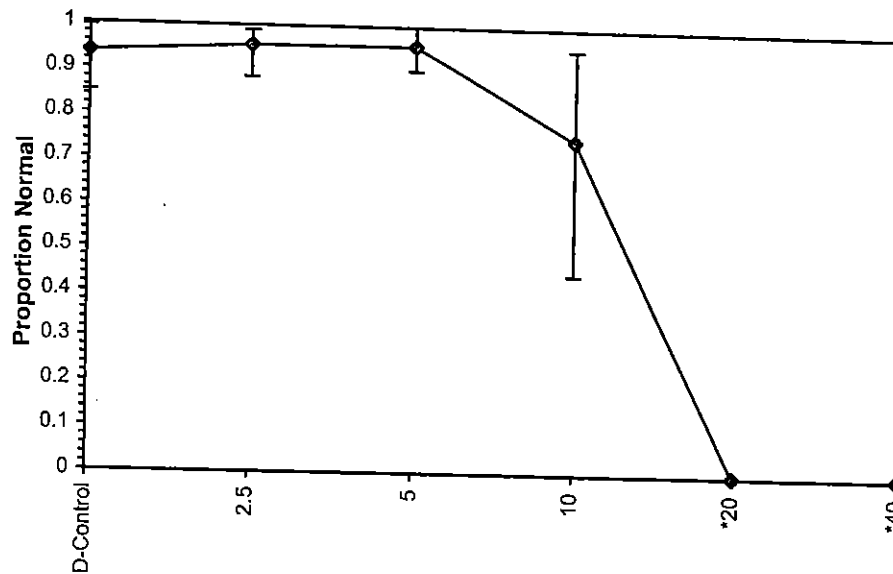
CUCL-Copper chloride

Protocol: ASTM 87

Test Species:

CG-Crassostrea gigas

Dose-Response Plot



Test: BV-Bivalve Larval Survival and Development Test
 Species: CR-Crassostrea virginica 8/4/03
 Sample ID: REF-REFERENCE TOXICANT
 Start Date: 06/21/2003 End Date: 06/23/2003

Test ID: Rt062102CV
 Protocol: ASTM 87
 Sample Type: CUCL-Copper chloride
 Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
41						201	0	
42						201	200	NF 7/22/03
43						206	203	
44						184	176	
45						157	0	
46						199	191	
47						134	0	
48						128	0	
49						138	0	
50						195	193	SM 7/22/03
51						143	129	
52						190	181	
53						166	141	
54						122	0	
55						131	103	
56						146	0	
57						156	107	
58						181	173	
59						176	168	
60						199	194	
61						178	168	
62						135	118	
63						178	170	
64						159	71	
65						155	0	
66						156	sm 20	
67						171	sm 171	
68						182	161	
69						119	0	
70						137	129	

Comments:

Day 0

1 219
 2 217
 3 213
 4 206
 5 201
 6 220

Mean - 213
 st. dev - 7.7
 CV = 3.6%

Test: BV-Bivalve Larval Survival and Development Test
 Species: CR-Crassostrea virginica 5948
 Sample ID: REF-REFERENCE TOXICANT
 Start Date: 06/21/2003 End Date: 06/23/2003

0364
 Test ID: Rt0621020V
 Protocol: ASTM 87
 Sample Type: CUCL-Copper chloride
 Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
58	1	1	D-Control					
70	2	2	D-Control					
51	3	3	D-Control					
61	4	4	D-Control					
42	5	5	D-Control					
44	6	1	2.500					
43	7	2	2.500					
68	8	3	2.500					
50	9	4	2.500					
46	10	5	2.500					
67	11	1	5.000					
63	12	2	5.000					
60	13	3	5.000					
59	14	4	5.000					
52	15	5	5.000					
53	16	1	10.000					
55	17	2	10.000					
62	18	3	10.000					
64	19	4	10.000					
57	20	5	10.000					
66	21	1	20.000					
65	22	2	20.000					
45	23	3	20.000					
49	24	4	20.000					
47	25	5	20.000					
69	26	1	40.000					
48	27	2	40.000					
56	28	3	40.000					
54	29	4	40.000					
41	30	5	40.000					

Comments:

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date: 9/13/03
End Date: 9/15/03
Sample Date: 9/13/03
Comments:

Test ID: RT091303MS
Lab ID: WAAEE-AMEC NW Bioassay
Protocol: ASTM 94
Sample ID: REF-REFERENCE TOXICANT
Sample Type: CUCL-Copper chloride
Test Species: MS-Mytilis species

Conc-ug/L	1	2	3	4	5
D-Control	0.7939	0.8984	0.8397	0.8770	0.8092
2.5	0.9507	0.8485	0.8063	0.8477	0.9562
5	0.9362	0.9130	0.9110	0.8645	0.9189
10	0.8170	0.8069	0.8676	0.9257	0.8671
20	0.0000	0.0000	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0000	0.0000	0.0000

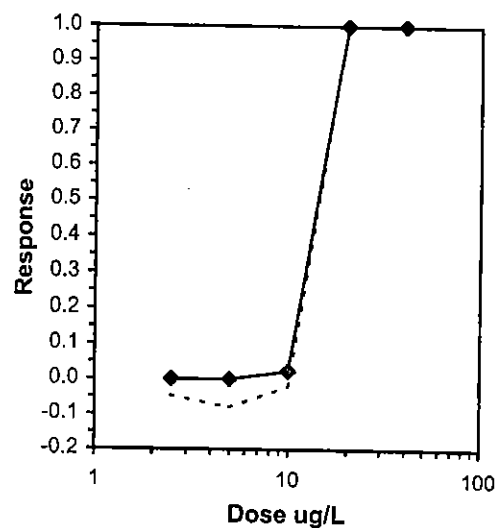
Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%	N				
D-Control	0.8437	1.0000	1.1672	1.0996	1.2465	5.303	5			112	702
2.5	0.8819	1.0453	1.2325	1.1150	1.3600	9.148	5	32.00	16.00	87	722
5	0.9087	1.0771	1.2661	1.1939	1.3154	3.518	5	38.00	16.00	69	751
10	0.8569	1.0156	1.1871	1.1158	1.2947	6.001	5	29.00	16.00	104	725
*20	0.0000	0.0000	0.0423	0.0406	0.0442	3.177	5	15.00	16.00	701	701
*40	0.0000	0.0000	0.2539	0.0964	0.5236	73.311	4	10.00	10.00	41	41

Auxiliary Tests

	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.91921	0.898	1.11882	2.69683
Bartlett's Test indicates unequal variances ($p = 1.07E-06$)	35.7406	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	10	20	14.1421	

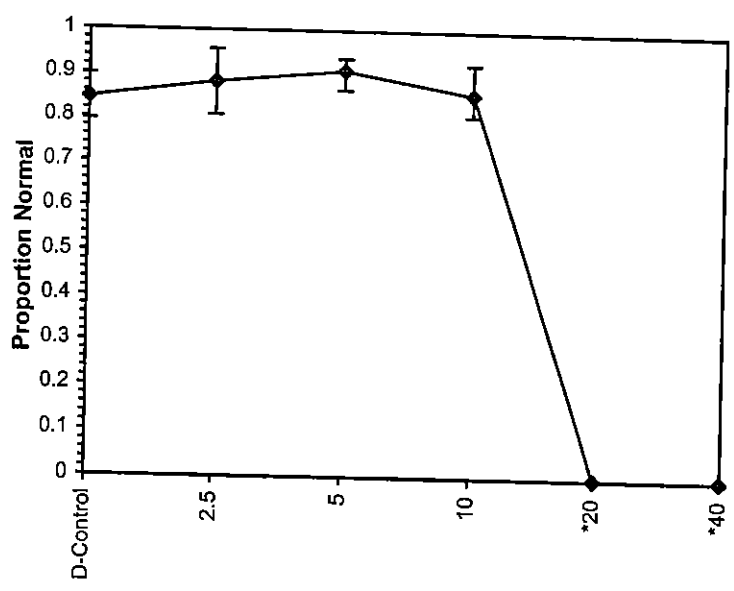
Trimmed Spearman-Kärber

Trim Level	EC50	95% CL
0.0%	13.926	13.821 14.032
5.0%	14.031	13.976 14.087
10.0%	14.031	13.976 14.087
20.0%	14.031	13.976 14.087
Auto-0.0%	13.926	13.821 14.032



Bivalve Larval Survival and Development Test-Proportion Normal			
Start Date: 9/13/03	Test ID: RT091303MS	Sample ID:	REF-REFERENCE TOXICANT
End Date: 9/15/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 9/13/03	Protocol: ASTM 94	Test Species:	MS-Mytilis species
Comments:			

Dose-Response Plot



Test: BV-Bivalve Larval Survival and Development Test

Test ID: RT091303MS

Species: MS-Mytilus species

Protocol: ASTM 94

Sample ID: REF-REFERENCE TOXICANT

Sample Type: CUCL-Copper chloride

Start Date: 09/13/2003

End Date: 09/15/2003

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
41						145	117	NE 10/20/03
42						160	129	
43						155	134	↓
44						7	0	SM 10/20/03
45						128	0	
46						141	132	
47						142	135	
48						1	0	
49						128	115	
50						146	133	
51						137	131	
52						137	0	
53						161	147	
54						27	0	
55						143	124	↓
56						165	131	NE 10/21/03
57						140	0	
58						151	128	
59						132	112	
60						148	136	
61						152	0	
62						0	0	
63						16	0	
64						144	0	
65						131	106	
66						153	125	
67						136	118	
68						122	107	
69						148	137	
70						156	131	↓

Comments:

RT Day 0

1 211
2 212
3 192
4 200
5 205
6 156

avg = 196
St dev = 20.9
CV = 10.7%

Test: BV-Bivalve Larval Survival and Development Test
 Species: MS-Mytilis species
 Sample ID: REF-REFERENCE TOXICANT
 Start Date: 09/13/2003

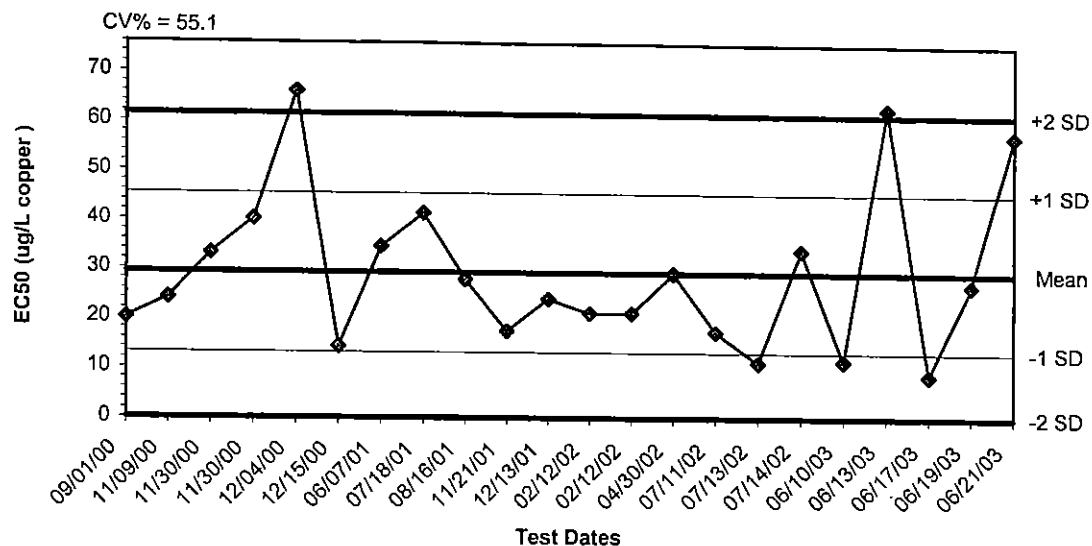
Test ID: RT091303MS
 Protocol: ASTM 94
 Sample Type: CUCL-Copper chloride
 Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Initial Density	Final Density	Total Counted	Number Normal	Notes
56	1	1	D-Control					
49	2	2	D-Control					
70	3	3	D-Control					
68	4	4	D-Control					
65	5	5	D-Control					
47	6	1	2.500					
59	7	2	2.500					
42	8	3	2.500					
58	9	4	2.500					
51	10	5	2.500					
46	11	1	5.000					
53	12	2	5.000					
50	13	3	5.000					
43	14	4	5.000					
60	15	5	5.000					
66	16	1	10.000					
41	17	2	10.000					
67	18	3	10.000					
69	19	4	10.000					
55	20	5	10.000					
57	21	1	20.000					
45	22	2	20.000					
52	23	3	20.000					
61	24	4	20.000					
64	25	5	20.000					
54	26	1	40.000					
48	27	2	40.000					
44	28	3	40.000					
62	29	4	40.000					
63	30	5	40.000					

Comments:

Echinoderm Sperm Cell Fertilization

Reference Toxicant Control Chart - Echinoderm Sperm Cell Fertilization



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/01/00	20.0292	29.2877	13.1506	0.0000	45.4248	61.5619
11/09/00	24.0934	29.2877	13.1506	0.0000	45.4248	61.5619
11/30/00	33.1288	29.2877	13.1506	0.0000	45.4248	61.5619
11/30/00	40.1307	29.2877	13.1506	0.0000	45.4248	61.5619
12/04/00	66.0919	29.2877	13.1506	0.0000	45.4248	61.5619
12/15/00	14.2505	29.2877	13.1506	0.0000	45.4248	61.5619
06/07/01	34.5299	29.2877	13.1506	0.0000	45.4248	61.5619
07/18/01	41.3271	29.2877	13.1506	0.0000	45.4248	61.5619
08/16/01	27.8736	29.2877	13.1506	0.0000	45.4248	61.5619
11/21/01	17.4642	29.2877	13.1506	0.0000	45.4248	61.5619
12/13/01	24.0295	29.2877	13.1506	0.0000	45.4248	61.5619
12/13/01	21.1669	29.2877	13.1506	0.0000	45.4248	61.5619
02/12/02	21.1669	29.2877	13.1506	0.0000	45.4248	61.5619
02/12/02	21.1669	29.2877	13.1506	0.0000	45.4248	61.5619
04/30/02	29.2667	29.2877	13.1506	0.0000	45.4248	61.5619
07/11/02	17.4175	29.2877	13.1506	0.0000	45.4248	61.5619
07/13/02	11.1696	29.2877	13.1506	0.0000	45.4248	61.5619
07/14/02	33.9335	29.2877	13.1506	0.0000	45.4248	61.5619
06/10/03	11.4466	29.2877	13.1506	0.0000	45.4248	61.5619
06/13/03	62.8701	29.2877	13.1506	0.0000	45.4248	61.5619
06/17/03	8.5095	29.2877	13.1506	0.0000	45.4248	61.5619
06/19/03	26.9491	29.2877	13.1506	0.0000	45.4248	61.5619
06/21/03	57.4842	29.2877	13.1506	0.0000	45.4248	61.5619

Sperm Cell Fertilization Test-Proportion Fertilized

Start Date: 6/10/03	Test ID: RT061003SP	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/10/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/9/03	Protocol: DL 87-Dinnel/Link	Test Species: SP-Strongylocentrotus purpuratus

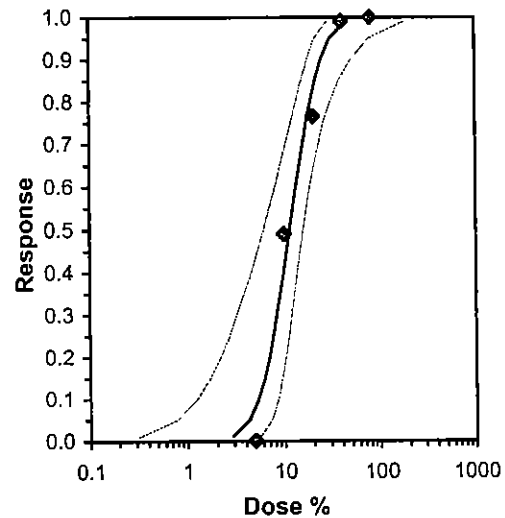
Comments:

Conc-%	1	2	3	4	5
D-Control	0.8900	0.8200	0.8400	0.7900	0.7600
5	0.8100	0.8000	0.8400	0.8500	0.8700
10	0.3800	0.5100	0.3500	0.4000	0.4500
20	0.2500	0.1500	0.1800	0.2300	0.1500
40	0.0000	0.0000	0.0000	0.0200	0.0200
80	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%	N				
D-Control	0.8200	1.0000	1.1356	1.0588	1.2327	5.835	5			90	500
5	0.8340	1.0171	1.1522	1.1071	1.2019	3.373	5	30.50	16.00	83	500
*10	0.4180	0.5098	0.7025	0.6331	0.7954	9.090	5	15.00	16.00	291	500
*20	0.1920	0.2341	0.4515	0.3977	0.5236	12.885	5	15.00	16.00	404	500
*40	0.0080	0.0098	0.0868	0.0500	0.1419	57.995	5	15.00	16.00	496	500
*80	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5	15.00	16.00	500	500

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.95391	0.9	0.43716	-0.5774
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	5	10	7.07107	20

Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	3.89094	0.67969	1.72785	6.05404	0.18	32.9555	7.81472	3.3E-07	1.05868	0.25701	6
Intercept	0.88074	0.79778	-1.6581	3.41963							
TSCR	0.1566	0.04983	-0.002	0.31518							
Point	Probits	%	95% Fiducial Limits								
EC01	2.674	2.88929	0.32326	5.60563							
EC05	3.355	4.32454	0.78938	7.37704							
EC10	3.718	5.3618	1.26522	8.57574							
EC15	3.964	6.1988	1.73463	9.51882							
EC20	4.158	6.95626	2.22396	10.3655							
EC25	4.326	7.67944	2.74635	11.1763							
EC40	4.747	9.85295	4.60729	13.7059							
EC50	5.000	11.4466	6.1869	15.7527							
EC60	5.253	13.2981	8.13348	18.4937							
EC75	5.674	17.0619	11.9344	25.9299							
EC80	5.842	18.8357	13.5123	30.4936							
EC85	6.036	21.1373	15.35	37.4763							
EC90	6.282	24.4369	17.6675	49.5495							
EC95	6.645	30.2982	21.2096	76.9052							
EC99	7.326	45.3488	28.7085	182.584							

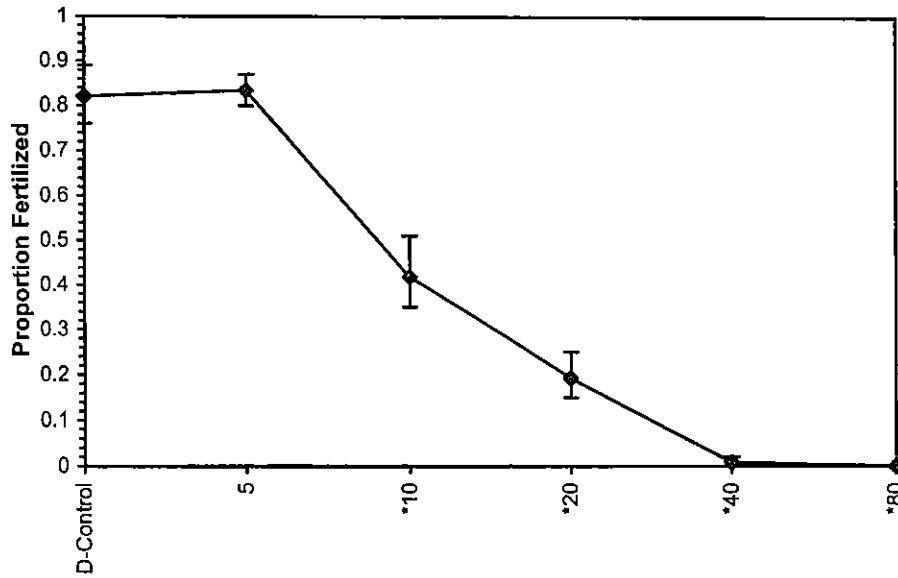


Significant heterogeneity detected ($p = 3.29E-07$)

Sperm Cell Fertilization Test-Proportion Fertilized

Start Date: 6/10/03	Test ID: RT061003SP	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/10/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/9/03	Protocol: DL 87-Dinnel/Link	Test Species: SP-Strongylocentrotus purpuratus
Comments:		

Dose-Response Plot



Test: SC-Sperm Cell Fertilization Test
 Species: SP-Strongylocentrotus purpuratus
 Sample ID: REF-REFERENCE TOXICANT
 Start Date: 06/10/2003

End Date: 06/10/2003

Test ID: RT061003SP
 Protocol: DL 87-Dinnet/Link
 Sample Type: CUCL-Copper chloride
 Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
81				100	87	ML 7/21/03
82				100	0	
83				100	2	
84				100	19	
85				100	0	
86				100	84	84
87				100	51	
88				100	0	
89				100	89	
90				100	0	
91				100	0	
92				100	35	
93				100	18	
94				100	40	
95				100	45	
96				100	0	
97				100	81	81
98				100	0	
99				100	76	
100				100	0	
101				100	23	
102				100	82	
103				100	25	
104				100	80	80
105				100	84	
106				100	38	
107				100	85	85
108				100	15	
109				100	15	
110				100	2	

Comments:

Test: SC-Sperm Cell Fertilization Test

Test ID: RT061003SP

Species: SP-Strongylocentrotus purpuratus

Protocol: DL 87-Dinnel/Link

Sample ID: REF-REFERENCE TOXICANT

Sample Type: CUCL-Copper chloride

Start Date: 06/10/2003

End Date: 06/10/2003

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
89	1	1	D-Control			
102	2	2	D-Control			
105	3	3	D-Control			
84	4	4	D-Control			
99	5	5	D-Control			
97	6	1	5.000			
104	7	2	5.000			
86	8	3	5.000			
107	9	4	5.000			
81	10	5	5.000			
106	11	1	10.000			
87	12	2	10.000			
92	13	3	10.000			
94	14	4	10.000			
95	15	5	10.000			
103	16	1	20.000			
109	17	2	20.000			
93	18	3	20.000			
101	19	4	20.000			
108	20	5	20.000			
88	21	1	40.000			
85	22	2	40.000			
82	23	3	40.000			
83	24	4	40.000			
110	25	5	40.000			
100	26	1	80.000			
98	27	2	80.000			
90	28	3	80.000			
91	29	4	80.000			
96	30	5	80.000			

Comments:

Sperm Cell Fertilization Test-Proportion Fertilized

Start Date: 6/13/03	Test ID: RT061303SP	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/13/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/13/03	Protocol: DL 87-Dinnel/Link	Test Species: SP-Strongylocentrotus purpuratus
Comments:		

Conc-ug/L	1	2	3	4	5
D-Control	1.0000	0.7900	0.7600	0.7400	1.0000
5	0.7700	0.7500	0.7500	0.5500	0.7200
10	0.7800	0.7700	0.9300	1.0000	0.9300
20	0.9700	0.9100	0.8900	0.9900	0.9500
40	0.8400	0.9300	0.9200	0.9100	0.8400
80	0.3800	0.1500	0.2100	0.1700	0.1000

Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Number Resp	Total Number
			Mean	Min	Max	CV%	N					
D-Control	0.8580	1.0000	1.2462	1.0357	1.5208	20.186	5				71	500
*5	0.7080	0.8252	1.0027	0.8355	1.0706	9.545	5	2.539	2.360	0.2263	146	500
10	0.8820	1.0280	1.2560	1.0706	1.5208	14.840	5	-0.103	2.360	0.2263	59	500
20	0.9420	1.0979	1.3423	1.2327	1.4706	7.189	5	-1.002	2.360	0.2263	29	500
40	0.8880	1.0350	1.2343	1.1593	1.3030	5.652	5	0.123	2.360	0.2263	56	500
*80	0.2020	0.2354	0.4569	0.3218	0.6642	28.140	5	8.231	2.360	0.2263	399	500

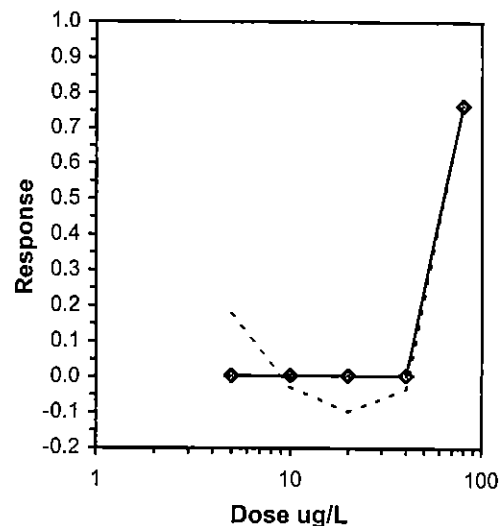
Auxiliary Tests

Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	Statistic	Critical	Skew	Kurt
Bartlett's Test indicates equal variances ($p = 0.14$)	0.93258	0.9	0.44211	-0.3289
	8.30778	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	40	80	56.5685		0.17228	0.19179	0.54482	0.02298	1.5E-08	5, 24

Trimmed Spearman-Kärber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%			
Auto-23.5%	62.870	61.465	64.308



Sperm Cell Fertilization Test-Proportion Fertilized

Start Date: 6/13/03

Test ID: RT061303SP

Sample ID:

REF-REFERENCE TOXICANT

End Date: 6/13/03

Lab ID: WAAEE-AMEC NW Bioassay

Sample Type:

CUCL-Copper chloride

Sample Date: 6/13/03

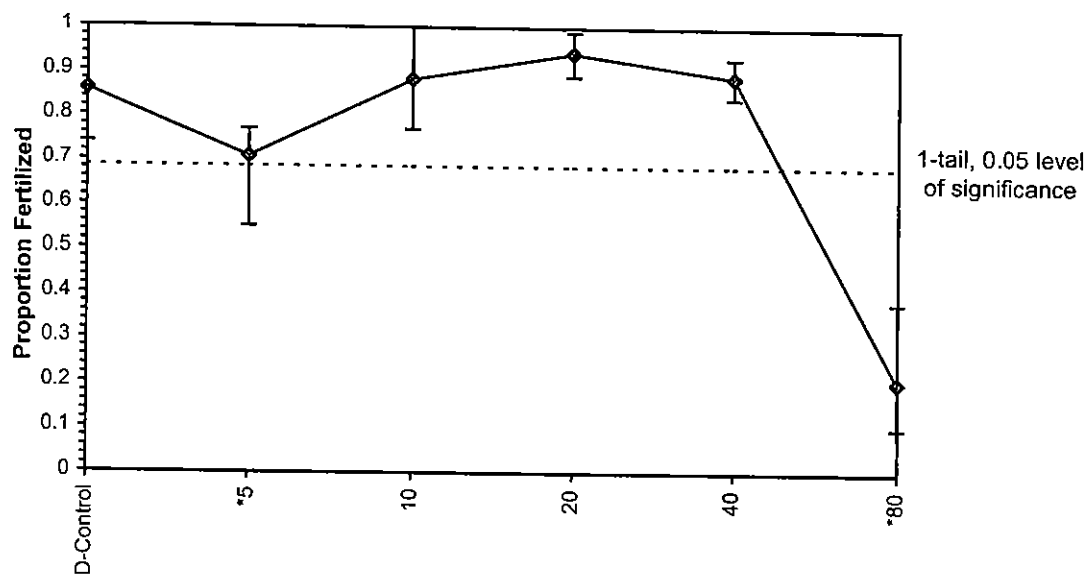
Protocol: DL 87-Dinnel/Link

Test Species:

SP-Strongylocentrotus purpuratus

Comments:

Dose-Response Plot



Test: SC-Sperm Cell Fertilization Test

Test ID: RT061303SP

Species: SP-Strongylocentrotus purpuratus

Protocol: DL 87-Dinzel/Link

Sample ID: REF-REFERENCE TOXICANT

Sample Type: CUCL-Copper chloride

Start Date: 06/13/2003

End Date: 06/18/2003

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
41				100	75	SM 8/3/03
42				100	100	
43				100	100	
44				100	100	
45				100	97	
46				100	99	
47				100	15	
48				100	91	
49				100	95	
50				100	89	
51				100	84	8/4/03
52				100	79	
53				100	82-572	
54				100	88	
55				100	76	
56				100	94	
57				100	75	
58				100	77	
59				100	93	
60				100	31	
61				100	91	
62				100	100	MF 8/5/03
63				100	18	
64				100	55	
65				100	74	
66				100	92	
67				100	93	
68				100	77	
69				100	93	
70				100	57	17 NF

Comments:

Test: SC-Sperm Cell Fertilization Test

Test ID: RT061303SP

Species: SP-Strongylocentrotus purpuratus

Protocol: DL 87-Dinnel/Link

Sample ID: REF-REFERENCE TOXICANT

Sample Type: CUCL-Copper chloride

Start Date: 6/13/03

End Date: 6/13/03

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
44	1	1	D-Control	100	100	
52	2	2	D-Control	100	79	
55	3	3	D-Control	100	76	
65	4	4	D-Control	100	74	
42	5	5	D-Control	100	100	
68	6	1	5.000	100	77	
41	7	2	5.000	100	75	
57	8	3	5.000	100	75	
64	9	4	5.000	100	55	
53	10	5	5.000	100	72	
63	11	1	10.000	100	78	
58	12	2	10.000	100	77	
67	13	3	10.000	100	93	
43	14	4	10.000	100	100	
69	15	5	10.000	100	93	
45	16	1	20.000	100	97	
61	17	2	20.000	100	91	
50	18	3	20.000	100	89	
46	19	4	20.000	100	99	
49	20	5	20.000	100	95	
51	21	1	40.000	100	84	
59	22	2	40.000	100	93	
66	23	3	40.000	100	92	
48	24	4	40.000	100	91	
56	25	5	40.000	100	84	
54	26	1	80.000	100	38	
47	27	2	80.000	100	15	
60	28	3	80.000	100	21	
70	29	4	80.000	100	17	
62	30	5	80.000	100	10	

Comments:

Sperm Cell Fertilization Test-Proportion Fertilized

Start Date: 6/17/03 Test ID: RT061703SP Sample ID: REF-REFERENCE TOXICANT
End Date: 6/17/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: CUCL-Copper chloride
Sample Date: 6/17/03 Protocol: DL 87-Dinnel/Link Test Species: SP-Strongylocentrotus purpuratus
Comments:

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
5	0.9800	0.9100	0.8500	0.9000	0.9600
10	0.3900	0.2600	0.3400	0.1900	0.3700
20	0.0800	0.0100	0.0300	0.0100	0.0000
40	0.0000	0.0000	0.0000	0.0100	0.0000
80	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				Rank Sum	1-Tailed Critical	Number Resp	Total Number
			Mean	Min	Max	CV%				
D-Control	1.0000	1.0000	1.5208	1.5208	1.5208	0.000	5		0	500
*5	0.9200	0.9200	1.2973	1.1731	1.4289	7.828	5	15.00	40	500
*10	0.3100	0.3100	0.5874	0.4510	0.6745	15.828	5	15.00	345	500
*20	0.0260	0.0260	0.1422	0.0500	0.2868	64.763	5	15.00	487	500
*40	0.0020	0.0020	0.0601	0.0500	0.1002	37.346	5	15.00	499	500
*80	0.0000	0.0000	0.0500	0.0500	0.0500	0.000	5	15.00	500	500

Auxiliary Tests

Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)
Equality of variance cannot be confirmed

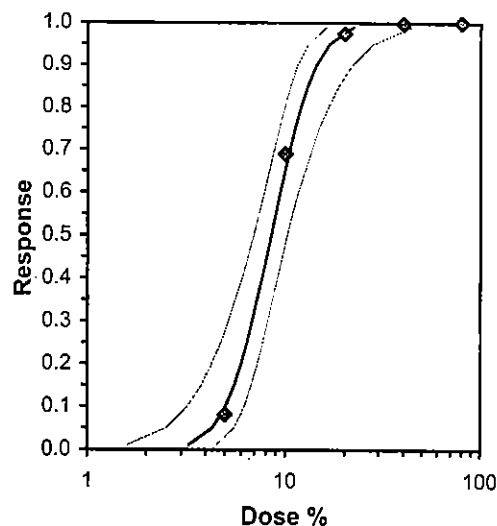
Hypothesis Test (1-tail, 0.05)	Statistic	Critical	Skew	Kurt
Steel's Many-One Rank Test	0.9318	0.9	0.16824	1.00737

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits	Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	5.61598	0.72525	3.3079 7.92406	0	29.2509	7.81472	2.0E-06	0.92991	0.17806	4
Intercept	-0.2223	0.69294	-2.4276 1.9829							

Point	Probits	%	95% Fiducial Limits
EC01	2.674	3.27846	1.60427 4.51716
EC05	3.355	4.33529	2.54325 5.58185
EC10	3.718	5.03164	3.23696 6.27633
EC15	3.964	5.5636	3.79728 6.81405
EC20	4.158	6.02621	4.29967 7.29325
EC25	4.326	6.45364	4.7712 7.75076
EC40	4.747	7.66999	6.10671 9.17544
EC50	5.000	8.50955	6.97986 10.3074
EC60	5.253	9.44101	7.87254 11.7338
EC75	5.674	11.2204	9.36676 14.9426
EC80	5.842	12.0162	9.96762 16.5593
EC85	6.036	13.0154	10.6812 18.7281
EC90	6.282	14.3914	11.6085 21.9467
EC95	6.645	16.703	13.0659 27.9051
EC99	7.326	22.0874	16.161 44.1955

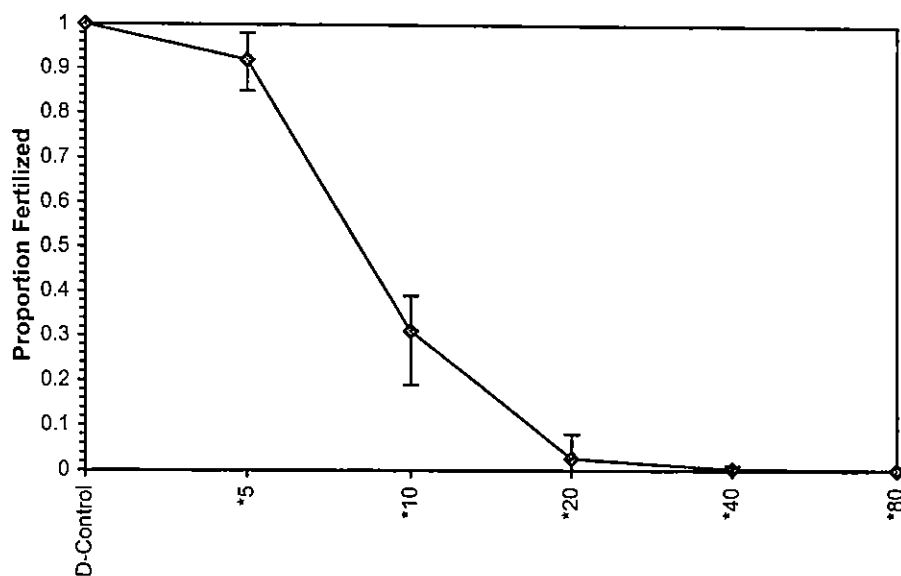
Significant heterogeneity detected ($p = 1.98E-06$)



Sperm Cell Fertilization Test-Proportion Fertilized

Start Date: 6/17/03	Test ID: RT061703SP	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/17/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/17/03	Protocol: DL 87-Dinnel/Link	Test Species: SP-Strongylocentrotus purpuratus
Comments:		

Dose-Response Plot



Test: SC-Sperm Cell Fertilization Test

Species: SP-Strongylocentrotus purpuratus

Sample ID: REF-REFERENCE TOXICANT

Start Date: 06/17/2003

End Date: 06/17/2003

Test ID: RT061703SP

Protocol: DL 87-Dinnel/Link

Sample Type: CUCL-Copper chloride

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
41				100	0	SM 7/24/03
42				100	48	
43				100	45	
44				100	100	
45				100	98	
46				100	1	
47				100	94	
48				100	100	
49				100	0	
50				100	70	
51				100	98	
52				100	0	
53				100	100	
54				100	75	
55				100	0	
56				100	100	
57				100	0	
58				100	2	
59				100	98	
60				100	100	
61				100	100	
62				100	0	
63				100	0	
64				100	100	
65				100	37	
66				100	100	
67				100	0	
68				100	100	
69				100	99	
70				100	100	↓

Comments:

Test: SC-Sperm Cell Fertilization Test				Test ID: RT061703SP		
Species: SP-Strongylocentrotus purpuratus				Protocol: DL 87-Dinnel/Link		
Sample ID: REF-REFERENCE TOXICANT				Sample Type: CUCL-Copper chloride		
Start Date: 6/17/03		End Date: 6/17/03		Lab ID: WAAEE-AMEC NW Bioassay		
Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
66	1	1	D-Control	100	100	
48	2	2	D-Control	100	100	
68	3	3	D-Control	100	100	
56	4	4	D-Control	100	100	
44	5	5	D-Control	100	100	
61	6	1	5.000	100	98	
69	7	2	5.000	100	91	
64	8	3	5.000	100	85	
70	9	4	5.000	100	90	
60	10	5	5.000	100	96	
45	11	1	10.000	100	39	
51	12	2	10.000	100	26	
47	13	3	10.000	100	34	
59	14	4	10.000	100	19	
53	15	5	10.000	100	37	
42	16	1	20.000	100	8	
65	17	2	20.000	100	1	
50	18	3	20.000	100	3	
43	19	4	20.000	100	1	
54	20	5	20.000	100	0	
57	21	1	40.000	100	0	
49	22	2	40.000	100	0	
58	23	3	40.000	100	0	
67	24	4	40.000	100	1	
46	25	5	40.000	100	0	
55	26	1	80.000	100	0	
41	27	2	80.000	100	0	
63	28	3	80.000	100	0	
62	29	4	80.000	100	0	
52	30	5	80.000	100	0	

Comments:

Sperm Cell Fertilization Test-Proportion Fertilized

Start Date: 6/19/03	Test ID: RT061903SP	Sample ID: REF-REFERENCE TOXICANT
End Date: 6/19/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type: CUCL-Copper chloride
Sample Date: 6/19/03	Protocol: DL 87-Dinnet/Link	Test Species: SP-Strongylocentrotus purpuratus
Comments:		

Conc-ug/L	1	2	3	4	5
D-Control	0.8600	0.8800	0.8400	0.7700	0.8700
2.5	0.8500	0.8500	0.8700	0.8500	0.8700
5	0.9100	0.8800	0.8800	0.7900	0.8300
10	0.8900	0.8900	0.9000	0.7200	0.8400
20	0.7200	0.7700	0.7800	0.7800	0.6800
40	0.0500	0.0300	0.0300	0.0800	0.0800

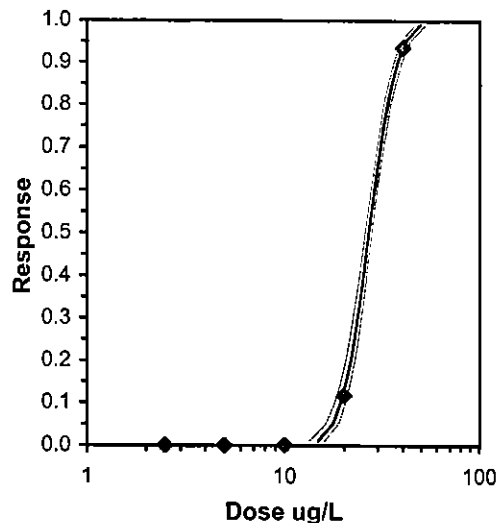
Conc-ug/L	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Number Resp	Total Number
			Mean	Min	Max	CV%	N					
D-Control	0.8440	1.0000	1.1672	1.0706	1.2171	4.975	5				78	500
2.5	0.8580	1.0166	1.1846	1.1731	1.2019	1.333	5	-0.439	2.360	0.0935	71	500
5	0.8580	1.0166	1.1882	1.0948	1.2661	5.687	5	-0.528	2.360	0.0935	71	500
10	0.8480	1.0047	1.1774	1.0132	1.2490	8.338	5	-0.256	2.360	0.0935	76	500
*20	0.7460	0.8839	1.0437	0.9695	1.0826	4.834	5	3.118	2.360	0.0935	127	500
*40	0.0540	0.0640	0.2294	0.1741	0.2868	24.573	5	23.669	2.360	0.0935	473	500

Auxiliary Tests

Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					Statistic	Critical	Skew	Kurt						
Bartlett's Test indicates equal variances (p = 0.10)					0.92563	0.9	-1.0141	0.93121						
					9.12031	15.0863								
Hypothesis Test (1-tail, 0.05)					NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test					10	20	14.1421		0.07317	0.08652	0.72459	0.00392	2.5E-18	5, 24

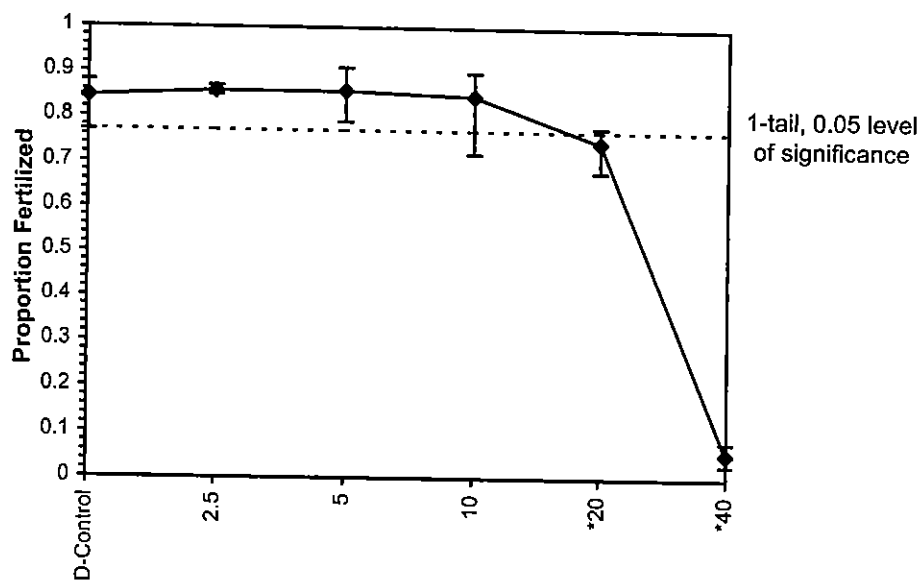
Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.90283	0.50099	7.9209	9.88477	0.156	0.34625	7.81472	0.95	1.43054	0.11232	3
Intercept	-7.7359	0.74255	-9.1913	-6.2805							
TSCR	0.14798	0.00794	0.13241	0.16356							
Point	Probits	ug/L	95% Fiducial Limits								
EC01	2.674	14.7652	13.3822	16.0032							
EC05	3.355	17.6111	16.2754	18.8011							
EC10	3.718	19.3462	18.0551	20.4991							
EC15	3.964	20.6124	19.3579	21.738							
EC20	4.158	21.6775	20.4546	22.7819							
EC25	4.326	22.6351	21.4399	23.7228							
EC40	4.747	25.2399	24.1072	26.3037							
EC50	5.000	26.9491	25.8382	28.023							
EC60	5.253	28.774	27.6613	29.8896							
EC75	5.674	32.0852	30.8885	33.3709							
EC80	5.842	33.5026	32.2375	34.8989							
EC85	6.036	35.2338	33.8614	36.7936							
EC90	6.282	37.5398	35.9887	39.3599							
EC95	6.645	41.2382	39.3331	43.5594							
EC99	7.326	49.1867	46.3295	52.8401							



Sperm Cell Fertilization Test-Proportion Fertilized			
Start Date: 6/19/03	Test ID: RT061903SP	Sample ID:	REF-REFERENCE TOXICANT
End Date: 6/19/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 6/19/03	Protocol: DL 87-Dinnel/Link	Test Species:	SP-Strongylocentrotus purpuratus
Comments:			

Dose-Response Plot



Test: SC-Sperm Cell Fertilization Test
 Species: SP-Strongylocentrotus purpuratus
 Sample ID: REF-REFERENCE TOXICANT
 Start Date: 06/19/2003

End Date: 06/19/2003

Test ID: RT061903SP
 Protocol: DL 87-Dinnel/Link
 Sample Type: CUCL-Copper chloride
 Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
41				100	87	et 8/1/03
42				100	85	
43				100	89	↓
44				100	79	
45				100	8	
46				100	84	
47				100	88	
48				100	77	
49				100	84	
50				100	90	
51				100	78	
52				100	8	
53				100	64	
54				100	72	
55				100	83	
56				100	88	
57				100	91	
58				100	78	
59				100	3	
60				100	86	
61				100	89	
62				100	72	
63				100	88	
64				100	85	
65				100	3	
66				100	5	
67				100	87	
68				100	85	
69				100	87	✓
70				100	77	

Comments:

Test: SC-Sperm Cell Fertilization Test
 Species: SP-Strongylocentrotus purpuratus
 Sample ID: REF-REFERENCE TOXICANT

Start Date: 06/19/2003

End Date: 06/19/2003

Test ID: RT061903SP

Protocol: DL 87-Dinnel/Link

Sample Type: CUCL-Copper chloride

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
60	1	1	D-Control			
47	2	2	D-Control			
49	3	3	D-Control			
70	4	4	D-Control			
67	5	5	D-Control			
64	6	1	2.500			
42	7	2	2.500			
41	8	3	2.500			
68	9	4	2.500			
69	10	5	2.500			
57	11	1	5.000			
56	12	2	5.000			
63	13	3	5.000			
44	14	4	5.000			
55	15	5	5.000			
61	16	1	10.000			
43	17	2	10.000			
50	18	3	10.000			
54	19	4	10.000			
46	20	5	10.000			
62	21	1	20.000			
48	22	2	20.000			
58	23	3	20.000			
51	24	4	20.000			
53	25	5	20.000			
66	26	1	40.000			
59	27	2	40.000			
65	28	3	40.000			
45	29	4	40.000			
52	30	5	40.000			

Comments:

Sperm Cell Fertilization Test-Proportion Fertilized

Start Date: 6/21/03 Test ID: RT062103SP Sample ID: REF-REFERENCE TOXICANT
End Date: 6/21/03 Lab ID: WAAEE-AMEC NW Bioassay Sample Type: CUCL-Copper chloride
Sample Date: 6/21/03 Protocol: DL 87-Dinnel/Link Test Species: SP-Strongylocentrotus purpuratus
Comments:

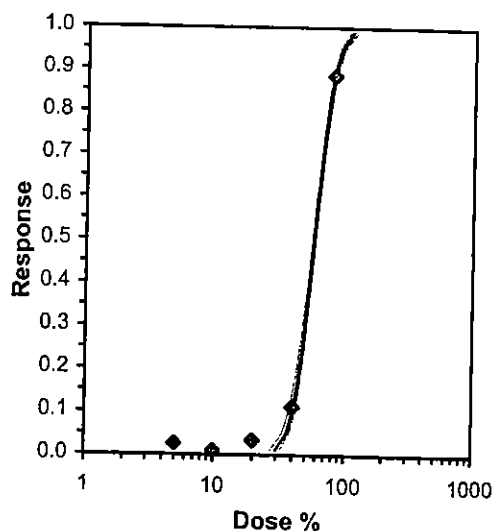
Conc-%	1	2	3	4	5
D-Control	0.9400	0.9800	0.9500	0.9400	0.9600
5	0.9100	0.9100	0.9300	0.9500	0.9500
10	0.9400	0.9400	0.9400	0.9200	0.9900
20	0.9400	0.9300	0.8900	0.9200	0.9300
40	0.9200	0.9300	0.8200	0.8400	0.7300
80	0.0900	0.2000	0.1600	0.0300	0.0700

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					t-Stat	1-Tailed Critical	MSD	Number Resp	Total Number
			Mean	Min	Max	CV%	N					
D-Control	0.9540	1.0000	1.3581	1.3233	1.4289	3.236	5				23	500
5	0.9300	0.9748	1.3052	1.2661	1.3453	3.035	5	1.073	2.360	0.1163	35	500
10	0.9460	0.9916	1.3449	1.2840	1.4706	5.376	5	0.266	2.360	0.1163	27	500
20	0.9220	0.9665	1.2892	1.2327	1.3233	2.677	5	1.397	2.360	0.1163	39	500
*40	0.8480	0.8889	1.1807	1.0244	1.3030	9.735	5	3.600	2.360	0.1163	76	500
*80	0.1100	0.1153	0.3243	0.1741	0.4636	35.547	5	20.978	2.360	0.1163	445	500

Auxiliary Tests

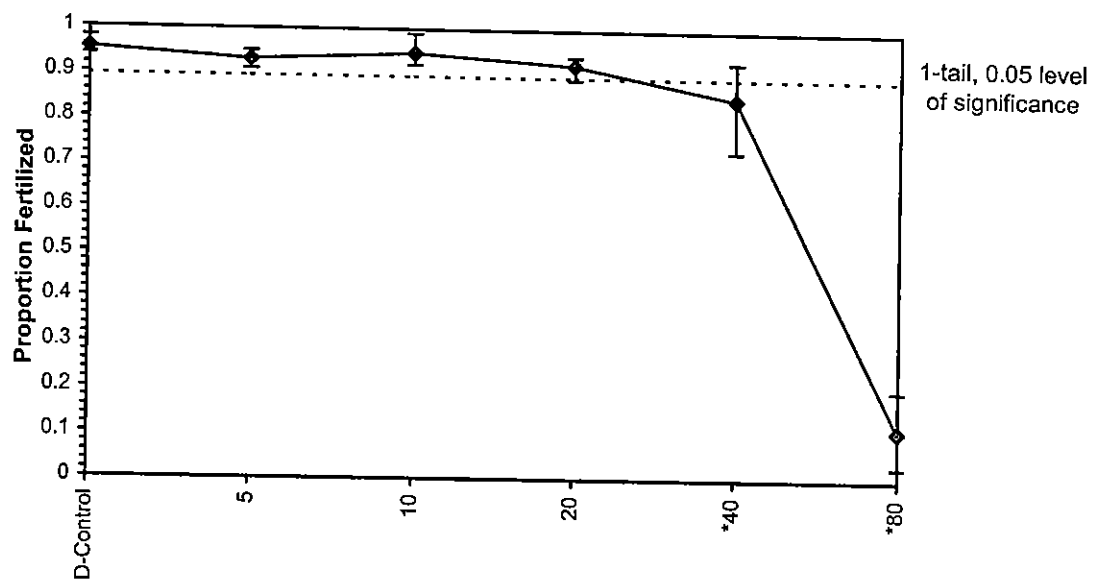
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					Statistic	Critical	Skew	Kurt		
Bartlett's Test indicates equal variances (p = 0.08)					0.94341	0.9	0.06834	0.37492		
Hypothesis Test (1-tail, 0.05)					9.89919	15.0863				
Dunnett's Test	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
	20	40	28.2843	5	0.05983	0.06262	0.80581	0.00607	1.1E-16	5, 24

Maximum Likelihood-Probit											
Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.28015	0.42777	7.44171	9.11858	0.046	3.29131	7.81472	0.35	1.75955	0.12077	6
Intercept	-9.5693	0.76987	-11.078	-8.0604							
TSCR	0.06197	0.0054	0.05139	0.07254							
Point	Probits	%	95% Fiducial Limits								
EC01	2.674	30.1019	27.4907	32.4588							
EC05	3.355	36.383	33.8706	38.6376							
EC10	3.718	40.2508	37.835	42.4229							
EC15	3.964	43.0901	40.7542	45.2003							
EC20	4.158	45.4889	43.2218	47.5504							
EC25	4.326	47.653	45.4458	49.6764							
EC40	4.747	53.5737	51.4955	55.5459							
EC50	5.000	57.4842	55.4393	59.4883							
EC60	5.253	61.6802	59.6043	63.7968							
EC75	5.674	69.3437	67.0088	71.8988							
EC80	5.842	72.6427	70.12	75.4744							
EC85	6.036	76.6866	73.881	79.9192							
EC90	6.282	82.0961	78.837	85.9555							
EC95	6.645	90.8236	86.6943	95.8683							
EC99	7.326	109.775	103.362	117.929							



Sperm Cell Fertilization Test-Proportion Fertilized			
Start Date: 6/21/03	Test ID: RT062103SP	Sample ID:	REF-REFERENCE TOXICANT
End Date: 6/21/03	Lab ID: WAAEE-AMEC NW Bioassay	Sample Type:	CUCL-Copper chloride
Sample Date: 6/21/03	Protocol: DL 87-Dinnel/Link	Test Species:	SP-Strongylocentrotus purpuratus
Comments:			

Dose-Response Plot



Test: SC-Sperm Cell Fertilization Test

Test ID: RT062103SP

Species: SP-Strongylocentrotus purpuratus

Protocol: DL 87-Dinnel/Link

Sample ID: REF-REFERENCE TOXICANT

Sample Type: CUCL-Copper chloride

Start Date: 6/21/03

End Date: 6/21/03

Lab ID: WAAEE-AMEC NW Bioassay

Pos	ID	Rep	Group	Total Counted	Number Fertilized	Notes
54	1	1	D-Control	100	94	
42	2	2	D-Control	100	98	
66	3	3	D-Control	100	95	
63	4	4	D-Control	100	94	
60	5	5	D-Control	100	96	
49	6	1	5.000	100	91	
61	7	2	5.000	100	91	
57	8	3	5.000	100	93	
65	9	4	5.000	100	95	
70	10	5	5.000	100	95	
53	11	1	10.000	100	94	
69	12	2	10.000	100	94	
62	13	3	10.000	100	94	
46	14	4	10.000	100	92	
48	15	5	10.000	100	99	
43	16	1	20.000	100	94	
44	17	2	20.000	100	93	
55	18	3	20.000	100	89	
51	19	4	20.000	100	92	
68	20	5	20.000	100	93	
56	21	1	40.000	100	92	
64	22	2	40.000	100	93	
47	23	3	40.000	100	82	
50	24	4	40.000	100	84	
67	25	5	40.000	100	73	
41	26	1	80.000	100	9	
58	27	2	80.000	100	20	
45	28	3	80.000	100	16	
52	29	4	80.000	100	3	
59	30	5	80.000	100	7	

Comments:

Appendix D
Chain-of-Custody Forms



Date 6/9/03 Page 1 of 1

DISTRIBUTION: WHITE, CANARY - AMEC Bioassay Lab, PINK - Originator



AMEC Northwest Bioassay Laboratory
5009 Pacific Highway East, Suite 2
Fife, WA 98424
253-922-4296

Chain of Custody

Date 6/9/03 Page 1 of 1

COMPANY <u>Sitaband & Wilson</u>					ANALYSIS REQUIRED										KAREN BECKMAN PROJECT MANAGER <u>Nat C Pat</u> SAMPLERS (SIGNATURE) <u>907/561-2120</u> PHONE NUMBER		NUMBER OF CONTAINERS
ADDRESS <u>5430 FAIRBANKS ST SUITE 3</u>															CONCENTRATIONS/COMMENTS		
CITY <u>ANCHORAGE</u> STATE <u>AK</u> ZIP <u>99508</u>																	
PHONE NO. <u>907/561-2120</u>																	
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	WHALE EFFLUENT TOXICITY												
SPIRIT OF COLUMBIA GWL	6/9/03	11:15	W	10 L CUBE (W)	X												
SPIRIT OF COLUMBIA GWL	6/9/03	9:05	X	X	X												
PROJECT INFORMATION		SAMPLE RECEIPT			RELINQUISHED BY										RELINQUISHED BY		
CLIENT CPV	TOTAL NO. OF CONTAINERS			2	(Signature) <u>Nat C Pat</u> (Time) <u>16:00</u>										(Signature) _____ (Time) _____		
P.O. NO. 32-1-16713-001	CHAIN OF CUSTODY SEALS			Y	(Printed Name) <u>Nat C Pat</u> (Date) <u>6/9/03</u>										(Printed Name) _____ (Date) _____		
SHIPPED VIA: AK AIR GOLDSMEAK	RECEIPT TEMP			21	(Company) <u>Sitaband & Wilson</u>										(Company) _____		
CONFORMS TO RECORD					Y												
SPECIAL INSTRUCTIONS/COMMENTS:					RECEIVED BY										RECEIVED BY (LABORATORY)		
					(Signature) _____ (Time) _____										(Signature) <u>Eric Tollefson</u> 9:00 (Time) _____		
					(Printed Name) _____ (Date) _____										(Printed Name) <u>ERIC TOLLEFSON</u> 6/10/03 (Date) _____		
					(Company) _____										AMEC Bioassay Lab Log-In No. <u>03-0202</u>		

Additional disposal charges may apply.

DISTRIBUTION: WHITE, CANARY - AMEC Bioassay Lab, PINK - Originator

Date 6/12/03 Page 1 of 1

COMPANY <u>SHANNON & WILSON</u> ADDRESS <u>5430 FAIRBANKS ST. SUITE 3</u> CITY <u>ANCHORAGE</u> STATE <u>AK</u> ZIP <u>99508</u> PHONE NO. <u>907/561-2120</u>					ANALYSIS REQUIRED										KAREN BERGMAN PROJECT MANAGER <u>Nick C. Pate</u> SAMPLERS (SIGNATURE) <u>907/561-2120</u> PHONE NUMBER		NUMBER OF CONTAINERS					
															CONCENTRATIONS/COMMENTS							
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	Whole Effluent Toxicity																	
SPIRIT OF OCEANUS COMBINED	6/12/03	0915	W	102 LWB		X															RESIDUAL CHLORINE NOT DETECTED IN FIELD	2

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY		RELINQUISHED BY	
CLIENT <u>CPV</u>	TOTAL NO. OF CONTAINERS <u>2</u>	CHAIN OF CUSTODY SEALS <u>Y</u> RECEIPT TEMP <u>°C</u> CONFORMS TO RECORD <u>Y</u>		<u>Nick C. Pate</u> <u>1200</u> (Signature) (Time) <u>NATHAN C. PATE</u> <u>6/12/03</u> (Printed Name) (Date) <u>SHANNON & WILSON</u> (Company)		(Signature) (Time) (Printed Name) (Date) (Company)	
P.O. NO. <u>32-1-16713-001</u>							
SHIPPED VIA: <u>AK AIR GOLDSTREAM</u>							
SPECIAL INSTRUCTIONS/COMMENTS:				RECEIVED BY		RECEIVED BY (LABORATORY)	
				(Signature) (Time) (Printed Name) (Date) (Company)		<u>Noelle Frick</u> <u>6900</u> (Signature) (Time) <u>Noelle Frick</u> <u>6/13/03</u> (Printed Name) (Date) <u>03-0208</u> (Date)	
						AMEC Bioassay Lab Log-in No.	

Additional disposal charges may apply.

Date 6/18 Page 1 of 1

COMPANY <u>Shannon + Wilson</u> ADDRESS <u>contract for DEC</u> CITY <u>5430 Fairbank St</u> STATE <u>AK</u> ZIP <u>99518</u> PHONE NO. <u>1-907-561-2120</u> <u>Anchorage</u>					ANALYSIS REQUIRED <u>EPA/600/4-90/2</u> <u>Topsoil Acute</u> <u>Chronic</u> <u>myocard shrink</u> <u>Chrome</u> <u>Bivalve Local</u> <u>Echinoderm</u> <u>EPA/600/4/90/27</u> <u>EPA/600/R-95/136</u> <u>Developing for or</u> <u>toxicity testing</u> <u>archival of data</u>										Nathan Patry PROJECT MANAGER <u>Carolyn Morehouse</u> SAMPLERS (SIGNATURE) <u>Carolyn</u> PHONE NUMBER <u>907-465-5279</u> CONCENTRATIONS/COMMENTS		NUMBER OF CONTAINERS <u>2</u>
SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE													
<u>Norwegian Wind</u>	<u>6/18</u>	<u>9:30</u>		<u>Cube</u>													
<u>Norwegian Wind</u>																	

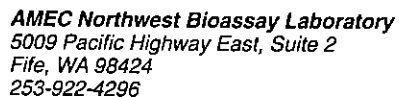
PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY		RELINQUISHED BY	
CLIENT <u>Shannon + Wilson/ADDC</u>	TOTAL NO. OF CONTAINERS <u>2</u>	CHAIN OF CUSTODY SEALS <u>✓</u>	RECEIPT TEMP <u>41</u>	(Signature) <u>Carolyn Morehouse</u>	(Time) <u>11:00</u>	(Signature)	(Time)
P.O. NO.		RECEIPT TEMP <u>41</u>	CONFORMS TO RECORD <u>✓</u>	(Printed Name) <u>ADDC</u>	(Date) <u>6/18/03</u>	(Printed Name)	(Date)
SHIPPED VIA: <u>Coldstreak</u>				(Company)		(Company)	
SPECIAL INSTRUCTIONS/COMMENTS: <u>Sealed before Alaska Air</u>				RECEIVED BY		RECEIVED BY (LABORATORY)	
				(Signature)	(Time)	(Signature)	(Time)
				(Printed Name)	(Date)	(Printed Name)	(Date)
				(Company)		(Company)	
						<u>Matthew J. Liebs</u> <u>1130</u> <u>6/19/03</u> <u>03-0224</u> AMEC Bioassay Lab Log-In No.	



Date 6/20/03 Page 1 of 1

Additional disposal charges may apply.

DISTRIBUTION: WHITE, CANARY - AMEC Bioassay Lab, PINK - Originator



Date 9/12/03 Page 1 of 1

DISTRIBUTION: WHITE, CANARY - AMEC Bioassay Lab, PINK - Originator

Appendix E
Field Sampling Data Sheets

Commercial Passenger Vessel Wastewater
Field Sampling Data Sheet

Vessel name SPIRIT OF COLUMBIA Location WHITTIER
(Port where sampled)

Vessel type SMALL SHIP
(e.g., "large ship," "small ship")

Sampling personnel name(s) and signature(s):

1) NATHAN C PATEY
Name (print)

Nathan C Patey
Signature

2) Carolyn Morehouse
Name (print)

Carolyn H Morehouse
Signature

Shipboard assistants (print name, and initial these field notes):

ZAW M LWIN Zaw M Lwin

Descriptions of photos taken of sample ports:

CAROLYN MOREHOUSE COLLECTED PHOTOS

Sample ID ¹ : <u>SPIRIT OF COLUMBIA BW</u>	Sample ID ¹ : <u>SPIRIT OF COLUMBIA GW</u>
Sample source ² : <u>Port B</u>	Sample source ² : <u>Port D</u>
Date collected: <u>6/9/03</u>	Date collected: <u>6/9/03</u>
Time collected: <u>9:35</u>	Time collected: <u>11:15</u>
<u>Field measurements</u>	<u>Field measurements</u>
Sample temperature (collection): <u>14.6°C</u>	Sample temperature (collection): <u>17.3°C</u>
pH: <u>7.64</u> Residual chlorine: <u>50.75</u> mg/L	pH: <u>7.15</u> Residual chlorine: <u>0</u> mg/L
Sample temperature (shipped): <u> </u> °C	Sample temperature (shipped): <u> </u> °C

Discharge flow rates and holding tank volumes for sample sources: ALL AUTOMATIC
CONTINUOUS DISCHARGE

Seawater influx into treatment systems (if applicable):

Note any deviations from Sampling Plan and/or QAPP, any unusual conditions, or general observations:

¹Sample identifier is same as written on Chain of Custody form

²Source of sample (e.g., "grab sample from laundry graywater tank sampling port")

Commercial Passenger Vessel Wastewater
Field Sampling Data Sheet

Vessel name SPIRIT OF OCEANUS Location ANCHORAGE, AK
(Port where sampled)

Vessel type SMALL
(e.g., "large ship," "small ship")

Sampling personnel name(s) and signature(s):

1) NATHAN C PATRY Nathan C Patry
Name (print) Signature

2) _____
Name (print) Signature

Shipboard assistants (print name, and initial these field notes):

Anatoly, C/E

Descriptions of photos taken of sample ports:

1 PHOTO OF SAMPLE PORT

Sample ID ¹ : <u>SPIRIT OF OCEANUS COMBINED</u>	Sample ID ¹ : _____
Sample source ² : <u>PORT 1</u>	Sample source ² : _____
Date collected: <u>6/12/03</u>	Date collected: _____
Time collected: <u>915</u>	Time collected: _____
<u>Field measurements</u>	<u>Field measurements</u>
Sample temperature (collection): <u>24.6°C</u>	Sample temperature (collection): _____°C
pH: <u>6.8</u> Residual chlorine: <u>0</u> mg/L	pH: _____ Residual chlorine: _____ mg/L
Sample temperature (shipped): _____°C	Sample temperature (shipped): _____°C

Discharge flow rates and holding tank volumes for sample sources:

Seawater influx into treatment systems (if applicable):

Note any deviations from Sampling Plan and/or QAPP, any unusual conditions, or general observations:

DISCHARGE TO DAY TANK

¹Sample identifier is same as written on Chain of Custody form

²Source of sample (e.g., "grab sample from laundry graywater tank sampling port")

Commercial Passenger Vessel Wastewater
Field Sampling Data Sheet

Vessel name SUN PRINCESS

Location SEWARD, AK
(Port where sampled)

Vessel type LARGE
(e.g., "large ship," "small ship")

Sampling personnel name(s) and signature(s):

1) NATHAN C PATRY
Name (print)

Nathan C Patry
Signature

2) ANDREA FIVOCCHIARO
Name (print)

Andrea Fivocchiaro
Signature

Shipboard assistants (print name, and initial these field notes):

Descriptions of photos taken of sample ports:

PHOTO OF MBE #1 DISCHARGE

PHOTO OF PREMEDIATE DISCHARGE PORT 5 (ALL 3 MBZ'S)
SAMPLE PORT

PHOTO OF OVERBOARD LINE

Sample ID¹: SUN PRINCESS COMBINED (MBZ'S)

Sample ID¹: _____

Sample source²: _____

Sample source²: _____

Date collected: 6/16/03

Date collected: _____

Time collected: 1315

Time collected: _____

Field measurements

Field measurements

Sample temperature (collection): 32.5°C

Sample temperature (collection): _____°C

pH: 6.85 Residual chlorine: 0.62 mg/L

pH: _____ Residual chlorine: _____ mg/L

Sample temperature (shipped): 3.9°C

Sample temperature (shipped): _____°C

Discharge flow rates and holding tank volumes for sample sources:

Seawater influx into treatment systems (if applicable):

Note any deviations from Sampling Plan and/or QAPP, any unusual conditions, or general observations:

WILL ADD SODIUM THIOSULFATE TO PRIORITY POLLUTANT
CONTAINERS UNTIL CI IS NO LONGER DETECTED
NO DISCHARGE IN LAST 24 HRS. ALL 3 MBZ'S DISCHARGE INTO PORT

¹Sample identifier is same as written on Chain of Custody form

²Source of sample (e.g., "grab sample from laundry graywater tank sampling port")

Commercial Passenger Vessel Wastewater
Field Sampling Data Sheet

Vessel name RYNDAM

Location SEWARD, AK
(Port where sampled)

Vessel type LARGE
(e.g., "large ship," "small ship")

Sampling personnel name(s) and signature(s):

1) NATHAN C PATRY
Name (print)

Nathan C Patry
Signature

2) _____
Name (print)

Signature

Shipboard assistants (print name, and initial these field notes):

Michael S. Strain ERIK NILSSEN B. Nih

Descriptions of photos taken of sample ports:

- 2- PICTURES OF SAMPLING PORT;
- 1- PICTURE OF LINE LABEL "PERMEATE FROM UV LINE"
- 1- PICTURE LABELED SAMPLE PORT

Sample ID¹: RYNDAM COMBINED

Sample ID¹: _____

Sample source²: OVERBOARD COMBINED PERMEATE

Sample source²: _____

Date collected: 6/20/03

Date collected: _____

Time collected: 1210

Time collected: _____

Field measurements

Field measurements

Sample temperature (collection): 25 °C

Sample temperature (collection): _____ °C

pH: 7.3 Residual chlorine: 0 mg/L
3.6 AMEC

pH: _____ Residual chlorine: _____ mg/L

Sample temperature (shipped): _____ °C ANALYTICA

Sample temperature (shipped): _____ °C

Discharge flow rates and holding tank volumes for sample sources:

Seawater influx into treatment systems (if applicable):

Note any deviations from Sampling Plan and/or QAPP, any unusual conditions, or general observations: SAMPLES COLLECTED FROM PORT PRIOR TO OVERBOARD DISCHARGE

¹Sample identifier is same as written on Chain of Custody form

²Source of sample (e.g., "grab sample from laundry graywater tank sampling port")