Responses to your questions about the sulfide criterion report
Dr. D.A. Coats to: Eugene Bromley 12/27/2006 10:32 PM
Please respond to Doug.Coats

History: This message has been replied to and forwarded.

Eugene,

Sorry if you have been getting multiple copies of this email but I keep getting delivery error messages when I send it to you.

Attached are revised tables and figures for the subject sulfide report that were modified based on your recent questions. The specific responses to your questions are listed below. If I missed something, or if you have further questions, please let me know.

Question 1: What is the origin of the concentration values in the primary data used as input to the PRA, listed in the report as Table V1?

Response 1: The values used in the PRA include both historic bioassay data, and recent data generated during the bioassay testing program conducted by Weston as part of this sulfide-toxicity study. A revised version of the PRA input data is attached as Table V.1. Revisions to this table were made based on your questions, and based on a reassessment of the suitability of data for use in the PRA. Revisions to the table of Weston bioassay endpoints that were used in the PRA (the last table in the Sulfide Criterion Report) are reflected in the attached Table V.4. Table V.4 replaces the last table in the Sulfide Criterion Report. The results of the PRA using the revised input are shown in the attached, revised version of Figure 5. It replaces the Figure provided on top of Page 73. The protective level determined from the revised results is 12.5 ug/L for the 95^{th} percentile.

Insofar as the origin of the PRA input data, endpoints referred to as "This Study" in Table V.1 correspond to average of endpoints from each of the multiple tests that were conducted as part of the Weston bioassays. Averaging ensures that the results of any one test (i.e., conducted for a specific duration on a specific species) is not unduly influential. Only the LOEC (lowest observed effects concentration) and LC50/EC50 endpoints were included in the PRA. The NOEC (no observed effect concentration) was not included for the reasons described in the report on Page 70. Note, also, that inclusion of the LOEC and LC50/EC50 values listed in red font in Table V.4 builds a substantial, but unknown level of conservatism into the PRA. The values in red represent a test in which the highest test concentration did not elicit a significant response (or in the case of an LC50/EC50 a response of a magnitude sufficient to calculate a 50% response estimate). In that case, the reported value is the highest concentration used in the test. Consequently, the actual response level is likely to be much higher than the concentration reported in red.

The PRA input data were also revised to exclude the "Growth" endpoints for chronic bioassays, in lieu of "Biomass" endpoints. These two endpoints are closely related and as such, do not represent statistically independent measures of toxic response, which is a premise of PRA. Growth and Biomass endpoints are both expressions of the amount of growth that has occurred during the chronic test. Both use the same raw test data (initial weight and end weight) to derive the numerator in the growth/biomass endpoints. EPA testing programs typically use the "Biomass" endpoint for chronic test. That endpoint was used in the revised Tables V.1 and V.4 attached hereto.

Finally, results from the chronic test conducted on 2.10.06 with *Menidia beryllina* were inadvertently included in the computations of the mean for *M. beryllina* in the PRA input. That test had been rejected during the data analysis. The mean LOEC and EC50 for survival and biomass were corrected in the attached tables to reflect data from the two remaining valid tests. The results for the bioassay on *H. rufescens* , which were inadvertently left out of the Weston Summary table, have been included in the revised Table V.4.

Question 2: In the PRA input table, the historical tests by Knezovich et al., 1996 lists two different endpoints (9 and 10 ug/L) for *Mytilus edulis* and *Mytilus* sp. Are these different tests on the same species or different species?

Response 2: These should both be *Mytilus edulis* , and attached Table V.1 has been revised accordingly. Both endpoints were generated from the same test conducted with *Mytilus edulis* . The two values for *M. edulis* that are used in the PRA come from Table 28 on Page III-5 of the report. The value of 9 is the LOEC, the value of 10 is the EC50.

Question 3: In the last table of the report summarizing the Weston test results for *Americamysis bahia* , why are the concentrations inconsistent with the discussion contained in the rest of the report? Why is there no discussion of the acute test conducted on 2.10.06?

Response 3: The 33.1 ug/L and 9.4 ug/L values originally listed in Table V.5 for the 1.25.06 acute test on *Americamysis bahia* were incorrect. They were revised to 14.6 ug/L and 7.2. ug/L in accordance with the reported test results. The revised values are reflected in the attached tables and PRA results. The acute values reported for the 2.10.06 test was extracted from a 7-d chronic test that was not used as a chronic test due to technical problems with the dosing system. However, the dosing system was functioning throughout a 96-h exposure period and those data provided a 96-h acute endpoint. The results of that test are also attached to this email.

Question 4: In the last table of the report summarizing the Weston test results for *M. galloprovincialis* , where do the "Continuous" endpoints come from? What are the "Spike" endpoints? What was included in the computation of average endpoints? Why are there inconsistencies between the discussion of Tests 1 and 2, and the entries in the table?

Response 4: The spike test exposed larvae for discrete periods to determine if there were "windows" of sensitivity. There was also an H_2S exposure during that test that exposed larvae continuously for the entire test period. The continuous endpoints represent a standard 48-h endpoint based on a mean of all acceptable hourly H_2S measurements. The non-standard spike-test results were not included in the computations of the mean responses used in the PRA. Accordingly, they have been removed from the revised Table V.4 attached hereto. The average endpoints were calculated based on the results from Test 1, Test 2, and the "Continuous" test values.

The report contained errors in the LOECs for Test 1 and Test 2, both in the descriptions of the two tests at the bottom of Page 52, and in the summary table in the Appendix. The body of the report (Page 52) should list the correct LOEC for Test 1 as 5.5 ug/L and the LOEC for Test 2 as 5.2 ug/L. The correct EC50s of 6.3 ug/L and 6.2 ug/L for the two respective tests were correctly reported in the body of the text, but not in the table in the appendix. The revised attached tables reflect the correct values for these tests along with the associated averages.

The LOEC for Test 1 used in the PRA (5.5 ug/L H_2S in the attached Table V.4) differs from the LOEC determined from the endpoint reported by the statistical hypothesis test (2.2 ug/L on Page 188 of the original report PDF). In this particular case, the LOEC used in the PRA was based on *biological significance* rather than the results of the statistical hypothesis test because the statistical test was inordinately influenced by the lack of variability among replicate samples. In particular, there was 100% normal development in each replicate of the control tests, so there was no variability about the mean. As such, the statistical hypothesis test incorrectly ascribed statistically significance to a very slight difference in the perceived response to low exposure concentrations. Such small differences would not be considered a toxic response in normal testing scenarios. Specifically, the percent normal development in the first two test concentrations were 99.7% normal in 2.2 ug/L H_2S, and 96% normal in 3.5 ug/L H_2S. With the variance typically observed in control tests, such small differences from control performance would not be considered biologically significant. The response in the 5.5 ug/L H_2S treatment was also very slight (88.5% normal development); however, because it was less than 90%, which is the performance control criteria for nearly all acute toxicity tests, it was considered biologically significant and was reported as the LOEC.

Best regards,

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Revised Sulfide Criterion Tables 061222.pdf

Table V.1. Primary Data Set Used in PRA Analysis

Phylum	Common Name	Species	Concentration ($\mu g/L\ H_2S$)	Reference
Mollusca	Bay Mussel	*Mytilus galloprovincialis*	7	This study
Arthropoda	Mysid	*Americamysis bahia*	8	This study
Arthropoda	Mysid	*Americamysis bahia*	8	This study
Mollusca	Bay Mussel	*Mytilus galloprovincialis*	8	This study
Mollusca	Bay Mussel	*Mytilus edulis*	9	Knezovich et al., 1996
Arthropoda	Mysid	*Americamysis bahia*	10	This study
Mollusca	Bay Mussel	*Mytilus edulis*	10	Knezovich et al., 1996
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	11	Holland, et al., 1960
Arthropoda	Mysid	*Americamysis bahia*	12	This study
Arthropoda	Mysid	*Americamysis bahia*	12	This study
Arthropoda	Mysid	*Americamysis bahia*	12	This study
Echinodermata	Purple Sea Urchin	*Strongylocentrotus purpuratus*	13	Knezovich et al., 1996
Mollusca	Red Abalone	*Haliotis rufescens*	14	This study
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	15	Holland, et al., 1960
Echinodermata	Purple Sea Urchin	*Strongylocentrotus purpuratus*	19	Knezovich et al., 1996
Echinodermatia	White Sea Urchin	*Lytechnius pictus*	21	Thompson et al., 1991
Chordata	Topsmelt	*Atherinops affinis*	23	This study
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	23	Holland, et al., 1960
Mollusca	Red Abalone	*Haliotis rufescens*	27	This study
Chordata	Inland Silverside	*Menidia beryllina*	29	This study
Chordata	Inland Silverside	*Menidia beryllina*	30	This study
Chordata	Inland Silverside	*Menidia beryllina*	33	This study
Chordata	Inland Silverside	*Menidia beryllina*	33	This study
Chordata	Northern Anchovy	*Engraulis mordax*	35	Bagarinao and Vetter, 1989
Echinodermata	Sea Urchin	*Paracentrotus lividus*	35	Knezovich et al., 1996
Arthropoda	Amphipod	*Ampelisca abdita*	39	This study
Chordata	Topsmelt	*Atherinops affinis*	40	This study
Chordata	Inland Silverside	*Menidia beryllina*	40	This study
Echinodermata	White Sea Urchin	*Lytechinus pictus*	43	Thompson et al., 1991
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	45	Holland, et al., 1960
Chordata	Inland Silverside	*Menidia beryllina*	48	This study
Arthropoda	Amphipod	*Ampelisca abdita*	48	This study
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	60	Holland, et al., 1960
Arthropoda	Penaeid Shrimp	*Penaeus indicus*	63	Gopakumar and Kuttyamma, 1996
Chordata	Sheepshead Minnow	*Cyprinodon variegatus*	73	This study
Arthropoda	Penaeid Shrimp	*Metapenaeus dobsoni*	77	Gopakumar and Kuttyamma, 1996
Chordata	Sheepshead Minnow	*Cyprinodon variegatus*	84	This study
Echinodermata	Sea Urchin	*Paracentrotus lividus*	95	Thompson et al., 1991
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	96	Holland, et al., 1960
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	96	Holland, et al., 1960
Chordata	Sheepshead Minnow	*Cyprinodon variegatus*	99	This study
Chordata	Speckled Sanddab	*Citharichthys stigmaeus*	102	Bagarinao and Vetter, 1989
Bacillariophyta	Diatom	*Skeletonema costarum*	105	Breteler et al., 1991
Annelida	Polychaete worm	*Neanthes arenaceodentata*	105	This study
Annelida	Polychaete worm	*Neanthes arenaceodentata*	105	This study
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	107	Holland, et al., 1960
Chordata	Sheepshead Minnow	*Cyprinodon variegatus*	110	This study
Chordata	Sheepshead Minnow	*Cyprinodon variegatus*	110	This study
Arthropoda	Penaeid Shrimp	*Penaeus indicus*	117	Gopakumar and Kuttyamma, 1996

Table V.1. Primary Data Set Used in PRA Analysis (continued)

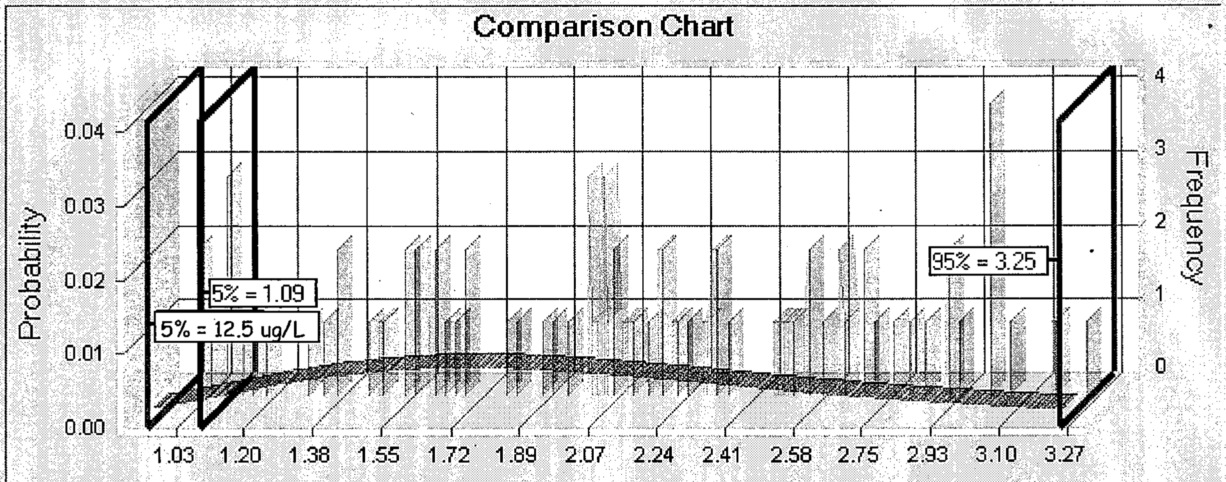
Phylum	Common Name	Species	Concentration (µg/L H_2S)	Reference
Arthropoda	Penaeid Shrimp	*Penaeus indicus*	119	Gopakumar and Kuttyamma, 1996
Arthropoda	Penaeid Shrimp	*Metapenaeus dobsoni*	125	Gopakumar and Kuttyamma, 1996
Chordata	Giant Kelpfish	*Heterostichus rostratus*	136	Bagarinao and Vetter, 1989
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	143	Holland et al, 1960
Arthropoda	Penaeid Shrimp	*Penaeus indicus*	144	Gopakumar and Kuttyamma, 1996
Arthropoda	Penaeid Shrimp	*Metapenaeus dobsoni*	147	Gopakumar and Kuttyamma, 1996
Arthropoda	Amphipoda	*Rhepoxynius abronius*	147	Knezovich et al., 1996
Chordata	Sheepshead Minnow	*Cyprinodon variegatus*	154	This study
Arthropoda	Amphipoda	*Rhepoxynius abronius*	160	Caldwell, 1975
Chordata	Black Surf Perch	*Embiotoca jacksoni*	170	Bagarinao and Vetter, 1989
Arthropoda	Penaeid Shrimp	*Penaeus indicus*	189	Gopakumar and Kuttyamma, 1996
Arthropoda	Amphipoda	*Eohaustorius estuarius*	192	Knezovich et al., 1996
Arthropoda	Amphipoda	*Anisogammarus confervicola*	200	Caldwell, 1975
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	200	Holland, et al., 1960
Magnoliophyta	Eelgrass	*Zostera marina*	204	Holmer and Bondgaard, 2001
Magnoliophyta	Eelgrass	*Zostera marina*	204	Holmer and Bondgaard, 2001
Arthropoda	Penaeid Shrimp	*Metapenaeus dobsoni*	219	Gopakumar and Kuttyamma, 1996
Arthropoda	Penaeid Shrimp	*Penaeus indicus*	281	Gopakumar and Kuttyamma, 1996
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	287	Holland et al, 1960
Chordata	Chinook Salmon	*Oncorhynchus tshawytscha*	300	Vismann, 1996
Chordata	Black Sea Turbot	*Rhombus maeoticus*	310	Ivanov et al., 1973
Arthropoda	Pacific Oyster	*Crassostrea gigas*	320	Caldwell, 1975
Arthropoda	Amphipoda	*Eohaustorius estuarius*	332	Knezovich et al., 1996
Arthropoda	Penaeid Shrimp	*Metapenaeus dobsoni*	340	Gopakumar and Kuttyamma, 1996
Arthropoda	Penaeid Shrimp	*Penaeus indicus*	342	Gopakumar and Kuttyamma, 1996
Arthropoda	Penaeid Shrimp	*Metapenaeus dobsoni*	378	Gopakumar and Kuttyamma, 1996
Magnoliophyta	Eelgrass	*Zostera marina*	408	Vismann, 1996
Magnoliophyta	Eelgrass	*Zostera marina*	408	Vismann, 1996
Chordata	Long-Jawed Mudsucker	*Gillichthys mirabilis*	417	Bagarinao and Vetter, 1989
Chordata	Kelp Bass	*Paralabrax clathratus*	476	Bagarinao and Vetter, 1989
Chordata	Sand Bass	*Paralabrax nebulifer*	476	Bagarinao and Vetter, 1989
Arthropoda	Red Rock Crab	*Cancer magister*	500	Caldwell, 1975
Phaeophyta	Rock Weed	*Fucus serratus*	560	Chapman and Fletcher, 2002
Chordata	Long-Jawed Mudsucker	*Gillichthys mirabilis*	625	Bagarinao and Vetter, 1989
Chordata	Atlantic Salmon	*Salmo salar*	670	Kiemer et al., 1995
Arthropoda	copepods	mixed	765	Marcus et al. 1987
Annelida	Nereidae	*Neanthes arenaceodentata*	780	Dillon et al., 1993
Chordata	Bay Blenny	*Hypsoblennius gentilis*	782	Bagarinao and Vetter, 1989
Chordata	California Killifish	*Fundulus parvipinnis*	833	Bagarinao and Vetter, 1989
Arthropoda	Rock Crab	*Cancer antennarius*	1000	Vetter et al. 1987
Arthropoda	Dungeness Crab	*Cancer magister*	1000	Caldwell, 1975
Arthropoda	Amphipoda	*Corophium salmonis*	1000	Caldwell, 1975
Arthropoda	Pacific Oyster	*Crassostrea gigas*	1000	Caldwell, 1975
Chordata	California Halibut	*Paralichthys californicus*	1122	Bagarinao and Vetter, 1989
Mollusca	Pacific Oyster	*Crassostrea gigas*	1400	Caldwell, 1975
Chordata	Striped Mullet	*Mugil cephalus*	1428	Bagarinao and Vetter, 1989
Annelida	Capitellida	*Capitella capitata*	1724	Dubilier, 1988
Chordata	California Killifish	*Fundulus parvipinnis*	1802	Bagarinao and Vetter, 1989
Chordata	Long-Jawed Mudsucker	*Gillichthys mirabilis*	1802	Bagarinao and Vetter, 1989
Annelida	Nereidae	*Neanthes arenaceodentata*	2035	Dillon et al., 1993
Annelida	Spionida	*Streblospio benedicti*	2244	Llanso, 1991
Arthropoda	Isopoda	*Gnorimosphaeroma oregonensis*	5200	Caldwell, 1975
Mollusca	Bent Nose Clam	*Macoma balthica*	6000	Caldwell, 1975

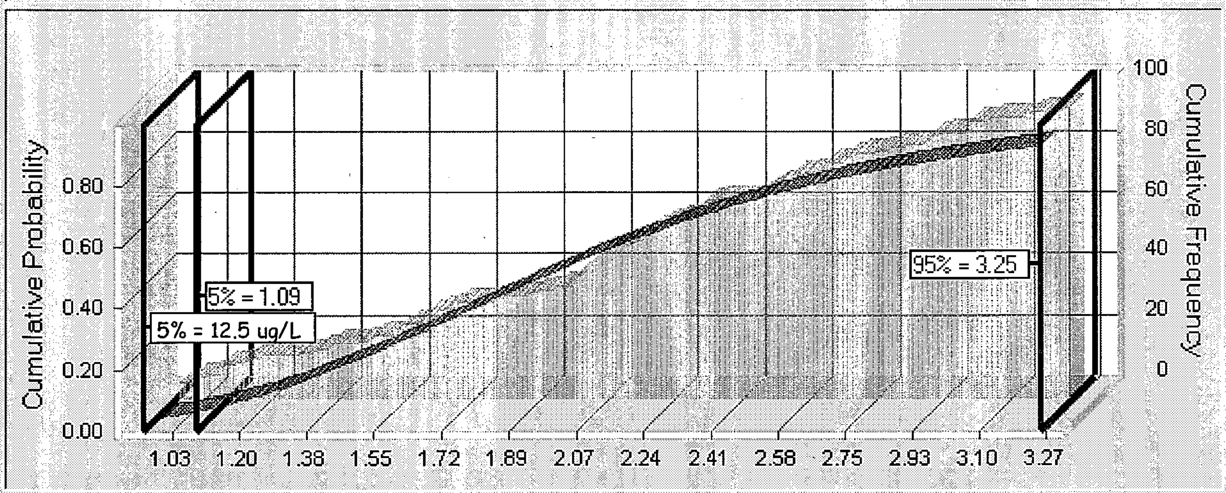
Table V.4. Summary of Endpoints from Bioassays conducted as part of this Study

Species and Date of Test	LOEC			EC50		
	96 h (4 d) Survival	168 h (7 d) Survival	168 h (7 d) Biomass	96 h (4 d) Survival	168 h (7 d) Survival	168 h (7 d) Biomass
Americamysis bahia						
Acute: 1.25.06	14.6			7.2		
Acute: 2.05.06	9.9			11.1		
Chronic Test 1: 2.01.06		12.0	12.0		8.4	12.0
Acute Test 1: 2.10.06	7.1			6.5		
Mean	10.5	12.0	12.0	8.3	8.4	12.0
Ampelisca abdita						
Acute Test 1: 2.23.06	22.2			40.2		
Acute Test 2: 2.23.06	55.7			55.7		
Mean	39.0			47.9		
Atherinops affinis						
Acute: 3.20.06	11.4			41.6		
Acute: 3.21.06	34.5			37.8		
Mean	23.0			39.7		
Cyprinodon variegatus						
Acute: 2.10.06	40.1			40.1		
Acute Test 1: 2.15.06	118.4			171.6		
Acute Test 2 : 2.15.06	60.3			83.9		
Chronic Test 1: 2.15.06		133.0	133.0		134.3	128.4
Chronic Test 2: 2.15.06		35.4	86.8		174.6	90.6
Mean	72.9	84.2	109.9	98.5	154.4	109.5
Menidia beryllina						
Acute: 1.13.06	63.4			34.6		
Acute: 1.19.06	25.5			20.8		
Acute: 1.25.06	53.7			65.0		
Chronic: 3.13.06		44.0	44.0		33.9	37.1
Chronic: 3.14.06		21.3	21.3		23.3	23.7
Mean	47.5	32.7	32.7	40.1	28.6	30.4
Neanthes arenaceodentata						
4 d Test 1: 2.17.06	123.5			123.5		
4 d Test 2: 2.17.06	86.6			86.6		
Mean	105.1			105.1		
M. galloprovincialis						
Spike Test -Continuous exposure	9.0			10.0		
Test 1	5.5			6.3		
Test 2	5.2			6.2		
Mean	6.6			7.5		
H. rufescens						
0 Hour Spike	14.0			27.0		
Mean	14.0			27.0		

Concentrations listed in red are maximum concentrations used in the bioassay, and they were below the effects level; i.e., the actual end-point concentrations were an unknown amount larger than the reported concentration.

102 Values — Split View — 91 Displayed





Statistic	Fit #1: Lo	Forecast
Values	---	102
Mean	2.13	2.12
Median	1.99	2.10
Mode	1.75	3.00
Standard	0.81	0.70
Variance	0.65	0.49
Skewnes	1.19	0.0733
Kurtosis	5.61	2.27

Percentile	Fit #1: Log	Forecast v
0%	0.00	0.86
10%	1.25	1.08
20%	1.47	1.47
30%	1.65	1.67
40%	1.82	1.99
50%	1.99	2.10
60%	2.19	2.29
70%	2.42	2.51
80%	2.71	2.73
90%	3.19	3.00
100%	Infinity	3.78

Ranked by: Chi-Square

Distribution	A-D	Chi-Sq
Lognormal	1.5129	

<< Previous | Next >> | Accept | Cancel | Help

LogNormal Distribution	
Log 95%	1.097
Conc 95%	12.5

Acute Mysid Test-96 Hour

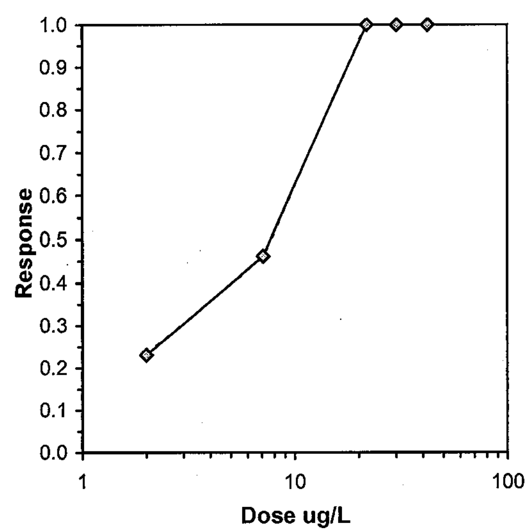
Start Date:	2/10/2006	Test ID:	Mysid 3	Sample ID:	P060103.14
End Date:	2/14/2006	Lab ID:	PGL- Port Gamble Laboratory	Sample Type:	Hydrogen Sulfide
Sample Date:	2/10/2006	Protocol:	EPAA 02-EPA Acute	Test Species:	Americamysis bahia
Comments:					

Conc-ug/L	1	2	3	4
Control	1.0000	1.0000	0.9000	1.0000
2	0.9000	0.6000	0.7000	0.8000
7.1	0.8000	0.0000	0.5000	0.8000
21.8	0.0000	0.0000	0.0000	0.0000
30.1	0.0000	0.0000	0.0000	0.0000
42.2	0.0000	0.0000	0.0000	0.0000

			Transform: Untransformed						
Conc-ug/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Mean	N-Mean
Control	0.9750	1.0000	0.9750	0.9000	1.0000	5.128	4	0.9750	0.0000
2	0.7500	0.7692	0.7500	0.6000	0.9000	17.213	4	0.7500	0.2308
*7.1	0.5250	0.5385	0.5250	0.0000	0.8000	71.903	4	0.5250	0.4615
*21.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4	0.0000	1.0000
*30.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4	0.0000	1.0000
*42.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	4	0.0000	1.0000

Auxiliary Tests						Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)						0.87809		0.805		-1.21957	3.137438
Bartlett's Test indicates equal variances (p = 0.01)						8.548713		9.21034			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**		**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test	2	7.1	3.768289			0.357842	0.367017	0.2025	0.053889	0.0651	2, 9
Treatments vs Control											

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%			
Auto-23.1%	6.4997	2.1092	20.0292



 ToxCalc v5.0.23 Reviewed by:_____

Table. Acute *Americamysis bahia* 4d Acute Test (10 Feb 2006)

		Day 0	Day 1		Day 2		Day 3		Day 4			Percentage Survival			
Treatment	**Rep**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**Mean**	**Day 1**	**Day 2**	**Day 3**	**Day 4**
Control	1	0.0	0.0				0.4				**0.1**	100	100	100	**100**
	2	0.0		0.0				0.3			**0.1**	100	100	100	**100**
	3	0.0			0.1				0.4		**0.1**	100	100	90	**90**
	4	0.0				0.4				0.0	**0.1**	100	100*	100*	**100**
2.5	1	1.0	1.8				1.3				**1.4**	100*	100	90	**90**
	2	0.9		3.9				1.4			**2.1**	100	60	60	**60**
	3	0.9			4.1				1.8		**2.2**	80	80	70	**70**
	4	1.6				3.3				1.7	**2.2**	10	80	80	**80**
5	1	6.2	7.0				7.2				**6.8**	100	100	90	**80**
	2	5.9		12.3				3.6			**7.3**	100	0	T	**T**
	3	6.7			12.0				5.9		**8.2**	100	80	80	**50**
	4	6.2				7.5				6.7	**6.8**	100	90	90	**80**
10	1	17.8	28.5				36.4				**27.5**	90	30	30	**0**
	2	16.5		26.0				11.8			**18.1**	70	40	20	**0**
	3	16.1			30.6				16.9		**21.2**	90	0	T	**T**
	4	17.8				21.5				21.2	**20.2**	60	20	20	**0**
15	1	25.5	33.5								**29.5**	60	0	T	**T**
	2	25.1		34.3							**29.7**	60	0	T	**T**
	3	27.1			39.2						**33.2**	90	0	T	**T**
	4	28.4				27.5					**27.9**	90	0	T	**T**
20	1	42.8	43.7								**43.2**	10	0	T	**T**
	2	34.0		55.9							**44.9**	60	0	T	**T**
	3	37.0			55.1						**46.1**	60	0	T	**T**
	4	37.0				32.3					**34.6**	30	0	T	**T**

*** miscounted during daily observations. Reported value is corrected.**

T = Test terminated due to 0% survival.

Table . Acute *Americamysis bahia* (10 Feb 2006)

Client	Marine Research Specialists
Project:	Hydrogen Sulfide
Client Sample ID:	N/A
Weston Test ID:	P060103.14
Species:	*Americamysis bahia*

Date Received:	
Date Test Started:	10-Feb-06
Date Test Ended:	14-Feb-06
Study Director:	Brian Hester
# Organisms/Chamber:	10

	Conc.	Jar #	Rep	Meter #	D.O. (mg/L)	Meter #	Temp (°C)	Meter #	Sal. (ppt)	Meter #	pH	Total Sulfide (µg/L) Value	Dil	Corr value
Day 0	Control		1		8.2		19.1		30		8.00	0	0	0
			2		8.2		19.2		30		8.00	0	0	0
			3		8.1		19.4		30		8.00	0	0	0
			4		8.1		19.7		30		7.99	0	0	0
	2.5		1		8.0		19.3		28		8.04	16	0	16
Date: 2/10/06			2		8.0		19.1		28		8.05	15	0	15
			3		8.0		19.3		28		8.04	14	0	14
			4		7.9		19.8		28		8.03	26	0	26
Time: 1145	5		1		7.9		19.3		28		8.03	98	0	98
			2		7.9		19.2		28		8.06	100	0	100
			3		7.9		19.6		28		8.07	116	0	116
Technician: CC			4		7.9		19.5		28		8.06	105	0	105
	10		1		7.9		19.2		28		8.09	323	0	323
			2		7.9		19.3		28		8.12	320	0	320
			3		7.9		19.6		28		8.13	318	0	318
			4		7.9		19.5		28		8.12	344	0	344
	15		1		7.9		19.5		28		8.17	552	0	552
			2		7.9		19.5		28		8.18	554	0	554
			3		7.9		19.7		28		8.17	587	0	587
			4		7.9		19.4		28		8.16	600	0	600
	20		1		7.8		19.4		28		8.21	202	1/5	1,010
			2		7.8		19.5		28		8.22	164	1/5	820
			3		7.8		19.4		28		8.21	175	1/5	875
			4		7.9		19.5		28		8.21	175	1/5	875
Day 1 AM	Control		1		8.0		19.3		30		7.88	0	0	0
Date: 2/11/06	2.5		1		7.8		19.7		28		7.92	23	0	23
Time: 0930	5		1		7.9		19.7		28		7.95	94	0	94
Technician: GZ/AM	10		1		7.9		19.7		28		7.83	296	0	296
	15		1		7.8		19.7		28		8.04	545	1/5	545
	20		1		7.7		19.8		28		8.07	759	1/5	759
Day 1 PM	Control		2		8.1		18.7		30		7.95	0	0	0
Date: 2/11/06	2.5		2		8.0		18.9		28		8.04	64	0	64
Time: 1600	5		2		7.9		19.0		28		8.05	205	0	205
Technician: GZ	10		2		7.9		18.9		28		8.08	461	0	461
	15		2		7.8		19.0		28		8.14	694	1/5	694
	20		2		7.8		19.2		28		8.18	247	1/5	1,235

Table. Acute *Americamysis bahia* (10 Feb 2006)

Weston Test ID:	P060103.07	Client:	Marine Research Specialists	Client Sample ID:	N/A

	Conc.	Jar #	Rep	Meter #	D.O. (mg/L)	Meter #	Temp (°C)	Meter #	Sal. (ppt)	Meter #	pH	Total Sulfide (µg/L)		
												Value	Dil	Corr value
Day 2 AM	Control		3		7.7		18.0		30		7.91	1	0	1
Date: 2/12/06	2.5		3		7.8		18.3		29		8.04	67	0	67
Time: 1016	5		3		7.6		18.0		29		8.04	196	0	196
Technician: CC/AM	10		3		7.7		18.3		29		8.09	557	0	557
	15		3		7.3		18.3		29		8.10	730	1/5	730
	20		3		7.5		18.0		28		8.14	223	1/5	1,115
Day 2 PM	Control		4		7.8		19.3		30		7.94	5	0	5
Date: 2/12/06	2.5		4		7.7		19.5		27		8.05	55	0	55
Time: 1600	5		4		7.9		19.5		27		8.08	133	0	133
Technician: CC	10		4		7.5		19.4		27		8.12	415	0	415
	15		4		7.7		19.5		28		8.20	635	1/5	635
	20		4		7.1		19.7		27		8.19	725	1/5	725
Day 3 AM	Control		1		7.7		19.1		30		7.63	3	0	3
Date: 2/13/06	2.5		1		7.7		19.4		28		7.72	11	0	11
Time: 0915	5		1		7.8		19.5		28		7.74	62	0	62
Technician: GZ/AM	10		1		7.6		19.5		28		7.67	272	0	272
	15		1		7.4		19.5		28		7.79	119	1/5	595
	20		1		7.2		19.5		27		7.85	158	1/5	790
Day 3 PM	Control		2		8.0		19.0		29		8.07	5	0	5
Date: 2/13/06	2.5		2		8.1		19.1		26		8.13	28	0	28
Time: 1715	5		2		8.1		19.2		27		8.11	68	0	68
Technician: JM/GZ/AM	10		2		7.2		19.3		27		8.11	222	0	222
	15		2		6.9		19.4		28		8.03	400	1/5	400
	20		2		5.5		19.4		27		8.16	801	1/5	801
Day 4 AM	Control		3		7.9		18.8		30		7.72	3	0	3
Date: 2/14/06	2.5		3		7.7		19.1		28		7.79	17	0	17
Time: 0910	5		3		7.7		19.2		28		7.81	59	0	59
Technician: GZ	10		3		7.6		19.2		28		7.85	183	0	183
	15		3		7.6		19.1		28		7.84	41	1/5	205
	20		3		7.3		19.2		28		7.90	89	1/5	445
Day 4 PM	Control		4		7.8		17.9		30		7.85	0	0	0
Date: 2/14/06	2.5		4		7.7		18.5		29		7.87	19	0	19
Time: 1740	5		4		7.8		18.6		29		7.92	85	0	85
Technician: TS/GZ	10		4		7.8		18.6		27		7.92	265	0	265
	15		4		7.8		18.4		27		7.98	93	1/5	465
	20		4		7.6		18.7		27		8.03	155	1/5	775

Table . Acute *Americamysis bahia* (10 Feb 2006)

Weston Test ID: P060103.14	Client: Marine Research Specialists	Client Sample ID:

Survival Data

Concentration	Rep	Jar #	Day 1	Day 2	Day 3	Day 4
Control	1		10	10	10	10
	2		10	10	10	10
	3		10	10	9	9
	4		10	10*	10*	10
2.5	1		10*	10	9	9
	2		10	6	6	6
	3		8	8	7	7
	4		10	8	8	8
5	1		10	10	9	8
	2		10	0	0	0
	3		10	8	8	5
	4		10	9	9	8
10	1		9	3	3	0
	2		7	4	2	0
	3		9	0	0	0
	4		6	2	2	0
15	1		6	0	0	0
	2		6	0	0	0
	3		9	0	0	0
	4		9	0	0	0
20	1		10	0	0	0
	2		6	0	0	0
	3		6	0	0	0
	4		3	0	0	0
Date						
Time						
Initials						

* Survival miscounted