Nautilus Environmental, LLC

Whole Effluent Toxicity Test Report: Shell Seattle Terminal; Harbor Island

January 2008

Report date: February 5, 2008

Submitted to:

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1.0 INTRODUCTION

Acute and chronic whole effluent toxicity tests were conducted using effluent samples collected from Shell Harbor Island Oil Refinery in January 2008. Acute bioassays were conducted using the test organisms *Menidia beryllina* (silverside minnows) and *Americamysis bahia* (a mysid shrimp and formerly known as *Mysidopsis bahia*). Chronic testing was conducted using *A. bahia* and *Atherinops affinis* (Pacific topsmelt). Testing was performed at Nautilus Environmental's Washington Laboratory located in Tacoma, Washington.

2.0 METHODS

2.1 Sample Collection and Transport

Effluent samples were collected into HDPE cubitainers by PES Environmental personnel. The samples were packed in coolers containing ice and transported to Nautilus the days of collection. Appropriate chain-of-custody procedures were employed during collection and transport.

2.2 Sample Receipt

Nautilus staff checked the samples immediately after arrival at the laboratory and verified they were in good condition and matched information provided on the chain-of-custody forms. Receipt temperatures were measured and recorded on the chain-of-custody form for each sample. Standard water quality parameters consisting of dissolved oxygen (DO), pH, conductivity, alkalinity, hardness, total chlorine, and total ammonia were measured and recorded on a sample check-in sheet provided in Appendix F. Samples were stored at 4°C in the dark until used for testing.

2.3 Test Methods

Acute toxicity tests were conducted using *M. beryllina* and *A. bahia* according to procedures presented by USEPA (2002a). Chronic toxicity tests were conducted according to USEPA (2002b) procedures for *A. bahia* and USEPA (1995) procedures for *A. affinis*. Test methods are summarized in Tables 1 through 4. The methods are the most recently published EPA methods.

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Table 1. Summary of methods for the 48h *Americamysis bahia* acute survival test.

Test initiation date and time	1/26/2008; 1255h
Test termination date and time	1/28/2008; 1300h
Test organism	*Americamysis Bahia*
Test organism source	Aquatic BioSystems; Fort Collins, CO
Test organism age	4 days post hatch
Test duration	48 hours with solution renewal at 24 hours
Feeding	*Artemia* nauplii during holding time and 2 hours prior to solution renewal
Test chamber	250 mL plastic cup
Test solution volume	200 mL
Test temperature	25 ± 1°C
Dilution water	Crystal Sea Marine Mix artificial seawater
Salinity	30 ± 2 ppt
Test concentrations (% sample)	100, 50, 25, 12.5, 6.25, laboratory control
Number of organisms/chamber	10
Number of replicates	4
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	EPA-821-R-02-012
Test acceptability criterion for controls	≥ 90% survival
Reference toxicant	Copper chloride

Table 2. Summary of methods for the 96h *Menidia beryllina* acute survival test.

Test initiation date and time	1/23/2008; 1330h
Test termination date and time	1/27/2008; 1330h
Test organism	*Menidia beryllina*
Test organism source	Aquatic BioSystems; Fort Collins, CO
Test organism age	11 days post hatch
Test duration	96 hours with solution renewal at 48 hours
Feeding	*Artemia* nauplii during holding time and 2 hours prior to solution renewal
Test chamber	1000 mL glass jar
Test solution volume	250 mL
Test temperature	20 ± 1°C
Dilution water	Crystal Sea Marine Mix artificial seawater
Salinity	30 ± 2 ppt
Test concentrations (% sample)	100, 50, 25, 12.5, 6.25, laboratory control
Number of organisms/chamber	10
Number of replicates	4
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	EPA-821-R-02-012
Test acceptability criterion for controls	≥ 90% survival
Reference toxicant	Copper chloride

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Table 3. Summary of methods for the *Americamysis bahia* 7-day survival and growth test.

Test initiation date and time	1/22/2008; 1300h
Test termination date and time	1/29/2008; 1400h
Test Type	Static renewal
Endpoint	Survival and growth at 7 days
Test organism	*Americamysis bahia*
Test organism source	Aquatic BioSystems; Fort Collins, CO
Test organism age	7 days post-hatch
Feeding	*Artemia* nauplii, twice daily
Test chamber and solution volume	250 mL plastic cup
Test solution volume	200 mL
Test temperature	26 ± 1°C
Dilution water	Crystal Sea Marine Mix artificial seawater
Salinity	30 ± 2 ppt
Test concentrations (% sample)	100, 50, 25, 12.5, 6.25, laboratory control
Number of organisms/chamber	5
Number of replicates	8
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	EPA-821-R-02-014
Test acceptability criterion for controls	≥ 80% survival; average dry weight ≥ 0.20 mg
Reference toxicant	Copper chloride

Table 4. Summary of methods for the *Atherinops affinis* 7-day survival and growth test.

Test initiation date and time	1/22/2008; 1220h
Test termination date and time	1/29/2008; 1345h
Test Type	Static renewal
Endpoint	Survival and growth at 7 days
Test organism	*Atherinops affinis*
Test organism source	Aquatic BioSystems; Fort Collins, CO
Test organism age	10 days post-hatch
Feeding	*Artemia* nauplii, twice daily
Test chamber	1-liter plastic cups
Test solution volume	500 mL
Test temperature	20 ± 1°C
Dilution water	Crystal Sea Marine Mix artificial seawater
Salinity	30 ± 2 ppt
Test concentrations (% sample)	100, 50, 25, 12.5, 6.25, laboratory control
Number of organisms/chamber	5
Number of replicates	5
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	EPA-600-R-95-136
Test acceptability criterion for controls	≥ 80% survival; average dry weight ≥ 0.85 mg
Reference toxicant	Copper chloride

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3.0 RESULTS

Details of standard water quality measurements conducted upon receipt of samples are provided in Table 5.

Table 5. Sample information.

Sample ID	WetTest-1-012108	WetTest-2-012308	WetTest-3-012508
Nautilus Log-In Number	08-023	08-026	08-028
Collection date and time	1/21/2008; 0905h	1/23/2008; 0815h	1/25/2008; 0845h
Receipt date and time	1/21/2008; 1045h	1/23/2008; 1040h	1/25/2008; 1015h
Receipt temperature (°C)	4.0	4.2	3.1
Dissolved oxygen (mg/L)	9.9	7.3	9.7
pH	7.29	7.35	7.29
Conductivity (µS/cm)	35	41	39.4
Hardness (mg/L $CaCO_3$)	20	24	32
Alkalinity (mg/L $CaCO_3$)	16	20	20
Total Chlorine (mg/L)	<0.03	<0.03	<0.03
Total Ammonia (mg/L)	<1	<1	<1

Survival was evaluated in the acute toxicity tests after 48 and 96 hours of exposure for *A. bahia* and *M. beryllina,* respectively. Results are summarized in Table 6. Mean survival in 100 percent effluent was 100 percent for both species.

Table 6. Summary of results for the acute toxicity tests.

Species	Concentration (%)	Percent Survival	NOEC[a] (% effluent)	LOEC[b] (% effluent)	LC_{50} (% effluent)
A. bahia (mysid shrimp)	0.0	100	100	>100	>100
	6.25	100			
	12.5	100			
	25	97.5			
	50	100			
	100	100			
M. beryllina (silverside minnows)	0.0	97.5	100	>100	>100
	6.25	97.5			
	12.5	97.5			
	25	100			
	50	100			
	100	100			

[a]No Observed Effect Concentration, [b]Lowest Observed Effect Concentration

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Results for the chronic toxicity tests are summarized in Table 7. The mysid shrimp and topsmelt tests involved a 7-day static-renewal exposure to the effluent. The endpoints for these tests were survival and growth (evaluated on the basis of dry weight divided by initial count) at the end of the 7-day exposure.

No statistically significant difference in response occurred in any concentration relative to control data for either survival or growth, including the acute and chronic critical effluent concentrations (ACEC and CCEC) of 100 percent sample.

Table 7. Summary of results for the chronic toxicity tests.

Test Species	Endpoint	NOEC[a] (% effluent)	LOEC[b] (% effluent)
A. bahia (mysid shrimp)	Survival	100	>100
	Growth	100	>100
A. affinis (topsmelt)	Survival	100	>100
	Growth	100	>100

[a]No Observed Effect Concentration, [b] Lowest Observed Effect Concentration

4.0 QA/QC

The samples were received in good condition and within the temperature range specified by WDOE (2005). The toxicity tests met all acceptability criteria for performance of control organisms. There were no deviations from the protocols and all water quality parameters remained within the ranges specified in the corresponding test methods throughout the tests.

Results for the reference toxicant tests used to monitor laboratory performance and test organism sensitivity are summarized in Table 8. The results for the reference toxicant tests fell within the acceptable range of mean ± two standard deviations of historical test results, indicating that the tests organisms were of an appropriate degree of sensitivity. The coefficients of variation (CV) for the tests are also shown in the table.

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Table 8. Reference toxicant test results.

Species	Date initiated	Endpoint	EC_{50} (µg/L copper)	Acceptable Range (µg/L copper)	CV (%)
A. bahia	1/9/2008	48h Survival	403	29.4-847	46.6
M. beryllina	1/23/2008	96h Survival	226	97.1-456	32.4
A. bahia	1/3/2008	7d Survival	228	135-517	29.3
A. bahia	1/3/2008	Growth	228	133-439	26.8
A. affinis	1/22/2008	7d Survival	123	26.2-166	36.4
A. affinis	1/22/2008	Growth	113	24.4-178	37.9

REFERENCES

Tidepool Scientific Software. 2000-2007. CETIS Comprehensive Environmental Toxicity Information System Software, Version 1.6.3revG.

USEPA. 2002a. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012.

USEPA. 2002b. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms, Third Edition. EPA-821-R-02-014.

USEPA. 1995. Short-Term Method for Estimating the Chronic Toxicity of Effluents and Receiving Waters to the West Coast Marine and Estuarine Organisms. EPA-600-R-95-136.

WDOE. 2005. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised June 2005.

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Appendix A

***Americamysis bahia* (Mysid Shrimp) Acute Toxicity Test**

Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Report Date: 05 Feb-08 12:50 (p 1 of 1)
Link/Link Code: 06-6419-1089/0801-T037

Mysid Acute — **Nautilus Environmental WA**

Test Run No:	00-7031-5210	**Test Type:**	Survival (48h)	**Analyst:**	Mary Ann Rempel-Hester
Start Date:	26 Jan-08 12:55	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Artificial Saltwater
Ending Date:	28 Jan-08 13:00	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix
Duration:	48h	**Source:**	Aquatic Biosystems, CO	**Age:**	4d

Sample No:	07-5747-5807	**Code:**	08-028	**Client:**	
Sample Date:	25 Jan-08 08:45	**Material:**	Oil Refinery Effluent	**Project:**	
Receive Date:	25 Jan-08 10:15	**Source:**	Shell Seattle Terminal (WA0001791)		
Sample Age:	28h (3.1 °C)	**Station:**			

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
15-3855-6924	48h Survival Rate	100	> 100	N/A	4.57%	Steel Many-One Rank Test

48h Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Dilution Water	4	1	1	1	1	1	0	0	0.0%	0.0%
6.25		4	1	1	1	1	1	0	0	0.0%	0.0%
12.5		4	1	1	1	1	1	0	0	0.0%	0.0%
25		4	0.975	0.956	0.994	0.9	1	0.00913	0.05	5.13%	2.5%
50		4	1	1	1	1	1	0	0	0.0%	0.0%
100		4	1	1	1	1	1	0	0	0.0%	0.0%

48h Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	1	1
6.25		1	1	1	1
12.5		1	1	1	1
25		1	1	0.9	1
50		1	1	1	1
100		1	1	1	1

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Saltwater Acute
48 Hour Toxicity Test Data Sheet
Nautilus Environmental

Client: Shell Harbor Island
Sample ID: WETTEST-3-012508
Test #: 0801-T037
Sample 08-028

Start Date & Time: 1/26/08 1255
End Date & Time: 1/28/08 1300
Test Organisms: Americamysis bahia

Conc. or (%)	Rep #	Cont. #	Number of Live Organisms 0	24	48	Dissolved Oxygen (mg/L) 0	Fin. 24	Init. 24	48	pH (units) 0	Fin. 24	Init. 24	48	Salinity (ppt) 0	Fin. 24	Init. 24	48	Temperature (°C) 0	Fin. 24	Init. 24	48	Mean Percent Survival
CON	1	11	10	10	10	6.3	4.8	6.6	5.9	8.17	8.03	8.41	8.18	30.7	30.9	29.6	29.9	24.7	24.9	24.6	24.1	100
	2	15	10	10	10																	
	3	18	10	10	10																	
	4	9	10	10	10																	
6.25	1	2	10	10	10	6.3	4.9	6.7	5.7	8.18	8.04	8.41	8.18	30.8	30.7	29.3	30.1	24.6	24.6	24.6	24.4	100
	2	14	10	10	10																	
	3	8	10	10	10																	
	4	4	10	10	10																	
12.5	1	10	10	10	10	6.7	4.8	6.4	5.7	8.20	8.06	8.41	8.20	30.7	30.7	29.2	30.1	24.8	25.0	24.8	24.3	100
	2	3	10	10	10																	
	3	6	10	10	10																	
	4	12	10	10	10																	
25	1	5	10	10	10	6.4	4.5	6.5	5.9	8.22	8.06	8.40	8.20	30.5	30.6	29.0	30.3	24.7	24.5	24.6	24.3	97.5
	2	13	10	10	10																	
	3	16	10	9	9																	
	4	22	10	10	10																	
50	1	1	10	10	10	6.8	4.7	6.6	5.3	8.25	8.07	8.40	8.20	30.0	30.1	29.2	29.1	24.3	24.7	24.5	24.5	100
	2	21	10	10	10																	
	3	19	10	10	10																	
	4	17	10	10	10																	
100	1	24	10	10	10	6.8	5.4	6.6	5.7	8.31	8.12	8.40	8.22	29.4	29.4	29.4	29.7	24.3	24.5	24.7	24.3	100
	2	23	10	10	10																	
	3	7	10	10	10																	
	4	20	10	10	10																	
Technician Initials			LCS	MM	(N)	LCS	MM	MM	(N)													

Dilution Water Batch #: 006 ASW

Sample Description: —

Comments: 0 hrs:
24 hrs. Fed at 24hr
48 hrs.

Organism source: ABS
Date Received: 1/26/08
Date of Hatch: 1/22/08

QA check: LCS

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Appendix B

***Menidia beryllina* (Silverside Minnows) Acute Toxicity Test**

Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Report Date: 05 Feb-08 15:10 (p 1 of 1)
Link/Link Code: 03-5309-0073/0801-T034

Inland Silverside 96-h Acute Survival Test — **Nautilus Environmental WA**

Test Run No:	08-2662-7315	**Test Type:**	Survival (96h)	**Analyst:**	Mary Ann Rempel-Hester
Start Date:	23 Jan-08 13:30	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Artificial Saltwater
Ending Date:	27 Jan-08 13:30	**Species:**	Menidia beryllina	**Brine:**	Crystal Sea Marine Mix
Duration:	96h	**Source:**	Aquatic Biosystems, CO	**Age:**	11d

Sample No:	12-5203-0864	**Code:**	08-026	**Client:**	
Sample Date:	23 Jan-08 08:15	**Material:**	Oil Refinery Effluent	**Project:**	
Receive Date:	23 Jan-08 10:40	**Source:**	Shell Seattle Terminal (WA0001791)		
Sample Age:	5h (4.2 °C)	**Station:**			

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
08-1106-5821	96h Survival Rate	100	> 100	N/A	6.25%	Steel Many-One Rank Test

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptabilty Limits	Overlap	Decision
08-1106-5821	96h Survival Rate	Control Resp	0.975	0.9 - NL	Yes	Passes acceptability criteria

96h Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Dilution Water	4	0.975	0.956	0.994	0.9	1	0.00913	0.05	5.13%	0.0%
6.25		4	0.975	0.956	0.994	0.9	1	0.00913	0.05	5.13%	0.0%
12.5		4	0.975	0.956	0.994	0.9	1	0.00913	0.05	5.13%	0.0%
25		4	1	1	1	1	1	0	0	0.0%	-2.56%
50		4	1	1	1	1	1	0	0	0.0%	-2.56%
100		4	1	1	1	1	1	0	0	0.0%	-2.56%

96h Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	0.9	1
6.25		1	1	0.9	1
12.5		1	1	0.9	1
25		1	1	1	1
50		1	1	1	1
100		1	1	1	1

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

Client: Shell Harbor Island
Sample ID: WET TEST-2- 012308
Test # 0801-T034
Nautilus Check-In #: 08-026

Start Date & Time: 1/23/08 1330
End Date & Time: 1/27/08 1330
Test Organism: Menidia beryllina

Sample Conc. or %	D.O. (mg/L) Init. 0	24	Fin. 48	Init. 48	72	Fin. 96	pH (mg/L) Init. 0	24	Fin. 48	Init. 48	72	Fin. 96
CON	6.9	7.0	6.4	6.4	6.9	6.8	8.04	8.04	7.94	8.26	8.17	8.18
6.25	7.0	6.7	5.6	6.8	7.0	6.9	8.06	8.05	7.95	8.28	8.19	8.19
12.5	6.9	7.4	5.6	6.7	7.1	6.9	8.09	8.05	7.95	8.29	8.19	8.19
25.0	7.0	7.3	6.0	6.5	7.0	6.5	8.13	8.08	7.98	8.28	8.19	8.20
50	7.3	7.0	6.2	7.2	6.9	6.8	8.20	8.12	8.01	8.30	8.19	8.20
100	7.4	7.2	5.7	7.4	7.0	6.8	8.32	8.21	8.09	8.34	8.18	8.19

Sample Conc. or %	Salinity ppt Init. 0	24	Fin. 48	Init. 48	~~Fin.~~ 72	Fin. 96	Test Temperature (°C) Init. 0	24	Fin. 48	Init. 48	72	Fin. 96
CON	29.7	30.0	29.9	30.8	31.0	31.3	20.4	19.4	19.9	20.1	19.3	19.9
6.25	29.7	30.3	30.1	30.6	31.7	31.0	20.8	19.4	20.1	19.9	19.4	19.9
12.5	29.8	30.2	30.0	30.6	31.9	31.2	20.5	19.6	20.4	19.8	19.1	19.5
25.0	29.6	30.2	30.1	30.6	32.0	31.3	20.2	19.5	20.3	19.8	19.6	19.6
50	29.2	30.1	30.1	30.6	32.0	31.4	20.0	19.5	20.2	19.4	19.1	19.7
100	29.1	30.1	29.8	30.7	31.8	31.3	19.6	19.8	20.3	19.0	19.1	19.8
Tech. Initials	RT	RT	RT	RT	MM	MM						
Sample Used:	WET #2			#3 08-028								

Sample Conc. or %	Rep #	Cont #	Number of Live Organisms 0	24	48	72	96
CON	1	19	10	10	10	10	10
	2	17	10	10	10	10	10
	3	5	10	10	9	9	9
	4	8	10	10	10	10	10
6.25	1	18	10	10	10	10	10
	2	20	10	10	10	10	10
	3	23	10	9	9	9	9
	4	13	10	10	10	10	10
12.5	1	24	10	10	10	10	10
	2	16	10	10	10	10	10
	3	12	10	9	9	9	9
	4	7	10	10	10	10	10
25	1	14	10	10	10	10	10
	2	11	10	10	10	10	10
	3	3	10	10	10	10	10
	4	6	10	10	10	10	10
50	1	4	10	10	10	10	10
	2	1	10	10	10	10	10
	3	22	10	10	10	10	10
	4	2	10	10	10	10	10
100	1	10	10	10	10	10	10
	2	21	10	10	10	10	10
	3	9	10	10	10	10	10
	4	15	10	10	10	10	10
Tech. Initials			RT	RT	RT	MM	MM

Dilution Water Batch #: 005 ASW

Sample Description:
Comments: Fed at 48h
QA Check: LLS

Organism Source: ABS
Date Received: 1/22/08
Date of Hatch: 1/12/08

Appendix C

***Americamysis bahia* (Mysid Shrimp) Chronic Test**

Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Mysidopsis 7-d Survival, Growth and Fecundity Test — **Nautilus Environmental WA**

Test Run No:	11-4938-5581	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	Mary Ann Rempel-Hester
Start Date:	22 Jan-08 13:00	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	Artificial Saltwater
Ending Date:	29 Jan-08 14:00	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	7d

Sample No:	02-6175-3034	**Code:**	08-023	**Client:**	
Sample Date:	21 Jan-08 09:05	**Material:**	Oil Refinery Effluent	**Project:**	
Receive Date:	21 Jan-08 10:45	**Source:**	Shell Seattle Terminal (WA0001791)		
Sample Age:	28h (4 °C)	**Station:**			

Sample Renewals

Renewal	Sample Code	Sample Date	Receive Date	Renewal Date	Temp °C
1	08-026	23 Jan-08 08:15	23 Jan-08 10:40	24 Jan-08 12:00	4.2
2	08-028	25 Jan-08 08:45	25 Jan-08 10:15	26 Jan-08 12:00	3.1

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
06-8903-7582	7d Survival Rate	100	> 100	N/A	14.1%	Steel Many-One Rank Test
15-5110-1396	Mean Dry Biomass-mg	100	> 100	N/A	16.9%	Dunnett's Multiple Comparison Test

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptabilty Limits	Overlap	Decision
06-8903-7582	7d Survival Rate	Control Resp	0.9	0.8 - NL	Yes	Passes acceptability criteria
15-5110-1396	Mean Dry Biomass-mg	Control Resp	0.32	0.2 - NL	Yes	Passes acceptability criteria
15-5110-1396	Mean Dry Biomass-mg	PMSD	0.169	0.11 - 0.37	Yes	Passes acceptability criteria

7d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Dilution Water	8	0.9	0.844	0.956	0.6	1	0.0276	0.151	16.8%	0.0%
6.25		8	1	1	1	1	1	0	0	0.0%	-11.1%
12.5		8	0.975	0.949	1	0.8	1	0.0129	0.0707	7.25%	-8.33%
25		8	0.925	0.869	0.981	0.6	1	0.0272	0.149	16.1%	-2.78%
50		8	0.95	0.915	0.985	0.8	1	0.0169	0.0926	9.75%	-5.56%
100		8	0.85	0.797	0.903	0.6	1	0.0258	0.141	16.6%	5.56%

Mean Dry Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Dilution Water	8	0.32	0.301	0.339	0.218	0.39	0.00922	0.0505	15.8%	0.0%
6.25		8	0.353	0.344	0.362	0.314	0.376	0.00419	0.023	6.5%	-10.3%
12.5		8	0.342	0.328	0.356	0.278	0.404	0.00683	0.0374	10.9%	-6.95%
25		8	0.322	0.303	0.34	0.232	0.386	0.00921	0.0504	15.7%	-0.47%
50		8	0.349	0.338	0.361	0.312	0.396	0.00571	0.0313	8.95%	-9.22%
100		8	0.308	0.281	0.334	0.202	0.414	0.0132	0.0721	23.5%	3.91%

Mysidopsis 7-d Survival, Growth and Fecundity Test — **Nautilus Environmental WA**

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1	1	1	0.6	0.8	1	0.8	1
6.25		1	1	1	1	1	1	1	1
12.5		1	0.8	1	1	1	1	1	1
25		1	1	1	0.6	1	1	1	0.8
50		1	1	0.8	1	0.8	1	1	1
100		1	0.8	0.8	1	0.8	1	0.6	0.8

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.348	0.39	0.336	0.218	0.314	0.316	0.292	0.346
6.25		0.36	0.374	0.326	0.376	0.372	0.346	0.314	0.356
12.5		0.338	0.278	0.318	0.404	0.332	0.372	0.338	0.358
25		0.38	0.318	0.292	0.232	0.332	0.386	0.34	0.292
50		0.374	0.396	0.326	0.372	0.312	0.362	0.312	0.342
100		0.366	0.22	0.292	0.414	0.308	0.358	0.202	0.3

Shell Harbor Island
***Americamysis bahia* Chronic Survival & Growth**
Test Initiation: January 22, 2008

Concentration %	Replicate	Survival # Alive	Survival % Survival	Survival Mean % Survival	Growth Tare Weight mg	Growth Total Weight mg	Growth Weight per Mysid[a] (mg)	Growth Mean Weight (mg)
Control	1	5	100	90.0	42.45	44.19	0.348	0.320
	2	5	100		42.79	44.74	0.390	
	3	5	100		41.68	43.36	0.336	
	4	3	60		41.30	42.39	0.218	
	5	4	80		40.59	42.16	0.314	
	6	5	100		39.24	40.82	0.316	
	7	4	80		41.94	43.40	0.292	
	8	5	100		41.81	43.54	0.346	
6.25	1	5	100	100.0	40.77	42.57	0.360	0.353
	2	5	100		43.27	45.14	0.374	
	3	5	100		41.73	43.36	0.326	
	4	5	100		40.36	42.24	0.376	
	5	5	100		42.17	44.03	0.372	
	6	5	100		39.97	41.70	0.346	
	7	5	100		41.77	43.34	0.314	
	8	5	100		40.12	41.90	0.356	
12.5	1	5	100	97.5	43.20	44.89	0.338	0.342
	2	4	80		42.44	43.83	0.278	
	3	5	100		41.16	42.75	0.318	
	4	5	100		42.17	44.19	0.404	
	5	5	100		41.77	43.43	0.332	
	6	5	100		42.82	44.68	0.372	
	7	5	100		41.90	43.59	0.338	
	8	5	100		39.23	41.02	0.358	
25	1	5	100	92.5	42.83	44.73	0.380	0.322
	2	5	100		42.22	43.81	0.318	
	3	5	100		40.30	41.76	0.292	
	4	3	60		42.42	43.58	0.232	
	5	5	100		41.73	43.39	0.332	
	6	5	100		41.97	43.90	0.386	
	7	5	100		41.11	42.81	0.340	
	8	4	80		44.91	46.37	0.292	
50	1	5	100	95.0	41.28	43.15	0.374	0.350
	2	5	100		43.11	45.09	0.396	
	3	4	80		42.81	44.44	0.326	
	4	5	100		41.48	43.34	0.372	
	5	4	80		41.31	42.87	0.312	
	6	5	100		41.99	43.80	0.362	
	7	5	100		42.34	43.90	0.312	
	8	5	100		40.14	41.85	0.342	
100	1	5	100	85	42.91	44.74	0.366	0.308
	2	4	80		43.86	44.96	0.220	
	3	4	80		42.35	43.81	0.292	
	4	5	100		42.78	44.85	0.414	
	5	4	80		42.44	43.98	0.308	
	6	5	100		41.09	42.88	0.358	
	7	3	60		40.00	41.01	0.202	
	8	4	80		41.34	42.84	0.300	

a- Weight per mysid evaluated using the combined growth & survival endpoint. Divide weight per container by initial mysid count.

Initial and Final Chemistries | **Seven Day Chronic Saltwater Bioassay**

Client: Shell Harbor Island
Sample ID: WET TEST - 1 - 012108
Test No: 0801-T030
Nautilus Check-In #: 08-023 08-026

Start Date & Time: 1/22/08 1300
Stop Date & Time: 1/29/08 1400
Test species: Americamysis bahia
08-028

Conc. or % CON	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.16	8.00	8.07	8.01	8.32	8.06	8.27	7.99	8.18	8.05	8.42	8.02	8.33	8.14
DO (mg/l)	6.3	5.8	6.7	5.8	6.6	6.3	6.3	4.9	6.3	5.2	6.3	5.5	~~7.9~~ 6.6	6.6
Salinity (ppt)	29.9	30.1	30.5	30.7	31.3	31.3	30.4	31.7	31.1	31.4	28.8	32.0	29.0	31.8
Temperature (°C)	25.4	25.2	25.2	25.1	~~31.3~~ 25.6	25.4	25.2	25.1	25.0	25.3	25.6	25.3	25.1	25.3

Conc. or % 6.25	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.18	8.02	8.10	7.95	8.31	8.03	8.24	8.00	8.20	8.03	8.41	8.00	8.33	8.13
DO (mg/l)	6.3	5.7	6.5	5.4	6.7	5.9	6.2	4.7	6.5	4.9	6.5	5.5	6.6	6.6
Salinity (ppt)	30.1	~~29.6~~ 30.6	30.6	30.6	31.4	31.2	30.7	31.6	31.2	30.9	29.2	29.8	29.2	30.7
Temperature (°C)	25.9	25.3	25.1	25.0	25.7	25.6	25.8	25.2	25.0	25.5	25.7	25.4	25.0	25.3

Conc. or % 12.5	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.19	8.02	8.10	7.97	8.30	8.04	8.24	8.01	8.21	8.05	8.40	8.01	8.34	8.13
DO (mg/l)	6.2	6.1	6.7	5.5	6.4	5.5	6.4	5.6	6.6	5.0	6.6	5.3	6.6	6.6
Salinity (ppt)	30.0	30.9	30.2	30.6	31.0	30.7	30.2	31.6	31.6	31.8	29.1	30.1	~~29.9~~	31.5
Temperature (°C)	25.7	25.2	25.2	25.2	25.7	25.7	25.0	25.3	25.6	25.4	25.8	25.4	~~25.2~~	25.2

Conc. or % 25	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.20	8.01	8.14	7.97	8.29	8.09	8.24	8.01	8.22	8.06	8.40	8.00	8.34	8.13
DO (mg/l)	6.4	5.6	6.4	5.5	6.6	6.2	6.6	4.9	6.7	5.0	6.6	5.4	6.8	6.4
Salinity (ppt)	30.2	30.6	30.4	31.0	30.8	31.5	30.3	32.0	31.0	32.0	29.2	31.6	29.0	31.8
Temperature (°C)	25.8	25.3	25.2	25.3	25.5	25.3	25.0	25.3	25.6	25.2	25.5	25.3	25.3	25.1

Conc. or % 50	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.25	8.06	8.21	8.03	8.26	8.04	8.21	8.01	8.24	8.08	8.40	7.92	8.36	8.14
DO (mg/l)	6.5	5.7	6.8	5.2	6.8	5.9	6.7	5.1	6.5	5.1	6.7	4.7	6.8	~~31.2~~ 6.5
Salinity (ppt)	30.0	30.3	29.7	30.4	30.0	30.3	30.1	31.2	30.5	30.9	29.0	30.5	29.1	31.2
Temperature (°C)	25.6	25.2	25.1	25.3	~~30.0~~ ~~24.7~~ 25.0	25.5	25.1	25.2	25.0	25.1	25.4	25.2	25.3	25.2

Conc. or % 100	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.33	8.13	8.31	8.09	8.19	8.05	8.17	8.00	8.30	8.07	8.40	8.00	8.40	8.17
DO (mg/l)	6.6	5.8	~~7.8~~ 6.8	5.2	6.8	6.0	6.7	4.8	6.6	4.7	6.8	5.0	6.8	6.3
Salinity (ppt)	29.7	30.4	29.4	30.3	29.3	31.2	29.2	30.5	29.5	29.7	29.1	29.8	29.4	31.4
Temperature (°C)	~~25.2~~ 26.1	25.2	25.0	25.1	~~24.8~~ 25.0	25.6	25.4	25.1	25.0	25.2	25.2	25.2	25.3	25.1
Tech Initials:	ICS	JS	JS	MN	MN	RT	RT	MM	MM	MM	MM	JS	JS	IC

Nautilus Environmental
Washington Laboratory
5009 Pacific Hwy. E., Suite 2
Tacoma, WA 98424

Dilution Water Batch #: ASW 005

QA Check: ICS

Sample Description:
Organism Source: ABS
Date Received: 1/22/08
Date of Hatch: 1/15/08

Comments:

Nautilus Environmental
Washington Laboratory
5009 Pacific Hwy. E., Suite 2
Tacoma, WA 98424

Raw Data Sheet
Mysid Shrimp
(Americamysis bahia)
Mysid Survival

Client: Shell Harbor Island **Test Number:** 0801-T030

Sample ID: WETTEST-1-012108

Conc. or %	Cont.	Rep.	Days 0	1	2	3	4	5	6	7	Mean % Survival
CON	45	1	5	5	5	5	5	5	5	5	
	46	2	5	5	5	5	5	5	5	5	
	10	3	5	5	5	5	5	5	5	5	
	26	4	5	4	4	4	4	4	3	3	
	30	5	5	4	4	4	4	4	4	4	
	21	6	5	5	5	5	5	5	5	5	
	16	7	5	5	5	4	4	4	4	4	
	24	8	5	5	5	5	5	5	5	5	90
6.25	28	1	5	5	5	5	5	5	5	5	
	44	2	5	5	5	5	5	5	5	5	
	13	3	5	5	5	5	5	5	5	5	
	39	4	5	5	5	5	5	5	5	5	
	27	5	5	5	5	5	5	5	5	5	
	29	6	5	5	5	5	5	5	5	5	
	7	7	5	5	5	5	5	5	5	5	
	48	8	5	5	5	5	5	5	5	5	100
12.5	18	1	5	5	5	5	5	5	5	5	
	3	2	5	5	5	5	4	4	4	4	
	43	3	5	5	5	5	5	5	5	5	
	25	4	5	5	5	5	5	5	5	5	
	23	5	5	5	5	5	5	5	5	5	
	41	6	5	5	5	5	5	5	5	5	
	36	7	5	5	5	5	5	5	5	5	
	5	8	5	5	5	5	5	5	5	5	97.5
Technician Initials			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

Feeding Times: 0 / 1540 1 815 1600 2 915 1530 3 0815 1640 4 815 1730 5 815 1730 6 815 1600

QA check RS

Comments:

Nautilus Environmental
Washington Laboratory
5009 Pacific Hwy. E., Suite 2
Tacoma, WA 98424

Raw Data Sheet
Mysid Shrimp
(Americamysis bahia)
Mysid Survival

Client: Shell Harbor Island **Test Number:** 0801-T030

Sample ID: WET TEST-1-012108

Conc. or (%)	Cont.	Rep.	Days 0	1	2	3	4	5	6	7	Mean % Survival
25	8	1	5	5	5	5	5	5	5	5	
	9	2	5	5	5	5	5	5	5	5	
	33	3	5	5	5	5	5	5	5	5	
	40	4	5	5	4	4	4	3	3	3	
	11	5	5	5	5	5	5	5	5	5	
	31	6	5	5	5	5	5	5	5	5	
	37	7	5	5	5	5	5	5	5	5	
	1	8	5	5	4	4	4	4	4	4	92.5
(B) ~~100~~ 50	35	1	5	5	5	5	5	5	5	5	
	20	2	5	5	5	5	5	5	5	5	
	32	3	5	5	5	5	5	5	5	~~25~~ 4	
	34	4	5	5	5	5	5	5	5	5	
	14	5	5	5	5	5	5	5	4	4	
	6	6	5	5	5	5	5	5	5	5	
	17	7	5	5	5	5	5	5	5	5	
	42	8	5	5	5	5	5	5	5	5	95
100	4	1	5	5	5	5	5	5	5	5	
	38	2	5	5	4	4	4	4	4	4	
	12	3	5	5	5	5	5	5	5	4	
	2	4	5	5	5	5	5	5	5	5	
	22	5	5	5	5	5	5	5	5	4	
	19	6	5	5	5	5	5	5	5	5	
	47	7	5	5	5	5	4	4	4	3	
	15	8	5	4	4	4	4	4	4	4	85
Technician Initials			MN	JS	MN	CT	MM	MM	JS	JS	

Feeding Times: 0 ✓ 1 815 2 915 3 815 4 815 5 815 6 815
1540 1600 1530 1640 1730 1730 1600

QA check ies

Comments:

Nautilus Environmental
Washington Laboratory
5009 Pacific Hwy. E., Suite 2
Tacoma, WA 98424

Raw Data Sheet
Mysid Weights
Seven Day Chronic Bioassay

Client: Shell Harbor Island

Species: *Americamysis bahia*

Sample ID: Wet Test - 1 - 012108

Test Number: 0801-7030

Conc. or %	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc. (biomass)
CON	45	1	.04245	0.04419		5		
	46	2	.04279	0.04474		5		
	10	3	.04168	0.04336		5		
	26	4	.04130	0.04239		3		
	30	5	.04059	0.04216		4		
	21	6	.03924	0.04082		5		
	16	7	.04194	0.04340		4		
	24	8	.04181	0.04354		5		0.32 mg
6.25	28	1	.04077	0.04257		5		
	44	2	.04327	0.04514		5		
	13	3	.04173	0.04336		5		
	39	4	.04036	0.04224		5		
	27	5	.04217	0.04403		5		
	29	6	.03997	0.04170		5		
	7	7	.04177	0.04334		5		
	48	8	.04012	0.04190		5		0.353
12.5	18	1	.04320	0.04489		5		
	3	2	.04244	0.04383		4		
	43	3	.04116	0.04275		5		
	25	4	.04217	0.04419		5		
	23	5	.04177	0.04343		5		
	41	6	.04282	0.04468		5		
	36	7	.04190	0.04359		5		
	5	8	.03923	0.04102		5		0.342
	Tech Initials:		lt	JS				

Date/Time in: 1/29/08 1400 **Oven temp. (°C):** 64.0 **QA Check:** les

Date/Time out: 1/30/08 1530 **Oven temp. (°C):** 64.0

Nautilus Environmental
Washington Laboratory
5009 Pacific Hwy. E., Suite 2
Tacoma, WA 98424

Raw Data Sheet
Mysid Weights
Seven Day Chronic Bioassay

Client: Shell Harbor Island

Species: *Americamysis bahia*

Sample ID: Wet Test-1-012108

Test Number: 0801-T030

Conc. or (%)	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc.
25	8	1	.04283	0.04473		5		
	9	2	.04222	0.04381		5		
	33	3	.04030	0.04176		5		
	40	4	.04242	0.04358		3		
	11	5	.04173	0.04339		5		
	31	6	.04197	0.04390		5		
	37	7	.04111	0.04281		5		
	1	8	.04491	0.04637		4		0.322
50	35	1	.04128	0.04315		5		
	20	2	.04311	0.04509		5		
	32	3	.04281	0.04494		4		
	34	4	.04148	0.04334		5		
	14	5	.04131	0.04287		4		
	6	6	.04199	0.04380		5		
	17	7	~~.0443~~ .04234	0.04390		5		
	42	8	.04014	0.04185		5		0.349
100	4	1	.04291	~~0.04637~~ 0.04434		4		
	38	2	.04386	0.04496		4		
	12	3	.04235	0.04381		4		
	2	4	.04278	0.04485		5		
	22	5	.04244	0.04398		4		
	19	6	.04109	0.04288		5		
	47	7	.04000	0.04101		3		
	15	8	.04134	0.04284		4		0.308
	Tech Initials:		lt	JS				

Date/Time in: 1/29/08 1400 **Oven temp. (°C):** 64.0 **QA Check:** JS

Date/Time out: 1/30/08 1530 **Oven temp. (°C):** 64.0

Appendix D

Atherinops affinis **(Pacific Topsmelt) Chronic Test**

Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental WA**

Test Run No:	00-1167-2749	**Test Type:**	Growth-Survival (7d)	**Analyst:**	
Start Date:	22 Jan-08 12:20	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Artificial Saltwater
Ending Date:	29 Jan-08 13:45	**Species:**	Atherinops affinis	**Brine:**	Crystal Sea Marine Mix
Duration:	7d 1h	**Source:**	Aquatic Biosystems, CO	**Age:**	10d

Sample No:	02-6175-3034	**Code:**	08-023	**Client:**	
Sample Date:	21 Jan-08 09:05	**Material:**	Oil Refinery Effluent	**Project:**	
Receive Date:	21 Jan-08 10:45	**Source:**	Shell Seattle Terminal (WA0001791)		
Sample Age:	27h (4 °C)	**Station:**			

Sample Renewals

Renewal	Sample Code	Sample Date	Receive Date	Renewal Date	Temp °C
1	08-026	23 Jan-08 08:15	23 Jan-08 10:40	24 Jan-08 12:00	4.2
2	08-028	25 Jan-08 08:45	25 Jan-08 10:15	26 Jan-08 12:00	3.1

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
14-1008-4440	7d Survival Rate	100	> 100	N/A	14.6%	Steel Many-One Rank Test
18-9094-5564	Mean Dry Biomass-mg	100	> 100	N/A	31.8%	Dunnett's Multiple Comparison Test

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptability Limits	Overlap	Decision
14-1008-4440	7d Survival Rate	Control Resp	0.96	0.8 - NL	Yes	Passes acceptability criteria
18-9094-5564	Mean Dry Biomass-mg	Control Resp	1.08	0.85 - NL	Yes	Passes acceptability criteria
14-1008-4440	7d Survival Rate	PMSD	0.146	NL - 0.25	No	Passes acceptability criteria
18-9094-5564	Mean Dry Biomass-mg	PMSD	0.318	NL - 0.5	No	Passes acceptability criteria

7d Survival Rate Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Dilution Water	5	0.96	0.927	0.993	0.8	1	0.0163	0.0894	9.32%	0.0%
6.25		5	0.96	0.927	0.993	0.8	1	0.0163	0.0894	9.32%	0.0%
12.5		5	0.92	0.879	0.961	0.8	1	0.02	0.11	11.9%	4.17%
25		5	1	1	1	1	1	0	0	0.0%	-4.17%
50		5	0.92	0.879	0.961	0.8	1	0.02	0.11	11.9%	4.17%
100		5	0.92	0.879	0.961	0.8	1	0.02	0.11	11.9%	4.17%

Mean Dry Biomass-mg Summary

Conc-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	Diff%
0	Dilution Water	5	1.08	1.03	1.13	0.874	1.24	0.0243	0.133	12.3%	0.0%
6.25		5	1.06	0.942	1.18	0.682	1.39	0.0575	0.315	29.8%	2.25%
12.5		5	1.05	0.98	1.13	0.802	1.27	0.0362	0.198	18.8%	2.77%
25		5	1.12	1.06	1.17	0.878	1.21	0.0253	0.139	12.4%	-3.03%
50		5	1.03	0.928	1.12	0.73	1.42	0.0474	0.26	25.3%	5.39%
100		5	1.1	0.998	1.2	0.666	1.44	0.0504	0.276	25.1%	-1.62%

HI-SHELL001156

Pacific Topsmelt 7-d Survival and Growth Test — **Nautilus Environmental WA**

7d Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	0.8	1	1	1	1
6.25		1	1	0.8	1	1
12.5		0.8	1	1	1	0.8
25		1	1	1	1	1
50		0.8	1	1	0.8	1
100		0.8	1	1	0.8	1

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.07	1.1	0.874	1.24	1.14
6.25		0.872	1.39	0.682	0.972	1.38
12.5		0.802	1.27	0.998	1.24	0.958
25		1.21	1.12	1.17	1.21	0.878
50		0.892	1.42	1.11	0.73	0.972
100		0.666	1.44	1.15	1.14	1.12

Shell Harbor Island
***Atherinops affinis* Chronic Survival & Growth**
Test Initiation: January 22, 2008

		Survival			Growth			
Concentration %	Replicate	# Alive	% Survival	Mean % Survival	Tare Weight mg	Total Weight mg	Weight per Fish [a] (mg)	Mean Weight (mg)
Control	1	4	80	96	41.12	46.47	1.07	1.08
	2	5	100		41.88	47.36	1.10	
	3	5	100		42.00	46.37	0.87	
	4	5	100		39.78	45.96	1.24	
	5	5	100		40.79	46.50	1.14	
6.25	1	5	100	96	41.42	45.78	0.87	1.06
	2	5	100		41.30	48.25	1.39	
	3	4	80		42.27	45.68	0.68	
	4	5	100		38.37	43.23	0.97	
	5	5	100		40.56	47.46	1.38	
12.5	1	4	80	92	41.40	45.41	0.80	1.05
	2	5	100		42.55	48.91	1.27	
	3	5	100		40.38	45.37	1.00	
	4	5	100		38.43	44.62	1.24	
	5	4	80		39.46	44.25	0.96	
25	1	5	100	100	42.78	48.82	1.21	1.12
	2	5	100		41.90	47.49	1.12	
	3	5	100		40.88	46.71	1.17	
	4	5	100		40.38	46.44	1.21	
	5	5	100		41.97	46.36	0.88	
50	1	4	80	92	40.81	45.27	0.89	1.03
	2	5	100		43.33	50.42	1.42	
	3	5	100		40.81	46.38	1.11	
	4	4	80		40.62	44.27	0.73	
	5	5	100		40.77	45.63	0.97	
100	1	4	80	92	41.76	45.09	0.67	1.10
	2	5	100		39.12	46.30	1.44	
	3	5	100		43.99	49.73	1.15	
	4	4	80		39.48	45.17	1.14	
	5	5	100		41.05	46.64	1.12	

a- Weight per fish evaluated using the combined growth & survival endpoint. Divide weight per container by initial fish count.

Initial and Final Chemistries | **Seven Day Chronic Saltwater Bioassay**

Client: Shell Harbor Island
Sample ID: WET TEST - 1 - 012108
Test No: 0801-T031
Nautilus Check-In #: 08-023 08-026

Start Date & Time: 1/22/08 1220
Stop Date & Time: 1/29/08 1345
Test species: Atherinops affinis
08-028

Conc. or % CON	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.19	7.94	8.07	7.85	8.37	8.03	8.28	8.06	8.22	8.02	8.48	8.08	8.38	8.10
DO (mg/l)	6.7	6.6	7.0	5.8	7.0	5.9	7.1	6.2	6.9	6.1	7.1	6.2	6.8	6.9
Salinity (ppt)	29.7	30.0	30.0	30.0	30.1	30.9	30.4	31.1	30.7	30.5	28.8	29.0	28.1	30.2
Temperature (°C)	19.9	20.7	20.8	20.5	19.6	19.8	19.8	20.3	19.2	20.0	19.4	20.7	20.0	19.8

Conc. or % 6.25	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.22	7.97	8.10	7.93	8.38	8.07	8.28	8.06	8.23	8.06	8.47	8.11	8.39	8.12
DO (mg/l)	7.0	6.6	7.0	5.7	7.0	6.1	7.2	6.0	7.0	5.8	7.2	6.1	7.1	6.5
Salinity (ppt)	29.9	~~29.9~~ ①	29.7	30.0	30.3	30.5	30.5	31.0	30.7	30.4	28.9	29.3	28.4	29.8
Temperature (°C)	19.2	20.6	20.5	20.4	19.2	19.8	19.7	20.1	19.1	19.9	19.4	20.4	19.6	19.9
		① 30.2												

Conc. or % 12.5	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.23	7.99	8.12	7.94	8.38	8.07	8.29	8.06	8.24	8.06	8.47	8.10	8.40	8.14
DO (mg/l)	6.9	6.5	7.1	5.8	7.2	6.3	7.2	5.9	6.9	5.9	7.0	5.6	6.9	6.5
Salinity (ppt)	29.8	30.2	29.6	29.9	30.3	30.3	30.4	30.8	30.7	30.3	28.9	29.2	28.4	29.7
Temperature (°C)	19.2	20.6	19.8	20.3	19.3	19.7	19.4	20.2	19.0	19.8	19.4	20.3	19.3	19.8

Conc. or % 25	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.26	8.00	8.15	7.96	8.37	8.03	8.29	8.05	8.27	8.06	8.46	8.10	8.42	8.11
DO (mg/l)	7.0	6.4	7.3	6.4	7.1	6.1	7.3	5.9	7.1	6.0	7.2	6.1	7.1	6.7
Salinity (ppt)	29.7	29.8	29.7	29.8	30.0	30.2	30.4	~~30.7~~ ①	30.4	30.2	28.9	29.1	28.5	29.9
Temperature (°C)	19.0	20.5	19.5	20.3	19.5	19.8	19.2	20.1	19.2	19.8	19.4	20.4	19.5	19.8
								① 30.7						

Conc. or % 50	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.30	8.05	8.22	8.02	8.36	8.08	8.31	8.07	8.30	8.09	8.45	8.11	8.45	8.18
DO (mg/l)	7.2	6.6	7.4	6.4	7.2	6.2	7.2	6.2	7.2	6.4	7.3	5.8	7.4	6.7
Salinity (ppt)	29.3	29.7	29.4	29.6	29.7	29.9	30.0	30.6	29.9	29.7	28.9	29.0	28.7	29.9
Temperature (°C)	19.5	20.6	19.5	20.2	19.1	19.7	19.5	20.3	19.3	19.7	19.3	20.4	19.8	19.9

Conc. or % 100	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.37	8.12	8.33	8.08	8.35	8.08	8.35	8.08	8.40	8.13	8.44	8.15	8.51	8.25
DO (mg/l)	7.4	6.5	7.0	5.7	7.4	5.9	7.3	5.5	7.4	5.4	7.4	5.5	7.4	6.4
Salinity (ppt)	29.2	29.4	28.8	29.2	28.8	29.1	29.7	30.1	29.1	29.1	29.1	28.9	29.0	① 30.2
Temperature (°C)	19.3	20.6	19.5	20.1	19.4	19.8	19.5	20.2	19.4	19.7	19.1	20.4	19.7	19.9
Tech Initials:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Nautilus Environmental
Washington Laboratory
5009 Pacific Hwy. E., Suite 2
Tacoma, WA 98424

Dilution Water Batch #: ASW 005

QA Check: LCS

Sample Description: —
Organism Source: ABS
Date Received: 1/22/08
Date of Hatch: 1/12/08

Comments:

Nautilus Environmental
Washington Laboratory
5009 Pacific Hwy. E., Suite 2
Tacoma, WA 98424

Raw Data Sheet
Pacific Topsmelt
(Atherinops affinis)
Larval Survival

Client Name: Shell Harbor Island **Test No.:** 0801-T031

Sample ID: WETTEST-1-012108

Conc. or (%)	Cont.	Rep.	Days 0	1	2	3	4	5	6	7	Mean % Survival
CON	3	1	5	4	4	4	4	4	4	4	
	6	2	5	5	5	5	5	5	5	5	
	16	3	5	5	5	5	5	5	5	5	
	2	4	5	5	5	5	5	5	5	5	
	22	5	5	5	5	5	5	5	5	5	96
6.25	10	1	5	5	5	5	5	5	5	5	
	1	2	5	5	5	5	5	5	5	5	
	23	3	5	4	4	4	4	4	4	4	
	4	4	5	5	5	5	5	5	5	5	
	12	5	5	5	5	5	5	5	5	5	96
12.5	13	1	5	4	4	4	4	4	4	4	
	14	2	5	5	5	5	5	5	5	5	
	17	3	5	5	5	5	5	5	5	5	
	19	4	5	5	5	5	5	5	5	5	
	5	5	5	4	4	4	4	4	4	4	92
25	29	1	5	5	5	5	5	5	5	5	
	21	2	5	5	5	5	5	5	5	5	
	27	3	5	5	5	5	5	5	5	5	
	8	4	5	5	5	5	5	5	5	5	
	18	5	5	5	5	5	5	5	5	5	100
50	15	1	5	4	4	4	4	4	4	4	
	28	2	5	5	5	5	5	5	5	5	
	25	3	5	5	5	5	5	5	5	5	
	24	4	5	4	4	4	4	4	4	4	
	20	5	5	5	5	5	5	5	5	5	92
100	30	1	5	4	4	4	4	4	4	4	
	9	2	5	5	5	5	5	5	5	5	
	26	3	5	5	5	5	5	5	5	5	
	11	4	5	4	4	4	4	4	4	4	
	7	5	5	5	5	5	5	5	5	5	92
Tech Initials			QT	JD	MM	QT	MM	MM	MM	QT	

Feeding Times: 0 ✓ 1 815 2 915 3 815 4 815 5 815 6 815
1640 1600 1530 1640 1730 1730 1600

Comments: _____ **QA Check** RS

Nautilus Environmental
Washington Laboratory
5009 Pacific Hwy., E. Suite 2
Tacoma, WA 98424

Fish Weights
Seven Day Chronic Bioassay

Client: Shell Harbor Island

Species: *A. affinis*

Sample ID: WETTEST-1-012108

Test No: 0801-T031

Conc. or %	cont. #	rep.	pan wt. (gm)	pan + fish (gm)	fish wt. (mg)	# fish	avg. per fish (mg)	avg. per conc. (mg) (biomass)
Ø	3	1	.04112	0.04647		4		
	6	2	.04188	0.04736		5		
	16	3	.04200	0.04637		5		
	2	4	.03978	0.04596		5		
	22	5	.04079	0.04650		5		1.08
6.25	10	1	.04142	0.04578		5		
	1	2	.04130	0.04826		5		
	23	3	.04227	0.04568		4		
	4	4	.03837	0.04323		5		
	12	5	.04056	0.04746		5		1.06
12.5	13	1	.04140	0.04541		4		
	14	2	.04255	0.04891		5		
	17	3	.04038	0.04537		5		
	19	4	.03843	0.04462		5		
	5	5	.03946	0.04425		4		1.05
25	29	1	.04278	0.04882		5		
	21	2	.04190	0.04749		5		
	27	3	~~.04~~ .04088	0.04671		5		
	8	4	.04038	0.04644		5		
	18	5	.04197	0.04636		5		1.12
50	15	1	.04081	0.04527		4		
	28	2	.04333	~~0.04~~ 0.05042		5		
	25	3	.04081	0.04638		5		
	24	4	.04062	0.04427		4		
	20	5	.04077	0.04563		5		1.03
100	30	1	.04176	0.04509		4		
	9	2	.03912	0.04630		5		
	26	3	.04399	0.04973		5		
	11	4	.03948	0.04517		4		
	7	5	.04105	0.04664		5		1.1
	Tech Initials:		[illegible]	[illegible]				

Date/Time in: 1/29/08 1350 **Oven temp. (°C):** 60.5 **QA check** IRS

Date/Time out: 1/30/08 1525 **Oven temp. (°C):** 64.0

Appendix E
Bioassay Testing Checklists

WET TESTING BIOASSAY CHECKLIST

MARINE ACUTE TOXICITY - 48-HOUR STATIC-RENEWAL TEST USING *AMERICAMYSIS BAHIA*

Sample ID Number: WetTest-3-012508 Date: 1/26/08
Project Name: Shell Harbor Island NPDES WET Tests Laboratory: Nautilus Environmental, WA
EPA Test Method: EPA-821-R-02-012 (Circle method to verify) Personnel: Indira Santiago, Meghan Murphy, Maria Brayfield

CHAIN-OF-CUSTODY	Yes	No	Comment
Are all Chain-of-Custody (COC) forms included with the sample(s)?	✓		
Correct number of water samples received?	✓		
Is the COC form completely filled out, signed, and dated?	✓		
Was the sample container temperature recorded and within the control limits (4°C)?	✓		
TEST PROCEDURES			
Equipment was calibrated?	✓		
Test salinity is set to project specific salinity?	✓		
Water samples kept at 4°C?	✓		
Testing initiated within 36 hours of sample collection?	✓		28h
Mysids are 1-5 days old, within 24 hours of same age?	✓		
Mysids acclimated to 25 ± 1°C?	✓		
Randomization sheets prepared?	✓		
Control prepared?	✓		
Dilution concentrations prepared to correct specifications?	✓		
Test chambers randomized?	✓		
pH, DO, salinity and temperature measured, recorded, and within acceptable parameters?	✓		
Ten mysids added to test chamber?	✓		
Environmental chamber at 25 ± 1°C with 16 hours light/8 hours dark photoperiod?	✓		

HI-SHELL001163

	YES	NO	COMMENT
DAILY MONITORING			
Test chambers rearranged according to concentration each day?	✓		
pH, DO, salinity and temperature measured and within acceptable parameters?	✓		
Mysids fed once daily	✓		on hr 24, as per test requirements
Surviving mysids counted?	✓		
Tanks cleaned?	✓		250 mL plastic cups - Excess food pipetted out
Effluent renewal at 24 hours?	✓		
Test ended within 48 ± 2 hours of start time?	✓		
DATA REVIEW			
Test acceptability criteria met? • Mean control survival ≥ 90%	✓		
Records are complete with no missing data?	✓		

Comments:

HI-SHELL001164

WET TESTING BIOASSAY CHECKLIST

MARINE ACUTE TOXICITY - 96-HOUR STATIC-RENEWAL TEST USING *MENIDIA BERYLLINA*

Sample ID Number: 08-026
Project Name: Shell Harbor Ltd. NPDES WET Tests
EPA Test Method: EPA-821-R-02-012
(Circle method to verify)

Date: 1/23/08
Laboratory: Nautilus Environmental, Washington
Personnel: Chris Tollefson, Liz Tobin, Megan Murphy

CHAIN-OF-CUSTODY	Yes	No	Comment
Are all Chain-of-Custody (COC) forms included with the sample(s)?	✓		
Correct number of water samples received?	✓		
Is the COC form completely filled out, signed, and dated?	✓		
Was the sample container temperature recorded and within the control limits (4°C)?	✓		
TEST PROCEDURES			
Equipment was calibrated?	✓		
Test salinity is set to project specific salinity?	✓		
Water samples kept at 4°C?	✓		
Testing initiated within 36 hours of sample collection?	✓		5h
Fish are 9-14 days old, within 24 hours of same age?	✓		
Fish acclimated to 25 ± 1°C?		✓	EPA-821-R-02-012 According to WDOE regulations test can be set up at either 20±1°C or 25±1°C; it was set up @ 20°C.
Randomization sheets prepared?	✓		
Control prepared?	✓		
Dilution concentrations prepared to correct specifications?	✓		
Test chambers randomized?	✓		
pH, DO, salinity and temperature measured, recorded, and within acceptable parameters?	✓		
Ten fish added to test chamber?	✓		
Environmental chamber at 25 ± 1°C with 16 hours light/8 hours dark photoperiod?		✓	Test being run at 20±1°C. Chamber is therefore at 20±1°C

	YES	NO	COMMENT
DAILY MONITORING			
Fed animals once prior to 48 hour renewal?	✓		
Test chambers rearranged according to concentration each day?	✓		
pH, DO, salinity and temperature measured and within acceptable parameters?	✓		
80% of test solution renewed at 48 hours?	✓		
Surviving fish counted?	✓		
Tanks cleaned?	✓		1-L glass jars + Excess food pipetted out.
Test ended within 96 ± 2 hours of start time?	✓		
DATA REVIEW			
Test acceptability criteria met? • Mean control survival ≥ 90%	✓		
Records are complete with no missing data?	✓		

Comments:

HI-SHELL001166

WET TESTING BIOASSAY CHECKLIST

MARINE CHRONIC TOXICITY - 7 DAY STATIC-RENEWAL TEST WITH *AMERICAMYSIS BAHIA*

Sample ID Number: 09-023, 08-026
Project Name: Shell Harbor Island NPDES WET Tests
EPA Test Method: EPA-821-R-02-014, method 1007.0
(Circle method to verify)

Date: 1/22/08
Laboratory: Nautilus Environmental, Washington
Personnel: Indira Santiago, Laura Shanks, Maria Brayfield, Eric Tollefson, Meghan Murphy, Liz Tobin

CHAIN-OF-CUSTODY	Yes	No	Comment
Are all Chain-of-Custody (COC) forms included with the sample(s)?	✓		
Correct number of water samples received?	✓		
Is the COC form completely filled out, signed, and dated?	✓		
Was the sample container temperature recorded and within the control limits (4°C)?	✓		
TEST PROCEDURES			
Equipment was calibrated?	✓		
Test salinity is 30 ± 2ppt?	✓		
Water samples kept at 4°C?	✓		
Testing initiated within 36 hours of sample collection?	✓		28h
Test animals are 7 days old, within 24 hours of same age?	✓		
Randomization sheets prepared?	✓		
Control prepared?	✓		
Dilution concentrations prepared to correct specifications?	✓		
Test chambers randomized?	✓		
pH, DO, salinity and temperature measured, recorded, and within acceptable parameters?	✓		
Mysids added to test chambers?	✓		5 mysid/chamber
Environmental chamber set to 26°C with 16 hours light/8 hours dark photoperiod?	✓		

	YES	NO	COMMENT
DAILY MONITORING			
Test chambers rearranged according to concentration each day?	✓		
pH, DO, salinity and temperature measured prior to water change and after water change during the 7 day period? Are the measurements within acceptable parameters?	✓		
Tanks cleaned?	✓		250mL plastic cups excess food rejected out
90% test solution renewals conducted?	✓		
Surviving mysids counted daily?	✓		
Mysids fed twice a day on Days 1-6?	✓		
Mysids dried on Day 7?	✓		
Mysid weights measured?	✓		
DATA REVIEW			
Test acceptability criteria met? • Mean control survival ≥ 80% • Average dry weight ≥ 0.20 mg per surviving mysid in control	✓ ✓		
Records are complete with no missing data?	✓		

Comments:

HI-SHELL001168

WET TESTING BIOASSAY CHECKLIST

MARINE CHRONIC TOXICITY - 7 DAY STATIC-RENEWAL TEST WITH *ATHERINOPS AFFINIS*

Sample ID Number: 08-023, 08-026, 08-028 Date: 1/22/08

Project Name: Shell Harbor Island NPDES WET Tests Laboratory: Nautilus Environmental, Washington

EPA Test Method: EPA / 600 / R-95 / 136 Personnel: Eric Tollefson, Laura Shanks, Megan Murphy, Liz Tobin

(Circle method ~~to verify~~)

CHAIN-OF-CUSTODY	Yes	No	comment
Are all Chain-of-Custody (COC) forms included with the sample(s)?	✓		
Correct number of water samples received?	✓		
Is the COC form completely filled out, signed, and dated?	✓		
Was the sample container temperature recorded and within the control limits (4°C)?	✓		
TEST PROCEDURES			
Equipment was calibrated?	✓		
Test salinity is 30 ± 1ppt or 34 ± 2 ppt?	✓		
Water samples kept at 4°C?	✓		
Testing initiated within 36 hours of sample collection?	✓		27h.
Test animals are 9-15 days old?	✓		
Fish acclimated to 20 ± 1°C?	✓		
Randomization sheets prepared?	✓		
Control prepared?	✓		
Dilution concentrations prepared to correct specifications?	✓		
Test chambers randomized?	✓		
pH, DO, salinity and temperature measured, recorded, and within acceptable parameters?	✓		
Fish added to test chamber?	✓		5 fish/chamber
Environmental chamber at 20 ± 1°C with 16 hours light/8 hours dark photoperiod?	✓		

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	YES	NO	COMMENT
DAILY MONITORING			
Test chambers rearranged according to concentration each day?	✓		
pH, DO, salinity and temperature measured prior to water change and after water change during the 7 day period? Are the measurements within acceptable parameters?	✓		
Tanks cleaned?	✓		1L plastic cups. Excess food pipetted out
75% test solution renewals conducted?	✓		
Surviving fish counted daily?	✓		
Fish fed twice a day on Days 1-6 with morning feeding at least 1 hour prior to water change?	✓		
Fish rinsed with DI on Day 7?	✓		
Fish dried on Day 7?	✓		
Fish weights measured?	✓		
DATA REVIEW			
Test acceptability criteria met? • Mean control survival ≥ 80% • Mean dry weight per fish ≥ 0.85 mg in the control • MSD <25% (survival) and MSD <50% (growth) • Copper LC_{50} for survival ≤205 µg/L	✓ ✓ ✓ ✓		
Records are complete with no missing data?	✓		

Comments:

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Appendix F
Sample Check-In Sheet

Nautilus Environmental
5009 Pacific Hwy East, Ste. 2
Tacoma, WA 98424

Sample Check-In Information

Client: Shell - Harbor Island

Sample ID: WETTEST-1-012108

Tests Performed: Mg-c, Aa-c, Mg-a, Mb-a

Sample Description:

Sample ID:	wettest-1-012108	Wettest-2-012308	Wettest-3-012508	
Log-in No. (07-xxxx):	08-023	08-026	08-028	
Sample Collection Date & Time:	1/21/08 905	1/23/08 0815	1/25/08 0845	
Sample Receipt Date & Time:	1/21/08 1045	1/23/08 ~~1400~~ 1010	1/25/08 1015	
Check-in Temperature (°C)	4.0	4.2	3.1	
Temperature OK?	(Y) N	(Y) N	(Y) N	Y N
DO (mg/L)	9.9	7.3	9.7	
pH (units)	7.29	7.35	7.29	
Conductivity (µS/cm)	35	41	39.4	
Salinity (ppt)	—	—	—	
Tit. Vol / Sam. Vol. / Alkalinity (mg/L)*	0.41 25 116	0.41 25 120	0.4 125 120	1 1
Tit. Vol. / Sam. Vol. / Hardness (mg/L)* #	0.5 125 120	0.6 125 124	0.8 125 132	1 1
Total Chlorine (mg/L)	<0.03	<0.03	<0.03 yes	
Total Ammonia (mg/L)	<1.0	<1.0	<1.0	
Technician Initials	PT	PT	PT	

* = mg/L as $CaCO_3$, # = Measured for freshwater samples only, NA = Not Applicable, NM = Not Measured

COC Complete? (Y) N
1 Y 2 Y 3 Y

Filtration? Y (N)
Pore Size: _____
Organisms or Debris

Aeration? Y (N)
Length of Time: _____
Final DO: _____
Final pH: _____

Hardness Adjustment? Y (N)
If adjusted, please see worksheet for details.

Freshwater Tests:

Control/Dilution Water Source: test type: _____ 8:2 (DMW) MHW Other: _____ Alkalinity: _____ Hardness: _____

Control/Dilution Water Source: test type: _____ 8:2 (DMW) MHW Other: _____ Alkalinity: _____ Hardness: _____

Additional Control? Y N = _____ Alkalinity: _____ Hardness: _____

Marine Tests:

Control/Dilution Water Source: test type: Mg-c, Aa-c (ART SW) NAT SW Alkalinity: 128 Salinity: 28.6

Control/Dilution Water Source: test type: Mg-a, Mb-a ART SW NAT SW Alkalinity: 128 Salinity: 28.6

Additional Control? Y N = _____ Alkalinity: _____ Salinity: _____

Sample Salted w/ artificial salt? Y N which test(s)?: _____

Sample salted w/brine? Y N which test(s)?: _____ ppt of brine: _____

Sub-samples for additional chemistry:

Comments: Temperature for grab sample must be 0-20°C if received within 1 hour of collection time, 0-12°C if effluent received within 4 hours of collection time, and 0-6°C for all other samples.

QC Check: yes

Appendix G
Chain-of-Custody Forms

Nautilus Environmental

☐ **CALIFORNIA**
5550 Morehouse Drive • Suite 150
San Diego, California 92121
Phone 858.587.7333
Fax 858.587.3961

☒ **WASHINGTON**
5009 Pacific Highway East • Suite 2
Tacoma, Washington 98424
Phone 253.922.4296
Fax 253.922.5814

☐ **BRITISH COLUMBIA**
8664 Commerce Court
Burnaby, British Columbia, Canada V5A 4N3
Phone 604.420.8773
Fax 604.357.1361

Chain of Custody

Date 1/21/08 Page ____ of ____

Sample Collection by: PES Environmental (Russell Stolsen)

Report to:
Company: PES Environmental
Address: 9 Lake Bellevue Way
City: Bellevue State: WA Zip: 98005
Contact: Bill Haldeman
Phone/Email: 425 637 1905 bhaldeman@pesenv.com

Invoice to:
Company: ~~Shell~~ PES Environmental
Address:
City: State: Zip:
Contact:
Phone/Email:

ANALYSES REQUIRED: Shell permit wet analyses; Menidia + Mysid acute; Mysid + Topsmelt-chronic

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	Shell permit wet analyses	Menidia + Mysid acute	Mysid + Topsmelt-chronic								RECEIPT TEMPERATURE (°C)
WetTest-1-012108	1/21/08	0905	W	Cubitainer	1		X										4.0

PROJECT INFORMATION	SAMPLE RECEIPT	
CLIENT: Shell	TOTAL NO. OF CONTAINERS	1
P.O. NO.	REC'D GOOD CONDITION	Y
SHIPPED VIA: PES transported	MATCHES TEST SCHEDULE	Y

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)
(Signature) Russell Stolsen (Time) 1045
(Printed Name) J. Russell Stolsen (Date) 1/21/08
(Company) PES Environmental

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)
(Signature) Eric Tollefson (Time) 1045
(Printed Name) ERIC TOLLEFSON (Date) 1/21/08
Nautilus Environmental Log-in No. 08-023

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

Nautilus Environmental

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Burnaby, British Columbia, Canada V5A 4N3
Phone 604.420.8773
Fax 604.357.1361

Chain of Custody

Date 1/23/08 **Page** 1 **of** 1

Sample Collection by: PES Environmental (Russell Stolsen)

Report to:
Company PES Environmental
Address 9 Lake Bellevue Drive
City Bellevue State WA Zip 98005
Contact Bill Hallaman
Phone/Email 425 637 1905

Invoice to:
Company PES Environmental
Address
City State Zip
Contact
Phone/Email

ANALYSES REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	Shell permit wet analyses	RECEIPT TEMPERATURE (°C)
WetTest-20123-08	1/23	0815	W	cube	1		X	4.2

PROJECT INFORMATION	SAMPLE RECEIPT	
CLIENT Shell	TOTAL NO. OF CONTAINERS	2
P.O. NO.	REC'D GOOD CONDITION	Y
SHIPPED VIA: PES Transported	MATCHES TEST SCHEDULE	Y

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)
(Signature) J R Stolsen (Time) 1040
(Printed Name) J. Russell Stolsen (Date) 1/23/08
(Company) PES Env.

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)
(Signature) Eric Tollefson (Time) 1/23/08
(Printed Name) ERIC TOLLEFSON (Date) 1040
Nautilus Environmental Log-in No. 08-026

Additional costs may be required for sample disposal or storage, Net 30 unless otherwise contracted.

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8664 Commerce Court
Burnaby, British Columbia, Canada V5A 4N3
Phone 604.420.8773
Fax 604.357.1361

Chain of Custody

Date 1/25/08 **Page** 1 **of** 1

Sample Collection by: Russell Stolsen (PES Environmental)

Report to:
Company PES Environmental
Address 9 Lake Bellevue Drive Suite 108
City Bellevue State WA Zip 98005
Contact Bill Haldeman
Phone/Email (425) 637-1905

Invoice to:
Company PES Environmental
Address
City State Zip
Contact
Phone/Email

ANALYSES REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	Shell permit wet sampling											RECEIPT TEMPERATURE (°C)
WetTest-3-012508	1/25/08	0845	W	Poly	1		X											3.1°

PROJECT INFORMATION
CLIENT Shell Harbor Island
P.O. NO.
SHIPPED VIA: KZS Transported

SAMPLE RECEIPT
TOTAL NO. OF CONTAINERS 2
REC'D GOOD CONDITION ✓
MATCHES TEST SCHEDULE ✓

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)
(Signature) (Time) 1015
(Printed Name) J. Russell Stolsen (Date) 1/25/08
(Company)

RELINQUISHED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (COURIER)
(Signature) (Time)
(Printed Name) (Date)
(Company)

RECEIVED BY (LABORATORY)
(Signature) Elizabeth Tobin (Time) 1015
(Printed Name) (Date) 1/25/08
Nautilus Environmental Log-in No. 08-028

Additional costs may be required for sample disposal or storage. Net 30 unless otherwise contracted.

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