Nautilus Environmental, LLC

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

October 2007

Report date: November 12, 2007

Submitted to:

PES Environmental
9 Lake Bellevue Drive, Suite 108
Bellevue, WA 98005

Washington Laboratory
5009 Pacific Hwy East
Suite 2
Tacoma, WA 98424

1.0 INTRODUCTION

Acute and chronic whole effluent toxicity tests were conducted using effluent samples collected from Shell Harbor Island Oil Refinery in October 2007. 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

24-hr. composite 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, salinity, 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.

HI-SHELL001231

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

Test initiation date and time	10/16/2007; 1655h
Test termination date and time	10/18/2007; 1635h
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	Samples aerated prior to dilution
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	10/16/2007; 1545h
Test termination date and time	10/20/2007; 1600h
Test organism	*Menidia beryllina*
Test organism source	Aquatic BioSystems; Fort Collins, CO
Test organism age	12 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	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	Samples aerated prior to dilution
Test protocol	EPA-821-R-02-012
Test acceptability criterion for controls	≥ 90% survival
Reference toxicant	Copper chloride

HI-SHELL001232

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

Test initiation date and time	10/16/2007; 1615h
Test termination date and time	10/23/2007; 1515h
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	Samples aerated prior to dilution
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	10/16/2007; 1445h
Test termination date and time	10/23/2007; 1445h
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	Samples aerated prior to dilution
Test protocol	EPA-600-R-95-136
Test acceptability criterion for controls	≥ 80% survival; average dry weight ≥ 0.85 mg
Reference toxicant	Copper chloride

HI-SHELL001233

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	WET		
Nautilus Log-In Number	07-505	07-516	07-520
Collection date and time	10/15/2007; 0740h	10/17/2007; 0820h	10/19/2007; 0815h
Receipt date and time	10/15/2007; 0900h	10/17/2007; 1047h	10/19/2007; 1005h
Receipt temperature (°C)	12.0	12.0	11.2
Dissolved oxygen (mg/L)	2.0	2.2	8.5
pH	6.89	6.94	7.34
Conductivity (µS/cm)	70	73	55
Hardness (mg/L $CaCO_3$)	56	76	72
Alkalinity (mg/L $CaCO_3$)	40	36	28
Total Chlorine (mg/L)	<0.03	0.08	0.1
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 95 percent for the mysid shrimp and 100 percent for the silverside minnows.

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	90.0	100	>100	>100
	6.25	100			
	12.5	95.0			
	25	100			
	50	95.0			
	100	95.0			
M. beryllina (silverside minnows)	0.0	100	100	>100	>100
	6.25	100			
	12.5	97.5			
	25	97.5			
	50	92.5			
	100	100			

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

HI-SHELL001234

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) 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.

HI-SHELL001235

Table 8. Reference toxicant test results.

Species	Date initiated	Endpoint	EC_{50} (µg/L copper)	Acceptable Range (µg/L copper)	CV (%)
A. bahia	10/17/2007	48h Survival	246	16.6-861	48.1
M. beryllina	10/17/2007	96h Survival	161	161-449.2	23.6
A. bahia	10/23/2007	7d Survival	341	116.7-565.9	32.9
A. bahia	10/23/2007	Growth	272	123.1-474.5	29.4
A. affinis	10/23/2007	7d Survival	83.7	27-175.2	36.7
A. affinis	10/23/2007	Growth	99.6	23-191.6	39.3

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.

HI-SHELL001236

Appendix A

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

Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Report Date: 13 Nov-07 11:46 (p 1 of 1)
Link/Link Code: 11-0184-4829/0710-T035

Mysid Acute — **Nautilus Environmental WA**

Test Run No:	01-7557-1061	**Test Type:**	Survival (48h)	**Analyst:**	Eric Tollefson
Start Date:	16 Oct-07 16:55	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Artificial Saltwater
Ending Date:	18 Oct-07 16:35	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix
Duration:	48h	**Source:**	Aquatic Biosystems, CO	**Age:**	4d

Sample No:	18-0619-5398	**Code:**	1806195398	**Client:**	
Sample Date:	15 Oct-07 07:40	**Material:**	Oil Refinery Effluent	**Project:**	
Receive Date:	15 Oct-07 09:00	**Source:**	Shell Seattle Terminal (WA0001791)		
Sample Age:	33h (12 °C)	**Station:**			

Sample Renewals

Renewal	Sample Code	Sample Date	Receive Date	Renewal Date	Temp °C
1	07-516	17 Oct-07 08:20	17 Oct-07 10:47	18 Oct-07 00:00	12
2	07-520	19 Oct-07 08:15	19 Oct-07 10:05	20 Oct-07 00:00	11.2

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
12-0223-6115	48h Survival Rate	100	> 100	N/A	14.9%	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	0.9	0.825	0.975	0.6	1	0.0365	0.2	22.2%	0.0%
6.25		4	1	1	1	1	1	0	0	0.0%	-11.1%
12.5		4	0.95	0.928	0.972	0.9	1	0.0105	0.0577	6.08%	-5.56%
25		4	1	1	1	1	1	0	0	0.0%	-11.1%
50		4	0.95	0.928	0.972	0.9	1	0.0105	0.0577	6.08%	-5.56%
100		4	0.95	0.928	0.972	0.9	1	0.0105	0.0577	6.08%	-5.56%

48h Survival Rate Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	0.6	1
6.25		1	1	1	1
12.5		1	0.9	1	0.9
25		1	1	1	1
50		1	0.9	0.9	1
100		0.9	1	1	0.9

HI-SHELL001238

Saltwater Acute
48 Hour Toxicity Test Data Sheet
Nautilus Environmental

Client: Shell Harbor Island
Sample ID: WET-1-101507
Test #: 0710-T035

Start Date & Time: 10/16/07 1655
End Date & Time: 10/18/07 ~~24~~ 1635
Test Organisms: America mysis 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	8	10	10	10	~~6.5~~	~~6.1~~	6.1	5.8	8.16	~~8.19~~	8.19	8.12	29.6	~~30.9~~	30.9	30.6	~~24.8~~	~~25.8~~	25.8	25.5	90%
	2	14	10	10	10	6.5	5.9				8.13				30.3			25.9	24.9			
	3	19	10	8	6																	
	4	1	10	10	10																	
6.25	1	17	10	10	10	6.6	~~6.3~~	6.3	5.9	8.17	~~8.22~~	8.22	8.15	29.7	~~30.3~~	30.3	30.9	25.2	~~26.0~~	26.0	25.3	100%
	2	9	10	10	10		5.5				8.14				30.4				24.9			
	3	21	10	10	10																	
	4	23	10	10	10																	
12.5	1	20	10	10	10	6.1	~~6.6~~	6.6	6.0	8.18	~~8.25~~	8.25	8.18	29.0	~~30.7~~	30.7	31.3	25.3	~~25.9~~	25.9	25.3	95%
	2	7	10	9	9		5.6				8.15				30.7				24.8			
	3	5	10	10	10																	
	4	12	10	10	9																	
25	1	11	10	10	10	6.3	~~6.2~~	6.2	~~5.5~~ 5.9	8.19	~~8.31~~	8.31	~~8.27~~ 8.21	29.6	~~30.7~~	30.7	~~31.1~~ 31.2	25.5	~~25.9~~	25.9	25.0	100%
	2	10	10	10	10		5.7				8.15				30.6				24.8			
	3	18	10	10	10																	
	4	3	10	10	10																	
50	1	2	10	10	10	6.3	~~6.3~~	6.3	5.5	8.22	~~8.41~~	8.41	8.27	29.5	~~30.8~~	30.8	31.1	25.2	~~25.8~~	25.8	25.3	95%
	2	13	10	9	9		5.4				8.18				30.4				24.8			
	3	22	10	9	9																	
	4	15	10	10	10																	
100	1	24	10	9	9	6.7	~~6.6~~	6.6	5.9	8.28	~~8.55~~	8.55	8.34	29.6	~~31.1~~	31.1	32.7	25.2	~~25.6~~	25.6	25.0	95%
	2	6	10	10	10		5.4				8.22				30.6				24.9			
	3	16	10	10	10																	
	4	4	10	9	9																	
Technician Initials			PT	PT	PT	PT	PT	PT	PT													

Dilution Water Batch #: Art. Seawater 10/6

Sample Description:

Note: Final water quality at 24L initially recorded for different species. Values corrected.

Comments: 0 hrs: Sample aerated prior to test
24 hrs.
48 hrs.

Organism source: ABS
Date Received: 10/16/07
Date of Hatch: 10/12/07

QA check: KT

(A) Salinity too high. See corrective action form 07-037

Nautilus Environmental
5009 Pacific Hwy. E. Suite 2
Tacoma, WA 98424
(253) 922-4296

Appendix B

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

Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Report Date: 13 Nov-07 11:47 (p 1 of 1)
Link/Link Code: 08-0716-0769/0710-T033

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

Test Run No:	18-9529-8664	**Test Type:**	Survival (96h)	**Analyst:**	Eric Tollefson
Start Date:	16 Oct-07 15:45	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Artificial Saltwater
Ending Date:	20 Oct-07 16:00	**Species:**	Menidia beryllina	**Brine:**	Crystal Sea Marine Mix
Duration:	4d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	12d

Sample No:	18-0619-5398	**Code:**	1806195398	**Client:**	
Sample Date:	15 Oct-07 07:40	**Material:**	Oil Refinery Effluent	**Project:**	
Receive Date:	15 Oct-07 09:00	**Source:**	Shell Seattle Terminal (WA0001791)		
Sample Age:	32h (12 °C)	**Station:**			

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
08-7689-2247	96h Survival Rate	100	> 100	N/A	6.45%	Steel Many-One Rank Test

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptabilty Limits	Overlap	Decision
08-7689-2247	96h Survival Rate	Control Resp	1	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	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	0.975	0.956	0.994	0.9	1	0.00913	0.05	5.13%	2.5%
25		4	0.975	0.956	0.994	0.9	1	0.00913	0.05	5.13%	2.5%
50		4	0.925	0.906	0.944	0.9	1	0.00913	0.05	5.41%	7.5%
100		4	1	1	1	1	1	0	0	0.0%	0.0%

96h 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	0.9
25		1	0.9	1	1
50		0.9	0.9	1	0.9
100		1	1	1	1

HI-SHELL001241

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

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

Client: Shell Harbor Island
Sample ID: WET-1-101507
Test # 0710-T033
Nautilus Check-In #: 07-505

Start Date & Time: 10/16/07 1545
End Date & Time: 10/20/07 1600
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	6.3	6.8	5.2	6.3	5.9	5.5	8.10	8.13	7.84	7.99	8.13	8.06
6.25	6.4	7.1	5.0	6.5	5.7	5.3	8.13	8.17	7.88	8.03	8.14	8.06
12.5	6.2	6.5	5.3	6.8	5.7	5.2	8.15	8.18	7.98	8.08	8.16	8.08
25	6.6	6.7	5.1	6.9	5.6	5.4	8.17	8.19	7.98	8.10	8.17	8.12
50	6.7	6.7	5.0	6.8	5.8	5.5	8.20	8.21	8.00	8.25	8.22	8.14
100	6.4	6.9	5.1	7.2	5.9	5.2	8.27	8.27	8.06	8.44	8.32	8.17

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	29.3	29.7	30.0	29.2	30.3	31.0	25.2	25.8	25.1	25.2	22.2*	25.5
6.25	29.5	30.0	29.5	29.4	30.0	31.1	25.1	25.8	25.1	25.3	24.6	25.6
12.5	29.5	29.9	30.9	29.7	30.1	29.8	25.1	25.9	25.2	25.2	24.7	25.3
25	29.5	29.9	30.6	29.7	30.6	31.2	25.0	25.9	25.1	25.2	24.6	25.5
50	29.6	30.1	29.8	29.9	30.7	30.5	25.0	25.8	25.1	25.4	24.6	25.9
100	29.4	29.9	30.7	29.2	31.0	30.4	25.2	25.8	25.2	25.3	24.4	25.9
Tech. Initials	RT	(N)	RT	RT	(N)	KES						
Sample Used:	#1			#2								

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

Dilution Water Batch #: 10/6/07 ASW

Sample Description:
Comments: Fed @ 48 hr
QA Check:

Organism Source: ABS
Date Received: 10/15/07
Date of Hatch: 10/4/07

KES Sample test aerated prior to dilutions

* Temp too low on CON @ 72 h. see corrective action form # 07-028.

Appendix C

Americamysis bahia (Mysid Shrimp) Chronic Test

Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Report Date: 13 Nov-07 11:47 (p 1 of 1)
Link/Link Code: 01-5182-7309/0710-T034

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

Test Run No:	02-9283-3561	**Test Type:**	Growth-Survival-Fec (7d)	**Analyst:**	Eric Tollefson
Start Date:	16 Oct-07 16:15	**Protocol:**	EPA/821/R-02-014 (2002)	**Diluent:**	Artificial Saltwater
Ending Date:	23 Oct-07 15:15	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea Marine Mix
Duration:	6d 23h	**Source:**	Aquatic Biosystems, CO	**Age:**	7d

Sample No:	18-0619-5398	**Code:**	1806195398	**Client:**	
Sample Date:	15 Oct-07 07:40	**Material:**	Oil Refinery Effluent	**Project:**	
Receive Date:	15 Oct-07 09:00	**Source:**	Shell Seattle Terminal (WA0001791)		
Sample Age:	33h (12 °C)	**Station:**			

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
18-8310-8617	7d Survival Rate	100	> 100	N/A	13.6%	Steel Many-One Rank Test
10-5469-0340	Mean Dry Biomass-mg	100	> 100	N/A	17.5%	Dunnett's Multiple Comparison Test

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptabilty Limits	Overlap	Decision
18-8310-8617	7d Survival Rate	Control Resp	0.925	0.8 - NL	Yes	Passes acceptability criteria
10-5469-0340	Mean Dry Biomass-mg	Control Resp	0.312	0.2 - NL	Yes	Passes acceptability criteria
10-5469-0340	Mean Dry Biomass-mg	PMSD	0.175	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	0.925	0.869	0.981	0.6	1	0.0272	0.149	16.1%	0.0%
6.25		8	0.925	0.869	0.981	0.6	1	0.0272	0.149	16.1%	0.0%
12.5		8	1	1	1	1	1	0	0	0.0%	-8.11%
25		8	0.925	0.886	0.964	0.8	1	0.0189	0.104	11.2%	0.0%
50		8	0.9	0.844	0.956	0.6	1	0.0276	0.151	16.8%	2.7%
100		8	1	1	1	1	1	0	0	0.0%	-8.11%

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	0.312	0.295	0.329	0.226	0.362	0.00833	0.0456	14.6%	0.0%
6.25		8	0.316	0.293	0.338	0.178	0.378	0.0112	0.0614	19.5%	-1.04%
12.5		8	0.322	0.313	0.331	0.29	0.354	0.00431	0.0236	7.33%	-3.12%
25		8	0.321	0.3	0.342	0.242	0.396	0.0102	0.0558	17.4%	-2.8%
50		8	0.332	0.311	0.354	0.252	0.39	0.0105	0.0577	17.4%	-6.41%
100		8	0.311	0.301	0.32	0.276	0.346	0.00462	0.0253	8.14%	0.48%

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	0.6	1	1	1	0.8	1	1	1
6.25		1	0.6	0.8	1	1	1	1	1
12.5		1	1	1	1	1	1	1	1
25		1	1	0.8	1	0.8	0.8	1	1
50		1	0.8	1	1	0.6	0.8	1	1
100		1	1	1	1	1	1	1	1

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	0.226	0.362	0.308	0.308	0.272	0.332	0.36	0.33
6.25		0.316	0.178	0.29	0.338	0.358	0.334	0.378	0.332
12.5		0.354	0.306	0.294	0.338	0.334	0.318	0.342	0.29
25		0.27	0.396	0.284	0.374	0.312	0.242	0.314	0.376
50		0.384	0.252	0.356	0.296	0.256	0.336	0.388	0.39
100		0.294	0.276	0.288	0.312	0.346	0.34	0.328	0.302

HI-SHELL001244

Shell Harbor Island
***Americamysis bahia* Chronic Survival & Growth**
Test Initiation: October 16, 2007

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	3	60	92.5	43.08	44.21	0.226	0.312
	2	5	100		44.70	46.51	0.362	
	3	5	100		41.51	43.05	0.308	
	4	5	100		43.71	45.25	0.308	
	5	4	80		42.53	43.89	0.272	
	6	5	100		41.03	42.69	0.332	
	7	5	100		45.32	47.12	0.360	
	8	5	100		42.75	44.40	0.330	
6.25	1	5	100	92.5	42.29	43.87	0.316	0.316
	2	3	60		47.65	48.54	0.178	
	3	4	80		43.52	44.97	0.290	
	4	5	100		42.27	43.96	0.338	
	5	5	100		44.60	46.39	0.358	
	6	5	100		43.98	45.65	0.334	
	7	5	100		41.96	43.85	0.378	
	8	5	100		42.34	44.00	0.332	
12.5	1	5	100	100	46.82	48.59	0.354	0.322
	2	5	100		51.75	53.28	0.306	
	3	5	100		41.91	43.38	0.294	
	4	5	100		40.71	42.40	0.338	
	5	5	100		43.25	44.92	0.334	
	6	5	100		41.03	42.62	0.318	
	7	5	100		45.07	46.78	0.342	
	8	5	100		42.88	44.33	0.290	
25	1	5	100	92.5	44.1	45.45	0.270	0.321
	2	5	100		40.5	42.48	0.396	
	3	4	80		40.16	41.58	0.284	
	4	5	100		42.27	44.14	0.374	
	5	4	80		37.51	39.07	0.312	
	6	4	80		40.09	41.30	0.242	
	7	5	100		43.92	45.49	0.314	
	8	5	100		45.48	47.36	0.376	
50	1	5	100	90.0	40.88	42.80	0.384	0.332
	2	4	80		38.93	40.19	0.252	
	3	5	100		46.82	48.60	0.356	
	4	5	100		46.22	47.70	0.296	
	5	3	60		48.87	50.15	0.256	
	6	4	80		44.53	46.21	0.336	
	7	5	100		43.09	45.03	0.388	
	8	5	100		40.26	42.21	0.390	
100	1	5	100	100	43.71	45.18	0.294	0.311
	2	5	100		45.61	46.99	0.276	
	3	5	100		43.36	44.80	0.288	
	4	5	100		39.42	40.98	0.312	
	5	5	100		39.71	41.44	0.346	
	6	5	100		40.45	42.15	0.340	
	7	5	100		40.87	42.51	0.328	
	8	5	100		45.06	46.57	0.302	

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-1-101507
Test No: D710-T034
Nautilus Check-In #: ~~D710-T0~~ 07-505 ICS | 07-516

Start Date & Time: 10/16/07 1615 ICS
Stop Date & Time: 10/23/07 1515
Test species: Americamysis bahia
07-520

Concentration 100N	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.11	8.01	8.14	8.02	7.92	8.04	8.05	7.94	8.06	8.00	8.08	8.06	8.18	8.03
DO (mg/l)	6.4	4.6	6.6	5.2	6.2	5.3	6.3	4.7	6.3	5.3	6.2	5.1	6.2	5.8
Salinity (ppt)	29.5	30.4	29.6	~~30~~ 31.3	30.0	~~30~~ 31.1	28.8	29.7	29.7	29.7	29.6	30.3	29.6	29.9
Temperature (°C)	26.1	25.0	25.0	25.0	25.5	25.3	25.1	25.6	26.5	25.6	25.8	25.0	~~24.6~~ 25.0	25.4

Concentration 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	8.13	8.02	8.18	8.05	7.99	8.04	8.11	8.00	8.10	7.97	8.14	8.08	8.19	8.07
DO (mg/l)	6.5	4.8	6.5	5.7	6.5	5.3	6.3	5.0	6.4	4.6	6.3	5.2	6.6	5.9
Salinity (ppt)	29.6	31.0	29.6	30.9	30.1	31.2	28.9	30.1	29.7	29.7	29.7	30.7	29.9	30.0
Temperature (°C)	26.0	25.0	25.0	25.0	26.2	25.3	25.2	25.7	26.8	25.7	25.8	25.0	25.0	25.5

Concentration 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	8.15	8.07	8.20	8.05	8.04	8.07	8.15	8.01	8.11	8.09	8.16	8.06	8.19	8.03
DO (mg/l)	6.5	4.8	6.6	5.3	6.6	5.3	6.6	5.0	6.3	5.2	6.4	4.8	6.4	5.6
Salinity (ppt)	29.6	31.0	29.8	31.8	30.1	30.1	29.0	30.2	29.8	29.6	29.5	30.2	29.7	29.8
Temperature (°C)	26.0	25.0	25.0	25.1	25.7	25.4	25.1	25.7	26.5	25.7	25.7	25.0	25.3	25.5

Concentration 25	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.16	8.08	8.23	8.07	8.11	8.05	8.20	8.05	8.12	8.09	8.17	8.10	8.21	8.07
DO (mg/l)	6.3 ICS	4.9	6.8	5.1	6.6	5.5	6.6	4.8	6.5	5.1	6.1	5.5	6.8	5.4
Salinity (ppt)	29.6	30.3	29.6	30.8	29.8	30.6	29.1	29.9	29.7	29.8	29.6	29.8	29.6	29.8
Temperature (°C)	26.5	25.0	25.0	25.1	25.1	25.3	25.1	25.7	26.9	25.7	~~29.4~~ 25.4	25.0	25.1	25.6

Concentration 50	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.20	8.10	8.29	8.13	8.23	8.14	8.32	8.08	8.16	8.12	8.20	8.12	8.22	8.10
DO (mg/l)	6.6	4.8	6.8	5.1	6.7	5.2	6.5	4.5	6.8	5.4	6.2	5.6	6.7	6.0
Salinity (ppt)	29.4	30.2	29.5	30.6	30.0	30.8	29.0	30.0	29.7	30.8	29.2	30.0	29.8	30.9
Temperature (°C)	26.5	25.0	25.0	25.2	25.1	25.4	25.1	25.8	26.0	25.4	25.6	25.0	25.2	25.4

Concentration 100	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.25	8.13	8.38	8.16	8.43	8.22	8.49	8.22	8.20	8.17	8.27	8.18	8.24	8.12
DO (mg/l)	6.3	4.8	6.8	5.0	6.9	5.4	6.8	4.6	6.6	5.2	6.8	5.2	7.2	6.1
Salinity (ppt)	29.4	30.0	29.3	30.5	29.8	31.3	29.5	30.4	29.4	30.0	29.0	30.1	29.5	30.1
Temperature (°C)	26.1	25.0	25.0	25.1	25.1	25.3	25.1	25.7	~~25.8~~ 26.0 ICS	25.6	25.7	25.2	25.0	25.4
Tech Initials:	ICS	(N)	(N)	JS	JS	RH/JS	(N)	ICS	ICS	RH	RH	JS	JS	RH

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

Dilution Water Batch #: 10/6/07 ASW

QA Check: KJ

Sample Description:
Organism Source: ABS
Date Received: 10/16/07 ICS
Date of Hatch: 10/9/07 ICS

Comments: 2 samples aerated prior to dilution

HI-SHELL001246

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: 0710-T034

Sample ID: WET-1-101507

Conc'n or %	Cont.	Rep.	Days 0	1	2	3	4	5	6	7	Mean % Survival
CON	4	1	5	3	3	3	3	3	3	3	
	5	2	5	5	5	5	5	5	5	5	
	43	3	5	5	5	5	5	5	5	5	
	37	4	5	5	5	5	5	5	5	5	
	48	5	5	4	4	4	4	4	4	4	
	34	6	5	5	5	5	5	5	5	5	
	20	7	5	5	5	5	5	5	5	5	
	9	8	5	5	5	5	5	5	5	5	92.5%
6.25	23	1	5	5	5	5	5	5	5	5	
	32	2	5	5	5	5	5	5	5	3	
	6	3	5	5	5	5	5*	4	4	4	
	46	4	5	5	5	5	5	5	5	5	
	2	5	5	5	5	5	5	5	5	5	
	31	6	5	5	5	5	5	5	5	5	
	27	7	5	5	5	5	5	5	5	5	
	8	8	5	5	5	5	5	5	5	5	92.5%
12.5	3	1	5	5	5	5	5	5	5	5	
	35	2	5	5	5	5	5	5	5	5	
	45	3	5	5	5	5	5	5	5	5	
	33	4	5	5	5	5	5	5	5	5	
	1	5	5	5	5	5	5	5	5	5	
	40	6	5	5	5	5	5	5	5	5	
	29	7	5	5	5	5	5	5	5	5	
	16	8	5	5	5	5	5	5	5	5	100%
Technician Initials			ICS	ICS	[illegible]	QT	ICS	QT	QT	QT	

Feeding Times: 0 1736 1 945 1755 2 830 1600 3 815 1614 4 720 1915 5 715 1545 6 815 1615

QA check KJ

Comments: *Mysid injured during removal

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:** 0710-7034

Sample ID: WET-1-101507

Conc'n or (%)	Cont.	Rep.	Days 0	1	2	3	4	5	6	7	Mean % Survival
25	14	1	5	5	5	5	5	5	5	5	
	39	2	5	5	5	5	5	5	5	5	
	22	3	5	5	4	4	4	4	4	4	
	19	4	5	5	5	5	5	5	5	5	
	47	5	5	4	4	4	4	4	4	4	
	36	6	5	5	5	5	5	5	5	4	
	10	7	5	5	5	5	5	5	5	5	
	18	8	5	5	5	5	5	5	5	5	92.5%
50	25	1	5	5	5	5	5	5	5	5	
	30	2	5	5	4	4	4	4	4	4	
	21	3	5	5	5	5	5	5	5	5	
	24	4	5	5	5	5	5	5	5	5	
	11	5	5	3	3	3	3	3	3	3	
	26	6	5	4	4	4	4	4	4	4	
	44	7	5	5	5	5	5	5	5	5	
	17	8	5	5	5	5	5	5	5	5	90%
100	7	1	5	5	5	5	5	5	5	5	
	28	2	5	5	5	5	5	5	5	5	
	12	3	5	5	~~2~~4 5	5	5	5	5	5	
	15	4	5	5	5	5	5	5	5	5	
	41	5	5	5	5	5	5	5	5	5	
	42	6	5	5	5	5	5	5	5	5	
	38	7	5	5	5	5	5	5	5	5	
	13	8	5	5	5	5	5	5	5	5	100%
Technician Initials			RCS	RCS	[illegible]	[illegible]	RCS	[illegible]	[illegible]	[illegible]	

Feeding Times: 0 1736 1 945/1755 2 830/1600 3 815/1614 4 720/1915 5 715/1545 6 815/1615

QA check KT

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-1-101507

Test Number: 0710-T034

% Conc.	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc.
CON	4	1	.04308	.04421		3		
	5	2	.04470	.04651		5		
	43	3	.04151	.04305		5		
	37	4	.04371	.04525		5		
	48	5	.04253	.04389		4		
	34	6	.04103	.04269		5		
	20	7	.04532	.04712		5		
	9	8	.04275	.04440		5		
6.25	23	1	.04229	.04387		5		
	32	2	.04765	.04854		3		
	6	3	.04352	.04497		4		
	46	4	.04227	.04396		5		
	2	5	.04460	.04639		5		
	31	6	.04398	.04565		5		
	27	7	.04196	(N) ~~.04570~~ → .04385		5		
	8	8	.04234	.04400		5		
12.5	3	1	.04682	.04859		5		
	35	2	.05175	.05328		5		
	45	3	.04191	.04338		5		
	33	4	.04071	.04240		5		
	1	5	.04325	.04492		5		
	40	6	.04103	.04262		5		
	29	7	.04507	.04678		5		
	16	8	.04288	.04433		5		
	Tech Initials:		(N)	(N)				

Date/Time in: 10/23/07 1515 **Oven temp. (°C):** 60 **QA Check:** KT

Date/Time out: 10/25/07 1100 **Oven temp. (°C):** 60

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-1-101507

Test Number: 0710-T034

% Conc.	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc.
25	14	1	.04410	.04545		5		
	39	2	.04050	.04248		5		
	22	3	.04016	.04158		4		
	19	4	.04227	.04414		5		
	47	5	.03751	.03907		4		
	36	6	.04009	.04130		4		
	10	7	.04392	.04549		5		
	18	8	.04548	.04736		5		
50	25	1	.04088	.04280		5		
	30	2	.03893	.04019		4		
	21	3	.04682	.04860		5		
	24	4	.04622	.04770		5		
	11	5	.04887	.05015		3		
	26	6	.04453	.04621		4		
	44	7	.04309	.04503		5		
	17	8	.04026	.04221		5		
100	7	1	.04371	.04518		5		
	28	2	.04561	.04699		5		
	12	3	.04336	.04480		5		
	15	4	.03942	.04098		5		
	41	5	.03971	.04144		5		
	42	6	.04045	.04215		5		
	38	7	.04087	.04251		5		
	13	8	.04506	.04657		5		
	Tech Initials:		MW	MW				

Date/Time in: 10/23/07 1515 Oven temp. (°C): 60 QA Check: KT

Date/Time out: 10/25/07 1100 Oven temp. (°C): 60

Appendix D

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

Statistical Summaries and Raw Bench Sheets

CETIS Summary Report

Report Date: 13 Nov-07 11:47 (p 1 of 1)
Link/Link Code: 17-5068-6967/0710-T032

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

Test Run No:	06-9461-4074	**Test Type:**	Growth-Survival (7d)	**Analyst:**	Eric Tollefson
Start Date:	16 Oct-07 14:45	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Artificial Saltwater
Ending Date:	23 Oct-07 14:45	**Species:**	Atherinops affinis	**Brine:**	Crystal Sea Marine Mix
Duration:	7d 0h	**Source:**	Aquatic Biosystems, CO	**Age:**	10d

Sample No:	18-0619-5398	**Code:**	1806195398	**Client:**	
Sample Date:	15 Oct-07 07:40	**Material:**	Oil Refinery Effluent	**Project:**	
Receive Date:	15 Oct-07 09:00	**Source:**	Shell Seattle Terminal (WA0001791)		
Sample Age:	31h (12 °C)	**Station:**			

Comparison Summary

Analysis No	Endpoint	NOEL	LOEL	TOEL	PMSD	Method
12-0440-7190	7d Survival Rate	100	>100	N/A	9.1%	Steel Many-One Rank Test
06-8594-5832	Mean Dry Biomass-mg	100	>100	N/A	22.9%	Dunnett's Multiple Comparison Test

Test Acceptability

Analysis No	Endpoint	Attribute	Test Stat	Acceptabilty Limits	Overlap	Decision
12-0440-7190	7d Survival Rate	Control Resp	0.96	0.8 - NL	Yes	Passes acceptability criteria
06-8594-5832	Mean Dry Biomass-mg	Control Resp	1.51	0.85 - NL	Yes	Passes acceptability criteria
12-0440-7190	7d Survival Rate	PMSD	0.091	NL - 0.25	No	Passes acceptability criteria
06-8594-5832	Mean Dry Biomass-mg	PMSD	0.229	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	1	1	1	1	1	0	0	0.0%	-4.17%
25		5	1	1	1	1	1	0	0	0.0%	-4.17%
50		5	1	1	1	1	1	0	0	0.0%	-4.17%
100		5	1	1	1	1	1	0	0	0.0%	-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	1.51	1.42	1.61	1.26	1.83	0.0454	0.248	16.4%	0.0%
6.25		5	1.42	1.34	1.51	1.06	1.62	0.0402	0.22	15.5%	5.94%
12.5		5	1.4	1.35	1.45	1.2	1.52	0.0247	0.135	9.65%	7.53%
25		5	1.52	1.41	1.63	1.1	1.88	0.0543	0.297	19.6%	-0.13%
50		5	1.69	1.59	1.79	1.32	2.04	0.0484	0.265	15.7%	-11.4%
100		5	1.58	1.51	1.65	1.29	1.8	0.0351	0.192	12.1%	-4.49%

7d Survival Rate Detail

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

Mean Dry Biomass-mg Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.83	1.55	1.26	1.67	1.27
6.25		1.44	1.06	1.57	1.44	1.62
12.5		1.49	1.2	1.33	1.46	1.52
25		1.38	1.67	1.56	1.1	1.88
50		1.8	1.62	2.04	1.32	1.66
100		1.29	1.55	1.7	1.57	1.8

Shell Harbor Island
***Atherinops affinis* Chronic Survival & Growth**
Test Initiation: October 16, 2007

Concentration %	Replicate	Survival # Alive	Survival % Survival	Survival Mean % Survival	Growth Tare Weight mg	Growth Total Weight mg	Growth Weight per Fish [a] (mg)	Growth Mean Weight (mg)
Control	1	5	100	96	39.32	48.45	1.83	1.51
	2	5	100		43.55	51.29	1.55	
	3	5	100		45.45	51.74	1.26	
	4	4	80		39.25	47.60	1.67	
	5	5	100		39.58	45.94	1.27	
6.25	1	5	100	96	45.52	52.72	1.44	1.42
	2	4	80		39.26	44.54	1.06	
	3	5	100		38.84	46.69	1.57	
	4	5	100		38.76	45.97	1.44	
	5	5	100		44.74	52.82	1.62	
12.5	1	5	100	100	41.47	48.94	1.49	1.40
	2	5	100		47.30	53.30	1.20	
	3	5	100		42.44	49.07	1.33	
	4	5	100		43.38	50.69	1.46	
	5	5	100		39.38	46.99	1.52	
25	1	5	100	100	51.17	58.06	1.38	1.52
	2	5	100		41.46	49.79	1.67	
	3	5	100		45.27	53.06	1.56	
	4	5	100		43.99	49.48	1.10	
	5	5	100		42.90	52.32	1.88	
50	1	5	100	100	38.09	47.11	1.80	1.69
	2	5	100		49.99	58.08	1.62	
	3	5	100		41.07	51.27	2.04	
	4	5			45.01	51.59	1.32	
	5	5	100		38.25	46.55	1.66	
100	1	5	100	100	41.47	47.92	1.29	1.58
	2	5	100		42.47	50.23	1.55	
	3	5	100		39.59	48.09	1.70	
	4	5	100		47.35	55.21	1.57	
	5	5	100		40.05	49.05	1.80	

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-1-101507
Test No: 0710-T032
Nautilus Check-In #: 07-505 07-516

Start Date & Time: 10/16/07 1445
Stop Date & Time: 10/23/07 1445
Test species: Atherinops affinis
07520

Concentration 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	8.03	8.23	7.94	7.95	7.91	8.04	7.68	8.16	7.88	8.17	7.89	8.16	7.88
DO (mg/l)	6.4	6.0	6.6	6.7	6.8	5.7	7.2	5.1	6.6	6.3	6.8	6.6	6.6	6.1
Salinity (ppt)	29.3	29.9	29.5	30.5	29.0	29.0	29.4	29.8	29.3	29.6	29.3	29.5	29.3	29.9
Temperature (°C)	20.8	20.3	19.9	20.4	20.2	20.8	20.8	20.8	20.4	20.5	20.1	20.2	20.9	20.1

Concentration 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	8.17	8.07	8.25	7.98	8.05	7.98	8.10	7.89	8.18	7.91	8.20	7.89	8.22	7.91
DO (mg/l)	6.6	6.2	6.4	6.2	6.8	5.6	7.0	5.9	6.7	6.2	6.8	6.1	6.8	6.3
Salinity (ppt)	29.4	29.8	29.9	30.2	29.4	29.3	29.5	30.2	29.6	29.8	29.5	29.8	29.5	29.8
Temperature (°C)	20.9	20.3	20.1	~~30.1~~ 20.1	20.0	20.7	20.6	20.4	20.1	~~29.7~~ 20.5	20.2	20.2	20.9	20.0

Concentration 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	8.18	8.10	8.27	8.04	8.08	8.01	8.14	7.95	8.18	7.98	8.22	7.96	8.25	7.97
DO (mg/l)	6.6	6.0	6.5	6.2	6.8	5.8	7.3	5.7	6.7	6.2	6.8	6.2	6.7	6.4
Salinity (ppt)	29.6	29.9	29.5	30.2	29.7	29.2	29.6	30.0	29.8	29.9	29.5	29.7	29.5	29.6
Temperature (°C)	20.9	20.3	20.1	20.1	20.3	20.9	20.5	21.0	20.7	20.6	20.2	20.2	20.7	20.1

Concentration 25	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.21	8.13	8.30	8.07	8.14	8.05	8.21	7.93	8.20	7.96	8.24	7.98	8.27	7.99
DO (mg/l)	6.6	6.2	6.4	6.3	6.8	6.0	7.4	5.7	6.7	6.0	6.8	6.1	6.7	6.0
Salinity (ppt)	29.4	29.9	29.9	30.4	29.8	29.5	29.8	29.6	29.7	29.7	~~30.5~~	29.7	29.6	29.9
Temperature (°C)	20.7	20.3	20.1	20.1	20.6	20.7	20.3	20.8	20.8	20.5	20.0	20.4	19.9	19.9

Concentration 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	8.15	8.37	8.10	8.26	8.10	8.33	8.04	8.22	8.04	8.29	8.03	8.30	8.01
DO (mg/l)	6.7	6.2	6.8	6.4	6.8	5.8	7.4	5.7	~~6.7~~	6.3	6.7	6.3	6.8	6.1
Salinity (ppt)	29.4	29.9	30.1	30.7	29.9	29.6	30.0	30.1	29.6	29.6	29.5	29.4	29.7	29.8
Temperature (°C)	20.5	20.5	19.9	20.2	19.5	20.9	20.0	20.6	20.0	20.5	19.8	20.3	19.1	20.1

Concentration 100	Days 0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.32	8.21	8.46	8.21	8.44	8.23	8.50	8.15	8.26	8.10	8.37	8.12	8.37	8.15
DO (mg/l)	7.2	6.0	6.7	6.3	6.8	5.7	7.4	5.8	7.1	6.2	6.8	6.3	6.8	6.4
Salinity (ppt)	29.6	29.9	30.8	30.9	30.2	30.0	30.3	30.9	29.7	29.7	29.7	29.8	29.5	29.8
Temperature (°C)	20.4	20.5	19.9	20.2	19.1	21.0	19.3	20.8	19.8	20.5	19.1	20.3	19.5	20.0
Tech Initials:	KT	KW	KW	KT	KT	KW	MM	LCS	LCS	KT	KT	KT	KT	MM

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

Dilution Water Batch #: 10/6/07 ASW

QA Check: KT

Sample Description:
Organism Source: ABS
Date Received: 10/16/07
Date of Hatch: 10/6/07

Comments: Sample curated prior to dilutions

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.:** 0710-T032

Sample ID: WET-1-101507

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

Feeding Times: 0 ____/1736 1 945/1755 2 830/1600 3 815/1614 4 720/1915 5 715/1545 6 815/1615

Comments: _____ **QA Check** KG

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: WET-1-101507

Test No: 0710-T032

Conc.	cont. #	rep.	pan wt. (gm)	pan + fish (gm)	fish wt. (mg)	# fish	avg. per fish (mg)	avg. per conc. (mg)
CON	12	1	.03932	.04845		5		
	29	2	.04355	.05129		5		
	6	3	.04545	.05174		5		
	11	4	.03925	.04760		4		
	23	5	.03958	.04594		5		
6.25	28	1	.04552	.05272		5		
	22	2	.03926	.04454		4		
	24	3	.03884	.04669		5		
	16	4	.03876	.04597		5		
	2	5	.04474	.05282		5		
12.5	27	1	.04147	.04894		5		
	4	2	.04730	.05330		5		
	20	3	.04244	.04907		5		
	17	4	.04338	.05069		5		
	10	5	.03938	.04699		5		
25	1	1	.05117	.05806		5		
	9	2	.04146	.04979		5		
	5	3	.04527	.05306		5		
	18	4	.04399	.04948		5		
30	~~28~~ 33	5	.04290	.05232		5		
50 ~~50~~ 33	21	1	.03809	.04711		5		
	7	2	.04999	.05808		5		
	15	3	.04107	.05127		5		
	13	4	.04501	.05159		5		
	25	5	.03825	.04655		5		
100	14	1	.04147	.04792		5		
	26	2	.04247	.05023		5		
	19	3	.03959	.04809		5		
	3	4	.04735	.05521		5		
	8	5	.04005	.04905		5		
	Tech Initials:		(W)	(W)				

Date/Time in: 10/23 1445 **Oven temp. (°C):** 61.0 **QA check** KT

Date/Time out: 10/25/07 1100 **Oven temp. (°C):** 60.0

Appendix E
Bioassay Testing Checklists

WET TESTING BIOASSAY CHECKLIST

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

Sample ID Number: WET-1-101507
Project Name: Shell Harbor Island NPDES WET tests
EPA Test Method: EPA-821-R-02-012 (Circle method to verify)

Date: 10/16/07
Laboratory: Nautilus Environmental
Personnel: Liz Tubin, Laura Shankl, Eric Tollefson, Julia Santiago

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)?	✓		Samples received w/in 4h
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?	✓		33h
Mysids are 1-5 days old, within 24 hours of same age?	✓		4d
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-SHELL001258

	YES	NO	COMMENT
DAILY MONITORING			
Test chambers rearranged according to concentration each day?	✓		
pH, DO, salinity and temperature measured and within acceptable parameters?	✓ (a)		(a)
Mysids fed once daily	✓		
Surviving mysids counted?	✓		
Tanks cleaned?	✓	X (5)	test chambers are plastic cups
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:

(a) Salinity high at 48 hours. Corrective action form 07-037 completed and available if requested.

HI-SHELL001259

WET TESTING BIOASSAY CHECKLIST

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

Sample ID Number: WET-1-101507 Date: 10/16/07

Project Name: Shell Harbor Island NPDES WET tests Laboratory: Nautilus Environmental

EPA Test Method: EPA-821-R-02-012 (Circle method to verify) Personnel: Eric Tolleston, Maria Brayfield, Liz Tubin, Justin Santiago

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)?	✓		Samples received w/in 4h
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?	✓		32h
Fish are 9-14 days old, within 24 hours of same age?	✓		12d old
Fish 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?	✓		DO Low - sample was aerated prior to dilutions
Ten fish added to test chamber?	✓		
Environmental chamber at 25 ± 1°C with 16 hours light/8 hours dark photoperiod?	✓		

	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?	✓ (a)		(a)
80% of test solution renewed at 48 hours?	✓		
Surviving fish counted?	✓		
Tanks cleaned?	✓		
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:

(a) Temperature recorded at 72h was taken from surrogate chamber that had cooled. Environmental chamber was at appropriate temperature so test chambers were likely ok. Corrective action form 07-028 completed and available if requested.

HI-SHELL001261

WET TESTING BIOASSAY CHECKLIST

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

Sample ID Number: WET-1-101507, WET-2-101707 Date: 10/16/07
Project Name: Shell Harbor Island NPDES WET tests Laboratory: Nautilus Environmental
EPA Test Method: EPA-821-R-02-014, method 1007.0 (Circle method to verify) Personnel: Eric Tulleson, Maria Brayfield, Laura Shaw, Indira Santiago, Liz Tubin

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?	✓		33h
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?	✓		
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?	✓		
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-SHELL001263

WET TESTING BIOASSAY CHECKLIST

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

Sample ID Number: WET-1-101507, WET-2-101707 Date: 10/16/07
Project Name: Shell Herbert Island NPDES WET Tests Laboratory: Nautilus Environmental
EPA Test Method: EPA / 600 / R-95 / 136 (Circle method to verify) Personnel: Eric Tollefsen, Marina Bragfield, Laura Shanks, Meg Murph, Indira Santiago

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?	✓		30 ppt
Water samples kept at 4°C?	✓		
Testing initiated within 36 hours of sample collection?	✓		31 h
Test animals are 9-15 days old?	✓		10 d
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?	✓		
Environmental chamber at 20 ± 1°C with 16 hours light/8 hours dark photoperiod?	✓		

HI-SHELL001264

	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?	✓		Test chambers are plastic cups (1L)
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:

HI-SHELL001265

Appendix F
Sample Check-In Sheet

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

Sample Check-In Information

Client: PES Environmental/Shell
Sample ID: Shell WET

Tests Performed: Mb, Mg-a ; Mg, Aa-c
Test ID No(s).:

Sample ID:	WET-1-101507	WET-2-101707	WET-3-101907	
Log-in No. (07-xxxx):	07-505	07-516	07-520	
Sample Collection Date & Time:	10/15/07 0740	10/17/07 0820	10/19/07 0815	
Sample Receipt Date & Time:	10/15/07 0900	10/17/07 1047	10/19/07 1005	
Check-in Temperature (°C)	12.0	12.0	11.2	
Temperature OK?	(Y) N	(Y) N	(Y) N	Y N
DO (mg/L)	2.0	2.2	8.5	
pH (units)	6.89	6.94	7.34	
Conductivity (µS/cm)	70	72.6	54.5	
Salinity (ppt)	—	Ø	Ø	
Tit. Vol / Sam. Vol. / Alkalinity (mg/L)*	1.0 / 25 / 40	0.9 / 25 / 36	0.7 / 25 / 28	/ /
Tit. Vol. / Sam. Vol. / Hardness (mg/L)* [a]	1.4 / 25 / 56	1.9 / 25 / 76	1.8 / 25 / 72	/ /
Total Chlorine (mg/L)	<0.03	0.08	0.1	
Total Ammonia (mg/L)	<1	<1	<1	
Technician Initials	MM	(N)	(N)	

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

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: My, AaC (ART SW) NAT SW Alkalinity: 120 Salinity: 29.2

Control/Dilution Water Source: test type: My, Mb-a (ART SW) NAT SW Alkalinity: 120 Salinity: 29.2

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

Sample Salted w/ artificial salt? Y N If yes, what ppt? _____ test type: _____

Sample salted w/brine? Y N If yes, what ppt? _____ test type: _____

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.

Sample Description:

COC Complete? Y or 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.

Sub-samples for additional chemistry:

QC Check: KJ

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 10/19/07 **Page** 1 **of** 1

Sample Collection by: Russell Stolsen, PES Environmental

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

Invoice to:
Company Shell
Address
City State Zip
Contact Frank Takahasi
Phone/Email

ANALYSES REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	Shell permit analyses	RECEIPT TEMPERATURE (°C)
wet-3-101907	10/19/07	0815	W	Cube poly	1		X	11.2

PROJECT INFORMATION	SAMPLE RECEIPT	
CLIENT Shell	TOTAL NO. OF CONTAINERS	1
P.O. NO. PES Proj. # 828.001.01	REC'D GOOD CONDITION	✓
SHIPPED VIA: PES hand-delivered	MATCHES TEST SCHEDULE	✓

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)
(Signature) J. Russell Stolsen (Time) 1000
(Printed Name) J. Russell Stolsen (Date) 10/19/07
(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) Elizabeth (Time) 1000
(Printed Name) (Date) 10/19/07
Nautilus Environmental Log-in No. 07-520

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

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

HI-SHELL001269

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 10/17/07 Page 1 of 1

Sample Collection by: Russell Stolsen

Report to:
Company PES Environmental
Address 9 Lake Bellevue Ste 108
City Bellevue State WA Zip 98005
Contact Bill Huldeman
Phone/Email 425 637 1905

Invoice to:
Company Shell
Address
City State Zip
Contact Frank Takahasi
Phone/Email

ANALYSES REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	Shell permit analyses	RECEIPT TEMPERATURE (°C)
Wet-2-101707	10/17/07	0820	W	Cube Poly	1		X	12

PROJECT INFORMATION	SAMPLE RECEIPT	
CLIENT Shell	TOTAL NO. OF CONTAINERS	1
P.O. NO. PES proj. # 828.001.01	REC'D GOOD CONDITION	✓
SHIPPED VIA: Hand delivered by PES	MATCHES TEST SCHEDULE	✓

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)
(Signature) J. Russell Stolsen (Time) 1047
(Printed Name) J. Russell Stolsen (Date) 10-17-07
(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) (Time) 1047
(Printed Name) MARIA E. BRAYFIELD (Date) 10-17-07
Nautilus Environmental Log-in No. 07-516

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

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

HI-SHELL001270

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 10/15/07 **Page** 1 **of** 1

Sample Collection by: Russell Stolsen,

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

Invoice to:
Company Shell Pipeline Company
Address 20945 South Willmington Ave.
City Carson State CA Zip 90810
Contact Frank Takahashi
Phone/Email 310-816-2125

ANALYSES REQUIRED

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NUMBER OF CONTAINERS	COMMENTS	Shell permit analyses	RECEIPT TEMPERATURE (°C)
wet-1-101507	10/15/07	0740	W	cube	1		X	12.0

PROJECT INFORMATION	SAMPLE RECEIPT	
CLIENT Shell	TOTAL NO. OF CONTAINERS	1
P.O. NO. 828.001.01	REC'D GOOD CONDITION	✓
SHIPPED VIA: Hand delivered by PES	MATCHES TEST SCHEDULE	✓

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)
(Signature) J. Russell Stolsen (Time)
(Printed Name) J. Russell Stolsen (Date) 10/15/07
(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) Meghan Murphy (Time) 0900
(Printed Name) Meg D Murphy (Date) 10/15/07

Nautilus Environmental Log-in No. 07-505

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

DISTRIBUTION: WHITE - Nautilus Environmental, COLOR - Originator

HI-SHELL001271