



**Whole Effluent Toxicity Test Report  
Birch Bay Water & Sewer**

July 2024

Report date: July 22, 2024

Submitted to:

**Birch Bay Water & Sewer**  
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## 1.0 INTRODUCTION

Chronic toxicity tests were conducted using effluent samples collected from Birch Bay in July 2024. Chronic bioassays were conducted using *Americamysis bahia* (mysid shrimp) and *Atherinops affinis* (Pacific topsmelt). Testing was performed at Rainier Environmental located in Fife, Washington.

## 2.0 METHODS

### 2.1 Sample Collection and Transport

Birch Bay Water & Sewer personnel collected composite samples of effluent into LDPE cubitainers. Samples were packed in coolers containing ice and transported to Rainier Environmental. Appropriate chain-of-custody procedures were employed during collection and transport.

### 2.2 Sample Receipt

Upon arrival at Rainier Environmental, coolers were opened, samples inspected, and the contents verified against information on the chain-of-custody forms. Receipt temperature was measured and recorded on the chain-of-custody forms. Standard water quality parameters were measured and recorded on a sample check-in sheet (Appendix D). The samples were stored at 4°C in the dark until used for testing.

### 2.3 Test Methods

The chronic toxicity tests were conducted for mysid shrimp and topsmelt according to USEPA (2002) and USEPA (1995) procedures, respectively, and are summarized in Tables 1 and 2.

**Table 1. Summary of methods for the mysid shrimp 7-day survival and growth test.**

Test initiation date and time	7/9/2024; 1450h
Test termination date and time	7/16/2024; 1430h
Test Type	Static renewal
Endpoint	Survival and growth at 7 days
Test organism	<i>Americamysis bahia</i>
Test organism source	Aquatic BioSystems; Fort Collins, CO
Test organism age	7 days post-hatch
Feeding	<i>Artemia</i> 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, 12.5, 2.5, 0.77, 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 criteria for controls	≥ 80% survival; average dry weight ≥ 0.20 mg
Reference toxicant	Copper chloride

**Table 2. Summary of methods for the Pacific topsmelt 7-day survival and growth test.**

Test initiation date and time	7/9/2024; 1515h
Test termination date and time	7/16/2024; 1540h
Test Type	Static renewal
Endpoint	Survival and growth at 7 days
Test organism	<i>Atherinops affinis</i>
Test organism source	Aquatic BioSystems; Fort Collins, CO
Test organism age	11 days post-hatch
Feeding	<i>Artemia</i> nauplii, twice daily
Test chamber	1-liter plastic cup
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, 12.5, 2.5, 0.77, 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 criteria for controls	≥ 80% survival; average dry weight ≥ 0.85 mg
Reference toxicant	Copper chloride

### 3.0 RESULTS

Details of standard water quality measurements conducted upon receipt of samples are provided in Table 3.

**Table 3. Sample information.**

Sample ID		Effluent	
Rainier Log-In No.	24-091	24-093	24-096
Collection date and time	7/8/2024; 0900h	7/10/2024; 0710h	7/12/2024; 0705h
Receipt date and time	7/9/2024; 1340h	7/11/2024; 1230h	7/13/2024; 0954h
Receipt temperature (°C)	4.7	5.6	3.8
Dissolved oxygen (mg/L)	5.6	4.9	5.2
pH (units)	7.14	7.26	7.29
Conductivity (µS/cm)	2130	2180	2170
Salinity (ppt)	1.2	1.2	1.2
Hardness (mg/L CaCO <sub>3</sub> )	204	212	216
Alkalinity (mg/L CaCO <sub>3</sub> )	104	140	116
Total Chlorine (mg/L)	<0.03	<0.03	<0.03
Total Ammonia (mg/L)	6.2	7.0	6.8

Results for the chronic toxicity tests are summarized in Table 4. The mysid shrimp and Pacific 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 for biomass and final count for dry weight) at the end of the 7-day exposure. In the Pacific Topsmelt test the highest concentration with no observed effect (NOEC) was 100 percent for survival, and 50 percent for dry weight and biomass. In the mysid shrimp test the highest concentration with no observed effect (NOEC) was 100 percent for survival, dry weight and biomass. No statistically significant difference was detected in the CCEC of 0.77 percent sample for any endpoint of either test.

Individual statistical summaries for all tests and copies of the laboratory bench sheets, control QC plots, sample check-in sheets, and chain of custody forms are provided in Appendices A through E.

**Table 4. Summary of results for the chronic toxicity tests.**

Species	Endpoint	NOEC <sup>a</sup> (% effluent)	LOEC <sup>b</sup> (% effluent)
Mysid Shrimp	Survival	100	>100
	Biomass	100	>100
	Dry weight	100	>100
Topsmelt	Survival	100	>100
	Biomass	50	100
	Dry weight	50	100

<sup>a</sup> No Observed Effect Concentration, <sup>b</sup> Lowest Observed Effect Concentration

#### 4.0 QA/QC

The samples were received in good condition and within the temperature range specified by WDOE (2016). The toxicity tests met all acceptability criteria for performance of control organisms. There were no deviations from the protocols and 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 7. Reference toxicant test results fell within the acceptable range of mean  $\pm$  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.

**Table 5. Reference toxicant test results.**

Species	Date initiated	Endpoint	LC <sub>50</sub> /EC <sub>50</sub>	Acceptable Range	CV (%)
Mysid shrimp	7/9/2024	7d survival	157 $\mu$ g/L Cu	155 – 294 $\mu$ g/L Cu	17.5
		7d growth	133 $\mu$ g/L Cu	119 – 258 $\mu$ g/L Cu	21.4
Topsmelt	7/9/2024	7d survival	55.3 $\mu$ g/L Cu	48.0 – 155 $\mu$ g/L Cu	34.0
		7d growth	52.1 $\mu$ g/L Cu	44.5 – 135 $\mu$ g/L Cu	32.0

## REFERENCES

- Tidepool Scientific Software. 2000-2007. CETIS Comprehensive Environmental Toxicity Information System Software, Version 1.6.3revG
- USEPA. 2002. 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. pp 214-292.
- 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. pp 71-140.
- WDOE. 2016. 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 2016.

**Appendix A**  
***Americamysis bahia* (mysid shrimp) Chronic Test**  
**Statistical Summaries and Raw Bench Sheets**

# CETIS Summary Report

Report Date: 19 Jul-24 14:11 (p 1 of 2)  
Test Code: 2407-016 | 19-4224-2600

## Mysidopsis 7-d Survival, Growth and Fecundity Test

Rainier Environmental Laboratory

Batch ID:	17-5851-9438	Test Type:	Growth-Survival (7d)	Analyst:	Eric Tollefson
Start Date:	09 Jul-24 14:50	Protocol:	EPA/821/R-02-014 (2002)	Diluent:	Laboratory Seawater
Ending Date:	16 Jul-24 14:30	Species:	Mysidopsis bahia	Brine:	
Duration:	7d	Source:	Aquatic Biosystems, CO	Age:	7d
Sample ID:	03-4076-1958	Code:	24-091	Client:	Birch Bay
Sample Date:	08 Jul-24 09:00	Material:	POTW Effluent	Project:	
Receive Date:	09 Jul-24 13:40	Source:	Birch Bay (WA0029556)		
Sample Age:	30h (4.7 °C)	Station:			

## Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
05-1336-8165	7d Survival Rate	100	>100	NA	10.3%	1	Steel Many-One Rank Sum Test
03-6922-2505	Mean Dry Biomass-mg	100	>100	NA	12.5%	1	Dunnett Multiple Comparison Test
04-8560-9658	Mean Dry Weight-mg	100	>100	NA	10.0%	1	Dunnett Multiple Comparison Test

## 7d Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	1	1	1	1	1	0	0	0.0%	0.0%
0.77		8	1	1	1	1	1	0	0	0.0%	0.0%
2.5		8	0.95	0.9154	0.9846	0.8	1	0.03273	0.09258	9.75%	5.0%
12.5		8	0.95	0.9154	0.9846	0.8	1	0.03273	0.09258	9.75%	5.0%
50		8	0.975	0.9486	1	0.8	1	0.025	0.07071	7.25%	2.5%
100		8	0.925	0.8863	0.9637	0.8	1	0.0366	0.1035	11.19%	7.5%

## Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.3738	0.3672	0.3803	0.35	0.398	0.006227	0.01761	4.71%	0.0%
0.77		8	0.3908	0.3775	0.404	0.342	0.442	0.01254	0.03547	9.08%	-4.55%
2.5		8	0.3705	0.3554	0.3856	0.316	0.436	0.01427	0.04035	10.89%	0.87%
12.5		8	0.3905	0.3721	0.4089	0.316	0.46	0.01741	0.04924	12.61%	-4.48%
50		8	0.4187	0.4035	0.434	0.354	0.466	0.01447	0.04092	9.77%	-12.04%
100		8	0.3593	0.3404	0.3781	0.29	0.412	0.01786	0.05051	14.06%	3.88%

## Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	8	0.3738	0.3672	0.3803	0.35	0.398	0.006227	0.01761	4.71%	0.0%
0.77		8	0.3908	0.3775	0.404	0.342	0.442	0.01254	0.03547	9.08%	-4.55%
2.5		8	0.3908	0.3796	0.4019	0.346	0.436	0.01056	0.02987	7.64%	-4.55%
12.5		8	0.4109	0.3999	0.4218	0.372	0.46	0.01037	0.02933	7.14%	-9.93%
50		8	0.4314	0.4126	0.4501	0.354	0.505	0.01776	0.05024	11.65%	-15.42%
100		8	0.3877	0.3793	0.396	0.352	0.412	0.007915	0.02239	5.77%	-3.73%



# CETIS Summary Report

Report Date: 19 Jul-24 14:11 (p 2 of 2)

Test Code: 2407-016 | 19-4224-2600

## Mysidopsis 7-d Survival, Growth and Fecundity Test

Rainier Environmental Laboratory

### 7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	1	1	1	1	1	1	1	1
0.77		1	1	1	1	1	1	1	1
2.5		1	1	1	1	0.8	0.8	1	1
12.5		1	1	0.8	0.8	1	1	1	1
50		1	0.8	1	1	1	1	1	1
100		0.8	1	1	1	0.8	1	1	0.8

### Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.372	0.386	0.35	0.39	0.398	0.376	0.368	0.35
0.77		0.418	0.374	0.442	0.344	0.342	0.39	0.408	0.408
2.5		0.436	0.364	0.346	0.376	0.316	0.332	0.414	0.38
12.5		0.372	0.402	0.336	0.316	0.398	0.394	0.46	0.446
50		0.45	0.404	0.454	0.354	0.404	0.444	0.466	0.374
100		0.298	0.352	0.408	0.398	0.29	0.412	0.394	0.322

### Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	0.372	0.386	0.35	0.39	0.398	0.376	0.368	0.35
0.77		0.418	0.374	0.442	0.344	0.342	0.39	0.408	0.408
2.5		0.436	0.364	0.346	0.376	0.395	0.415	0.414	0.38
12.5		0.372	0.402	0.42	0.395	0.398	0.394	0.46	0.446
50		0.45	0.505	0.454	0.354	0.404	0.444	0.466	0.374
100		0.3725	0.352	0.408	0.398	0.3625	0.412	0.394	0.4025

### 7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8
0	Dilution Water	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
0.77		5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5
2.5		5/5	5/5	5/5	5/5	4/5	4/5	5/5	5/5
12.5		5/5	5/5	4/5	4/5	5/5	5/5	5/5	5/5
50		5/5	4/5	5/5	5/5	5/5	5/5	5/5	5/5
100		4/5	5/5	5/5	5/5	4/5	5/5	5/5	4/5

## Initial and Final Chemistries

## Seven Day Chronic Saltwater Bioassay

Client: Birch Bay  
 Sample ID: Effluent  
 Test No: 2407-D16  
 Rainier Check-In #: 24-091 24-093

Start Date & Time: 7/9/2024 1450  
 Stop Date & Time: 7/16/2024 1430  
 Test species: Americamysis bahia  
24-096

Conc. or (%)	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
Con														
pH	8.89	8.58	8.81	8.55	8.78	8.50	8.74	8.24	8.64	8.11	8.48	8.09	8.45	8.07
DO (mg/l)	6.6	6.0	6.5	5.9	6.5	6.0	6.4	5.7	6.2	5.5	6.6	5.5	6.6	5.5
Salinity (ppt)	29.2	29.8	29.4	30.0	29.7	29.9	30.0	30.5	29.8	30.3	29.9	29.7	29.9	30.1
Temperature (°C)	25.3	25.1	25.3	25.3	25.1	25.3	25.1	25.2	25.0	25.3	25.1	25.1	25.1	25.1
0.77	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.88	8.59	8.85	8.54	8.75	8.51	8.73	8.18	8.54	8.17	8.47	8.11	8.42	8.07
DO (mg/l)	6.7	6.0	6.6	6.0	6.6	6.1	6.4	5.9	6.4	5.8	6.5	5.6	6.5	5.6
Salinity (ppt)	30.0	30.1	29.5	30.0	29.9	30.0	29.9	30.1	29.8	30.0	29.8	29.9	29.9	30.1
Temperature (°C)	25.4	25.1	25.4	25.2	25.1	25.3	25.1	25.2	25.0	25.3	25.2	25.1	25.1	25.0
2.5	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.87	8.54	8.84	8.51	8.71	8.47	8.70	8.21	8.49	8.15	8.45	8.13	8.44	8.09
DO (mg/l)	6.7	5.9	6.6	5.8	6.7	6.1	6.5	6.0	6.5	5.7	6.2	5.8	6.4	5.6
Salinity (ppt)	30.1	30.1	29.6	30.1	29.9	30.0	29.9	30.4	29.7	29.8	29.8	30.0	29.9	30.1
Temperature (°C)	25.4	25.1	25.4	25.3	25.0	25.4	25.0	25.3	25.1	25.1	25.1	25.0	25.1	25.2
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	8.82	8.54	8.78	8.50	8.69	8.44	8.65	8.22	8.47	8.17	8.42	8.14	8.40	8.12
DO (mg/l)	6.7	5.7	6.8	5.7	6.8	6.2	6.7	6.1	6.5	5.5	6.4	5.8	6.4	5.7
Salinity (ppt)	30.0	29.9	29.7	29.8	29.7	29.8	29.6	30.0	29.5	29.8	29.6	30.1	29.8	29.9
Temperature (°C)	25.4	25.0	25.4	25.3	25.0	25.4	25.1	25.3	25.3	25.1	25.1	25.1	25.2	25.2
50	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.66	8.49	8.61	8.47	8.57	8.39	8.54	8.20	8.45	8.13	8.37	8.15	8.34	8.14
DO (mg/l)	6.8	5.5	6.8	5.6	6.8	6.1	6.7	6.1	6.6	5.6	6.5	5.6	6.4	5.6
Salinity (ppt)	29.6	29.6	29.7	29.8	29.5	29.7	29.4	29.8	29.1	29.4	29.4	30.1	29.3	29.5
Temperature (°C)	25.3	25.1	25.4	25.2	25.0	25.4	25.1	25.2	25.4	25.1	25.3	25.1	25.1	25.2
100	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.49	8.39	8.44	8.36	8.30	8.30	8.29	8.18	8.22	8.10	8.19	8.17	8.16	8.15
DO (mg/l)	6.8	5.2	6.3	5.0	6.8	6.0	6.8	6.0	6.6	5.8	6.5	5.5	6.5	5.6
Salinity (ppt)	29.0	29.0	29.3	29.5	28.9	29.1	28.1	29.1	28.4	28.7	28.9	30.0	29.0	29.2
Temperature (°C)	25.5	25.1	25.3	25.2	25.0	25.3	25.1	25.2	25.7	25.2	25.6	25.0	25.1	25.3
Tech Initials:	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF

Rainier Environmental  
 Washington Laboratory  
 5013 Pacific Hwy. E., Suite 20  
 Tacoma, WA 98424

Test Chamber: VWR  
 Dilution Water Batch #: ASW 007

QA Check: W

Sample Description:  
 Organism Source: ABS  
 Date Received: 7/9/2024  
 Date of Hatch: 7/2/2024

Comments:

Rainier Environmental  
Washington Laboratory  
5013 Pacific Hwy. E., Suite 20  
Tacoma, WA 98424

Raw Data Sheet  
Mysid Shrimp  
(*Americamysis bahia*)  
Mysid Survival

Client: Birch Bay

Test Number: 2407-016

Sample ID: EFFLUENT

Conc. or %	Cont.	Rep.	Days								Mean % Survival
			0	1	2	3	4	5	6	7	
CON	38	1	5	5	5	5	5	5	5	5	
	2	2	5	5	5	5	5	5	5	5	
	29	3	5	5	5	5	5	5	5	5	
	17	4	5	5	5	5	5	5	5	5	
	1	5	5	5	5	5	5	5	5	5	
	26	6	5	5	5	5	5	5	5	5	
	10	7	5	5	5	5	5	5	5	5	
	34	8	5	5	5	5	5	5	5	5	
0.77	24	1	5	5	5	5	5	5	5	5	
	41	2	5	5	5	5	5	5	5	5	
	8	3	5	5	5	5	5	5	5	5	
	28	4	5	5	5	5	5	5	5	5	
	19	5	5	5	5	5	5	5	5	5	
	4	6	5	5	5	5	5	5	5	5	
	32	7	5	5	5	5	5	5	5	5	
	15	8	5	5	5	5	5	5	5	5	
2.5	27	1	5	5	5	5	5	5	5	5	
	7	2	5	5	5	5	5	5	5	5	
	14	3	5	5	5	5	5	5	5	5	
	46	4	5	5	5	5	5	5	5	5	
	12	5	5	5	5	5	5	4	4	4	
	35	6	5	5	5	4	4	4	4	4	
	30	7	5	5	5	5	5	5	5	5	
	47	8	5	5	5	5	5	5	5	5	
Technician Initials			<i>af</i>	<i>af</i>	<i>af</i>	<i>af</i>	<i>af</i>	<i>af</i>	<i>af</i>	<i>af</i>	

Feeding Times: 0 1000 1 1015 2 1030 3 1045 4 1000 5 1015 6 1030  
1000 1045 1030 1045 1045 1045 1500

QA check af

Comments: \_\_\_\_\_

Rainier Environmental  
Washington Laboratory  
5013 Pacific Hwy. E., Suite 20  
Tacoma, WA 98424

Raw Data Sheet  
Mysid Shrimp  
(*Americamysis bahia*)  
Mysid Survival

Client: Birch Bay

Test Number: 2407-016

Sample ID: EFFLUENT

Conc. or %	Cont.	Rep.	Days								Mean % Survival
			0	1	2	3	4	5	6	7	
12.5	37	1	5	5	5	5	5	5	5	5	
	10	2	5	5	5	5	5	5	5	5	
	45	3	5	5	4	4	4	4	4	4	
	3	4	5	5	5	5	5	4	4	4	
	36	5	5	5	5	5	5	5	5	5	
	23	6	5	5	5	5	5	5	5	5	
	40	7	5	5	5	5	5	5	5	5	
	9	8	5	5	5	5	5	5	5	5	
50	44	1	5	5	5	5	5	5	5	5	
	22	2	5	5	5	4	4	4	4	4	
	11	3	5	5	5	5	5	5	5	5	
	39	4	5	5	5	5	5	5	5	5	
	25	5	5	5	5	5	5	5	5	5	
	5	6	5	5	5	5	5	5	5	5	
	33	7	5	5	5	5	5	5	5	5	
	16	8	5	5	5	5	5	5	5	5	
100	43	1	5	5	5	4	4	4	4	4	
	21	2	5	5	5	5	5	5	5	5	
	13	3	5	5	5	5	5	5	5	5	
	42	4	5	5	5	5	5	5	5	5	
	6	5	5	4	4	4	4	4	4	4	
	31	6	5	5	5	5	5	5	5	5	
	20	7	5	5	5	5	5	5	5	5	
	48	8	5	5	5	5	4.5	5	4	4	
Technician Initials			st	st	st	st	st	st	st	st	

Feeding Times: 0 1600 1 0815 2 0815 3 0815 4 0800 5 0915 6 0800  
1545 1530 1545 1545 1445 1500

QA check st

Comments: \_\_\_\_\_

Rainier Environmental  
Washington Laboratory  
5013 Pacific Hwy. E., Suite 20  
Tacoma, WA 98424

Raw Data Sheet  
Mysid Weights  
Seven Day Chronic Bioassay

Client: Birch Bay

Species: Americamysis bahia

Sample ID: EFFLUENT

Test Number: 2407-016

Conc. or ②	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc.
CON	38	1	0.04340	0.04526		5		
	2	2	0.04428	0.04621		5		
	29	3	0.04273	0.04448		5		
	17	4	0.04252	0.04447		5		
	1	5	0.04353	0.04552		5		
	26	6	0.04221	0.04409		5		
	10	7	0.04230	0.04414		5		
	34	8	0.04374	0.04549		5		
0.17	24	1	0.04388	0.04597		5		
	41	2	0.04687	0.04874		5		
	8	3	0.04302	0.04523		5		
	28	4	0.04304	0.04476		5		
	19	5	0.04365	0.04536		5		
	4	6	0.04469	0.04664		5		
	32	7	0.04368	0.04572		5		
	15	8	0.04486	0.04690		5		
2.5	21	1	0.04253	0.04471		5		
	7	2	0.04461	0.04643		5		
	14	3	0.04454	0.04627		5		
	46	4	0.04411	0.04599		5		
	12	5	0.04287	0.04445		4		
	35	6	0.04410	0.04576		4		
	30	7	0.04331	0.04538		5		
	47	8	0.04445	0.04635		5		
Tech Initials:			HL	U				

Date/Time in: 7/16/2024 1430  
Date/Time out: 7/18/2024 1230

Oven temp. (°C): 65.5  
Oven temp. (°C): 62.5

QA Check: U



Rainier Environmental  
Washington Laboratory  
5013 Pacific Hwy. E., Suite 20  
Tacoma, WA 98424

Raw Data Sheet  
Mysid Weights  
Seven Day Chronic Bioassay

Client: Birch Bay

Species: Americamysis bahia

Sample ID: EFFLUENT

Test Number: 2407-016

Conc. or %	Cont.	Rep.	pan wt. (gm)	pan + mysid (gm)	mysid wt. (mg)	# mysids	avg. per mysid (mg)	avg. per conc.
12.5	37	1	0.04471	0.04657		5		
	18	2	0.04291	0.04492		5		
	45	3	0.04180	0.04348		4		
	3	4	0.04400	0.04558		4		
	36	5	0.04271	0.04470		5		
	23	6	0.04320	0.04623		5		
	40	7	0.04358	0.04588		5		
	9	8	0.04322	0.04545		5		
50	44	1	0.04415	0.04640		5		
	22	2	0.04364	0.04566		4		
	11	3	0.04343	0.04570		5		
	39	4	0.04426	0.04603		5		
	25	5	0.04344	0.04546		5		
	5	6	0.04369	0.04591		5		
	33	7	0.04408	0.04641		5		
	16	8	0.04355	0.04542		5		
100	43	1	0.04447	0.04596		4		
	21	2	0.04155	0.04331		5		
	13	3	0.04517	0.04721		5		
	42	4	0.04449	0.04648		5		
	6	5	0.04348	0.04493		4		
	31	6	0.04227	0.04433		5		
	20	7	0.04343	0.04540		5		
	48	8	0.04422	0.04583		4		
Tech Initials:			SH	U				

Date/Time in: 7/16/2024 1430  
Date/Time out: 7/18/2024 1230

Oven temp. (°C): 65.5  
Oven temp. (°C): 62.5

QA Check: U

① 0.04426

**Appendix B**  
***Atherinops affinis* (Pacific topsmelt) Chronic Test**  
**Statistical Summaries and Raw Bench Sheets**

# CETIS Summary Report

Report Date: 19 Jul-24 10:08 (p 1 of 3)  
Test Code: 2407-017 | 19-4663-6823

## Pacific Topsmelt 7-d Survival and Growth Test

Rainier Environmental Laboratory

Batch ID:	04-5717-7813	Test Type:	Growth-Survival (7d)	Analyst:	Eric Tollefson
Start Date:	09 Jul-24 15:15	Protocol:	EPA/600/R-95/136 (1995)	Diluent:	Laboratory Seawater
Ending Date:	16 Jul-24 15:40	Species:	Atherinops affinis	Brine:	Crystal Sea
Duration:	7d 0h	Source:	Aquatic Biosystems, CO	Age:	11d
Sample ID:	03-4076-1958	Code:	24-091	Client:	Birch Bay
Sample Date:	08 Jul-24 09:00	Material:	POTW Effluent	Project:	
Receive Date:	09 Jul-24 13:40	Source:	Birch Bay (WA0029556)		
Sample Age:	30h (4.7 °C)	Station:			

## Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-1813-4690	7d Survival Rate	100	>100	NA	14.6%	1	Steel Many-One Rank Sum Test
14-5837-0386	Mean Dry Biomass-mg	50	100	70.71	22.0%	2	Dunnett Multiple Comparison Test
01-7033-8679	Mean Dry Weight-mg	50	100	70.71	20.4%	2	Dunnett Multiple Comparison Test

## Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
18-8671-2717	Mean Dry Biomass-mg	IC5	0.2911	0.06521	78.71	343.5	Linear Interpolation (ICPIN)
		IC10	0.6671	0.1177	99.93	149.9	
		IC15	7.908	N/A	N/A	12.65	
		IC20	62.42	N/A	N/A	1.602	
		IC25	87.26	N/A	N/A	1.146	
		IC40	>100	N/A	N/A	<1	
		IC50	>100	N/A	N/A	<1	
10-9829-9666	Mean Dry Weight-mg	IC5	0.3559	0.005781	80.07	281	Linear Interpolation (ICPIN)
		IC10	1.187	N/A	109.4	84.23	
		IC15	6.365	N/A	N/A	15.71	
		IC20	60.23	N/A	N/A	1.66	
		IC25	94.57	N/A	N/A	1.057	
		IC40	>100	N/A	N/A	<1	
		IC50	>100	N/A	N/A	<1	

## Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
15-1813-4690	7d Survival Rate	Control Resp	0.96	0.8 - NL	Yes	Passes Acceptability Criteria
14-5837-0386	Mean Dry Biomass-mg	Control Resp	1.269	0.85 - NL	Yes	Passes Acceptability Criteria
18-8671-2717	Mean Dry Biomass-mg	Control Resp	1.269	0.85 - NL	Yes	Passes Acceptability Criteria
15-1813-4690	7d Survival Rate	PMSD	0.1463	NL - 0.25	No	Passes Acceptability Criteria
14-5837-0386	Mean Dry Biomass-mg	PMSD	0.2199	NL - 0.5	No	Passes Acceptability Criteria



# CETIS Summary Report

Report Date: 19 Jul-24 10:08 (p 2 of 3)  
Test Code: 2407-017 | 19-4663-6823

## Pacific Topsmelt 7-d Survival and Growth Test

Rainier Environmental Laboratory

### 7d Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	5	0.96	0.9266	0.9934	0.8	1	0.04	0.08944	9.32%	0.0%
0.77		5	0.92	0.8791	0.9609	0.8	1	0.04899	0.1095	11.91%	4.17%
2.5		5	0.96	0.9266	0.9934	0.8	1	0.04	0.08944	9.32%	0.0%
12.5		5	1	1	1	1	1	0	0	0.0%	-4.17%
50		5	0.92	0.8791	0.9609	0.8	1	0.04899	0.1095	11.91%	4.17%
100		5	0.92	0.8791	0.9609	0.8	1	0.04899	0.1095	11.91%	4.17%

### Mean Dry Biomass-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	5	1.269	1.185	1.353	0.97	1.514	0.1006	0.2249	17.72%	0.0%
0.77		5	1.119	1.059	1.18	0.864	1.274	0.07235	0.1618	14.45%	11.82%
2.5		5	1.136	1.079	1.192	0.924	1.296	0.06731	0.1505	13.25%	10.53%
12.5		5	1.044	0.9873	1.101	0.898	1.25	0.06795	0.1519	14.55%	17.74%
50		5	1.07	0.9939	1.147	0.76	1.282	0.0916	0.2048	19.14%	15.66%
100		5	0.926	0.8468	1.005	0.678	1.176	0.09481	0.212	22.89%	27.04%

### Mean Dry Weight-mg Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	5	1.341	1.218	1.465	0.97	1.807	0.1474	0.3297	24.57%	0.0%
0.77		5	1.216	1.18	1.252	1.08	1.333	0.04313	0.09644	7.93%	9.38%
2.5		5	1.189	1.127	1.25	0.924	1.33	0.07387	0.1652	13.89%	11.38%
12.5		5	1.044	0.9873	1.101	0.898	1.25	0.06795	0.1519	14.55%	22.18%
50		5	1.157	1.11	1.205	0.95	1.282	0.05696	0.1274	11.0%	13.72%
100		5	0.9978	0.9481	1.048	0.8475	1.176	0.05954	0.1331	13.34%	25.62%

### 7d Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1	0.8	1	1	1
0.77		1	0.8	1	0.8	1
2.5		0.8	1	1	1	1
12.5		1	1	1	1	1
50		1	1	1	0.8	0.8
100		1	1	0.8	1	0.8

### Mean Dry Biomass-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.124	1.446	1.514	1.292	0.97
0.77		1.274	1.066	1.174	0.864	1.218
2.5		1.064	1.258	1.296	0.924	1.136
12.5		0.898	1.25	0.906	1.14	1.026
50		1.19	1.282	1.138	0.76	0.982
100		1.092	1.176	0.758	0.926	0.678

### Mean Dry Weight-mg Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	1.124	1.807	1.514	1.292	0.97
0.77		1.274	1.333	1.174	1.08	1.218
2.5		1.33	1.258	1.296	0.924	1.136
12.5		0.898	1.25	0.906	1.14	1.026
50		1.19	1.282	1.138	0.95	1.227
100		1.092	1.176	0.9475	0.926	0.8475

CETIS Summary Report

Report Date: 19 Jul-24 10:08 (p 3 of 3)  
Test Code: 2407-017 | 19-4663-6823

Pacific Topsmelt 7-d Survival and Growth Test Rainier Environmental Laboratory

7d Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Dilution Water	5/5	4/5	5/5	5/5	5/5
0.77		5/5	4/5	5/5	4/5	5/5
2.5		4/5	5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	4/5	4/5
100		5/5	5/5	4/5	5/5	4/5

## Initial and Final Chemistries

## Seven Day Chronic Saltwater Bioassay

Client: Birch Bay  
 Sample ID: Effluent  
 Test No: 2407-017  
 Rainier Check-In #: 24-091 24-093

Start Date & Time: 7/9/2024 1515  
 Stop Date & Time: 7/16/2024 1540  
 Test species: Atherinops affinis  
24-096

Conc. or $\phi$ CON	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
pH	8.92	8.51	8.80	8.47	8.79	8.42	8.75	8.37	8.47	8.11	8.38	8.09	8.35	8.10
DO (mg/l)	6.7	6.1	6.6	6.0	6.5	6.1	6.5	5.7	7.0	5.9	6.8	5.9	6.6	5.7
Salinity (ppt)	29.5	29.9	29.6	29.7	29.9	29.9	29.7	29.9	29.9	29.9	29.8	29.9	29.9	30.2
Temperature (°C)	20.1	20.2	20.1	19.9	20.0	20.1	20.1	19.8	20.3	19.9	20.3	20.2	20.1	20.2
0.77	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
	8.90	8.47	8.93	8.44	8.75	8.40	8.11	8.33	8.52	8.13	8.33	8.10	8.31	8.10
	6.7	6.1	6.6	6.0	6.7	5.9	6.6	5.3	7.1	6.4	6.7	6.1	6.7	5.6
	29.7	29.9	29.9	29.9	30.0	30.4	29.8	30.0	29.9	30.1	29.8	30.0	29.9	30.1
	20.1	20.1	20.1	19.7	19.9	20.0	20.1	19.9	20.3	20.1	20.3	20.1	20.1	19.7
2.5	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
	8.84	8.45	8.79	8.40	8.71	8.31	8.70	8.32	8.39	8.14	8.35	8.14	8.30	8.11
	6.8	6.2	6.6	5.9	6.7	5.7	6.6	5.4	7.0	6.7	7.0	6.2	6.9	5.6
	29.9	30.1	29.7	29.7	30.0	30.1	29.9	30.2	29.9	30.1	29.8	29.7	29.9	30.1
12.5	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
	8.78	8.44	8.74	8.40	8.70	8.36	8.68	8.28	8.34	8.14	8.31	8.13	8.27	8.13
	6.8	6.3	6.8	5.9	6.8	5.8	6.8	5.7	6.8	6.5	7.0	6.2	6.9	5.5
	29.9	30.0	29.7	29.7	29.8	30.2	29.7	30.1	29.7	30.0	29.6	29.5	29.8	30.0
50	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
	8.60	8.39	8.54	8.37	8.50	8.35	8.54	8.27	8.32	8.20	8.29	8.15	8.26	8.14
	7.0	6.3	6.9	5.8	6.8	5.8	6.8	5.6	7.0	6.6	6.8	6.4	6.8	5.4
	29.4	30.0	29.4	29.5	29.5	30.0	29.4	30.0	29.5	29.7	29.3	29.1	29.4	29.7
100	Days													
	0		1		2		3		4		5		6	
	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final	init.	final
	8.41	8.31	8.37	8.30	8.44	8.27	8.36	8.24	8.31	8.19	8.22	8.16	8.19	8.15
	7.2	6.4	7.0	5.7	6.8	5.6	6.9	5.5	7.1	6.7	6.7	6.5	6.9	5.4
	28.7	29.5	29.0	28.9	29.0	29.6	28.8	29.4	29.0	29.4	28.8	28.4	28.9	29.0
Tech Initials: <u>df df df df df df df df df df df df df df df</u>														

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 Washington Laboratory  
 5013 Pacific Hwy. E., Suite 20  
 Tacoma, WA 98424

QA Check: df

Sample Description: \_\_\_\_\_  
 Organism Source: ABS  
 Date Received: 7/9/2024  
 Date of Hatch: 6/29/2024

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Test Chamber: RM 2  
 Dilution Water Batch #: ASH 001

Rainier Environmental  
Washington Laboratory  
5013 Pacific Hwy. E., Suite 20  
Tacoma, WA 98424

Raw Data Sheet  
Pacific Topsmelt  
(*Atherinops affinis*)  
Larval Survival

Client Name:

Birch Bay

Test No.:

2407-017

Sample ID:

EFFLUENT

Conc. or %	Cont.	Rep.	Days								Mean % Survival
			0	1	2	3	4	5	6	7	
CON	21	1	5	5	5	5	5	5	5	5	
	12	2	5	5	5	5	5	5	5	4	
	17	3	5	5	5	5	5	5	5	5	
	4	4	5	5	5	5	5	5	5	5	
	28	5	5	5	5	5	5	5	5	5	
0.17	18	1	5	5	5	5	5	5	5	5	
	2	2	5	5	5	5	4	4	4	4	
	25	3	5	5	5	5	5	5	5	5	
	20	4	5	5	5	5	5	5	5	4	
	9	5	5	5	5	5	5	5	5	5	
2.5	26	1	5	5	5	5	5	4	4	4	
	5	2	5	5	5	5	5	5	5	5	
	1	3	5	5	5	5	5	5	5	5	
	16	4	5	5	5	5	5	5	5	5	
	8	5	5	5	5	5	5	5	5	5	
12.5	29	1	5	5	5	5	5	5	5	5	
	3	2	5	5	5	5	5	5	5	5	
	24	3	5	5	5	5	5	5	5	5	
	6	4	5	5	5	5	5	5	5	5	
	15	5	5	5	5	5	5	5	5	5	
50	11	1	5	5	5	5	5	5	5	5	
	19	2	5	5	5	5	5	5	5	5	
	7	3	5	5	5	5	5	5	5	5	
	22	4	5	5	5	5	5	4	4	4	
	14	5	5	5	5	5	5	4	4	4	
100	23	1	5	5	5	5	5	5	5	5	
	10	2	5	5	5	5	5	5	5	5	
	27	3	5	5	5	5	5	4	4	4	
	13	4	5	5	5	5	5	5	5	5	
	30	5	5	5	5	5	5	5	5	4	
Tech Initials			<i>df</i>	<i>df</i>	<i>df</i>	<i>df</i>	<i>df</i>	<i>df</i>	<i>df</i>	<i>df</i>	

Feeding Times: 0 10315 1 0815 2 0815 3 0815 4 0800 5 0915 6 0800  
1800 1545 1530 1545 1545 1445 1500

Comments:

QA Check u

Rainier Environmental  
Washington Laboratory  
5013 Pacific Hwy., E. Suite 20  
Tacoma, WA 98424

Fish Weights  
Seven Day Chronic Bioassay

Client: Birch Bay

Species: A. affinis

Sample ID: EFFLUENT

Test No: 2407-017

Conc. or ②	cont. #	rep.	pan wt. (gm)	pan + fish (gm)	fish wt. (mg)	# fish	avg. per fish (mg)	avg. per conc. (mg)
CON	21	1	0.04461	0.05023		5		
	12	2	0.04469	0.05192		4		
	17	3	0.04427	0.05194		5		
	4	4	0.04498	0.05144		5		
	28	5	0.04406	0.04991		5		
0.77	18	1	0.04230	0.04867		5		
	2	2	0.04619	0.05152		4		
	25	3	0.04533	0.05120		5		
	20	4	0.04381	0.04813		4		
	9	5	0.04379	0.04988		5		
2.5	26	1	0.04374	0.04906		4		
	5	2	0.04258	0.04887		5		
	1	3	0.04424	0.05072		5		
	16	4	0.04256	0.04718		5		
	8	5	0.04306	0.04874		5		
12.5	29	1	0.04394	0.04943		5		
	3	2	0.04527	0.05152		5		
	24	3	0.04414	0.04867		5		
	6	4	0.04417	0.04987		5		
	15	5	0.04394	0.04912		5		
50	11	1	0.04549	0.05144		5		
	19	2	0.04544	0.05185		5		
	7	3	0.04282	0.04851		5		
	22	4	0.04276	0.04656		4		
	14	5	0.04357	0.04848		4		
100	23	1	0.04383	0.04929		5		
	10	2	0.04400	0.04988		5		
	27	3	0.04436	0.04815		4		
	13	4	0.04456	0.04919		5		
	30	5	0.04315	0.04654		4		
Tech Initials:			VF	VF				

Date/Time in: 7/16/2024 1540  
Date/Time out: 7/19/2024 1230

Oven temp. (°C): 63.0  
Oven temp. (°C): 62.5

QA check VF

## **Appendix C**

### **Control QC Plots**

## Mysidopsis 7-d Survival, Growth and Fecundity Test

Rainier Environmental Laboratory

Test Type: Growth-Survival (7d)

Organism: Mysidopsis bahia (Atlantic Mysid)

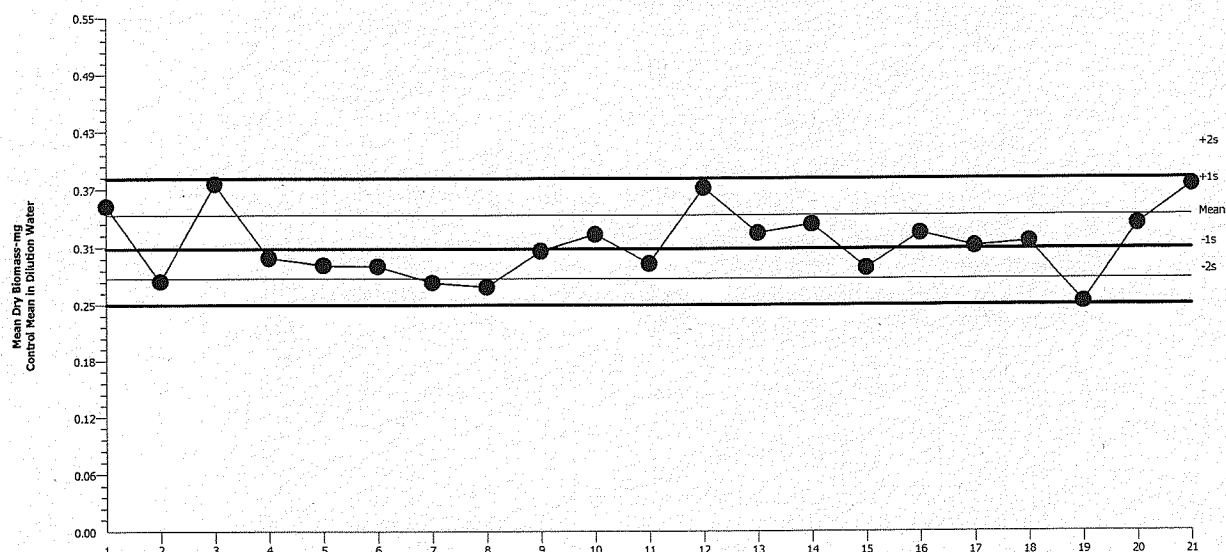
Material: All Materials

Protocol: EPA/821/R-02-014 (2002)

Endpoint: Mean Dry Biomass-mg

Source: All SampleID Sources

Mysidopsis 7-d Survival, Growth and Fecundity Test



Mean: 0.3064

Count: 20

-1s Warning Limit: 0.2747

-2s Action Limit: 0.2463

Sigma: NA

CV: 11.50%

+1s Warning Limit: 0.3417

+2s Action Limit: 0.3811

## Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2022	Oct	18	0.3517	0.04534	1.264	(+)		07-6505-9381	
2			18	0.2717	-0.03466	-1.099	(-)		14-1722-5275	
3			18	0.3752	0.06884	1.856	(+)		17-0962-9515	
4		Nov	15	0.2968	-0.009558	-0.2903			10-4540-6015	
5			15	0.289	-0.01736	-0.5341			16-8953-5320	
6	2023	Feb	14	0.288	-0.01836	-0.5659			16-3174-0222	
7			14	0.2703	-0.03606	-1.147	(-)		19-5181-2318	
8		Jun	20	0.2655	-0.04086	-1.311	(-)		11-6707-3060	
9		Sep	19	0.3038	-0.002558	-0.07679			14-1206-6025	
10			19	0.3215	0.01514	0.4418			08-4328-9224	
11			19	0.2907	-0.01566	-0.4804			09-3046-9852	
12		Dec	7	0.3707	0.06434	1.746	(+)		19-4896-5773	
13			7	0.3227	0.01634	0.4759			02-6887-3147	
14	2024	Jan	23	0.332	0.02564	0.7361			07-5636-7580	
15			23	0.286	-0.02036	-0.6297			07-7768-5247	
16			30	0.3227	0.01634	0.4759			06-6661-5863	
17		Feb	13	0.3087	0.002342	0.06973			05-8904-3553	
18			13	0.3137	0.007342	0.2169			15-1428-5394	
19			27	0.2493	-0.05706	-1.887	(-)		19-0175-0992	
20		Jul	2	0.3323	0.02594	0.7443			18-3599-0689	
21			9	0.3738	0.06744	1.822	(+)		19-4224-2600	

## Mysidopsis 7-d Survival, Growth and Fecundity Test

Rainier Environmental Laboratory

Test Type: Growth-Survival (7d)

Organism: Mysidopsis bahia (Atlantic Mysid)

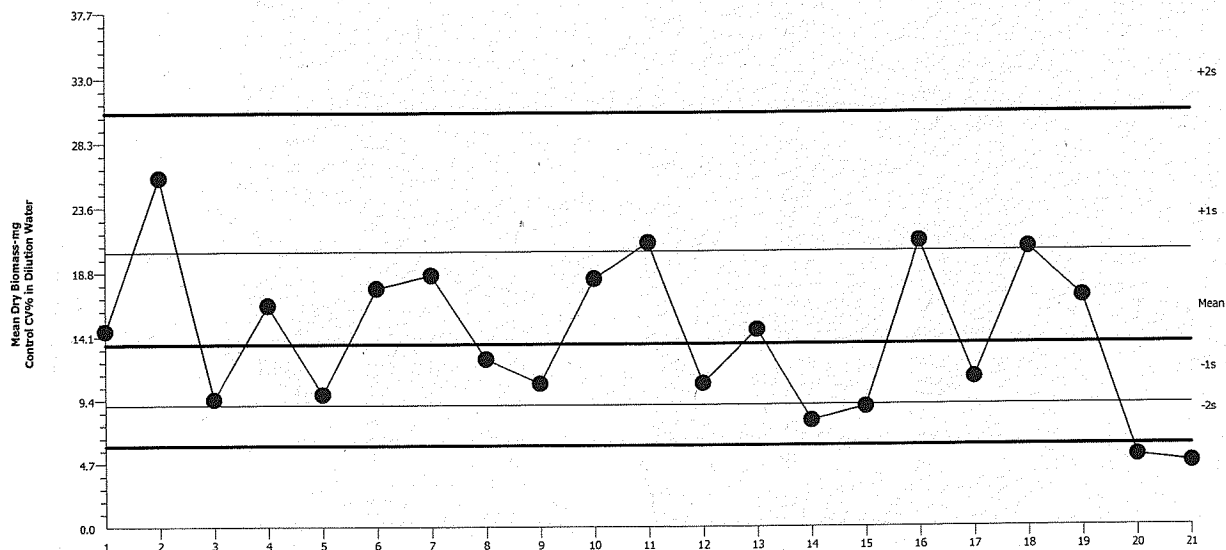
Material: All Materials

Protocol: EPA/821/R-02-014 (2002)

Endpoint: Mean Dry Biomass-mg

Source: All SampleID Sources

Mysidopsis 7-d Survival, Growth and Fecundity Test



Mean: 13.56

Count: 20

-1s Warning Limit: 9.042

-2s Action Limit: 6.03

Sigma: NA

CV: 49.90%

+1s Warning Limit: 20.33

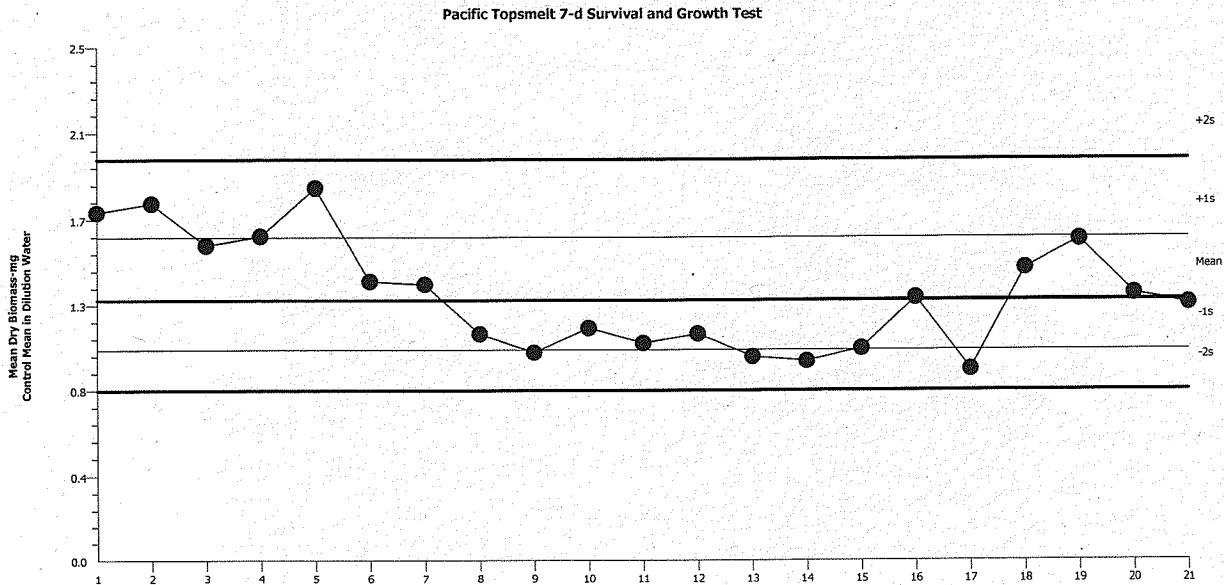
+2s Action Limit: 30.48

## Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2022	Oct	18	14.56	1.002	0.176			07-6505-9381	
2			18	25.74	12.18	1.582	(+)		14-1722-5275	
3			18	9.478	-4.08	-0.8838			17-0962-9515	
4		Nov	15	16.43	2.872	0.4742			10-4540-6015	
5			15	9.85	-3.708	-0.7888			16-8953-5320	
6	2023	Feb	14	17.67	4.112	0.6538			16-3174-0222	
7			14	18.64	5.082	0.7858			19-5181-2318	
8		Jun	20	12.45	-1.108	-0.2105			11-6707-3060	
9		Sep	19	10.63	-2.928	-0.6006			14-1206-6025	
10			19	18.35	4.792	0.747			08-4328-9224	
11			19	20.95	7.392	1.074	(+)		09-3046-9852	
12		Dec	7	10.63	-2.928	-0.6006			19-4896-5773	
13			7	14.59	1.032	0.181			02-6887-3147	
14	2024	Jan	23	7.854	-5.704	-1.348	(-)		07-5636-7580	
15			23	8.877	-4.681	-1.046	(-)		07-7768-5247	
16			30	21.04	7.482	1.085	(+)		06-6661-5863	
17		Feb	13	11.04	-2.518	-0.5072			05-8904-3553	
18			13	20.55	6.992	1.027	(+)		15-1428-5394	
19			27	16.99	3.432	0.557			19-0175-0992	
20		Jul	2	5.212	-8.346	-2.36	(-)	(-)	18-3599-0689	
21			9	4.713	-8.845	-2.608	(-)	(-)	19-4224-2600	



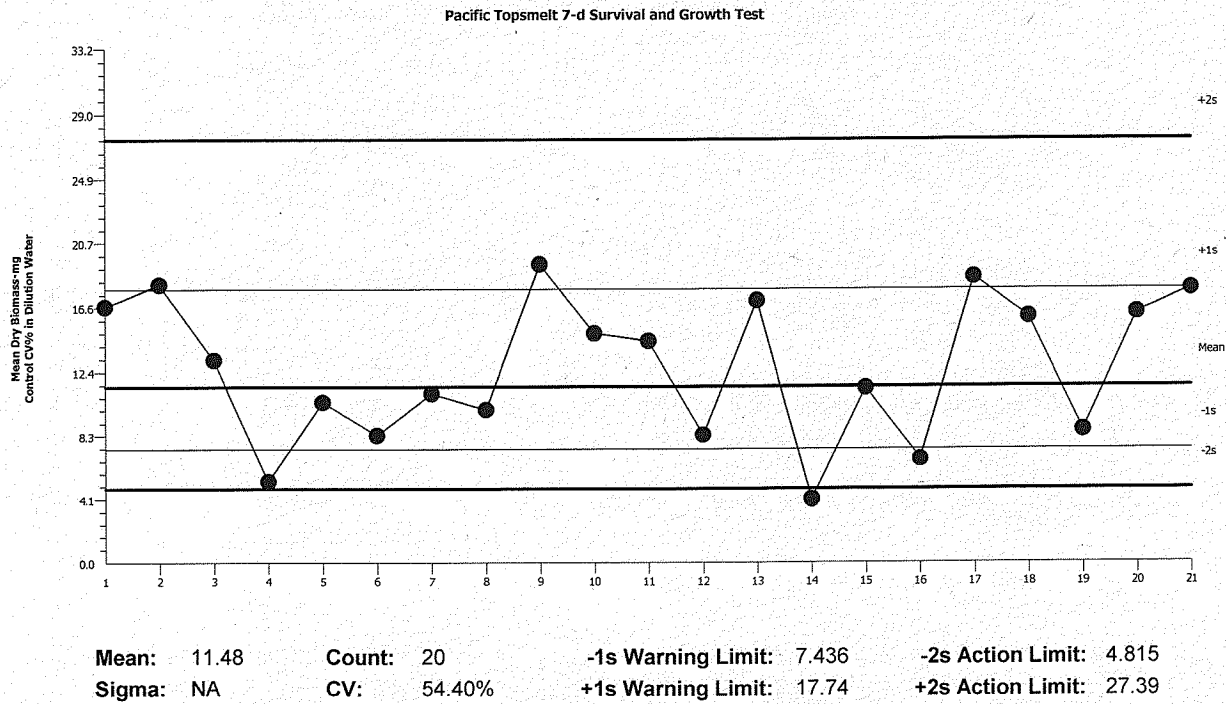
Pacific Topsmelt 7-d Survival and Growth Test				Rainier Environmental Laboratory	
Test Type: Growth-Survival (7d)		Organism: Atherinops affinis (Topsmelt)		Material: All Materials	
Protocol: EPA/600/R-95/136 (1995)		Endpoint: Mean Dry Biomass-mg		Source: All SampleID Sources	



Mean: 1.289      Count: 20      -1s Warning Limit: 1.041      -2s Action Limit: 0.8413  
Sigma: NA      CV: 23.80%      +1s Warning Limit: 1.596      +2s Action Limit: 1.975

Quality Control Data											
Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	
1	2022	Aug	30	1.718	0.4288	1.346	(+)		04-8631-7953		
2				30	1.763	0.4738	1.467	(+)		01-7642-5485	
3		Oct	18	1.558	0.2688	0.8875			18-9262-1368		
4			18	1.603	0.3138	1.021	(+)		06-3956-3589		
5			18	1.838	0.5488	1.662	(+)		16-0050-5061		
6		Nov	15	1.381	0.09183	0.3224			02-6388-3938		
7			15	1.366	0.07683	0.2713			19-7735-5874		
8	2023	Feb	14	1.12	-0.1692	-0.6592			13-3851-4935		
9				14	1.028	-0.2612	-1.061	(-)		05-2095-0938	
10		Sep	19	1.149	-0.1402	-0.5394			01-4985-4309		
11			19	1.074	-0.2152	-0.8557			04-2870-8687		
12			19	1.12	-0.1692	-0.6592			18-5036-9464		
13		Dec	7	1.007	-0.2822	-1.158	(-)		17-3680-6402		
14			7	0.9848	-0.3044	-1.262	(-)		12-7265-0591		
15	2024	Jan	23	1.048	-0.2412	-0.9706			17-5564-6480		
16				23	1.3	0.01083	0.0392			16-5544-6742	
17				30	0.944	-0.3452	-1.46	(-)		12-9691-7398	
18		Feb	13	1.445	0.1558	0.5347			03-7083-2459		
19			13	1.585	0.2958	0.9681			07-2326-5884		
20			27	1.319	0.02983	0.1072			08-1584-0901		
21			Jul	9	1.269	-0.02017	-0.0739			19-4663-6823	

Pacific Topsmelt 7-d Survival and Growth Test			Rainier Environmental Laboratory		
Test Type:	Growth-Survival (7d)	Organism:	Atherinops affinis (Topsmelt)	Material:	All Materials
Protocol:	EPA/600/R-95/136 (1995)	Endpoint:	Mean Dry Biomass-mg	Source:	All SampleID Sources



Quality Control Data										
Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2022	Aug	30	16.64	5.155	0.8532			04-8631-7953	
2			30	18.06	6.575	1.042	(+)		01-7642-5485	
3		Oct	18	13.21	1.725	0.3221			18-9262-1368	
4			18	5.312	-6.173	-1.774	(-)		06-3956-3589	
5			18	10.49	-0.9945	-0.2084			16-0050-5061	
6		Nov	15	8.322	-3.163	-0.7411			02-6388-3938	
7			15	11.05	-0.4345	-0.08875			19-7735-5874	
8	2023	Feb	14	10	-1.485	-0.3185			13-3851-4935	
9			14	19.33	7.845	1.198	(+)		05-2095-0938	
10		Sep	19	14.9	3.415	0.5991			01-4985-4309	
11			19	14.41	2.925	0.5221			04-2870-8687	
12			19	8.344	-3.141	-0.7351			18-5036-9464	
13		Dec	7	17	5.515	0.9025			17-3680-6402	
14			7	4.144	-7.341	-2.345	(-)	(-)	12-7265-0591	
15	2024	Jan	23	11.39	-0.09452	-0.01902			17-5564-6480	
16			23	6.763	-4.722	-1.218	(-)		16-5544-6742	
17			30	18.5	7.015	1.097	(+)		12-9691-7398	
18		Feb	13	15.95	4.465	0.7558			03-7083-2459	
19			13	8.647	-2.838	-0.653			07-2326-5884	
20			27	16.2	4.715	0.7916			08-1584-0901	
21		Jul	9	17.72	6.235	0.9979			19-4663-6823	

**Appendix D**  
**Sample Check-In Sheet**

Client: Birch Bay Water & Sewer

Tests Performed: MYC, AA-C, Cd-A, PPA  
Test ID No(s): 2407-016, 2407-017, 2407-018, 2407-019

Sample ID:	Effluent	Final Effluent	Final Effluent	
Log-in No. (20-xxxx):	24-091	24-093	24-096	
Sample Collection Date & Time:	7/8/24 0900	7/10/24 0710	7/12/24 0705	
Sample Receipt Date & Time:	7/9/24 1340	7/11/24 1230	7/13/24 0954	
Check-in Temperature (°C)	4.7	5.6	3.8	
Temperature OK?	<input checked="" type="radio"/> N	<input checked="" type="radio"/> N	<input checked="" type="radio"/> N	<input type="radio"/> Y <input type="radio"/> N
DO (mg/L)	5.6	4.9	5.3	
pH (units)	7.14	7.26	7.39	
Conductivity (µS/cm)	2130	2180	2170	
Salinity (ppt)	1.2	1.2	1.2	
Tit. Vol / Sam. Vol / Alkalinity (mg/L)*	2.6 / 25 / 104	3.5 / 25 / 140	3.9 / 25 / 116	1 1
Tit. Vol. / Sam. Vol. / Hardness (mg/L)*	5.1 / 25 / 204	5.3 / 25 / 212	5.4 / 25 / 216	1 1
Total Chlorine (mg/L)	<0.03	<0.03	<0.03	
Total Ammonia Nitrogen (mg/L)	6.3	7.0	6.8	
Technician Initials	df	df	df	

\* = mg/L as CaCO<sub>3</sub>; \* = Measured for freshwater samples only, NA = Not Applicable,

NM = Not Measured

Freshwater Tests:

Control/Dilution Water Source: test type: CD-A 8:2 (DMW) NA Other: 070 Alkalinity: 64 Hardness: 84

Control/Dilution Water Source: test type: PP-A 8:2 (DMW) NA Other: 070 Alkalinity: 64 Hardness: 84

Additional Control? ☐ Y ☐ N = 070 Alkalinity: 64 Hardness: 84

Marine Tests:

Control/Dilution Water Source: test type: AA-C ART SW NAT SW Alkalinity: 124 Salinity: 30.1

Control/Dilution Water Source: test type: MYC ART SW NAT SW Alkalinity: 124 Salinity: 30.1

Additional Control? ☐ Y ☐ N = 070 Alkalinity: 124 Salinity: 30.1

Sample Salted w/ artificial salt? ☐ Y ☐ N If yes, what ppt? 070 test type: 070

Sample salted w/brine? ☐ Y ☐ N If yes, what ppt? 070 test type: 070

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 2 3 4

Filtration? ☐ Y ☒ N

Pore Size: 0.45

Organisms or Debris 0.45

Aeration? ☐ Y ☒ N

Length of Time: 0.45

Final DO: 0.45

Final pH: 0.45

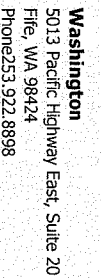
Hardness Adjustment? ☐ Y ☒ N

If adjusted, please see worksheet for details.

Sub-samples for additional chemistry:

QC Check: 070

**Appendix E**  
**Chain-of-Custody Forms**



## Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

[illegible]

**Washington**  
5013 Pacific Highway East, Suite 20  
Fife, WA 98424  
Phone 253.922.8898

## Date \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Receipt Temperature (°C)



[illegible]