



**Whole Effluent Toxicity Test Report  
Miller Creek WWTP**

July 2022

Report date: August 11, 2022

Submitted to:

**Southwest Suburban Sewer District**  
1015 S.W. 174<sup>th</sup> Street  
Normandy Park, WA 98166

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Suite 20  
Tacoma, WA 98424

## 1.0 INTRODUCTION

An acute toxicity test was conducted using an effluent sample collected from the Southwest Suburban Sewer District's (SWSSD) Miller Creek Wastewater Treatment Plant in July 2022. The bioassay was conducted using the test organism *Ceriodaphnia dubia* (*Ceriodaphnia*). Testing was performed at Rainier Environmental Laboratory located in Tacoma, Washington.

## 2.0 METHODS

### 2.1 Sample Collection and Transport

SWSSD personnel collected a 24-hr. composite effluent sample in an LDPE cubitainer. The sample was packed in a cooler containing ice and shipped overnight to Rainier Environmental. Appropriate chain-of-custody procedures were employed during collection and transport.

### 2.2 Sample Receipt

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

### 2.3 Test Methods

An acute toxicity test was conducted according to procedures presented by USEPA (2002) and is summarized in Table 1.

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

Test initiation date and time	7/26/2022; 1045h
Test termination date and time	7/28/2022; 1100h
Test organism	<i>Ceriodaphnia dubia</i>
Test organism source	In-house cultures
Test organism age	< 24 hours
Test duration	48 hours
Feeding	50:50 mixture YTC:algal suspension during organism holding time. No feeding during test.
Test chamber	30 mL plastic cup
Test solution volume	15 mL
Test temperature	20 ± 1°C
Dilution water	Moderately Hard Synthetic Water
Test concentrations (% sample)	100, 50, 25, 12.5, 1.8, laboratory control
Number of organisms/chamber	5
Number of replicates	4
Photoperiod	16 hours light/8 hours dark
Aeration	None
Test protocol	EPA-821-R-02-012
Test acceptability criterion for controls	≥ 90% survival
Reference toxicant	Copper sulfate

### 3.0 RESULTS

Details of standard water quality measurements conducted upon receipt of sample are provided in Table 2.

**Table 2. Sample information.**

Sample ID	Miller Creek Eff
Rainier Environmental Log-In Number	22-105
Collection date; time	7/25/2022; 0730h
Receipt date; time	7/25/2022; 0839h
Receipt temperature (°C)	3.5
Dissolved oxygen (mg/L)	8.7
pH	7.29
Conductivity (µS/cm)	667
Hardness (mg/L CaCO <sub>3</sub> )	88
Alkalinity (mg/L CaCO <sub>3</sub> )	192
Total Chlorine (mg/L)	<0.03
Total Ammonia (mg/L)	25.2

Survival was evaluated in the *Ceriodaphnia* acute toxicity test after 48 hours of exposure. Results are summarized in Table 3. Mean survival was 10 percent in 100 percent effluent. There was no statistically significant difference between the control and the acute critical effluent concentration (ACEC) of 1.8 percent sample.

**Table 3. Summary of results for the acute toxicity test.**

Species	Concentration (%)	Survival (%)	NOEC <sup>a</sup> (% effluent)	LOEC <sup>b</sup> (% effluent)	LC <sub>50</sub> <sup>c</sup> (% effluent)
<i>Ceriodaphnia</i>	0.0	100	50	100	73.5
	1.8	100			
	12.5	100			
	25	100			
	50	100			
	100	10.0			

<sup>a</sup> No Observed Effect Concentration, <sup>b</sup> Lowest Observed Effect Concentration, <sup>c</sup> Predicted lethal concentration for 50% of test organisms

Statistical summary for the test and a copy of the laboratory bench sheet and a copy of the chain-of-custody form are provided in Appendices A and C.

#### 4.0 QA/QC

The sample was received in good condition and within the temperature range specified by WDOE (2016). The toxicity test met acceptability criteria for performance of control organisms. There were no deviations from the protocol and water quality parameters remained within the ranges specified in the corresponding test method throughout the test.

Results for the reference toxicant test used to monitor laboratory performance and test organism sensitivity are summarized in Table 4. The results for the reference toxicant test fell within the acceptable range of mean ± two standard deviations of historical test results, indicating that the test organisms were of an appropriate degree of sensitivity. The coefficient of variation (CV) for the test is also shown in the table.

**Table 4. Reference toxicant test results.**

Species	Date initiated	Endpoint	LC <sub>50</sub> (g/L NaCl)	Acceptable Range (g/L NaCl)	CV (%)
<i>Ceriodaphnia</i>	7/12/2022	48h survival	11.3	8.78 - 30.4	36.4

## REFERENCES

Tidepool Scientific Software. 2000-2010. CETIS Comprehensive Environmental Toxicity Information System Software, Version 1.8.0.8.

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012. Pp 55-56.

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**  
***Ceriodaphnia dubia* Acute Toxicity Test**  
**Statistical Summary and Raw Bench Sheet**

# CETIS Summary Report

Report Date: 09 Aug-22 10:32 (p 1 of 1)  
 Test Code: 2207-042 | 07-9038-4726

## Ceriodaphnia 48-h Acute Survival Test

Rainier Environmental Laboratory

Batch ID: 04-4646-3225	Test Type: Survival (48h)	Analyst: Eric Tollefson
Start Date: 26 Jul-22 10:45	Protocol: EPA/821/R-02-012 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 28 Jul-22 11:00	Species: Ceriodaphnia dubia	Brine:
Duration: 48h	Source: In-House Culture	Age: <24h
Sample ID: 16-5083-8540	Code: 22-105	Client: Southwest Suburban Sewer District
Sample Date: 25 Jul-22 07:30	Material: POTW Effluent	Project:
Receive Date: 25 Jul-22 08:39	Source: Miller Creek WWTP (WA0022764)	
Sample Age: 27h (3.5 °C)	Station:	

## Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
04-5458-1602	48h Survival Rate	50	100	70.71	9.96%	2	Dunnett Multiple Comparison Test

## Point Estimate Summary

Analysis ID	Endpoint	Level	%	95% LCL	95% UCL	TU	Method
00-9109-1264	48h Survival Rate	LC50	73.49	69.39	77.83	1.361	Trimmed Spearman-Kärber

## Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
00-9109-1264	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria
04-5458-1602	48h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

## 48h Survival Rate Summary

C-%	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	4	1	1	1	1	1	0	0	0.0%	0.0%
1.8		4	1	1	1	1	1	0	0	0.0%	0.0%
12.5		4	1	1	1	1	1	0	0	0.0%	0.0%
25		4	1	1	1	1	1	0	0	0.0%	0.0%
50		4	1	1	1	1	1	0	0	0.0%	0.0%
100		4	0.1	0.05688	0.1431	0	0.2	0.05774	0.1155	115.5%	90.0%

## 48h Survival Rate Detail

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	1	1	1	1
1.8		1	1	1	1
12.5		1	1	1	1
25		1	1	1	1
50		1	1	1	1
100		0	0	0.2	0.2

## 48h Survival Rate Binomials

C-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Dilution Water	5/5	5/5	5/5	5/5
1.8		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		0/5	0/5	1/5	1/5

Freshwater Acute  
48 Hour Toxicity Test Data Sheet

Client: SWSSD  
 Sample ID: Miller Creek EFF  
 Test # 2207-012  
 Log-In # 22-105

Start Date & Time: 7/26/2022 1045  
 End Date & Time: 7/28/2022 1100  
 Test Organism: Ceriodaphnia dubia

Rep. #	Conc. or %	Cont. #	Number of Live Organisms			Dissolved Oxygen (mg/L)			pH (units)			Cond (uhorn-cm)			Temperature (°C)			Mean Percent Survival
			0	24	48	0	24	48	0	24	48	0	24	48				
1	CON	10	5	5	5	8.2	7.9	7.6	8.27	8.10	8.07	372	374	377	20.2	19.9	20.1	
2		24	5	5	5													
3		7	5	5	5													
4		19	5	5	5													
1	1.8	20	5	5	5	8.3	7.9	7.7	8.18	8.07	8.05	352	354	354	20.3	20.0	20.2	
2		2	5	5	5													
3		9	5	5	5													
4		18	5	5	5													
1	12.5	11	5	5	5	8.1	7.7	7.6	8.02	7.99	8.00	367	368	374	20.3	19.8	20.2	
2		1	5	5	5													
3		16	5	5	5													
4		4	5	5	5													
1	25	21	5	5	5	8.1	7.8	7.4	7.90	7.85	7.82	408	409	411	20.4	19.9	20.3	
2		13	5	5	5													
3		6	5	5	5													
4		17	5	5	5													
1	50	12	5	5	5	8.0	7.7	7.5	7.81	7.76	7.79	483	480	486	20.2	19.9	20.4	
2		3	5	5	5													
3		22	5	5	5													
4		15	5	5	5													
1	100	8	5	5	5	8.1	7.5	7.4	7.66	7.71	7.76	653	647	644	20.2	19.9	20.5	
2		5	5	5	5													
3		14	5	5	5													
4		23	5	5	5													

Technician Initials: SP SP SP

Dilution Water Batch #: MHSM 068  
 Test Chamber: RM2

Animal Source: In-house cultures  
 Date Received: \_\_\_\_\_

Sample Description: \_\_\_\_\_  
 QA Check: 87

Comments: 0 hrs:  
 24 hrs:  
 48 hrs:

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

**Appendix B**  
**Sample check-in sheet**

Client: Southwest Suburban Sewer Dist.

Tests Performed: My-c ; Au-c ; Cd-a  
Test ID No(s): 2207-040; 2207-041; 2207-042

Sample Check-In Information

Sample Description:

Sample ID:	Miller Creek EFF	Miller Creek EFF	Miller Creek EFF
Log-in No. (20-xxxx):	22-105	22-106	22-107
Sample Collection Date & Time:	7/25/22 0730	7/27/22 0730	7/29/22 0730
Sample Receipt Date & Time:	7/25/22 0839	7/27/22 0852	7/29/22 0808
Check-in Temperature (°C)	3.5	5.7	5.5
Temperature OK?	<input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="radio"/> Y <input type="radio"/> N
DO (mg/L)	8.7	8.3	8.6
pH (units)	7.29	7.63	7.35
Conductivity (µS/cm)	667	757	647
Salinity (ppt)	0.3	0.3	0.3
Tit. Vol / Sam. Vol. / Alkalinity (mg/L)*	4.8 / 25 / 192	4.2 / 25 / 168	4.4 / 25 / 176
Tit. Vol. / Sam. Vol. / Hardness (mg/L)* <sup>2</sup>	2.2 / 25 / 88	2.5 / 25 / 100	2.4 / 25 / 96
Total Chlorine (mg/L)	<0.03	<0.03	<0.03
Total Ammonia Nitrogen (mg/L)	252	198	227
Technician Initials	PH	PH	PH

\* = mg/L as CaCO<sub>3</sub>, <sup>2</sup> = Measured for freshwater samples only, NA = Not Applicable, NMI = Not Measured

Freshwater Tests:

Control/Dilution Water Source: test type: Cd<sup>a</sup> 8:2 (DMW) MHW Other: -068 Alkalinity: 68 Hardness: 100

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

Marine Tests:

Control/Dilution Water Source: test type: ART SW -016 NAT SW Alkalinity: 100 Salinity: 29.0

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

Additional Control? Y N =  test type:  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.

COC Complete? Y or N

1 2 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: PH

**Appendix C**  
**Chain-of-Custody Form**



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

Chain of Custody

Sample Collection By:

Report to: Southwest Suburban Sewer Dist.  
 Company Address: 1015 s.w. 174th PL  
 City/State/Zip: Normandy Park, WA-98166  
 Contact: Tim Berge 206-786-9572  
 Phone: tim.berge@swssd.com  
 Email:

Invoice To: same  
 Company Address: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Email: \_\_\_\_\_

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS
1	Miller Creek EFF	7/25/2022	0730 24 hr comp	cube	one	
2						
3						
4						
5						
6						
7						
8						
9						
10						

Receipt Temperature (°C) 35

ANALYSES REQUIRED

Fathhead acute  
 Daphnid acute  
 Topsmelt chronic  
 Mysid chronic

PROJECT INFORMATION

SAMPLE RECEIPT

RELINQUISHED BY (CLIENT)

RELINQUISHED BY (COURIER)

Client: \_\_\_\_\_ Total No. of Containers: 1  
 Received Good Condition?   
 Shipped Via: Just Matches Test Schedule?   
 SPECIAL INSTRUCTIONS/COMMENTS: Southwest Suburban Sewer district

RECEIVED BY (COURIER)

RECEIVED BY (LABORATORY)

Signature: [Signature] Date: 7/25/2022  
 Printed Name: Tim Berge  
 Signature: [Signature] Date: 08/31/22  
 Printed Name: Eric Tolliver  
 Signature: [Signature] Date: 7/25/22  
 Printed Name: ERIC TOLLIVER  
 Tag in #): 22-105