Rainier ENVIRONMENTAL

Dangerous Waste Characterization

Sample ID's: : BO270515FT; TO270515FT

Report date: June 10, 2015

Submitted to:

Washington State Department of Ecology

5013 Pacific Hwy East
Suite 20
Tacoma, WA 98424

1.0 INTRODUCTION

A dangerous waste characterization using the test organism *Oncorhynchus mykiss* (rainbow trout) was conducted on two samples submitted by Washington State Department of Ecology to Rainier Environmental. Testing was conducted following the Washington State Department of Ecology Publication 80-12.

2.0 METHODS

The samples, identified as BO270515FT and TO270515FT were received in the laboratory on May 29, 2015. Upon arrival at the laboratory the samples were inspected and contents verified against information provided on the chain-of-custody form. The samples were stored at 4°C in the dark until use. The test procedure is outlined in Table 1.

Table 1. Summary of Dangerous Waste Characterization Test Conditions

Parameter	Standard Fish Toxicity Test
Test number's	1506-006; 1506-007
Sample ID's	BO270515FT; TO270515FT
Test initiation date; time	6/4/2015; 1330h
Test termination date; time	6/8/2015; 1330h
Endpoint	Mortality at 96-hours
Test chamber	7.5 L plastic tank
Test temperature	12 ± 1°C
Dilution water	Moderately hard synthetic water
Test solution volume	6 L
Test concentrations (mg/L)	100, 10, 0
Number of organisms/ chamber	10
Number of replicates	3
Test organism	*Oncorhynchus mykiss* (rainbow trout)
Feeding	No feeding during test
Photoperiod	16 hours light/ 8 hours dark
Extraction	Rotary agitation (30 +/- 2 rpm) for 18 hours
Reference Toxicant	Copper sulfate
Deviations	None

The test organisms used in the test are outlined in Table 2. The samples were tested using fish received on April 29, 2015.

Table 2. Test organisms (*Oncorhynchus mykiss*)

Test organism age	54 days post swim-up (hatch date 3/18/2015)
Mean weight	0.34 g
Mean length	33 mm
Ratio of longest to shortest	1.3
Loading	0.56 g/L
Test organism source	Trout Lodge; Sumner, WA

3.0 RESULTS

A summary of results for the dangerous waste characterization conducted on samples BO270515FT and TO270515FT are contained in Table 3. There was 100 percent mortality in the 100mg/L concentration of sample TO270515FT and no other mortality. Based on these results, sample TO270515FT does designate as dangerous waste but not extremely hazardous waste. Copies of the laboratory bench sheets, statistical summaries of reference toxicant tests, and chain-of-custody form are provided in Appendices A through C.

Table 3. Summary of Results

Sample ID	Concentration (mg/L)	Survival (# fish, N=30)	Percent Mortality	Dangerous Waste Designation
Control	0	30	0	NA
BO270515FT	10 100	30 30	0 0	None
TO270515FT	10 100	30 0	0 100	Dangerous Waste

4.0 QUALITY ASSURANCE

The most recently completed reference toxicant test was initiated June 3, 2015. The LC_{50} of 47.3 g/L copper 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 last 21 tests was 22.5 percent, which is considered excellent by the Biomonitoring Science Advisory Board.

5.0 REFERENCES

WDOE. 2008. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised December 2008.

WDOE. 2009. Biological Testing Methods 80-12 for the Designation of Dangerous Waste. Washington State Department of Ecology. Hazardous Waste and Toxics Reduction Program. Publication number: 80-12, Revised June 2009.

Appendix A

Oncorhynchus mykiss Dangerous Waste Toxicity Test

Raw Bench Sheets

Dangerous Waste Toxicity Test

Client: Department of Ecology
Sample ID: B0270515FT; T0270515FT
Test # 1506-006; 1506-007
Log In # T15-133; T15-134

Start Date & Time: 6/4/15 1330
End Date & Time: 6/8/15 1330
Test Organism: *Oncorhynchus mykiss*
Test Protocol: **Washington State Department of Ecology Publ. 80-12**

Rep	Conc.	Cont #	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH (units) 0	24	48	72	96	Conductivity (umhos/cm) 0	24	48	72	96	Temperature (°C) 0	24	48	72	96	Percent Survival
1	CON	18	10	10	10	10	10	8.8	8.2	8.3	8.1	7.7	7.88	7.38	7.29	7.37	7.18	230				242	11.8	11.6	12.2	11.9	12.4	
2		3	10	10	10	10	10	8.9	8.1	8.2	8.1	7.8	7.91	7.41	7.33	7.32	7.21	232				237						
3		25	10	10	10	10	10	8.9	8.1	7.9	7.8	7.4	7.89	7.40	7.34	7.35	7.22	233				235						
1	10 PPM	13	10	10	10	10	10	9.1	8.2	8.1	8.0	7.9	7.87	7.42	7.34	7.35	7.22	222				228	11.6	11.5	12.1	12.0	12.5	
2	(T15-133	22	10	10	10	10	10	8.9	8.3	8.1	7.7	7.5	7.89	7.40	7.35	7.35	7.25	221				224						
3	"B0")	4	10	10	10	10	10	8.8	8.2	7.8	7.5	7.3	7.87	7.39	7.32	7.34	7.23	223				230						
1	100 PPM	2	10	10	10	10	10	8.8	8.6	8.2	8.1	8.0	7.75	7.36	7.33	7.28	7.25	223				224	11.6	11.5	12.1	11.7	12.1	
2	(T15-133	8	10	10	10	10	10	8.7	8.5	8.4	8.4	8.1	7.76	7.37	7.34	7.35	7.21	223				231						
3	"B0")	17	10	10	10	10	10	8.9	8.5	8.5	8.2	7.8	7.72	7.37	7.37	7.37	7.20	224				235						
1	10 PPM	23	10	10	10	10	10	9.1	7.2	7.1	7.0	6.8	7.77	7.33	7.31	7.34	7.18	222				228	11.5	11.6	12.4	11.7	12.4	
2	(T15-134	12	10	10	10	10	10	8.8	7.3	7.5	7.3	7.2	7.80	7.35	7.31	7.35	7.15	221				223						
3	"T0")	27	10	10	10	10	10	8.8	7.3	7.6	7.4	7.3	7.81	7.36	7.24	7.28	7.19	219				218						
1	100 PPM	7	10	10	0	—	—	8.9	6.5	6.7	—	—	7.73	7.06	7.12	—	—	220				225	11.6	11.5	12.3	11.7	—	
2	(T15-134	11	10	10	1	0	—	9.0	6.4	6.8	6.4	—	7.71	7.08	7.15	7.14	—	219				228						
3	"T0")	21	10	10	5	0	—	9.0	6.5	6.9	6.7	—	7.72	7.07	7.18	7.17	—	219				231						
1																												
2																												
3																												
1																												
2																												
3																												
Technician Initials			TM	TM	RT	RT	RT	TM	TM	RT	RT	RT																

Sample	Alk. (init.)	Hard. (init.)	Alk. (fin.)	Hard. (fin.)	Chlorine
	(mg/L as CaCO3)				(mg/L Cl2)
Control	70	100	68	100	<0.03
T15-133	68	102	68	100	
T15-134	70	96	72	96	

Animal Source: Trout Lodge
Date of Hatch: 3/18/15

Test Volume: 6 L
Date Received: 4/29/15
Date of Swim up: 4/10/15

Weights (g): .37 .31 .34 .32 .39 .30 .32 .33 .32 .35 μ = .34
Lengths(mm): 35 32 31 33 39 29 34 31 32 35 μ = 33
Length max/min: 39/29 1.3
Loading: 0.56 g/L

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

Dilution Water Source: MHSW 042
QA Check RT

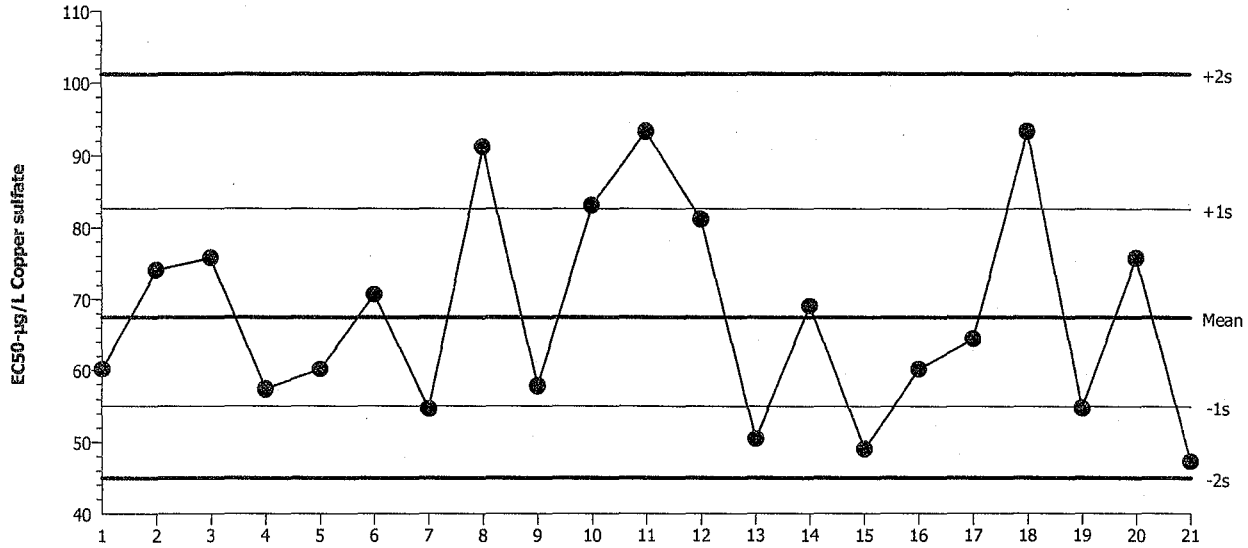
Appendix B
Reference Toxicant Test
Control Chart and Statistical Summary

CETIS QC Plot

Report Date: 08 Jun-15 14:39 (1 of 1)

Fish 96-h Acute Survival Test — **Rainier Environmental Laboratory**

Test Type:	Survival (96h)	**Organism:**	Oncorhynchus mykiss (Rainbow Tro	**Material:**	Copper sulfate
Protocol:	Not Applicable	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	67.49	**Count:**	20	**-1s Warning Limit:**	55.11	**-2s Action Limit:**	45
Sigma:	NA	**CV:**	22.50%	**+1s Warning Limit:**	82.66	**+2s Action Limit:**	101.2

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2013	Nov	7	60.15	-7.34	-0.568			18-4191-8353	08-5289-2625
2		Dec	3	74.05	6.563	0.4579			05-6836-0933	03-9767-6728
3	2014	Jan	2	75.79	8.294	0.5718			17-1726-5142	11-8783-5985
4			30	57.43	-10.06	-0.796			15-6663-8146	20-3824-7613
5		Feb	20	60.15	-7.34	-0.568			10-4530-0297	04-9790-7457
6		Mar	20	70.71	3.219	0.2299			05-2414-7219	13-5812-8148
7		Apr	16	54.7	-12.79	-1.037	(-)		19-9848-2715	04-2789-7256
8		May	15	91.17	23.68	1.484	(+)		19-9757-6408	01-1506-8089
9		Jun	15	57.87	-9.619	-0.7586			17-7770-2611	08-9048-4188
10		Jul	15	83.12	15.63	1.028	(+)		20-9533-3105	00-9643-5040
11		Aug	12	93.3	25.81	1.598	(+)		16-9419-2603	03-8467-1697
12		Sep	11	81.23	13.73	0.9138			01-4702-9532	04-7171-0994
13		Oct	8	50.48	-17.01	-1.432	(-)		19-9965-4133	06-8257-8888
14		Nov	5	69.1	1.604	0.1159			12-4414-2221	18-6944-2941
15		Dec	6	49.06	-18.43	-1.573	(-)		11-5776-2415	18-8302-9953
16	2015	Jan	1	60.15	-7.34	-0.568			07-7597-4197	17-7560-4766
17			31	64.47	-3.023	-0.2261			15-5281-5142	00-2323-2143
18		Mar	5	93.3	25.81	1.598	(+)		02-0547-6463	12-5775-2701
19		Apr	3	54.84	-12.65	-1.024	(-)		05-4256-3553	21-3677-7651
20		May	6	75.79	8.294	0.5718			17-0309-5731	08-3430-0742
21		Jun	3	47.32	-20.17	-1.751	(-)		10-2761-8033	20-2414-3583

CETIS Summary Report

Report Date: 08 Jun-15 14:39 (p 1 of 1)
Test Code: RA060315OM | 10-2761-8033

Fish 96-h Acute Survival Test — **Rainier Environmental Laboratory**

Batch ID:	06-1625-0605	**Test Type:**	Survival (96h)	**Analyst:**	Eric Tollefson
Start Date:	03 Jun-15 15:40	**Protocol:**	Not Applicable	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	07 Jun-15 15:00	**Species:**	Oncorhynchus mykiss	**Brine:**	
Duration:	95h	**Source:**	Trout Lodge Fish Farm	**Age:**	28d

Sample ID:	05-5030-0124	**Code:**	RA060315OM	**Client:**	Internal Lab
Sample Date:	03 Jun-15	**Material:**	Copper sulfate	**Project:**	
Receive Date:	03 Jun-15	**Source:**	Reference Toxicant		
Sample Age:	16h	**Station:**	In House		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
18-9727-9232	96h Survival Rate	<25	25	NA	14.2%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
20-2414-3583	96h Survival Rate	LC50	47.32	36.78	60.89		Trimmed Spearman-Kärber

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	1	1	1	1	1	0	0	0.0%	0.0%
25		3	0.8	0.7627	0.8373	0.7	0.9	0.05774	0.1	12.5%	20.0%
50		3	0.4333	0.3902	0.4765	0.3	0.5	0.06667	0.1155	26.65%	56.67%
100		3	0.2333	0.1902	0.2765	0.1	0.3	0.06667	0.1155	49.49%	76.67%
200		3	0	0	0	0	0	0	0		100.0%
400		3	0	0	0	0	0	0	0		100.0%

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	1	1
25		0.9	0.8	0.7
50		0.3	0.5	0.5
100		0.3	0.3	0.1
200		0	0	0
400		0	0	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	10/10	10/10	10/10
25		9/10	8/10	7/10
50		3/10	5/10	5/10
100		3/10	3/10	1/10
200		0/10	0/10	0/10
400		0/10	0/10	0/10

Appendix C
Chain-of-Custody Form

BO-270515 270515-FT

Chain of Custody

Rainier ENVIRONMENTAL

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

Date_____Page___of___

Sample Collection By:

Report to:	Mindy Collins	**Invoice To:**	
Company	Dept of Ecology	**Company**	Department of Ecology, HWTR
Address	Bellingham WA 98225	**Address**	3190-160th Ave SE
City/State/Zip	1440 10th St.	**City/State/Zip**	Bellevue, WA 98008-5452
Contact	Mindy Collins	**Contact**	Aurana Lewis
Phone	360-594-6411	**Phone**	425-649-7065
Email	minc461@ecy.wa.gov	**Email**	aurana.lewis@ecy.wa.gov

ANALYSES REQUIRED

	SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	Fish bio assay	Receipt Temperature (°C)
1	BO 270515 FT	5/27/15	11:00	oil	8oz jar	1	composite 7 totes - heterogen	✓	Rainier Log-in # T15-133
2	TO 270515 ~~FT~~ FT	5/27/15	12:45	oil	1/2 6 jar	1	grab from 1 tote (#8)	✓	T15-134
3									
4									
5									
6									
7									
8									
9									
10									

PROJECT INFORMATION		SAMPLE RECEIPT	
Client:		Total No. of Containers	2
PO No.:		Received Good Condition?	✓
Shipped Via:	client	Matches Test Schedule?	✓

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY (CLIENT)	RELINQUISHED BY (COURIER)
(Signature) Mindy Collins (Time) 3:21	(Signature) (Time)
(Printed Name) Mindy Collins (Date) 5/27/15	(Printed Name) (Date)
(Company) Ecology	(Company)

RECEIVED BY (COURIER)	RECEIVED BY (LABORATORY)
(Signature) (Time)	(Signature) Eric Tollefson (Time) 1150
(Printed Name) (Date)	(Printed Name) ERIC TOLLEFSON (Date) 5/29/15
(Company)	(Company) Rainier