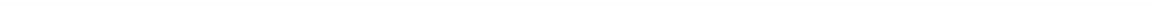
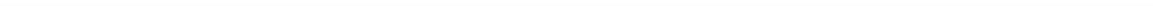


APPENDIX A

STANDARD OPERATING PROCEDURE FOR STILL BOTTOM SAMPLING



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Standard Operating Procedure: Still Bottoms sample collection
Revised: 29 October 2014

Supplies & equipment:

- Rolling cart
- Camera
- Disposable Tyvek lab coat
- Safety glasses
- Nitrile gloves
- Half-face APR with OV cartridges
- Clipboard
- Waste Sample Sheets
- Pen
- Sharpie
- Sample labels
- 6 Ziploc bags (quart)
- Roll of paper towels
- 6 pre-cut Benchkote pads
- 4-8 oz I-CHEM jars (I-CHEM #220-0250)
- Scissors
- Dry Cleaner Questionnaire
- Cooler
- Ice packs
- 3 Stainless steel ladles (Polar Ware Company #T1604)
- 3 Stainless steel pitchers (Polar Ware Company #T1063)
- 1 liter deionized water
- Gray plastic bin for secondary containment
- Plastic trash bags
- 5-gallon plastic bucket

Procedure:

1. Set up equipment in a location proximal to the dry cleaning machine. Use the rolling cart as a work surface, if feasible.
2. Put on all PPE except the respirator.
3. Label the sample jars.
4. Line the gray plastic bin with Benchkote and add the roll of paper towels.
5. Line the 5-gallon bucket with a trash bag.
6. Prepare the blank:

Add 500 ml of deionized water to the sample collection pitcher
Stir the sample ladle in the pitcher six times
Pour the contents of the pitcher into two labeled I-CHEM jars
Place the I-CHEM jars in the cooler
Dry the pitcher and ladle with clean paper towels

7. Put on the respirator.
8. Ask the operator to open the still door and ensure that all sampling equipment is located in the lined gray plastic bin.
9. As the waste begins to flow, collect ~ 500 ml of liquid from the lip of the still opening using the stainless steel pitcher.
10. Pour the contents of the pitcher into the first I-CHEM jar and secure the lid (this sample reserved for future chemical analysis).
11. Ask the operator to scrape the remaining material to the front of the still and collect semi-solid sample using the stainless steel ladle.
12. Deposit the semi-solid sample into a second I-CHEM jar and secure the lid (this sample reserved for future chemical analysis).
13. Then deposit a sample of the semi-solid material into the pitcher that contains the liquid material. Mix by gently stirring with the ladle two or three times.
14. Place this mixed sample into an I-CHEM jar and secure the lid (this sample will be used for the fish bioassay).
15. Place the sample jars in separate Ziploc bags.
16. Place the samples in the cooler with the ice packs.
17. Wipe the ladle with paper towels and place them the lined bucket.
18. Double-bag the waste and either place it in the dry cleaner's waste drum (if given permission) or transport in the cooler back to the lab.
19. Place the used sampling equipment in another plastic bag.
20. Ensure all contaminated materials are safely stored in the cooler.
21. Remove gloves, then respirator, then eye protection and lab coat.
22. Wash your hands.
23. Complete the Waste Sample form and the chain of custody form.

Labeling:

1. Label each I_CHEM jar individually with the date, number assigned to the drycleaner, and sample number
 - a. XXMMDDYY_##_BSS
 - i. XX= initials
 - ii. ##= drycleaner site designation number
 - iii. B= still bottoms
 - iv. SS= Sample number
 2. Label the Ziploc bag with initials and the date
-

CHAIN OF CUSTODY RECORDS

Chain of Custody forms will be completed for all samples collected during the program. The Chain of Custody form will document the transfer of sample containers. Custody seals will be placed on each cooler. The cooler will then be sealed with packing tape. Sample container labels will include sample number, place of collection, date and time of collection. All samples will be kept on cooler blocks and delivered to the testing laboratory within 24 hours of collection. All samples will be delivered to the laboratory by same day or overnight delivery. All samples will be stored at <6°C at the laboratory.

The laboratory will be notified in advance of the sampling schedule. The Chain of Custody record completed at the time of sampling will contain the sample number, date, time of sampling, and the name of the sampler. The Chain of Custody document will be signed, timed, and dated by the sampler when transferring the samples.

Each sample cooler being shipped to the laboratory will contain a Chain of Custody form.

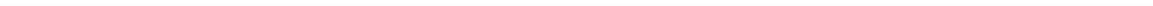
The Chain of Custody form will consist of four copies, which will be distributed as follows:

- The shipper will maintain a copy while the other three copies will be enclosed in a waterproof envelope within the cooler with the samples
- The shipper's copy will be kept together with the field log in a project folder for the specific sampling event. The cooler will then be sealed properly for shipment.
- Upon receiving the samples, the laboratory will complete the three remaining copies.
- The laboratory will retain one copy for their records.
- The laboratory will return one copy to the project officer or lead inspector upon receipt of the samples.
- One copy will be returned with the data deliverables package.

Upon receipt of the cooler at the laboratory, the Sample Custodian will inspect the shipping cooler and the custody seal. The Sample Custodian will note the condition of the cooler and the custody seal on the Chain of Custody record sheet. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The Sample Custodian will document the date and time of receipt of the container and sign the form. The Sample Custodian will record the temperature of one sample (or temperature blank) from each cooler, and the temperature will be noted on the Chain of Custody.

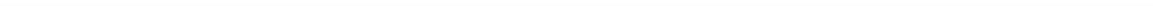
If damage or discrepancies are noticed (including sample temperature exceedances), they will be recorded in the remarks column of the record sheet, dated, and signed. Any damage or discrepancies will be reported to Dr. Steve Whittaker before the sample is processed. If the discrepancies will affect the integrity of the fish bioassay, the laboratory must contact the sample owner to discuss the variance before proceeding with the bioassay or request for another sample.

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APPENDIX B
DRY CLEANING QUESTIONNAIRE

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DRY CLEANING SAMPLING QUESTIONNAIRE

Interview date: _____ **Interviewed by:** _____

Business name / City: _____

Interviewee name: _____ **Job position:** _____

Manufacturer of machine: _____ **Model of machine:** _____

What is the capacity of the machine? _____ pounds

How many loads do you run per week? _____ per week

How old is the dry cleaning machine? _____ years

How often do you clean out the still bottoms? _____ times per month

What type of gloves do you wear when you clean out the still bottoms? _____

What type of respirator do you wear when you clean out the still bottoms?

What type of other protective clothing do you wear when you clean out the still bottoms?

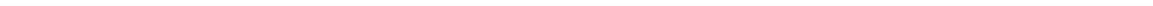
Have you ever used any spot cleaners that contain TCE with this machine? Y / N

What spot cleaners do you have at this location?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

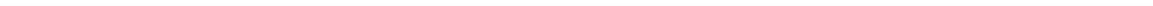
Observations:

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APPENDIX C
WASTE SAMPLING FORM

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WASTE SAMPLE

Business name / City: _____

Date sampled: _____

Sampled by: _____

Waste sampled: _____

Sample #: _____

Comments: _____

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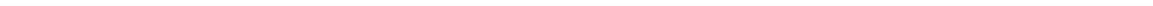
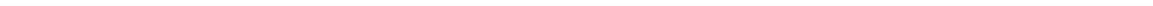


Exhibit B:
Questionnaire

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DRY CLEANING SAMPLING QUESTIONNAIRE

Interview date: _____ Interviewed by: _____

Business name / City: _____

Interviewee name: _____ Job position: _____

- How long has there been a dry cleaner at this location? _____ years
 - Manufacturer of machine: _____ Model of machine:

 - What is the capacity of the machine? _____ pounds
 - How many loads do you run per week? _____ per week
 - Did you buy the machine new? Y / N
 - How long have you had the machine? _____ years
 - How old is the dry cleaning machine? _____ years
 - Who cleans out the still bottoms? _____
 - How often do you clean out the still bottoms? _____ times per month
 - What protective equipment do you use when cleaning the still bottoms (apron/coveralls/gloves/respirator/eye protection)? _____

 - What day and time are the still bottoms cleaned out? _____
 - How do you dispose of the still bottoms? _____
 - How often do you dispose of the separator water? _____
 - How do you dispose of the separator water? _____
 - Are you an EnviroStar? Y / N
 - If yes, how many stars? _____
-

- **What spot cleaners do you use regularly?**

1. _____ (pre- / post- / both)

2. _____ (pre- / post- / both)

3. _____ (pre- / post- / both)

4. _____ (pre- / post- / both)

5. _____ (pre- / post- / both)

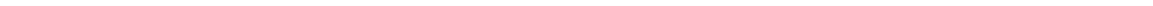
- **What is stopping you from buying a non-PERC machine?**

- **If you bought a new machine, what type of solvent would it use?**

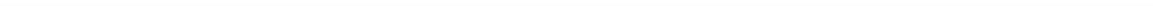
- **How can LHWMP help you?**

Exhibit C:

Fish Bioassay Results for Shops 01A and 02



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July 24, 2015

Steve Whittaker
Local Hazardous Waste Management Program
CNK-PH-1100
401 Fifth Avenue, Suite 1100
Seattle, WA 98101-1818

Dear Steve:

Attached is a report on the toxicity test (Method DOE 80-12) initiated on 6-8-15. Detailed findings are in the "Results" section of the attached report. The table below shows a summary of the test results.

There was 100% mortality in the dry cleaning waste (perc waste) sample SW050915_01_W01 at the 100 mg/L test concentration and 100% survival at the 10 mg/L test concentration. Hence, this sample designates as a "Dangerous Waste" according to DOE 80-12 criteria.

There was 100% mortality in the dry cleaning waste (still bottom waste) sample SW053015_02_B01 at the 100 mg/L test concentration and 93% mortality (7% survival) at the 10 mg/L test concentration. This sample designates as an "Extremely Hazardous Waste" according to DOE 80-12 criteria.

Rainbow Trout

Sample	Sample Concentration mg/L	Percent Survival %	Designation	Designates (Yes/No)
SW050915_01_W01	10	100	Extremely Hazardous Waste	No
	100	0	Dangerous Waste	Yes
SW053015_02_B01	10	7	Extremely Hazardous Waste	Yes
	100	0	Dangerous Waste	--

If you would like additional information, please call Francis Sweeney at 477-7117.

Sincerely,



Gary Yoshida
King County Environmental Laboratory

**REPORT ON
TOXICITY TESTS FOR THE
DESIGNATION OF DANGEROUS WASTE
(METHOD DOE 80-12)
CONDUCTED ON
DRY CLEANING WASTE**

**KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS
WATER AND LAND RESOURCES DIVISION
ENVIRONMENTAL LABORATORY SECTION
322 WEST EWING STREET
SEATTLE, WASHINGTON 98119**

**Test Date: June 8, 2015
KCEL Test Numbers: #7550 (*Oncorhynchus mykiss*: DOE 80-12, 96-Hour Acute Test)
Report Date: July 24, 2015**

SAMPLE

Dry cleaning waste samples SW050915_01_W01 (collected on 5-9-15) and SW053015_02_B01 (collected on 5-30-15) were received by the King County Environmental Laboratory (KCEL), Aquatic Toxicology Section on 5-28-15 and 6-1-15, respectively. The samples were delivered in 250 mL glass wide mouth jars and were refrigerated in the dark at $4 \pm 2.0^\circ\text{C}$ until test initiation.

CONTROL WATER

The control water for the test with rainbow trout is freshwater obtained from a 95 ft. deep well located at the KCEL. Stock cultures of trout are held in a flow-through system of well water (WW).

The WW is analyzed for metals monthly (last analyzed 5-15) and organics are measured annually (last analyzed on 3-15). Hardness, alkalinity, conductivity and pH are measured monthly.

Physical-chemical characteristics of the WW are listed in the following table:

Parameter	Value	Units
Conductivity	266	$\mu\text{mhos/cm}$
pH	7.94	
Total Hardness (calc.)	109	mg/L as CaCO_3
Total Alkalinity	77	mg/L as CaCO_3
Total Cd	< 2	$\mu\text{g/L}$
Total Cr	< 3	$\mu\text{g/L}$
Total Cu	< 4	$\mu\text{g/L}$
Total Ni	< 5	$\mu\text{g/L}$
Total Pb	< 20	$\mu\text{g/L}$
Total Zn	< 5	$\mu\text{g/L}$
Total Mercury	< 0.05	$\mu\text{g/L}$ (measured 2-2015)
Volatile Organics	45 cmpds not detectable	
Organic Analysis (BNA'S):	69 cmpds not detectable	
Bis(2-Ethylhexyl)Phthalate	0.49	$\mu\text{g/L}$
Pesticides & PCB's:	28 cmpds not detected	

METHODS

The acute toxicity test #7550 was conducted as outlined in Washington State Department of Ecology, Publication 80-12, Part A: Static Acute Fish Toxicity Test Protocol (Revised June 2009). The test was conducted at 10 mg/L and 100 mg/L to determine whether the samples designate as "Extremely Hazardous Waste" or "Dangerous Waste", respectively.

Test Organisms

Swim-up (swim-up on 5-1-15) rainbow trout (*Oncorhynchus mykiss*) were purchased from Trout Lodge located in Sumner, Washington on 5-26-15. The trout were acclimated for a period of 13 days in well water with a mean temperature of 13.6°C , a minimum of 13.5°C and a maximum of 13.8°C in a flow-through system at KCEL. During acclimation the fish were fed Ziegler's Salmon Starter twice daily. Feed was withheld 48 hours prior to the start of the test.

Physical data (based on a randomly chosen control jar at the end of the test) on trout used in the tests is shown in the table below.

Test #	Age (days-post swim-up at start of test)	Mean Standard Length (cm)	Mean Weight (grams)	Loading Wt./Vol. (g/L)
7550	38	3.6	0.52	0.52

As indicated in the table the mean weight of the trout used in the test was 0.52 g with a mean standard length of 3.6 cm. The loading in each jar was 0.52 g/L.

Extraction

For each sample three aliquots of 0.1 g (test concentration 10 mg/L) and three aliquots of 1.0 g (test concentration 100 mg/L) of the sample were weighed and each placed into a 1L, blue cap, wide-mouth glass extraction jar (total 6 jars). 200 mL of well water (diluted 20% with DI water) was added to each jar. The jars were then closed with a teflon lined cap and extracted on a rotary agitator for 16.5 hours.

Rainbow Trout – 96-Hour Static Acute Toxicity Tests

The test jars were 5-gal, glass wide mouth jars with inside measurements of 40 cm (height) and 25 cm (dia.). The liquid level at a volume of 10 L was 19.5 cm. The jars were partially covered during the test.

Well water (diluted 20% with DI water to keep the hardness below 100 mg/L) was measured (9.6 L for test and control jars) into each replicate. The solutions were maintained at $12 \pm 1.0^\circ\text{C}$ in an environmental chamber (Hotpack Model 08082, s/n 79719). The D.O. at the start of the test (9.7-10.2 mg/L) was $> 80\%$ saturation (> 8.6 mg/L).

The extracted samples were added to the test jars followed by a 200 mL WW (diluted 20% with DI) rinse of the extraction jar bringing the total volume in the test chambers to 10 L. The extraction jar (laid on its side) and teflon cap liner were placed on the bottom of the test chamber. Ten rainbow trout were placed randomly into each test jar.

Survival was monitored during the test and recorded at 24, 48, 72, and 96 hours. Dissolved oxygen, temperature and pH were recorded for the samples and controls at 0, 24, 48, 72 and 96 hours. The photoperiod was 16h L:8h D. The test was initiated at 0950 h on 6-8-15 and ended at 1010 h on 6-12-15.

Quality Assurance

The reference toxicant testing for the lot of fish used in this test was conducted on 6-1-15 (Test #7538). Cadmium nitrate was used as a reference toxicant for rainbow trout. The precision table located at the end of this report is maintained to monitor the sensitivity of these organisms to the reference toxicant and thereby provide an indication of their overall sensitivity to other compounds. The LC50 for the reference toxicant test (#7538) was $2.7 \mu\text{g Cd/L}$ which is within the control limits (mean ± 2 SD) of $1.3 - 3.1 \mu\text{g/L Cd}$.

Temperature, pH and dissolved oxygen measurements remained within acceptable limits (USEPA, 2002) throughout the reference toxicant test for rainbow trout (#7538) and sample test (#7550). The test met acceptability criteria regarding control survival ($\geq 90\%$).

Physical-chemical methods are outlined in the table below:

Parameter	Method
Water Quality Tests	APHA (1992); US EPA (1991).
Temperature	Standard Mercury Thermometer (calibrated with a certified thermometer traceable to NBS records) and Onset, Tidbit (v2) UTBI-001 Temperature Logger (KCEL #436v1).
Dissolved Oxygen	YSI membrane electrode method (Method #4500-0 G; KCEL #434).
pH	Beckman 690 meter with automatic temperature compensation and Ross combination electrode (Method #4500-H; APHA 1992; KCEL #433).
Total Alkalinity	Potentiometric Method (Method #2320 B; KCEL #319v4).
Total Hardness	By calculation (Method #2340 B; KCEL #612v4).
Conductivity	Orion Model #122 Meter with 012210 conductivity cell (Method 2510B; KCEL #435).
Pesticides and PCB's	Continuous liquid extraction method (EPA Method #608; KCEL #733).
Organic Analysis	Continuous liquid extraction method for BNA's (EPA Method #625; KCEL #731).
Volatile Organics	Purge and trap method (EPA Method #624; KCEL #732).
Total Metals	ICP for Cd, Cr, Cu, Ni, Pb and Zn (EPA Method #200.7; KCEL #612v4); for Hg analysis (KCEL #604v5, 601v4, 605v0).

RESULTS

Rainbow trout

The following table contains survival percentages at 24-hour intervals during the 96-hour test in which rainbow trout were exposed to dilution water (controls) or to 10 and 100 mg/L sample concentrations.

	Sample mg/L	Percentage Survival (%)				Number Dead	Number of Fish Tested
		24 h	48 h	72 h	96 h		
WW (control)	0	100	100	100	100	0	30
SW050915_01_W01	10	100	100	100	100	0	30
	100	0	0	0	0	30*	30
SW053015_02_B01	10	100	73	43	7	28	30
	100	0	0	0	0	30*	30

* All dead within 60 minutes of test start.

Sample

As the table above shows for sample SW050915_01_W01 there was 100% mortality (all dead within 60 minutes of test initiation) in the 100 mg/L test concentration. In addition, there was 100% survival in the 10 mg/L test concentration. Hence, this sample designates as a "Hazardous Waste" according to DOE 80-12 criteria.

For sample SW053015_02_B01 there was 100% mortality (all dead within 60 minutes of test initiation) in the 100 mg/L test concentration. In addition, there was 93% mortality in the 10 mg/L test concentration at the end of the test. Hence, this sample designates as an "Extremely Hazardous Waste" according to DOE 80-12 criteria.

WATER QUALITY

The following table contains measurements of Temperature, pH and Dissolved Oxygen taken throughout the 96 h test (or up to the time of 100% mortality). Measurement of Total Hardness, Total Alkalinity and Conductivity are taken from samples collected at the beginning (0-h) and end (96-h) of the test (unless otherwise noted).

Parameter	Sample:	Control	SW050915_01_W01		SW053015_02_B01	
		0 mg/L	10 mg/L	100 mg/L	10 mg/L	100 mg/L
°C	Mean	12.1	11.9	12.5	12.1	12.7
	Min.	11.7	11.7	12.3**	11.7	12.5**
	Max.	12.8	12.6	12.6**	12.8	12.8**
pH	Mean	7.67	7.69	7.99	7.74	7.97
	Min.	7.52	7.55	7.98**	7.61	7.96**
	Max.	7.96	7.98	7.99**	8.00	7.98**
D.O. (mg/L)	Mean	8.8	8.5	9.4	9.3	9.3
	Min.	8.2	8.1	9.4**	8.2	9.3**
	Max.	9.5	9.4	9.4**	9.3	9.4**
Tot. Hard (mg/L as CaCO ₃)	0h	88	89	88	87	88
	96h	89	86	*	88	*
Tot. Alk (mg/L as CaCO ₃)	0h	65	65	64	64	61
	96h	67	67	*	68	*
Cond (µmhos/cm)	0h	221	221	222	222	224
	96h	214	223	*	228	*

* Not taken since all dead within 1 hour of test initiation

** Based on 0 hour readings only

Additional water quality and QC data are listed on the attached photocopied pages from the laboratory notebook.

TESTED BY:
King County Environmental Laboratory
322 West Ewing Street
Seattle WA 98119

REFERENCES

APHA. 1992. Standard Methods for the Examination of Water and Wastewater, 18th Edition. American Public Health Association, American Waterworks Association, Water Pollution Control Association. Washington D.C.

U.S. E.P.A. 1991. Code of Federal Regulations, 40CFR, Appendix A, July 1991 U.S. Environmental Protection Agency, Office of Federal Registry, Washington, D.C.

Washington State Department of Ecology. Biological Testing Methods for the designation of Dangerous Waste. DOE 80-12, revised June 2009.

US EPA. 2002. Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms. 5th edition. EPA-821-02-012, October 2002. US Environmental Protection Agency, Office of Water (4303T), Washington, DC.

DOE 80-12 Toxicity Test:

Statistics

Chain of Custody

Bench Sheets

Statistical Analysis for Sample SW053015-02-B01 (10mg/L concentration)

Summary table for the variance ratio F test to determine the appropriate t-test (equal or modified)

Replicate	Control		10 mg/L Concentration	
	Number Dead	Proportion Dead (p_o)	Number Dead	Proportion Dead (p_T)
A	0	0	10	1
B	0	0	10	1
C	0	0	8	0.8
Mean (p_m)		0		0.933
Variance (s^2)		0		0.0133 ¹

$$s^2 = \sum (p - p_m)^2 / N - 1 \text{ where } p = p_o \text{ or } p_T$$

$$^1 [(1 - 0.933)^2 + (1 - 0.933)^2 + (0.8 - 0.933)^2] / 3 - 1$$

Since one of the variances is 0 (control) the variances are unequal.
Use the modified t-test for analysis.

Summary table for the modified t-test.

	10 mg/L Concentration
Critical t df (N-1) ^a	2
Critical t ($\alpha = 0.10$, one tailed)	-1.886
Calculated t statistic ²	6.503
Calculated t statistic 6.503 > Critical t -1.886. Accept H _o	
H _o : LC50 ≤ 10 mg/L (Extremely Waste Threshold). Waste Designates	Accept H _o
H _A : LC50 > 10 mg/L (Extremely Waste Threshold). Waste Does Not Designate	
Does waste designate?	Yes

^aN-1 is used in the modified t-test when either s_o^2 or $s_T^2 = 0$

$$^2 t = (p_{Tm} - p_{em} - 0.5) / [(s_T^2 + s_o^2) / N]^{0.5}$$

$$= (0.933 - 0 - 0.5) / [(0.0133 + 0) / 3]^{0.5} = 6.503$$

DOE 80-12 Hazardous Waste Test, Project # Dry Cleaners
Rainbow Trout 96-Hour Static Acute Test

Test #: 7550
Test Date: 6-8-15

ORGANISMS

200 fish received from Trout Lodge Lot # (Swim-up date): 5-1-15 Shipped via Pick up Arrived at KCEL at 1355 h on 5-26-15 in 1 box double plastic bag.
dead removed. At Arrival: pH —, D.O. > 20 mg/L, Temp 12.2 °C. Into Tank # 1 Hold in tank with new well water and aeration for — days. Feed 2X/day with Ziegler's starter #1. Refer to culture log for feeding & holding information.

DILUTION WATER/SAMPLE

1. New Well Water (NWW) 6-7, filtered through nylon netting. Hardness must be between 80-100 mg/L. At start TH ≈ 109 mg/L. Dilute 206 w/ MilliQ DI.
Want D.O. @ 90-100% saturation (9.8-10.7 mg/L) before add sample. Aerate with O₂.

2. Hazardous waste samples from Dry Cleaners
LIMS RBT80-12 Sample #: — Wkgrp #: — *not going to LMS*

	Sample 1	Sample 2
Sample #:	SW050915-01-W01	SW053015-02-B01
Sample Site:	Perc Waste	Still Bottom
Collect Date:	5-9-15 to	5-30-15 to
Collect Time:	h to h	h to h
Collected by:	Steve Whittaker	Steve Whittaker
Delv'd to KCEL:	5-28-15 h on 6907	1350 h on 6-1-15
By:	Steve Whittaker	Steve Whittaker
Rec'd by:	LB	JK
Sample Container:	1 250ml wide mouth	1 250ml wide mouth
Sample Volume:	250ml	250ml
Sample Description:	Dark liquid	Dark, thick like molasses. Smells like residue
pH (at arrival):	—	—
DO (mg/L) (at arrival):	—	—
Temp (°C) (at arrival):	—	—
Storage:	In dark at 4 ± 2°C	In dark at 4 ± 2°C

By Blue/green/yellow

orange/red

PROCEDURE

1) Sample Extraction (Rotary Agitation).

- Cut, crush or break solid samples into approx. 1-1.7 cm pieces. Used: —
- Use sample and NWW volumes in table below:
For 10 ppm: weigh 0.10 g of sample into each of ³ 1L blue cap wide mouth bottles (Reps A-C for fish plus 1 for WQ).
For 100 ppm: weigh 1.0 g of sample into each of ³ 1L blue cap wide mouth bottles (Reps A-C for fish plus 1 for WQ).
- Add 200 mL of NWW to each bottle and cap with lid and teflon liner (avoid caps with adhesive on liner).
- Mix samples on rotary agitator for 18 ± 2 h at 23 ± 2°C.
- Start extraction at 1600 h on 6-7-15
- End extraction at 0830 h on 6-8-15.

DOE 80-12 Hazardous Waste Test, Project # Dry Cleaners
 Rainbow Trout 96-Hour Static Acute Test

Test #: 7550
 Test Date: 6-8-15

Treatment	Sample Conc (mg/L)	Code	Rep	Random #	NWW (L) Final Vol.	Sample (g)
Control	0	Blue	A	11	10	0
			B	3	10	0
			C	6	10	0
Sample 1	10	Green	A	15	10	0.1
			B	9	10	"
			C	13	10	"
Sample 1	100	Yellow	A	14	10	1.0
			B	8	10	"
			C	12	10	"
Sample 2	10	Orange	A	10	10	0.1
			B	2	10	"
			C	1	10	"
Sample 2	100	Red	A	4	10	1.0
			B	5	10	"
			C	7	10	"

- 2) Test Jars *diluted 20% w/DI*
- Fill test jars with 9.0 L of NWW and place randomly into EC # 8556, East & West shelf.
 - Measure D.O. 3.7-10.2 mg/L at 12°C. Aerate if < 80% saturation (8.6 mg/L). Aerate w/ O₂ @ L/min for sec per jar.

AERATION	Before Aeration	Aeration		After Aeration
	D.O. (mg/L)	Start Date/Time	End Date/Time	D.O. (mg/L)
Before Add Sample:		/	/	

- Extraction bottles:
 - Rinse outside of extraction bottle with DW
 - Pour contents into assigned jar
 - Rinse extraction bottle with 200 mL NWW and pour into test jar, bringing total volume to 10 L.
- Place extraction bottle into test jar on its side, remove liner and place at bottom of test jar (prevent from floating). **Setup** at 0950-0915h.
- Take 0h sample for pH, DO, Temp, Tot. Alk, Tot. Hard, Cond.
- Add 10 fish per jar, one at a time to randomize, using dip net.
- Counts verified by GY & .
- Start** test at 0950 h on 6-8-15. Place Tidbit temp recorder (SN 9716078, East shelf; SN 10463448, West shelf) in jar w/water into EC.
- Measure pH, DO, Temp, cumulative survival and mortality (# Dead) daily in all reps/trtmt.
- End** test at 1010 h on 6-12-15 by GY.
- Take 96h samples for pH, DO, Temp, Tot Alk, Tot Hard, Cond.

DOE-80-12 Hazardous Waste Test, Project # Dry Cleaners
 Rainbow Trout 96-Hour Static Acute Test

Test #: 7550
 Test Date: 6-8-12

Treatment	Sample Conc (mg/L)	Code	Rep	Temperature °C (SN 150104270)				
				0 h	24 h	48 h	72 h	96 h
Control	0	Blue	A	12.4	11.8	11.7	11.8	11.7
			B	12.8	12.1	11.9	12.1	12.0
			C	12.7	12.0	12.0	12.0	12.1
Sample 1	10	Green	A	12.6	11.5	11.7	11.8	11.7
			B	12.2	11.8	11.8	11.8	11.8
			C	12.4	11.9	11.8	11.8	11.8
Sample 1	100	Yellow	A	12.5	-	-	-	-
			B	12.6	-	-	-	-
			C	12.3	-	-	-	-
Sample 2	10	Orange	A	12.3	11.8	11.7	11.8	11.7
			B	12.8	12.0	11.9	12.0	11.9
			C	12.8	12.0	12.1	12.0	12.1
Sample 2	100	Red	A	12.7	-	-	-	-
			B	12.5	-	-	-	-
			C	12.8	-	-	-	-
Analyst:				Gy	Gy	Gy	Gy	Gy

Test Organism Data at 96 Hours		
Fish	Length (cm)	Weight (g)
1	3.5	0.438
2	3.6	0.534
3	4.0	0.648
4	3.6	0.481
5	3.7	0.483
6	3.5	0.485
7	3.5	0.493
8	3.7	0.557
9	3.4	0.444
10	3.7	0.559
Mean:	3.6	0.517
Load Rate = [(Wt)(# Fish)] / Vol		(0.517 g)(10)
Where:		10 L
Wt = Mean Wt in g		
Vol = Total Test Vol in L		
# Fish = # Fish/Rep		
		= 0.52 g/L

Day 0 10/5 dying rapidly in yellow + red
 Can't see in yellow too turbid
 24h orange some fish loss of equilibrium

NOTES

Blue B, C } West
 Yell B } West
 Orange BC } West
 Red A, BC } West
 Blue A } East
 Green A, BC } East
 Yell A, C } Shelf
 R, A } Shelf



Steve Whittaker, PhD
 Public Health Researcher
 Local Hazardous Waste Management Program
 CHK-PH-1100
 401 5th Avenue, Suite 1100
 Seattle, WA 98104-1818
 steve.whittaker@kingcounty.gov
 www.kingcounty.gov/health

206-263-8499
 Fax 206-296-0189
 TTY Relay: 711

SAMPLE CHAIN OF CUSTODY

Page # 1 of 1

TURNAROUND TIME
 Standard (2 Weeks)
 RUSH
 Rush charges authorized by _____

SAMPLE DISPOSAL
 Dispose after 30 days
 Return samples
 Will call with instructions

SAMPLERS (signature) S.G. Whittaker

PROJECT NAME/NO. PERC sampling PO# _____

REMARKS _____

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED						Notes
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HPS	
SU050915-01-0001		5/8/15		PERC waste	1							Fish bioassay

Friedman & Bruya, Inc.
 3012 16th Avenue West
 Seattle, WA 98119-2029
 Ph (206) 285-8282
 Fax (206) 283-5044

FORMS\COC\COC.DOC

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
<u>S.G. Whittaker</u>	Steve Whittaker	PHSKC	5/28/15	9:07
<u>J. Bulge</u>	Lori Belanger	KCEL	5/28/15	9:07
Relinquished by: _____				
Received by: _____				
Relinquished by: _____				
Received by: _____				

Reference Toxicant Test:

Bench Sheets

Precision Table

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7538
Test Date: 6-1-15

ORGANISMS

700 fish received from Trout Lodge Lot # (Swim-up date): 5-1-15 Shipped via pick up Arrived at KCEL at 1355 h on 5-26-15 in 1 box double plastic Bag dead removed. At Arrival: pH -, D.O. >20 mg/L, Temp 12.2 °C. Into Tank # 126 Hold in tank with new well water and aeration for 6 days. Feed 2X/day with 2 cycles starter #1. Refer to culture log for feeding & holding information.

DILUTION WATER/TOXICANT

- New Well Water (NWW) 5-31-15, filtered through nylon netting.
- Cd Stock Soln: Nominal 20 mg Cd/L, Measured 20.3 mg/L on 12-20-12 Prep 12-5-12
- by add - g Cd(NO₃)₂·4H₂O (mfr Baker) # 1-1226, rec'd
-, opened -, lot # 099130 ⊆ IL DW.
LIMS RTA Sample #: 139996-1 Wkqp #: 139996

SOLUTIONS					
Cd Trtmt (µg/L)	Code	Cd Stock (mL/jar)	NWW (L/jar)	Sample #	Cd (µg/L) (Measured)
0	Blue	0 (NWW only)	6L (NWW only)		
0.75	Green	0.22	⊆ 6L		
1.5	Yellow	0.44	↓		
3.0	Orange	0.89	↓	* L62956-1	2.93
6.0	Red	1.77	↓		
12.0	White	3.55	↓		

PROCEDURE

- Add 6 L NWW to each of 2 jars/trtmt; place in 12°C EC # 8.556, East & West shelf. Bring to 12°C. Setup at - h.
- Measure DO; if DO << saturation, aerate until DO ≥ 9 mg/L. Stop aeration.
- Measure Temp, pH & DO. in all trtmts.
- Add Cd stock soln to jars: Mix: Sample for Cd: sample at 48h Acidify: Analyst: COY
- Add 10 fish/jar, one at a time to randomize, using dip net. Start count verified by GY & -.
- Start test at 0830 h on 6-1-15. Place Tidbit temp recorder (SN 9716078, East shelf; SN 10468448, West shelf) in beaker w/WW into EC.
- Remove dead fish daily; record #/ weight/ length/ time dead. Record survival daily. Measure Temp, pH & DO daily in all trtmts.
- Renew solns (≈ 80%) at 48h:
 - Siphon 4.8 L from each jar.
 - Filter NWW into 4L graduated cylinder.
 - Add Cd stock soln ⊆ 4L aliquot during filling as below:

Cd (µg/L):	0	0.75	1.5	3	6	12
mL Cd Stock:	0	0.15	0.30	0.59	1.18	2.36

- Replace ⊆ 6 L/jar with fresh soln by pouring through funnel and tubing into jar.
9. End test at 2910 h on 6-5-15. Measure Temp, pH and DO in all trtmts.

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7538
Test Date: 6-1-15

MEASUREMENTS

Code	Cumulative Survival (#Alive/Rep)						Tot # Alive
	Cd (µg/L)	Rep	24 h	48 h	72 h	96 h	
Blue	0	A	10	10	10	10	10
	0	B	10	10	10	10	10
Green	0.75	A	10	10	10	10	10
	0.75	B	10	10	10	10	10
Yellow	1.5	A	10	10	10	10	10
	1.5	B	10	10	10	10	10
Orange	3	A	8	7	5	5	5
	3	B	10	5	4	2	2
Red	6	A	3	0	0	0	0
	6	B	3	0	0	0	0
White	12	A	1	0	0	0	0
	12	B	1	0	0	0	0
Analyst:			Gy	Gy	Gy	Gy	

s = stressed

Code	Rep	Daily #Dead/Rep										Mean	
		1	2	3	4	5	6	7	8	9	10		
White	A	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	1300	1300	0730	
		cm	3.2	3.0	3.2	3.3	3.2	3.2	3.2	3.0	3.1	3.1	3.15
		g	0.461	0.369	0.458	0.440	0.382	0.388	0.446	0.422	0.377	0.312	0.403
White	B	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	1300	1300	0730	
Red	A	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	6-3	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	0730	0730	0730	
Red	B	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	6-3	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	0730	0730	0730	
Orange	A	Date	6-2	6-2	6-3	6-4	6-4						
		Time	1300	1300	0730	1040	1040						
Orange	B	Date	6-3	6-3	6-3	6-3	6-3	6-4	6-5	6-5			
		Time	0730	0730	0730	0730	0730	1040	0900	0900			
		Date											
		Time											
		Date											
		Time											
		Date											
		Time											

Load Rate = [(Wt)(# Fish)] / Vol = (0.403 g)(10) / 6 L = 0.67 g/L

Where: Wt = Mean Wt in g; Vol = Total Test Vol in L; # Fish = #Fish/Rep

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7538
Test Date: 6-1-15

Chemistry

150104270

Code	Rep	Temp (°C) SN:					pH					D.O. (mg/L)				
		0h	24h	48h	72h	96h	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h
Blue	A	11.7	11.8	11.9	12.0	11.7	8.016	7.650	7.714	7.660	7.596	9.8	8.6	8.8	8.6	8.3
	B	11.9	12.0	11.9	12.0	11.8	8.083	7.700	7.752	7.759	7.674	10.0	8.5	9.0	8.6	8.4
Grn	A	11.9	11.9	11.9	12.0	11.8	8.102	7.704	7.781	7.736	7.651	10.1	8.4	8.8	8.5	8.1
	B	12.0	12.0	11.9	12.2	11.9	8.100	7.738	7.809	7.794	7.715	10.1	8.7	9.1	8.8	8.4
Yell	A	11.9	11.8	11.8	11.8	11.7	8.104	7.789	7.881	7.781	7.718	10.1	8.7	8.8	8.7	8.4
	B	12.0	12.1	11.9	12.2	11.8	8.106	7.735	7.788	7.736	7.717	10.1	8.8	8.9	8.4	8.1
Orng	A	11.8	11.8	11.7	11.8	11.7	8.116	7.703	7.823	7.839	7.826	10.1	8.4	9.0	9.2	9.3
	B	11.7	11.8	11.7	11.9	11.7	8.115	7.750	7.822	7.886	7.879	10.1	8.7	9.0	9.4	9.4
Red	A	11.5	11.7	11.5	-	-	8.125	7.742	7.929	-	-	10.1	8.8	9.6	-	-
	B	11.9	11.9	11.9	-	-	8.128	7.779	7.912	-	-	10.1	8.8	9.6	-	-
Wht	A	11.9	11.9	11.8	-	-	8.118	7.753	7.931	-	-	10.1	8.9	9.8	-	-
	B	12.1	12.0	12.0	-	-	8.110	7.779	7.930	-	-	10.1	8.9	9.6	-	-
Analyst:		Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy

Random # Beaker Position					
Code	Rep	Random Jar #	Code	Rep	Random Jar #
Blue	A	3	Orange	A	10
	B	11		B	7
Green	A	8	Red	A	6
	B	2		B	9
Yellow	A	1	White	A	12
	B	4		B	5

NOTES

wg139996 7538

CETIS Analytical Report

Report Date: 24 Jun-15 08:20 (p 1 of 2)
 Test Code: 7538RTAQC|21-3096-6125

Fish 96-h Acute Survival Test

King County Metro Services, WQ Lab

Analysis ID: 19-7586-6520	Endpoint: 96h Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 24 Jun-15 8:18	Analysis: Untrimmed Spearman-Kärber	Official Results: Yes
Batch ID: 00-5147-3809	Test Type: Survival (96h)	Analyst: GY
Start Date: 01 Jun-15 08:30	Protocol: EPA/821/R-02-012 (2002)	Diluent: Well Water
Ending Date: 05 Jun-15 09:10	Species: Oncorhynchus mykiss	Brine: Not Applicable
Duration: 4d 1h	Source: Trout Lodge Fish Farm	Age: 31d
Sample ID: 05-4172-3026	Code: WG139996-1	Client: Internal Lab
Sample Date: 01 Jun-15 08:00	Material: Cadmium nitrate	Project: Reference Toxicant
Receive Date:	Source: Reference Toxicant	
Sample Age: 30m	Station:	

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	0.00%	0.432	0.03211	2.704	2.332	3.135

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

96h Survival Rate Summary

C-µg/L	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	2	1	1	1	0	0	0.0%	0.0%	20	20
0.75		2	1	1	1	0	0	0.0%	0.0%	20	20
1.5		2	1	1	1	0	0	0.0%	0.0%	20	20
3		2	0.35	0.2	0.5	0.15	0.2121	60.61%	65.0%	7	20
6		2	0	0	0	0	0		100.0%	0	20
12		2	0	0	0	0	0		100.0%	0	20

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
0.75		1	1
1.5		1	1
3		0.5	0.2
6		0	0
12		0	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	10/10	10/10
0.75		10/10	10/10
1.5		10/10	10/10
3		5/10	2/10
6		0/10	0/10
12		0/10	0/10

Checked
 QA: 6-24-15
 Jm

CETIS Analytical Report

Report Date: 24 Jun-15 08:20 (p 2 of 2)
Test Code: 7538RTAQC | 21-3096-6125

Fish 96-h Acute Survival Test

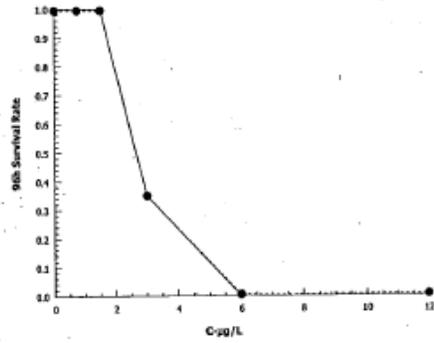
King County Metro Services, WQ Lab

Analysis ID: 19-7586-6520
Analyzed: 24 Jun-15 8:18

Endpoint: 96h Survival Rate
Analysis: Untrimmed Spearman-Kärber

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Summary Report

Report Date: 24 Jun-15 08:20 (p 1 of 1)
 Test Code: 7538RTAQC | 21-3096-6125

Fish 96-h Acute Survival Test

King County Metro Services, WQ Lab

Batch ID: 00-5147-3809	Test Type: Survival (96h)	Analyst: GY
Start Date: 01 Jun-15 08:30	Protocol: EPA/821/R-02-012 (2002)	Diluent: Well Water
Ending Date: 05 Jun-15 09:10	Species: Oncorhynchus mykiss	Brine: Not Applicable
Duration: 4d 1h	Source: Trout Lodge Fish Farm	Age: 31d
Sample ID: 05-4172-3026	Code: WG139996-1	Client: Internal Lab
Sample Date: 01 Jun-15 08:00	Material: Cadmium nitrate	Project: Reference Toxicant
Receive Date:	Source: Reference Toxicant	
Sample Age: 30m	Station:	

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
19-7586-6520	96h Survival Rate	EC50	2.704	2.332	3.135		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
19-7586-6520	96h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

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	2	1	1	1	1	1	0	0	0.0%	0.0%
0.75		2	1	1	1	1	1	0	0	0.0%	0.0%
1.5		2	1	1	1	1	1	0	0	0.0%	0.0%
3		2	0.35	0	1	0.2	0.5	0.15	0.2121	60.61%	65.0%
6		2	0	0	0	0	0	0	0		100.0%
12		2	0	0	0	0	0	0	0		100.0%

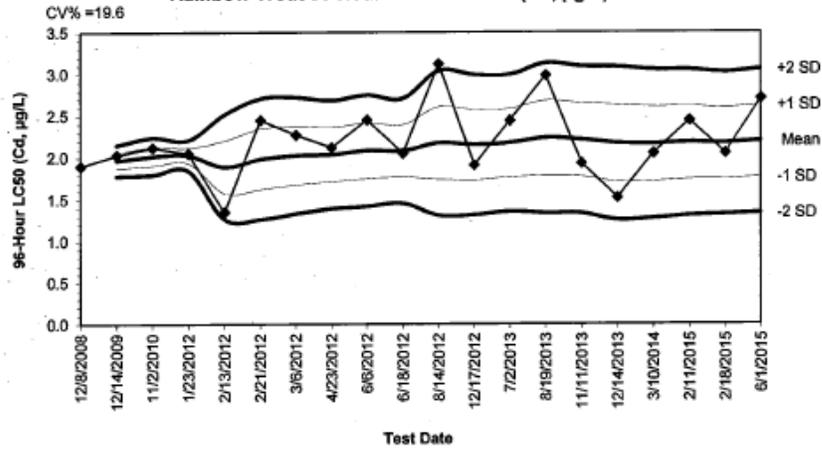
96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
0.75		1	1
1.5		1	1
3		0.5	0.2
6		0	0
12		0	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	10/10	10/10
0.75		10/10	10/10
1.5		10/10	10/10
3		5/10	2/10
6		0/10	0/10
12		0/10	0/10

**Control Chart for Acute Reference Toxicant Tests with
Rainbow Trout 96-Hour Survival LC50 (Cd, µg/L)**



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
12/8/2008	1.90					
12/14/2009	2.03	1.9650	1.8731	1.7812	2.0569	2.1488
11/2/2010	2.12	2.0167	1.9061	1.7955	2.1273	2.2379
1/23/2012	2.05	2.0250	1.9332	1.8413	2.1168	2.2087
2/13/2012	1.35	1.8900	1.5778	1.2657	2.2022	2.5143
2/21/2012	2.45	1.9833	1.6225	1.2616	2.3442	2.7051
3/6/2012	2.27	2.0243	1.6775	1.3307	2.3711	2.7179
4/23/2012	2.12	2.0363	1.7134	1.3906	2.3591	2.6819
6/6/2012	2.45	2.0822	1.7502	1.4182	2.4142	2.7462
6/18/2012	2.05	2.0790	1.7658	1.4527	2.3922	2.7053
8/14/2012	3.12	2.1736	1.7414	1.3093	2.6058	3.0380
12/17/2012	1.91	2.1517	1.7326	1.3136	2.5707	2.9898
7/2/2013	2.44	2.1738	1.7648	1.3557	2.5829	2.9920
8/19/2013	2.98	2.2314	1.7832	1.3350	2.6797	3.1279
11/11/2013	1.93	2.2113	1.7725	1.3336	2.6502	3.0891
12/14/2013	1.52	2.1681	1.7103	1.2524	2.6260	3.0839
3/10/2014	2.05	2.1612	1.7169	1.2727	2.6054	3.0497
2/11/2015	2.44	2.1767	1.7407	1.3047	2.6128	3.0486
2/18/2015	2.05	2.1700	1.7453	1.3206	2.5947	3.0194
6/1/2015	2.70	2.1965	1.7665	1.3365	2.6265	3.0565

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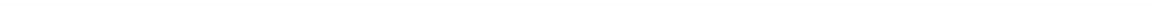
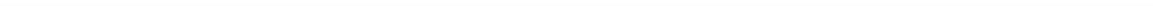
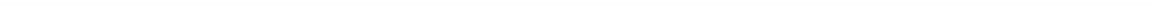


Exhibit D:

Fish Bioassay Results for Shop 03



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August 7, 2015

Steve Whittaker
Local Hazardous Waste Management Program
CNK-PH-1100
401 Fifth Avenue, Suite 1100
Seattle, WA 98101-1818

Dear Steve:

Attached is a report on the toxicity test (Method DOE 80-12) initiated on 6-22-15 on Dry Cleaning Sample SB061315_03_SB(m).

Detailed findings are in the Results section of the attached report. The table below shows a summary of the test results. Sample SB061315_03_SB(m) had 100% mortality in the 100 mg/L test concentration and 100% survival in the 10 mg/L test concentration. Hence, this sample designates as a "Hazardous Waste" according to DOE 80-12 criteria.

Rainbow Trout

Sample	Sample Concentration mg/L	Percent Survival %	Designation	Designation (Yes/No)
SB061315_03_SB(m)	10	100	Extremely Hazardous Waste	No
	100	0	Dangerous Waste	Yes

If you would like additional information, please call Francis Sweeney at 477-7117.

Sincerely,



Gary Yoshida
King County Environmental Laboratory

**REPORT ON
TOXICITY TESTS FOR THE
DESIGNATION OF DANGEROUS WASTE
(METHOD DOE 80-12)
CONDUCTED ON DRY CLEANING WASTE SAMPLES**

**KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS
WATER AND LAND RESOURCES DIVISION
ENVIRONMENTAL LABORATORY SECTION
322 WEST EWING STREET
SEATTLE, WASHINGTON 98119**

**Test Date: June 22, 2015
KCEL Test Numbers: #7576 (*Oncorhynchus mykiss*: DOE 80-12, 96-Hour Acute Test)
Report Date: August 7, 2015**

SAMPLE

Sample SB061315_03_SB(m) was received by the King County Environmental Laboratory (KCEL), Aquatic Toxicology Section on 6-15-15. The sample was collected on 6-13-15 and was delivered in a 250 mL wide mouth glass jar and refrigerated in the dark at $4 \pm 2.0^\circ\text{C}$ until test initiation.

CONTROL WATER

The control water for the test with rainbow trout is freshwater obtained from a 95-ft. deep well located at the KCEL. Stock cultures of trout are cultured in a flow-through system of well water (WW).

The WW is analyzed for metals monthly (last analyzed 5-15) and organics are measured annually (last analyzed on 3-15). Hardness, alkalinity, conductivity and pH are measured at the beginning of each test.

Physical-chemical characteristics of the WW are listed in the following table:

Parameter	Value	Units
Conductivity	262	$\mu\text{mhos/cm}$
pH	8.01	
Total Hardness (calc.)	107	mg/L as CaCO_3
Total Alkalinity	80	mg/L as CaCO_3
Total Cd	< 2	$\mu\text{g/L}$
Total Cr	< 3	$\mu\text{g/L}$
Total Cu	< 4	$\mu\text{g/L}$
Total Ni	< 5	$\mu\text{g/L}$
Total Pb	< 20	$\mu\text{g/L}$
Total Zn	< 5	$\mu\text{g/L}$
Total Mercury	< 0.05	$\mu\text{g/L}$ (measured 2-2015)
Volatile Organics	45 cmpds not detectable	
Organic Analysis (BNA'S):	69 cmpds not detectable	
Bis(2-Ethylhexyl)Phthalate	0.49	$\mu\text{g/L}$
Pesticides & PCB's:	28 cmpds not detected	

METHODS

The acute toxicity test #7576 was conducted as outlined in Washington State Department of Ecology, Publication 80-12, Part A: Static Acute Fish Toxicity Test Protocol (Revised June 2009). The test was conducted at 10 mg/L and 100 mg/L to determine if the sample designates as "Extremely Hazardous Waste" or "Dangerous Waste", respectively.

Test Organisms

Swim-up (swim-up on 5-1-15) rainbow trout (*Oncorhynchus mykiss*) were purchased from Trout Lodge located in Sumner, Washington on 5-26-15. The trout were acclimated for a period of 27 days in well water with a mean temperature of 13.6°C , a minimum of 13.5°C and a maximum of 13.8°C in a flow-through

system at KCEL. During acclimation the fish were fed Ziegler's Salmon Starter twice daily. Feed was withheld 48 hours prior to the start of the test.

Physical data (based on a randomly chosen control jar at the end of the test) on trout used in the tests is shown in the table below.

Test #	Age (days-post swim-up at start of test)	Mean Standard Length (cm)	Mean Weight (grams)	Loading Wt./Vol. (g/L)
7576	52	3.8	0.68	0.68

As indicated in the table the mean weight of the trout used in the test was 0.68 g with a mean standard length of 3.8 cm. The loading in each test jar was 0.68 g/L.

Extraction

Three aliquots of 0.10 g (test concentration 10 mg/L) and three aliquots of 1.0 g (test concentration 100 mg/L) of the sample were weighed and each placed into a 1L, wide-mouth glass extraction jar (total 6 jars). 200 mL of well water (diluted 20% with DI water) was added to each jar. The jars were then closed with a teflon lined cap and extracted on a rotary agitator for 17.5 hours.

Rainbow Trout – 96-Hour Static Acute Toxicity Tests

The test jars were 5-gal, glass wide mouth jars with inside measurements of 40 cm (height) and 25 cm (dia.). The liquid level at a volume of 10 L was 19.5 cm. The jar opening was partially covered during the test.

Well water (diluted 20% with DI water to keep the hardness below 100 mg/L) was measured (9.6 L for test and control jars) into each replicate. The solutions were maintained at $12 \pm 1.0^\circ\text{C}$ in an environmental chamber (Hotpack Model 08082, s/n 79719). The D.O. at the start of the test (9.6 - 9.7 mg/L) was > 80% saturation (>8.6 mg/L).

The extracted sample was added to the test jars followed by a 200 mL WW (diluted 20% with DI) rinse of the extraction jar bringing the total volume in the test chambers to 10 L. The extraction jar (laid on its side) and teflon liner were placed on the bottom of the test chamber. Ten rainbow trout were placed randomly into each test jar.

Mortality was monitored during the test and recorded at 24, 48, 72, and 96 hours. Dissolved oxygen, temperature and pH were recorded in each test and control jar at 0, 24, 48, 72 and 96 hours. The photoperiod was 16h L:8h D. The test was initiated at 0900 h on 6-22-15 and ended at 0915 h on 6-26-15.

Quality Assurance

The reference toxicant testing for the lot of fish used in this test was conducted on 6-1-15 (Test #7538). Cadmium nitrate was used as a reference toxicant for rainbow trout. The precision table located at the end of this report is maintained to monitor the sensitivity of these organisms to the reference toxicant and thereby provide an indication of their overall sensitivity to other compounds. The LC50 for the reference toxicant test (#7538) was 2.70 $\mu\text{g Cd/L}$ which is within the control limits (mean \pm 2 SD) of 1.3 - 3.1 $\mu\text{g/L Cd}$.

Temperature, pH and dissolved oxygen measurements remained within acceptable limits (USEPA, 2002) throughout the reference toxicant test for rainbow trout (#7538) and sample test (#7576). The test met acceptability criteria regarding control survival ($\geq 90\%$).

Physical-chemical methods are outlined in the table below:

Parameter	Method
Water Quality Tests	APHA (1992); US EPA (1991).
Temperature	Standard Mercury Thermometer (calibrated with a certified thermometer traceable to NBS records) and Onset, Tidbit (v2) UTBI-001 Temperature Logger (KCEL #436v1).
Dissolved Oxygen	YSI membrane electrode method (Method #4500-0 G; KCEL #434).
pH	Beckman 690 meter with automatic temperature compensation and Ross combination electrode (Method #4500-H; APHA 1992; KCEL #433).
Total Alkalinity	Potentiometric Method (Method #2320 B; KCEL #319v4).
Total Hardness	By calculation (Method #2340 B; KCEL #612v4).
Conductivity	Orion Model #122 Meter with 012210 conductivity cell (Method 2510B; KCEL #435).
Pesticides and PCB's	Continuous liquid extraction method (EPA Method #608; KCEL #733).
Organic Analysis	Continuous liquid extraction method for BNA's (EPA Method #625; KCEL #731).
Volatile Organics	Purge and trap method (EPA Method #624; KCEL #732).
Total Metals	ICP for Cd, Cr, Cu, Ni, Pb and Zn (EPA Method #200.7; KCEL #612v4); for Hg analysis (KCEL #604v5, 601v4, 605v0).

RESULTS

Rainbow trout

The following table contains survival percentages at 24-hour intervals during the 96-hour test in which rainbow trout were exposed to dilution water (controls) or to 10 and 100 mg/L sample concentrations.

	Sample mg/L	Percentage Survival (%)				Number Dead	Number of Fish Tested
		24 h	48 h	72 h	96 h		
WW (control)	0	100	100	100	100	0	30
SB061315_03_SB(m)	10	100	100	100	100	0	30
	100	0*	0	0	0	30	30

* All dead within 90 minutes of test initiation

Sample

As the table above shows for sample SB061315_03_SB(m) there was 100% mortality (all dead within 90 minutes of test initiation) in the 100 mg/L test concentration. There was 100% survival in the 10 mg/L test concentration. Hence, this sample designates as a "Hazardous Waste" according to DOE 80-12 criteria.

WATER QUALITY

The following table contains measurements of temperature, pH and dissolved oxygen taken throughout the 96 hour test. Measurement of Total Hardness, Total Alkalinity and Conductivity are taken from samples collected at the beginning (0-h) and end (96-h) of the test.

Parameter	Sample:	Control	SB061315_03_SB(m)	
		0 mg/L	10 mg/L	100 mg/L
Temperature (°C)	Mean	11.9	12.2	12.4
	Min.	11.8	12.1	12.3**
	Max.	12.2	12.5	12.5**
pH	Mean	7.64	7.64	7.99
	Min.	7.51	7.49	7.97**
	Max.	7.97	8.02	8.00**
D.O. (mg/L)	Mean	8.3	8.0	9.7
	Min.	7.6	7.3	9.7**
	Max.	10.0	9.8	9.7**
Tot. Hard (mg/L as CaCO ₃)	0h	88	87	89
	96h	82	82	*
Tot. Alk (mg/L as CaCO ₃)	0h	66	66	66
	96h	68	68	*
Cond (µmhos/cm)	0h	217	218	219
	96h	221	224	*

* Not taken since all dead within 1.5 hour of test initiation

** Based on 0 hour readings only

Additional water quality and QC data are listed on the attached photocopied pages from the laboratory notebook.

TESTED BY:
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322 West Ewing Street
Seattle WA 98119

REFERENCES

APHA. 1992. Standard Methods for the Examination of Water and Wastewater, 18th Edition. American Public Health Association, American Waterworks Association, Water Pollution Control Association. Washington D.C.

U.S. E.P.A. 1991. Code of Federal Regulations, 40CFR, Appendix A, July 1991. U.S. Environmental Protection Agency, Office of Federal Registry, Washington, D.C.

Washington State Department of Ecology. Biological Testing Methods for the designation of Dangerous Waste. DOE 80-12, revised June 2009.

US EPA. 2002. Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms. 5th edition. EPA-821-02-012, October 2002. US Environmental Protection Agency, Office of Water (4303T), Washington, DC.

DOE 80-12 Toxicity Test:

Bench Sheets

Chain of Custody

DOE 80-12 Hazardous Waste Test, Project # _____
 Rainbow Trout 96-Hour Static Acute Test

Test #: 7576
 Test Date: 6-22-15

ORGANISMS

²⁰⁰ fish received from Trout Lodge Lot # (Swim-up date): 5-1-15 Shipped via
 Pickup Arrived at KCEL at 1355 h on 5-26-15 in 1 Box double poly
 dead removed. At Arrival: pH —, D.O. > 20 mg/L, Temp 12.2 °C. Into
 Tank # 1 Hold in tank with new well water and aeration for _____ days. Feed 2X/day with
Ziegler's starter #1. Refer to culture log for feeding & holding information.

DILUTION WATER/SAMPLE

1. New Well Water (NWW) 6-21-15, filtered through nylon netting. Hardness must be between 80-100
 mg/L. At start TH ≈ 109 mg/L. Dilute 20% w/ MilliQ DI.
 Want D.O. @ 90-100% saturation (9.8-10.7 mg/L) before add sample. Aerate with O₂.

2. Hazardous waste samples from Dry Cleaners
 LIMS RBT80-12 Sample #: _____ Wksp #: _____ not going to LIMS

	Sample 1	Sample 2
Sample #:	<u>SB061315-03-SB(m)</u>	
Sample Site:		
Collect Date:	<u>6-15-15</u> to <u>—</u>	to
Collect Time:	h to h	h to h
Collected by:	<u>Steve Whittaker</u>	
Delv'd to KCEL:	<u>1045</u> h on <u>6-15-15</u>	h on
By:	<u>Steve Whittaker</u>	
Rec'd by:	<u>JK</u>	
Sample Container:	<u>1 - 250ml wide-mouth</u>	
Sample Volume:	<u>≈ 200ml</u>	
Sample Description:	<u>liquid Brown mix</u> <u>Smell's like oil Resol Parrot</u>	
pH (at arrival):	<u>—</u>	
DO (mg/L) (at arrival):	<u>—</u>	
Temp (°C) (at arrival):	<u>—</u>	
Storage:	In dark at 4 ± 2°C	In dark at 4 ± 2°C

PROCEDURE

1) **Sample Extraction (Rotary Agitation)**

- Cut, crush or break solid samples into approx. 1-1.7 cm pieces. Used: _____
- Use sample and NWW volumes in table below:
 - For 10 ppm: weigh 0.10 g of sample into each of ³ 1L blue cap wide mouth bottles (Reps A-C for fish plus 1 for WQ).
 - For 100 ppm: weigh 1.0 g of sample into each of ³ 1L blue cap wide mouth bottles (Reps A-C for fish plus 1 for WQ).
- Add 200 mL of NWW to each bottle and cap with lid and teflon liner (avoid caps with adhesive on liner).
- Mix samples on rotary agitator for 18 ± 2 h at 23 ± 2°C:
- Start extraction at 140 h on 6-21-15
- End extraction at 0735 h on 6-22-15.

DOE 80-12 Hazardous Waste Test, Project # _____
 Rainbow Trout 96-Hour Static Acute Test

Test #: 7576
 Test Date: 6-22-15

Treatment	Sample Conc (mg/L)	Code	Rep	Random #	NWW (L) Final Vol.	Sample (g)
Control	0	Blue	A	6	10	0
			B	9	10	0
			C	7	10	0
Sample 1	10	Green	A	4	10	0.1
			B	1	10	"
			C	3	10	"
Sample 1	100	Yellow	A	2	10	1.0
			B	5	10	"
			C	8	10	"
Sample 2	10	Orange	A			
			B			
			C			
Sample 2	100	Red	A			
			B			
			C			

2) Test Jars

- Fill test jars with 9.6 L of NWW and place randomly into EC # 8556, East & West shelf.
- Measure D.O. 9.6-9.7 mg/L at 12°C. Aerate if < 80% saturation (8.6 mg/L).
 Aerate w/ O₂ @ L/min for sec per jar.

AERATION	Before Aeration	Aeration		After Aeration
	D.O. (mg/L)	Start Date/Time	End Date/Time	D.O. (mg/L)
Before Add Sample:		/	/	

3) Extraction bottles:

- Rinse outside of extraction bottle with DW
 - Pour contents into assigned jar
 - Rinse extraction bottle with 200 mL NWW and pour into test jar, bringing total volume to 10 L.
- 4) Place extraction bottle into test jar on its side, remove liner and place at bottom of test jar (prevent from floating). Setup at h.
- 5) Take 0h sample for pH, DO, Temp, Tot. Alk, Tot. Hard, Cond.
- 6) Add 10 fish per jar, one at a time to randomize, using dip net.
- 7) Counts verified by GJ & . *Count see in yellow too turbid*
- 8) Start test at 0900 h on 6-22-15. Place Tidbit temp recorder (SN 9716078, EGJ shelf; SN 10468448, West shelf) in jar w/water into EC.
- 9) Measure pH, DO, Temp, cumulative survival and mortality (# Dead) daily in all reps/trtmt.
- 10) End test at 0915 h on 6-26-15 by .
- 11) Take 96h samples for pH, DO, Temp, Tot Alk, Tot Hard, Cond.

DOE 80-12 Hazardous Waste Test, Project # _____
 Rainbow Trout 96-Hour Static Acute Test

Test #: 7576
 Test Date: 6-22-15

Chemistry

Treatment	Sample Conc (mg/L)	Code	Rep	pH					D. O. (mg/L)				
				0 h	24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h
Control	0	Blue	A	7.980	7.613 7.524	7.520	7.507	7.522	9.7	9.2	7.6	7.6	7.6
			B	7.962	7.631	7.519	7.549	7.538	9.9	9.3	8.0	7.9	7.8
			C	7.973	7.626	7.553	7.616	7.543	10.0	9.3	8.1	8.1	7.9
Sample 1	10	Green	A	8.003	7.589	7.503	7.576	7.601	9.7	7.9	7.6	7.8	8.0
			B	8.013	7.590	7.490	7.521	7.521	9.7	7.8	7.3	7.3	7.4
			C	8.016	7.582	7.495	7.540	7.508	9.8	7.6	7.4	7.3	7.3
Sample 1	100	Yellow	A	7.995	-	-	-	-	9.7	-	-	-	-
			B	7.989	-	-	-	-	9.7	-	-	-	-
			C	7.974	-	-	-	-	9.7	-	-	-	-
Sample 2	10	Orange	A										
			B										
			C										
Sample 2	100	Red	A										
			B										
			C										
Analyst:				GY	GY	GY	GY	GY	GY	GY	GY	GY	GY

Code	Trtmt	Sample Conc (mg/L)	Sample #		T. Alkalinity (mg/L as CaCO ₃)		T. Hardness (mg/L as CaCO ₃)		Conductivity (µmhos/cm)		
			0 h	96 h	0 h	96 h	0 h	96 h	0 h	96 h	
Blue	Control	0	63073-1	-4	66.1	67.6	87.6	81.6	217	221	
Green	Sample 1	10	-2	-5	66	68	87.2	82.4	218	224	
Yellow	Sample 1	100	-3	-6	66	omit	88.8	omit	219	omit	
Orange	Sample 2	10									
Red	Sample 2	100									
Analyst:										GY	GY

DOE 80-12 Hazardous Waste Test, Project # _____
 Rainbow Trout 96-Hour Static Acute Test

Test #: 7576
 Test Date: 6-22-15

Treatment	Sample Conc (mg/L)	Code	Rep	Temperature °C (SN 150104270)				
				0 h	24 h	48 h	72 h	96 h
Control	0	Blue	A	12.2	11.8	11.8	11.8	11.9
			B	12.2	11.9	11.9	11.8	11.9
			C	12.2	11.8	11.8	11.8	11.8
Sample 1	10	Green	A	12.5	12.1	12.1	12.1	12.1
			B	12.4	12.3	12.1	12.1	12.2
			C	12.4	12.2	12.2	12.2	12.2
Sample 1	100	Yellow	A	12.5	-	-	-	-
			B	12.4	-	-	-	-
			C	12.3	-	-	-	-
Sample 2	10	Orange	A					
			B					
			C					
Sample 2	100	Red	A					
			B					
			C					
Analyst:				Gy	Gy	Gy	Gy	Gy

Test Organism Data at 96 Hours			
Sampled From: <u>Control</u> Rep. <u>A</u>			
Fish	Length (cm)	Weight (g)	
1	3.8	0.642	
2	3.6	0.554	
3	4.0	0.768	
4	4.0	0.772	
5	3.8	0.707	
6	3.7	0.673	
7	3.7	0.650	
8	4.0	0.771	
9	3.8	0.634	
10	3.6	0.606	
Mean:	3.8	0.678	Load Rate:
Load Rate = [(Wt)(# Fish)] / Vol Where: Wt = Mean Wt in g Vol = Total Test Vol in L # Fish = # Fish/Rep			$\frac{(0.678 \text{ g})(10)}{10 \text{ L}} = 0.678 \text{ g/L}$

Green A, B, C west shelf
 Blue A, B, C yellow C east shelf
 Day 0: within minutes of fish being placed in test chamber (yellow) fish losing equilibrium.
 0945 - nearly all dead.
 1030. all dead.
 86h All fish look normal in Green.

NOTES

Reference Toxicant Test:

**Bench Sheets
and
Precision Table**

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7538
Test Date: 6-1-15

ORGANISMS

700 fish received from Treat Lodge Lot # (Swim-up date): 5-1-15 Shipped via
pick up Arrived at KCEL at 1355 h on 5-26-15 in 1 box double plastic bag
dead removed. At Arrival: pH -, D.O. >20 mg/L, Temp 12.2 °C. Into
Tank # 129 Hold in tank with new well water and aeration for 6 days. Feed 2X/day with
Eyeglass Starter #1. Refer to culture log for feeding & holding information.

DILUTION WATER/TOXICANT

- New Well Water (NWW) 5-31-15, filtered through nylon netting.
- Cd Stock Soln: Nominal 20 mg Cd/L, Measured 20.3 mg/L on 12-20-12 Prep 12-5-12
- by add - g Cd(NO₃)₂•4H₂O (mfr Baker # 1-1226, rec'd
-, opened -, lot # 049/30) ± 1L DW.
LIMS RTA Sample #: 139976-1 Wkgrp #: 139986

SOLUTIONS					
Cd Trtmt (µg/L)	Code	Cd Stock (mL/jar)	NWW (L/jar)	Sample #	Cd (µg/L) (Measured)
0	Blue	0 (NWW only)	6 L (NWW only)		
0.75	Green	0.22	± 6L		
1.5	Yellow	0.44	↓		
3.0	Orange	0.89	↓	# <u>L62956-1</u>	<u>2.43</u>
6.0	Red	1.77	↓		
12.0	White	3.55	↓		

PROCEDURE

- Add 6 L NWW to each of 2 jars/trtmt; place in 12°C EC # 8556, East & West shelf. Bring to 12°C. Setup at - h.
- Measure DO; if DO << saturation, aerate until DO ≥ 9 mg/L. Stop aeration.
- Measure Temp, pH & DO. in all trtmts.
- Add Cd stock soln to jars: Mix: Sample for Cd: sample at 48h Acidify: Analyst: CEY
- Add 10 fish/jar, one at a time to randomize, using dip net. Start count verified by GY & -.
- Start test at 0830 h on 6-1-15. Place Tidbit temp recorder (SN 9716078, East shelf; SN 10468448, West shelf) in beaker w/WW into EC.
- Remove dead fish daily; record #/ weight/ length/ time dead. Record survival daily. Measure Temp, pH & DO daily in all trtmts.
- Renew solns (≈ 80%) at 48h:
 - Siphon 4.5 L from each jar.
 - Filter NWW into 4L graduated cylinder.
 - Add Cd stock soln ± 4L aliquot during filling as below:

Cd (µg/L):	0	0.75	1.5	3	6	12
mL Cd Stock:	0	0.15	0.30	0.59	1.18	2.36

- Replace ± 6 L/jar with fresh soln by pouring through funnel and tubing into jar.
- End test at 0910 h on 6-5-15. Measure Temp, pH and DO in all trtmts.

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7538
Test Date: 6-1-15

MEASUREMENTS

Code	Cumulative Survival (#Alive/Rep)						Tot # Alive
	Cd (µg/L)	Rep	24 h	48 h	72 h	96 h	
Blue	0	A	10	10	10	10	10
	0	B	10	10	10	10	10
Green	0.75	A	10	10	10	10	10
	0.75	B	10	10	10	10	10
Yellow	1.5	A	10	10	10	10	10
	1.5	B	10	10	10	10	10
Orange	3	A	8	7	5	5	5
	3	B	10	5	4	2	2
Red	6	A	3	0	0	0	0
	6	B	3	0	0	0	0
White	12	A	1	0	0	0	0
	12	B	1	0	0	0	0
		Analyst:	Gy	Gy	Gy	Gy	

s = stressed

Code	Rep	Date	Time	Daily #Dead/Rep										Mean	
				1	2	3	4	5	6	7	8	9	10		
white	A	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	0730	
		cm	3.2	3.0	3.2	3.3	3.2	3.2	3.2	3.0	3.1	3.1	3.1	3.15	
		s	0.1461	0.369	0.458	0.440	0.382	0.388	0.1416	0.422	0.379	0.312	0.403		
white	B	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3		
		Time	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	0730		
Red	A	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	6-3	6-3		
		Time	1300	1300	1300	1300	1300	1300	1300	1300	0730	0730	0730		
Red	B	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	6-3	6-3		
		Time	1300	1300	1300	1300	1300	1300	1300	1300	0730	0730	0730		
Orange	A	Date	6-2	6-2	6-3	6-4	6-4								
		Time	1300	1300	0730	1040	1040								
Orange	B	Date	6-3	6-3	6-3	6-3	6-3	6-4	6-5	6-5					
		Time	0730	0730	0730	0730	0730	1040	0900	0900					
		Date													
		Time													
		Date													
		Time													
		Date													
		Time													

Load Rate = [(Wt)(# Fish)] / Vol = (0.403 g)(10) / 6 L = 0.67 g/L

Where: Wt = Mean Wt in g; Vol = Total Test Vol in L; # Fish = #Fish/Rep

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7559
Test Date: 6-1-15

Chemistry

150104270

Code	Rep	Temp (°C) SN:					pH					D.O. (mg/L)				
		0h	24h	48h	72h	96h	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h
Blue	A	11.7	11.8	11.9	12.0	11.7	8.016	7.650	7.714	7.660	7.596	9.9	8.6	8.8	8.6	8.3
	B	11.9	12.0	11.9	12.0	11.8	8.033	7.700	7.752	7.759	7.674	10.0	8.5	9.0	8.6	8.4
Grn	A	11.9	11.9	11.9	12.0	11.8	8.102	7.704	7.781	7.736	7.651	10.1	8.4	8.8	8.5	8.1
	B	12.0	12.0	11.9	12.2	11.9	8.100	7.738	7.809	7.794	7.715	10.1	8.7	9.1	8.8	8.4
Yell	A	11.9	11.8	11.8	11.8	11.7	8.104	7.789	7.881	7.781	7.718	10.1	8.7	8.8	8.7	8.4
	B	12.0	12.1	11.9	12.2	11.8	8.106	7.735	7.788	7.736	7.717	10.1	8.8	8.9	8.4	8.1
Orng	A	11.8	11.8	11.7	11.8	11.7	8.116	7.703	7.823	7.839	7.826	10.1	8.4	9.0	9.2	9.3
	B	11.7	11.8	11.7	11.9	11.7	8.115	7.750	7.822	7.886	7.879	10.1	8.7	9.0	9.4	9.4
Red	A	11.5	11.7	11.5	-	-	8.125	7.742	7.929	-	-	10.1	8.8	9.6	-	-
	B	11.9	11.9	11.9	-	-	8.128	7.779	7.912	-	-	10.1	8.8	9.6	-	-
Wht	A	11.9	11.9	11.8	-	-	8.118	7.753	7.931	-	-	10.1	8.9	9.8	-	-
	B	12.1	12.0	12.0	-	-	8.110	7.779	7.930	-	-	10.1	8.9	9.6	-	-
Analyst:		Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy

Random # Beaker Position					
Code	Rep	Random Jar #	Code	Rep	Random Jar #
Blue	A	3	Orange	A	10
	B	11		B	7
Green	A	8	Red	A	6
	B	2		B	9
Yellow	A	1	White	A	12
	B	4		B	5

NOTES

wg13 9996 7538

CETIS Analytical Report

Report Date: 24 Jun-15 08:20 (p 1 of 2)
 Test Code: 7538RTAQC | 21-3098-6125

Fish 96-h Acute Survival Test

King County Metro Services, WQ Lab

Analysis ID: 19-7586-6520	Endpoint: 96h Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 24 Jun-15 8:18	Analysis: Untrimmed Spearman-Kärber	Official Results: Yes
Batch ID: 00-5147-3809	Test Type: Survival (96h)	Analyst: GY
Start Date: 01 Jun-15 08:30	Protocol: EPA/821/R-02-012 (2002)	Diluent: Well Water
Ending Date: 05 Jun-15 08:10	Species: Oncorhynchus mykiss	Brine: Not Applicable
Duration: 4d 1h	Source: Trout Lodge Fish Farm	Age: 31d
Sample ID: 05-4172-3026	Code: WG139995-1	Client: Internal Lab
Sample Date: 01 Jun-15 08:00	Material: Cadmium nitrate	Project: Reference Toxicant
Receive Date:	Source: Reference Toxicant	
Sample Age: 30m	Station:	

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	0.00%	0.432	0.03211	2.704	2.332	3.135

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

96h Survival Rate Summary

C-µg/L	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	2	1	1	1	0	0	0.0%	0.0%	20	20
0.75		2	1	1	1	0	0	0.0%	0.0%	20	20
1.5		2	1	1	1	0	0	0.0%	0.0%	20	20
3		2	0.35	0.2	0.5	0.15	0.2121	60.61%	65.0%	7	20
6		2	0	0	0	0	0	100.0%	100.0%	0	20
12		2	0	0	0	0	0	100.0%	100.0%	0	20

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
0.75		1	1
1.5		1	1
3		0.5	0.2
6		0	0
12		0	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	10/10	10/10
0.75		10/10	10/10
1.5		10/10	10/10
3		5/10	2/10
6		0/10	0/10
12		0/10	0/10

Checked
 QA: 6-24-15
 Jm

CETIS Analytical Report

Report Date: 24 Jun-15 08:20 (p 2 of 2)
Test Code: 7538RTAQC | 21-3096-6125

Fish 96-h Acute Survival Test

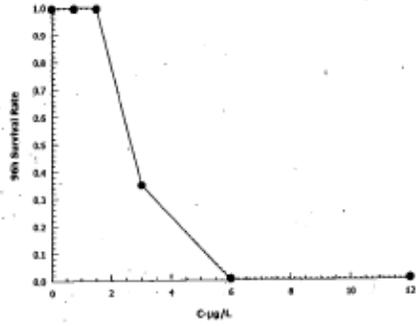
King County Metro Services, WQ Lab

Analysis ID: 19-7586-6520
Analyzed: 24 Jun-15 8:18

Endpoint: 96h Survival Rate
Analysis: Untrimmed Spearman-Kärber

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Summary Report

Report Date: 24 Jun-15 08:20 (p 1 of 1)
 Test Code: 7538RTAQC | 21-3096-6125

Fish 96-h Acute Survival Test

King County Metro Services, WQ Lab

Batch ID: 00-5147-3809	Test Type: Survival (96h)	Analyst: GY
Start Date: 01 Jun-15 08:30	Protocol: EPA/821/R-02-012 (2002)	Diluent: Well Water
Ending Date: 05 Jun-15 09:10	Species: Oncorhynchus mykiss	Brine: Not Applicable
Duration: 4d 1h	Source: Trout Lodge Fish Farm	Age: 31d
Sample ID: 05-4172-3026	Code: WG139986-1	Client: Internal Lab
Sample Date: 01 Jun-15 08:00	Material: Cadmium nitrate	Project: Reference Toxicant
Receive Date:	Source: Reference Toxicant	
Sample Age: 30m	Station:	

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
19-7586-6520	96h Survival Rate	EC50	2.704	2.332	3.135		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
19-7586-6520	96h Survival Rate	Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

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	2	1	1	1	1	1	0	0	0.0%	0.0%
0.75		2	1	1	1	1	1	0	0	0.0%	0.0%
1.5		2	1	1	1	1	1	0	0	0.0%	0.0%
3		2	0.35	0	1	0.2	0.5	0.15	0.2121	60.61%	65.0%
6		2	0	0	0	0	0	0	0		100.0%
12		2	0	0	0	0	0	0	0		100.0%

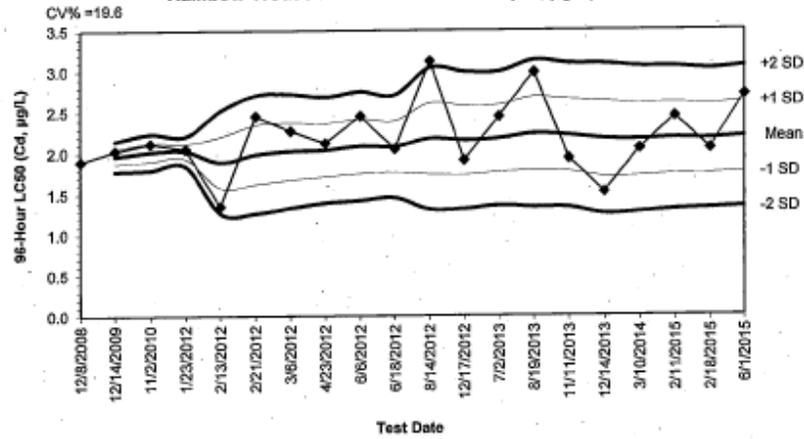
96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
0.75		1	1
1.5		1	1
3		0.5	0.2
6		0	0
12		0	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	10/10	10/10
0.75		10/10	10/10
1.5		10/10	10/10
3		5/10	2/10
6		0/10	0/10
12		0/10	0/10

Control Chart for Acute Reference Toxicant Tests with
Rainbow Trout 96-Hour Survival LC50 (Cd, µg/L)



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
12/8/2008	1.90					
12/14/2009	2.03	1.9650	1.8731	1.7812	2.0569	2.1488
11/2/2010	2.12	2.0167	1.9081	1.7955	2.1273	2.2379
1/23/2012	2.05	2.0250	1.9332	1.8413	2.1168	2.2087
2/13/2012	1.35	1.8900	1.5778	1.2657	2.2022	2.5143
2/21/2012	2.45	1.9833	1.6225	1.2616	2.3442	2.7051
3/6/2012	2.27	2.0243	1.6775	1.3307	2.3711	2.7179
4/23/2012	2.12	2.0363	1.7134	1.3906	2.3591	2.6819
6/6/2012	2.45	2.0822	1.7502	1.4182	2.4142	2.7462
6/18/2012	2.05	2.0790	1.7658	1.4527	2.3922	2.7053
8/14/2012	3.12	2.1736	1.7414	1.3093	2.6058	3.0380
12/17/2012	1.91	2.1517	1.7326	1.3136	2.5707	2.9898
7/2/2013	2.44	2.1738	1.7648	1.3557	2.5829	2.9920
8/19/2013	2.98	2.2314	1.7832	1.3350	2.6797	3.1279
11/11/2013	1.93	2.2113	1.7725	1.3336	2.6502	3.0891
12/14/2013	1.52	2.1681	1.7103	1.2524	2.6260	3.0839
3/10/2014	2.05	2.1612	1.7169	1.2727	2.6054	3.0497
2/11/2015	2.44	2.1767	1.7407	1.3047	2.6126	3.0486
2/18/2015	2.05	2.1700	1.7453	1.3206	2.5947	3.0194
6/1/2015	2.70	2.1965	1.7665	1.3365	2.6265	3.0565

Exhibit E:

Fish Bioassay Results for Shops 01B and 04



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August 14, 2015

Steve Whittaker
Local Hazardous Waste Management Program
CNK-PH-1100
401 Fifth Avenue, Suite 1100
Seattle, WA 98101-1818

Dear Steve:

Attached is a report on the toxicity test (Method DOE 80-12) initiated on 7-2-15. Detailed findings are in the "Results" section of the attached report. The table below shows a summary of the test results.

There was 100% mortality in the dry cleaning waste (perc sludge) sample SW062615_04_SB(m) at the 100 mg/L test concentration and 100% survival at the 10 mg/L test concentration. Hence, this sample designates as a "Dangerous Waste" according to DOE 80-12 criteria.

There was 100% mortality in the dry cleaning waste (perc sludge) sample SW062715_01_SB(m) at the 100 mg/L test concentration and 100% survival at the 10 mg/L test concentration. This sample designates as a "Dangerous Waste" according to DOE 80-12 criteria.

Rainbow Trout

Sample	Sample Concentration mg/L	Percent Survival %	Designation	Designates (Yes/No)
SW062615_04_SB(m)	10	100	Extremely Hazardous Waste	No
	100	0	Dangerous Waste	Yes
SW062715_01_SB(m)	10	100	Extremely Hazardous Waste	No
	100	0	Dangerous Waste	Yes

If you would like additional information, please call Francis Sweeney at 477-7117.

Sincerely,



Gary Yoshida
King County Environmental Laboratory

**REPORT ON
TOXICITY TESTS FOR THE
DESIGNATION OF DANGEROUS WASTE
(METHOD DOE 80-12)
CONDUCTED ON
DRY CLEANING WASTE**

**KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS
WATER AND LAND RESOURCES DIVISION
ENVIRONMENTAL LABORATORY SECTION
322 WEST EWING STREET
SEATTLE, WASHINGTON 98119**

**Test Date: July 2, 2015
KCEL Test Numbers: #7600 (*Oncorhynchus mykiss*: DOE 80-12, 96-Hour Acute Test)
Report Date: August 14, 2015**

SAMPLE

Dry cleaning waste samples SW062615_04_SB(m) collected on 6-26-15 and SW062715_01_SB(m) collected on 6-27-15 were received by the King County Environmental Laboratory (KCEL), Aquatic Toxicology Section on 6-29-15. The samples were delivered in 250 mL glass wide mouth jars and were refrigerated in the dark at $4 \pm 2.0^\circ\text{C}$ until test initiation.

CONTROL WATER

The control water for the test with rainbow trout is freshwater obtained from a 95 ft. deep well located at the KCEL. Stock cultures of trout are held in a flow-through system of well water (WW).

The WW is analyzed for metals (last analyzed 5-15) and organics are measured annually (last analyzed on 3-15). Hardness, alkalinity, conductivity and pH are measured monthly.

Physical-chemical characteristics of the WW are listed in the following table:

Parameter	Value	Units
Conductivity	262	$\mu\text{mhos/cm}$
pH	8.01	
Total Hardness (calc.)	107	mg/L as CaCO_3
Total Alkalinity	80	mg/L as CaCO_3
Total Cd	< 2	$\mu\text{g/L}$
Total Cr	< 3	$\mu\text{g/L}$
Total Cu	< 4	$\mu\text{g/L}$
Total Ni	< 5	$\mu\text{g/L}$
Total Pb	< 20	$\mu\text{g/L}$
Total Zn	< 5	$\mu\text{g/L}$
Total Mercury	< 0.05	$\mu\text{g/L}$ (measured 2-2015)
Volatile Organics	45 cmpds not detectable	
Organic Analysis (BNA'S):	69 cmpds not detectable	
Bis(2-Ethylhexyl)Phthalate	0.49	$\mu\text{g/L}$
Pesticides & PCB's:	28 cmpds not detected	

METHODS

The acute toxicity test #7600 was conducted as outlined in Washington State Department of Ecology, Publication 80-12, Part A: Static Acute Fish Toxicity Test Protocol (Revised June 2009). The test was conducted at 10 mg/L and 100 mg/L to determine whether the samples designate as "Extremely Hazardous Waste" or "Dangerous Waste", respectively.

Test Organisms

Swim-up (swim-up on 5-1-15) rainbow trout (*Oncorhynchus mykiss*) were purchased from Trout Lodge located in Sumner, Washington on 5-26-15. The trout were acclimated for a period of 37 days in well water with a mean temperature of 13.7°C , a minimum of 13.5°C and a maximum of 13.9°C in a flow-through system at KCEL. During acclimation the fish were fed Ziegler's Salmon Starter twice daily. Feed was withheld 48 hours prior to the start of the test.

Physical data (based on a randomly chosen control jar at the end of the test) on trout used in the tests is shown in the table below.

Test #	Age (days-post swim-up at start of test)	Mean Standard Length (cm)	Mean Weight (grams)	Loading Wt./Vol. (g/L)
7600	62	3.9	0.76	0.51

As indicated in the table the mean weight of the trout used in the test was 0.76 g with a mean standard length of 3.9 cm. The loading in each jar was 0.51 g/L.

Extraction

For each sample three aliquots of 0.15 g (test concentration 10 mg/L) and three aliquots of 1.5 g (test concentration 100 mg/L) of the sample were weighed and each placed into a 1L wide-mouth glass extraction jar (total 6 jars). 200 mL of well water (diluted 20% with DI water) was added to each jar. The jars were then closed with a teflon lined cap and extracted on a rotary agitator for 19.5 hours.

Rainbow Trout – 96-Hour Static Acute Toxicity Tests

The test jars were 5-gal, glass wide mouth jars with inside measurements of 40 cm (height) and 25 cm (dia.). The liquid level at a volume of 15 L was 28 cm. The jar opening was partially covered during the test.

Well water (diluted 20% with DI water to keep the hardness below 100 mg/L) was measured (14.6 L for test and control jars) into each replicate. The solutions were maintained at $12 \pm 1.0^\circ\text{C}$ in an environmental chamber (Hotpack Model 08082, s/n 79719). The D.O. at the start of the test (9.7 - 9.9 mg/L) was > 80% saturation (>8.6 mg/L).

The extracted samples were added to the test jars followed by a 200 mL WW (diluted 20% with DI) rinse of the extraction jar bringing the total volume in the test chambers to 15 L. The extraction jar (laid on its side) and teflon cap liner were placed on the bottom of the test chamber. Ten rainbow trout were placed randomly into each test jar.

Survival was monitored during the test and recorded at 24, 48, 72, and 96 hours. Dissolved oxygen, temperature and pH were recorded for the samples and controls at 0, 24, 48, 72 and 96 hours. The photoperiod was 16h L:8h D. The test was initiated at 1005 h on 7-2-15 and ended at 1000 h on 7-6-15.

Quality Assurance

The reference toxicant testing for the lot of fish used in this test was conducted on 6-1-15 (Test #7538). Cadmium nitrate was used as a reference toxicant for rainbow trout. The precision table located at the end of this report is maintained to monitor the sensitivity of these organisms to the reference toxicant and thereby provide an indication of their overall sensitivity to other compounds. The LC50 for the reference toxicant test (#7538) was 2.7 $\mu\text{g Cd/L}$ which is within the control limits (mean \pm 2 SD) of 1.3 – 3.1 $\mu\text{g/L Cd}$.

Temperature, pH and dissolved oxygen measurements remained within acceptable limits (USEPA, 2002) throughout the reference toxicant test for rainbow trout (#7538) and sample test (#7600). The tests met acceptability criteria regarding control survival ($\geq 90\%$).

Physical-chemical methods are outlined in the table below:

Parameter	Method
Water Quality Tests	APHA (1992); US EPA (1991).
Temperature	Standard Mercury Thermometer (calibrated with a certified thermometer traceable to NBS records) and Onset, Tidbit (v2) UTBI-001 Temperature Logger (KCEL #436v1).
Dissolved Oxygen	YSI membrane electrode method (Method #4500-0 G; KCEL #434).
pH	Beckman 690 meter with automatic temperature compensation and Ross combination electrode (Method #4500-H; APHA 1992; KCEL #433).
Total Alkalinity	Potentiometric Method (Method #2320 B; KCEL #319v4).
Total Hardness	By calculation (Method #2340 B; KCEL #612v4).
Conductivity	Orion Model #122 Meter with 012210 conductivity cell (Method 2510B; KCEL #435).
Pesticides and PCB's	Continuous liquid extraction method (EPA Method #608; KCEL #733).
Organic Analysis	Continuous liquid extraction method for BNA's (EPA Method #625; KCEL #731).
Volatile Organics	Purge and trap method (EPA Method #624; KCEL #732).
Total Metals	ICP for Cd, Cr, Cu, Ni, Pb and Zn (EPA Method #200.7; KCEL #612v4); for Hg analysis (KCEL #604v5, 601v4, 605v0).

RESULTS

Rainbow trout

The following table contains survival percentages at 24-hour intervals during the 96-hour test in which rainbow trout were exposed to dilution water (controls) or to 10 and 100 mg/L sample concentrations.

	Sample mg/L	Percentage Survival (%)				Number Dead	Number of Fish Tested
		24 h	48 h	72 h	96 h		
WW (control)	0	100	100	100	100	0	30
SW062615_04_SB(m)	10	100	100	100	100	0	30
	100	0	0	0	0	30*	30
SW062715_01_SB(m)	10	100	100	100	100	0	30
	100	0	0	0	0	30*	30

* All dead within 90 minutes of test start.

Sample

As the table above shows for sample SW062615_04_SB(m) there was 100% mortality (all dead within 90 minutes of test initiation) in the 100 mg/L test concentration and 100% survival in the 10 mg/L test concentration. Hence, this sample designates as a "Hazardous Waste" according to DOE 80-12 criteria.

For sample SW062715_01_SB(m) there was 100% mortality (all dead within 90 minutes of test initiation) in the 100 mg/L test concentration and 100% survival in the 10 mg/L test concentration. Hence, this sample designates as a "Hazardous Waste" according to DOE 80-12 criteria.

WATER QUALITY

The following table contains measurements of Temperature, pH and Dissolved Oxygen taken throughout the 96 h test (or up to the time of 100% mortality). Measurement of Total Hardness, Total Alkalinity and Conductivity are taken from samples collected at the beginning (0-h) and end (96-h) of the test (unless otherwise noted).

Parameter	Sample:	Control	SW062615 04 SB(m)		SW062715 01 SB(m)	
		0 mg/L	10 mg/L	100 mg/L	10 mg/L	100 mg/L
°C	Mean	12.0	12.3	12.5	12.2	12.5
	Min.	11.8	11.8	12.3**	11.9	12.2**
	Max.	12.5	12.9	12.7**	12.5	12.8**
pH	Mean	7.65	7.67	7.98	7.71	7.98
	Min.	7.42	7.43	7.96**	7.50	7.98**
	Max.	7.95	7.97	7.98**	8.00	7.98**
D.O. (mg/L)	Mean	8.3	8.0	9.5	8.2	9.4
	Min.	7.3	6.8	9.4**	7.3	9.4**
	Max.	9.6	9.4	9.5**	9.4	9.5**
Tot. Hard (mg/L as CaCO ₃)	0h	87	87	86	87	87
	96h	85	86	*	86	*
Tot. Alk (mg/L as CaCO ₃)	0h	65	65	65	65	65
	96h	66	66	*	66	*
Cond (µmhos/cm)	0h	218	218	219	219	218
	96h	219	220	*	219	*

* Not taken since all dead within 90 minutes of test initiation

** Based on 0 hour readings only

Additional water quality and QC data are listed on the attached photocopied pages from the laboratory notebook.

TESTED BY:
King County Environmental Laboratory
322 West Ewing Street
Seattle WA 98119

REFERENCES

APHA. 1992. Standard Methods for the Examination of Water and Wastewater, 18th Edition. American Public Health Association, American Waterworks Association, Water Pollution Control Association. Washington D.C.

U.S. E.P.A. 1991. Code of Federal Regulations, 40CFR, Appendix A, July 1991 U.S. Environmental Protection Agency, Office of Federal Registry, Washington, D.C.

Washington State Department of Ecology. Biological Testing Methods for the designation of Dangerous Waste. DOE 80-12, revised June.2009.

US EPA. 2002. Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms. 5th edition. EPA-821-02-012, October 2002. US Environmental Protection Agency, Office of Water (4303T), Washington, DC.

DOE 80-12 Toxicity Test:

Bench Sheets

Chain of Custody

DOE 80-12 Hazardous Waste Test, Project # 421193
Rainbow Trout 96-Hour Static Acute Test

Test #: 7600
Test Date: 7-2-15

ORGANISMS

700 fish received from Frost Lodge Lot # (Swim-up date): 5-1-15 Shipped via
Pick up Arrived at KCEL at 1355 h on 5-26-15 in 1 Box double Poly
dead removed. At Arrival: pH -, D.O. >20 mg/L, Temp 12.2 °C. Into
Tank # 1 Hold in tank with new well water and aeration for - days. Feed 2X/day with -
Ziegler's starter #1. Refer to culture log for feeding & holding information.

DILUTION WATER/SAMPLE

- New Well Water (NWW) 7-1-15, filtered through nylon netting. Hardness must be between 80-100 mg/L. At start TH ≈ 109 mg/L. Dilute 20% w/ MilliQ DI.
Want D.O. @ 90-100% saturation (9.8-10.7 mg/L) before add sample. Aerate with O₂.
- Hazardous waste samples from Dry Cleaners
LIMS RBT80-12 Sample #: - Wksp #: - *Not going to LIMS*

	Sample 1	Sample 2
Sample #:	<u>SW062615-04-SB(m)</u>	<u>SW062715-01-SB(m)</u>
Sample Site:		
Collect Date:	<u>6-26-15</u> to <u>-</u>	<u>6-27-15</u> to <u>-</u>
Collect Time:	<u>-</u> h to <u>-</u> h	<u>-</u> h to <u>-</u> h
Collected by:	<u>Steve Whittaker</u>	<u>Steve Whittaker</u>
Deliv'd to KCEL:	<u>1000</u> h on <u>6-29-15</u>	<u>1000</u> h on <u>6-29-15</u>
By:	<u>Steve Whittaker</u>	<u>Steve Whittaker</u>
Rec'd by:	<u>JK</u>	<u>JK</u>
Sample Container:	<u>250ml WM</u>	<u>250ml WM</u>
Sample Volume:	<u>200ml</u>	<u>200ml</u>
Sample Description:	<u>liquid sludge, dark, molasses' color like formaldehyde</u>	<u>liquid sludge, dark, NOT thick, like paint store</u>
pH (at arrival):	<u>-</u>	<u>-</u>
DO (mg/L) (at arrival):	<u>-</u>	<u>-</u>
Temp (°C) (at arrival):	<u>-</u>	<u>-</u>
Storage:	<u>In dark at 4 ± 2°C</u>	<u>In dark at 4 ± 2°C</u>

Perc Waste

Perc Waste

PROCEDURE**1) Sample Extraction (Rotary Agitation)**

- Cut, crush or break solid samples into approx. 1-1.7 cm pieces. Used: -
- Use sample and NWW volumes in table below:
For 10 ppm: weigh 0.150 g of sample into each of 4 - 1L blue cap wide mouth bottles (Reps A-C for fish plus 1 for WQ).
For 100 ppm: weigh 1.5 g of sample into each of 4 - 1L blue cap wide mouth bottles (Reps A-C for fish plus 1 for WQ).
- Add 200 mL of NWW to each bottle and cap with lid and teflon liner (avoid caps with adhesive on liner).
- Mix samples on rotary agitator for 18 ± 2 h at $23 \pm 2^\circ\text{C}$:
- Start extraction at 1300 h on 7-1-15
- End extraction at 0840 h on 7-2-15.

DOE 80-12 Hazardous Waste Test, Project # 421193
 Rainbow Trout 96-Hour Static Acute Test

Test #: 5
 Test Date: 7600
7-2-15

Treatment	Sample Conc (mg/L)	Code	Rep	Random #	NWW (L) Final Vol:	Sample (g)
Control	0	Blue	A	12	15L	0
			B	14	15	0
			C	10	15	0
Sample 1	10	Green	A	3	15	0.15
			B	15	15	"
			C	2	15	"
Sample 1	100	Yellow	A	13	15	1.5
			B	8	15	"
			C	7	15	"
Sample 2	10	Orange	A	5	15	0.15
			B	6	15	"
			C	11	15	"
Sample 2	100	Red	A	1	15	1.5
			B	9	15	"
			C	4	15	"

2) Test Jars

- Fill test jars with 14.6 L of NWW and place randomly into EC # 8556, East & West shelf.
- Measure D.O. 9.7 - 9.9 mg/L at 12°C. Aerate if < 80% saturation (8.6 mg/L). Aerate w/ O₂ @ L/min for sec per jar.

AERATION	Before Aeration	Aeration		After Aeration
	D.O. (mg/L)	Start Date/Time	End Date/Time	D.O. (mg/L)
Before Add Sample:		/	/	

3) Extraction bottles:

- Rinse outside of extraction bottle with DW
 - Pour contents into assigned jar
 - Rinse extraction bottle with 200 mL NWW and pour into test jar, bringing total volume to 15 L.
- Place extraction bottle into test jar on its side, remove liner and place at bottom of test jar (prevent from floating). Setup at 0930 h.
 - Take 0h sample for pH, DO, Temp, Tot. Alk, Tot. Hard, Cond.
 - Add 10 fish per jar, one at a time to randomize, using dip net.
 - Counts verified by 61 & . Can't see yellow + red too Turbid
 - Start test at 1025 h on 7-2-15. Place Tidbit temp recorder (SN 10468448, West shelf; SN 9716078, East shelf) in jar w/water into EC.
 - Measure pH, DO, Temp, cumulative survival and mortality (# Dead) daily in all reps/trtmt.
 - End test at 1000 h on 7-6-15 by .
 - Take 96h samples for pH, DO, Temp, Tot Alk, Tot Hard, Cond.

DOE 80-12 Hazardous Waste Test, Project # 421193
 Rainbow Trout 96-Hour Static Acute Test

Test #: 5
 Test Date: 7-2-15

Chemistry

Treatment	Sample Conc (mg/L)	Code	Rep	pH					D. O. (mg/L)				
				0 h	24 h	48 h	72 h	96 h	0 h	24 h	48 h	72 h	96 h
Control	0	Blue	A	7.844	7.619	7.609	7.541	7.423	9.5	8.5	8.1	7.8	7.6
			B	7.950	7.702	7.639	7.589	7.448	9.6	8.5	8.0	7.6	7.4
			C	7.939	7.731	7.673	7.567	7.499	9.5	8.8	8.1	7.5	7.3
Sample 1	10	Green	A	7.952	7.665	7.619	7.479	7.428	9.3	8.0	7.5	7.1	6.8
			B	7.971	7.696	7.673	7.599	7.534	9.4	8.5	8.0	7.8	7.5
			C	7.959	7.713	7.666	7.597	7.502	9.4	8.3	8.0	7.6	7.1
Sample 1	100	Yellow	A	7.979	-	-	-	-	9.5	-	-	-	-
			B	7.963	-	-	-	-	9.5	-	-	-	-
			C	7.983	-	-	-	-	9.4	-	-	-	-
Sample 2	10	Orange	A	8.002	7.693	7.672	7.630	7.548	9.4	8.4	8.1	7.8	7.5
			B	7.981	7.701	7.669	7.635	7.581	9.4	8.4	7.9	8.0	7.5
			C	7.979	7.714	7.693	7.634	7.498	9.3	8.6	8.0	8.0	7.3
Sample 2	100	Red	A	7.980	-	-	-	-	9.4	-	-	-	-
			B	7.979	-	-	-	-	9.4	-	-	-	-
			C	7.975	-	-	-	-	9.5	-	-	-	-
Analyst:				Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	

Code	Trtmt	Sample Conc (mg/L)	Sample #		T. Alkalinity (mg/L as CaCO ₃)		T. Hardness (mg/L as CaCO ₃)		Conductivity (µmhos/cm)	
			0 h	96 h	0 h	96 h	0 h	96 h	0 h	96 h
Blue	Control	0	L63134-1	L63134-6	65	65.9	87.3	85.1	218	219
Green	Sample 1	10	-2	-7	64.9	66.3	86.9	86.3	218	220
Yellow	Sample 1	100	-3	-8	64.8	omit	85.5	omit	219	omit
Orange	Sample 2	10	-4	-9	65.2	65.8	87.1	85.9	219	219
Red	Sample 2	100	-5	-10	65	omit	87.3	omit	218	omit
Analyst:									Gy	Gy

DOE 80-12 Hazardous Waste Test, Project # 421193
 Rainbow Trout 96-Hour Static Acute Test

Test #: 5
 Test Date: 76007
7-2-15

Treatment	Sample Conc (mg/L)	Code	Rep	Temperature °C (SN 15014 270)				
				0 h	24 h	48 h	72 h	96 h
Control	0	Blue	A	12.5	12.0	11.8	11.8	11.8
			B	12.5	12.1	11.9	11.9	12.0
			C	12.4	12.1	11.9	12.0	12.0
Sample 1	10	Green	A	12.9	12.5	12.3	12.3	12.4
			B	12.5	12.1	11.8	11.8	11.9
			C	12.7	12.4	12.2	12.2	12.3
Sample 1	100	Yellow	A	12.3	-	-	-	-
			B	12.5	-	-	-	-
			C	12.7	-	-	-	-
Sample 2	10	Orange	A	12.5	12.4	12.2	12.2	12.3
			B	12.5	12.4	12.1	12.2	12.3
			C	12.5	12.1	11.9	11.9	11.9
Sample 2	100	Red	A	12.6	-	-	-	-
			B	12.2	-	-	-	-
			C	12.8	-	-	-	-
Analyst:				Gy	Gy	Gy	Gy	Gy

Test Organism Data at 96 Hours			
Sampled From: <u>Control</u> Rep <u>B</u>			
Fish	Length (cm)	Weight (g)	
1	4.0	0.821	
2	4.0	0.783	
3	3.9	0.695	
4	3.9	0.750	
5	4.1	0.873	
6	4.2	0.939	
7	4.0	0.760	
8	3.8	0.687	
9	3.7	0.573	
10	3.8	0.696	
Mean:	3.9	0.758	Load Rate:
Load Rate = [(Wt)(# Fish)] / Vol			(0.758 g)(10) /
Where:			15 L
Wt = Mean Wt in g			= 0.51 g/L
Vol = Total Test Vol in L			
# Fish = # Fish/Rep			

East
 Blue A, B, C
 Green B
 Yellow B
 orange -
 red B

West
 Green AC
 Yellow BC
 OR AB
 Red AC

yellow + red very turbid. fish
 losing equilibrium within minutes
 of being placed in test sat.
 After 1hr nearly all dead.
 1130 all dead in yellow and red

All remaining fish appear
 normal at end of test.

NOTES

Reference Toxicant Test:

Bench Sheets

Precision Table

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7538
Test Date: 6-1-15

ORGANISMS

700 fish received from Trout Lodge Lot # (Swim-up date): 5-1-15 Shipped via
pick up Arrived at KCEL at 1355 h on 5-26-15 in 1 box double plastic Bag
dead removed. At Arrival: pH —, D.O. > 20 mg/L, Temp 12.2 °C. Into
Tank # 129 Hold in tank with new well water and aeration for 6 days. Feed 2X/day with
Ziegler's Starter #1. Refer to culture log for feeding & holding information.

DILUTION WATER/TOXICANT

1. New Well Water (NWW) 5-31-15, filtered through nylon netting.
2. Cd Stock Soln: Nominal 20 mg Cd/L, Measured 20.3 mg/L on 12-20-12 Prep 12-5-12
— by add — g Cd(NO₃)₂·4H₂O (mfr Baker) # 1-1226, rec'd
—, opened —, lot # 049130) ⊆ 1L DW.
LIMS RTA Sample #: 139996-1 Wkgrp #: 139996

SOLUTIONS					
Cd Trtmt (µg/L)	Code	Cd Stock (mL/jar)	NWW (L/jar)	Sample #	Cd (µg/L) (Measured)
0	Blue	0 (NWW only)	6L (NWW only)		
0.75	Green	0.22	⊆ 6L		
1.5	Yellow	0.44	↓		
3.0	Orange	0.89	↓	# <u>L62956-1</u>	<u>2.93</u>
6.0	Red	1.77	↓		
12.0	White	3.55	↓		

PROCEDURE

1. Add 6 L NWW to each of 2 jars/trtmt; place in 12°C EC # 8556, East & West shelf. Bring to 12°C. Setup at — h.
2. Measure DO; if DO << saturation, aerate until DO ≥ 9 mg/L. Stop aeration.
3. Measure Temp, pH & DO. in all trtmts.
4. Add Cd stock soln to jars: Mix: Sample for Cd: sample at 48h Acidify: Analyst: GY
5. Add 10 fish/jar, one at a time to randomize, using dip net. Start count verified by GY & —
6. Start test at 0830 h on 6-1-15. Place Tidbit temp recorder (SN 9716078, East shelf; SN 10468448, West shelf) in beaker w/WW into EC.
7. Remove dead fish daily; record #/ weight/ length/ time dead. Record survival daily. Measure Temp, pH & DO daily in all trtmts.
8. Renew solns (≈ 80%) at 48h:
 - a) Siphon 4.5 L from each jar.
 - b) Filter NWW into 4L graduated cylinder.
 - c) Add Cd stock soln ⊆ 4L aliquot during filling as below:

Cd (µg/L):	0	0.75	1.5	3	6	12
mL Cd Stock:	0	0.15	0.30	0.59	1.18	2.36

- d) Replace ⊆ 6 L/jar with fresh soln by pouring through funnel and tubing into jar.
9. End test at 0910 h on 6-5-15. Measure Temp, pH and DO in all trtmts.

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7538
Test Date: 6-1-15

MEASUREMENTS

Code	Cumulative Survival (#Alive/Rep)						Tot # Alive
	Cd (µg/L)	Rep	24 h	48 h	72 h	96 h	
Blue	0	A	10	10	10	10	10
	0	B	10	10	10	10	
Green	0.75	A	10	10	10	10	10
	0.75	B	10	10	10	10	
Yellow	1.5	A	10	10	10	10	10
	1.5	B	10	10	10	10	
Orange	3	A	8	7	5	5	5
	3	B	10	5	4	2	
Red	6	A	3	0	0	0	0
	6	B	3	0	0	0	
White	12	A	1	0	0	0	0
	12	B	1	0	0	0	
		Analyst:	Gy	Gy	Gy	Gy	

s - stressed

Code	Rep	Daily #Dead/Rep										Mean	
		1	2	3	4	5	6	7	8	9	10		
White	A	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	1300	1300	0730	
		cm	3.2	3.0	3.2	3.3	3.2	3.2	3.2	3.0	3.1	3.1	3.15
		B	0.461	0.369	0.458	0.440	0.382	0.388	0.416	0.422	0.377	0.312	0.403
White	B	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	1300	1300	0730	
Red	A	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	6-3	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	0730	0730	0730	
Red	B	Date	6-2	6-2	6-2	6-2	6-2	6-2	6-2	6-3	6-3	6-3	
		Time	1300	1300	1300	1300	1300	1300	1300	0730	0730	0730	
Orange	A	Date	6-2	6-2	6-3	6-4	6-4						
		Time	1300	1300	0730	1040	1040						
Orange	B	Date	6-3	6-3	6-3	6-3	6-3	6-4	6-5	6-5			
		Time	0730	0730	0730	0730	0730	1040	0900	0900			
		Date											
		Time											
		Date											
		Time											
		Date											
		Time											

Load Rate = [(Wt)(# Fish)] / Vol = (0.403 g)(10) / L = 0.67 g/L

Where: Wt = Mean Wt in g; Vol = Total Test Vol in L; # Fish = #Fish/Rep

Reference Toxicant, Cd, 96-Hour Acute Static Renewal Test
Rainbow Trout

Test #: 7539
Test Date: 6-1-15

Chemistry

15064270

Code	Rep	Temp (°C) SN:					pH					D.O. (mg/L)				
		0h	24h	48h	72h	96h	0h	24h	48h	72h	96h	0h	24h	48h	72h	96h
Blue	A	11.7	11.8	11.9	12.0	11.7	8.016	7.650	7.714	7.660	7.596	8.8	8.6	8.8	8.6	8.3
	B	11.9	12.0	11.9	12.0	11.8	8.083	7.700	7.752	7.759	7.674	10.0	8.5	9.0	8.6	8.4
Grn	A	11.9	11.9	11.9	12.0	11.8	8.102	7.704	7.781	7.736	7.651	10.1	8.4	8.8	8.5	8.1
	B	12.0	12.0	11.9	12.2	11.9	8.100	7.738	7.809	7.794	7.715	10.1	8.7	9.1	8.8	8.4
Yell	A	11.9	11.8	11.8	11.8	11.7	8.104	7.789	7.881	7.781	7.718	10.1	8.7	8.8	8.7	8.4
	B	12.0	12.1	11.9	12.2	11.8	8.106	7.735	7.788	7.736	7.717	10.1	8.8	8.9	8.4	8.1
Orng	A	11.8	11.8	11.7	11.8	11.7	8.116	7.703	7.823	7.839	7.826	10.1	8.4	9.0	9.2	9.3
	B	11.7	11.8	11.7	11.9	11.7	8.115	7.750	7.822	7.886	7.879	10.1	8.7	9.0	9.4	9.4
Red	A	11.5	11.7	11.5	-	-	8.125	7.742	7.929	-	-	10.1	8.8	9.6	-	-
	B	11.9	11.9	11.9	-	-	8.128	7.799	7.912	-	-	10.1	8.8	9.6	-	-
Wht	A	11.9	11.9	11.8	-	-	8.118	7.753	7.931	-	-	10.1	8.9	9.8	-	-
	B	12.1	12.0	12.0	-	-	8.110	7.779	7.930	-	-	10.1	8.9	9.6	-	-
Analyst:		Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy	Gy

Random # Beaker Position					
Code	Rep	Random Jar #	Code	Rep	Random Jar #
Blue	A	3	Orange	A	10
	B	11		B	7
Green	A	8	Red	A	6
	B	2		B	9
Yellow	A	1	White	A	12
	B	4		B	5

NOTES

wg13 9996 7538

CETIS Analytical Report

Report Date: 24 Jun-15 08:20 (p 1 of 2)
 Test Code: 7538RTAQC | 21-3098-6125

Fish 96-h Acute Survival Test

King County Metro Services, WQ Lab

Analysis ID: 19-7596-6520	Endpoint: 96h Survival Rate	CETIS Version: CETISv1.8.7
Analyzed: 24 Jun-15 8:18	Analysis: Untrimmed Spearman-Kärber	Official Results: Yes
Batch ID: 00-5147-3809	Test Type: Survival (96h)	Analyst: GY
Start Date: 01 Jun-15 08:30	Protocol: EPA/821/R-02-012 (2002)	Diluent: Well Water
Ending Date: 05 Jun-15 09:10	Species: Oncorhynchus mykiss	Brine: Not Applicable
Duration: 4d 1h	Source: Trout Lodge Fish Farm	Age: 31d
Sample ID: 05-4172-3026	Code: WG139986-1	Client: Internal Lab
Sample Date: 01 Jun-15 08:00	Material: Cadmium nitrate	Project: Reference Toxicant
Receive Date:	Source: Reference Toxicant	
Sample Age: 30m	Station:	

Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	0.00%	0.432	0.03211	2.704	2.332	3.135

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits	Overlap	Decision
Control Resp	1	0.9 - NL	Yes	Passes Acceptability Criteria

96h Survival Rate Summary

C-µg/L	Control Type	Count	Calculated Variate(A/B)								
			Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Dilution Water	2	1	1	1	0	0	0.0%	0.0%	20	20
0.75		2	1	1	1	0	0	0.0%	0.0%	20	20
1.5		2	1	1	1	0	0	0.0%	0.0%	20	20
3		2	0.35	0.2	0.5	0.15	0.2121	60.61%	65.0%	7	20
6		2	0	0	0	0	0	100.0%	100.0%	0	20
12		2	0	0	0	0	0	100.0%	100.0%	0	20

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
0.75		1	1
1.5		1	1
3		0.5	0.2
6		0	0
12		0	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	10/10	10/10
0.75		10/10	10/10
1.5		10/10	10/10
3		5/10	2/10
6		0/10	0/10
12		0/10	0/10

Checked
 QA: 6-24-15
 GY

CETIS Analytical Report

Report Date: 24 Jun-15 08:20 (p 2 of 2)
Test Code: 7538RTAQC | 21-3096-6125

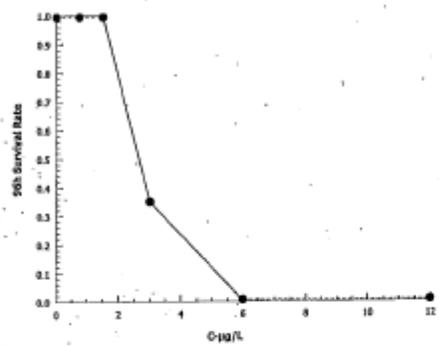
Fish 96-h Acute Survival Test

King County Metro Services, WQ Lab

Analysis ID: 19-7598-6520 Endpoint: 96h Survival Rate
Analyzed: 24 Jun-15 8:18 Analysis: Untrimmed Spearman-Kärber

CETIS Version: CETISv1.8.7
Official Results: Yes

Graphics



CETIS Summary Report

Report Date: 24 Jun-15 08:20 (p 1 of 1)
 Test Code: 7538RTAQC | 21-3098-6125

Fish 96-h Acute Survival Test

King County Metro Services, WQ Lab

Batch ID: 00-5147-3809	Test Type: Survival (96h)	Analyst: GY
Start Date: 01 Jun-15 08:30	Protocol: EPA/821/R-02-012 (2002)	Diluent: Well Water
Ending Date: 05 Jun-15 09:10	Species: Oncorhynchus mykiss	Brine: Not Applicable
Duration: 4d 1h	Source: Trout Lodge Fish Farm	Age: 31d
Sample ID: 05-4172-3026	Code: WG139996-1	Client: Internal Lab
Sample Date: 01 Jun-15 08:00	Material: Cadmium nitrate	Project: Reference Toxicant
Receive Date:	Source: Reference Toxicant	
Sample Age: 30m	Station:	

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
19-7586-6520	96h Survival Rate	EC50	2.704	2.332	3.135		Spearman-Kärber

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits	Overlap	Decision
19-7586-6520	96h Survival Rate	Control Resp	1	0.9 - Nil	Yes	Passes Acceptability Criteria

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	2	1	1	1	1	1	0	0	0.0%	0.0%
0.75		2	1	1	1	1	1	0	0	0.0%	0.0%
1.5		2	1	1	1	1	1	0	0	0.0%	0.0%
3		2	0.35	0	1	0.2	0.5	0.15	0.2121	60.61%	65.0%
6		2	0	0	0	0	0	0	0		100.0%
12		2	0	0	0	0	0	0	0		100.0%

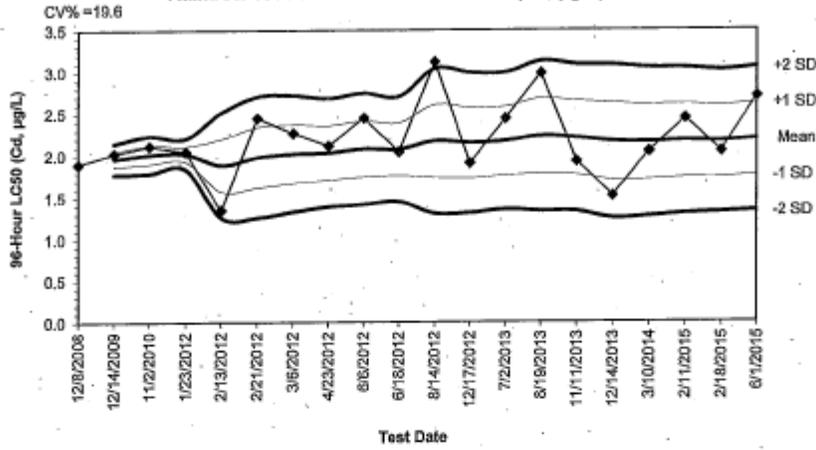
96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	1	1
0.75		1	1
1.5		1	1
3		0.5	0.2
6		0	0
12		0	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2
0	Dilution Water	10/10	10/10
0.75		10/10	10/10
1.5		10/10	10/10
3		5/10	2/10
6		0/10	0/10
12		0/10	0/10

**Control Chart for Acute Reference Toxicant Tests with
Rainbow Trout 96-Hour Survival LC50 (Cd, µg/L)**



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
12/8/2008	1.90					
12/14/2009	2.03	1.9650	1.8731	1.7812	2.0569	2.1488
11/2/2010	2.12	2.0167	1.9061	1.7955	2.1273	2.2379
1/23/2012	2.05	2.0250	1.9332	1.8413	2.1168	2.2087
2/13/2012	1.35	1.8900	1.5778	1.2657	2.2022	2.5143
2/21/2012	2.45	1.9833	1.6225	1.2616	2.3442	2.7051
3/6/2012	2.27	2.0243	1.6775	1.3307	2.3711	2.7179
4/23/2012	2.12	2.0363	1.7134	1.3906	2.3591	2.6819
6/6/2012	2.45	2.0822	1.7502	1.4182	2.4142	2.7462
6/18/2012	2.05	2.0790	1.7658	1.4527	2.3922	2.7053
8/14/2012	3.12	2.1736	1.7414	1.3093	2.6058	3.0380
12/17/2012	1.91	2.1517	1.7326	1.3136	2.5707	2.9896
7/2/2013	2.44	2.1738	1.7648	1.3557	2.5829	2.9920
8/19/2013	2.98	2.2314	1.7832	1.3350	2.6797	3.1279
11/11/2013	1.93	2.2113	1.7725	1.3336	2.6502	3.0891
12/14/2013	1.52	2.1681	1.7103	1.2524	2.6260	3.0839
3/10/2014	2.05	2.1612	1.7169	1.2727	2.6054	3.0497
2/11/2015	2.44	2.1767	1.7407	1.3047	2.6126	3.0486
2/18/2015	2.05	2.1700	1.7453	1.3206	2.5947	3.0194
6/1/2015	2.70	2.1665	1.7665	1.3365	2.6265	3.0565