APPENDIX A: EXECUTIVE SUMMARY DOCUMENTS

COEUR
ALASKA
KENSINGTON GOLD MINE

Habitat - Douglas
MAR 08 2011
RECEIVED

March 7, 2011

Ms. Jackie Timothy
Regional Supervisor
Division of Habitat
Alaska Department of Fish and Game
P.O. Box 110024
Juneau, Alaska 99811-0024

Re: Kensington Aquatic Resource Monitoring

Dear Jackie:

Coeur Alaska requests that the Alaska Department of Fish and Game (ADF&G) consider completing the aquatic resource monitoring required for the Kensington Mine. Coeur currently envisions the monitoring to be completed by ADF&G to include the sediment toxicity, benthic invertebrate, resident fish, anadromous fish, aquatic vegetation and other associated monitoring with the scope of the monitoring to be further refined by Kate Kanouse with ADF&G and Kevin Eppers with Coeur Alaska. Coeur anticipates the monitoring to be completed by ADF&G would commence at the beginning of the 2011 field season.

We appreciate ADF&G's consideration of our request. If you have any questions regarding this request, please contact me at (907) 523-3309 or by email cgillespie@coeur.com .

Sincerely,

C. D. Gill

Clyde D. Gillespie
Environmental and Surface Operations Manager

XC: Kate Kanouse, ADF&G
Allan Nakanishi, ADEC
Luke Russell, CDA
Guy Jeske, Coeur AK
Al Ott, ADF&G
Tom Crafford, ADNR
Kevin Eppers, Coeur AK

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Juneau, Alaska 99801
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www.KensingtonGold.com

Permit No.: **AK-005057-1**

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 *et seq*., as amended by the Water Quality Act of 1987, P.L. 100-4, the "Act",

Coeur-Alaska, Inc.

is authorized to discharge from the **Kensington Project** located 40 miles north of Juneau, Alaska, at the following locations:

Outfall	Receiving Water	Latitude	Longitude
001	Sherman Creek	58° 52' 04"N	135° 06' 55"W
002	East Fork Slate Creek	58° 49' 58"N	134° 57' 58"W
003	Lynn Canal	58° 51' 58"N	135° 08' 28"W

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective **September 1 , 2005**

This permit and the authorization to discharge shall expire at midnight, **August 31, 2010**

The permittee shall reapply for a permit reissuance on or before **March 1, 2010**, 180 days before the expiration of this permit if the permittee intends to continue operations and discharges at the facility beyond the term of this permit.

Signed this **28th** day of July 2005.

/s/Michael Gearheard
Michael Gearheard
Director, Office of Water & Watersheds
Region 10
U.S. Environmental Protection Agency

TABLE OF CONTENTS

I. LIMITATIONS AND MONITORING REQUIREMENTS

During the effective period of this permit, the Permittee is authorized to discharge pollutants from the outfalls specified herein to Sherman Creek, East Fork Slate Creek, and Lynn Canal within the limits and subject to the conditions set forth herein. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process.

A. Effluent Limitations and Monitoring - Outfall 001

The permittee must limit and monitor discharges from outfall 001 as specified in Table 1, below. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the tables at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

1. Table 1

Table 1 - Outfall 001 Effluent Limitations and Monitoring Requirements

Parameter[1]	Hardness as mg/L $CaCO_3$	Units	Effluent Limitations		Monitoring Requirements		
			Maximum Daily	Average Monthly	Sample Frequency[2]	Sample Location	Sample Type
Aluminum[3]	—	ug/L	143	71	weekly	Influent (I) /Effluent (E)	24 hr. comp.
Ammonia, Total	—	mg/L as N	4.0	2.0	weekly	E	24 hr. comp.
Arsenic	—	ug/L	—	—	monthly	I/E	24 hr. comp.
Cadmium[3]	$50 \leq H < 100$	ug/L	0.3	0.1	weekly	I/E	24 hr. comp.
	$100 \leq H < 200$	ug/L	0.4	0.2	weekly	I/E	24 hr. comp
	$H \geq 200$	ug/L	0.7	0.4	weekly	I/E	24 hr. comp
Copper[3]	$50 \leq H < 100$	ug/L	7.3	3.6	weekly	I/E	24 hr. comp.
	$100 \leq H < 200$	ug/L	14.0	7.0	weekly	I/E	24 hr. comp
	$H \geq 200$	ug/L	26.9	13.4	weekly	I/E	24 hr. comp

Table 1 - Outfall 001 Effluent Limitations and Monitoring Requirements

Parameter[1]	Hardness as mg/L $CaCO_3$	Units	Effluent Limitations		Monitoring Requirements		
			Maximum Daily	Average Monthly	Sample Frequency[2]	Sample Location	Sample Type
Chromium, Total[4]	—	ug/L	—	—	weekly	I/E	24 hr. comp.
Chromium VI[4]	—	ug/L	16	8	---	I/E	24 hr. comp.
Iron	—	ug/L	1700	800	weekly	I/E	24 hr. comp.
Lead[3]	50≤H<100	ug/L	2.2	1.1	weekly	I/E	24 hr. comp.
	100≤H<200	ug/L	5.2	2.6	weekly	I/E	24 hr. comp
	H≥200	ug/L	12.6	6.3	weekly	I/E	24 hr. comp
Manganese	—	ug/L	—	—	weekly	I/E	24 hr. comp.
Mercury[3,5]	—	ug/L	0.02	0.01	weekly	I/E	24 hr. comp.
Nickel[3]	50≤H<100	ug/L	47.7	23.8	weekly	I/E	24 hr. comp.
	100≤H<200	ug/L	85.7	42.7	weekly	I/E	24 hr. comp
	H≥200	ug/L	154.0	76.8	weekly	I/E	24 hr. comp
Nitrate	—	mg/L as N	20	10	weekly	E	24 hr. comp
Selenium[3]	—	ug/L	8.2	4.1	weekly	I/E	24 hr. comp.
Silver[3]	50≤H<100	ug/L	1.2	0.6	weekly	I/E	24 hr. comp.
	100≤H<200	ug/L	4.1	2.0	weekly	I/E	24 hr. comp
	H≥200	ug/L	13.4	6.6	weekly	I/E	24 hr. comp
Zinc[3]	50≤H<100	ug/L	66.6	33.2	weekly	I/E	24 hr. comp.
	100≤H<200	ug/L	119.8	59.7	weekly	I/E	24 hr. comp
	H≥200	ug/L	215.6	107.5	weekly	I/E	24 hr. comp
TDS	—	mg/L	1000	1000	weekly	E	24 hr. comp.
TDS anions/cations[6]	—	mg/L	—	—	quarterly	E	24 hr. comp.

Table 1 - Outfall 001 Effluent Limitations and Monitoring Requirements

Parameter[1]	Hardness as mg/L $CaCO_3$	Units	Effluent Limitations		Monitoring Requirements		
			Maximum Daily	Average Monthly	Sample Frequency[2]	Sample Location	Sample Type
Sulfate	—	mg/L	200	200	weekly	E	24 hr. comp.
Turbidity, effluent	—	NTU	see Permit Part 1.A.5.		weekly	E	grab
Turbidity, natural condition	—	NTU	—	—	weekly	background	grab
Hardness	—	mg/L $CaCO_3$	—	—	weekly	downstream	grab
pH	—	s.u.	see Permit Part 1.A.4.		Continuous	E	Recorder
TSS	—	mg/L	30	20	daily	I/E	24 hr. comp.
Flow	—	gpm	—	—	Continuous	I/E	Recorder
Temperature	—	°C	—	—	Weekly	E	Grab
Dissolved Oxygen	—	mg/L	—	—	Weekly	E	Grab
Chronic Whole Effluent Toxicity[7] (WET)	—	TU_c	1.6	1.1	Monthly	E	24 hr. comp.

1 - Parameters must be analyzed and reported as total recoverable unless otherwise noted.
2 - Weekly sampling shall occur on the same day of each week, unless the Permittee can document that sampling could not be performed due to extreme conditions. In such cases, a detailed explanation of the reason sampling could not be performed shall be prepared and kept with the analytical results for that day.
3 - Reporting of a maximum daily limit violation is required according to Permit Part III.G.
4 - Chromium VI (Cr VI) must be analyzed during the next sampling event when results are received showing a total chromium measure exceeding 11 ug/L - the sample holding time for chromium VI is 24 hours. Cr VI must be analyzed and reported as dissolved.
5 - Mercury must be analyzed and reported as total.
6 - This monitoring shall include a standard and complete suite of those cations and anions contributing to TDS including but not limited to boron (B), sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), fluoride (F), chloride (Cl), sulfate (SO_4), total alkalinity, hardness, pH, and electrical conductivity.
7 - See Permit Part I.D. for whole effluent toxicity testing requirements.

2. Until underground activities commence, the following monitoring frequencies shall apply. These frequencies shall also apply during a long term shut down of the mine. These frequencies shall be implemented after a 6 month closure period.

TABLE 2
Monitoring Requirements for Outfall 001
(During Non-Mining Periods)

Effluent Parameter[1]	Units	Monitoring Requirement	
		Sampling Frequency	Sample Type
Aluminum	ug/L	Quarterly	Grab
Ammonia, Total	mg/L	Quarterly	Grab
Arsenic	ug/L	Quarterly	Grab
Cadmium	ug/L	Quarterly	Grab
Copper	ug/L	Quarterly	Grab
Total Chromium	ug/L	Quarterly	Grab
Iron	ug/L	Quarterly	Grab
Lead	ug/L	Quarterly	Grab
Mercury[2]	ug/L	Quarterly	Grab
Nickel	ug/L	Quarterly	Grab
Nitrate	mg/L	Quarterly	Grab
Selenium	ug/L	Quarterly	Grab
Silver	ug/L	Quarterly	Grab
Zinc	ug/L	Quarterly	Grab
Total Dissolved Solids	mg/L	Quarterly	Grab
TDS anions/cations	mg/L	Annually	Grab
Sulfate	mg/L	Quarterly	Grab
Hardness[3]	mg/L	Monthly - Instream	Grab
pH[4]	s.u.	Quarterly	Grab
Total Suspended Solids	mg/L	Daily	Grab
Flow	MGD	Continuous	Recorder
Temperature	°C	Quarterly	Grab
WET, Chronic	TU_c[5]	Annually	Grab

1 The Permittee shall conduct analysis for total recoverable and dissolved.
2 Mercury shall be analyzed as total.
3 The Permittee shall sample the receiving water hardness downstream of the discharge.
4 The Permittee shall monitor and report the number of pH excursions outside the range of 6.5 to 8.5 Standard Units.
5 Chronic toxic units (See Definitions).

3. The permittee must not discharge any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.

4. The pH must not be less than 6.5 standard units (s.u.) nor greater than 8.5 standard units (s.u.). During continuous monitoring required in Table 1, the

Permittee shall monitor the total time outside the range for the month, the length of each excursion and the number of pH excursions outside the range of 6.5 to 8.5 Standard Units (s.u.). The Permittee shall report the total time outside the range for the month as well as the number of individual excursions which exceed 60 minutes.

5. The turbidity measured in nephelometric turbidity units (NTU) must not be more than 5 NTUs above the natural condition. The natural condition sample taken from Sherman Creek must be taken upstream of the discharge point within an hour of the effluent sample.

6. The permittee must collect effluent samples from the effluent stream after the last treatment unit prior to discharge into the receiving waters.

7. Minimum Levels. For all effluent monitoring, the permittee must use analytical methods that can achieve a minimum level (ML) less than the effluent limitation, if possible. For parameters that do not have effluent limitations, the permittee must use methods that can achieve MLs less than or equal to those specified in Table 6 (Permit Part I.E.1.).

8. Chromium VI has an average monthly effluent limit that is not quantifiable using EPA approved or approvable analytical methods. EPA will use 10 ug/L (the ML for EPA Method 218.4) as the compliance evaluation level for this parameter.

9. For purposes of reporting on the DMR, for a single sample, if a value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if a value is less than the ML, the permittee must report "less than {numeric value of the ML}." For purposes of calculating monthly averages, zero may be assigned for values less than the MDL, the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the permittee must report "less than {numeric value of the ML}." If a value is greater than the ML, the permittee must report and use the actual value.

B. Effluent Limitations and Monitoring - Outfall 002

The permittee must limit and monitor discharges from outfall 002 as specified in the Table 3, below. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the table at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

1. Table 3

Table 3 - Outfall 002 Effluent Limitations and Monitoring Requirements					
Parameter[1]	Units	Effluent Limitations		Monitoring Requirements	
		Maximum Daily	Average Monthly	Sample Frequency[2]	Sample Type
Aluminum	ug/L	143	71	weekly	24 hr. comp.
Ammonia, Total	mg/L as N	3.5	1.7	weekly	Grab
Arsenic	ug/L	—	—	monthly	24 hr. comp.
Cadmium[3]	ug/L	0.2	0.1	weekly	24 hr. comp.
Copper[3]	ug/L	3.8	1.9	weekly	24 hr. comp.
Chromium, Total[4]	ug/L	—	—	weekly	24 hr. comp.
Chromium VI[3,4]	ug/L	16	8	---	24 hr. comp.
Iron	ug/L	1700	800	weekly	24 hr. comp.
Lead[3]	ug/L	0.9	0.5	weekly	24 hr. comp.
Manganese	ug/L	—	—	weekly	24 hr. comp.
Mercury[3, 5]	ug/L	0.02	0.01	weekly	24 hr. comp.
Nickel[3]	ug/L	26	13	weekly	24 hr. comp.
Selenium[3]	ug/L	8.2	4.1	weekly	24 hr. comp.
Silver[3]	ug/L	0.4	0.2	weekly	24 hr. comp.
Zinc[3]	ug/L	37	18	weekly	24 hr. comp.
TDS	mg/L	500	500	weekly	24 hr. comp.
TDS anions/cations	mg/L	—		quarterly	24 hr. comp.
Nitrates	mg/L	—		weekly	grab
Sulfates	mg/l	250	250	weekly	24 hr. comp.
Turbidity, effluent	NTU	see Permit Part 1.B.4.		weekly	grab
Turbidity, natural condition	NTU	—	—	weekly	grab
pH	s.u.	see Permit Part 1.B.3.		Continuous	Recorder
TSS	mg/L	20	30	daily	24 hr. comp.
Outfall Flow	gpm	1,100	—	Continuous	Recorder
Temperature	°C	—	—	weekly	grab
Hardness, as $CaCO_3$	mg/l	—	—	weekly	grab

Table 3 - Outfall 002 Effluent Limitations and Monitoring Requirements					
Parameter[1]	Units	Effluent Limitations		Monitoring Requirements	
		Maximum Daily	Average Monthly	Sample Frequency[2]	Sample Type
Chronic Whole Effluent Toxicity[6]	TU_c	1.6	1.1	Monthly	24 hr. comp.

1 - Parameters must be analyzed and reported as total recoverable unless otherwise indicated.
2 - Weekly sampling shall occur on the same day of each week, unless the Permittee can document that sampling could not be performed due to extreme conditions. In such cases, a detailed explanation of the reason sampling could not be preformed shall be prepared and kept with the analytical results for that day.
3 - Reporting of a maximum daily limit violation is required according to Permit Part III.G.
4 - Cr VI must be analyzed during the next sampling event when results are received showing a total chromium measure exceeding 11 ug/L - the sample holding time for Cr VI is 24 hours. Cr VI must be analyzed and reported as dissolved.
5 - Mercury must be analyzed and reported as total.
6 - See Permit Part I.D. for whole effluent toxicity testing requirements.

2. The permittee must not discharge any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.

3. The pH must not be less than 6.5 standard units (s.u.) nor greater than 8.5 standard units (s.u.). The Permittee shall monitor the total time outside the range for the month, the length of each excursion and the number of pH excursions outside the range of 6.5 to 8.5 Standard Units (s.u.). The Permittee shall report the total time outside the range for the month as well as the number of individual excursions which exceed 60 minutes.

4. The turbidity measured in nephelometric turbidity units (NTU) must not be more than 5 NTUs above the natural condition. The background level for turbidity shall be measured at a point upstream of the discharge point in the diversion around the TSF.

5. The permittee must collect effluent samples from the effluent stream after the last treatment unit prior to discharge into the receiving waters.

6. Minimum Levels. For all effluent monitoring, the permittee must use analytical methods that can achieve a minimum level (ML) less than the effluent limitation, if possible. For parameters that do not have effluent limitations, the permittee must use methods that can achieve MLs less than or equal to those specified in Table 6 (Permit Part I.E.1.).

7. Chromium VI has an average monthly effluent limit that is not quantifiable using EPA approved or approvable analytical methods. EPA will use 10 ug/L (the ML for EPA Method 218.4) as the compliance evaluation level for this parameter.

8. For purposes of reporting on the DMR, for a single sample, if a value is less

than the MDL, the permittee must report "less than {numeric value of the MDL}" and if a value is less than the ML, the permittee must report "less than {numeric value of the ML}." For purposes of calculating monthly averages, zero may be assigned for values less than the MDL, the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the permittee must report "less than {numeric value of the ML}." If a value is greater than the ML, the permittee must report and use the actual value.

C. Effluent Limitations and Monitoring Requirements - Outfall 003

The permittee must limit and monitor discharges from outfall 003 as specified in the Table 4, below. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the table at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

1. Table 4:

TABLE 4

Parameter	Units	Effluent Limitations			Monitoring Requirements	
		Maximum Daily	Average Monthly	Weekly Average	Sample Frequency	Sample Type
Flow	gpd	60,000	30,000	—	Daily	Recording
Biochemical Oxygen Demand (BOD_5)	mg/L	60	30	45	Weekly	Grab
Total Suspended Solids (TSS)	mg/L	60	30	45	Weekly	Grab
Fecal Coliform	#/100 ml	150,000	100,000	—	Weekly	Grab
Chlorine[1]	mg/L	0.02	—	—	Weekly	Grab
pH	s.u.	See Permit Part I.C.3.			Weekly	Grab
1 - Monitoring required only if chlorine is used. See Permit Part I.C.6., below.						

2. The permittee must not discharge any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.

3. The pH must not be less than 6.5 standard units (s.u.) nor greater than 8.5 standard units (s.u.).

4. Influent (prior to treatment) measures of BOD_5 and TSS shall be done on a quarterly basis. From this information, percent removal shall be calculated and reported on the DMR in January, April, July, and September for the previous quarter. Percent removal shall meet or exceed 85% for both

parameters.

5. The permittee must collect effluent samples from the effluent stream after the last treatment unit prior to discharge into the receiving waters.

6. If chlorine (Cl) is used for disinfection, the compliance evaluation level will be 0.1 mg/L as a daily maximum. The effluent limit for chlorine is not quantifiable using EPA approved analytical methods. The ML for EPA Methods 330.3 and 330.4 is 0.1 mg/L and is used as the compliance evaluation level for this parameter.

7. For purposes of reporting on the DMR, for a single sample, if a value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if a value is less than the ML, the permittee must report "less than {numeric value of the ML}." For purposes of calculating monthly averages, zero may be assigned for values less than the MDL, the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the permittee must report "less than {numeric value of the ML}." If a value is greater than the ML, the permittee must report and use the actual value.

8. The permittee is required to place signs along the beach near the mixing zone and outfall line for Outfall 003. The signs must provide the identity and telephone numbers of the permittee, must inform the public that a mixing zone exists, that treated wastewater is being discharged, and that users of the area should exercise caution.

9. The Permittee is required to inform ADEC and local fishing organizations of any upset in the treatment system likely to result in an exceedance of the permit limitations of Outfall 003.

D. Whole Effluent Toxicity Testing (WET) Requirements. The permittee must conduct chronic toxicity tests on effluent samples from outfall 001 and outfall 002. Testing must be conducted in accordance with subsections 1 through 6, below.

1. Toxicity testing must be conducted on 24-hour composite sample of the effluent. In addition, a split of each sample collected must be analyzed for the chemical and physical parameters required in Permit Part I.A. and B., above. The sample for toxicity testing should be of adequate size to accommodate the split sample. When the timing of sample collection coincides with that of the sampling required in Permit Parts I.A. and B., analysis of the split sample will fulfill the requirements of Permit Parts I.A. and I.B. as well.

2. Chronic Test Species and Methods

   a. The permittee shall perform chronic toxicity test on samples representative of the effluents discharged from Outfalls 001 and 002.

b. The permittee shall conduct one chronic toxicity test per month. Of the twelve annual tests:

Four tests shall be conducted using:

the fathead minnow, *Pimephales promelas* - static, renewal, larval survival and growth test;

Four tests shall be conducted using:

the water flea, *Ceriodaphnia dubia* - 7-day static renewal, survival and reproduction test;

Four tests shall be conducted using:

green algae, *Selanastrum capricornutum* - 4-day static, growth.

c. The presence of chronic toxicity must be determined as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002.

d. Results must be reported in TU_c (chronic toxic units), where $TU_c = 100/IC_{25}$. See Permit Part VI. for a definition of inhibition concentration (IC).

3. Quality Assurance

a. The toxicity testing on each organism must include a series of five test dilutions (e.g., 100%, 75%, 50%, 25%, and 12.5%) and a control.

b. All quality assurance criteria and statistical analyses used for chronic tests and reference toxicant tests must be in accordance with *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002. If logistical problems beyond the control of the permittee, prevent the delivery of a sample to the laboratory, the permitee may collect only two samples for WET testing and the acceptable sample holding times can be extended from 36 to 48 hours.

c. In addition to those quality assurance measures specified in the methodology, the following quality assurance procedures must be followed:

i) If organisms are not cultured in-house, concurrent testing with reference toxicants must be conducted. If organisms are cultured in-house, monthly reference toxicant testing is sufficient.

Reference toxicant tests must be conducted using the same test conditions as the effluent toxicity tests.

ii) If either of the reference toxicant tests or the effluent tests do not meet all test acceptability criteria as specified in the test methods manual, the permittee must re-sample and re-test within 14 days of receipt of the test results.

iii) Control and dilution water must be receiving water or lab water, as appropriate, as described in the manual. If the dilution water used is different from the culture water, a second control, using culture water must also be used. Receiving water may be used as control and dilution water upon notification of EPA and ADEC. In no case shall water that has not met test acceptability criteria be used for either dilution or control.

4. Accelerated Testing.

a. Initial Investigation. If the permittee demonstrates through an evaluation of facility operations that the cause of the exceedence is known and corrective actions have been implemented, only one accelerated test is necessary. If toxicity exceeding the limit is detected in this test, then the TRE requirements in Permit Part I.D.6. shall apply, or

b. If chronic toxicity is detected above the limits specified in Table 1 or Table 3 and no initial investigation is conducted or no cause is determined by an initial investigation then the permittee must conduct four more biweekly tests over an eight week period. This accelerated testing must be initiated within two weeks of receipt of the test results that indicate an exceedence.

c. The permittee must notify EPA and ADEC of the exceedence in writing within two weeks of receipt of the test results. The notification must include the following information:

i) A status report on any actions required by the permit, with a schedule for actions not yet completed.

ii) A description of any additional actions the permittee has taken or will take to investigate and correct the cause(s) of the toxicity.

iii) Where no actions have been taken, a discussion of the reasons for no taking action.

d. If none of the four accelerated tests exceed the toxicity limit, the permittee may return to the normal testing frequency. If any of the four tests exceed the limit, then the TRE requirements in Permit Part I.D.5., shall apply.

5. Toxicity Reduction Evaluation (TRE) and Toxicity Identification Evaluation (TIE):

   a. If chronic toxicity limits are exceeded during accelerated testing under Permit Part I.D.4., the permittee must initiate a toxicity reduction evaluation (TRE) in accordance with *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070) within two weeks of the receipt of the test results showing an exceedence. At a minimum, the TRE must include:

      i) Further actions to investigate and identify the cause of toxicity;

      ii) Actions the permittee will take to mitigate the impact of the discharge and to prevent the recurrence of toxicity; and

      iii) A schedule for these actions.

   b. If a TRE is initiated prior to completion of the accelerated testing, the accelerated testing schedule may be terminated, or used as necessary in performing the TRE.

   c. The permittee may initiate a Toxicity Identification Evaluation (TIE) as part of the TRE process. Any TIE must be performed in accordance with EPA guidance manuals, *Toxicity Identification Evaluation; Characterization of Chronically Toxic Effluents, Phase I* (EPA/600/6-91/005F), *Methods for Aquatic Toxicity Identification Evaluations, Phase II: Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA/600/R-92/080), and *Methods for Aquatic Toxicity Identification Evaluations, Phase III: Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA-600/R-92/081).

6. Reporting

   a. The permittee shall submit the results of the monthly toxicity tests in TU_c with the discharge monitoring report (DMR) for the month in which the results are received.

   b. The permittee must submit the results of any accelerated testing, under Permit Part I.D.4., within 2 weeks of receipt of the results from the lab. The full report must be submitted within 4 weeks of receipt of the results from the lab. If an initial investigation indicates the source of toxicity and accelerated testing is unnecessary, the result of the investigation must be submitted with the DMR for the month following completion of the investigation.

   c. The report of toxicity test results must include all relevant information outlined in Section 10, Report Preparation, of *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October

2002. In addition to toxicity test results, the permittee must report: dates of sample collection and initiation of each test; flow rate at the time of sample collection; the results of the monitoring required in Permit Parts I.A. and I.B.; and an explanation of logistical problems described in Permit Part I.D.3.b., if encountered.

E. **Receiving Water Monitoring.** The permittee must conduct the following receiving water monitoring program in the vicinity of the mine.

1. Water Column Monitoring

a. The permittee must conduct monthly monitoring at the following stations:

1) SL-B 10 m upstream of confluence with West Fork Slate Creek,
2) SL-C 30 m downstream of confluence with West Fork Slate Creek,
3) a newly named station that is representative of the flow diversion pipeline prior to commingling with the discharge from Outfall 002 (this could be within the diversion pipe and should be used as the background monitoring location for turbidity sampling).
4) Station 109 (or equivalent baseline location in Upper Sherman Creek),
5) Station 105,
6) a station downstream of Outfall 001,
7) a point in Johnson Creek immediately above the process area, and
8) a pont in Johnson Creek immediately below the process area.

The date, time, and weather conditions shall be recorded for each sample taken.

b. All ambient samples must be grab samples.

c. All samples must be analyzed for the parameters listed in Table 5, below to achieve MLs less than the effluent limitations of the limited parameters. For parameters not limited in Permit Parts I.A. or I.B., the MLs in Table 6 should be utilized.

Table 5
Receiving Water Monitoring Parameters

pH	TDS	Copper
Dissolved Oxygen	TSS	Manganese
Conductivity	Hardness	Mercury
Temperature	Aluminum	Nickel
Turbidity	Arsenic	Selenium
Total Ammonia	Cadmium	Silver
Nitrate	Chromium	Zinc
Sulfates	Lead	Color

Table 5 Receiving Water Monitoring Parameters		
Iron	Chlorides	
Ambient Monitoring shall be done in dissolved metals.		

Table 6: Addition MLs		
Parameter	Units	Minimum Level (ML)
Manganese	ug/L	10
Chromium, Total	ug/L	10

d. Quality assurance/quality control (QA/QC) plans for all the monitoring must be documented in the Quality Assurance Plan required under Permit Part I.F., "Quality Assurance Plan".

e. Results shall be included with the DMRs for the month samples were taken and all results shall be included in the Annual Water Quality Monitoring Summary (Permit Part I.E.4.). At a minimum, the monthly reports must include the following:

1) Dates of sample collection and analyses.
2) Results of sample analysis.
3) Relevant QA/QC information.

2. Sediment Monitoring

a. Samples shall be taken (1) immediately downstream of Outfall 001 and below the fish barrier in Sherman Creek, (2) immediately downstream of Outfall 002 and below the fish barrier in Slate Creek, and (3) immediately below the process area in Johnson Creek. If a site immediately downstream of the outfall or process area is not suitable for sample collection, the permittee shall sample at the nearest downstream site suitable for sampling.

b. One baseline sampling shall be conducted in Slate Creek prior to commencement of tailings disposal and in Johnson Creek prior to the initiation of process facility construction.

c. Sampling shall be conducted annually after the first baseline sample.

d. The Permittee shall monitor the parameters in Table 7 and shall achieve the listed detection levels for each sediment sample.

TABLE 7 Sediment Monitoring Parameters and Analytical Methods			
Parameter	Preparation Method	Analysis Method	Sediment MDL[1]
Aluminum (mg/kg)	PSEP[2]		

TABLE 7
Sediment Monitoring Parameters and Analytical Methods

Parameter	Preparation Method	Analysis Method	Sediment MDL[1]
Arsenic (mg/kg)	PSEP[2]	GFAA[3]	2.5
Cadmium (mg/kg)	PSEP[2]	GFAA[3]	0.3
Chromium (mg/kg)	PSEP[2]		
Copper (mg/kg)	PSEP[2]	ICP[4]	15.0
Lead (mg/kg)	PSEP[2]	ICP[4]	0.5
Mercury (mg/kg)	7471[5]	7471[5]	0.02
Nickel (mg/kg)	PSEP[2]	ICP[4]	2.5
Selenium (mg/kg)	PSEP[2]		
Silver (mg/kg)	PSEP[2]	GFAA[3]	0.2
Zinc (mg/kg)	PSEP[2]	ICP[4]	15.0
Acute Toxicity	see below	see below	NA
Total Solids (%)	-----	PSEP[2], pg 17	0.1
Total Volatile Solids (%)	-----	PSEP[2], pg 20	0.1
Total Organic Carbon (%)	-----	PSEP[2,6], pg 23	0.1
Total Sulfides (mg/kg)	-----	PSEP[2], pg 32	0.1
Grain Size	-----	Modified ASTM with Hydrometer	NA

1 Dry weight basis
2 Recommended Protocols for Measuring Selected Environmental Variables, in Puget Sound Estuary Program, EPA 910/9-86-157, as updated by Washington Department of Ecology; Subsection: Metals in Puget Sound Water, Sediment, and Tissue Samples
3 Graphite Furnace Atomic Absorption Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986
4 Inductively Coupled Plasma Emission Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986
5 Mercury Digestion and Cold Vapor Atomic Absorption Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986 The Permittee shall sample the receiving water hardness downstream of the discharge.
6 Recommended Methods for Measuring TOC in Sediments, Kathryn Bragdon-Cook Clarification Paper, Puget Sound Dredged Disposal Authority Annual Review, May, 1993.

e. Biological Testing of Sediments

1) Sediment samples will undergo acute toxicity testing to assess the relative toxicity of the sediment to representative aquatic life. The following bioassays are required:

- Test Method 100.1: Hyalella azteca 10-day survival test for sediments
- Test Method 100.2: Chironomus tentans 10-day survival test for sediments

2) Test methods, QA/QC, data recording, data analysis and calculations, and reporting shall be in accordance with Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, EPA/600/R-94/024.

Both Hyallella azteca and Chirmonous tentans are representative species for their respective classes of aquatic life.

f. The permittee shall collect sufficient sediment from each monitoring station to conduct all chemical and biological tests identified herein. Sediment samples shall consist of the upper two (2) centimeters of sediment. The minimum depth of sample penetration shall be four centimeters.

Sediment monitoring stations shall be located in areas where deposition is likely to occur (i.e. pools or moderately deep, slow-moving water with the surface not turbulent to the extent of being broken).

g. Sediment monitoring results shall be reported in the Annual Water Quality Monitoring Summary (see Permit Part I.E.4.) and must include, at a minimum: dates of sample collection and analyses, locations of samples collected, results of the monitoring required in Permit Parts I.E.2.d. and e., and relevant QA/QC information.

3. Aquatic Resource Monitoring

The Permittee shall monitor aquatic resources as described below and shall report results, including relevant quality assurance/quality control data, in the Annual Water Quality Monitoring Report.

a. Benthic Invertebrates

1) Benthic invertebrates shall be monitored using methods and locations established in baseline surveys in Sherman and Sweeny Creeks. The Permittee shall establish reaches to be sampled in Slate and Johnson Creeks that are representative of potential project impacts. Sweeny Creek data will provide baseline data for benthic invertebrates. Sherman Creek data shall be collected downstream of mine discharges to assess potential impacts.

For Sherman and Sweeny Creeks, two reaches in each creek shall be sampled. For Slate and Johnson Creeks, one reach shall be sampled. Sweeny Creek reaches shall be those identified in <u>Reconnaissance Photograph Study of Sherman and Sweeny Creeks, Located Near the Kensington Mine, Alaska, During Mid-July 1991</u> (Konopacky Environmental, January 1992).

Each reach shall be delineated for all possible sampling sites (those areas containing stream substrate with particles <20 cm along the long axis). Every third or fourth sampling site shall be sampled until a total of 6 samples is obtained for each reach.

2) Samples shall be collected using a 0.093 m^2 Surber sampler equipped with a 300-micron mesh collection net. Collected samples shall be placed in labeled plastic containers and preserved with 70 percent ethyl alcohol. Samples shall be enumerated and identified to the generic level (except for oligochaetes to order). For each sample the following shall be calculated: density per unit area, Shannon Diversity and Evenness indices, EPT (epheropterans, plecopterans, and tricopterans), and number of EPT taxa.

3) Sampling shall be conducted once during the construction period and annually thereafter. Surveys shall be conducted between late March and the end of May, after spring breakup (ice out) and before peak snowmelt.

b. Resident Fish Monitoring - Population Status

1) Abundance and condition of Dolly Varden char in Sherman, Slate and Johnson Creeks shall be monitored annually using snorkel observations, electroshocking techniques, or other appropriate techniques. Surveys shall be conducted in lower, middle and upper Sherman Creek as identified in <u>Presence-Absence Survey for Fish in Small Unnamed Streams, Located In and Near the Area Proposed for the Dry Tailings Storage Facility Associated with the Kensington Mine, Alaska, During May 1996</u> (Konopacky Environmental, May 1996). Similar locations shall be identified in Slate and Johnson Creeks. These surveys shall focus on fish greater than 25 mm. Data to be derived from these surveys shall include: (1) population estimates by species, habitat type and stratum, and (2) condition factor by stratum.

2) Monitoring shall be conducted annually between August 1 and September 15. Data shall be collected so that statistical comparisons can be made with the previous baseline data. Estimates shall be made of the variability of the data, including minimum detectable differences between samples as well as the precision of the 95 percent confidence interval. This information shall be used to refine or revise sampling protocols during the construction and operations phase.

c. Anadromous Fish Monitoring

1) Abundance of Spawning Salmon and Survival of Embryos

a) Annual surveys of spawning salmon in Sherman, Slate, and Johnson creeks shall be conducted to assess the size of the escapement. Surveys shall consist of weekly stream counts throughout the spawning season documenting the distribution of salmon within the surveyed areas.

b) Outmigrating juvenile pink salmon from the Sherman, Slate, and Johnson creek drainages will be sampled during the spring following each year of adult counts. These counts are to be conducted in April until population counts diminish. Quantitative methods, such as a screw trap or inclined plane trap will be used to estimate the relationship between adult escapement and fry protection

2) Quality of Spawning Substrate

The quality of spawning substrate used by pink salmon shall be monitored annually to detect possible changes caused by potential introduction of fine sediments into lower Sherman, Slate, and Johnson Creeks. Sediment samples shall be collected in July prior to spawning activity. Four replicate samples shall be collected from 2 locations in each creek using a McNeil-type sampler, using techniques and locations comparable to those in Konopacky (1992). Reaches 1 and 3, as defined in Konopacky reports, shall be the sampling locations for Sherman Creek. The geometric mean particle size will be calculated for each sample.

d. Aquatic Vegetation

Annual visual surveys of aquatic vegetation in Sherman, Slate, and Johnson Creeks downstream of the discharges or project area shall be conducted during summer months. Evidence of algal mats, vegetation die-off, and/or other visible impacts shall be reported.

e. Aquatic resource monitoring results shall be reported in the Annual Water Quality Monitoring Summary (see Permit Part I.E.4.) and must include, at a minimum: dates of sample collection and analyses, locations of samples collected, results of all monitoring required in Permit Parts I.E.3., and relevant QA/QC information.

4. All discharge and receiving water monitoring results for the year must be included in an Annual Water Quality Monitoring Summary and submitted by March 1 for the previous year. The report must include a presentation of the analytical results and an evaluation of the results. The evaluation must include an electronic spreadsheet containing all historical data, a graphical presentation of the data at each monitoring station, a comparison of upstream and downstream monitoring results (to show any differences) and a comparison of monitoring results for each station over time (to show any trends). This annual report may reference the monthly reports for QA/QC information.

F. Quality Assurance Plan (QAP). The permittee must develop a quality assurance plan (QAP) for all monitoring required by this permit. The QAP may be contained in an overall monitoring plan for the entire project. The QAP, or the QAP portion of an overall monitoring plan, must be submitted to EPA and ADEC for review and approval within 60 days of the effective date of this permit and implemented within 120 days of the effective date of this permit. Any existing QAPs may be modified for submittal under this section.

1. The QAP must be designed to assist in planning for the collection and analysis of effluent and receiving water samples in support of the permit and in explaining data anomalies when they occur.

2. Throughout all sample collection and analysis activities, the permittee must use the EPA-approved QA/QC and chain-of-custody procedures described in *Requirements for Quality Assurance Project Plans* (EPA/QA/R-5) and

Guidance for Quality Assurance Project Plans (EPA/QA/G-5). The QAP must be prepared in the format which is specified in these documents.

3. The permittee must amend the QAP whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QAP.

4. Copies of the QAP must be kept on site and made available to EPA and/or ADEC upon request.

II. BEST MANAGEMENT PRACTICES PLAN

A. Purpose. Through implementation of the best management practices (BMP) plan the permittee must prevent or minimize the generation and the potential for the release of pollutants from the facility to the waters of the United States through normal and ancillary activities.

B. Development and Implementation Schedule. The permittee must develop and implement a BMP Plan which achieves the objectives and the specific requirements listed below. A copy of the BMP Plan must be submitted to EPA and ADEC within 120 days of the effective date of the permit. Any existing BMP plans may be modified for submittal and approval under this section. The BMP Plan may be included as part of a project wide document. The permittee must implement the provisions of the plan as conditions of this permit within 180 days of the effective date of this permit.

C. Objectives. The permittee must develop and amend the BMP Plan consistent with the following objectives for the control of pollutants.

1. The number and quantity of pollutants and the toxicity of effluent generated, discharged or potentially discharged at the facility must be minimized by the permittee to the extent feasible by managing each waste stream in the most appropriate manner.

2. Under the BMP Plan and any Standard Operating Procedures included in the BMP Plan, the permittee must ensure proper operation and maintenance of water management and wastewater treatment systems. BMP Plan elements must be developed in accordance with good engineering practices.

3. Each facility component or system must be examined for its waste minimization opportunities and its potential for causing a release of significant amounts of pollutants to waters of the United States due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc. The examination must include all normal operations and ancillary activities including material storage areas, storm water, in-plant transfer, material handling and process handling areas, loading or unloading operations, spillage or leaks, sludge and waste disposal, or drainage from raw material storage.

D. Elements of the BMP Plan. The BMP Plan should be consistent with the objectives above and the general guidance contained in *Guidance Manual for Developing Best Management Practices* (EPA 833-B-93-004, October 1993) and *Storm Water Management For Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006) or any subsequent revision to these guidance documents. The BMP Plan must include, at a minimum, the following items:

1. Plan Components.

   a. Statement of BMP policy. The BMP Plan must include a statement of management commitment to provide the necessary financial, staff, equipment, and training resources to develop and implement the BMP Plan on a continuing basis.

   b. Structure, functions, and procedures of the BMP Committee. The BMP Plan must establish a BMP Committee responsible for developing, implementing, and maintaining the BMP Plan.

   c. Description of potential pollutant sources.

   d. Risk identification and assessment.

   e. Standard operating procedures to achieve the above objectives and specific best management practices (see below) and

   f. Reporting of BMP incidents. The reports must include a description of the circumstances leading to the incident, corrective actions taken and recommended changes to operating and maintenance practices to prevent recurrence.

   g. Materials compatibility.

   h. Good housekeeping.

   i. Inspections.

   j. Preventative maintenance and repair.

   k. Security

   l. Employee training.

   m. Recordkeeeping and reporting.

   n. Prior evaluation of any planned modifications to the facility to ensure that the requirements of the BMP plan are considered as part of the modifications.

o. Final constructed site plans, drawings and maps (including detailed storm water outfall/culvert configurations).

2. Specific Best Management Practices. The BMP Plan must establish specific BMPs or other measures to achieve the objectives under Permit Part II.C. and which ensure that the following specific requirements are met:

   a. Solids, sludges, or other pollutants removed in the course of treatment or control of water and wastewaters must be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

   b. Ensure proper management of solid and hazardous waste in accordance with regulations promulgated under the Resource Conservation and Recovery Act (RCRA). Management practices required under RCRA regulations must be referenced in the BMP Plan.

   c. Ensure proper management of materials in accordance with Spill Prevention, Control, and Countermeasure (SPCC) plans under Section 311 of the Act and 40 CFR Part 112. The BMP Plan may incorporate any part of such plans into the BMP Plan by reference.

   d. Proper explosives management to minimize contamination of mine drainage with ammonia, nitrate and other explosives residuals.

3. Review and Certification. The BMP Plan must be reviewed and certified as follows:

   a. Annual review by the plant manager and BMP Committee.

   b. Certified statement that the above reviews have been completed and that the BMP Plan fulfills the requirements set forth in this permit. The statement must be certified by the dated signatures of each BMP Committee member. The statement must be submitted to EPA and ADEC on or before January 31st of each year of operation under this permit after the initial BMP submittal (the initial statement must be submitted to EPA and ADEC six months after submittal of the BMP Plan).

E. Documentation. The permittee must maintain a copy of the BMP Plan at the facility and make it available to EPA, ADEC or an authorized representative upon request.

F. BMP Plan Modification.

1. The permittee must amend the BMP Plan whenever there is a change in the facility or in the operation of the facility which materially increases the generation of pollutants or their release or potential release to surface waters.

2. The permittee must amend the BMP Plan whenever it is found to be ineffective in achieving the general objective of preventing and minimizing the generation and the potential for the release of pollutants from the facility to the waters of the United States and/or the specific requirements above.

3. Any changes to the BMP Plan must be consistent with the objectives and specific requirements listed above. All changes in the BMP Plan must be reported to EPA and ADEC with the annual certification required under Permit Part D.3., above.

III. MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Representative Sampling (Routine and Non-Routine Discharges).

Samples and measurements must be representative of the volume and nature of the monitored discharge.

In order to ensure that the effluent limits set forth in this permit are not violated at times other than when routine samples are taken, the permittee must collect additional samples at the appropriate outfall whenever any discharge occurs that may reasonably be expected to cause or contribute to a violation that is unlikely to be detected by a routine sample. The permittee must analyze the additional samples for those parameters limited in Permit Part I.A. of this permit that are likely to be affected by the discharge.

The permittee must collect such additional samples as soon as the spill, discharge, or bypassed effluent reaches the outfall. The samples must be analyzed in accordance with paragraph III.C ("Monitoring Procedures"). The permittee must report all additional monitoring in accordance with paragraph III.D ("Additional Monitoring by Permittee").

B. Reporting of Monitoring Results. The permittee must summarize monitoring results each month on the Discharge Monitoring Report (DMR) form (EPA No. 3320-1) or equivalent. The permittee must submit reports monthly, postmarked by the 20th day of the following month. The permittee must sign and certify all DMRs, and all other reports, in accordance with the requirements of Permit Part V.E. of this permit ("Signatory Requirements"). The permittee must submit the legible originals of these documents to the Director, Office of Water, with copies to ADEC at the following addresses:

USEPA Region 10 1200 Sixth Avenue, OW-133 Seattle, Washington 98101	ADEC Division of Water 410 Willoughby, Suite 303 Juneau, Alaska 99801

C. Monitoring Procedures. Monitoring must be conducted according to test procedures approved under 40 CFR 136, unless other test procedures have been specified in this permit.

D. **Additional Monitoring by Permittee**. If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the permittee must include the results of this monitoring in the calculation and reporting of the data submitted in the DMR.

E. **Records Contents**. Records of monitoring information must include:

1. the date, exact place, and time of sampling or measurements;
2. the individual(s) who performed the sampling or measurements;
3. the date(s) analyses were performed;
4. the individual(s) who performed the analyses;
5. the analytical techniques or methods used; and
6. the results of such analyses.

F. **Retention of Records**. The permittee must retain records of all monitoring information, including, all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, copies of DMRs, a copy of the NPDES permit, and records of all data used to complete the application for this permit, for a period of at least five years from the date of the sample, measurement, report or application. This period may be extended by request of the Director or ADEC at any time.

G. **Twenty-four Hour Notice of Noncompliance Reporting**

1. The permittee must report the following occurrences of noncompliance by telephone within 24 hours from the time the permittee becomes aware of the circumstances:

   a. any noncompliance that may endanger health or the environment;

   b. any unanticipated bypass that exceeds any effluent limitation in the permit (See Permit Part IV.F., "Bypass of Treatment Facilities");

   c. any upset that exceeds any effluent limitation in the permit (See Permit Part IV.G., "Upset Conditions"); or

   d. any violation of a maximum daily discharge limitation for any of the pollutants in Table 1 of Permit Part I.A.

2. The permittee must also provide a written submission within five days of the time that the permittee becomes aware of any event required to be reported under subpart 1 above. The written submission must contain:

   a. a description of the noncompliance and its cause;

   b. the period of noncompliance, including exact dates and times;

c. the estimated time noncompliance is expected to continue if it has not been corrected; and

d. steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

3. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the NPDES Compliance Hotline in Seattle, Washington, by telephone, (206) 553-1846.

4. Reports must be submitted to the addresses in Permit Part III.B ("Reporting of Monitoring Results").

H. Other Noncompliance Reporting. The permittee must report all instances of noncompliance, not required to be reported within 24 hours, at the time that monitoring reports for Permit Part III.B ("Reporting of Monitoring Results") are submitted. The reports must contain the information listed in Permit Part III.G.2 of this permit ("Twenty-four Hour Notice of Noncompliance Reporting").

I. Changes in Discharge of Toxic Substances. The permittee must notify the Director and ADEC as soon as it knows, or has reason to believe:

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in the permit, if that discharge may reasonably be expected to exceed the highest of the following "notification levels":

   a. One hundred micrograms per liter (100 ug/L);

   b. Two hundred micrograms per liter (200 ug/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/L) for 2,4-dinitrophenol and for 2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

   c. Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

   d. The level established by the Director in accordance with 40 CFR 122.44(f).

2. That any activity has occurred or will occur that would result in any discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in the permit, if that discharge may reasonably be expected to exceed the highest of the following "notification levels":

   a. Five hundred micrograms per liter (500 ug/L);

   b. One milligram per liter (1 mg/l) for antimony;

c. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

d. The level established by the Director in accordance with 40 CFR 122.44(f).

J. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.

IV. COMPLIANCE RESPONSIBILITIES

A. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

B. Penalties for Violations of Permit Conditions

1. Civil and Administrative Penalties. Pursuant to 40 CFR Part 19 and the Act, any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $32,500 per day for each violation).

2. Administrative Penalties. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Pursuant to 40 CFR 19 and the Act, administrative penalties for Class I violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $11,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $27,500). Pursuant to 40 CFR 19 and the Act, penalties for Class II violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $11,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $157,500).

3. Criminal Penalties:

   a. Negligent Violations. The Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both.

   b. Knowing Violations. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

   c. Knowing Endangerment. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

   d. False Statements. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

C. **Need to Halt or Reduce Activity not a Defense**. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this permit.

D. **Duty to Mitigate**. The permittee must take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

E. **Proper Operation and Maintenance**. The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

F. **Bypass of Treatment Facilities**

1. Bypass not exceeding limitations. The permittee may allow any bypass to occur that does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2 and 3 of this Permit Part.

2. Notice.

   a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it must submit prior notice, if possible at least 10 days before the date of the bypass.

   b. Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required under Permit Part III.G ("Twenty-four Hour Notice of Noncompliance Reporting").

3. Prohibition of bypass.

   a. Bypass is prohibited, and the Director may take enforcement action against the permittee for a bypass, unless:

      i) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

      ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance; and

iii) The permittee submitted notices as required under paragraph 2 of this Permit Part.

b. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 3.a. of this Permit Part.

G. Upset Conditions

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee meets the requirements of paragraph 2 of this Permit Part. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

2. Conditions necessary for a demonstration of upset. To establish the affirmative defense of upset, the permittee must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a. An upset occurred and that the permittee can identify the cause(s) of the upset;

   b. The permitted facility was at the time being properly operated;

   c. The permittee submitted notice of the upset as required under Permit Part III.G, "Twenty-four Hour Notice of Noncompliance Reporting;" and

   d. The permittee complied with any remedial measures required under Permit Part IV.D, "Duty to Mitigate."

3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

H. Toxic Pollutants. The permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

I. Planned Changes. The permittee must give notice to the Director and ADEC as soon as possible of any planned physical alterations or additions to the permitted facility whenever:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as determined in 40 CFR 122.29(b); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in the permit, nor to notification requirements under Permit Part III.I ("Changes in Discharge of Toxic Substances").

J. **Anticipated Noncompliance**. The permittee must give advance notice to the Director and ADEC of any planned changes in the permitted facility or activity that may result in noncompliance with this permit.

V. GENERAL PROVISIONS

A. **Permit Actions**. This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 122.62, 122.64, or 124.5. The filing of a request by the permittee for a permit modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

B. **Duty to Reapply**. If the permittee intends to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. In accordance with 40 CFR 122.21(d), and unless permission for the application to be submitted at a later date has been granted by the Regional Administrator, the permittee must submit a new application at least **180 days before the expiration date of this permit**.

C. **Duty to Provide Information**. The permittee must furnish to the Director and ADEC, within the time specified in the request, any information that the Director or ADEC may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee must also furnish to the Director or ADEC, upon request, copies of records required to be kept by this permit.

D. **Other Information**. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or that it submitted incorrect information in a permit application or any report to the Director or ADEC, it must promptly submit the omitted facts or corrected information.

E. **Signatory Requirements**. All applications, reports or information submitted to the Director and ADEC must be signed and certified as follows.

1. All permit applications must be signed as follows:

    a. For a corporation: by a responsible corporate officer.

    b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.

c. For a municipality, state, federal, or other public agency: by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Director or ADEC must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above;

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and

   c. The written authorization is submitted to the Director and ADEC.

3. Changes to authorization. If an authorization under Permit Part V.E.2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Permit Part V.E.2. must be submitted to the Director and ADEC prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this Permit Part must make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

F. Availability of Reports. In accordance with 40 CFR 2, information submitted to EPA pursuant to this permit may be claimed as confidential by the permittee. In accordance with the Act, permit applications, permits and effluent data are not considered confidential. Any confidentiality claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice to the permittee. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR 2, Subpart B (Public Information) and 41 Fed. Reg. 36902 through 36924 (September 1, 1976), as amended.

G. **Inspection and Entry**. The permittee must allow the Director, ADEC, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

H. **Property Rights**. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, nor any infringement of state or local laws or regulations.

I. **Transfers**. This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act. (See 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory).

J. **State Laws**. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Act.

VI. DEFINITIONS

1. "Act" means the Clean Water Act.

2. "ADEC" means Alaska Department of Environmental Conservation.

3. "Administrator" means the Administrator of the EPA, or an authorized representative.

4. “Average monthly discharge limitation” means the highest allowable average of “daily discharges” over a calendar month, calculated as the sum of all “daily discharges” measured during a calendar month divided by the number of “daily discharges” measured during that month.

5. “Best Management Practices” (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of wasters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage areas.

6. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

7. “Chronic toxic unit” (“TU_c”) is a measure of chronic toxicity. The number of chronic toxic units in the effluent is calculated as $100/IC_{25}$ where the IC is measured in percent effluent.

8. “Daily discharge” means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

9. “Director” means the Director of the Office of Water, EPA, or an authorized representative.

10. “DMR” means discharge monitoring report.

11. “EPA” means the United States Environmental Protection Agency.

12. “Grab" sample is an individual sample collected over a period of time not exceeding 15 minutes.

13. “Inhibition concentration”, IC, is a point estimate of the toxicant concentration that causes a given percent reduction (p) in a non-quantal biological measurement (e.g., reproduction or growth) calculated from a continuous model (e.g., Interpolation Method).

14. "Maximum daily discharge limitation" means the highest allowable "daily discharge."

15. “Method Detection Limit (MDL)” means the minimum concentration of a substance (analyte) that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

16. “Minimum Level (ML)” means the concentration at which the entire analytical system must give a recognizable signal and an acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.

17. “QA/QC” means quality assurance/quality control.

18. “Regional Administrator” means the Regional Administrator of Region 10 of the EPA, or the authorized representative of the Regional Administrator.

19. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

20. “Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Appendix A: Maps showing sampling locations will be included in the final.

See last 3 pages of the File named D-1b pages 3-5.pdf for the maps included in the permit.

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

SEAN PARNELL, GOVERNOR

802 3rd Street, Douglas
P.O. BOX 110024
JUNEAU, AK 99811-0024
PHONE: (907) 465-4105
FAX: (907) 465-4759

June 9, 2010

Kenwyn George
Alaska Department of Environmental Conservation
Division of Water
410 Willoughby Ave., Suite 303
Juneau, Alaska 99801

RE: Kensington Gold Project APDES Draft Permit AK-005057-1

Dear Mr. ~~George~~: Kenwyn

Alaska Department of Fish and Game Division of Habitat (Habitat) biologists reviewed the draft Alaska Pollutant Discharge Elimination System (APDES) permit (AK-005057-1) and Fact Sheet for the Kensington Gold Project. The proposed permit renewal would authorize continued use of Outfall 001 in Sherman Creek and Outfall 002 in East Fork Slate Creek. Outfall 001 discharges treated water from the underground mine workings, while Outfall 002 discharges treated water from the Tailings Treatment Facility (TTF).

The permit renewal contains several modifications to the aquatic biological monitoring requirements, most of which resulted from recommendations provided by Habitat biologists. Our recommendations for the annual monitoring are based on available data, stream-specific considerations, and reasonable foreseeable potential for adverse effects to occur from the project. Should any results of the required monitoring suggest that aquatic life may be affected from the discharges, we would work with you to determine if additional aquatic studies are necessary to document stream health following the incident(s). In addition, Habitat can require aquatic resource sampling to provide information about impact(s) to fishery resources and habitats.[1]

In the last several months, we've worked with a federal Marine Mammal Biologist, Habitat Conservation Biologist, Environmental Contaminants Biologist, and the Southeast Alaska Conservation Council's Clean Water Specialist to review the data collected to date by Coeur Alaska Inc. (2006-2008) and Aquatic Science Inc. (2009-2011), discuss the biological monitoring requirements in the current 2005 National Pollutant Discharge Elimination System (NPDES) permit, and discuss the rationale for our proposed changes in the APDES permit. This letter contains the data analyses and rationale that support our recommendations for the aquatic studies that should be included in the APDES permit.

Following are the aquatic biological monitoring studies listed in the draft APDES permit (*in italics*) and Habitat's recommendations for the final permit:

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[1] Pursuant to Alaska Statute (AS) 16.05.841 and AS 16.05.871.

1.5.2 Sediment Monitoring and Biological Testing

Annually sample sediment in 1) the inlet creek to Upper Slate Lake, 2) East Fork Slate Creek, 3) Lower Slate Creek, and 4) Johnson Creek.

In the 2005 NPDES permit, sediment monitoring and biological testing was required in 1) East Fork Slate Creek (EFSC), 2) Lower Slate Creek, 3) Johnson Creek, 4) Middle Sherman Creek, and 5) Lower Sherman Creek. In the Slate Creek system, Habitat recommends retaining the sediment testing given the location of the TTF, and adding a sample reach in the inlet to Upper Slate Lake to provide reference data for comparing data collected downstream. Under the 2005 NPDES permit, sampling was only completed in EFSC during 2010 as sediment sufficient for sampling is uncommon in that reach. Of the eleven metals tested in 2010, only two were lower in EFSC than Lower Slate Creek (Cd and Hg). Sampling may also be difficult in the inlet to Upper Slate Lake as gravel is the dominant substrate, however, any data that is collected may assist with further interpretation of downstream data. We will review this sampling recommendation during the next permit renewal period to determine if further sampling would be useful.

We recommend discontinuing sampling in Johnson Creek as there are no discharges to the creek and project operations are unlikely to contribute metal loading. Ore is not transported on the adjacent road, concentrate produced at the Mill is transported in sealed containers, production rock stored at the Jualin portal is largely inert, major construction at the upper camp is complete, and sediment metals concentrations were stable between 2005 and 2010 during project construction. In addition, natural seeps containing metal-laden groundwater drain into upper Johnson Creek, which could influence results and not reflect project effects. There are two bridges that cross Johnson Creek that can be a source of sediment into Johnson Creek. We will work with Coeur to ensure Best Management Practices are implemented to reduce sediment input from those sources. For these reasons, we do not support continuing sediment monitoring in Johnson Creek.

In Sherman Creek, we recommend discontinuing sediment toxicity testing as sediment metals concentrations between 2005 and 2010 were stable during project construction. Though ore was not processed through the Mill during this period, mining activity was occurring underground at a smaller scale representative of full operations. Water quality monitoring of the effluent and receiving waters and permit limits further alleviate the need for sampling in Sherman Creek. Should any exceedances occur that are likely to change metals concentrations in Sherman Creek, we may request sediment testing to document conditions and detect change.

1.5.3.2 Benthic Invertebrates

Annually sample benthic macroinvertebrates in 1) the inlet creek to Upper Slate Lake, 2) East Fork Slate Creek, 3) West Fork Slate Creek, and 4) Sherman Creek.

In the 2005 NPDES permit, benthic macroinvertebrate sampling was required in 1) Slate Creek, 2) Johnson Creek, and two reaches each in 3) Sherman Creek, and 4) Sweeny Creek. In the Slate Creek system, Habitat recommends increasing the number of sample reaches from one to four. Samples collected from the inlet creek to Upper Slate Lake will provide local reference data, while samples from West Fork Slate Creek (WFSC) will provide additional reference data in an adjacent drainage where mine development and operations do not occur. The benthic invertebrate community in

WFSC may be different than in EFSC and Lower Slate Creek as no lakes are present upstream, however results may be comparable to those from the inlet to Upper Slate Creek. Samples collected between 2004 and 2010 in Lower Slate Creek contained more pollution-sensitive than less-sensitive taxa, generally comprising more than 60% of the sample, except in 2007 when less-sensitive taxa represented more than 50% of samples.

Between 2004 and 2010, the density and total number of benthic macroinvertebrate taxa in samples from upper Johnson Creek increased, and pollution-sensitive taxa represented 65-85% of samples. There are no outfalls to the creek and major construction at the upper camp is complete. Sufficient data was collected during construction under the 2005 NPDES permit and further monitoring is not warranted as there are no discharges to the creek and project operations are unlikely to contribute metal loading (see 1.5.2).

Benthic macroinvertebrate samples collected in both reaches of Sherman Creek between 2006 and 2010 had similar densities, except in 2010 when the mean density was several times more than the mean for each of the previous four years. Pollution-sensitive taxa have generally comprised 70-90% of samples in both reaches, except in 2009 and 2010 when pollution-sensitive taxa comprised 58-65% of samples. Comparing the two sample reaches, density and numbers of taxonomic groups are similar between years. Because of Outfall 001 in Sherman Creek and the recent changes in composition of benthic macroinvertebrate communities, we support continued monitoring of the benthic macroinvertebrate communities in the two established reaches in Sherman Creek.

Benthic macroinvertebrate samples collected in both reaches of Sweeny Creek between 2006 and 2010 had similar densities and number of taxa present. No mine development occurs in the Sweeny Creek watershed, thus monitoring benthic macroinvertebrate communities is unrelated to the project and unnecessary. Further, sufficient baseline and monitoring data was collected in Sherman Creek during the years 1991, 1995, 2000-2002 and 2006-2010 to track change over time, and data from Sweeny Creek is not an ideal reference site for comparison because it's a separate system, generally has fewer taxa than Sherman Creek, and baseline data from Sherman Creek can be used to evaluate data trends. Therefore, we support discontinuing benthic macroinvertebrate sampling in Sweeny Creek.

1.5.3.3 Resident Fish Monitoring – Population Status

Annually sample abundance and condition of Dolly Varden char in 1) the inlet to Upper Slate Lake and 2) EFSC.

In the 2005 NPDES permit, abundance estimates and condition of resident fish populations were required in the upper, middle and lower reaches of Slate Creek, Johnson Creek and Sherman Creek. Combined fish populations for all reaches in each creek have generally increased since 2006, and the condition factor (K) of Dolly Varden has remained fairly stable in each reach, generally exceeding 0.8.

We recommend continued monitoring of resident fish populations in the inlet to Upper Slate Lake, to provide reference data, and in EFSC downstream of the TTF. We assume that fish residing in EFSC originated from Upper Slate Lake, traveled downstream via the diversion pipeline, and do not reside in EFSC year-round as available habitats are unlikely to support a long-term population. The purposes for monitoring the resident fish population are 1) presence/absence and to 2) study the outmigration rate of resident Dolly Varden from Upper Slate Lake, which will be helpful in designing the final TTF Reclamation Plan at closure. We do not recommend sampling in Lower Slate Creek as Dolly Varden present in the anadromous reach could be anadromous and from another system in Berners Bay, which would not represent a true resident fish population.

In Johnson Creek, sufficient baseline data was collected during construction under the 2005 NPDES permit during years 2005-2010 and further monitoring is not warranted as there are no discharges to the creek and project operations are unlikely to cause changes to resident fish populations downstream (see 1.5.2). Therefore, we support discontinuing resident fish surveys.

In Sherman Creek, sufficient baseline data was collected during the years 1998-2002 and sufficient monitoring data was collected between 2005 and 2010 when some underground mining activity was occurring. Except for access roads, the Comet water treatment plant, Outfall 001, and fairly inert production rock stored adjacent to Ophir Creek, no mine development or operations occur near Sherman Creek. Because the outfall water quality is closely monitored to meet water quality standards, and because little development related to the project occurs near Sherman Creek, we support discontinuing resident fish surveys in Sherman Creek.

We also recommend the methods included in 1.5.3.3.1 be unrestrictive, allowing other population survey methods to be used. To estimate fish abundance, baited minnow traps may be more advantageous than snorkeling and electroshocking in certain stream types (Bryant 2000). In addition, we recommend only requiring reporting of population estimates by reach (stratum), not by habitat type as this level of detail is not necessary for population monitoring purposes.

1.5.3.4 Resident Fish Monitoring – Whole Body Metal Analysis

Annually retain six juvenile Dolly Varden for whole body metals concentrations of Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn in 1) the inlet of Upper Slate Creek, 2) EFSC, and 3) Lower Slate Creek.

This study was not a requirement in the 2005 NPDES permit. This requirement will provide additional data on metals concentrations in juvenile fish within the Slate Creek watershed. There are many sampling limitations for this study, including:

1) We assume juvenile fish in EFSC originated from Upper Slate Lake, therefore residency time downstream of the TTF will be unknown; and
2) Juvenile fish sampled from Lower Slate Creek may not be native to Slate Creek as fry and presmolt may migrate between streams in Berners Bay. To improve confidence of residency time in the lower reach, fish should be captured as far upstream from the mouth as possible.

Because of these limitations, we considered recommending aquatic macroinvertebrate tissue analyses for metals concentrations instead of juvenile fish to improve residency integrity. Aquatic macroinvertebrates, however, can retain higher concentrations of metals than fish, depending on physical structure, and some invertebrate structures cannot be digested by fish (Aquatic Science Inc 2000). Therefore, aquatic macroinvertebrates metals concentrations may not be appropriate to directly assess metal bioaccumulations in resident juvenile Dolly Varden, the target species.

Given the possible complications with this proposed monitoring component, we will reassess whether or not to continue this study after a three year trial period.

1.5.3.5 Anadromous Fish Monitoring

Annually estimate pink salmon escapement and the number of outmigrating pink salmon fry in Slate Creek, and estimate egg-to-fry survival. In addition, sample pink salmon spawning substrate in Lower Slate Creek to determine particle size distribution and the calculate geometric mean size.

In the 2005 NPDES permit, the anadromous fish surveys and spawning habitat sampling were required in Sherman Creek, Johnson Creek and Slate Creek. We recommend discontinuing sampling in all three creeks because fry mortalities caused by the required sample design are unacceptable, since the study does not provide useful data to detect change caused by mining operations and development upstream. However, Habitat does support monitoring pink salmon substrate composition in Lower Slate Creek to detect changes in anadromous fish spawning habitat downstream of mine development and operations at the TTF.

Pink salmon escapement and fry outmigration estimates are highly variable between years. Escapement data collected during the years 2005-2011[2] for Slate and Johnson Creeks illustrate weak (odd year) and strong (even year) parent year trends, except in Johnson Creek during 2010, and the Sherman Creek escapement data does not show a trend. Comparing all streams between years, egg-to-fry survival rates between 2005 and 2006 were relatively low (<1-13%), and much higher than expected (11-34%) for the following five years, except in Johnson Creek during 2008 and 2009 when an average, expected survival rate of 11-15% was estimated. Low survival between 2005 and 2006 is believed to be due to a heavy rainstorm in November that caused significant substrate movement and flooding across northern southeast Alaska. Overall, the geometric mean particle size calculated from samples collected in Slate and Johnson Creeks was similar among years for 2005-2010, and some statistical differences are present in samples collected from Sherman Creek between years during the same period.

Methods used to estimate fry outmigration since 2005 do not provide accurate data, and excessive fry mortalities are caused from the sample design each year. For instance, fyke nets used to capture pink fry do not cover the same percentage of the stream in any 24 hour sampling period given stream characteristics and variable discharge rates. Additionally, occasional mark-recapture experiments using a small percentage of captured fish skews estimates produced from the data and result in additional mortalities. Net mesh also allows an unknown number of pink fry to pass undetected and causes mortalities, especially during high flows when debris caught in the net causes fry to be impinged or gilled and water pressure entrains fish against the holding box.

In 2011, a total of 305,568 pink fry were captured in Sherman Creek, Johnson Creek and Slate Creek, of which 11,877 were found dead within the fyke net (3.7%).[2] Of these mortalities, approximately 6,000 fry were killed in two separate events in Slate Creek during late-April when the stream level rose overnight due to heavy rainfall. Quinn (2005) reports the average pink salmon smolt-to-adult survival is 2.8%, which could result in the combined 2012 pink run for all three creeks reduced by 333 spawners. In the previous three years, 2,300-5,400 pink deaths were reported (1-3% of total captures) each year, though total captures were lower.

Federal biologists have requested anadromous population sampling be retained as a requirement of the APDES permit so that if an acute event happened at the mine that was missed by water quality

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[2] Data collected in 2011 are preliminary and subject to additional review.

monitoring or aquatic studies, it could be detected in the anadromous population. We've asked federal biologists and SEACC's Clean Water Specialist to explain how they could use anadromous fish data to detect an event water quality or aquatic studies missed given population variability and sample design. We have not been provided an answer other than to except to ensure pink salmon production, an important food source for marine mammals. Any substantial impacts to aquatic resources from Outfall 001 and 002 will be detected in water quality monitoring and aquatic studies. Should the monitoring studies detect changes in the aquatic ecosystem in Slate Creek, ADEC and Habitat can seek additional studies, including anadromous fish studies. Discontinuing this study will eliminate outmigration mortalities and increase prey opportunities for marine mammals.

1.5.3.5.2 Periphyton Biomass and Community Composition

Annually sample periphyton biomass in 1) the inlet creek to Upper Slate Lake, 2) EFSC, 3) WFSC, 4) Lower Slate Creek, and 5) Sherman Creek.

The 2005 NPDES permit did not include periphyton sampling in any of the three creeks. Periphyton data will provide another data set to assess overall stream health in Slate Creek and Sherman Creek, downstream of the outfalls (samples collected from the inlet to Upper Slate Lake and WFSC will provide reference data for Slate Creek samples). Data collected in WFSC will allow Habitat biologists to study stream health in the adjacent drainage, where mine development and operations do not occur, and compare changes in productivity between the two forks. The sampling will provide quantitative data to replace the subjective visual aquatic vegetation survey requirements included in the 2005 NPDES permit.

Thank you for the opportunity to provide recommendations for continuing aquatic biological monitoring at the Kensington Gold Project. We appreciate the Alaska Department of Environmental Conservation's consideration of our recommendations. The sampling data we request will provide adequate information for Habitat biologists to evaluate and detect changes in stream health from mine development and operations, particularly in Slate Creek where affects are most likely. Please contact Kate Kanouse by phone at (907) 465-4290 or by email at kate.kanouse@alaska.gov if you have any questions regarding these recommendations.

Sincerely,

Jackie Timothy

Jackie Timothy
Regional Supervisor
Division of Habitat

Email cc:

Al Ott, ADF&G Habitat, Fairbanks
Kate Kanouse, ADF&G Habitat, Douglas
Brian Glynn, ADF&G SF, Douglas
Kevin Monagle, ADF&G CF, Douglas
Ryan Scott, ADF&G Wildlife, Douglas
Benjamin Brewster, ADF&G Habitat, Douglas
Gordon Willson-Naranjo, ADF&G Habitat, Douglas
Sarah Samuelson, USFS, Juneau
Kevin Eppers, Coeur Alaska, Juneau
Chiska Derr, NOAA NMFS, Juneau
Ryan Kreiner, USFS, Juneau
Jack DiMarchi, ADNR OPMP, Fairbanks
Guy Archibald, SEACC, Juneau

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ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

INDIVIDUAL PERMIT

Permit Number: AK0050571

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501

In compliance with the provisions of the Clean Water Act (CWA), 33 U.S.C. §1251 *et seq*., as amended by the Water Quality Act of 1987, P.L. 100-4, this permit is issued under provisions of Alaska Statutes (AS) 46.03; the Alaska Administrative Code (AAC) as amended; and other applicable State laws and regulations. The

Coeur Alaska, Inc.,
3031 Clinton Dr., Suite 202
Juneau, Alaska 99801

is authorized to discharge from the Kensington Gold Mine located 45 miles north of Juneau, Alaska at the following location(s):

Outfall	Receiving Water or Body	Latitude	Longitude
001	Sherman Creek	58° 52' 04" N	135° 06' 55" W
002	East Fork Slate Creek	58° 48' 23.8" N	135° 02' 10.9" W

In accordance with the discharge point(s), effluent limits, monitoring requirements, and other conditions set forth herein:

This permit shall become effective September 1, 2011

This permit and the authorization to discharge shall expire at midnight, August 31, 2016

The permittee shall reapply for a permit reissuance on or before Friday March 4, 2016, 180 days before the expiration of this permit, if the permittee intends to continue operations and discharge(s) at the facility beyond the term of this permit.

The permittee shall post or maintain a copy of this permit to discharge at the facility and make it available to the public, employees, and subcontractors at the facility.

Signed

Sharon Morgan — 11/7/11

Signature — Date

Sharon Morgan — Program Manager

Printed Name — Title

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

SCHEDULE OF SUBMISSIONS

The Schedule of Submissions summarizes some of the required submissions and activities the permittee must complete or revise, and submit to the Alaska Department of Environmental Conservation (ADEC or the Department) during the term of this permit. The permittee is responsible for all submissions and activities even if they are not summarized below.

Table 1: Schedule of Submissions

Permit Part	Submittal or Completion	Frequency	Due Date	Submit to:[a]
Appendix A, 3.2	Discharge Monitoring Report (DMR)	Monthly	Must be postmarked or submitted electronically through the eDMR system, on or before the 20th day of the following month. See http://dec.alaska.gov/water/Compliance/permittee.html for current compliance submittal information.	C
1.6	Annual Water Quality Monitoring Summary	Annually	Submitted by March 1st of each year for the previous year's data.	P
2.2.1	Quality Assurance Project Plan (QAPP)	1/permit cycle	Within 60 days after the effective date of the final permit	P
2.3.4.3.1	Written certified statement that the BMP Plan fulfills the requirements set forth in this permit.	Annually		P
Appendix A, 1.3	Application for Permit Reissuance	1/permit cycle	180 days before expiration of the final permit	P
Appendix A, 2.4	Reports of compliance or noncompliance with a Compliance Schedule	As required	The Report must be submitted no later than 14 days following each schedule date	C
Appendix A, 3.4	Oral notification of noncompliance	As Necessary	Within 24 hours from the time the permittee becomes aware of the circumstances of noncompliance	O
Appendix A, 3.4	Written documentation of noncompliance	As Necessary	Within 5 days after the permittee becomes aware of the circumstances	C

Note a: Submittal information:

P – State of Alaska, Department of Environmental Conservation, Division of Water, Wastewater Discharge Authorization Program, 555 Cordova St., Anchorage, Alaska 99501.

C - State of Alaska, Department of Environmental Conservation, Division of Water, Compliance Enforcement Program, 555 Cordova St., Anchorage, Alaska 99501.

O - Oral notifications must be reported to the Department's non-compliance reporting hotline: 1-907-269-4114 (from Alaska) or 1-877-569-4114 (nationwide)

LIMITATIONS AND MONITORING REQUIREMENTS

1.1 Discharge Authorization

During the effective period of this permit, the permittee is authorized to discharge pollutants from the outfalls specified herein to Sherman Creek and East Fork Slate Creek, within the limits and subject to the conditions set forth herein. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process. These processes, waste streams, and operations include mine drainage water and mill process waters.

1.2 Effluent Limits and Monitoring for Outfall 001

1.2.1 The permittee must limit and monitor discharges during mining and non-mining periods from Outfall 001 to Sherman Creek, as specified in Table 2 and 3, respectively. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the tables at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

Table 2: Outfall 001 Effluent Limits and Monitoring Requirements (Frequency during mining periods)

Effluent Parameter [a]	Hardness as mg/L $CaCO_3$	Units	Effluent Limits		Monitoring Requirements		
			Maximum Daily	Average Monthly	Sample Frequency[b]	Sample Location	Sample Type
Aluminum [c]	—	µg/L	153	50	Weekly	Effluent (E)	24 hr. comp
Ammonia, Total	—	mg/L as N	4.0	2.0	Weekly	E	24 hr. comp
Arsenic	-	ug/L	Monitor only		Monthly	E	24 hr. comp
Cadmium [c]	50 ≤ H < 100	µg/L	0.3	0.1	Weekly	E	24 hr. comp
	100 ≤ H < 200	µg/L	0.5	0.2	Weekly	E	24 hr. comp
	H ≥ 200	µg/L	0.8	0.3	Weekly	E	24 hr. comp
Copper [c]	50 ≤ H < 100	µg/L	7.3	2.5	Weekly	E	24 hr. comp
	100 ≤ H < 200	µg/L	14	4.8	Weekly	E	24 hr. comp
	H ≥ 200	µg/L	26.9	9.2	Weekly	E	24 hr. comp
Chromium, Total	—	µg/L	Monitor only		Monthly	E	24 hr. comp
Iron	—	µg/L	1850	690	Weekly	E	24 hr. comp
Lead [c]	50 ≤ H < 100	µg/L	2.3	0.8	Weekly	E	24 hr. comp
	100 ≤ H < 200	µg/L	5.6	1.8	Weekly	E	24 hr. comp
	H ≥ 200	µg/L	13.4	4.4	Weekly	E	24 hr. comp
Manganese	—	µg/L	98	50	Weekly	E	24 hr. comp
Mercury [c]	—	µg/L	0.02	0.01	Monthly	E	24 hr. comp
Nickel [c]	50 ≤ H < 100	µg/L	52.9	21.2	Weekly	E	24 hr. comp

Effluent Parameter [a]	Hardness as mg/L $CaCO_3$	Units	Effluent Limits		Monitoring Requirements		
			Maximum Daily	Average Monthly	Sample Frequency[b]	Sample Location	Sample Type
	100 ≤ H < 200	µg/L	95.0	38.1	Weekly	E	24 hr. comp
	H ≥ 200	µg/L	170.3	68.5	Weekly	E	24 hr. comp
Nitrate	—	mg/L as N	20	10	Weekly	E	24 hr. comp
Selenium	—	µg/L	Monitor only		Monthly	E	24 hr. comp
Silver	—	µg/L	Monitor only		Monthly	E	24 hr. comp
Zinc [c]	50 ≤ H < 100	µg/L	66.6	29.1	Weekly	E	24 hr. comp
	100 ≤ H < 200	µg/L	119.8	52.4	Weekly	E	24 hr. comp
	H ≥ 200	µg/L	215.6	94.3	Weekly	E	24 hr. comp
TDS	—	mg/L	1,000	1,000	Weekly	E	24 hr. comp
TDS anions/cations [d]	—	mg/L	Monitor only		Quarterly	E	24 hr. comp
Sulfate associated with Na & Mg	—	mg/L	200	200	Weekly	E	24 hr. comp
Turbidity, effluent	—	NTU	See Part 1.2.6		Weekly	E	Grab
Turbidity, natural condition	—	NTU	Monitor only		Weekly	Background	Grab
Hardness	—	mg/L $CaCO_3$	Monitor only		Weekly	Downstream	Grab
pH	—	s.u.	See Part 1.2.5		Continuous	E	Recorder
TSS	—	mg/L	30	20	Daily	E	24 hr. comp
Flow	—	gpm	Monitor only		Continuous	E	Recorder
Temperature	—	°C	Monitor only		Weekly	E	Grab
Dissolved Oxygen	—	mg/L	Monitor only		Weekly	E	Grab
Chronic Whole Effluent Toxicity [e] (WET)	—	TU_c	1.6	1.1	Monthly	E	24 hr. comp

Note:

a. Parameters must be analyzed and reported as total recoverable, unless otherwise noted.

b. Weekly sampling shall occur on the same day of each week, unless the permittee can document that sampling could not be performed due to extreme conditions. In such cases, a detailed explanation of the reason sampling could not be performed shall be prepared and kept with the analytical results for that day.

c. Reporting of a maximum daily limit violation is required according to Appendix A, Item 3.4.3.3.

d. This monitoring shall include a standard and complete suite of those cations and anions contributing to TDS including but not limited to boron (B), sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), fluoride (F), chloride (Cl), sulfate (SO_4), total alkalinity, hardness, pH, and electrical conductivity.

e. See Permit Part 1.4. for whole effluent toxicity testing requirements.

1.2.2 Table 3 summarizes the sampling frequencies that shall apply during a long term shut down of the mine. These frequencies shall be implemented after a 6 month closure period. The reporting requirements of Appendix A, Part 3.2 apply.

Table 3: Monitoring Frequencies for Outfall 001 During Non-Mining Periods

Effluent Parameter	Monitoring Requirement	
	Sampling Frequency	Sample Type
Aluminum	Quarterly	Grab
Ammonia, Total	Quarterly	Grab
Arsenic	Quarterly	Grab
Cadmium	Quarterly	Grab
Copper	Quarterly	Grab
Chromium, Total	Quarterly	Grab
Iron	Quarterly	Grab
Lead	Quarterly	Grab
Mercury	Quarterly	Grab
Nickel	Quarterly	Grab
Nitrate	Quarterly	Grab
Selenium	Quarterly	Grab
Silver	Quarterly	Grab
Zinc	Quarterly	Grab
Total Dissolved Solids	Quarterly	Grab
TDS anions/cations	Annually	Grab
Sulfate associated with Na and Mg	Quarterly	Grab
Turbidity - effluent	Weekly	Grab
Turbidity - upstream	Weekly	Grab
Hardness - downstream	Monthly – Instream	Grab
pH	Quarterly	Grab
Total Suspended Solids	Daily	Grab
Flow	Continuous	Recorder
Temperature	Quarterly	Grab
WET, Chronic	Annually	Grab

1.2.3 The discharge shall not cause contamination of receiving or ground waters and shall not cause a violation of the Alaska Water Quality Standards (18 AAC 70) unless allowed in this permit through exceptions to the standards or in a compliance schedule.

1.2.4 The permittee must not discharge any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water. Monitoring for floating materials listed shall be conducted on a weekly basis.

1.2.5 The pH must not be less than 6.5 standard units (units) nor greater than 8.5 units. During continuous monitoring required in Table 2, the permittee shall monitor the total time outside the range for the month, the length of each excursion, and the number of pH excursions outside the range of 6.5 to 8.5 units. The permittee shall report the total time outside the range for the month, as well as the number of individual excursions which exceed 60 minutes. The total time during which the pH values are outside the required range of pH values shall not exceed 7 hours and 26 minutes in any calendar month.

1.2.6 The turbidity measured in nephelometric turbidity units (NTU) must not be more than 5 NTUs above the natural condition. The natural condition sample taken from Sherman Creek must be taken upstream of the discharge point at SH109 within an hour of the effluent sample.

1.2.7 The permittee must collect effluent samples from the effluent stream after the last treatment unit prior to discharge into the receiving waters.

1.2.8 Minimum Levels. For all effluent monitoring, the permittee must use analytical methods that can achieve a minimum detection limit (MDL) less than the effluent limit, if possible. For parameters that do not have effluent limits, the permittee must use methods that can achieve minimum levels (MLs) less than or equal to those specified in Table 6 (Part 1.5.1.3).

1.2.9 For purposes of reporting on the DMR, for a single sample, if a value is less than the MDL, the permittee must report "less than numeric value of the MDL" and if a value is less than the ML, the permittee must report "less than numeric value of the ML." For purposes of calculating monthly averages, zero may be assigned for values less than the MDL. The numeric value of the MDL may be assigned for values between the MDL and the ML. If the average value is less than the MDL, the permittee must report "less than numeric value of the MDL" and if the average value is less than the ML, the permittee must report "less than numeric value of the ML." If a value is greater than the ML, the permittee must report and use the actual value. The resulting average value must be compared to the permit limit in assessing compliance.

1.3 Effluent Limits and Monitoring - Outfall 002 – East Fork Slate Creek

1.3.1 The permittee must limit and monitor discharges from Outfall 002 to East Fork Slate Creek, as specified in Table 4. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the table at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

Table 4: Outfall 002 Effluent Limits and Monitoring Requirements

Parameter [a]	Units	Hardness as mg/L $CaCO_3$	Effluent Limits		Monitoring Requirements	
			Maximum Daily	Average Monthly	Sample Frequency [b]	Sample Type
Aluminum	µg/L		143	71	Weekly	24 hr. comp
Ammonia, Total	mg/L as N		3.5	1.7	Weekly	Grab
Arsenic	µg/L		Monitor only		Monthly	24 hr. comp
Cadmium [c]	µg/L	H < 30	0.2	0.1	Weekly	24 hr. comp
	µg/L	H ≥ 30	0.2	0.1	Weekly	24 hr. comp
Copper [c]	µg/L	H < 30	3.8	1.9	Weekly	24 hr. comp
	µg/L	H ≥ 30	4.5	2.2	Weekly	24 hr. comp
Chromium, Total [d]	µg/L		Monitor only		Weekly	24 hr. comp
Chromium VI [c, d]	µg/L		16	8	See note (d)	Grab
Iron	µg/L		1,700	800	Weekly	24 hr. comp
Lead [c]	µg/L	H < 30	0.9	0.5	Weekly	24 hr. comp
	µg/L	H ≥ 30	1.1	0.6	Weekly	24 hr. comp
Manganese	µg/L		98	50	Weekly	24 hr. comp
Mercury [c]	µg/L		0.02	0.01	Weekly	24 hr. comp

Parameter [a]	Units	Hardness as mg/L $CaCO_3$	Effluent Limits		Monitoring Requirements	
			Maximum Daily	Average Monthly	Sample Frequency [b]	Sample Type
Nickel [c]	µg/L	H < 30	26	13	Weekly	24 hr. comp
	µg/L	H ≥ 30	31	15	Weekly	24 hr. comp
Selenium [c]	µg/L		8.2	4.1	Weekly	24 hr. comp
Silver [c]	µg/L	H < 30	0.4	0.2	Weekly	24 hr. comp
	µg/L	H ≥ 30	0.5	0.25	Weekly	24 hr. comp
Zinc [c]	µg/L	H < 30	37	18	Weekly	24 hr. comp
	µg/L	H ≥ 30	43	22	Weekly	24 hr. comp
TDS	mg/L		500	500	Weekly	24 hr. comp
TDS anions/cations[e]	mg/L		Monitor only		Quarterly	24 hr. comp
Nitrates	mg/L		Monitor only		Weekly	24 hr. comp
Sulfates	mg/L		250	250	Weekly	24 hr. comp
Turbidity, effluent	NTU		See Permit Part 1.3.5		Weekly	Grab
Turbidity, natural condition , Site MLA	NTU		Monitor only		Weekly	Grab
Hardness – Site #5	mg/L		Monitor only		Weekly	Grab
pH	s.u.		See Permit Part 1.3.4		Continuous	Recorder
TSS	mg/L		30	20	Daily	24 hr. comp
Outfall Flow	gpm		1,500	—	Continuous	Recorder
Temperature	°C		Monitor only		Weekly	Grab
Hardness, as $CaCO_3$	mg/L		Monitor only		Weekly	Grab
Chronic Whole Effluent Toxicity [f] (WET)	TU_c		1.6	1.1	Monthly	24 hr. comp

Note:

a. Parameters must be analyzed and reported as total recoverable unless otherwise noted.

b. Weekly sampling shall occur on the same day of each week, unless the permittee can document that sampling could not be performed due to extreme conditions. In such cases, a detailed explanation of the reason sampling could not be performed shall be prepared and kept with the analytical results for that day.

c. Reporting of a maximum daily limit violation is required according to Appendix A.

d. Chromium VI (Cr VI) must be analyzed during the next sampling event when results are received showing a total chromium measure exceeding 11 µg/L — the sample holding time for Cr VI is 24 hours. Cr VI must be analyzed and reported as dissolved.

e. This monitoring shall include a standard and complete suite of those cations and anions contributing to TDS including but not limited to boron (B), sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), fluoride (F), chloride (Cl), sulfate (SO_4), total alkalinity, hardness, pH, and electrical conductivity.

f. See Part 1.4 for whole effluent toxicity testing requirements.

1.3.2 The discharge shall not cause contamination of receiving or ground waters and shall not cause a violation of the Alaska Water Quality Standards (18 AAC 70) unless allowed in this permit through exceptions to the standards or in a compliance schedule.

1.3.3 The permittee must not discharge any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water. Monitoring for floating materials listed shall be conducted on a weekly basis.

1.3.4 The pH must not be less than 6.5 standard units (units) nor greater than 8.5 units. The permittee shall monitor the total time outside the range for the month, the length of each excursion and the number of pH excursions outside the range of 6.5 to 8.5 units. The permittee shall report the total time outside the range for the month, as well as the number of individual excursions which exceed 60 minutes. The total time during which the pH values are outside the required range of pH values shall not exceed 7 hours and 26 minutes in any calendar month.

1.3.5 The turbidity measured in nephelometric turbidity units (NTU) must not be more than 5 NTUs above the natural condition. The background level for turbidity shall be measured at Site MLA.

1.3.6 The permittee must collect effluent samples from the effluent stream after the last treatment unit prior to discharge into the receiving waters.

1.3.7 Minimum Levels. For all effluent monitoring, the permittee must use analytical methods that can achieve a minimum detection limit (MDL) less than the effluent limit, if possible. For parameters that do not have effluent limits, the permittee must use methods that can achieve MLs less than or equal to those specified in Table 6 (Permit Part 1.5.1.3).

1.3.8 Chromium VI has an average monthly effluent limit that is not quantifiable using EPA-approved or approvable analytical methods. ADEC will use 10 µg/L (the ML for EPA Method 218.4) as the compliance evaluation level for this parameter.

1.3.9 For purposes of reporting on the DMR, for a single sample, if a value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if a value is less than the ML, the permittee must report "less than {numeric value of the ML}." For purposes of calculating monthly averages, zero may be assigned for values less than the MDL, the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the permittee must report "less than {numeric value of the ML}." If a value is greater than the ML, the permittee must report and use the actual value. For all metals but hexavalent chromium the resulting average value must be compared to the permit limit. . For hexavalent chromium the resulting average value must be compared to the permit limit or compliance level

1.4 Whole Effluent Toxicity Testing (WET) Requirements.

1.4.1 The permittee must conduct chronic toxicity tests on effluent samples from Outfall 001 and Outfall 002. Testing must be conducted in accordance with Parts 1.4.1.1 through 1.4.1.3.6.

1.4.1.1 Toxicity testing must be conducted on a 24-hour composite sample of the effluent. In addition, a split of each sample collected must be analyzed for the chemical and physical parameters required in Parts 1.2 and 1.3 above The sample for toxicity testing should be of adequate size to accommodate the split sample. When the timing of sample collection coincides with that of the sampling required in Permit Parts 1.2 and 1.3, analysis of the split sample will fulfill the requirements of Permit Parts 1.2 and 1.3, as well.

1.4.1.2 Chronic Test Species and Methods

1.4.1.2.1 The permittee shall perform chronic toxicity tests on samples representative of the effluents discharged from Outfalls 001 and 002.

1.4.1.2.2 The permittee shall conduct one chronic toxicity test per month. Of the twelve annual tests:

1.4.1.2.2.1 Four tests shall be conducted using: the fathead minnow, *Pimephales promelas* - static, renewal, larval survival, and growth test;

1.4.1.2.2.2 Four tests shall be conducted using: the water flea, *Ceriodaphnia dubia* - 7-day static renewal, survival, and reproduction test; and

1.4.1.2.2.3 Four tests shall be conducted using: green algae, *Selanastrum capricornutum* - 4-day static and growth.

1.4.1.2.3 The presence of chronic toxicity must be determined as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002.

1.4.1.2.4 Results must be reported in TU_c (chronic toxic units), where $TU_c = 100/IC_{25}$. See Appendix C for a definition of inhibition concentration (IC).

1.4.1.3 Quality Assurance

1.4.1.3.1 The toxicity testing on each organism must include a series of five test dilutions (e.g., 100%, 75%, 50%, 25%, and 12.5%) and a control.

1.4.1.3.2 All quality assurance criteria and statistical analyses used for chronic tests and reference toxicant tests must be in accordance with *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002. If logistical problems beyond the control of the permittee prevent the delivery of a sample to the laboratory, the permittee may collect only two samples for WET testing and the acceptable sample holding times can be extended from 36 to 48 hours.

1.4.1.3.3 In addition to those quality assurance measures specified in the methodology, the following quality assurance procedures must be followed:

1.4.1.3.3.1 If organisms are not cultured in-house, concurrent testing with reference toxicants must be conducted. If organisms are cultured in-house, monthly reference toxicant testing is sufficient. Reference toxicant tests must be conducted using the same test conditions as the effluent toxicity tests.

1.4.1.3.3.2 If either of the reference toxicant tests or the effluent tests does not meet all test acceptability criteria, as specified in the test methods manual, the permittee must re-sample and re-test within 14 days of receipt of the test results.

1.4.1.3.3.3 Control and dilution water must be receiving water or lab water, as appropriate, as described in the manual. If the dilution water used is different from the culture water, a second control using culture water must also be used. Receiving water may be used as control and dilution water upon notification of ADEC. In no case shall water that has not met test acceptability criteria be used for either dilution or control.

1.4.1.3.4 Accelerated Testing

1.4.1.3.4.1 Initial Investigation. If the permittee demonstrates through an evaluation of facility operations that the cause of the exceedance is known and corrective actions have been implemented, only one accelerated test is necessary. If toxicity exceeding the limit is detected in this test, then the Toxicity Reduction Evaluation requirements in Permit Part 1.4.1.3.5 shall apply, or

1.4.1.3.4.2 If chronic toxicity is detected above the limits specified in Table 2 or Table 4 and no initial investigation is conducted or no cause is determined by an initial investigation, then the permittee must conduct four more biweekly tests over an eight week period. This accelerated testing must be initiated within two weeks of receipt of the test results that indicate an exceedance.

1.4.1.3.4.3 The permittee must notify ADEC of the exceedance in writing within two weeks of receipt of the test results. The notification must include the following information:

1.4.1.3.4.3.1 A status report on any actions required by the permit, with a schedule for actions not yet completed;

1.4.1.3.4.3.2 A description of any additional actions the permittee has taken or will take to investigate and correct the cause(s) of the toxicity; and

1.4.1.3.4.3.3 Where no actions have been taken, a discussion of the reasons for taking no action.

1.4.1.3.4.4 If none of the four accelerated tests exceed the toxicity limit, the permittee may return to the normal testing frequency. If any of the four accelerated tests exceed the limit, then the TRE requirements in Permit Part 1.4.1.3.5, shall apply.

1.4.1.3.5 Toxicity Reduction Evaluation (TRE) and Toxicity Identification Evaluation (TIE):

1.4.1.3.5.1 If chronic toxicity limits are exceeded during accelerated testing under Permit Part 1.4.1.3.4, the permittee must initiate a toxicity reduction evaluation (TRE) in accordance with *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070) within two weeks of the receipt of the test results showing an exceedance. At a minimum, the TRE must include:

1.4.1.3.5.1.1 Further actions to investigate and identify the cause of toxicity;

1.4.1.3.5.1.2 Actions the permittee will take to mitigate the impact of the discharge and to prevent the recurrence of toxicity; and

1.4.1.3.5.1.3 A schedule for these actions.

1.4.1.3.5.2 If a TRE is initiated prior to completion of the accelerated testing, the accelerated testing schedule may be terminated or used as necessary in performing the TRE.

1.4.1.3.5.3 The permittee may initiate a Toxicity Identification Evaluation (TIE) as part of the TRE process. Any TIE must be performed in accordance with EPA guidance manuals: *Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents*, Phase I (EPA/600/6-91/005F); *Methods for*

Aquatic Toxicity Identification Evaluations, Phase II: Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity (EPA/600/R-92/080); and *Methods for Aquatic Toxicity Identification Evaluations, Phase III: Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity* (EPA-600/R-92/081).

1.4.1.3.6 Reporting

1.4.1.3.6.1 The permittee shall submit the results of the monthly toxicity tests in TU_c with the discharge monitoring report (DMR) for the month in which the results are received.

1.4.1.3.6.2 The permittee must submit the results of any accelerated testing, under Permit Part 1.4.1.3.4, within 2 weeks of receipt of the results from the lab. The full report must be submitted within 4 weeks of receipt of the results from the lab. If an initial investigation indicates the source of toxicity and accelerated testing is unnecessary, the result of the investigation must be submitted with the DMR for the month following completion of the investigation.

1.4.1.3.6.3 The report of toxicity test results must include all relevant information outlined in Section 10, Report Preparation of *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Fourth Edition, EPA/821-R-02-013, October 2002. In addition to toxicity test results, the permittee must report: dates of sample collection and initiation of each test; flow rate at the time of sample collection; the results of the monitoring required in Permit Parts 1.2 and 1.3; and an explanation of logistical problems described in Permit Part 1.4.1.3.2, if encountered.

1.5 Receiving Water Monitoring

1.5.1 The permittee must conduct the following receiving water monitoring program in the vicinity of the mine.

1.5.1.1 Water Column Monitoring

1.5.1.1.1 The permittee must conduct monthly monitoring for all parameters at the following stations (See Attachment A: Maps showing sampling locations).

1.5.1.1.1.1 Sherman Creek – above Outfall 001at station SH109, below the outfall at station SH113, and in Lower Sherman Creek at station SH105;

1.5.1.1.1.2 Slate Creek – prior to Outfall 002 mixing with Upper Slate Lake water within the bypass pipe at either station MLA or from the bypass pipe, Site 5 at the tree-line below the TTF dam, 10m upstream of the confluence with West Fork Slate Creek at station SLB, and 30m downstream of the confluence with West Fork Slate Creek at station SLC; and

1.5.1.1.1.3 Johnson Creek – above any mine runoff from present mining activities at station JS2 and below the mill at station JS5.

1.5.1.1.1.4 Ophir Creek – above the waste rock pile at station SH111 and below the waste rock pile at station SH103.

1.5.1.1.2 Additional monitoring for manganese shall be conducted at site SH113 and Site 5 at the tree line below the TTF dam. Monitoring at SH113 shall be increased to once every 2 weeks. Monitoring at Site 5 shall be monthly with samples taken mid-way between the sample times at Site SLB. This additional monitoring shall continue until two months after water quality criteria have been met in the receiving waters.

1.5.1.1.3 The date, time, and weather conditions shall be recorded for each sample taken.

1.5.1.2 All receiving water samples must be grab samples.

1.5.1.3 All receiving water samples must be analyzed for the parameters listed in Table 5 to achieve MLs less than the effluent limits of the limited parameters. For parameters not limited in Permit Parts 1.2 or 1.3, the MLs in Table 6 must be utilized.

Table 5: Receiving Water Monitoring Parameters

Aluminum, TR	Lead	Nitrate	Dissolved Oxygen
Ammonia, Total	Manganese, TR	Sulfates	Temperature
Arsenic	Mercury	Chlorides	Conductivity
Cadmium	Nickel	Turbidity	Hardness
Chromium	Selenium, TR	TDS	Color
Copper	Silver	TSS	
Iron, TR	Zinc	pH	

Note:
1) Receiving water metals analyses shall be dissolved unless otherwise specified.
2) Total Recoverable (TR)

Table 6: Additional Minimum Levels

Parameter	Units	Minimum Level (ML)
Chromium, Total	µg/L	10

1.5.1.4 Quality assurance/quality control (QA/QC) plans for all the monitoring must be documented in the Quality Assurance Project Plan required under Permit Part 2.1, "Quality Assurance Project Plan".

1.5.1.5 Results shall be included with the DMRs for the month samples are taken and all results shall be included in the Annual Water Quality Monitoring Summary, Part 1.6. At a minimum, the monthly reports must include the following:

1.5.1.5.1 Dates of sample collection and analyses.

1.5.1.5.2 Results of sample analysis.

1.5.1.5.3 Relevant QA/QC information.

1.5.1.5.3.1 In addition to the requirements for the Annual Water Quality Monitoring Summary, manganese results shall be submitted monthly in Excel format until two months after water quality criteria have been met in the receiving waters.

1.5.2 Sediment Monitoring

1.5.2.1 Samples shall be taken at Lower Sherman Creek, the inlet creek to Upper Slate Lake, East Fork Slate Creek between Site #5 and SLB, Lower Slate Creek, and lower Johnson Creek. Sampling shall be conducted annually in July prior to spawning and the results included in the Annual Water Quality Monitoring Summary, Part 1.6.

1.5.2.2 The permittee shall monitor the parameters in Table 7 and shall achieve the listed detection levels for each sediment sample.

Table 7: Sediment Monitoring Parameters and Analytical Methods

Parameter	Units	Preparation Method	Analysis Method	Sediment MDL [a]
Aluminum	mg/Kg	PSEP [b]	—	—
Arsenic	mg/Kg	PSEP [b]	GFAA [c]	2.5
Cadmium	mg/Kg	PSEP [b]	GFAA c	0.3
Chromium	mg/Kg	PSEP [b]		—
Copper	mg/Kg	PSEP [b]	ICP [d]	15.0
Lead	mg/Kg	PSEP [b]	ICP [d]	0.5
Mercury	mg/Kg	7471 [e]	7471 [e]	0.02
Nickel	mg/Kg	PSEP [b]	ICP [d]	2.5
Selenium	mg/Kg	PSEP [b]		—
Silver	mg/Kg	PSEP [b]	GFAA [c]	0.2
Zinc	mg/Kg	PSEP [b]	ICP [d]	15.0
Acute Toxicity	%	See Below	See Below	NA
Total Solids	%	—	PSEP [b], pg 17	0.1
Total Volatile Solids	%	—	PSEP [b], pg 20	0.1
Total Organic Carbon	%	—	PSEP [b, f], pg 23	0.1
Total Sulfides	mg/Kg	—	PSEP [b], pg 32	1
Grain Size	—	—	Modified ASTM with Hydrometer	NA

Note:
a. Dry weight basis
b. Recommended Protocols for Measuring Selected Environmental Variables, in Puget Sound Estuary Program, EPA 910/9-86-157, as updated by Washington Department of Ecology; Subsection: Metals in Puget Sound Water, Sediment, and Tissue Samples
c. Graphite Furnace Atomic Absorption Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986

Parameter	Units	Preparation Method	Analysis Method	Sediment MDL [a]
d. Inductively Coupled Plasma Emission Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986 e. Mercury Digestion and Cold Vapor Atomic Absorption Spectrometry, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986. The permittee shall sample the receiving water hardness downstream of the discharge. f. Recommended Methods for Measuring TOC in Sediments, Kathryn Bragdon-Cook Clarification Paper, Puget Sound Dredged Disposal Authority Annual Review, May, 1993.				

1.5.2.3 Biological Testing of Sediments

1.5.2.3.1 Sediment samples will undergo acute toxicity testing to assess the relative toxicity of the sediment to representative aquatic life. The following bioassays are required:

- Test Method 100.1: *Hyalella azteca* 10-day survival test for sediments
- Test Method 100.2: *Chironomus dilutus* 10-day survival test for sediments

1.5.2.3.2 Test methods, QA/QC, data recording, data analysis and calculations, and reporting shall be in accordance with *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates*, EPA/600/R-94/024.

1.5.2.3.3 *Hyalella azteca* and *Chironomus dilutus* are representative species for their respective classes of aquatic life.

1.5.2.4 The permittee shall collect sufficient sediment from each monitoring station to conduct all chemical and biological tests identified herein. Sediment samples shall consist of the upper two (2) centimeters of sediment. The maximum depth of sample penetration shall be four (4) centimeters.

1.5.2.5 Sediment monitoring stations shall be located in areas where deposition is likely to occur (i.e. pools or moderately deep, slow-moving water with the surface not turbulent to the extent of being broken).

1.5.2.6 Sediment monitoring results shall be reported in the Annual Water Quality Monitoring Summary (Part 1.6) and must include, at a minimum: dates of sample collection and analyses, locations of samples collected, results of the monitoring required in Permit Parts 1.5.2.2 and 1.5.2.3, and relevant QA/QC information.

1.5.3 Aquatic Resource Monitoring

1.5.3.1 The permittee shall monitor aquatic resources, as described in Part 1.5.3.2, and shall report results, including relevant quality assurance/quality control data, in the Annual Water Quality Monitoring Report, Part 1.6.

1.5.3.2 Benthic Invertebrates

1.5.3.2.1 Benthic invertebrates shall be monitored in inlet creek to Upper Slate Lake, East Fork Slate Creek, Lower Slate Creek, West Fork Slate Creek, lower Sherman Creek and upper Johnson Creek using established methods. The permittee shall continue sampling the East Fork Slate Creek and Lower Sherman Creek reaches, and establish new sampling reaches in Upper East Fork Slate Creek, Lower Slate Creek, and in West Fork Slate Creek. The Inlet creek to Upper Slate Lake reach shall be located in the inlet stream to Upper Slate Lake, which will provide reference data for comparing downstream sites subject to mine development. The Lower Slate Creek site shall be located downstream of the anadromous fish barrier, which will provide information on stream health in anadromous fish habitat. The West Fork Slate Creek reach shall be located upstream of the anadromous fish barrier and the confluence with East Fork Slate Creek, which will provide additional reference data to compare with that portion of the Slate Creek watershed not subject to development. Sampling in Johnson Creek will be in the previously established reach.

1.5.3.2.1.1 Each reach shall be delineated for all possible sampling sites (those areas containing stream substrate with particles <20 cm along the long axis). Every third or fourth sampling site shall be sampled until a total of 6 samples are obtained for each reach.

1.5.3.2.2 Samples shall be collected using a 0.093 m^2 Surber sampler equipped with a 300-micron mesh collection net. Collected samples shall be placed in labeled plastic containers and preserved with 70 percent ethyl alcohol. Samples shall be enumerated and identified to the genus level (except for oligochaetes to order). For each sample the following shall be calculated: density per unit area, Shannon Diversity and Evenness indices, EPT (epheropterans, plecopterans, and tricopterans), and number of EPT taxa.

1.5.3.2.3 The permittee shall sample annually between late March and late May, after spring breakup (ice out) and before peak snowmelt.

1.5.3.3 Resident Fish Monitoring - Population Status

1.5.3.3.1 Abundance and condition of Dolly Varden char in the inlet creek to Upper Slate Lake and East Fork Slate Creek shall be monitored annually using snorkel observations and electroshocking, or similar approved techniques. The permittee shall continue using established methods in the established reaches. Sampling is not required in Lower Slate Creek since Dolly Varden present in that reach may be anadromous. Data to be derived from these surveys shall include: (1) population estimates by species, habitat type and stratum; and (2) condition factor by stratum.

1.5.3.3.2 The permittee shall monitor annually between July 1 and September 15. Data shall be collected so that statistical comparisons can be made with the previous baseline data. Estimates shall be made of the variability of the data, including minimum detectable differences between samples, as well as the precision of the 95 percent confidence interval. This information shall be used to refine or revise sampling protocols.

1.5.3.4 Resident Fish Monitoring – Whole Body Metal Analysis

1.5.3.4.1 Whole body metal analysis for metals concentrations in resident Dolly Varden tissues shall be tested annually for the following nine elements: Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn. Six fish within the size class 90-130 mm (generally 2-3 year old fish) shall be collected from the inlet creek to Upper Slate Lake, East Fork Slate Creek, and Lower Slate Creek for a total of 18 fish collected each year. The tissue analysis will provide metal bioaccumulation data in resident fish. ADEC and ADFG will evaluate the results after three years of data collection to determine if some elements do not need to be monitored and if further testing is necessary.

1.5.3.5 Anadromous Fish Monitoring

1.5.3.5.1 Quality of Spawning Substrate

1.5.3.5.1.1 The quality of spawning substrate used by pink salmon shall be monitored annually in Lower Slate Creek to detect changes in composition. Sediment samples shall be collected in July prior to spawning activity. Four replicate samples shall be collected from 2 locations using a McNeil-type sampler using established locations and methods. The geometric mean particle size will be calculated for each sample.

1.5.3.5.2 Periphyton Biomass and Community Composition

1.5.3.5.2.1 The permittee shall annually monitor periphyton biomass and composition in the inlet creek to Upper Slate Lake, East Fork Slate Creek, West Fork Slate Creek, Lower Slate Creek, and Lower Sherman Creek. The permittee shall establish sample reaches similar to those for benthic invertebrate sampling, and use methods employed at other Alaskan mines. For each reach ten periphyton samples from stream benthos shall be collected using methods established by Barbour et al (1999) or similar during the period late-June through early-August at low stream flow and not within three weeks after peak snowmelt/outfall discharge. Annual sampling timing will depend on snowmelt rate combined with discharge from Outfall 002, and sampling conditions should be consistent in all years to compare data between years, to the extent possible. ADF&G Habitat biologists are available to assist the permittee in identifying appropriate timing, if necessary. Estimate periphyton biomass densities and proportions of mean chlorophyll a, b, and c concentrations shall be reported for each reach sampled. An analysis of stream flow four weeks prior to sampling shall also be included using a local stream gage data (e.g. Johnson Creek). This information shall be included in the Annual Water Quality Monitoring Summary (Part 1.6).

1.5.4 Biological data collection is for data analysis purposes to assess the overall health of the ecosystem. This data is used to determine whether any changes are necessary during the next permit reissuance, and may be modified in the next permit if necessary.

1.6 Annual Water Quality Monitoring Summary

All discharge and receiving water monitoring results for the year must be included in an Annual Water Quality Monitoring Summary and submitted by March 1st for the previous year. The report must include a presentation of the analytical results and an evaluation of the results. The evaluation must include an electronic spreadsheet containing all historical data, a graphical presentation of the data at each monitoring station, a comparison of upstream and downstream monitoring results (to show any differences), and a comparison of monitoring results for each station over time (to show any trends). The annual report may reference the monthly reports for QA/QC information.

2.0 SPECIAL CONDITIONS

2.1 Compliance schedule for manganese

2.1.1 Manganese exceeds water quality criteria at Outfalls 001 and 002. The 2005 permit only required reporting of manganese, and treatment plants were not designed to remove manganese. Manganese levels have increased since mining commenced in July 2010.

2.1.2 In order to comply with 2011 permit limits, the permittee shall comply with the following schedule:

Action	**Completion Date** (months after permit effective date)
a. Compliance alternatives analysis	1 month
b. Treatability tests	3 months
c. Select compliance alternative	4 months
d. Preliminary design report	8 months
e. Final design report and drawings	12 months
f. Construction	18 months
g. Comply with manganese limits	20 months

2.2 Quality Assurance Project Plan (QAPP)

2.2.1 Any modification or update of the QAPP must be submitted to ADEC for review and approval within 60 days after the effective date of the permit. The modification or update shall be in accord with the latest ADEC guidance at http://dec.alaska.gov/water/wqapp/Generic_Tier_2_WQ_QAPP_Rev_1.pdf.

2.2.2 The QAPP must assist in planning for the collection and analysis of effluent and receiving water samples in support of the permit and in explaining data anomalies when they occur.

2.2.3 Throughout all sample collection and analysis activities, the permittee must use the ADEC-approved QA/QC and chain-of-custody procedures described in *Requirements for Quality Assurance Project Plans* (EPA/QA/R-5) and *Guidance for Quality Assurance Project Plans* (EPA/QA/G-5). The QAPP must be prepared in the format which is specified in these documents.

2.2.4 At a minimum, a QAPP must include:

2.2.4.1 Details on number of samples, type of sample containers, preservation of samples, holding times, analytical methods, analytical detection and quantitation limits for each target compound, type and number of quality assurance field samples, precision and accuracy requirements, sample preparation requirements, sample shipping methods, and laboratory data delivery requirements;

2.2.4.2 Maps indicating the location of each sampling point;

2.2.4.3 Qualification and training of personnel; and

2.2.4.4 Name, address, and telephone number of all laboratories used by or proposed to be used by the permittee.

2.2.5 The permittee must amend the QAPP whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QAPP. Any amendment to the QAPP must be reviewed and approved by ADEC before the amendment is implemented.

2.2.6 Copies of the QAPP must be kept on site and made available to ADEC upon request.

2.3 Best Management Practices Plan

2.3.1 Purpose. Through implementation of the best management practices (BMP) plan, the permittee must prevent or minimize the generation and the potential for the release of pollutants from the facility to the waters of the United States through normal and ancillary activities.

2.3.2 Maintenance. The permittee currently has an approved and implemented BMP Plan, which achieves the objectives and the specific requirements of Parts 2.3.3 through 2.3.6. The existing BMP Plan may be modified for submittal under this section. The BMP Plan may be included as part of a project wide document.

2.3.3 Objectives. The BMP Plan must be maintained to be consistent with the following objectives for the control of pollutants.

2.3.3.1 The number and quantity of pollutants and the toxicity of effluent generated, discharged or potentially discharged at the facility must be minimized by the permittee to the extent feasible by managing each waste stream in the most appropriate manner.

2.3.3.2 Under the BMP Plan and any Standard Operating Procedures included in the BMP Plan, the permittee must ensure proper operation and maintenance of water management and wastewater treatment systems. BMP Plan elements must be developed in accordance with good engineering practices.

2.3.3.3 Each facility component or system must be examined for its waste minimization opportunities and its potential for causing a release of significant amounts of pollutants to waters of the United States due to equipment failure, improper operation, and natural phenomena such as rain or snowfall, etc. The examination must include all normal operations and ancillary activities, including material storage areas, storm water, in-plant transfer, material handling and process handling areas, loading or unloading operations, spillage or leaks, sludge and waste disposal, or drainage from raw material storage.

2.3.4 Elements of the BMP Plan. The BMP Plan should be consistent with the objectives of Part 2.2.3 and the general guidance contained in *Guidance Manual for Developing Best Management Practices* (EPA 833-B-93-004, October 1993) and *Storm Water Management For*

Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-006, September, 1992), or any subsequent revision to these guidance documents. The BMP Plan must include, at a minimum, the following items:

2.3.4.1 Plan Components

2.3.4.1.1 Statement of BMP policy. The BMP Plan must include a statement of management commitment to provide the necessary financial, staff, equipment, and training resources to develop and implement the BMP Plan on a continuing basis.

2.3.4.1.2 Structure, functions, and procedures of the BMP Committee. The BMP Plan must establish a BMP Committee responsible for developing, implementing, and maintaining the BMP Plan.

2.3.4.1.3 Description of potential pollutant sources.

2.3.4.1.4 Risk identification and assessment.

2.3.4.1.5 Standard operating procedures to achieve the objectives of Part 2.3.3and specific best management practices under Part 2.2.4.2.

2.3.4.1.6 Reporting of BMP incidents. The reports must include a description of the circumstances leading to the incident, corrective actions taken, and recommended changes to operating and maintenance practices to prevent recurrence.

2.3.4.1.7 Materials compatibility.

2.3.4.1.8 Good housekeeping.

2.3.4.1.9 Inspections.

2.3.4.1.10 Preventative maintenance and repair.

2.3.4.1.11 Security

2.3.4.1.12 Employee training.

2.3.4.1.13 Recordkeeping and reporting.

2.3.4.1.14 Prior evaluation of any planned modifications to the facility to ensure that the requirements of the BMP plan are considered as part of the modifications.

2.3.4.1.15 Final constructed site plans, drawings and maps (including detailed storm water outfall/culvert configurations).

2.3.4.2 Specific Best Management Practices. The BMP Plan must establish specific BMPs or other measures to achieve the objectives under Part 2.3.3 and which ensure that the following specific requirements are met:

2.3.4.2.1 Solids, sludges, or other pollutants removed in the course of treatment or control of water and wastewaters must be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

2.3.4.2.2 Ensure proper management of solid and hazardous waste in accordance with regulations promulgated under the Resource Conservation and Recovery Act (RCRA). Management practices required under RCRA regulations must be referenced in the BMP Plan.

2.3.4.2.3 Ensure proper management of materials in accordance with Spill Prevention, Control, and Countermeasure (SPCC) plans under Section 311 of the Act and 40 CFR Part 112. The BMP Plan may incorporate any part of such plans into the BMP Plan by reference.

2.3.4.2.4 The permittee is required to develop and implement a BMP to ensure that best blasting practices are used in any wet blast holes to minimize the amount of blasting agent that dissolves in the groundwater in the vicinity of the blast hole.

2.3.4.3 Review and Certification. The BMP Plan must be reviewed and certified as follows:

2.3.4.3.1 Annual review by the plant manager and BMP Committee: An annual review is required with a certified statement that the BMP Plan fulfills the requirements set forth in this permit. The statement is considered certified when it contains the dated signatures of each BMP Committee member. The statement must be submitted to ADEC on or before January 31st of each year.

2.3.5 Documentation. The permittee must maintain a copy of the BMP Plan at the facility and make it available to EPA, ADEC or an authorized representative upon request.

2.3.6 BMP Plan Modification.

2.3.6.1 The permittee must amend the BMP Plan whenever there is a change in the facility or in the operation of the facility which materially increases the generation of pollutants or their release or potential release to surface waters.

2.3.6.2 The permittee must amend the BMP Plan whenever it is found to be ineffective in achieving the general objective of preventing and minimizing the generation and the potential for the release of pollutants from the facility to the waters of the United States and/or the specific requirements in Part 2.3.4.2.

2.3.6.3 Any changes to the BMP Plan must be consistent with the objectives and specific requirements of Part 2.3.4.2. All changes in the BMP Plan must be reported to ADEC with the annual certification required under Permit Part 2.3.4.3.

2.4 Air and Land Releases

Except as otherwise permitted, the permittee must not place, deposit, or allow to be placed or deposited on the premises, any material which may produce, cause or contribute to the spread of disease, create a safety hazard or in any way endanger the health of the public.

Attachment A: Maps showing sampling locations

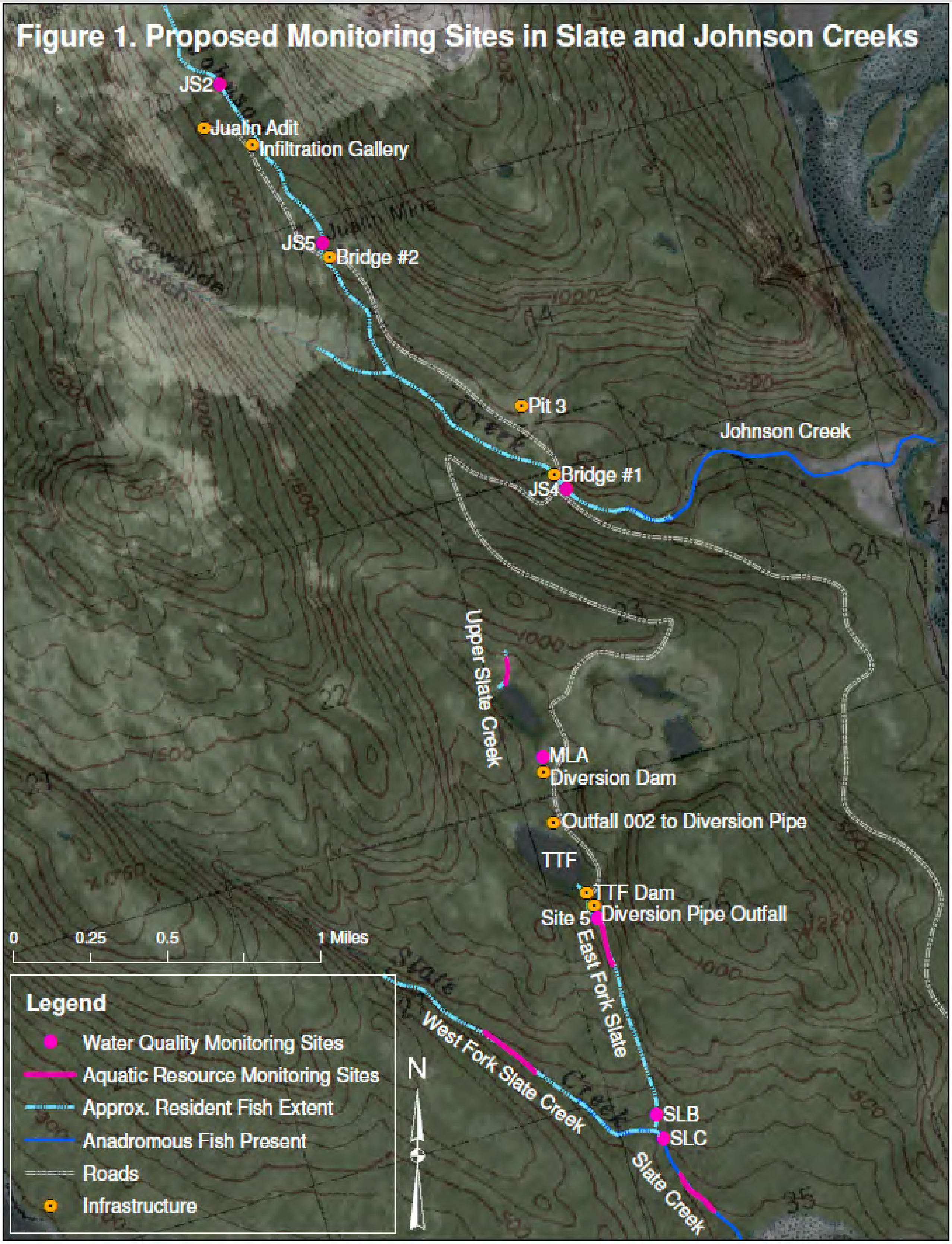

Figure 2. Proposed Monitoring Sites in Sherman Creek

APPENDIX A

STANDARD CONDITIONS

APDES PERMIT

NONDOMESTIC DISCHARGES

June 2010

TABLE OF CONTENTS

Appendix A of the permit contains standard regulatory language that must be included in all APDES permits. These requirements are based on the regulations and cannot be challenged in the context of an individual APDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements. Appendix A, Standard Conditions is an integral and enforceable part of the permit. Failure to comply with a Standard Condition in this Appendix constitutes a violation of the permit and is subject to enforcement.

1.0 Standard Conditions Applicable to All Permits

1.1 Contact Information and Addresses

1.1.1 Permitting Program

Documents, reports, and plans required under the permit and Appendix A are to be sent to the following address:

State of Alaska
Department of Environmental Conservation
Division of Water
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, Alaska 99501
Telephone (907) 269-6285
Fax (907) 269-7508
Email: DEC.Water.WQPermit@alaska.gov

1.1.2 Compliance and Enforcement Program

Documents and reports required under the permit and Appendix A relating to compliance are to be sent to the following address:

State of Alaska
Department of Environmental Conservation
Division of Water
Compliance and Enforcement Program
555 Cordova Street
Anchorage, Alaska 99501
Telephone Nationwide (877) 569-4114
Anchorage Area / International (907) 269-4114
Fax (907) 269-4604
Email: dec-wqreporting@alaska.gov

1.2 Duty to Comply

A permittee shall comply with all conditions of the permittee's APDES permit. Any permit noncompliance constitutes a violation of 33 U.S.C 1251-1387 (Clean Water Act) and state law and is grounds for enforcement action including termination, revocation and reissuance, or modification of a permit, or denial of a permit renewal application. A permittee shall comply with effluent standards or prohibitions established under 33 U.S.C. 1317(a) for toxic pollutants within the time provided in the regulations that establish those effluent standards or prohibitions even if the permit has not yet been modified to incorporate the requirement.

1.3 Duty to Reapply

If a permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee must apply for and obtain a new permit. In accordance with 18 AAC 83.105(b), a permittee with a currently effective permit shall reapply by submitting a new application at least 180 days before the existing permit expires, unless the Department has granted the permittee permission to submit an application on a later date. However, the Department will not grant permission for an application to be submitted after the expiration date of the existing permit.

1.4 Need to Halt or Reduce Activity Not a Defense

In an enforcement action, a permittee may not assert as a defense that compliance with the conditions of the permit would have made it necessary for the permittee to halt or reduce the permitted activity.

1.5 Duty to Mitigate

A permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

1.6 Proper Operation and Maintenance

1.6.1 A permittee shall at all times properly operate and maintain all facilities and systems of treatment and control and related appurtenances that the permittee installs or uses to achieve compliance with the conditions of the permit. The permittee's duty to operate and maintain properly includes using adequate laboratory controls and appropriate quality assurance procedures. However, a permittee is not required to operate back-up or auxiliary facilities or similar systems that a permittee installs unless operation of those facilities is necessary to achieve compliance with the conditions of the permit.

1.6.2 Operation and maintenance records shall be retained and made available at the site.

1.7 Permit Actions

A permit may be modified, revoked and reissued, or terminated for cause as provided in 18 AAC 83.130. If a permittee files a request to modify, revoke and reissue, or terminate a permit, or gives notice of planned changes or anticipated noncompliance, the filing or notice does not stay any permit condition.

1.8 Property Rights

A permit does not convey any property rights or exclusive privilege.

1.9 Duty to Provide Information

A permittee shall, within a reasonable time, provide to the Department any information that the Department requests to determine whether a permittee is in compliance with the permit, or whether cause exists to modify, revoke and reissue, or terminate the permit. A permittee shall also provide to the Department, upon request, copies of any records the permittee is required to keep under the permit.

1.10 Inspection and Entry

A permittee shall allow the Department, or an authorized representative, including a contractor acting as a representative of the Department, at reasonable times and on presentation of credentials establishing authority and any other documents required by law, to:

1.10.1 Enter the premises where a permittee's regulated facility or activity is located or conducted, or where permit conditions require records to be kept;

1.10.2 Have access to and copy any records that permit conditions require the permittee to keep;

1.10.3 Inspect any facilities, equipment, including monitoring and control equipment, practices, or operations regulated or required under a permit; and

1.10.4 Sample or monitor any substances or parameters at any location for the purpose of assuring permit compliance or as otherwise authorized by 33 U.S.C. 1251-1387 (Clean Water Act).

1.11 Monitoring and Records

A permittee must comply with the following monitoring and recordkeeping conditions:

1.11.1 Samples and measurements taken for the purpose of monitoring must be representative of the monitored activity.

1.11.2 The permittee shall retain records in Alaska of all monitoring information for at least three years, or longer at the Department's request at any time, from the date of the sample, measurement, report, or application. Monitoring records required to be kept include:

1.11.2.1 All calibration and maintenance records,

1.11.2.2 All original strip chart recordings or other forms of data approved by the Department for continuous monitoring instrumentation,

1.11.2.3 All reports required by a permit,

1.11.2.4 Records of all data used to complete the application for a permit,

1.11.2.5 Field logbooks or visual monitoring logbooks,

1.11.2.6 Quality assurance chain of custody forms,

1.11.2.7 Copies of discharge monitoring reports, and

1.11.2.8 A copy of this APDES permit.

1.11.3 Records of monitoring information must include:

1.11.3.1 The date, exact place, and time of any sampling or measurement;

1.11.3.2 The name(s) of any individual(s) who performed the sampling or measurement(s);

1.11.3.3 The date(s) and time any analysis was performed;

1.11.3.4 The name(s) of any individual(s) who performed any analysis;

1.11.3.5 Any analytical technique or method used; and

1.11.3.6 The results of the analysis.

1.11.4 Monitoring Procedures

Analyses of pollutants must be conducted using test procedures approved under 40 CFR Part 136, adopted by reference at 18 AAC 83.010, for pollutants with approved test procedures, and using test procedures specified in the permit for pollutants without approved methods.

1.12 Signature Requirement and Penalties

1.12.1 Any application, report, or information submitted to the Department in compliance with a permit requirement must be signed and certified in accordance with 18 AAC 83.385. Any person who knowingly makes any false material statement, representation, or certification in any application, record, report, or other document filed or required to be maintained under a permit, or who knowingly falsifies, tampers with, or renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be subject to penalties under 33 U.S.C. 1319(c)(4), AS 12.55.035(c)(1)(B), (c)(2), and (c)(3) and AS 46.03.790(g).

1.12.2 In accordance with 18 AAC 83.385, an APDES permit application must be signed as follows:

1.12.2.1 For a corporation, by a responsible corporate officer.

1.12.2.2 For a partnership or sole proprietorship, by the general partner or the proprietor, respectively.

1.12.2.3 For a municipality, state, federal, or other public agency, by either a principal executive officer or ranking elected official.

1.12.3 Any report required by an APDES permit, and a submittal with any other information requested by the Department, must be signed by a person described in Appendix A, Part 1.12.2, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1.12.3.1 The authorization is made in writing by a person described in Appendix A, Part 1.12.2;

1.12.3.2 The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, including the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility; or an individual or position having overall responsibility for environmental matters for the company; and

1.12.3.3 The written authorization is submitted to the Department to the Permitting Program address in Appendix A, Part 1.1.1.

1.12.4 If an authorization under Appendix A, Part 1.12.3 is no longer effective because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Appendix A, Part 1.12.3 must be submitted to the Department before or together with any report, information, or application to be signed by an authorized representative.

1.12.5 Any person signing a document under Appendix A, Part 1.12.2 or Part 1.12.3 shall certify as follows:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

1.13 Proprietary or Confidential Information

1.13.1 A permit applicant or permittee may assert a claim of confidentiality for proprietary or confidential business information by stamping the words "confidential business information" on each page of a submission containing proprietary or confidential business information. The Department will treat the stamped submissions as confidential if the information satisfies the test in 40 CFR §2.208, adopted by reference at 18 AAC 83.010, and is not otherwise required to be made public by state law.

1.13.2 A claim of confidentiality under Appendix A, Part 1.13.1 may not be asserted for the name and address of any permit applicant or permittee, a permit application, a permit, effluent data, sewage sludge data, and information required by APDES or NPDES application forms provided by the Department, whether submitted on the forms themselves or in any attachments used to supply information required by the forms.

1.13.3 A permittee's claim of confidentiality authorized under Appendix A, Part 1.13.1 is not waived if the Department provides the proprietary or confidential business information to the EPA or to other agencies participating in the permitting process. The Department will supply any information obtained or used in the administration of the state APDES program to the EPA upon request under 40 CFR §123.41, as revised as of July 1, 2005. When providing information submitted to the Department with a claim of confidentiality to the EPA, the Department will notify the EPA of the confidentiality claim. If the Department provides the EPA information that is not claimed to be confidential, the EPA may make the information available to the public without further notice.

1.14 Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any action or relieve a permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under state laws addressing oil and hazardous substances.

1.15 Cultural and Paleontological Resources

If cultural or paleontological resources are discovered because of this disposal activity, work that would disturb such resources is to be stopped, and the Office of History and Archaeology, a Division of Parks and Outdoor Recreation of the Alaska Department of Natural Resources (http://www.dnr.state.ak.us/parks/oha/), is to be notified immediately at (907) 269-8721.

1.16 Fee

A permittee must pay the appropriate permit fee described in 18 AAC 72.

1.17 Other Legal Obligations

This permit does not relieve the permittee from the duty to obtain any other necessary permits from the Department or from other local, state, or federal agencies and to comply with the requirements contained in any such permits. All activities conducted and all plan approvals implemented by the permittee pursuant to the terms of this permit shall comply with all applicable local, state, and federal laws and regulations.

2.0 Special Reporting Obligations

2.1 Planned Changes

2.1.1 The permittee shall give notice to the Department as soon as possible of any planned physical alteration or addition to the permitted facility if:

2.1.1.1 The alteration or addition may make the facility a "new source" under one or more of the criteria in 18 AAC 83.990(44); or

2.1.1.2 The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged if those pollutants are not subject to effluent limitations in the permit or to notification requirements under 18 AAC 83.610.

2.1.2 If the proposed changes are subject to plan review, then the plans must be submitted at least 30 days before implementation of changes (see 18 AAC 15.020 and 18 AAC 72 for plan review requirements). Written approval is not required for an emergency repair or routine maintenance.

2.1.3 Written notice must be sent to the Permitting Program address in Appendix A, Part 1.1.1.

2.2 Anticipated Noncompliance

2.2.1 A permittee shall give seven days' notice to the Department before commencing any planned change in the permitted facility or activity that may result in noncompliance with permit requirements.

2.2.2 Written notice must be sent to the Compliance and Enforcement Program address in Appendix A, Part 1.1.2.

2.3 Transfers

2.3.1 A permittee may not transfer a permit for a facility or activity to any person except after notice to the Department in accordance with 18 AAC 83.150. The Department may modify or revoke and reissue the permit to change the name of the permittee and incorporate such other requirements under 33 U.S.C. 1251-1387 (Clean Water Act) or state law.

2.3.2 Written notice must be sent to the Permitting Program address in Appendix A, Part 1.1.1.

2.4 Compliance Schedules

2.4.1 A permittee must submit progress or compliance reports on interim and final requirements in any compliance schedule of a permit no later than 14 days following the scheduled date of each requirement.

2.4.2 Written notice must be sent to the Compliance and Enforcement Program address in Appendix A, Part 1.1.2.

2.5 Corrective Information

2.5.1 If a permittee becomes aware that it failed to submit a relevant fact in a permit application or submitted incorrect information in a permit application or in any report to the Department, the permittee shall promptly submit the relevant fact or the correct information.

2.5.2 Information must be sent to the Permitting Program address in Appendix A, Part 1.1.1.

2.6 Bypass of Treatment Facilities

2.6.1 Prohibition of Bypass

Bypass is prohibited. The Department may take enforcement action against a permittee for any bypass, unless:

2.6.1.1 The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

2.6.1.2 There were no feasible alternatives to the bypass, including use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. However, this condition is not satisfied if the permittee, in the exercise of reasonable engineering judgment, should have installed adequate back-up equipment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance; and

2.6.1.3 The permittee provides notice to the Department of a bypass event in the manner, as appropriate, under Appendix A, Part 2.6.2.

2.6.2 Notice of bypass

2.6.2.1 For an anticipated bypass, the permittee submits notice at least 10 days before the date of the bypass. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the conditions of Appendix A, Parts 2.6.1.1 and 2.6.1.2.

2.6.2.2 For an unanticipated bypass, the permittee submits 24-hour notice, as required in 18 AAC 83.410(f) and Appendix A, Part 3.4, Twenty-four Hour Reporting.

2.6.2.3 Written notice must be sent to the Compliance and Enforcement Program address in Appendix A, Part 1.1.2.

2.6.3 Notwithstanding Appendix A, Part 2.6.1, a permittee may allow a bypass that:

2.6.3.1 Does not cause an effluent limitation to be exceeded, and

2.6.3.2 Is for essential maintenance to assure efficient operation.

2.7 Upset Conditions

2.7.1 In any enforcement action for noncompliance with technology-based permit effluent limitations, a permittee may claim upset as an affirmative defense. A permittee seeking to establish the occurrence of an upset has the burden of proof to show that the requirements of Appendix A, Part 2.7.2 are met.

2.7.2 To establish the affirmative defense of upset, the permittee must demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:

2.7.2.1 An upset occurred and the permittee can identify the cause or causes of the upset;

2.7.2.2 The permitted facility was at the time being properly operated;

2.7.2.3 The permittee submitted 24-hour notice of the upset, as required in 18 AAC 83.410(f) and Appendix A, Part 3.4, Twenty-four Hour Reporting; and

2.7.2.4 The permittee complied with any mitigation measures required under 18 AAC 83.405(e) and Appendix A, Part 1.5, Duty to Mitigate.

2.7.3 Any determination made in administrative review of a claim that noncompliance was caused by upset, before an action for noncompliance is commenced, is not final administrative action subject to judicial review.

2.8 Existing Manufacturing, Commercial, Mining, and Silvicultural Discharges

2.8.1 In addition to the reporting requirements under 18 AAC 83.410, an existing manufacturing, commercial, mining, and silvicultural discharger shall notify the Department as soon as that discharger knows or has reason to believe that any activity has occurred or will occur that would result in:

2.8.1.1 The discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in the permit, if that discharge will exceed the highest of the following notification levels:

2.8.1.1.1 One hundred micrograms per liter (100 µg/L);

2.8.1.1.2 Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile, 500 micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol, and one milligram per liter (1 mg/L) for antimony;

2.8.1.1.3 Five times the maximum concentration value reported for that pollutant in the permit application in accordance with 18 AAC 83.310(c)-(g); or

2.8.1.1.4 The level established by the Department in accordance with 18 AAC 83.445.

2.8.1.2 Any discharge, on a non-routine or infrequent basis, of a toxic pollutant that is not limited in the permit, if that discharge will exceed the highest of the following notification levels:

2.8.1.2.1 Five hundred micrograms per liter (500 µg/L);

2.8.1.2.2 One milligram per liter (1 mg/L) for antimony;

2.8.1.2.3 Ten times the maximum concentration value reported for that pollutant in the permit application in accordance with 18 AAC 83.310(c)-(g); or

2.8.1.2.4 The level established by the Department in accordance with 18 AAC 83.445.

3.0 Monitoring, Recording, and Reporting Requirements

3.1 Representative Sampling

A permittee must collect effluent samples from the effluent stream after the last treatment unit before discharge into the receiving waters. Samples and measurements must be representative of the volume and nature of the monitored activity or discharge.

3.2 Reporting of Monitoring Results

At intervals specified in the permit, monitoring results must be reported on the EPA discharge monitoring report (DMR) form, as revised as of March 1999, adopted by reference.

3.2.1 Monitoring results shall be summarized each month on the DMR or an approved equivalent report. The permittee must submit reports monthly postmarked by the 20th day of the following month.

3.2.2 The permittee must sign and certify all DMRs and all other reports in accordance with the requirements of Appendix A, Part 1.12, Signatory Requirements and Penalties. All signed and certified legible original DMRs and all other documents and reports must be submitted to the Department at the Compliance and Enforcement Program address in Appendix A, Part 1.1.2.

3.2.3 If, during the period when this permit is effective, the Department makes available electronic reporting, the permittee may, as an alternative to the requirements of Appendix A, Part 3.2.2, submit monthly DMRs electronically by the 15th day of the following month in accordance with guidance provided by the Department. The permittee must certify all DMRs and other reports, in accordance with the requirements of Appendix A, Part 1.12, Signatory Requirements and Penalties. The permittee must retain the legible originals of these documents and make them available to the Department upon request.

3.3 Additional Monitoring by Permittee

If the permittee monitors any pollutant more frequently than the permit requires using test procedures approved in 40 CFR Part 136, adopted by reference at 18 AAC 83.010, or as specified in this permit, the results of that additional monitoring must be included in the calculation and reporting of the data submitted in the DMR required by Appendix A, Part 3.2. All limitations that require averaging of measurements must be calculated using an arithmetic means unless the Department specifies another method in the permit. Upon request by the Department, the permittee must submit the results of any other sampling and monitoring regardless of the test method used.

3.4 Twenty-four Hour Reporting

A permittee shall report any noncompliance event that may endanger health or the environment as follows:

3.4.1 A report must be made:

3.4.1.1 Orally within 24 hours after the permittee becomes aware of the circumstances, and

3.4.1.2 In writing within five days after the permittee becomes aware of the circumstances.

3.4.2 A report must include the following information:

3.4.2.1 A description of the noncompliance and its causes, including the estimated volume or weight and specific details of the noncompliance;

3.4.2.2 The period of noncompliance, including exact dates and times;

3.4.2.3 If the noncompliance has not been corrected, a statement regarding the anticipated time the noncompliance is expected to continue; and

3.4.2.4 Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

3.4.3 An event that must be reported within 24 hours includes:

3.4.3.1 An unanticipated bypass that exceeds any effluent limitation in the permit (see Appendix A, Part 2.6, Bypass of Treatment Facilities).

3.4.3.2 An upset that exceeds any effluent limitation in the permit (see Appendix A, Part 2.7, Upset Conditions).

3.4.3.3 A violation of a maximum daily discharge limitation for any of the pollutants listed in the permit as requiring 24-hour reporting.

3.4.4 The Department may waive the written report on a case-by-case basis for reports under Appendix A, Part 3.4 if the oral report has been received within 24 hours of the permittee becoming aware of the noncompliance event.

3.4.5 The permittee may satisfy the written reporting submission requirements of Appendix A, Part 3.4 by submitting the written report via e-mail, if the following conditions are met:

3.4.5.1 The Noncompliance Notification Form or equivalent form is used to report the noncompliance;

3.4.5.2 The written report includes all the information required under Appendix A, Part 3.4.2;

3.4.5.3 The written report is properly certified and signed in accordance with Appendix A, Parts 1.12.3 and 1.12.5.;

3.4.5.4 The written report is scanned as a PDF (portable document format) document and transmitted to the Department as an attachment to the e-mail; and

3.4.5.5 The permittee retains in the facility file the original signed and certified written report and a printed copy of the conveying email.

3.4.6 The e-mail and PDF written report will satisfy the written report submission requirements of this permit provided the e-mail is received by the Department within five days after the time the permittee becomes aware of the noncompliance event and the e-mail and written report satisfy the criteria of Part 3.4.5. The e-mail address to report noncompliance is: dec-wqreporting@alaska.gov

3.5 Other Noncompliance Reporting

A permittee shall report all instances of noncompliance not required to be reported under Appendix A, Parts 2.4 (Compliance Schedules), 3.3 (Additional Monitoring by Permittee), and 3.4 (Twenty-four Hour Reporting) at the time the permittee submits monitoring reports under Appendix A, Part 3.2 (Reporting of Monitoring Results). A report of noncompliance under this part must contain the information listed in Appendix A, Part 3.4.2 and be sent to the Compliance and Enforcement Program address in Appendix A, Part 1.1.2.

4.0 Penalties for Violations of Permit Conditions

Alaska laws allow the State to pursue both civil and criminal actions concurrently. The following is a summary of Alaska law. Permittees should read the applicable statutes for further substantive and procedural details.

4.1 Civil Action

Under AS 46.03.760(e), a person who violates or causes or permits to be violated a regulation, a lawful order of the Department, or a permit, approval, or acceptance, or term or condition of a permit, approval or acceptance issued under the program authorized by AS 46.03.020 (12) is liable, in a civil action, to the State for a sum to be assessed by the court of not less than $500 nor more than $100,000 for the initial violation, nor more than $10,000 for each day after that on which the violation continues, and that shall reflect, when applicable:

4.1.1 Reasonable compensation in the nature of liquated damages for any adverse environmental effects caused by the violation, that shall be determined by the court according to the toxicity, degradability, and dispersal characteristics of the substance discharged, the sensitivity of the receiving environment, and the degree to which the discharge degrades existing environmental quality;

4.1.2 Reasonable costs incurred by the State in detection, investigation, and attempted correction of the violation;

4.1.3 The economic savings realized by the person in not complying with the requirements for which a violation is charged; and

4.1.4 The need for an enhanced civil penalty to deter future noncompliance.

4.2 Injunctive Relief

4.2.1 Under AS 46.03.820, the Department can order an activity presenting an imminent or present danger to public health or that would be likely to result in irreversible damage to the environment be discontinued. Upon receipt of such an order, the activity must be immediately discontinued.

4.2.2 Under AS 46.03.765, the Department can bring an action in Alaska Superior Court seeking to enjoin ongoing or threatened violations for Department-issued permits and Department statutes and regulations.

4.3 Criminal Action

Under AS 46.03.790(h), a person is guilty of a Class A misdemeanor if the person negligently:

4.3.1 Violates a regulation adopted by the Department under AS 46.03.020(12);

4.3.2 Violates a permit issued under the program authorized by AS 46.03.020(12);

4.3.3 Fails to provide information or provides false information required by a regulation adopted under AS 46.03.020(12);

4.3.4 Makes a false statement, representation, or certification in an application, notice, record, report, permit, or other document filed, maintained, or used for purposes of compliance with a permit issued under or a regulation adopted under AS 46.03.020(12); or

4.3.5 Renders inaccurate a monitoring device or method required to be maintained by a permit issued or under a regulation adopted under AS 46.03.020(12).

4.4 Other Fines

Upon conviction of a violation of a regulation adopted under AS 46.03.020(12), a defendant who is not an organization may be sentenced to pay a fine of not more than $10,000 for each separate violation (AS 46.03.790(g)). A defendant that is an organization may be sentenced to pay a fine not exceeding the greater of: (1) $200,00; (2) three times the pecuniary gain realized by the defendant as a result of the offense; or (3) three times the pecuniary damage or loss caused by the defendant to another, or the property of another, as a result of the offense (AS 12.55.035(c)(B), (c)(2), and (c)(3)).

Appendix B

Acronyms

APPENDIX B

The following acronyms are common terms that may be found in an in the Alaska Pollutant Discharge Elimination System (APDES) permit and fact sheet.

18 AAC 15	Alaska Administrative Code. Title 18 Environmental Conservation, Chapter 15: Administrative Procedures
18 AAC 70	Alaska Administrative Code. Title 18 Environmental Conservation, Chapter 70: Water Quality Standards
18 AAC 72	Alaska Administrative Code. Title 18 Environmental Conservation, Chapter 72: Wastewater Disposal
18 AAC 83	Alaska Administrative Code. Title 18 Environmental Conservation, Chapter 83: Alaska Pollutant Discharge Elimination System

All chapters of Alaska Administrative Code, Title 18 are available at the Alaska Administrative Code database http://www.legis.state.ak.us/cgi-bin/folioisa.dll/aac

40 CFR	Code of Federal Regulations Title 40: Protection of Environment
AAC	Alaska Administrative Code
ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
Ag	Silver
Al	Aluminum
As	Arsenic
APDES	Alaska Pollutant Discharge Elimination System
AS	Alaska Statutes
AS 46.03	Alaska Statutes Title 46, Chapter 03: Environmental Conservation. Available at http://www.legis.state.ak.us/default.htm
BMP	Best Management Practice
Cd	Cadmium
CFR	Code of Federal Regulations
Cr	Chromium
Cu	Copper
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
DTF	Dry Tailings Facility
EPA	U.S. Environmental Protection Agency

APPENDIX B

Fe	Iron
GFRD	Geosynthetic Face Rock fill Dam
Hg	Mercury
IC_{25}	Inhibition Concentration 25%
MDL	Method Detection Limit
mg/L	Milligrams per Liter
MGD or mgd	Million gallons per day
ML	Minimum Level
MWTP	Mine Water Treatment Plant
N/A	Not Applicable
NEPA	National Environmental Policy Act
Ni	Nickel
Pb	Lead
POO	Plan of Operations
PQL	Practical Quantification Limit
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
Se	Selenium
TIE	Toxicity Identification Evaluation
TPY	Tons per Year
TRE	Toxicity Reduction Evaluation
TSS	Total Suspended Solids
TTF	Tailings Treatment Facility
TTFWTP	Tailings Treatment Facility Water Treatment Plant
TUc	Toxic Unit, Chronic
µg/L	Micrograms per Liter
U.S.C.	United States Code
WQBEL	Water Quality Based Effluent Limit
WQS	Water Quality Standards
Zn	Zinc

Appendix C

Definitions

APPENDIX C

The following definitions of terms are associated with the APDES permit and fact sheet. Consult the footnote references for a complete list of terms and definitions.

Alaska Pollutant Discharge Elimination System (APDES)[a]	The state's program, approved by EPA under 33 U.S.C. 1342(b), for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits and imposing and enforcing pretreatment requirements under 33 U.S.C. 1317, 1328, 1342, and 1345
Annual	Annual shall be once per calendar year
Aquaculture[b]	The cultivation of aquatic plants or animals for human use or consumption
Average	An arithmetic mean obtained by adding quantities and dividing the sum by the number of quantities
Average Monthly (Effluent) Limit[a]	The highest allowable average of "daily discharges" over a calendar month calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured for that month
Best Management Practices (BMPs)[a]	Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage areas.
Clean Water Act (CWA)[a]	Means the federal law codified at 33 U.S.C. 1251-1387, also referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972
Color[b]	The condition that results in the visual sensations of hue and intensity as measured after turbidity is removed
Commissioner[a]	The commissioner of the Alaska Department of Environmental Conservation or the commissioner's designee
Composite Samples	Composite samples must consist of at least eight equal volume grab samples. 24 hour composite sample means a combination of at least eight discrete samples of equal volume collected at equal time intervals over a 24-hour period at the same location. A "flow proportional composite" sample means a combination of at least eight discrete samples collected at equal time intervals over a 24-hour period with each sample volume proportioned according to the flow volume. The sample aliquots must be collected and stored in accordance with procedures prescribed in the most recent edition of *Standard Methods for the Examination of Water and Wastewater*.
Criterion[b]	A set concentration or limit of a water quality parameter that, when not exceeded, will protect an organism, a population of organisms, a community of organisms, or a prescribed water use with a reasonable degree of safety. A criterion might be a narrative statement instead of a numerical concentration or limit.

a) See 18 AAC 83
b) See 18 AAC 70.990
c) See 18 AAC 72.990
d) See 40 CFR Part 136
e) See EPA Technical Support Document
f) See Standard Methods for the Examination of Water and Wastewater 18th Edition
g) See EPA Permit Writers Manual

APPENDIX C

Department[a]	The Alaska Department of Environmental Conservation
Design Flow[a]	The wastewater flow rate that the plant was designed to handle
Director[a]	The commissioner or the commissioner’s designee assigned to administer the APDES program or a portion of it, unless the context identifies an EPA director
Discharge[a]	When used without qualification, discharge means the discharge of a pollutant
Dissolved Oxygen (DO)[b]	The concentration of oxygen in water as determined either by the Winkler (iodometric) method and its modifications or by the membrane electrode method The oxygen dissolved in water or wastewater and usually expressed in milligrams per liter or percent saturation
Diversion Pipeline	A pipe installed to convey Upper Slate Lake water around the Tailings Treatment Facility to East Fork Slate Creek. Outfall 002 from the TTFWTP discharges into the diversion pipeline.
Effluent[b]	The segment of a wastewater stream that follows the final step in a treatment process and precedes discharge of the wastewater stream to the receiving environment
Fish[b]	Any of the group of cold-blooded vertebrates that live in water and have permanent gills for breathing and fins for locomotion
Grab Sample	A single instantaneous sample collected at a particular place and time that represents the composition of wastewater only at that time and place
Influent	Untreated wastewater before it enters the first treatment process of a wastewater treatment works
Inhibition Concentration 25% (IC_{25})[e]	The point estimate of the toxicant concentration that would cause 25% reduction in a nonlethal biological measurement of the test organisms, such as reproduction or growth
Maximum Daily[a]	The highest allowable “daily discharge”
Method Detection Limit (MDL)[d]	The minimum concentration of a substance (analyte) that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte
Micrograms per Liter (μg/L)[b]	The concentration at which one millionth of a gram (10^{-6} g) is found in a volume of one liter
Milligrams per Liter (mg/L)[b]	The concentration at which one thousandth of a gram (10^{-3} g) is found in a volume of one liter. It is approximately equal to the unit “parts per million (ppm),” formerly of common use.
Mine Water Treatment Plant (MWTP)	The treatment plant on the Comet side of the project that treats only mine drainage water.

a) See 18 AAC 83
b) See 18 AAC 70.990
c) See 18 AAC 72.990
d) See 40 CFR Part 136
e) See EPA Technical Support Document
f) See Standard Methods for the Examination of Water and Wastewater 18th Edition
g) See EPA Permit Writers Manual

APPENDIX C

Minimum Level (ML)[e]	The concentration at which the entire analytical system must give a recognizable signal and an acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes, and processing steps have been followed. This level is used as the compliance level if the effluent limit is below it.
Month	Month shall be the time period from the 1st of a calendar month to the last day in the month
Monthly Average	The average of daily discharges over a monitoring month calculated as the sum of all daily discharges measured during a monitoring month divided by the number of daily discharges measured during that month
Permittee	A company, organization, association, entity, or person who is issued a wastewater permit and is responsible for ensuring compliance, monitoring, and reporting as required by the permit
pH[g]	A measure of the hydrogen ion concentration of water or wastewater; expressed as the negative log of the hydrogen ion concentration in mg/L. A pH of 7 is neutral. A pH less than 7 is acidic, and a pH greater than 7 is basic.
Practical Quantification Limit (PQL)[g]	The lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.
Pollutant[a]	Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under 42 U.S.C. 2011), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, or agricultural waste discharged into water
Quality Assurance Project Plan (QAPP)	A system of procedures, checks, audits, and corrective actions to ensure that all research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality
Quarter	The time period of three months based on the calendar year beginning with January
Receiving Water Body	Lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, straits, passages, canals, the Pacific Ocean, Gulf of Alaska, Bering Sea, and Arctic Ocean, in the territorial limits of the state, and all other bodies of surface water, natural or artificial, public or private, inland or coastal, fresh or salt, which are wholly or partially in or bordering the state or under the jurisdiction of the state. (See "Waters of the U.S." at 18 AAC 83.990(77))
Recorded	A permanent record using mechanical or electronic equipment to provide a totalized reading, as well as a record of instantaneous readings
Report	Report results of analysis
Settleable Solids[b]	Solid material of organic or mineral origin that is transported by and deposited from water, as measured by the volumetric Imhoff cone method and at the method detection

a) See 18 AAC 83
b) See 18 AAC 70.990
c) See 18 AAC 72.990
d) See 40 CFR Part 136
e) See EPA Technical Support Document
f) See Standard Methods for the Examination of Water and Wastewater 18th Edition
g) See EPA Permit Writers Manual

	limits specified in method 2540(F), *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), adopted by reference in 18 AAC 70.020(c)(1)
Suspended Solids	Insoluble solids that either float on the surface of, or are in suspension in, water, wastewater, or other liquids. The quantity of material removed from wastewater in a laboratory test, as prescribed in *Standard Methods for the Examination of Water and Wastewater* and referred to as nonfilterable.
Tailings	Material from the milling process.
Tailings Treatment Facility (TTF)	An impoundment used for the treatment of process water.
Total Suspended Solids (TSS)[g]	A measure of the filterable solids present in a sample, as determined by the method specified in 40 CFR Part 136.
Toxic Unit, Chronic (TUc)[e]	The reciprocal of the effluent concentration that causes no observable effect on the test organisms by the end of the chronic exposure period (i.e., 100/NOEC)
TTF Embankment	The dam constructed to retain tailings in the former Lower Slate lake.
Wastewater Treatment	Any process to which wastewater is subjected in order to remove or alter its objectionable constituents and make it suitable for subsequent use or acceptable for discharge to the environment
Waters of the United States or Waters of the U.S.	Has the meaning given in 18 AAC 83.990(77)
Water Supply[b]	Any of the waters of the United States that are designated in 18 AAC 70 to be protected for fresh water or marine water uses. Water supply includes waters used for drinking, culinary, food processing, agricultural, aquacultural, seafood processing, and industrial purposes. Water supply does not necessarily mean that water in a waterbody that is protected as a supply for the uses listed in this paragraph is safe to drink in its natural state.
Week	The time period of Sunday through Saturday

a) See 18 AAC 83
b) See 18 AAC 70.990
c) See 18 AAC 72.990
d) See 40 CFR Part 136
e) See EPA Technical Support Document
f) See Standard Methods for the Examination of Water and Wastewater 18th Edition
g) See EPA Permit Writers Manual

APPENDIX B: FISH HABITAT PERMITS

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

SEAN PARNELL, GOVERNOR

Douglas Island Center Building
802 W. 3rd Street, Douglas
P.O. BOX 110024
JUNEAU, AK 99811-0024
PHONE: (907) 465-4105
FAX: (907) 465-4759

FISH HABITAT PERMIT FH05-I-0050
Amendment B

ISSUED: May 6, 2005
AMENDMENT: April 19, 2007
AMENDMENT: August 28, 2009
EXPIRES: Upon Satisfactory Completion of Restoration

Coeur Alaska, Inc
ATTN: Clyde Gillespie, Surface Operations Manager
3031 Clinton Drive, Suite 202
Juneau, AK 99801

RE: **Lower Slate Lake Tailings Impoundment Dam**
Slate Creek (Stream No. 115-20-10030)
T. 35 S., R. 62 E. Section 26, CRM (Juneau D-4)
Location: N 58.8081 W 135.0383
City and Borough of Juneau, Alaska

Dear Mr. Gillespie:

Pursuant to AS 16.05.841 and AS 16.05.871(b), the Alaska Department of Fish and Game Division of Habitat reviewed Coeur Alaska, Inc.'s request to reinstate Fish Habitat Permit FH05-I-0050 in its entirety. The permit authorized Coeur to construct the Lower Slate Lake tailings storage facility (TSF), which included installing a dam in East Fork Slate Creek below the outlet of Lower Slate Lake and diverting Mid-Lake Slate Creek around the TSF during construction and operations. Upon closure, Coeur will reclaim Lower Slate Lake and restore water flow between Mid-Lake Slate Creek, Lower Slate Lake and East Fork Slate Creek.

Project Description
Coeur will construct a dam that will raise the water level in Lower Slate Lake by about 85 feet, increasing the size of the lake from about 20 to 56 acres and flooding the majority of Mid-Lake Slate Creek, the main inflow to Lower Slate Lake. Mine tailings will be permanently stored in the lake. Mid-Lake Slate Creek will be diverted around the TSF during operations. Downstream fish passage will be provided by manual relocation of fish or through the diversion. The TSF will be used for approximately twelve (12) years, and then reclaimed and improved to provide fish habitat. At reclamation, downstream fish migration will be provided via a constructed spillway. This project was found consistent with the Alaska Coastal Management Program on 4/25/2005 (State ID No. AK 0406-13J).

Background

Below is a chronological summary of Fish Habitat Permitting for the Lower Slate Lake TSF:

Date	Permit No.	Authorization
5/06/05	FH05-I-0050	Construct the Lower Slate Lake TSF.
4/19/07	FH05-I-0050A	Remove the cofferdam and restore lake water flow into the natural East Fork Slate Creek watercourse.
9/5/08	FH08-I-0151	Remove the diversion pipeline from Mid-Lake Slate Creek and restore creek flow into Lower Slate Lake.

On August 24, 2006, the Ninth Circuit Court of Appeals ordered an injunction on the portion of the US Army Corps of Engineers (USACE) permit that authorized development of the Lower Slate Lake TSF, and on August 25, 2006, USACE suspended that portion of the permit. On April 13, 2007, USACE authorized Coeur to remove the cofferdam and dam construction materials at Lower Slate Lake as part of an interim reclamation plan by order of the Ninth Circuit. Habitat issued permit Amendment A on April 19 approving the required reclamation work. Habitat also issued Fish Habitat Permit FH08-I-0151 on September 5, 2008 to remove the diversion pipeline and restore flow between Mid-Lake Slate Creek and Lower Slate Lake, also part of their interim reclamation plan.

On June 22, 2009, the US Supreme Court ruled that USACE has deference in determining compliance with the Clean Water Act, and therefore reversed the Ninth Circuit's 2006 order. On July 8, 2009, the Ninth Circuit lifted the injunction in response to the US Supreme Court's decision, and on August 14, 2009, USACE lifted the permit suspension to allow development of the Lower Slate Lake TSF.

Anadromous Fish Act, Fishway Act and Coastal Consistency Requirements

The dam and the impoundment of tailings in Lower Slate Lake will impact the aquatic ecosystem, both above and below the dam during construction and operation. However, Coeur proposes habitat improvements during reclamation that meet the requirements of AS 16.05.851. The Division of Habitat has determined that there will not be an overall negative impact to fishery resources in the Slate Creek drainage, and after the area is reclaimed fish habitat will be improved. The basis for our decision follows:

- Slate Creek below Lower Slate Lake has been specified as being important for the migration, spawning or rearing of anadromous fishes in accordance with AS 16.05.871(a). However, a permanent barrier to the upstream migration of anadromous fish is located approximately one mile below the proposed dam near the confluence of East and West Fork Slate Creek.

- Lower Slate Lake is a deeply incised 20-acre lake up to 50 feet deep. The lake has populations of resident Dolly Varden char and three-spine stickleback. Productivity of the lower lake is relatively low compared to Upper Slate Lake, largely because it is deep and lacks substantial shallow littoral habitat and productive inlet streams. The lower lake provides rearing habitat for Dolly Varden char, but successful spawning has not been documented in the lower lake or inlet streams. Recruitment of Dolly Varden char comes from fish spawned in inlet streams to Upper Slate Lake which enter Lower Slate Lake via Mid-Lake Slate Creek

- The tailings in Lower Slate Lake are expected to be inert. Following reclamation, the larger and shallower lake is expected to provide habitat for macroinvertebrates and forage fish that will support a population of Dolly Varden char year-round. If monitoring shows the tailings are not suitable for colonization, the tailings will be capped with clean material. We anticipate the reclaimed area will provide over-wintering, spawning, and rearing habitat for Dolly Varden char.

- Upper Slate Lake is not expected to be affected by the dam and will provide seed populations of fish, invertebrates, and plants native to the lake system during the reclamation of the lower lake.

- In order to assure that there are adequate flows to maintain conditions for spawning, incubation, rearing and migration of fish in Slate Creek, water withdrawals will not be allowed when natural flows are below the in-stream flow schedule specified in Water Right LAS 24486.

The original permit and Amendment A included four permit stipulations. Stipulation #1 requires Coeur to submit to the Division of Habitat for review and approval dam construction plans that specify how downstream fish passage will be provided during development and reclamation of the TSF[1]. In May 2005, Coeur submitted a copy of the Final Plan of Operations containing those plans, which specifies that Coeur will manually relocate fish from the diversion intake area to East Fork Slate Creek below the dam during construction and operation. In addition, pending further review and approval, fish passage may be provided via the diversion pipeline if safe downstream fish passage can be demonstrated. During reclamation, Coeur will construct a spillway to provide water flow and downstream fish passage around the dam and remove the temporary diversion pipeline, restoring flow between Mid-Lake Slate Creek, Lower Slate Lake, and East Fork Slate Creek. However, the plans do not specify how the spillway will provide safe downstream fish passage after closure of the facility, as required in the original permit and Amendment A.

Permit Stipulations #3 and #4 included in the original permit and Amendment A require Coeur to develop and submit for Division of Habitat approval an ecological monitoring plan for Upper and Lower Slate Lakes and East Fork Slate Creek, and a reclamation and closure plan for aquatic habitats in the Lower Slate Lake area. Coeur submitted these plans in May 2005 under cover of the Final Plan of Operations, however Division of Habitat staff did not thoroughly review or approve these plans while the project was pending judicial review of the USACE permit.

Therefore, in accordance with AS 16.05.841 and AS 16.05.871(d) project approval is hereby given subject to the following three stipulations[2]:

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[1] Pursuant to AS 16.05.841, Coeur proposes to offset impacts resulting from construction of an upstream fish barrier in East Fork Slate Creek through restoring and enhancing habitat in Lower Slate Lake as described in the Final Plan of Operations Reclamation Plan. The Division of Habitat determined that construction of an efficient Fishway over the dam is impracticable and further concluded that opportunities exist to enhance aquatic habitats in Lower Slate Lake following closure that will satisfy the compensation requirements of AS 16.05.851.

[2] Stipulations #1 and #2 are required for compliance with AS 16.05.841. Stipulation #3 is required for compliance with AS 16.05.841 and AS 16.05.871.

1. Prior to construction of the spillway, Coeur shall develop and submit plans and specifications for the structure, including an analysis of how the spillway will provide safe downstream fish passage after reclamation of the TSF. Also, if Coeur plans to use the diversion pipeline for downstream fish passage around the TSF during operations, Habitat biologists will work with Coeur to ensure the pipeline provides safe fish passage.

2. The integrity of the earthen dam in Mid-Lake Slate Creek must be maintained for the life of the structure in accordance with the terms and conditions of this permit.

3. The Division of Habitat received your ecological monitoring plan for Upper and Lower Slate Lakes and East Fork Slate Creek, and a reclamation and closure plan for aquatic habitats in the Lower Slate Lake area under cover of the May 2005 Final Plan of Operations. The Division of Habitat will review the plans as soon as possible, and provide recommendations and required changes for compliance with AS 16.05.841 and AS 16.05.871. The Division of Habitat will approve the final plans via future permit amendments.

You are responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved project. For any activity that significantly deviates from the approved plan, you shall notify Division of Habitat and obtain written approval in the form of a permit amendment before beginning the activity. Any action that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the Division of Habitat. Therefore, it is recommended you consult Division of Habitat immediately when a deviation from the approved plan is being considered.

Please be advised that this determination applies only to activities regulated by Division of Habitat; other agencies also may have jurisdiction under their respective authorities. This determination does not relieve you of your responsibility to secure other permits; state, federal, or local. You are still required to comply with all other applicable laws.

This letter constitutes a permit issued under the authority of AS 16.05.841 and AS 16.05.871 and must be retained on site during construction. In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish created by the project which was a direct result of failure to comply with this permit or any applicable law.

You shall indemnify, save harmless, and defend the department, its agents, and its employees from any and all claims, actions or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or your performance under this permit. However, this provision has no effect if, and only if, the sole proximate cause of the injury is the department's negligence.

This AS 16.05.871 permit decision may be appealed in accordance with the provisions of AS 44.62.330-630.

If you have any questions regarding this permit, please contact Kate Kanouse at (907) 465-4290 or by email at kate.kanouse@alaska.gov.

Sincerely,
Denby Lloyd
Commissioner

Jackie Timothy

By Jackie Timothy
Regional Supervisor
Division of Habitat

Email cc:

Al Ott, ADF&G Habitat, Fairbanks
Kate Kanouse, ADF&G Habitat, Douglas
Brian Glynn, ADF&G Sport Fish, Douglas
Rich Chapell, ADF&G Sport Fish, Haines
Kevin Monagle, ADF&G Comm Fish, Douglas
Randy Bachman, ADF&G Comm Fish, Haines
Ryan Scott, ADF&G Wildlife Conservation, Douglas
Tom Crafford, ADNR OPMP, Anchorage
Carrie Bohan, ADNR DCOM, Juneau
Jim Anderson, ADNR DMLW, Juneau
Kenwyn George, ADEC, Juneau
Richard Jackson, USACE, Anchorage
Chad Hood, USFS, Juneau
Kevin Eppers, Coeur, Juneau

STATE OF ALASKA

SEAN PARNELL, GOVERNOR

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

802 3rd Street, Douglas
P.O. BOX 110024
JUNEAU, AK 99811-0024
PHONE: (907) 465-4105
FAX: (907) 465-4759

FISH HABITAT PERMITS
FH11-I-0128, FH11-I-0129 and FH11-I-0130

ISSUED: February 13, 2012

Coeur Alaska, Inc.
ATTN: Mr. Luke J. Russell
3031 Clinton Dr., Suite 202
Juneau, AK 99801

RE: **Johnson Creek Bridges and Water Use**
T. 35 S., R. 62 E. Sec. 15, C.R.M. (Juneau D4)
Locations:

58.8250 N, 135.0260 W	Johnson Creek "Bridge 1" (FH11-I-0128)
58.8370 N, 135.0430 W	Johnson Creek "Bridge 2" (FH11-I-0129)
58.8370 N, 135.0430 W	Johnson Creek Water Intake (FH11-I-0130)

Dear Mr. Russell:

Pursuant to AS 16.05.841 (Fishway Act), the Alaska Department of Fish and Game (ADF&G), Division of Habitat reviewed three existing structures on Johnson Creek, two bridges and one infiltration gallery, that support the Kensington Gold Mine. These new permits replace the preceding permits for these structures, which all occur upstream of the cataloged anadromous portion of Johnson Creek (Stream No. 115-20-10070). The purpose of issuing these re-authorizations is to update departmental change and current conditions of these structures.

Project Description
The structures on Johnson Creek include the following:

1) "Bridge 1" **FH11-I-0128** (previously permitted under FH05-I-0047)

   The 30' full-span steel bridge is located about 0.5 miles upstream of a natural barrier to anadromous fish migration. It was constructed above the ordinary high water mark, and the previous log abutments were left in place downstream.

2) <u>"Bridge 2"</u> **FH11-I-0129** (previously permitted under FH05-I-0048)

   The 30' full-span steel bridge is located about 1.4 miles upstream of a natural barrier to anadromous fish migration. It was constructed above the ordinary high water mark, and the previous log abutments were left in place upstream.

3) <u>Intake Structure</u> **FH11-I-0130** (previously permitted under FH05-I-0049)

   The structure provides water to the mill and camp. You excavated a 15' long trench, measuring 5-6' wide and 10' deep. The trench was dug perpendicular to the stream channel extending primarily into the bank, but also into the stream channel. The excavated area was backfilled with coarse gravel surrounding a 24" diameter vertical pipe that intersects the bank at the low flow water surface elevation and extends approximately 3 feet below the streambed.

Fish Resources
Johnson Creek supports resident Dolly Varden char.

Fishway Act
In accordance with AS 16.05.841, project approval is hereby given subject to the project description and the terms of this permit:

The structures shall maintained to accommodate the efficient passage and movement of fish, both upstream and downstream.

You are responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved project. For any activity that significantly deviates from the approved plan, you shall notify the Division of Habitat and obtain written approval in the form of a permit amendment before beginning the activity. Any action that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the Division of Habitat. Therefore, it is recommended you consult the Division of Habitat immediately when a deviation from the approved plan is being considered.

For the purpose of inspecting or monitoring compliance with any condition of this permit, you shall give an authorized representative of the state free and unobstructed access, at safe and reasonable times, to the permit site. You shall furnish whatever assistance and information as the authorized representative reasonably requires for monitoring and inspection purposes.

This letter constitutes a permit issued under the authority of AS 16.05.841 and must be retained on site during project activities. Please be advised that this determination applies only to activities regulated by the Division of Habitat; other agencies also may have jurisdiction under their respective authorities. This determination does not relieve you of your responsibility to secure other permits; state, federal, or local. You are still required to comply with all other applicable laws.

In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which was a direct result of the failure to comply with this permit or any applicable law.

You shall indemnify, save harmless, and defend the department, its agents, and its employees from any and all claims, actions, or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or your performance under this permit. However, this provision has no effect if, and only if, the sole proximate cause of the injury is the department's negligence.

Any questions or concerns about this permit may be directed to Habitat Biologist Kate Kanouse at (907) 465-4290 or emailed to kate.kanouse@alaska.gov.

Sincerely,
Cora Campbell
Commissioner

Timothy

By Jackie Timothy
Regional Supervisor
Division of Habitat

CC via email:
Al Ott, ADF&G Habitat, Fairbanks
Brian Glynn, ADF&G/SF, Douglas
Kevin Monagle, ADF&G/CF, Douglas
Ryan Scott, ADF&G/WC, Douglas
Ted Deats, ADNR Water, Juneau
Steve Brockmann, USFWS, Juneau
Mary Goode, NMFS, Juneau
Heidi Firstencel, USACE, Juneau
Linda Speerstra, USACE, Sitka
Kevin Eppers, Coeur Alaska, Juneau

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

SEAN PARNELL, GOVERNOR

802 3rd Street, Douglas
P.O. BOX 110024
JUNEAU, AK 99811-0024
PHONE: (907) 465-4105
FAX: (907) 465-4759

FISH HABITAT PERMITS
FH11-I-0134 and FH11-I-0135

ISSUED: February 13, 2012

Coeur Alaska, Inc.
ATTN: Mr. Luke J. Russell
3031 Clinton Dr., Suite 202
Juneau, AK 99801

RE: **Sherman Creek Tributary Bridges**
T. 35 S., R. 62 E. Sec. 5, C.R.M. (Juneau D4)
Locations:
58.8633 N, 135.1082 W — South Fork Sherman Creek Bridge (FH11-I-0134)
58.8632 N, 135.1022 W — Upper Sherman Creek Bridge (FH11-I-0135)

Dear Mr. Russell:

Pursuant to AS 16.05.841 (Fishway Act), the Alaska Department of Fish and Game (ADF&G) Division of Habitat reviewed two existing bridges located on tributaries to Sherman Creek that support the Kensington Gold Mine. These structures are located upstream of the cataloged anadromous portion of Sherman Creek (Stream No. 115-31-10330).

Project Description
The bridges on tributaries[1] to Sherman Creek include the following:

1) South Fork Sherman Creek Bridge **FH11-I-0134**

The log stringer bridge is located on the South Fork Sherman Creek, about 1500' upstream of its confluence with Sherman Creek and was installed above the ordinary high

[1]South Fork Sherman Creek and Upper Sherman Creek are commonly referenced in project documents for Kensington Gold Mine. They are not shown on most USGS Quad maps of the area.

water mark. On April 17, 1998, this office issued Coeur Alaska, Inc. a permit (FG97-I(J)-66) authorizing replacement of this bridge with a new prefabricated bridge, but that work was never completed and the original log stringer bridge is still in place.

2) Upper Sherman Creek Bridge **FH11-I-0135**

The log stringer bridge is located on the Upper Sherman Creek, about 2400' upstream of the confluence of South Fork Sherman Creek and Upper Sherman Creek, and was installed above the ordinary high water mark. On April 17, 1998, this office issued Coeur Alaska, Inc. a permit (FG97-I(J)-65) authorizing replacement of this bridge with a new prefabricated bridge, but that work was never completed and the original log stringer bridge is still in place.

Fish Resources
South Fork and Upper Sherman Creeks support resident Dolly Varden char.

Fishway Act
In accordance with AS 16.05.841, project approval is hereby given subject to the project description and the terms of this permit:

The structures shall be maintained to accommodate the efficient passage and movement of fish, both upstream and downstream.

You are responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved project. For any activity that significantly deviates from the approved plan, you shall notify the Division of Habitat and obtain written approval in the form of a permit amendment before beginning the activity. Any action that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the Division of Habitat. Therefore, it is recommended you consult the Division of Habitat immediately when a deviation from the approved plan is being considered.

For the purpose of inspecting or monitoring compliance with any condition of this permit, you shall give an authorized representative of the state free and unobstructed access, at safe and reasonable times, to the permit site. You shall furnish whatever assistance and information as the authorized representative reasonably requires for monitoring and inspection purposes.

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In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which was a direct result of the failure to comply with this permit or any applicable law.

You shall indemnify, save harmless, and defend the department, its agents, and its employees from any and all claims, actions, or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or your performance under this permit. However, this provision has no effect if, and only if, the sole proximate cause of the injury is the department's negligence.

Any questions or concerns about this permit may be directed to Habitat Biologist Kate Kanouse at (907) 465-4290 or emailed to kate.kanouse@alaska.gov.

Sincerely,
Cora Campbell
Commissioner

Timothy

By Jackie Timothy
Regional Supervisor
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Mary Goode, NMFS, Juneau
Heidi Firstencel, USACE, Juneau
Linda Speerstra, USACE, Sitka
Kevin Eppers, Coeur Alaska, Juneau

APPENDIX C: MONITORING SCHEDULES

Kensington 2011 Sampling Dates by Site

Parameters	Lower Slate	East Fork Slate	Upper Slate	West Fork Slate	Lower Johnson	Middle Johnson	Upper Johnson	Lower Sherman	Middle Sherman	Upper Sherman	Sweeny
Periphyton Sampling	7/29/11	7/28/11	7/28/11	7/29/11	N/A	N/A	N/A	7/28/11	N/A	N/A	N/A
Macroinvertebrates Sampling	5/4/11	5/12/11	5/12/11	5/4/11	N/A	N/A	5/3/11	5/3/11	N/A	N/A	5/3/11
Spawning Substrate Sampling	8/17/11	N/A	N/A	N/A	8/15/11	N/A	N/A	8/11/11	N/A	N/A	N/A
Escapement Survey	7/19/11-11/15/11	N/A	N/A	N/A	7/18/11-11/7/11	N/A	N/A	7/19/11-9/20/11	N/A	N/A	N/A
Resident Fish Survey	7/14/11	9/1/11	8/10/11	N/A	7/15/11	9/19/11	8/31/11	7/13/11	9/26/11	9/19/11	N/A
Habitat Surveys	7/11/11	8/18/11	8/13/11	N/A	7/12/11	8/19/11	8/19/11	7/12/11	8/18/11	8/18/11	N/A
Out-Migrating Fry Sampling	4/12/11-5/21/11	N/A	N/A	N/A	4/14/11-5/21/11	N/A	N/A	4/11/11-5/20/11	N/A	N/A	N/A
Metal/Toxicity Sediment Sampling	10/3/11	9/26/11	10/6/11	N/A	10/3/11	N/A	N/A	10/4/11	10/4/11	N/A	N/A
Metals Fish Sampling	10/11/2011	9/13/2011	8/10/2011	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Location	Location Description	NPDES/APDES	Parameters	Sampling Frequency
Lower Slate Creek	Anadromous section, draining into Berners Bay, below an undisputed barrier; a waterfall approximately 25 meters high.	APDES	Periphyton biomass (as chlorophyll-a concentrations)	1/year
		APDES	Abundance and composition of benthic macroinvertebrates	1/year
		NPDES	Resident fish population and condition	1/year
		APDES	Resident fish metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		NPDES/APDES	Sediment toxicity and metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		NPDES	Outmigrating pink fry abundance	1/year
		NPDES	Adult salmon escapement surveys	1/year
		NPDES/APDES	Quality of anadromous fish spawning substrate	1/year
		NPDES	Aquatic vegetation survey	1/year
East Fork Slate Creek	Reach consisting mostly of cascade falls located directly below the tailings treatment facility to the top of the barrier waterfall.	APDES	Periphyton biomass (as chlorophyll-a concentrations)	1/year
		NPDES/APDES	Abundance and composition of benthic macroinvertebrates	1/year
		NPDES/APDES	Resident fish population and condition	1/year
		APDES	Resident fish metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		NPDES/APDES	Sediment toxicity and metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		NPDES	Aquatic vegetation survey	1/year
West Fork Slate Creek	A Slate Creek tributary located outside of mine influence.	APDES	Periphyton biomass (as chlorophyll-a concentrations)	1/year
		APDES	Abundance and composition of benthic macroinvertebrates	1/year
Upper Slate Creek	Control site, inlet located on the north side of upper Slate Lake outside of mine influence.	APDES	Periphyton biomass (as chlorophyll-a concentrations)	1/year
		APDES	Abundance and composition of benthic macroinvertebrates	1/year
		APDES	Resident fish population and condition	1/year
		APDES	Resident fish metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		NPDES/APDES	Sediment toxicity and metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
Lower Johnson Creek	Anadromous Section, draining into Berners Bay, below an undisputed barrier; a waterfall approximately 30 meters high.	NPDES	Resident fish population and condition	1/year
		NPDES/APDES	Sediment toxicity and metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		NPDES	Outmigrating pink fry abundance	1/year
		NPDES	Adult salmon escapement surveys	1/year
		NPDES	Quality of anadromous fish spawning substrate	1/year
Middle Johnson Creek	Reach consisting of uniform Pool, Riffle, and Glide Habitat extending from above the anadromous barrier to the Kensington Mine bridge 2.	NPDES	Resident fish population and condition	1/year

-continued-

Location	Location Description	NPDES/APDES	Parameters	Sampling Frequency
Upper Johnson Creek	Control site, located above the mill bench and outside of mine influence.	NPDES/APDES	Abundance and composition of benthic macroinvertebrates	1/year
		NPDES	Resident fish population and condition	
Lower Sherman Creek	Anadromous Section, draining into Lynn Canal, below and undisputed barrier; waterfall approximately 15 meters high	APDES	Periphyton biomass (as chlorophyll-a concentrations)	1/year
		APDES	Abundance and composition of benthic macroinvertebrates	1/year
		NPDES	Resident fish population and condition	1/year
		NPDES/APDES	Sediment toxicity and metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		NPDES	Outmigrating pink fry abundance	1/year
		NPDES	Adult salmon escapement surveys	1/year
		NPDES/APDES	Quality of anadromous fish spawning substrate	1/year
		NPDES	Aquatic vegetation survey	1/year
Middle Sherman Creek	Reach consisting of uniform Pool, Riffle, and Glide Habitat extending from above the anadromous barrier to the first bridge on Comet Road. Containing outfall 001 from mine water treatment plant.	NPDES	Resident fish population and condition	1/year
		NPDES/APDES	Sediment toxicity and metals concentrations (Al, Ag, Cd, Cr, Cu, Pb, Hg, Ni, Se, and Zn)	1/year
		NPDES	Aquatic vegetation survey	1/year
Upper Sherman Creek	Control site, located above outfall 001 and the Kensington adit, outside mine influence.	NPDES	Resident fish population and condition	1/year
Lower Sweeny Creek	Anadromous Section, draining into Lynn Canal, below an undisputed barrier. Reach is outside of mine influence.	NPDES	Abundance and composition of benthic macroinvertebrates	1/year

APPENDIX D: PERIPHYTON BIOMASS

Appendix D.–Periphyton biomass data.

	Jul-11			Oct-11		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
Upper Slate Creek						
	0.43	0	0	6.62	0	0.25
	0.32	0	0.04	0.96	0	0.04
	0.96	0.01	0.07	-	0	0.05
	0.11	0	0	0.53	0	0.04
	2.67	0	0.26	0.55	0	0.02
	0.32	0	0	1.47	0	0.03
	0.64	0	0.12	0.14	0.01	0.05
	1.14	0	0.01	-	0	0.15
	0.53	0	0	0.64	0	0.11
	0.64	0	0.02	-	-	-
mean	0.7762	0.0009	0.052	1.5597	0.0009	0.0835
max	2.67	0.006	0.263	6.6216	0.0083	0.2508
min	0.1068	0	0	0.14	0	0.0248
East Fork Slate Creek						
	9.51	2.16	0.24	18.9	7.97	1.11
	9.18	0.02	0.2	10.68	1.3	0.36
	1.28	0.03	0	2.99	0.79	0.12
	5.13	1.15	0.11	6.73	1.88	0.64
	16.02	0.18	0.44	22.53	5.43	0.99
	8.86	1.94	0.7	-	-	-
	4.7	0.7	0.13	-	-	-
	16.13	5.35	0.28	-	-	-
	4.91	0.49	0.12	-	-	-
	12.71	3.59	0.15	-	-	-
mean	8.843	1.5617	0.2369	12.3674	3.4731	0.6427
max	16.1268	5.3514	0.7024	22.5348	7.974	1.1099
min	1.2816	0.0244	0	2.9904	0.7868	0.1192
West Fork Slate Creek						
	2.56	0	0.19	-	-	-
	4.7	0	0.43	-	-	-
	2.78	0	0.26	-	-	-
	3.35	0	0.04	-	-	-
	4.27	0	0.25	-	-	-
	4.91	0	0.42	-	-	-
	3.95	0	0.27	-	-	-
	3.1	0	0.25	-	-	-
	4.38	0	0.39	-	-	-
	5.23	0	0.2	-	-	-
mean	3.9233	0	0.2689	-	-	-
max	5.23	0	0.426	-	-	-
min	2.5632	0	0.044	-	-	-

-continued-

	Jul-11			Oct-11		
mg/m²	chlor-*a*	chlor-*b*	chlor-*c*	chlor-*a*	chlor-*b*	chlor-*c*
Lower Slate Creek						
	0.21	0.05	0	6.41	0	0.87
	1.28	0.02	0.11	11.85	1.3	0.99
	0.85	0.01	0.07	2.99	0.15	0.13
	3.31	0.08	0.25	2.1	0	0.21
	11.85	3.11	0.3	5.23	0.03	0.63
	18.05	0.42	0.91	1.5	0	0.18
	0.75	0.13	0	0.32	0	0
	0.43	0.05	0	8.22	0.25	0.77
	8.54	0.39	0.58	2.24	0	0.23
	6.3	0.03	0.38	5.87	0	0.85
mean	5.7079	0.4704	0.2895	4.6742	0.1725	0.4842
max	18.0492	3.1082	0.9093	11.8548	1.2954	0.9874
min	0.4272	0.006	0	0.3204	0	0
Sherman Creek Sample Site 1						
	1.28	0	0.05	-	-	-
	5.34	0	0.36	-	-	-
	5.98	0	0.54	-	-	-
	3.84	0.1	0.48	-	-	-
	15.59	3.98	0.17	-	-	-
	11.11	2.64	0.28	-	-	-
	19.33	0	1.65	-	-	-
	7.26	0	0.74	-	-	-
	1.92	0.04	0.19	-	-	-
	4.38	0.17	0.44	-	-	-
mean	7.9625	0.7523	0.497	-	-	-
max	19.3308	3.9842	1.6464	-	-	-
min	1.2816	0	0.0535	-	-	-
Sherman Creek Sample Site 2						
	3.1	0	0.26	-	-	-
	6.3	0.19	0.62	-	-	-
	4.59	0	0.38	-	-	-
	0.32	0	0	-	-	-
	13.88	0	0.54	-	-	-
	7.37	0	0.46	-	-	-
	1.5	0	0.09	-	-	-
	14.31	0	0.59	-	-	-
	0.85	0	0.01	-	-	-
	3.84	0	0.25	-	-	-
mean	5.607	0.0189	0.3198	-	-	-
max	14.3112	0.1892	0.6228	-	-	-
min	0.3204	0	0	-	-	-

APPENDIX E: BENTHIC MACROINVERTEBRATES

Appendix E.–Benthic macroinvertebrates.

Order	Family	Genus	2011
Lower Slate Creek			
Ephemeroptera	Baetidae	*Baetis*	50
	Heptageniidae	*Epeorus*	12
		Cinygmula	19
		Rhithrogena	2
	Ephemerellidae	*Drunella*	2
Plecoptera	Unidentified		6
	Chloroperlidae	*Sweltsa*	1
		Suwallia	48
		Kathroperla	2
	Capniidae	*Unidentified*	1
		Capnia	5
	Nemouridae	*Nemoura*	1
		Zapada	2
	Leuctridae	*Despaxia*	3
		Perlomyia	1
Trichoptera	Unidentified		1
	Polycentropidae	*Unidentified*	1
Diptera	Tipulidae	*Antocha*	5
		Dicranota	9
		Tipula	1
		Hemerodromia	3
		Oreogeton	2
	Chironomidae		827
	Ceratopogonidae	*Dasyhelea*	1
	Empididae	*Clinocera*	12
		Chelifera	2
Collembola	Unidentified		1
	Poduridae		1
	Tomoceridae		1
Acari			7
Oligochaeta			57
Amphipoda	Gammaridae		5
Ostracoda			57
East Fork Slate Creek			
Ephemeroptera	Baetidae	*Baetis*	323
	Heptageniidae	*Epeorus*	38
		Cinygmula	7
	Ephemerellidae	*Drunella*	2
	Leptophlebiidae	*Unidentified*	2
		Paraleptophlebia	6
Plecoptera	Unidentified		2
	Chloroperlidae	*Unidentified*	15
		Sweltsa	11
		Suwallia	22
	Capniidae	*Unidentified*	2
	Nemouridae	*Unidentified*	2
		Nemoura	5
		Zapada	6
	Perlodidae	*Acroneuria*	1
		Hesperoperla	2
	Leuctridae	*Despaxia*	3
Trichoptera	Unidentified		1
	Unidentified	*Adult*	1
	Glossosomatidae	*Glossosoma*	2
	Rhyacophilidae	*Rhyacophila*	14
	Brachycentridae	*Micrasema*	11

-continued-

Order	Family	*Genus*	2011
Diptera	Unidentified	*Adult*	1
		Dicranota	7
		Tipula	3
	Chironomidae		437
	Ceratopogonidae	*Probezzia*	54
	Empididae	*Oreogeton*	1
	Simuliidae	*Prosimulium*	5
Acari			34
Oligochaeta			36
Gastropoda			5
Bivalvia			1428
Amphipoda	Gammaridae		6
Ostracoda			115
Terrestrial Flies			1
West Fork Slate Creek			
Ephemeroptera	Unidentified		1
	Baetidae	*Baetis*	82
	Heptageniidae	*Epeorus*	6
		Cinygmula	72
		Rhithrogena	7
	Ephemerellidae	*Drunella*	4
		Caudatella	9
Plecoptera	Unidentified		3
	Chloroperlidae	*Unidentified*	2
		Suwallia	7
	Nemouridae	*Unidentified*	2
		Zapada	4
	Leuctridae	*Unidentified*	16
		Unident. Adult	1
		Despaxia	9
Trichoptera	Glossosomatidae	*Glossosoma*	2
	Rhyacophilidae	*Rhyacophila*	1
Diptera	Tipulidae	*Dicranota*	1
		Tipula	3
	Chironomidae		28
	Ceratopogonidae	*Probezzia*	1
		Ceratogpogon	1
	Simuliidae	*Prosimulium*	1
Collembola	Poduridae		1
Acari			2
Oligochaeta			13
Ostracoda			4
Upper Slate Creek			
Ephemeroptera	Unidentified		1
	Baetidae	*Baetis*	88
	Heptageniidae	*Epeorus*	42
		Cinygmula	105
		Rhithrogena	24
	Ephemerellidae	*Drunella*	34
		Caudatella	1
	Leptophlebiidae	*Unidentified*	21
		Paraleptophlebia	48
Plecoptera	Unidentified		12
	Chloroperlidae	*Unidentified*	6
		Suwallia	42

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Order	Family	*Genus*	2011
		Kathroperla	5
	Capniidae	*Unidentified*	1
	Nemouridae	*Unidentified*	103
		Zapada	100
	Perlodidae	*Megarcys*	1
	Leuctridae	*Unidentified*	31
		Despaxia	87
Trichoptera	Unidentified	*Adult*	1
	Hydropsychidae	*Arctopsyche*	3
		Parapsyche	3
	Glossosomatidae	*Glossosoma*	59
	Rhyacophilidae	*Rhyacophila*	43
	Limnephilidae	*Moselyana*	6
	Odondoceridae	*Namamyia*	1
Diptera	Tipulidae	*Dicranota*	3
		Hesperoconopa	1
		Tipula	3
	Chironomidae		212
	Ceratopogonidae	*Probezzia*	5
		Oreogeton	3
		poduridae	2
	Simuliidae	*Unidentified*	1
		Prosimulium	18
Collembola	Tomoceridae	*Tomocerus*	1
	Mackenziellidae		1
Acari			16
Oligochaeta			18
Gastropoda			3
Amphipoda	Gammaridae		11
Ostracoda			223
Upper Johnson Creek			
Ephemeroptera	Unidentified		4
	Baetidae	*Baetis*	496
	Heptageniidae	*Epeorus*	146
		Cinygmula	254
		Rhithrogena	7
	Ephemerellidae	*Drunella*	38
		Caudatella	14
	Leptophlebiidae	*Unidentified*	1
		Paraleptophlebia	1
	Potamanthidae	*Anthopotomas*	1
Plecoptera	Unidentified		1
	Chloroperlidae	*Suwallia*	15
	Nemouridae	*Unidentified*	6
		Zapada	62
	Perlodidae	*Unidentified*	1
	Leuctridae	*Unidentified*	3
		Despaxia	26
Trichoptera	Unidentified		1
	Hydropsychidae	*Arctopsyche*	4
	Glossosomatidae	*Glossosoma*	23
	Rhyacophilidae	*Rhyacophila*	31
Diptera	Unidentified	*Adult*	1
	Tipulidae	*Unidentified*	2
		Dicranota	13
		Hexatoma	1

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Order	Family	*Genus*	2011
		pedicia	1
	Dixidae	*Dixa*	1
	Blephariceridae	*Unidentified*	1
	Chironomidae		596
	Empididae	*Unidentified*	1
	Simuliidae	*Prosimulium*	3
Collembola	Poduridae		1
Acari			9
Oligochaeta			28
Ostracoda			292
Sherman Creek Sample Site 1			
Ephemeroptera	Baetidae	*Baetis*	92
	Heptageniidae	*Epeorus*	23
		Cinygmula	23
		Rhithrogena	1
	Ephemerellidae	*Drunella*	17
	Leptophlebiidae	*Paraleptophlebia*	1
Plecoptera	Unidentified		3
	Chloroperlidae	*Unidentified*	2
		Suwallia	20
	Capniidae	*Capnia*	1
	Nemouridae	*Unidentified*	3
		Nemoura	1
		Zapada	3
	Leuctridae	*Unidentified*	1
		Despaxia	1
		Paraleuctra	1
Trichoptera	Glossosomatidae	*Glossosoma*	2
	Rhyacophilidae	*Rhyacophila*	4
	Brachycentridae	*Micrasema*	1
Diptera	Tipulidae	*Dicranota*	10
		Hesperoconopa	36
		Hexatoma	4
	Chironomidae		38
	Empididae	*Clinocera*	1
Acari			9
Oligochaeta			312
Gastropoda			1
Bivalvia			2
Amphipoda	Gammaridae		3
Ostracoda			8
Terrestrial Flies			1
Sherman Creek Sample Site 2			
Ephemeroptera	Unidentified		3
	Baetidae	*Baetis*	274
	Heptageniidae	*Epeorus*	108
		Cinygmula	84
	Ephemerellidae	*Drunella*	68
		Caudatella	5
	Leptophlebiidae	*Unidentified*	1
		Paraleptophlebia	5
Plecoptera	Unidentified		3
	Chloroperlidae	*Unidentified*	5
		Sweltsa	1
		Suwallia	51
		Kathroperla	2

-continued-

Order	Family	*Genus*	2011
	Capniidae	*Unidentified*	3
		Capnia	9
	Nemouridae	*Unidentified*	18
		Nemoura	3
		Zapada	36
	Leuctridae	*Despaxia*	6
Trichoptera	Unidentified		1
	Glossosomatidae	*Glossosoma*	3
	Rhyacophilidae	*Rhyacophila*	8
	Limnephilidae	*Moselyana*	1
		Allomyia	1
Diptera	Tipulidae	*Dicranota*	26
		Hesperoconopa	4
		Tipula	1
		Hexatoma	5
		pedicia	1
		Limnophila	2
	Chironomidae		98
	Empididae	*Unidentified*	2
		Clinocera	4
Collembola	Poduridae		2
Arachnida	Acari		9
Oligochaeta			36
Amphipoda	Gammaridae		15
Ostracoda			17
Misc. Terrestrial			1

Sweeny Creek Sample Site 1			
Ephemeroptera	Baetidae	*Baetis*	35
	Heptageniidae	*Epeorus*	1
		Cinygmula	7
	Leptophlebiidae	*Paraleptophlebia*	1
Plecoptera	Unidentified		2
	Chloroperlidae	*Suwallia*	26
		Kathroperla	1
	Capniidae	*Capnia*	24
	Nemouridae	*Nemoura*	2
		Zapada	1
	Leuctridae	*Despaxia*	1
		Paraleuctra	1
Trichoptera	Rhyacophilidae	*Rhyacophila*	2
	Brachycentridae	*Unidentified*	1
Lepidoptera	Unidentified		1
Diptera	Tipulidae	*Antocha*	4
		Dicranota	2
		Tipula	1
		Hexatoma	1
	Chironomidae		77
Collembola	Poduridae		2
	Mackenziellidae		1
Acari			4
Oligochaeta			16
Gastropoda			2
Amphipoda	Gammaridae		2
Ostracoda			16

-continued-

Order	Family	*Genus*	2011
Sweeny Creek Sample Site 2			
Ephemeroptera	Unidentified		2
	Baetidae	*Baetis*	158
	Heptageniidae	*Epeorus*	4
		Cinygmula	26
	Ephemerellidae	*Drunella*	1
	Leptophlebiidae	*Paraleptophlebia*	2
Plecoptera	Chloroperlidae	*Unidentified*	4
		Suwallia	20
	Capniidae	*Capnia*	11
	Nemouridae	*Unidentified*	1
		Nemoura	1
		Zapada	2
	Leuctridae	*Unidentified*	5
		Despaxia	7
		Perlomyia	3
Trichoptera	Unidentified		1
Coleoptera	Hydrophilidae		1
	Staphylinidae	*Stenus*	1
Diptera	Unidentified		1
		Dicranota	10
		Hesperoconopa	1
		Hexatoma	2
	Chironomidae		113
	Empididae	*Unidentified*	2
Collembola	Sminthuridae	*Sminthurus*	2
	Poduridae		2
Acari			13
Oligochaeta			25
Ostracoda			19

APPENDIX F: RESIDENT FISH

Table F 1. Resident fish at Slate Creek.

Lower Slate Creek				
Pass #	Species	Length	Weight	K
1	DV	70	3.9	1.14
1	DV	90	7	0.96
1	DV	100	7.2	0.72
1	CT	95	12.2	1.42
1	CT	72	4.1	1.1
1	CT	85	6.7	1.09
1	CT	95	7.6	0.89
1	CT	75	4.3	1.02
1	CT	95	7.7	0.9
1	CT	110	11.6	0.87
1	CT	95	8.7	1.01
1	CT	110	12.8	0.96
1	CT	110	13.4	1.01
1	CT	95	N/A	N/A
1	CT	105	11.4	0.98
1	CT	100	7.3	0.73
1	CT	90	6.4	0.88
1	CT	90	7.5	1.03
1	CT	95	8.5	0.99
1	CT	85	6.1	0.99
1	CT	80	5.1	1
1	CT	70	3.6	1.05
2	CT	100	10.6	1.06
2	CT	95	7.8	0.91
2	CT	80	5.3	1.04
2	CT	78	5.2	1.1
2	CT	83	6.1	1.07
2	CT	81	5	0.94
3	DV	110	7.7	0.58
3	CT	95	6.1	0.71
3	CT	85	5.8	0.94
3	CT	85	5.5	0.9
3	CT	80	5.1	1
	Average DV K (95% CI)			0.85 (±0.40)
	Average CT K (95% CI)			0.98 (±0.05)

Middle Slate Creek				
Pass #	Species	Length	Weight	K
1	DV	120	19.3	1.12
1	DV	130	19	0.86
1	DV	105	11.9	1.03
1	DV	105	15.9	1.37
1	DV	105	15	1.3
1	DV	120	18.6	1.08
2	DV	140	29.2	1.06
2	DV	105	13.9	1.2
3	DV	120	18.3	1.06
3	DV	115	15.9	1.05
	Average DV K (95% CI)			1.11 (±0.10)

Upper Slate Creek				
Pass #	Species	Length	Weight	K
1	DV	124	19.8	1.04
1	DV	85	6.6	1.07
1	DV	109	13.6	1.05
1	DV	125	21.6	1.11
1	DV	144	29.8	1
1	DV	55	1.7	1.02
1	DV	60	2.3	1.06
1	DV	65	3.1	1.13
1	DV	59	2.3	1.12
1	DV	62	2.5	1.05
1	DV	57	1.8	0.97
1	DV	56	1.9	1.08
1	DV	36	0.3	0.64
1	DV	*	*	*
2	DV	75	3.7	0.88
2	DV	65	2.4	0.87
2	DV	55	2.7	1.62
2	DV	60	3.5	1.62
2	DV	65	3.3	1.2
2	DV	34	0.3	0.76
2	DV	52	1.5	1.07
2	DV	55	1.8	1.08
2	DV	62	2.6	1.09
2	DV	34	0.3	0.76
2	DV	55	1.7	1.02
2	DV	56	1.8	1.02
3	DV	125	18.3	0.94
3	DV	58	2.3	1.18
	Average DV K (95% CI)			1.06 ±0.08

*Possible outliers not included in mean condition factor.

Table F 2. Resident Fish at Johnson Creek.

Lower Johnson Creek				
Pass #	Species	Length	Weight	K
1	DV	110	10.6	0.8
1	DV	100	8.9	0.89
1	DV	115	14.4	0.95
1	DV	30	1.6	5.93
1	DV	150	33.4	0.99
1	DV	115	17	1.12
1	DV	50	4.3	3.44
1	DV	190	62.6	0.91
1	DV	110	14.3	1.07
1	DV	70	5.3	1.55
1	DV	45	2	2.19
1	DV	210	34.3	0.37
1	DV	220	100.7	0.95
1	DV	190	60.7	0.88
1	DV	110	15.5	1.16
1	DV	30	0.4	1.48
1	DV	30	0.3	1.11
1	DV	75	6	1.42
1	DV	117	16.6	1.04
1	DV	165	31.8	0.71
1	DV	195	65.8	0.89
1	DV	180	55.8	0.96
1	DV	35	0.5	1.17
1	CT	110	14.3	1.07
2	DV	70	4.6	1.34
2	DV	75	4.5	1.07
2	DV	55	2	1.2
2	DV	110	9.3	0.7
2	DV	90	5.4	0.74
2	DV	75	4.6	1.09
2	DV	325	367.2	1.07
2	DV	100	10.6	1.06
2	DV	90	7.65	1.05
2	CT	70	8.1	2.36
3	DV	110	12.2	0.92
3	DV	75	4.3	1.02
3	DV	75	5.2	1.23
3	DV	30	2.2	8.15
3	DV	35	0.7	1.63
3	DV	60	3.6	1.67
3	DV	30	0.7	2.59
3	DV	110	10.9	0.82
3	DV	73	7.8	2.01
3	DV	25	0.2	1.28
3	CT	80	6.8	1.33
	Average DV K (95% CI)			1.13 ±0.16
	Average CT K (95% CI)			1.20 ±0.16

Middle Johnson Creek				
Pass #	Species	Length	Weight	K
1	DV	120	19.1	1.11
1	DV	150	34.5	1.02
1	DV	135	24.8	1.01
1	DV	90	7.5	1.03
1	DV	120	14.3	0.83
1	DV	100	9.2	0.92
1	DV	95	9.1	1.06
1	DV	75	4.4	1.04
1	DV	110	14.7	1.1
1	DV	110	13	0.98
1	DV	115	13.2	0.87
1	DV	125	19.2	0.98
1	DV	115	15.6	1.03
1	DV	145	27.5	0.9
1	DV	115	16.8	1.1
1	DV	120	15.4	0.89
1	DV	115	14.7	0.97
1	DV	105	11	0.95
1	DV	145	30.2	0.99
1	DV	125	18.2	0.93
1	DV	100	9.4	0.94
1	DV	110	11.4	0.86
1	DV	115	14.8	0.97
1	DV	130	21.6	0.98
1	DV	85	6.2	1.01
1	DV	120	15.9	0.92
1	DV	115	16.1	1.06
1	DV	100	8.9	0.89
1	DV	105	12.1	1.05
1	DV	115	15.6	1.03
1	DV	95	8.5	0.99
1	DV	120	18.4	1.06
1	DV	80	4.4	0.86
1	DV	120	13.8	0.8
1	DV	90	7	0.96
2	DV	95	10.6	1.24
2	DV	90	*	*
2	DV	85	*	*
2	DV	100	*	*
2	DV	105	*	*
2	DV	120	*	*
2	DV	125	*	*
2	DV	55	*	*
2	DV	100	*	*
2	DV	115	*	*
2	DV	75	*	*
2	DV	75	*	*
2	DV	100	*	*

-continued-

Appendix F 2. Resident Fish at Johnson Creek.

Middle Johnson Creek				
Pass #	Species	Length	Weight	K
2	DV	95	*	*
2	DV	120	*	*
2	DV	125	*	*
3	DV	150	*	*
3	DV	125	*	*
3	DV	125	*	*
3	DV	100	*	*
3	DV	120	*	*
3	DV	95	*	*
3	DV	80	*	*
3	DV	165	*	*
3	DV	130	*	*
3	DV	95	*	*
3	DV	90	*	*
3	DV	75	*	*
3	DV	95	*	*
3	DV	130	*	*
3	DV	100	*	*
3	DV	105	*	*
	Average DV K (95% CI)			0.97 ±0.03

*Weights not available as the batteries in our scale expired during data collection.

Upper Johnson Creek				
Pass #	Species	Length	Weight	K
1	DV	175	51.5	0.96
1	DV	95	8.6	1
3	DV	145	36.1	1.18
3	DV	145	28.4	0.93
3	DV	155	37.5	1.01
3	DV	165	40.1	0.89
3	DV	120	19.3	1.12
	Average DV K (95% CI)			1.01± 0.10

Table F 3. Resident fish at Sherman Creek.

Lower Sherman Creek				
Pass #	Species	Length	Weight	K
1	DV	75	4.7	1.11
1	DV	125	19.5	1
1	DV	95	10.7	1.25
1	DV	115	14.9	0.98
1	DV	130	22.3	1.02
1	DV	75	4.4	1.04
1	DV	85	7	1.14
1	DV	80	5.9	1.15
1	DV	130	19.5	0.89
1	DV	70	5.2	1.52
1	DV	75	6.5	1.54
1	DV	145	29.8	0.98
1	DV	74	7.5	1.85
1	DV	85	7	1.14
1	DV	65	4.5	1.64
1	DV	80	6.5	1.27
1	DV	90	6.1	0.84
1	DV	140	25.8	0.94
1	DV	110	14.6	1.1
1	DV	135	23	0.93
1	DV	135	24.1	0.98
1	DV	130	20.6	0.94
1	DV	110	14.7	1.1
1	DV	90	7.8	1.07
1	DV	70	6	1.75
1	DV	143	26.8	0.92
1	DV	75	6	1.42
1	DV	120	17.7	1.02
1	DV	75	5.8	1.37
1	DV	87	6.9	1.05
1	DV	70	4	1.17
1	DV	305	307.6	1.08
1	DV	240	153.1	1.11
1	DV	200	76.3	0.95
1	DV	220	75	0.7
1	DV	175	85.3	1.59
1	DV	185	59.3	0.94
1	DV	130	21.6	0.98
1	DV	230	22.8	0.19
1	DV	105	10.7	0.92
1	DV	115	14.2	0.93
1	CT	75	5.1	1.21
2	DV	120	14.5	0.84
2	DV	90	7.5	1.03
2	DV	165	40.2	0.89
2	DV	180	60.1	1.03
2	DV	90	7.5	1.03
2	DV	125	17.4	0.89
2	DV	85	5	0.81
2	DV	140	24	0.87

-continued-

Appendix F 3. Resident fish at Sherman Creek.

Lower Sherman Creek				
Pass #	Species	Length	Weight	K
2	DV	110	10.5	0.79
2	DV	115	12.8	0.84
2	DV	75	4.9	1.16
2	DV	85	5.4	0.88
2	DV	70	3.6	1.05
2	DV	80	5.3	1.04
2	DV	60	4.1	1.9
2	DV	85	8.2	1.34
2	DV	305	334	1.18
2	CT	90	7.2	0.99
3	DV	85	7.8	1.27
3	DV	130	20.4	0.93
3	DV	95	8.7	1.01
3	DV	70	4.3	1.25
3	DV	135	25.9	1.05
3	DV	130	24.4	1.11
3	DV	95	7.3	0.85
3	CT	125	20.7	1.06
	Average DV K (95% CI)			1.09 ± 0.07
	Average CT K (95% CI)			1.09 ± 0.28

Middle Sherman Creek				
Pass #	Species	Length	Weight	K
1	DV	145	27.6	0.91
1	DV	125	20.4	1.04
1	DV	110	13.3	1
1	DV	95	8.2	0.96
1	DV	115	13.7	0.9
1	DV	105	11.6	1
1	DV	105	12.4	1.07
1	DV	95	7.7	0.9
2	DV	105	11.1	0.96
2	DV	160	42.6	1.04
2	DV	115	15.1	0.99
2	DV	105	10.7	0.92
3	DV	125	10.4	0.53
3	DV	110	15.2	1.14
3	DV	130	21.3	0.97
3	DV	110	13.8	1.04
3	DV	75	3.7	0.88
3	DV	115	13.3	0.87
	Average DV K (95% CI)			0.95 ±0.04

Upper Sherman Creek				
Pass #	Species	Length	Weight	K
1	DV	135	23.7	0.96
1	DV	110	11.9	0.89
1	DV	125	19.3	0.99
1	DV	80	5.3	1.04
1	DV	125	20.1	1.03
1	DV	140	23.5	0.86
1	DV	75	4	0.95
2	DV	105	11.6	1
2	DV	105	10	0.86
2	DV	110	12.5	0.94
2	DV	105	10.9	0.94
2	DV	145	26.6	0.87
2	DV	125	18.4	0.94
2	DV	125	19.2	0.98
2	DV	110	13.7	1.03
3	DV	140	30.2	1.1
3	DV	110	12.7	0.95
3	DV	100	9.4	0.94
3	DV	115	15	0.99
3	DV	100	10.1	1.01
3	DV	70	4.5	1.31
3	DV	125	17.1	0.88
3	DV	80	4.6	0.9
3	DV	90	6.6	0.91
3	DV	80	4.2	0.82
	Average DV K (95% CI)			0.97 ± 0.04

Table F 4.–Resident fish capture data at Kensington Mine biomonitoring sites.

Site	Fish Species	Fork Lengths	Number of Fish Captured 90m Set 1	Set 2	Set 3	Total	Pop. Est.	Popn 95% C.I.	Pop. Est. 360m Projection	Popn 95% C.I.
2011										
Lower Slate Cr	DV	70–110	3	0	1	4	4	---	16	---
	CT	70–110	19	6	4	29	30	27-33	123	115–131
	CO	*	89	74	44	207	---	---	---	---
Middle Slate Cr	DV	105–140	6	2	2	10	10	10-Oct	44	38–50
Upper Slate Cr	DV	35–145	14	12	2	28	30	26-34	124	112–136
Lower Johnson Cr	DV	30–325	23	9	9	41	46	39-53	193	171–215
	CT	70–110	1	1	1	3	3	---	12	---
	CO	*	11	23	30	64	---	---	---	---
Middle Johnson Cr	DV	55–165	35	16	16	67	81	65-97	332	295–369
Upper Johnson Cr	DV	95–175	2	0	5	7	10	16-Apr	58	26–90
Lower Sherman Cr	DV	60–305	42	17	7	66	69	64-74	280	268–292
	CT	75–125	1	1	1	3	3	---	12	---
Middle Sherman Cr	DV	75–160	8	4	6	18	23	14-32	103	73–133
Upper Sherman Cr	DV	70–145	7	8	10	25	40	20-60	182	125–239

Table F 5.–Resident fish capture data by habitat type.

Site	Habitat Type	Fish Species	Number of Fish Captured 360m Set 1	Set 2	Set 3	Total	Pop. Est.	Popn 95% C.I.	Pop. Est. 360m Projection	Popn 95% C.I.
2011										
Lower Slate Cr	Riffle	DV	0	0	1	1	1	---	4	---
		CT	3	3	0	6	6	---	24	---
	Pool	DV	3	0	0	3	3	---	12	---
		CT	14	2	3	19	19	19-19	79	74-84
	Glide	DV	0	0	0	0	0	0	0	0
		CT	3	1	1	5	5	5-May	27	21-33
Middle Slate Cr	Riffle	DV	3	0	0	3	3	---	12	---
	Pool	DV	3	1	2	6	7	10-Apr	30	20-40
	Glide	DV	0	1	0	1	1	---	4	---
Upper Slate Cr	Riffle	DV	2	2	0	4	4	---	16	---
	Pool	DV	11	9	1	21	22	19-25	90	83-97
	Glide	DV	1	1	1	3	3	---	12	---
Lower Johnson Cr	Riffle	DV	1	1	3	5	6	9-Mar	39	15-63
		CT	0	0	1	1	1	---	4	---
	Pool	DV	19	6	4	29	30	27-33	123	115-131
		CT	1	1	0	2	2	---	8	---
	Glide	DV	3	2	2	7	8	11-May	36	24-48
		CT	0	0	0	0	0	0	0	0
Middle Johnson Cr	Riffle	DV	3	3	3	9	11	16-Jun	54	32-76
	Pool	DV	29	13	13	55	65	53-77	219	201-237
	Glide	DV	3	0	0	3	3	---	12	---
Upper Johnson Cr	Riffle	DV	0	0	0	0	0	0	0	0
	Pool	DV	2	0	0	2	2	---	8	---
	Glide	DV	0	0	5	5	9	17-Jan	53	18-88
Lower Sherman Cr	Riffle	DV	3	0	2	5	5	5-May	24	17-31
		CT	1	0	0	1	1	---	4	---
	Pool	DV	32	14	0	46	46	46-46	200	195-205
		CT	0	1	0	1	1	---	4	---
	Glide	DV	7	3	5	15	16	20-Dec	83	59-107
		CT	0	0	1	1	1	---	4	---
Middle Sherman Cr	Riffle	DV	2	1	2	5	5	5-May	28	15-41
	Pool	DV	6	3	4	13	15	19-Nov	70	49-91
	Glide	DV	0	0	0	0	0	0	0	0
Upper Sherman Cr	Riffle	DV	1	2	4	7	10	16-Apr	58	26-90
	Pool	DV	6	4	4	14	17	23-Nov	76	54-98
	Glide	DV	0	2	2	4	5	8-Feb	32	Oct-54

Figure F 1.–Length/frequency figures for Dolly Varden char captured at Slate Creek.

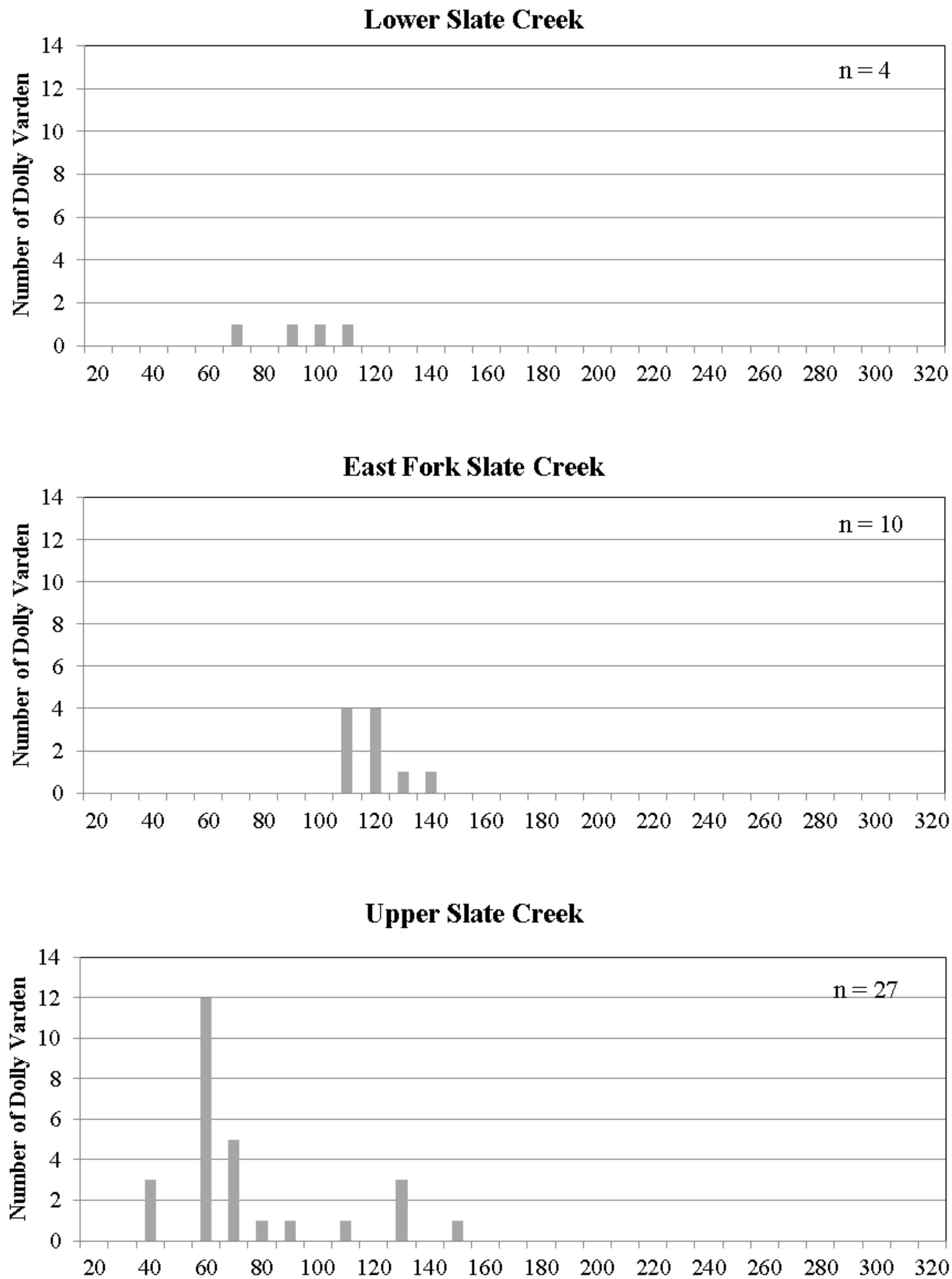
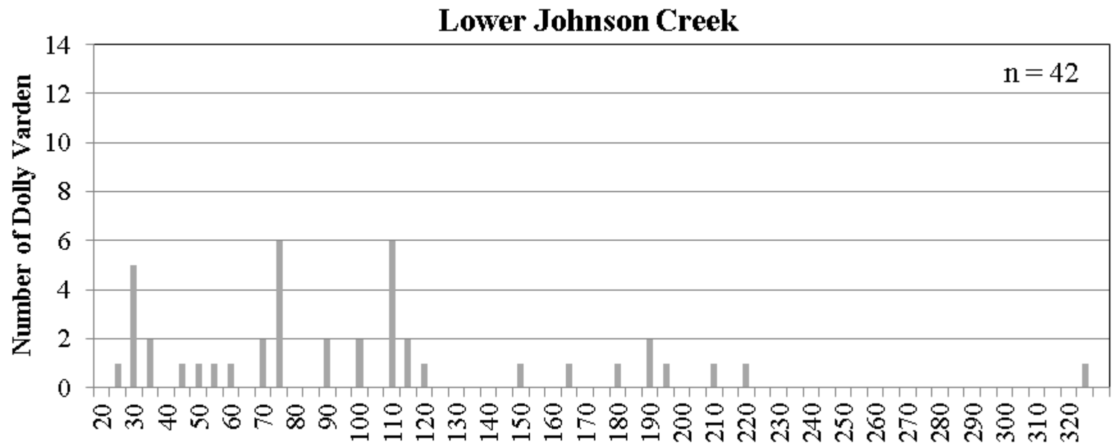
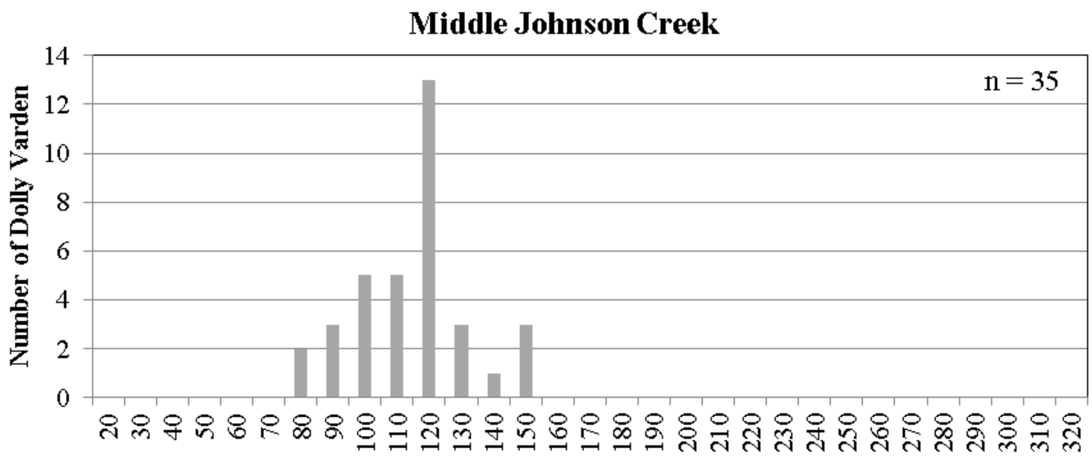


Figure F 2.–Length/frequency figures for Dolly Varden char captured at Johnson Creek.





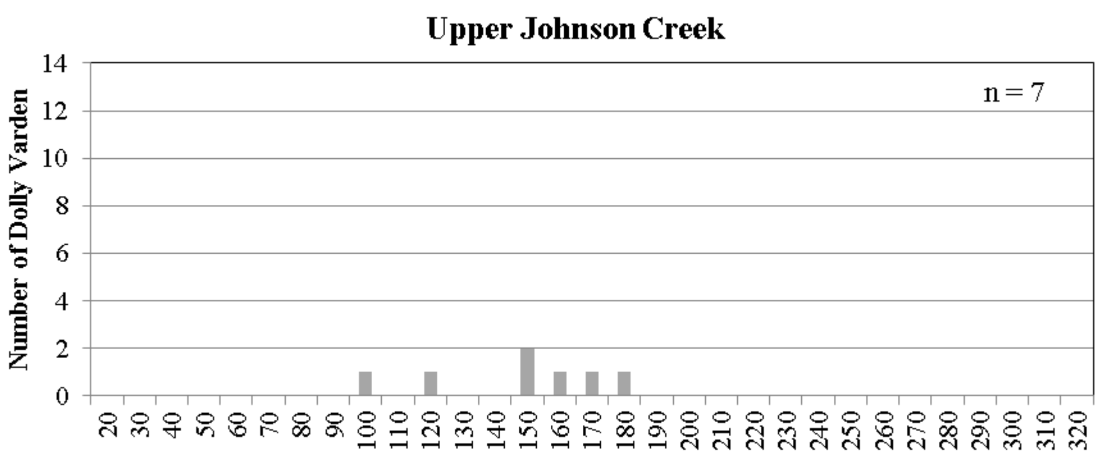
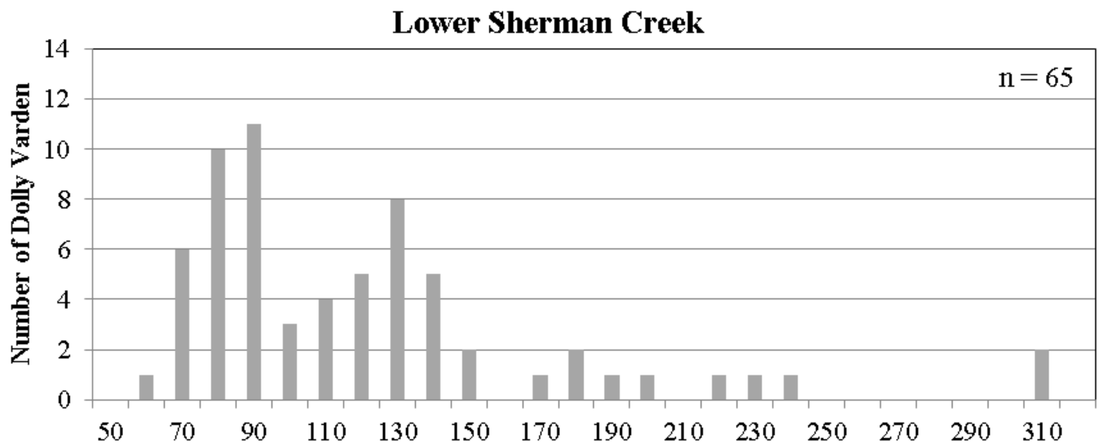
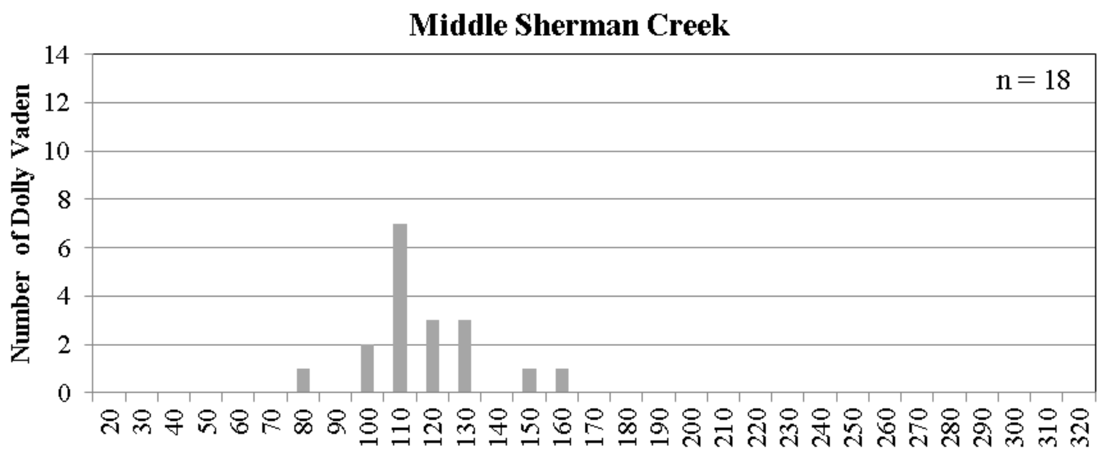
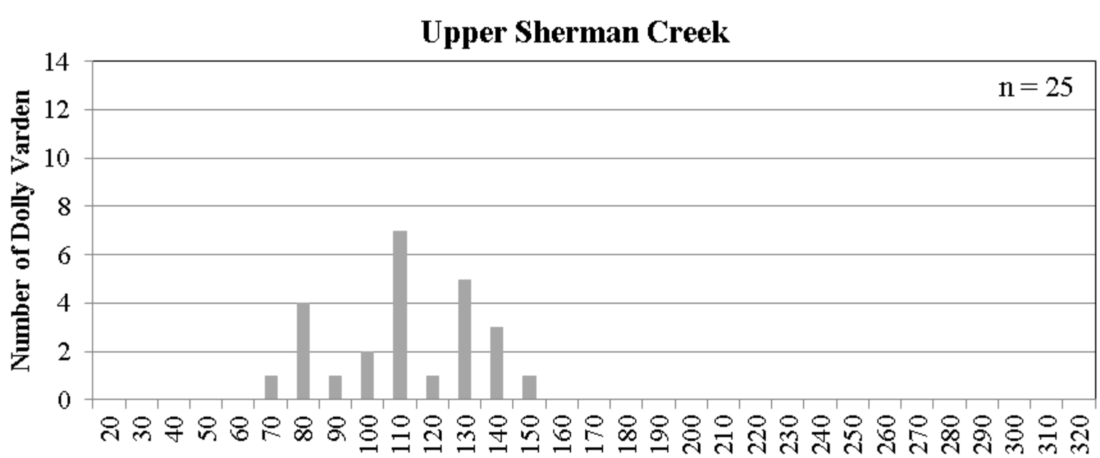


Figure F 3.–Length/frequency figures for Dolly Varden char captured at Sherman Creek.







APPENDIX G: RESIDENT FISH METALS CONCENTRATIONS

Columbia Analytical Services™ 1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

December 7, 2011 Analytical Report for Service Request No: K1110960

Gordon Willson-Naranjo
Alaska Department of Fish and Game
Division of Habitat
P.O. Box 110024
Juneau, AK 99811

RE: Kensington Gold Mine Whole Fish analysis/22224

Dear Gordon:

Enclosed are the results of the samples submitted to our laboratory on November 09, 2011. For your reference, these analyses have been assigned our service request number K1110960.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3364. You may also contact me via Email at HHolmes@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Howard Holmes
Project Chemist

HH/ln

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- \+ The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Agency	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
DOD ELAP	L11-119
Florida DOH	E87412
Georgia DNR	881
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
ISO 17025	L11-118
Louisiana DEQ	3016
Louisiana DHH	LA080001
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon – DEQ (NELAP)	WA100010
South Carolina DHEC	61002
Texas CEQ	04704427-08-TX
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Alaska Department of Fish & Game	**Service Request No.:**	K1110960
Project:	Kensington Gold Mine-Whole Fish Analysis	**Date Received:**	11/9/11
Sample Matrix:	Fish Tissue		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Three fish tissue samples were received for analysis at Columbia Analytical Services on 11/9/11. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored frozen at -20C upon receipt at the laboratory.

Total Metals

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of Aluminum for sample KGM Lower Slate were not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for the replicate analysis of Aluminum in sample KGM Lower Slate was outside the CAS control limits (23% RPD versus a control limit of 20%). The samples were homogenized, freeze dried, then ground prior to digestion, however this was not sufficient to achieve a completely uniform distribution of Aluminum in the tissue.

No other anomalies associated with the analysis of these samples were observed.

Approved by Howard Holmes **Date** 12-8-11

Columbia Analytical Services™
An Employee-Owned Company

CHAIN OF CUSTODY

SR#: K1110960

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 1 OF 1 COC #

PROJECT NAME: Kensington Gold Mine whole Fish analysis
PROJECT NUMBER: 22224
PROJECT MANAGER: Kate Kanouse
COMPANY/ADDRESS: Alaska Dept. Fish and Game
602 West 3rd St.
CITY/STATE/ZIP: Juneau, AK, 99801
E-MAIL ADDRESS: gordon.willson-naranjo@alaska.gov
PHONE #: 907-465-6646 FAX#: 907-465-4759
SAMPLER'S SIGNATURE: Benjamin Brewster

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625 ☐ 8270 ☐ 8270LL ☐	Volatile Organics 624 ☐ 8260 ☐ 8021 ☐ BTEX ☐	Hydrocarbons (*see below) Gas ☐ Diesel ☐ Oil ☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM ☐ 1664 SGT ☐	PCB's Aroclors ☐ Congeners ☐	Pesticides/Herbicides 608 ☐ 8081A ☐ 8141A ☐ 8151A ☐	Chlorophenolics - 8151M Tri ☐ Tetra ☐ PCP ☐	PAHS 8310 ☐ SIM ☐	Metals, Total or Dissolved (See list below)	Cyanide ☐ Hex-Chrom ☐	pH, Cond., Cl, SO4, PO4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020 ☐ AOX 1650 ☐ 506 ☐	Total Mercury 1631				REMARKS
KGM upper slate	8/10/11	1200		tissue	1										X					X				
KGM E Fork slate	9/13/11	1200		tissue	1										X					X				
KGM lower slate	10/11/11	1200		tissue	1										X					X				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ________
Bill To: ________

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
___ Standard (10-15 working days)
___ Provide FAX Results
________ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: ______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: Benjamin Brewster Date/Time: 11/8/11	Signature: N Smith Date/Time: 11/9/11 0930	Signature ___ Date/Time ___	Signature ___ Date/Time ___
Printed Name: Benjamin Brewster Firm: ADF&G	Printed Name: N Smith Firm: CAS	Printed Name ___ Firm ___	Printed Name ___ Firm ___

PC K.2

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

Client / Project: Alaska Dept of Fish & Game Service Request K11 10960

Received: 11/9/11 Opened: 11/9/11 By: HB Unloaded: 11/9/11 By: HB

1. Samples were received via? *Mail* ***Fed Ex*** *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) ***Cooler*** *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA **Y** N If yes, how many and where? 1, front
   If present, were custody seals intact? **Y** N If present, were they signed and dated? Y **N**

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
3.7		310		8768 4878 6203	

7. Packing material used. *Inserts* ***Baggies*** *Bubble Wrap* *Gel Packs* ***Wet Ice*** *Sleeves* *Other* hard pack ice
8. Were custody papers properly filled out (ink, signed, etc.)? NA **Y** N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA **Y** N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA **Y** N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA **Y** N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA **Y** N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* **NA** Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* **NA** Y N
15. Was C12/Res negative? **NA** Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions:

Page 1 *of* ____

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kensington Gold Mine Whole Fish analysis/22224	**Date Collected:**	08/10/11
Sample Matrix:	Tissue	**Date Received:**	11/09/11

Solids, Total

Prep Method:	NONE	Units:	PERCENT
Analysis Method:	Freeze Dry	Basis:	Wet
Test Notes:			

Sample Name	**Lab Code**	**Date Analyzed**	**Result**	**Result Notes**
KGM Upper Slate	K1110960-001	11/10/11	22.5	
KGM E.Fork Slate	K1110960-002	11/10/11	24.9	
KGM Lower Slate	K1110960-003	11/10/11	23.8	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kensington Gold Mine Whole Fish analysis/22224	**Date Collected:**	10/11/11
Sample Matrix:	Tissue	**Date Received:**	11/09/11
		Date Extracted:	NA
		Date Analyzed:	11/10/11

Duplicate Summary

Sample Name:	KGM Lower Slate	Units:	PERCENT
Lab Code:	K1110960-003D	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Solids, Total	NA	Freeze Dry	23.8	23.7	23.8	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kensington Gold Mine Whole Fish analysis/22224	**Date Collected:**	08/10/11
Sample Matrix:	Animal tissue	**Date Received:**	11/09/11

Mercury, Total

Prep Method:	METHOD	Units:	ng/g = ppb
Analysis Method:	1631E	Basis:	Dry
Test Notes:			

Sample Name	Lab Code	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
KGM Upper Slate	K1110960-001	1.0	20	11/17/11	11/18/11	112	
KGM E.Fork : Slate	K1110960-002	1.0	20	11/17/11	11/18/11	107	
KGM Lower Slate	K1110960-003	1.0	20	11/17/11	11/18/11	67.4	
Method Blank 1	K1110960-MB1	1.0	20	11/17/11	11/18/11	ND	
Method Blank 2	K1110960-MB2	1.0	20	11/17/11	11/18/11	ND	
Method Blank 3	K1110960-MB3	1.0	20	11/17/11	11/18/11	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kensington Gold Mine Whole Fish analysis/22224	**Date Collected:**	NA
Sample Matrix:	Animal tissue	**Date Received:**	NA
		Date Extracted:	11/17/11
		Date Analyzed:	11/18/11

Matrix Spike/Duplicate Matrix Spike Summary
Total Metals

Sample Name:	Batch QC		Units:	ng/g
Lab Code:	K1110959-003MS,	K1110959-003MSD	Basis:	Dry
Test Notes:				

										Percent Recovery				
Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Spike Level MS**	**DMS**	**Sample Result**	**Spike Result MS**	**DMS**	**MS**	**DMS**	**CAS Acceptance Limits**	**Relative Percent Difference**	**Result Notes**
Mercury	METHOD	1631E	1.0	247	249	42.3	317	276	111	94	70-130	17	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kensington Gold Mine Whole Fish analysis/22224	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	11/18/11

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name:	Ongoing Precision and Recovery (Initial)	Units:	ng/L
		Basis:	NA

Test Notes:

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Mercury	METHOD	1631E	5.00	4.87	97	70-130	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kensington Gold Mine Whole Fish analysis/22224	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	11/18/11

Ongoing Precision and Recovery (OPR) Sample Summary
Total Metals

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L
Basis: NA

Test Notes:

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Mercury	METHOD	1631E	5.00	4.60	92	70-130	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kensington Gold Mine Whole Fish analysis/22224	**Date Collected:**	NA
LCS Matrix:	Animal tissue	**Date Received:**	NA
		Date Extracted:	11/17/11
		Date Analyzed:	11/18/11

Quality Control Sample (QCS) Summary
Total Metals

Sample Name:	Quality Control Sample	Units:	ng/L
Lab Code:		Basis:	Dry
Test Notes:			

Source: TORT

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	270	247	91	70-130	

Columbia Analytical Services

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Game
Project Name: Kensington Gold Mine Whole Fish analysis
Project No.: 22224

Service Request: K1110960

Sample Name:	Lab Code:
KGM Upper Slate	K1110960-001
KGM E.Forke Slate	K1110960-002
KGM Lower Slate	K1110960-003
KGM Lower SlateD	K1110960-003D
KGM Lower SlateS	K1110960-003S
Method Blank	K1110960-MB

Comments:

Approved By: ______________________ **Date:** 12/6/11

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga — **Service Request:** K1110960
Project No.: 22224 — **Date Collected:** 08/10/11
Project Name: Kensington Gold Mine Whole Fish — **Date Received:** 11/09/11
Matrix: TISSUE — **Units:** mg/Kg
Basis: DRY

Sample Name: KGM Upper Slate — **Lab Code:** K1110960-001

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum Al	6020A	40.0	100.0	11/16/11	12/02/11	1630		*
Cadmium Cd	6020A	0.02	5.0	11/16/11	12/01/11	0.14		
Chromium Cr	6020A	0.2	5.0	11/16/11	12/01/11	13.5		
Copper Cu	6020A	0.1	5.0	11/16/11	12/01/11	11.3		
Lead Pb	6020A	0.02	5.0	11/16/11	12/02/11	0.20		
Nickel Ni	6020A	0.2	5.0	11/16/11	12/01/11	5.5		
Selenium Se	6020A	1.0	5.0	11/16/11	12/01/11	4.4		
Silver Ag	6020A	0.02	5.0	11/16/11	12/01/11	0.02	U	
Zinc Zn	6020A	0.5	5.0	11/16/11	12/01/11	115		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1110960
Project No.: 22224
Date Collected: 09/13/11
Project Name: Kensington Gold Mine Whole Fish
Date Received: 11/09/11
Matrix: TISSUE
Units: mg/Kg
Basis: DRY

Sample Name: KGM E.Fork Slate **Lab Code:** K1110960-002

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6020A	2.0	5.0	11/16/11	12/02/11	46.3		*
Cadmium	6020A	0.02	5.0	11/16/11	12/01/11	1.99		
Chromium	6020A	0.2	5.0	11/16/11	12/01/11	1.3		
Copper	6020A	0.1	5.0	11/16/11	12/01/11	14.6		
Lead	6020A	0.02	5.0	11/16/11	12/02/11	0.04		
Nickel	6020A	0.2	5.0	11/16/11	12/01/11	1.1		
Selenium	6020A	1.0	5.0	11/16/11	12/01/11	4.6		
Silver	6020A	0.02	5.0	11/16/11	12/01/11	0.02		
Zinc	6020A	0.5	5.0	11/16/11	12/01/11	133		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga
Service Request: K1110960
Project No.: 22224
Date Collected: 10/11/11
Project Name: Kensington Gold Mine Whole Fish
Date Received: 11/09/11
Matrix: TISSUE
Units: mg/Kg
Basis: DRY

Sample Name: KGM Lower Slate **Lab Code:** K1110960-003

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6020A	39.9	100.0	11/16/11	12/02/11	2430		*
Cadmium	6020A	0.02	5.0	11/16/11	12/01/11	0.72		
Chromium	6020A	0.2	5.0	11/16/11	12/01/11	17.3		
Copper	6020A	0.1	5.0	11/16/11	12/01/11	15.5		
Lead	6020A	0.02	5.0	11/16/11	12/02/11	0.50		
Nickel	6020A	0.2	5.0	11/16/11	12/01/11	6.2		
Selenium	6020A	1.0	5.0	11/16/11	12/01/11	3.8		
Silver	6020A	0.02	5.0	11/16/11	12/01/11	0.05		
Zinc	6020A	0.5	5.0	11/16/11	12/01/11	195		

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: Alaska Department of Fish and Ga **Service Request:** K1110960
Project No.: 22224 **Date Collected:**
Project Name: Kensington Gold Mine Whole Fish **Date Received:**
Matrix: TISSUE **Units:** mg/Kg
Basis: DRY

Sample Name: Method Blank **Lab Code:** K1110960-MB

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Aluminum	6020A	2.0	5.0	11/16/11	12/02/11	2.0	U	*
Cadmium	6020A	0.02	5.0	11/16/11	12/01/11	0.02	U	
Chromium	6020A	0.2	5.0	11/16/11	12/01/11	0.2	U	
Copper	6020A	0.1	5.0	11/16/11	12/01/11	0.1	U	
Lead	6020A	0.02	5.0	11/16/11	12/02/11	0.02	U	
Nickel	6020A	0.2	5.0	11/16/11	12/01/11	0.2	U	
Selenium	6020A	1.0	5.0	11/16/11	12/01/11	1.0	U	
Silver	6020A	0.02	5.0	11/16/11	12/01/11	0.02	U	
Zinc	6020A	0.5	5.0	11/16/11	12/01/11	0.5	U	

Comments:

Metals

- 5A -

SPIKE SAMPLE RECOVERY

Client: Alaska Department of Fish and Ga **Service Request:** K1110960

Project No.: 22224 **Units:** MG/KG

Project Name: Kensington Gold Mine Whole Fish **Basis:** DRY

Matrix: TISSUE

Sample Name: KGM Lower SlateS **Lab Code:** K1110960-003S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Aluminum		4152.4		2428.4		198.0	871		6020A
Cadmium	75 - 125	5.57		0.72		4.95	98		6020A
Chromium	75 - 125	40.3		17.3		19.8	116		6020A
Copper	75 - 125	41.7		15.5		24.8	106		6020A
Lead	75 - 125	40.38		0.50		49.50	81		6020A
Nickel	75 - 125	57.5		6.2		49.5	104		6020A
Selenium	75 - 125	20.5		3.8		16.5	101		6020A
Silver	75 - 125	4.52		0.05		4.95	90		6020A
Zinc	75 - 125	234.8		194.7		49.5	81		6020A

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

- 6 -

DUPLICATES

Client: Alaska Department of Fish and Ga **Service Request:** K1110960

Project No.: 22224 **Units:** MG/KG

Project Name: Kensington Gold Mine Whole Fish **Basis:** DRY

Matrix: TISSUE

Sample Name: KGM Lower SlateD **Lab Code:** K1110960-003D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Aluminum	20	2428.4		3065.4		23.2	*	6020A
Cadmium	20	0.72		0.67		7.2		6020A
Chromium	20	17.3		19.2		10.4		6020A
Copper	20	15.5		17.3		11.0		6020A
Lead	20	0.50		0.55		9.5		6020A
Nickel	20	6.2		7.2		14.9		6020A
Selenium		3.8		3.7		2.7		6020A
Silver		0.05		0.05		0.0		6020A
Zinc	20	194.7		192.5		1.1		6020A

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals
-7-
LABORATORY CONTROL SAMPLE

Client: Alaska Department of Fish and Ga **Service Request:** K1110960

Project No.: 22224

Project Name: Kensington Gold Mine Whole Fish

Aqueous LCS Source: CAS MIXED **Solid LCS Source:**

Analyte	Aqueous: ug/L			Solid: mg/kg				
	True	Found	%R	True	Found	C	Limits	%R
Aluminum	2000.0	1883.3	94					
Cadmium	50.0	48.8	98					
Chromium	200.0	184.0	92					
Copper	250.0	244.8	98					
Lead	500.0	459.6	92					
Nickel	500.0	464.4	93					
Selenium	167.0	178.9	107					
Silver	50.0	46.7	93					
Zinc	500.0	505.8	101					

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kennsington Gold Mine Whole Fish analysis	**Date Collected:**	NA
LCS Matrix:	Tissue	**Date Received:**	NA
		Date Extracted:	11/16/11
		Date Analyzed:	12/01-02/11

Standard Reference Material Summary
Total Metals

Sample Name:	Standard Reference Material	Units:	mg/Kg (ppm)
Lab Code:	K1110960-SRM1	Basis:	Dry
Test Notes:			

Source: N.R.C.C. Dorm-3

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits	Result Notes
Cadmium	PSEP Tissue	6020A	0.29	0.33	114	0.216 - 0.372	
Chromium	PSEP Tissue	6020A	1.89	1.70	90	1.38 - 2.47	
Copper	PSEP Tissue	6020A	15.5	15.7	101	11.9 - 19.4	
Lead	PSEP Tissue	6020A	0.395	0.308	78	0.276 - 0.534	
Nickel	PSEP Tissue	6020A	1.28	1.25	98	0.83 - 1.82	
Zinc	PSEP Tissue	6020A	51.3	52.6	103	38.6 - 65.3	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Alaska Department of Fish and Game	**Service Request:**	K1110960
Project:	Kennsington Gold Mine Whole Fish analysis	**Date Collected:**	NA
LCS Matrix:	Tissue	**Date Received:**	NA
		Date Extracted:	11/16/11
		Date Analyzed:	12/01-02/11

Standard Reference Material Summary
Total Metals

Sample Name:	Standard Reference Material	Units:	mg/Kg (ppm)
Lab Code:	K1110960-SRM2	Basis:	Dry
Test Notes:			

Source: N.R.C.C. Tort-2

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits	Result Notes
Cadmium	PSEP Tissue	6020A	26.7	28.2	106	20.9-32.8	
Chromium	PSEP Tissue	6020A	0.77	0.68	88	0.5-1.1	
Copper	PSEP Tissue	6020A	106	103	97	77-139	
Lead	PSEP Tissue	6020A	0.35	0.29	83	0.18-0.58	
Nickel	PSEP Tissue	6020A	2.5	2.3	92	1.85-3.23	
Selenium	PSEP Tissue	6020A	5.63	6.07	108	3.97-7.56	
Zinc	PSEP Tissue	6020A	180	191	106	139-223	

APPENDIX H: SEDIMENT METALS CONCENTRATIONS AND TOXICITY

Coeur Alaska, Inc.
Juneau, Alaska

Report of Short-Term Toxicity of Whole Sediment to *Chironomus dilutus*

Prepared by

AECOM

AECOM Environment
Environmental Toxicology
Fort Collins, CO

60225262-058-(075-080)
November 2011

Report of Short-Term Toxicity of Whole Sediment to Chironomus dilutus

Project IDs: 60225262-058-(075-080)
November 2011

Sponsor and Laboratory Information

Sponsor	Coeur Alaska Inc. Kensington Gold Mine 3031 Clinton Drive Suite 202 Juneau, Alaska 99801
Project Officer	Kevin Eppers (907) 523-3328
Testing Facility	AECOM Environment Fort Collins Environmental Toxicology Laboratory 4303 West LaPorte Ave. Fort Collins, CO 80521 Fax: (970) 490-2963 State of Florida NELAP Laboratory ID: E87972
Study Director	Rami B. Naddy, Ph.D. (970) 416-0916 email: rami.naddy@aecom.com
Report Author	Christina Needham (970) 416-0916 email: christina.needham@aecom.com

Test Information

Test	Short-term chronic screening toxicity test of sediment	
Basis	USEPA (2000) and ASTM (2009)	
Test Period	November 18, 2011 @ 0930-1200 and 1445 to November 28, 2011 @ 0915-1140	
Test Length	10 days	
Species	*Chironomus dilutus*	
Test Material	Whole sediment	
Sediment ID	Sample ID	AECOM Laboratory ID
	Inlet Upper Slate	25192
	Lower Sherman	25193
	Middle Slate	25194
	Lower Slate	25195
	Lower Johnson	25196
	Middle Sherman	25197
Control Sediments	Laboratory Formulated Sediment and Silica Sand	
Overlying water	Moderately hard reconstituted water prepared according to USEPA (2002), augmented with approximately 50 mg/L Cl^- (as NaCl)	
Test Concentrations	0 (control) and 100% of each test sediment	

- *Results described in this report apply only to the samples submitted to the laboratory and analyzed, as listed in the report*
- *Test results comply with NELAC standards. Reports are intended to be considered in their entirety; AECOM is not responsible for consequences arising from use of a partial report*
- *This report contains 8 pages plus 3 appendices*

Sediment Collection and Receipt

Sample ID	Collection Date and Time	AECOM No.	Date of Receipt	Temp. at Arrival (°C)[a]
Inlet Upper Slate	10/06/11 @ 1200	25192	10/11/11	3.4
Lower Sherman	10/04/11 @ 1200	25193	10/11/11	3.4
Middle Slate	10/03/11 @ 1200[b]	25194	10/11/11	3.4
Lower Slate	10/03/11 @ 1200	25195	10/11/11	3.4
Lower Johnson	10/03/11 @ 1200	25196	10/11/11	3.4
Middle Sherman	10/04/11 @ 1200	25197	10/11/11	3.4

[a] Air temperature of cooler
[b] Sample collection was started on 9/26/11 but due to weather constraints had to be completed on 10/03/11.
Note: See Appendix A for copies of chain of custody records

Control Sediment

The primary control sediment was a laboratory formulated sediment with a smaller grain size and higher organic matter content than the secondary control (silica sand, obtained from a local commercial supplier). The composition of the formulated sediment is given in the following table (Kemble et al. 1999).

Composition of Laboratory Formulated Sediment (Control)

Material	Source	Pre-Treatment	Weight (g)
Quartz Sand	Unimin Corporation, Emmett, ID	Rinsed with gentle mixing in deionized water until water ran clear. Dried in oven.	1242
Silt/Clay (ASP400)	Mozel, St. Louis, MO. Distributor = Englehardt	None	219
Dolomite	Grey Rock Clay Center, Ft. Collins, CO.	None	7.5
α-cellulose	Sigma	None	77.3
Humic Acid	Fluka	None	0.15
Total			1545.95

Test Sediment Preparation

Sample ID	Date Homogenized	Time Homogenized
Formulated Sediment (Cont.)	November 17, 2011	0938-0941
Inlet Upper Slate		1012-1016
Lower Sherman		1020-1023
Middle Slate		1000-1003
Lower Slate		1031-1034
Lower Johnson		0955-0959
Middle Sherman		1021-1024
Sand (Cont.)	November 18, 2011	1425-1428

Before, during and after homogenization, debris (including sticks and other plant material) and large stones were removed from the sediment and discarded.

Test Conditions

Test Type	Static sediment with continuous replacement of overlying water
Test Duration	10 days
Overlying Water Delivery System	Continuous renewal (flow-through)[a]
Test Endpoints	Survival, AFDW[b] per original and surviving organism
Test Chambers	500 ml glass beakers
Test Sediment Volume	100 ml
Overlying Water Volume	175 ml
Replicates per Treatment	8[c]
Organisms per Replicate	10
Test Temperature	23 ± 1°C
Lighting	Fluorescent, 16 hours light:8 hours dark
Chamber Placement	Randomized
Test Sediment Renewal	None
Test Overlying Water Renewal	Approximately two volume additions per test chamber per day

[a] Continuous replacement via a drip system
[b] Ash-Free Dry Weight
[c] Due to insufficient sediment volume, the Middle Slate treatment and Sand control had only 6 replicates.

Test Organism

From the lot of *Chironomus dilutus* received for use in the test, 20 were collected, preserved, and used to determine head capsule widths. The mean head capsule width of lot 11-028 was 0.41 mm and the range was 0.35 to 0.56 mm. Some of the organisms were slightly larger than the upper limit for third instar (0.45 mm). However, all organisms were smaller than the lower limit for fourth instars according to the range given in USEPA (2000). All organisms were, therefore, third instars.

Species and Lot Number	*Chironomus dilutus*, Lot 11-028
Age	3rd instar
Source	Aquatic BioSystems (ABS), Fort Collins, CO
Overlying Water	Moderately Hard Reconstituted Water with added chloride (49 mg/L) as NaCl, RW # 10096
Reference Toxicant Testing	Initiated November 17, 2011 using sodium chloride (NaCl)

TEST RESULTS

Biological Data – Survival and Ash Free Dry Weights

Sample ID	Percent Survival	Ash Free Dry Weight (mg)	
		Per original organism	Per surviving organism
Sand	75.0	0.566	0.769
Formulated Sediment	75.0	0.874	1.186
Inlet Upper Slate	61.2	0.644[a]	1.054
Lower Sherman	58.8	0.631[a]	1.120
Middle Slate	78.3	0.718	0.926[a]
Lower Slate	60.0	0.749	1.256
Lower Johnson	75.0	0.836	1.170
Middle Sherman	55.0[b]	0.649	1.167

[a] Statistically significant reduction in AFDW relative to the formulated sediment control using Toxstat Version 3.5 (WEST, Inc. and Gulley 1996)
[b] Statistically significant reduction in survival relative to the formulated sediment control using Toxstat Version 3.5 (WEST, Inc. and Gulley 1996). This treatment was excluded from statistical analysis of AFDW.
Note: See Appendix B for test data sheets.

Analytical Data

Parameter	Sample Identification					
	Inlet Upper Slate	Lower Slate Creek	Middle Slate Creek	Middle Sherman Creek	Lower Sherman	Lower Johnson
Metals (mg/kg-dry)[a]						
Aluminum	22,500	13,600	20,100	19,000	18,200	13,100
Chromium	127	29.4	29.5	43.4	46.2	31.5
Zinc	130	220	1,360	120	110	93.3
Arsenic	17.9	16.2	30.0	55.7	28.9	16.2
Cadmium	0.722	1.46	20.9	0.175	0.389	0.238
Copper	53.4	56.7	88.4	97.1	94.0	73.1
Lead	3.37	7.79	8.50	17.3	6.70	9.76
Nickel	87.5	47.4	143	44.0	45.9	27.3
Selenium	0.809	0.720	1.41	ND	ND	ND
Silver	0.120 J	0.134 J	0.233 J	0.633	0.137 J	0.164 J
Mercury	ND	0.0502 J	0.0692 J	ND	ND	ND
Particle Size (%)[b]						
Clay	4.0	2.0	10.0	2.0	2.0	2.0
Sand	94.0	94.0	86.0	96.0	96.0	96.0
Silt	2.0	4.0	4.0	2.0	2.0	2.0
Texture	Sand	Sand	Loamy Sand	Sand	Sand	Sand
Coarse Material (2 mm)	ND	0.44	1.65	0.22	0.11	ND
TOC (%-dry)[c]	5.46	2.04	11.0	1.17	0.54	0.89
Acid Volatile Sulfide (umoles/g)	1.39	ND	ND	1.01	1.50	ND

[a] Al, As, Cd, Cr, Cu, Pb, Ni, Se, Ag and Zn by SW-846 Method 6020; Hg by SW-846 7471B (USEPA 1986)
[b] Particle size was determined using ASTM Method D422 and Modified ASA 15-5
[c] TOC was determined using the Walkley Black Method
J = The concentration was below the Reporting Limit but above the Method Detection Limit
ND = Not Detected at the Method Detection Limit (MDL)
Note: See Appendix C for a copy of the report from the analytical laboratory (MSE Analytical Laboratory, Butte, MT)

Total and Total Volatile Solids

Sample ID	Percent Total Solids[a]	Percent Total Volatile Solids[b]
Inlet Upper Slate	72.10	4.12
Lower Sherman	73.15	2.75
Middle Slate	60.17	7.81
Lower Slate	78.00	3.38
Lower Johnson	74.28	2.01
Middle Sherman	72.45	2.82

[a] Total solids were determined using Standard Methods 2540B (APHA 1998)
[b] Total volatile solids were determined using Standard Methods 2540E (APHA 1998)
All values are means of duplicate analyses
Note: See Appendix C for data sheets (these parameters were determined at the AECOM/FCETL)

Physical and Chemical Data (Min/Max)

Sample ID	pH (units)	DO (mg/L)	Cond. (µS/cm)	Temp. (°C)[a]	Ammonia as N (mg/L)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
Sand	7.8/8.1	5.2/6.7	550	22/23	<1.0	94	69
Formulated Sediment	7.9/8.2	5.0/7.1	550/636	22/23	<1.0	102/128	72/100
Inlet Upper Slate	7.8/8.2	5.2/6.8	506/650	22/23	<1.0/1.5	104/130	65/92
Lower Sherman	7.8/8.2	5.3/6.8	523/587	22/23	<1.0	108/114	75/77
Middle Slate Creek	7.7/8.1	4.6/6.6	613/699	22/24	<1.0/1.3	154/156	113/117
Lower Slate	7.7/8.1	5.0/6.6	504/569	22/23	<1.0	104/108	61/70
Lower Johnson	7.5/8.0	5.0/6.6	498/569	22/24	<1.0	94/106	56/64
Middle Sherman	7.7/8.1	5.2/6.5	512/581	22/24	<1.0	104	68/70

[a] Temperature in test chambers

Reference Toxicant Test Results for *C. dilutus*

Organism Lot Number	Test Dates	96-Hour LC_{50}	AECOM/FCETL Historical 95% Control Limits	
			Low	High
11-028	11/17/11-11/21/11	3,251	3,081	6,568

Note: Values are expressed as mg/L chloride

References

APHA. 1998. Standard Methods for the Examination of Water and Wastewater. Amer. Public Health Assoc., Amer. Water Works Assoc., Water Pollut. Control Fed., APHA, Washington, DC.

ASTM. 2009. Standard Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates. Method E 1706-05 In *2009 Annual Book of ASTM Standards, Section 11, Water and Environmental Technology, Volume 11.06, Biological Effects and Environmental Fate; Biotechnology*. American Society of Testing and Materials. West Conshohocken, PA.

Kemble, N.E., F.J. Dwyer, C.G. Ingersoll, T.D. Dawson, and T.J. Norberg-King. 1999. Tolerance of Freshwater Test Organisms to Formulated Sediments for Use as Control Materials in Whole-Sediment Toxicity Test. *Environ. Toxicol. Chem.* 18:222-230.

USEPA. 1986. Test Methods for Evaluating Solid Waste. Third Edition. SW-846.

USEPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. EPA/600/R-99/064.

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

WEST, Inc. and D.D. Gulley. 1996. Toxstat Version 3.5. Western EcoSystems Technology, Inc., Cheyenne, WY.

Statement of Procedural Compliance

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, accurate and complete.

Rami Naddy, Ph.D. February 6, 2012
Study Director Date

Statement of Quality Assurance

The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with standard operating procedures, and that the resulting data and report meet the requirements of the NELAC standards. This report is an accurate reflection of the raw data.

Anita Rehner February 3, 2012
Quality Assurance Unit Date

APPENDIX A

Chain of Custody

Sent 7-26-2011

AECOM

CHAIN OF CUSTODY RECORD

(063-064-065-#Ref1-066)

Client/Project Name: Coeur Alaska

Project Location: FCETL

Project Number: 60147217-058

Field Logbook No.:

Sampler (Print Name)/(Affiliation): GORDON WN ADF+G

Chain of Custody Tape Nos.: 41156 *intact*

Signature:

Send Results/Report to:

TAT:

Analysis Requested

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Field Sample No./Identification	Date ⊛	Time △	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	Analysis	Lab I.D.	Remarks
INLET UPPER SLATE	10/6	1200	X		1 g jar		ICE		X	25192	
LOWER SHERMAN	10/4	1200	X		1 g jar		ICE		X	25193	
MS (middle slate)	~~9/26~~ 10/3	1200	X		1 g jar		ICE		X	25194	
LOWER SLATE	10/3	1200	X		1 g jar		ICE		X	25195	
L JOHNSON	10/3	1200	X		1 g jar		ICE		X	25196	
MIDDLE SHERM	10/4	1200	X		1 g jar		ICE		X	~~25197~~	
000388 LOWER JOHNSON	10/3	1200	X		1 4oz jar		ICE		X	25196	
000458 LOWER SH	10/3	1200	X		1 4oz jar		ICE		X	25193	
000389 LS	10/3	1200	X		1 4oz jar		ICE		X	25195	
000383 MS	10/4	1200	X		1 4oz jar		ICE		X	25194	
000463 UPPER SLATE	|	1200	X		1 4oz jar		ICE		X	25192	
000457 MID SHERM	|	1200	X		1 4oz jar		ICE		X	25197	

Relinquished by: (Print Name)/(Affiliation) GORDON WN ADFG — Date: 10/10 — Time: 0730
Signature:

Received by: (Print Name)/(Affiliation) Amber Potts/AECOM — Date: 10/11/11 — Time: 1020
Signature: Amber Potts

Relinquished by: (Print Name)/(Affiliation) — Date: — Time:
Signature:

Received by: (Print Name)/(Affiliation) — Date: — Time:
Signature:

Relinquished by: (Print Name)/(Affiliation) — Date: — Time:
⊛ All samples were collected in the year 2011.
Signature:

Received by: (Print Name)/(Affiliation) — Date: — Time:
Signature:

Analytical Laboratory (Destination): (D53)
rec. on ice via Fed ex @ 3.4°C (cooler temp)

AECOM Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)

Sample Shipped Via: UPS FedEx Courier Other

Temp blank: Yes No

△ All sample times were confirmed with client via phone conversation. 12/13 TNB

Serial No. № 51474

APPENDIX B

Data Sheets

CW 01/30/12
QA: AR 07/31/12

C. dilutus ① ~~H. azteca~~

10-day Survival and Growth, Testing Cover Page

Project Number:	60225262-058-(~~063-068~~ 075-080)②			Protocol #: ① ~~CT3AK-TIE056.008~~ USEPA (2000) + ASTM (2009)			
Test Substance:	Sediment						
Test Species:	C. dilutus*	Lot #:	11-028	Age:	2nd Instar	Supplier:	ABS
Test Type:	Chronic, Static Renewal						
Overlying Water:	Reconstituted Fresh Water (Smith et al., 1997) (RW# 10096▲ 10112Ⓐ 10119▲)			Investigators:	CW/TK/MT/Am		
Sampling Date(s):	10/3/11-10/6/11			Sampling Time(s):	1200		
FCETL Sample #(s):	25192, 25193, 25194, 25195, 25196, 25197						
Test Initiation Date/Time:	11/18/11 @ 0930-1200						
Test Termination Date/Time:	11/28/11 @ 0915-1140						
Renewal Frequency:	⊛ Cont. drip; 2+ vol/day	Feeding Freq:	daily	Food Type/Amount:	1.5 ml of 4 g/L Tetrafin	Test Temp:	23 +/- 1 deg C
Test Chamber Capacity:	500 ml	Test Soltn. Vol:	100 mL sed/175 mL H2O	# Repl's/Trtmnt:	8 / 6*		
Test Duration:	10 days	# Org.'s/Repl:	10	Env. Chmbr/Bath:			

Water Characterization: Minimum of Hardness, Alkalinity, & Conductivity on days 0 and 10; Ammonia on days 0, 3, 7, and 10; No TRC; pH, temperature & DO daily on overlying water
aerate if dissolved oxygen <2.5 mg/L

Test Sediment (s):

1) Form Sed (Cont)	2) Inlet Upper Slate	3) Lower Sherman	4) Middle Slate
5) Lower Slate	6) Lower Johnson	7) Middle Sherman	8) Sand
9)	10)	11)	

Reference Tox. Dates:	11/17/11 - 11/21/11	LC50:	3251 mg Cl⁻/L	Hist. Limits:	3081 - 6568	Method:	Probit
Study Director Initials:	CW for RBN	Date:	11/17/11				

Overlying water added at a minimum of 2 volume additions/day; equivalent to >350 ml/day or >0.24 ml/min
* formerly known as *C. tentans*

* Middle Slate and sand control only ~~has~~ have② 6 replicates due to insufficient amount of sediment.

⊛ Sand controls were renewed manually 2x daily

▲ Started new overlying water on 11/27/11 TK

Ⓐ New overlying water started on 11/21/11 CW

① CW 11/28/11 CF
② CW 02/02/12 CF

CW 01/30/12
QA: AR 01/31/12

SEDIMENT/SOIL PREPARATION

Project Number: 60225262-058-(~~063-068~~) 075-080 ①

Artificial soil	
Constituent/source	**Amount added (g)**
Coarse Silica Sand	1242
Silt/Clay (ASP 400)	219
Dolomite	7.5
α-cellulose	77.3
Humic Acid	0.15
Total	1545.95

Notes: Container was placed into tumbler for a minimum of an hour to homogenize prior to use

Soil/sediment	FCETL#	Homogenization Date	From	To	Analyst
Form Sed (Cont)*	NA	11/17/11	0938	0941	CW
Inlet Upper Slate	25192	11/17/11	1012	1016	AB
Lower Sherman	25193	11/17/11	1020	1023	CW
Middle Slate (MS)▲	25194	11/17/11	1000	1003	CW
Lower Slate	25195	11/17/11	1031	1034	CW
Lower Johnson	25196	11/17/11	0955	0959	AB
Middle Sherman	25197	11/17/11	1021	1024	AB
Sand (A)	NA	11/18/11	1425	1428	CW

* added overlying H_2O and homogenized on 11/16/11 and stored overnight @ 4°C. CW

▲ enough sediment for 6 reps only.

(A) Added overlying water during homogenization process.

① CW 02/02/12 CF

075-080 QA: AR 01/11/12

BIOLOGICAL DATA *C. dilutus** Chronic, Static Renewal Project 60225262-058-~~(063-068)~~ ⑩ cw 1/8/12

Observations made on 11/28/11

Sediment	Test Termination	A	B	C	D	E	F	G	H	Remarks:	% Survival
Form Sed (Cont)	# Surviving	9	8	6	6	8	6	7	10		75%
	# Observed Dead	0	0	0	0	0	0	1	0		
	# Not Found	①~~2~~1	2	4	4	2	4	2	0		
	Initials	AP	Am	AP	AD	AP	cw	AD	cw		
Inlet Upper Slate	# Surviving	6	5	7	⑥~~9~~*~~5~~	7	6	⑥~~8~~7	6	~~*1 emerged~~⑥	61.2%
	# Observed Dead	0	0	0	⑥~~0~~1	0	0	1	0		
	# Not Found	4	5	3	⑥~~1~~4	②~~1~~3	4	2	4		
	Initials	Am	KB	AP	②~~AD~~ AD	E	KB	JL	AD		
Lower Sherman	# Surviving	8	8	4	3	6	⑤~~5~~4^Δ	6	7	^Δpupae°	⑦ ~~57.5%~~ 58.8%
	# Observed Dead	0	0	0	0	0	⑤~~1~~0	1	0		
	# Not Found	2	2	6	7	4	5	3	3		
	Initials	AP	AB	Am	cw	KB	JL	AD	AP		
Middle Slate	# Surviving	8	9	8	5	8	9				78.3%
	# Observed Dead	0	0	0	0	1	0				
	# Not Found	2	1	2	5	1	1				
	Initials	AB	Am	AD	AD	AD	cw				
Lower Slate	# Surviving	6	6	5	3	5	7	7	9		60%
	# Observed Dead	0	0	0	4	0	0	0	0		
	# Not Found	4	4	5	3	5	3	3	1		
	Initials	E	AP	AD	AD	KB	Am	JL	Am		
Lower Johnson	# Surviving	9	10	5^Δ	8	7	7	7^Δ	7	^Δ1 pupae°	75%
	# Observed Dead	0	0	0	0	0	0	0	0		
	# Not Found	1	0	5	2	3	3	3	3		
	Initials	AD	AP	AD	Am	cw	JL	AP	cw		
Middle Sherman	# Surviving	4	4	7	5^Δ6	5^Δ	~~4~~5⑧	7	6	^Δ1 pupae° ⑧ 1 empty casing (n.c) partial ~~(not including dry weight)~~ ⑧	55%
	# Observed Dead	0	0	0	~~0~~0	0	0	0	0		
	# Not Found	6	6*	3	5^Δ4	5	4	3	4	*1 empty casing (n.c)	
	Initials	AD	KB	Am	~~AD~~ AD	JL	AP	cw	E		
Sand 0	# Surviving	8	8	5	9*	8	7			*1 emerged°	75%
	# Observed Dead	1	0	2	0	0	0~~3~~④				
	# Not Found	1	2	3	1	2	3				
0	~~# Surviving~~ Initials	Am	cw	Am	cw	cw	Am				
	# Observed Dead										
	# Not Found										
0	# Surviving										
	# Observed Dead										
	# Not Found										
	# Surviving										
	# Observed Dead										
	# Not Found										

① cw 11/28/11 cf ③ cw 11/28/11 wp ⑤ AD 11/28/11 wp ⑦ cw 1/11/12 E ⑨ E 1/30/12 E Note: (n.c) = not counted or AFDW

② AP 11/28/11 E ④ Am 11/28/11 wp ⑥ JL 11/28/11 E ⑧ JL 1/13/12 E ⑩ cw 02/02/12 cf •Not included in dry weight determination

cw 01/30/12
QA: AR 01/31/12

CHEMICAL DATA (Composite of Overlying Water) *C. dilutus** Chronic, Static Renewal Project 60225262-058-(~~063-068~~) 075-080③

Parameter	Sediment	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day	Meter	Date	Time	Initials
Dissolved	Form Sed (Cont)	7.1	6.2	6.0	5.4	6.0	5.0	5.2	5.6	6.5	5.7	6.7	0	5	11/18/11	0905	cw
Oxygen	Inlet Upper Slate	6.8	6.1	6.8	6.0	5.5	5.2	5.3	5.5	5.8	5.6	6.7	1	5	11/19/11	1430	F
(mg/l)	Lower Sherman	6.8	6.0	6.6	5.6	5.8	6.0	5.3	5.6	6.4	5.6	6.8	2	5	11/20/11	0915	F
	Middle Slate	6.2	5.6	5.0	4.6	5.1	5.3	4.7*	5.0*	5.1*	5.1*	6.6	3	5	11/21/11	1005	mt
	Lower Slate	6.4	6.0	6.3	5.0	6.1	5.3	5.2	5.2	5.9	5.6	6.6	4	5	11/22/11	0905	Am
	Lower Johnson	6.6	5.8	6.2	5.3	5.7	5.6	5.0	5.2	6.0	5.6	6.5	5	5	11/23/11	1350	mt
	Middle Sherman	6.5	5.7	5.9	6.3	5.8	5.2	6.2	5.3	6.3	5.3	6.4	6	5	11/24/11	1000	F
	Sand	NM	6.2	6.5	6.1	5.6	5.2	5.9*	5.4*	6.7*	5.9*	6.7	7	5	11/25/11	0930	F
													8	5	11/26/11	0900	F
	0												9	5	11/27/11	0900	F
	0												10	5	11/28/11	1005	mt
	0																
Temp	Form Sed (Cont)	①~~23~~22	22	23	22	23	23	23	22	22	22	22	0	D47	11/18/11	0900	cw
	Inlet Upper Slate	22	22	23	22	23	23	23	22	22	22	22	1	D47	11/19/11	1430	F
(deg C)	Lower Sherman	22	23	22	21④	22	23	22	23	22	22	22	2	D47	11/20/11	0915	F
	Middle Slate	22	22	23	23	23	23	24*	23*	23*	22*	22	3 ~~4~~②	D54	11/21/11	1005	mt
	Lower Slate	22	22	22	23	23	23	23	22	22	22	22	4 ~~5~~②	D47	11/22/11	0905	Am
	Lower Johnson	22	22	23	22	22	24	22	22	23	22	22	5 ~~8~~②	D47	11/23/11	1350	mt
	Middle Sherman	22	22	22	22	23	24	22	22	22	22	22	6 ~~7~~②	D47	11/24/11	1000	F
	Sand	NM	23	22	23	23	23	23*	23*	22*	23*	22	7 ~~8~~②	D47	11/25/11	0930	F
	0												8 ~~8~~②	D47	11/26/11	0900	F
	0												9 ~~10~~②	D47	11/27/11	0900	F
	0												10	D47	11/28/11	0905	cw
pH	Form Sed (Cont)	8.2	8.0	8.0	8.1	8.0	7.9	8.0	8.0	8.1	8.0	8.0	0	16	11/18/11	0905	cw
	Inlet Upper Slate	8.2	7.8	8.1	8.0	7.9	7.8	7.8	7.9	7.8	7.9	8.1	1	16	11/19/11	1430	F
	Lower Sherman	8.2	7.9	8.0	8.0	8.0	8.0	7.8	8.0	8.1	7.9	8.1	2	16	11/20/11	0915	F
	Middle Slate	8.1	7.9	7.9	8.0	8.0	7.8	7.7*	7.8*	7.7*	7.7*	8.1	3	FM21	11/21/11	1005	mt
	Lower Slate	8.1	7.7	7.9	7.9	7.9	7.9	7.7	7.8	7.8	7.8	8.0	4	16	11/22/11	0905	Am
	Lower Johnson	8.0	7.6	7.7	7.8	7.8	7.9	7.5	7.7	7.8	7.7	8.0	5	16	11/23/11	1350	mt
	Middle Sherman	8.1	7.7	7.8	8.0	7.9	7.8	7.9	7.8	7.9	7.7	8.0	6	16	11/24/11	1000	F
	Sand 0	NM	7.9	8.0	8.0	8.0	8.0	7.9*	7.8*	8.1*	7.9*	8.0	7	16	11/25/11	0930	F
	0												8	16	11/26/11	0900	F
	0												9	16	11/27/11	0900	F
	Replicate	A	B	C	D	E	F	G/A*	H/B*	A/C*	B/D*	C	10	16	11/28/11	1005	mt

① cw 11/18/11 E ③ cw 02/02/12 cf
② F 11/26/11 E ④ mt 2/2/12 cf 22

OVERLYING WATER CHARACTERIZATION *C. dilutus** Chronic, Static Renewal Project No. 60225262-058-(~~063-068~~)① 075-080
QA: ARD 1/31/12

	Conductivity (s/cm)		Hardness (mg/L as CaCO3)		Alkalinity (mg/l as CaCO3)		Ammonia (mg/l)				
Sediment	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 3	Day 7	Day 10	
Form Sed (Cont)	550	636	102	128	72	100	<1.0	<1.0	<1.0	<1.0	
Inlet Upper Slate	506	650	104	130	65	92	<1.0	<1.0	1.5	<1.0	
Lower Sherman	523	587	108	114	75	77	<1.0	<1.0	<1.0	<1.0	
Middle Slate	613	699	154	156	117	113	<1.0	1.3	<1.0	<1.0	
Lower Slate	504	569	104	108	61	70	<1.0	<1.0	<1.0	<1.0	
Lower Johnson	498	569	94	106	56	64	<1.0	<1.0	<1.0	<1.0	
Middle Sherman	512	581	104	104	68	70	<1.0	<1.0	<1.0	<1.0	
Sand	NM	550	NM	94	NM	69	NM	<1.0	<1.0	<1.0	
Overlying water							① ~~NH4~~ <1.0 Δ				Cl- = 49.2 mg/L
(RW 10096) measured 11/17/11	483		90		63		① ~~NH4~~ <1.0 Δ				Cl- = 49.8 mg/L
(RW 10112) measured 11/21/11	442		86		55		<1.0 Δ				Cl- = 52.0 mg/L
(RW 10119) measured 11/23/11	513		90		59						
Meter #	15	15	Titr	Titr	Titr	Titr	HA #1	HA #1	HA #1	HA #1	
Date:	11/18/11	11/28/11	11/18/11	11/28/11	11/18/11	11/28/11	11/18/11	11/21/11	11/25/11	11/28/11	
Time:	0900	1520	0900	1520	0900	1520	1600	1330	1625	1640	
Initials:	TK	AD	TK	AD	TK	AD	TK	MT	BP	AD	

Δ measured in source water

① cw 02/02/12 CF

CW 01/30/12
QA: AR 01/31/12

DAILY TESTING LOG C. dilutus* Chronic, Static Renewal Project No. 60225262-058-(~~063-068~~)① 075-080

Day			Feeding	Initials/Date
Day -1	Sediment Homogenized @ 0945-1035 Overlying water added to chambers @ 1130			CW 11/17/11
Day 0	Test organisms added to chambers @ 0930-1200 added to Sand @ 1445		@1530 CW	CW 11/18/11
Day 1	Bath CT = 24.2 °C	Range = 23.0 – 24.8 °C	1500 K	K 11/19/11
Day 2	Bath CT = 24.2°C	Range = 23.8 – 24.4 °C	1505 AP	K 11/20/11
Day 3	Bath CT = 24.0°C overlying water switched to RW#10112 @ ~1000	Range = 23.8 – 24.8 °C	1630 CW	NT 11/21/11
Day 4	Bath CT = 24.0°C	Range = 23.4 – 24.4°C	1700 AM	AM 11/22/11
Day 5	Bath CT = 23.4°C	Range = 23.0 – 24.2 °C	1630 KB	11/23/11
Day 6	Bath CT = 23.6°C	Range = 23.0 – 24.8 °C	1720 K	K 11/24/11
Day 7	Bath CT = 23.4°C	Range = 23.0 – 23.8°C	1600 BP	K 11/25/11
Day 8	Bath CT = 23.4 °C	Range = 23.0 – 23.8 °C	1530 K	K 11/26/11
Day 9	Bath CT = 23.4 °C Overlying H_2O switched to RW#10119	Range = 23.0 – 23.8 °C	1530 BP	K 11/27/11
Day 10	Bath CT = 23.6 °C	Range = 23.0 – 23.8°C	None	CW 11/28/11

①CW 02/02/12 CF

cw 01/16/12

QA: AR 01/31/12

Length/Width of Objects Using a Micrometer

Project/Study Number: 60225262-058-(075-080) ~~(063-068)~~ ②	**Project Name:** Coeur
Study Initiation Date: 11/18/11	**Species:** C. dilutus
Source of Organisms: ABS	**Organism Batch/Lot#:** 11-028
Collected by: cw	**Date Collected:** 11/18/11
Analyzed by: cw	**Date Analyzed:** 12/02/11

Specimen Number	Magnif.	# of Squares	Length of One Square (mm)	Total (mm)	Remarks
1	100X	5.5	0.07	0.385	
2	100X	6		0.420	
3	100X	5		0.350	
4	100X	5.5		0.385	
5	100X	6		0.420	
6	100X	5		0.350	
7	100X	8		0.560	
8	100X	5		0.350	
9	100X	5.5		0.385	
10	100X	5.5		0.385	
11	100X	6		0.420	
12	100X	5		0.350	
13	100X	6		0.420	
14	100X	6		0.420	
15	100X	5		0.350	
16	100X	7		0.490	
17	100X	5		0.350	
18	100X	8		0.560	
19	100X	5.5		0.385	
20	100X	5.5		0.385	
Total				① ~~8.61~~ 8.120	
Mean				① ~~0.430~~ 0.406	

3rd Instar = 0.33 - 0.45 mm

① cw 01/16/12 c ② cw 02/02/12 cf

FCETL QA Form No.108
Revision 0
Effective 08/99

cw 1/8/12
QA: AR 01/13/12

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

Project No: 60225262-058-(063-008) 075-080 ②	TARE: Date/time: 12/08/11 @1130 Analyst: cw	Dried in Oven # 3 from Date: 12/8/11 Time: 1500 Oven °C: 60-90 to Date: 12/13/11 Time: 0925
Species: Chironomus dilutus Lot/Batch No.: 11-028	DRY GROSS: Date/time: 12/13/11 @1015 Analyst: cw	Ashed in Furnace from Date: 12/13/11 Time: 1100 Furnace °C: 550 to Date: 12/13/11 Time: 1630
Analytical Balance ID: Sart #1	ASHED GROSS: Date/time: 12/16/11 @1100-1230 Analyst: cw	

Indicate mean weight is Dry Weight or AFDW (Circle one)

Boat No.	Treatment	Rep	Tare Weight (g) A	Dry Gross Weight (g) B	Dry Net Weight (g) (B-A)	Adjusted Dry Net Weight (g)[1]	Ashed Gross Weight (g) (D)	AFDW (g) (B-D)	No. of Original Org.	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Org.	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
1	Sand	A	1.98766	1.99650^A	0.00884		1.99071	0.00579				8		
2		B	2.20280	2.20967	0.00687		2.20362	0.00605				8		
3		C	1.88503	1.891780 9 ①	0.00676		1.88722	0.00457				5		
4		D	2.22825	2.23477	0.00652		2.22928	0.00549	9			8		
5		E	2.21528	2.22220	0.00692		2.21651	0.00569				8		
7		F	2.03168	2.03909	0.00741		2.03333	0.00576				7		
8	Form Sed	A	2.22211	2.23859^A	0.01648		2.22839	0.01020				9		
9		B	1.94352	1.95670	0.01318		1.94835	0.00835				8		
10		C	2.21543	2.22970	0.01427		2.22183	0.00787				6		
11		D	2.23168	2.24368	0.01200		2.23491	0.00877				6		
12		E	2.35657	2.37240	0.01583		2.36092	0.01148				8		
13		F	2.17951	2.19107	0.01156		2.18395	0.00712				6		
14		G	2.21717	2.22863	0.01146		2.22166	0.00697				7		
A Blank			2.35273	2.35270	-0.00003		2.35273	+0.00003						

[1] Add in weight loss of blank boat, if appropriate.

① cw 12/13/11 E
② cw 02/02/12 CF

A double checked gross weight

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Revision 0
Effective 08/99

cw 1/18/12
QA: AR 01/13/12

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

Project No: 60225262-058-~~063-068~~ 075-080 ③	TARE: Date/time: 12/08/11 @1130 Analyst: cw	Dried in Oven # 3 from Date: 12/8/11 Time: 1500 Oven °C: 60-90 to Date: 12/13/11 Time: 0925
Species: Chironomus dilutus Lot/Batch No.: 11-028	DRY GROSS: Date/time: 12/13/11@1030 Analyst: cw	Ashed in Furnace from Date: 12/13/11 Time: 1100 Furnace °C: 550 to Date: 12/13/11 Time: 1630
Analytical Balance ID: Sart # 1	ASHED GROSS: Date/time: 12/16/11 @1100-1230 Analyst: cw	

Indicate mean weight is **Dry Weight** or AFDW (Circle one)

Boat No.	Treatment	Rep	Tare Weight (g) A	Dry Gross Weight (g) B	Dry Net Weight (g) (B-A)	Adjusted Dry Net Weight (g)[1]	Ashed Gross Weight (g) (D)	AFDW (g) (B-D)	No. of Original Org.	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Org.	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
15	Form Sed	H	2.29082	2.30545	0.01463		2.29628	0.00917				10		
16	Inlet	A	1.96481	1.97584	0.01103		1.96826	0.00758				6		
17	Upper Slate	B	2.29295	2.30115	0.00820		2.29530	0.00585				5		
18		C	2.23689	2.24801 ~~2.26189~~ ①	0.01112		2.24014	0.00787				7		
19		D	2.11460	2.12090	0.00630		2.11621	0.00469				5		
20		E	2.37662	2.38578	0.00916		2.37918	0.00660				7		
21		F	1.87369	1.88161	0.00792		1.87623	0.00538				6		
22		G	1.82777	1.83891	0.01114		1.83176	0.00715				7		
23		H	2.07904	2.08855	0.00951		2.08211	0.00644				6		
24	Lower Sherman	A	2.32528	2.34056	0.01528		2.33246	0.00810				8		
25		B	2.30195	2.31919	0.01724		2.31053	0.00866				8		
26		C	2.27462	2.28230 ~~1.98804~~ ①	0.00768		2.27802	0.00428				4		
27		D	1.98082	1.98804	0.00722		1.98358	0.00446				3		
B Blank			2.26189	2.26189	0.00000		2.26192	+0.00003						

[1] Add in weight loss of blank boat, if appropriate.

①cw 12/13/11 WP
②cw 12/16/11 E
③cw 02/02/12 cf

• use blank A ~~• use blank B~~ ② re-ashed on 12/15/11 from 1100 to 1645 to ensure complete ashing. weights didn't change. cw

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Revision 0
Effective 08/99
cw 1/18/12
QA: AR 01/13/12

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

Project No: 60225262-058-(~~063-068~~ 075-080) (4)
TARE: Date/time: 12/08/11 @1130 Analyst: cw
Species: Chironomus dilutus
Lot/Batch No.: 11-028
DRY GROSS: Date/time: 12/13/11 @1110 Analyst: cw
Analytical Balance ID: Sart # 1
ASHED GROSS: Date/time: 12/16/11 @1100-1230 Analyst: cw
Dried in Oven # 3 from Date: 12/8/11 Time: 1500
Oven °C: 60-90 to Date: 12/13/11 Time: 0925
Ashed in Furnace from Date: ~~12/14/11~~ 12/13/11 Time: 1100
Furnace °C: 550 to Date: 12/15/11 Time: 1645

Indicate mean weight is Dry Weight or AFDW (Circle one)

	Boat No.	Treatment	Rep	Tare Weight (g) A	Dry Gross Weight (g) B	Dry Net Weight (g) (B-A)	Adjusted Dry Net Weight (g)[1]	Ashed Gross Weight (g) (D)	AFDW (g) (B-D)	No. of Original Org.	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Org.	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
(*)	28	Lower Sherman	E	2.20960	2.22129	0.01169		2.21489	0.00640				6		
(*)	29		F	2.24436	2.25490	0.01054		2.24980	0.00510	9			4		
(*)	30		G	2.05894	2.~~20(1)~~ 06611 A	0.00717		2.06105	0.00506				6		
(*)	31		H	2.23133	2.24627	0.01494		2.23840	0.00787				7		
(A)	33	Middle Slate	A	2.24651	2.25712	~~0.01160~~ 0.01061		2.24907	0.00805				8		
(A)	34		B	1.82243	1.83289	0.01046		1.82566	0.00723				9		
(*)	35		C	2.08135	2.09123	0.00988		2.08350	0.00773				8		
(A)	36		D	1.95061	1.95682	0.00621		1.95177	0.00505				5		
(A)	37		E	1.87730	1.88663	0.00933		1.87948	0.00715				8		
(A)	39		F	1.94708	1.95799	0.01091		1.95013	0.00786				9		
(A)	40	Lower Slate	A	1.75882	1.77355	0.01473		1.76533	0.00822				6		
(A)	41		B	1.88183	1.896~~20~~(1) 32	0.01449		1.88831	0.00801				6		
(*)	42		C	1.93580	1.94627	0.01047		1.93998	0.00629				5		
(3)	A2 Blank			~~2.20598~~	~~2.20598~~	~~0.00000~~		~~NM~~							

[1] Add in weight loss of blank boat, if appropriate.

(1) cw 12/13/11 E
(2) cw 12/15/11 E
(3) cw 12/20/11, Not used
A double checked gross weight
(*) use blank C
(4) cw 02/02/12 CF
(A) use blank B

FCETL QA Form No.108
Revision 0
Effective 08/99
cw 1/8/12
QA: AR 01/13/12

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

Project No: 60225262-058 (~~063-068~~) 075-080 ①	TARE: Date/time: 12/08/11 @1130 Analyst: cw	Dried in Oven # 3 from Date: 12/8/11 Time: 1500 Oven °C: 60-90 to Date: 12/13/11 Time: 0925
Species: Chironomus dilutus Lot/Batch No.: 11-028	DRY GROSS: Date/time: 12/13/11 @1130 Analyst: cw	Ashed in Furnace from Date: 12/15/11 Time: 1100 Furnace °C: 550 to Date: 12/15/11 Time: 1645
Analytical Balance ID: Sart #1	ASHED GROSS: Date/time: 12/16/11 @1100-1230 Analyst: cw	

Indicate mean weight is Dry Weight or AFDW (Circle one) — AFDW circled

	Boat No.	Treatment	Rep	Tare Weight (g) A	Dry Gross Weight (g) B	Dry Net Weight (g) (B-A)	Adjusted Dry Net Weight (g)[1]	Ashed Gross Weight (g) (D)	AFDW (g) (B-D)	No. of Original Org.	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Org.	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
(A)	43	Lower Slate	D	2.21729	2.22306	0.00577		2.21963 ~~2.12978~~ ③	0.00343					3	
(*)	44		E	2.24508	2.25596	0.01088		2.24895	0.00701					5	
(*)	45		F	2.24060	2.25535	0.01475		2.24657	0.00878					7	
(*)	46		G	1.87060	1.88377	0.01317		1.87582	0.00795					7	
(A)	47		H	1.87603	1.89229	0.01626		1.88308	0.00921	9				8 (A)	
(*)	48	Lower Johnson	A	1.98055	1.99478	0.01423		1.98716	0.00762					9	
(*)	49		B	2.12133	2.13940	0.01807		2.12978	0.00962					10	
(*)	50		C	2.12985	2.13779	0.00794		2.13274	0.00505	9				① ~~5~~ 4	
(A)	52		D	2.03561	2.05231	0.01670		2.04369	0.00862					8	
(*)	55		E	1.85798	1.87240	0.01442		1.86408	0.00832					7	
(*)	60		F	2.06066	2.07189	0.01123		2.06623	0.00566					7	
(A)	64		G	2.15883	2.17404	0.01521		2.16607	0.00797	9				① ~~7~~ 6	
	C Blank			1.97054	1.97054	0.00000		1.97055	+0.00001						
③	• B2 Blank			~~2.33449~~	~~2.33451~~	~~+0.00002~~		~~2.33450~~	~~-0.00001~~						

[1] Add in weight loss of blank boat, if appropriate.

• Note: Blank B2 ashed 12/13/11 from 1100 to 1630 and again on 12/15/11 from 1100 to 1645. cw

① cw 12/8/11 E
② cw 12/16/11 wp
③ cw 12/20/11 Not used
(*) use Blank C
(A) use blank B
④ cw 02/02/12 cf
(A) Lower slate H had 9 survivors, but one was lost during drying process

cw 1/18/12
QA: AR 01/13/12

TEST ORGANISM DRY WEIGHT AND ASH-FREE DRY WEIGHT (AFDW)

Project No: ~~60225262-058~~ (~~063-068~~ 075-080) ②	TARE: Date/time: 12/8/11 @1630 Analyst: cw	Dried in Oven # 3 from Date: 12/8/11 Time: 1645 Oven °C: 60-90 to Date: 12/13/11 Time: 0925
Species: Chironomus dilutus Lot/Batch No.: 11-028	DRY GROSS: Date/time: 12/13/11@1000 Analyst: cw	Ashed in Furnace from Date: 12/13/11 Time: 1100 Furnace °C: 550 to Date: 12/13/11 Time: 1630
Analytical Balance ID:	ASHED GROSS: Date/time: 12/16/11@1100-1230 Analyst: cw	

Indicate mean weight is Dry Weight or AFDW (Circle one)

Boat No.	Treatment	Rep	Tare Weight (g) A	Dry Gross Weight (g) B	Dry Net Weight (g) (B-A)	Adjusted Dry Net Weight (g)[1]	Ashed Gross Weight (g) (D)	AFDW (g) (B-D)	No. of Original Org.	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Org.	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
• 3B	L.Johnson	H	2.24642	2.25918	0.01276		2.24789	0.01129	9			6		
• 6	Middle Sherman	A	2.14744	2.15585	0.00841		2.15085	0.00500				4		
Ⓐ B7		B	2.56437	2.57087	0.00650		2.56647	0.00440				4		
• 9B		C	2.19549	2.20919	0.01370		2.20150	0.00769				7		
• 10B		D	1.93442	1.94977	0.01535		1.94197	0.00780				6		
• 28B		E	2.06910	2.07927	0.01017		2.07343	0.00584	9			5	① note: one of	the 5 orgs was partially pupated
• 29B		F	2.03751	2.04808	0.01057		2.04244	0.00564				5		
Ⓒ 36B		G	2.02155	2.03523	0.01368		2.02736	0.00787				7		
Ⓐ 41B		H	2.26881	2.28204	0.01323		2.27503	0.00701				6		
D Blank			1.97082	1.97080			NM							
E Blank			2.35711	2.35712			NM							

[1] Add in weight loss of blank boat, if appropriate.
① AR 01/13/12 E ② cw 02/02/12 cf

• use blank A Ⓒ use blank C and the corresponding times in furnace Ⓐ use blank B and the corresponding times in furnace

① ~~Middle Sherman E had 6 survivors but 1 was lost in drying process~~

Lower Johnson H had 7 survivors, but 1 was lost during drying process

CW 01/13/12
QA: AR 01/13/12

Chironomus dilutus Ash-Free Dry Weight (AFDW) Determination

Test Start Date:	11/18/2011	Test End Date:	11/28/2011
Test Number(s):	60225262-058-(~~060-069~~) 053-060 (1)	Test Material:	Sediment
Species:	*C. dilutus*	Entered by:	Christina Needham

Boat #	Treatment	Rep	Tare wt (dry) (g)	Gross wt (dry) (g)	Dry net wt (g)	Dry adjusted net wt (g)	Ashed gross wt (g)	AFDW (g)	Adjusted AFDW (g)	Number original organisms	Mean wt per orig (mg) AFDW	Mean wt per treatment (orig) (mg) AFDW	Number surviving	Mean wt per surviving AFDW	Mean wt per treatment (surv) (mg) AFDW
1	Sand cont	A	1.98766	1.99650	0.00884	0.00887	1.99071	0.00579	0.00579	10	0.5790	0.5660	8	0.7237	0.7691
2		B	2.20280	2.20967	0.00687	0.00690	2.20362	0.00605	0.00605	10	0.6050		8	0.7563	
3		C	1.88503	1.89179	0.00676	0.00679	1.88722	0.00457	0.00457	10	0.4570		5	0.9140	
4		D	2.22825	2.23477	0.00652	0.00655	2.22928	0.00549	0.00549	9	0.6100		8	0.6862	
5		E	2.21528	2.22220	0.00692	0.00695	2.21651	0.00569	0.00569	10	0.5690		8	0.7112	
7		F	2.03168	2.03909	0.00741	0.00744	2.03333	0.00576	0.00576	10	0.5760		7	0.8229	
8	Form sed	A	2.22211	2.23859	0.01648	0.01651	2.22839	0.01020	0.01020	10	1.0200	0.8741	9	1.1333	1.1856
9		B	1.94352	1.95670	0.01318	0.01321	1.94835	0.00835	0.00835	10	0.8350		8	1.0438	
10		C	2.21543	2.22970	0.01427	0.01430	2.22183	0.00787	0.00787	10	0.7870		6	1.3117	
11		D	2.23168	2.24368	0.01200	0.01203	2.23491	0.00877	0.00877	10	0.8770		6	1.4617	
12		E	2.35657	2.37240	0.01583	0.01586	2.36092	0.01148	0.01148	10	1.1480		8	1.4350	
13		F	2.17951	2.19107	0.01156	0.01159	2.18395	0.00712	0.00712	10	0.7120		6	1.1867	
14		G	2.21717	2.22863	0.01146	0.01149	2.22166	0.00697	0.00697	10	0.6970		7	0.9957	
15		H	2.29082	2.30545	0.01463	0.01466	2.29628	0.00917	0.00917	10	0.9170		10	0.9170	
16	nlet Upper Slate	A	1.96481	1.97584	0.01103	0.01106	1.96826	0.00758	0.00758	10	0.7580	0.6445	6	1.2633	1.0537
17		B	2.29295	2.30115	0.00820	0.00823	2.29530	0.00585	0.00585	10	0.5850		5	1.1700	
18		C	2.23689	2.24801	0.01112	0.01115	2.24014	0.00787	0.00787	10	0.7870		7	1.1243	
19		D	2.11460	2.12090	0.00630	0.00633	2.11621	0.00469	0.00469	10	0.4690		5	0.9380	
20		E	2.37662	2.38578	0.00916	0.00919	2.37918	0.00660	0.00660	10	0.6600		7	0.9429	
21		F	1.87369	1.88161	0.00792	0.00795	1.87623	0.00538	0.00538	10	0.5380		6	0.8967	
22		G	1.82777	1.83891	0.01114	0.01117	1.83176	0.00715	0.00715	10	0.7150		7	1.0214	
23		H	2.07904	2.08855	0.00951	0.00954	2.08211	0.00644	0.00644	10	0.6440		6	1.0733	
24	Lower Sherman	A	2.32528	2.34056	0.01528	0.01531	2.33246	0.00810	0.00810	10	0.8100	0.6312	8	1.0125	1.1201
25		B	2.30195	2.31919	0.01724	0.01727	2.31053	0.00866	0.00866	10	0.8660		8	1.0825	
26		C	2.27462	2.28230	0.00768	0.00771	2.27802	0.00428	0.00428	10	0.4280		4	1.0700	
27		D	1.98082	1.98804	0.00722	0.00725	1.98358	0.00446	0.00446	10	0.4460		3	1.4867	
28		E	2.20960	2.22129	0.01169	0.01169	2.21489	0.00640	0.00640	10	0.6400		6	1.0667	
29		F	2.24436	2.25490	0.01054	0.01054	2.24980	0.00510	0.00510	9	0.5667		4	1.2750	
30		G	2.05894	2.06611	0.00717	0.00717	2.06105	0.00506	0.00506	10	0.5060		6	0.8433	
31		H	2.23133	2.24627	0.01494	0.01494	2.23840	0.00787	0.00787	10	0.7870		7	1.1243	

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cw 01/13/12
QA: AR 01/13/12

Chironomus dilutus Ash-Free Dry Weight (AFDW) Determination

Test Start Date:	11/18/2011 ~~075-080~~	**Test End Date:**	11/28/2011
Test Number(s):	60225262-058-(~~063-068~~)①	**Test Material:**	Sediment
Species:	*C. dilutus*	**Entered by:**	Christina Needham

Boat #	Treatment	Rep	Tare wt (dry) (g)	Gross wt (dry) (g)	Dry net wt (g)	Dry adjusted net wt (g)	Ashed gross wt (g)	AFDW (g)	Adjusted AFDW (g)	Number original organisms	Mean wt per orig (mg) AFDW	Mean wt per treatment (orig) (mg) AFDW	Number surviving	Mean wt per surviving AFDW	Mean wt per treatment (surv) (mg) AFDW
33	Middle Slate	A	2.24651	2.25712	0.01061	0.01061	2.24907	0.00805	0.00805	10	0.8050	0.7178	8	1.0062	0.9255
34		B	1.82243	1.83289	0.01046	0.01046	1.82566	0.00723	0.00723	10	0.7230		9	0.8033	
35		C	2.08135	2.09123	0.00988	0.00988	2.08350	0.00773	0.00773	10	0.7730		8	0.9663	
36		D	1.95061	1.95682	0.00621	0.00621	1.95177	0.00505	0.00505	10	0.5050		5	1.0100	
37		E	1.87730	1.88663	0.00933	0.00933	1.87948	0.00715	0.00715	10	0.7150		8	0.8937	
39		F	1.94708	1.95799	0.01091	0.01091	1.95013	0.00786	0.00786	10	0.7860		9	0.8733	
40	Lower Slate	A	1.75882	1.77355	0.01473	0.01473	1.76533	0.00822	0.00822	10	0.8220	0.7490	6	1.3700	1.2562
41		B	1.88183	1.89632	0.01449	0.01449	1.88831	0.00801	0.00801	10	0.8010		6	1.3350	
42		C	1.93580	1.94627	0.01047	0.01047	1.93998	0.00629	0.00629	10	0.6290		5	1.2580	
43		D	2.21729	2.22306	0.00577	0.00577	2.21963	0.00343	0.00343	10	0.3430		3	1.1433	
44		E	2.24508	2.25596	0.01088	0.01088	2.24895	0.00701	0.00701	10	0.7010		5	1.4020	
45		F	2.24060	2.25535	0.01475	0.01475	2.24657	0.00878	0.00878	10	0.8780		7	1.2543	
46		G	1.87060	1.88377	0.01317	0.01317	1.87582	0.00795	0.00795	10	0.7950		7	1.1357	
47		H	1.87603	1.89229	0.01626	0.01626	1.88308	0.00921	0.00921	9	1.0233		8	1.1512	
48	Lower Johnson	A	1.98055	1.99478	0.01423	0.01423	1.98716	0.00762	0.00762	10	0.7620	0.8356	9	0.8467	1.1695
49		B	2.12133	2.13940	0.01807	0.01807	2.12978	0.00962	0.00962	10	0.9620		10	0.9620	
50		C	2.12985	2.13779	0.00794	0.00794	2.13274	0.00505	0.00505	9	0.5611		4	1.2625	
52		D	2.03561	2.05231	0.01670	0.01670	2.04369	0.00862	0.00862	10	0.8620		8	1.0775	
55		E	1.85798	1.87240	0.01442	0.01442	1.86408	0.00832	0.00832	10	0.8320		7	1.1886	
60		F	2.06066	2.07189	0.01123	0.01123	2.06623	0.00566	0.00566	10	0.5660		7	0.8086	
64		G	2.15883	2.17404	0.01521	0.01521	2.16607	0.00797	0.00797	9	0.8856		6	1.3283	
33		H	2.24642	2.25918	0.01276	0.01279	2.24789	0.01129	0.01129	9	1.2544		6	1.8817	
6	Middle Sherman	A	2.14744	2.15585	0.00841	0.00844	2.15085	0.00500	0.00500	10	0.5000	0.6487	4	1.2500	1.1671
B7		B	2.56437	2.57087	0.00650	0.00650	2.56647	0.00440	0.00440	10	0.4400		4	1.1000	
9B		C	2.19549	2.20919	0.01370	0.01373	2.20150	0.00769	0.00769	10	0.7690		7	1.0986	
10B		D	1.93442	1.94977	0.01535	0.01538	1.94197	0.00780	0.00780	10	0.7800		6	1.3000	
28B		E	2.06910	2.07927	0.01017	0.01020	2.07343	0.00584	0.00584	9	0.6489		5	1.1680	
29B		F	2.03751	2.04808	0.01057	0.01060	2.04244	0.00564	0.00564	10	0.5640		5	1.1280	
36B		G	2.02155	2.03523	0.01368	0.01368	2.02736	0.00787	0.00787	10	0.7870		7	1.1243	
41B		H	2.26881	2.28204	0.01323	0.01323	2.27503	0.00701	0.00701	10	0.7010		6	1.1683	
Blank	A		2.35273	2.35270	-0.00003		2.35273	0.00003	0.00003						
Blank	B		2.26189	2.26189	0.00000		2.26192	0.00003	0.00003						
Blank	C		1.97054	1.97054	0.00000		1.97055	0.00001	0.00001						

① cw 02/02/12 CF

File: 058063s.dat Transform: NO TRANSFORMATION
Number of Groups: 8

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Form Sed	1	0.9000	0.9000
1	Form Sed	2	0.8000	0.8000
1	Form Sed	3	0.6000	0.6000
1	Form Sed	4	0.6000	0.6000
1	Form Sed	5	0.8000	0.8000
1	Form Sed	6	0.6000	0.6000
1	Form Sed	7	0.7000	0.7000
1	Form Sed	8	1.0000	1.0000
2	In. Upper Slate	1	0.6000	0.6000
2	In. Upper Slate	2	0.5000	0.5000
2	In. Upper Slate	3	0.7000	0.7000
2	In. Upper Slate	4	0.5000	0.5000
2	In. Upper Slate	5	0.7000	0.7000
2	In. Upper Slate	6	0.6000	0.6000
2	In. Upper Slate	7	0.7000	0.7000
2	In. Upper Slate	8	0.6000	0.6000
3	Lower Sherman	1	0.8000	0.8000
3	Lower Sherman	2	0.8000	0.8000
3	Lower Sherman	3	0.4000	0.4000
3	Lower Sherman	4	0.3000	0.3000
3	Lower Sherman	5	0.6000	0.6000
3	Lower Sherman	6	0.5000	0.5000
3	Lower Sherman	7	0.6000	0.6000
3	Lower Sherman	8	0.7000	0.7000
4	Middle Slate	1	0.8000	0.8000
4	Middle Slate	2	0.9000	0.9000
4	Middle Slate	3	0.8000	0.8000
4	Middle Slate	4	0.5000	0.5000
4	Middle Slate	5	0.8000	0.8000
4	Middle Slate	6	0.9000	0.9000
5	Lower Slate	1	0.6000	0.6000
5	Lower Slate	2	0.6000	0.6000
5	Lower Slate	3	0.5000	0.5000
5	Lower Slate	4	0.3000	0.3000
5	Lower Slate	5	0.5000	0.5000
5	Lower Slate	6	0.7000	0.7000
5	Lower Slate	7	0.7000	0.7000
5	Lower Slate	8	0.9000	0.9000
6	Lower Johnson	1	0.9000	0.9000
6	Lower Johnson	2	1.0000	1.0000
6	Lower Johnson	3	0.5000	0.5000
6	Lower Johnson	4	0.8000	0.8000
6	Lower Johnson	5	0.7000	0.7000
6	Lower Johnson	6	0.7000	0.7000
6	Lower Johnson	7	0.7000	0.7000
6	Lower Johnson	8	0.7000	0.7000
7	Middle Sherman	1	0.4000	0.4000
7	Middle Sherman	2	0.4000	0.4000
7	Middle Sherman	3	0.7000	0.7000
7	Middle Sherman	4	0.6000	0.6000
7	Middle Sherman	5	0.5000	0.5000
7	Middle Sherman	6	0.5000	0.5000
7	Middle Sherman	7	0.7000	0.7000
7	Middle Sherman	8	0.6000	0.6000
8	Sand	1	0.8000	0.8000
8	Sand	2	0.8000	0.8000
8	Sand	3	0.5000	0.5000
8	Sand	4	0.9000	0.9000
8	Sand	5	0.8000	0.8000
8	Sand	6	0.7000	0.7000

①CW 02/02/12 CF

Title: 60225262-058-(063-068) C. dilutus survival
File: 058063s.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Form Sed	8	0.6000	1.0000	0.7500
2	In. Upper Slate	8	0.5000	0.7000	0.6125
3	Lower Sherman	8	0.3000	0.8000	0.5875
4	Middle Slate	6	0.5000	0.9000	0.7833
5	Lower Slate	8	0.3000	0.9000	0.6000
6	Lower Johnson	8	0.5000	1.0000	0.7500
7	Middle Sherman	8	0.4000	0.7000	0.5500
8	Sand	6	0.5000	0.9000	0.7500

Title: 60225262-058-(063-068) C. dilutus survival
File: 058063s.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Form Sed	0.0229	0.1512	0.0535	20.1581
2	In. Upper Slate	0.0070	0.0835	0.0295	13.6249
3	Lower Sherman	0.0327	0.1808	0.0639	30.7697
4	Middle Slate	0.0217	0.1472	0.0601	18.7910
5	Lower Slate	0.0314	0.1773	0.0627	29.5468
6	Lower Johnson	0.0229	0.1512	0.0535	20.1581
7	Middle Sherman	0.0143	0.1195	0.0423	21.7314
8	Sand	0.0190	0.1378	0.0563	18.3787

① CW 02/02/12 CF

Title: 60225262-058-(063-068) C. dilutus survival
File: 058063cs.dat Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

******** Shapiro - Wilk's Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 54

Title: 60225262-058-(063-068) C. dilutus survival
File: 058063cs.dat Transform: ARC SINE(SQUARE ROOT(Y))

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	3.6180	13.0680	20.6280	13.0680	3.6180
OBSERVED	3	11	25	12	3

Chi-Square = 1.5523 (p-value = 0.8173)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: 60225262-058-(063-068) C. dilutus survival
File: 058063cs.dat Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 6.1586 (p-value = 0.4057)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 16.8119 (alpha = 0.01, df = 6)
= 12.5916 (alpha = 0.05, df = 6)

Using Average Degrees of Freedom
(Based on average replicate size of 7.71)

Calculated B2 statistic = 5.2494 (p-value = 0.5122)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.

①cw 02/02/12 cf

Title: 60225262-058-(063-068) C. dilutus survival
File: 058063cs.dat Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	6	0.5335	0.0889	3.1298
Within (Error)	47	1.3352	0.0284	
Total	53	1.8686		

(p-value = 0.0116)

Critical F = 3.2128 (alpha = 0.01, df = 6,47)
= 2.2990 (alpha = 0.05, df = 6,47)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: 60225262-058-(063-068) C. dilutus survival
File: 058063cs.dat Transform: ARC SINE(SQUARE ROOT(Y))

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05
1	Form Sed	1.0656	0.7500		
2	In. Upper Slate	0.9003	0.6125	1.9613	
3	Lower Sherman	0.8784	0.5875	2.2210	
4	Middle Slate	1.1008	0.7833	-0.3870	
5	Lower Slate	0.8942	0.6000	2.0333	
6	Lower Johnson	1.0648	0.7500	0.0097	
7	Middle Sherman	0.8368	0.5500	2.7145	*

Bonferroni t critical value = 2.4827 (1 Tailed, alpha = 0.05, df = 6,47)

Title: 60225262-058-(063-068) C. dilutus survival
File: 058063cs.dat Transform: ARC SINE(SQUARE ROOT(Y))

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Form Sed	8			
2	In. Upper Slate	8	0.1950	25.5	0.1375
3	Lower Sherman	8	0.1950	25.5	0.1625
4	Middle Slate	6	0.2117	27.6	-0.0333
5	Lower Slate	8	0.1950	25.5	0.1500
6	Lower Johnson	8	0.1950	25.5	0.0000
7	Middle Sherman	8	0.1950	25.5	0.2000

① cw 02/02/12 cf

Coeur Alaska, Inc.
C. dilutus Chronic Study
List Data for Ash-Free Dry Weight (AFDW) per Original Organism

File: 058063g.dat Transform: NO TRANSFORMATION
Number of Groups: 8

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Form Sed	1	1.0200	1.0200
1	Form Sed	2	0.8350	0.8350
1	Form Sed	3	0.7870	0.7870
1	Form Sed	4	0.8770	0.8770
1	Form Sed	5	1.1480	1.1480
1	Form Sed	6	0.7120	0.7120
1	Form Sed	7	0.6970	0.6970
1	Form Sed	8	0.9170	0.9170
2	In. Upper Slate	1	0.7580	0.7580
2	In. Upper Slate	2	0.5850	0.5850
2	In. Upper Slate	3	0.7870	0.7870
2	In. Upper Slate	4	0.4690	0.4690
2	In. Upper Slate	5	0.6600	0.6600
2	In. Upper Slate	6	0.5380	0.5380
2	In. Upper Slate	7	0.7150	0.7150
2	In. Upper Slate	8	0.6440	0.6440
3	Lower Sherman	1	0.8100	0.8100
3	Lower Sherman	2	0.8660	0.8660
3	Lower Sherman	3	0.4280	0.4280
3	Lower Sherman	4	0.4460	0.4460
3	Lower Sherman	5	0.6400	0.6400
3	Lower Sherman	6	0.5667	0.5667
3	Lower Sherman	7	0.5060	0.5060
3	Lower Sherman	8	0.7870	0.7870
4	Middle Slate	1	0.8050	0.8050
4	Middle Slate	2	0.7230	0.7230
4	Middle Slate	3	0.7730	0.7730
4	Middle Slate	4	0.5050	0.5050
4	Middle Slate	5	0.7150	0.7150
4	Middle Slate	6	0.7860	0.7860
5	Lower Slate	1	0.8220	0.8220
5	Lower Slate	2	0.8010	0.8010
5	Lower Slate	3	0.6290	0.6290
5	Lower Slate	4	0.3430	0.3430
5	Lower Slate	5	0.7010	0.7010
5	Lower Slate	6	0.8780	0.8780
5	Lower Slate	7	0.7950	0.7950
5	Lower Slate	8	1.0233	1.0233
6	Lower Johnson	1	0.7620	0.7620
6	Lower Johnson	2	0.9620	0.9620
6	Lower Johnson	3	0.5611	0.5611
6	Lower Johnson	4	0.8620	0.8620
6	Lower Johnson	5	0.8320	0.8320
6	Lower Johnson	6	0.5660	0.5660
6	Lower Johnson	7	0.8856	0.8856
6	Lower Johnson	8	1.2544	1.2544
7	Middle Sherman	1	0.5000	0.5000
7	Middle Sherman	2	0.4400	0.4400
7	Middle Sherman	3	0.7690	0.7690
7	Middle Sherman	4	0.7800	0.7800
7	Middle Sherman	5	0.6489	0.6489
7	Middle Sherman	6	0.5640	0.5640
7	Middle Sherman	7	0.7870	0.7870
7	Middle Sherman	8	0.7010	0.7010
8	Sand	1	0.5790	0.5790
8	Sand	2	0.6050	0.6050
8	Sand	3	0.4570	0.4570
8	Sand	4	0.6100	0.6100
8	Sand	5	0.5690	0.5690
8	Sand	6	0.5760	0.5760

①CW 02/02/12 CF

Title: 60225262-058-(063-068) C. dilutus AFDW
File: 058063g.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Form Sed	8	0.6970	1.1480	0.8741
2	In. Upper Slate	8	0.4690	0.7870	0.6445
3	Lower Sherman	8	0.4280	0.8660	0.6312
4	Middle Slate	6	0.5050	0.8050	0.7178
5	Lower Slate	8	0.3430	1.0233	0.7490
6	Lower Johnson	8	0.5611	1.2544	0.8356
7	Middle Sherman	8	0.4400	0.7870	0.6487
8	Sand	6	0.4570	0.6100	0.5660

Title: 60225262-058-(063-068) C. dilutus AFDW
File: 058063g.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Form Sed	0.0236	0.1535	0.0543	17.5592
2	In. Upper Slate	0.0120	0.1096	0.0387	17.0051
3	Lower Sherman	0.0296	0.1719	0.0608	27.2352
4	Middle Slate	0.0121	0.1101	0.0450	15.3392
5	Lower Slate	0.0405	0.2013	0.0712	26.8706
6	Lower Johnson	0.0497	0.2230	0.0788	26.6835
7	Middle Sherman	0.0181	0.1344	0.0475	20.7149
8	Sand	0.0031	0.0559	0.0228	9.8738

①cw 02/02/12 cf

Title: 60225262-058-(063-068) C. dilutus AFDW
File: 058063.dat Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 1.1481
W = 0.9920

Critical W = 0.9270 (alpha = 0.01 , N = 46)
W = 0.9450 (alpha = 0.05 , N = 46)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: 60225262-058-(063-068) C. dilutus AFDW
File: 058063.dat Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 5.0283 (p-value = 0.4124)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 15.0863 (alpha = 0.01, df = 5)
= 11.0705 (alpha = 0.05, df = 5)

Using Average Degrees of Freedom
(Based on average replicate size of 7.67)

Calculated B2 statistic = 4.7321 (p-value = 0.4494)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.

①CW 02/02/12 CF

Title: 60225262-058-(063-068) C. dilutus AFDW
File: 058063.dat Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	0.3879	0.0776	2.7028
Within (Error)	40	1.1481	0.0287	
Total	45	1.5360		

(p-value = 0.0339)

Critical F = 3.5138 (alpha = 0.01, df = 5,40)
= 2.4495 (alpha = 0.05, df = 5,40)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: 60225262-058-(063-068) C. dilutus AFDW
File: 058063.dat Transform: NO TRANSFORMATION

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Form Sed	0.8741	0.8741		
2	In. Upper Slate	0.6445	0.6445	2.7108	*
3	Lower Sherman	0.6312	0.6312	2.8676	*
4	Middle Slate	0.7178	0.7178	1.7082	
5	Lower Slate	0.7490	0.7490	1.4767	
6	Lower Johnson	0.8356	0.8356	0.4544	

Bonferroni t critical value = 2.4233 (1 Tailed, alpha = 0.05, df = 5,40)

Title: 60225262-058-(063-068) C. dilutus AFDW
File: 058063.dat Transform: NO TRANSFORMATION

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Form Sed	8			
2	In. Upper Slate	8	0.2053	23.5	0.2296
3	Lower Sherman	8	0.2053	23.5	0.2429
4	Middle Slate	6	0.2217	25.4	0.1563
5	Lower Slate	8	0.2053	23.5	0.1251
6	Lower Johnson	8	0.2053	23.5	0.0385

①cw 02/02/12 cf

Coeur Alaska, Inc.
C. dilutus Chronic Study
List Data for Ash-Free Dry Weight (AFDW) per Surviving Organism

CW 01/13/12
QA: AR 02/01/12

File: 058063gs.dat Transform: NO TRANSFORMATION
Number of Groups: 8

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Form Sed	1	1.1333	1.1333
1	Form Sed	2	1.0438	1.0438
1	Form Sed	3	1.3117	1.3117
1	Form Sed	4	1.4617	1.4617
1	Form Sed	5	1.4350	1.4350
1	Form Sed	6	1.1867	1.1867
1	Form Sed	7	0.9957	0.9957
1	Form Sed	8	0.9170	0.9170
2	In. Upper Slate	1	1.2633	1.2633
2	In. Upper Slate	2	1.1700	1.1700
2	In. Upper Slate	3	1.1243	1.1243
2	In. Upper Slate	4	0.9380	0.9380
2	In. Upper Slate	5	0.9429	0.9429
2	In. Upper Slate	6	0.8967	0.8967
2	In. Upper Slate	7	1.0214	1.0214
2	In. Upper Slate	8	1.0733	1.0733
3	Lower Sherman	1	1.0125	1.0125
3	Lower Sherman	2	1.0825	1.0825
3	Lower Sherman	3	1.0700	1.0700
3	Lower Sherman	4	1.4867	1.4867
3	Lower Sherman	5	1.0667	1.0667
3	Lower Sherman	6	1.2750	1.2750
3	Lower Sherman	7	0.8433	0.8433
3	Lower Sherman	8	1.1243	1.1243
4	Middle Slate	1	1.0062	1.0062
4	Middle Slate	2	0.8033	0.8033
4	Middle Slate	3	0.9663	0.9663
4	Middle Slate	4	1.0100	1.0100
4	Middle Slate	5	0.8937	0.8937
4	Middle Slate	6	0.8733	0.8733
5	Lower Slate	1	1.3700	1.3700
5	Lower Slate	2	1.3350	1.3350
5	Lower Slate	3	1.2580	1.2580
5	Lower Slate	4	1.1433	1.1433
5	Lower Slate	5	1.4020	1.4020
5	Lower Slate	6	1.2543	1.2543
5	Lower Slate	7	1.1357	1.1357
5	Lower Slate	8	1.1512	1.1512
6	Lower Johnson	1	0.8467	0.8467
6	Lower Johnson	2	0.9620	0.9620
6	Lower Johnson	3	1.2625	1.2625
6	Lower Johnson	4	1.0775	1.0775
6	Lower Johnson	5	1.1886	1.1886
6	Lower Johnson	6	0.8086	0.8086
6	Lower Johnson	7	1.3283	1.3283
6	Lower Johnson	8	1.8817	1.8817
7	Middle Sherman	1	1.2500	1.2500
7	Middle Sherman	2	1.1000	1.1000
7	Middle Sherman	3	1.0986	1.0986
7	Middle Sherman	4	1.3000	1.3000
7	Middle Sherman	5	1.1680	1.1680
7	Middle Sherman	6	1.1280	1.1280
7	Middle Sherman	7	1.1243	1.1243
7	Middle Sherman	8	1.1683	1.1683
8	Sand	1	0.7237	0.7237
8	Sand	2	0.7563	0.7563
8	Sand	3	0.9140	0.9140
8	Sand	4	0.6862	0.6862
8	Sand	5	0.7112	0.7112
8	Sand	6	0.8229	0.8229

OCW 02/02/12 cf

File: 058063gs.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Form Sed	8	0.9170	1.4617	1.1856
2	In. Upper Slate	8	0.8967	1.2633	1.0537
3	Lower Sherman	8	0.8433	1.4867	1.1201
4	Middle Slate	6	0.8033	1.0100	0.9255
5	Lower Slate	8	1.1357	1.4020	1.2562
6	Lower Johnson	8	0.8086	1.8817	1.1695
7	Middle Sherman	8	1.0986	1.3000	1.1672
8	Sand	6	0.6862	0.9140	0.7690

File: 058063gs.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Form Sed	0.0408	0.2019	0.0714	17.0303
2	In. Upper Slate	0.0163	0.1277	0.0452	12.1204
3	Lower Sherman	0.0362	0.1903	0.0673	16.9852
4	Middle Slate	0.0068	0.0824	0.0337	8.9085
5	Lower Slate	0.0112	0.1060	0.0375	8.4417
6	Lower Johnson	0.1182	0.3438	0.1216	29.3982
7	Middle Sherman	0.0053	0.0728	0.0257	6.2369
8	Sand	0.0073	0.0853	0.0348	11.0855

① CW 02/02/12 CF

File: 058063so.dat Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 1.5931
W = 0.9417

Critical W = 0.9270 (alpha = 0.01 , N = 46)
W = 0.9450 (alpha = 0.05 , N = 46)

Data PASS normality test (alpha = 0.01). Continue analysis.

File: 058063so.dat Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 15.8892 (p-value = 0.0072)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

Critical B = 15.0863 (alpha = 0.01, df = 5)
= 11.0705 (alpha = 0.05, df = 5)

Using Average Degrees of Freedom
(Based on average replicate size of 7.67)

Calculated B2 statistic = 15.0327 (p-value = 0.0102)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.

File: 058063so.dat Transform: NO TRANSFORMATION

Wilcoxon's Rank Sum Test w/ Bonferroni Adjustment Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	REPS	SIG 0.05
1	Form Sed	1.1856				
2	In. Upper Slate	1.0537	55.00	45	8	
3	Lower Sherman	1.1201	63.00	45	8	
4	Middle Slate	0.9255	26.00	27	6	*
5	Lower Slate	1.2562	76.00	45	8	
6	Lower Johnson	1.1695	64.00	45	8	

Critical values are 1 tailed (k = 5)

(1) CW 02/02/12 CF

File: 058063so.dat Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	0.4625	0.0925	2.3223
Within (Error)	40	1.5931	0.0398	
Total	45	2.0555		

(p-value = 0.0608)

Critical F = 3.5138 (alpha = 0.01, df = 5,40)
= 2.4495 (alpha = 0.05, df = 5,40)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: 60225262-058-(063-068) C. dilutus AFDW (Per Surviving)
File: 058063so.dat Transform: NO TRANSFORMATION

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Form Sed	1.1856	1.1856		
2	In. Upper Slate	1.0537	1.0537	1.3216	
3	Lower Sherman	1.1201	1.1201	0.6563	
4	Middle Slate	0.9255	0.9255	2.4137	
5	Lower Slate	1.2562	1.2562	-0.7073	
6	Lower Johnson	1.1695	1.1695	0.1616	

Bonferroni t critical value = 2.4233 (1 Tailed, alpha = 0.05, df = 5,40)

Title: 60225262-058-(063-068) C. dilutus AFDW (Per Surviving)
File: 058063so.dat Transform: NO TRANSFORMATION

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Form Sed	8			
2	In. Upper Slate	8	0.2418	20.4	0.1319
3	Lower Sherman	8	0.2418	20.4	0.0655
4	Middle Slate	6	0.2612	22.0	0.2601
5	Lower Slate	8	0.2418	20.4	-0.0706
6	Lower Johnson	8	0.2418	20.4	0.0161

(1) cw 02/02/12 CF

APPENDIX C

Analytical Data

FCETL QA Form No.131
Revision 0
Effective 10/06

PERCENT TOTAL SOLIDS AND PERCENT TOTAL VOLATILE SOLIDS (TVS)

QA: AR 01/11/12

Project No: 60225262-058-(075-080 / ~~063-068~~)③	TARE: Date/time: 12/8/11 @ 1515 Analyst: ARS / CW DRY GROSS: Date/time: 12/9/11 @ 1250 Analyst: CW	Dried in Oven # 1 from Date: 12/8/11 Time: 1540 Oven °C: 104 to Date: 12/9/11 Time: 1220
Analytical Balance ID: A+D #2	ASHED GROSS: Date/time: 12/12/11 @ 1025 Analyst: CW	Ashed in Furnace from Date: 12/9/11 Time: 1300 Furnace °C: 550 to Date: 12/9/11 Time: 1635

	Dish No.	Treatment	Rep	Tare Weight of Dish (g) A	Dish + Wet Sample (g) B	Dry Gross Weight (g) (dish + dry sample) C	% Total Solids (g) [(C-A)(100)]/(B-A)	Ashed Gross Weight (dish + sample)(g) D	% Total Volatile Solids (g) [(C-D)(100)]/(C-A)
▲	6	inlet upper side		17.8731	38.1931	32.5184		31.9334	
▲	5(side)	"		28.2599	57.4630	49.3248		48.4312	
▲	54B	Lower		26.4402	55.5349	49.1594		48.3934	
▲	52	side "		25.7186	46.9934	42.2961		41.7338	
	7	Middle		19.9943	39.9894	32.0925		31.1624	
	19	side "		18.0636	38.3900	30.2261		29.2623	
	26	Lower		19.0541	42.1467	35.8163		35.3507	
	15	Sherman "		18.3875	39.9342	34.2720		33.8392	
	16	Middle		19.1703	43.2400	36.4068		35.8727	
▲	21	Sherman "		19.9266	40.4985	35.0048		34.6220	
	28	Lower		18.1432	39.7009	34.1146		33.7975	
	10	Johnson "		18.01~~39~~45 ①	41.6577	35.6213		35.2623	
▲	Blank	(53)		26.6048	~~26.6035~~②	~~26.6048~~② 26.6035		26.6043	
	Blank	(1)		20.2117	~~20.2105~~②	20.2105		20.2114	

[1] Add in weight loss of blank boat, if appropriate.

▲ Ashed in furnace from 12/12/11 @ 1030 to 12/12/11 @ 1640
Ashed gross weight 12/13/11 @ 0950 CW

① AB 12/8/11 C
② CW 12/9/11 WP
③ CW 02/02/12 CF

FCETL QA Form No. 132
Revision 0
Effective 10/09

CW 12/20/11
QA: AR 01/11/12

Percent Total Solids and Percent Total Volatile Solids

Project Number: 60225262-058-(~~063-068~~ 075-080) ①

Treatment	Rep		Tare Weight (g) A	Dish + Wet Sample (g) B	Dry Gross Weight (g) (dish + dry sample) C	% Total Solids [(C-A)(100)]/(B-A)	Treatment Mean % Total Solids	Ashed Gross Weight (g) (dish + sample) D	% Total Volatile Solids [(C-D)(100)]/(C-A)	Treatment Mean % Total Volatile Solids
Inlet Upper Slate	A		17.8731	38.1931	32.5184	72.0733	72.1029	31.9334	3.9945	4.1183
	B		28.2599	57.4630	49.3248	72.1324		48.4312	4.2421	
Lower Slate	A		26.4402	55.5349	49.1594	78.0871	78.0040	48.3934	3.3716	3.3818
	B		25.7186	46.9934	42.2961	77.9208		41.7338	3.3919	
Middle Slate	A		19.9943	39.9894	32.0925	60.5058	60.1709	31.1624	7.6879	7.8061
	B		18.0636	38.3900	30.2261	59.8360		29.2623	7.9244	
Lower Sherman	A		19.0541	42.1467	35.8163	72.5869	73.1541	35.3507	2.7777	2.7512
	B		18.3875	39.9342	34.2720	73.7213		33.8392	2.7247	
Middle Sherman	A		19.1703	43.2400	36.4068	71.6108	72.4530	35.8727	3.0987	2.8187
	B		19.9266	40.4985	35.0048	73.2951		34.6220	2.5388	
Lower Johnson	A		18.1432	39.7009	34.1146	74.0868	74.2778	33.7975	1.9854	2.0122
	B		18.0145	41.6577	35.6213	74.4688		35.2623	2.0390	
Blank 1			26.6048		26.6035			26.6043		
Blank 2			20.2117		20.2105			20.2114		

① CW 02/02/12 cf

Friday, December 02, 2011

Analytical Laboratory

Rami Naddy
AECOM
4303 W Laporte Ave
Fort Collins, CO 80521

RE: FCETL/AECOM

Work Order: 1111062

Dear Rami Naddy:

MSE Lab Services received 7 sample(s) on 11/15/2011 for the analyses presented in the following report.

Please find enclosed analytical results for the sample(s) received at the MSE Laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Sara Ward

Sara Ward
Laboratory Manager
406-494-7334

Enclosure

12/2/11

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	FORM SED
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-001A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	1050	4.45	14.2		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	ND	0.103	0.354		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.061	0.006	0.024		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	7.31	0.130	0.472		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	0.940	0.097	0.295		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	0.390	0.011	0.047		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	0.986	0.068	0.236		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	ND	0.160	0.472		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	ND	0.087	0.236		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	3.92	0.216	0.708		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0366	0.126		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	25.3	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	8.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	86.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	6.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	LOAMYSAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	15.2	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:				
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-002A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	13600	5.04	16.0		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	16.2	0.116	0.401		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	1.46	0.007	0.027		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	29.4	0.147	0.535		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	56.7	0.110	0.334		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	7.79	0.012	0.054		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	47.4	0.077	0.267		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	0.720	0.182	0.535		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.134	0.098	0.267	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	220	0.244	0.802		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	0.0502	0.0393	0.136	J	mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	2.04	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	0.44	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	94.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	4.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	25.2	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/3/2011
Lab ID:	1111062-002B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	ND	0.55	1.50		µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	INLET UPPER SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-003A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	22500	5.25	16.7		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	17.9	0.121	0.418		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.722	0.007	0.028		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	127	0.153	0.557		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	53.4	0.114	0.348		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	3.37	0.012	0.056		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	87.5	0.080	0.278		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	0.809	0.189	0.557		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.120	0.103	0.278	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	130	0.254	0.835		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0489	0.169		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	5.46	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	4.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	94.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	28.2	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	INLET UPPER SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/4/2011
Lab ID:	1111062-003B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	1.39	0.55	1.50	J	µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	MIDDLE SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-004A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	20100	6.31	20.1		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	30.0	0.146	0.502		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	20.9	0.009	0.034		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	29.5	0.184	0.669		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	88.4	0.137	0.418		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	8.50	0.015	0.067		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	143	0.096	0.335		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	1.41	0.227	0.669		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.233	0.123	0.335	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	1360	0.306	1.00		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	0.0692	0.0545	0.188	J	mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	11.0	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	1.65	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	10.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	86.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	4.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	LOAMYSAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	40.2	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	MIDDLE SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/4/2011
Lab ID:	1111062-004B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: kgw
Sulfide	ND	0.55	1.50		µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:				
E	Value above quantitation range		H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit		Limit	Reporting Limit
MDL	Method Detection Limit		ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	MIDDLE SHERMAN
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-005A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	19000	5.06	16.1		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	55.7	0.117	0.402		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.175	0.007	0.027		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	43.4	0.147	0.536		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	97.1	0.110	0.335		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	17.3	0.012	0.054		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	44.0	0.077	0.268		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	ND	0.182	0.536		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.633	0.099	0.268		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	120	0.245	0.804		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0412	0.142		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **dk**
Organic Matter - Walkley Black	1.17	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	0.22	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	96.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	25.4	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	MIDDLE SHERMAN
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/4/2011
Lab ID:	1111062-005B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS		**AVS-SEM**		**AVS-SEM**			Analyst: kgw
Sulfide	1.01	0.55	1.50	J	µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:				
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER SHERMAN
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-006A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	18200	4.88	15.5		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	28.9	0.112	0.388		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.389	0.007	0.026		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	46.2	0.142	0.517		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	94.0	0.106	0.323		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	6.70	0.012	0.052		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	45.9	0.074	0.259		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	ND	0.176	0.517		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.137	0.095	0.259	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	110	0.236	0.776		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0455	0.157		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **dk**
Organic Matter - Walkley Black	0.54	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	0.11	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	96.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	22.7	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER SHERMAN
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/3/2011
Lab ID:	1111062-006B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	1.50	0.55	1.50		µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:				
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER JOHNSON
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-007A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	13100	5.02	16.0		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	16.2	0.116	0.399		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.238	0.007	0.027		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	31.5	0.146	0.533		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	73.1	0.109	0.333		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	9.76	0.012	0.053		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	27.3	0.076	0.266		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	ND	0.181	0.533		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.164	0.098	0.266	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	93.3	0.243	0.799		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0386	0.133		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	0.89	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	96.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	24.9	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers: E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER JOHNSON
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/3/2011
Lab ID:	1111062-007B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	ND	0.55	1.50		µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Analytical Laboratory
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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: 5060

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: **5060-PB FILTERED**			*Method:* **SW6020**		*Batch ID:* **5060**		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	0.070	0.150	mg/Kg							J
Cadmium	0.012	0.010	mg/Kg							
Lead	0.020	0.020	mg/Kg							
Selenium	ND	0.200	mg/Kg							
Silver	0.078	0.100	mg/Kg							J
Sample ID: **5060-PB UNFILTERED**			*Method:* **SW6020**		*Batch ID:* **5060**		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	0.150	0.150	mg/Kg							
Cadmium	0.004	0.010	mg/Kg							J
Lead	0.022	0.020	mg/Kg							
Selenium	ND	0.200	mg/Kg							
Silver	ND	0.100	mg/Kg							
Sample ID: **5060-LCS**			*Method:* **SW6020**		*Batch ID:* **5060**		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	85.9	0.300	mg/Kg	85.30	101	80	120			
Cadmium	153	0.020	mg/Kg	159.0	96.4	80	120			
Lead	44.4	0.040	mg/Kg	46.30	96.0	80	120			
Selenium	39.3	0.400	mg/Kg	45.20	87.0	80	120			
Silver	24.7	0.200	mg/Kg	24.30	102	80	120			
Sample ID: **1111062-007A MS**			*Method:* **SW6020**		*Batch ID:* **5060**		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	146	0.399	mg/Kg-dry	113.6	114	75	125			
Cadmium	202	0.027	mg/Kg-dry	211.7	95.2	75	125			
Lead	67.2	0.053	mg/Kg-dry	61.65	93.1	75	125			
Selenium	56.8	0.533	mg/Kg-dry	60.19	94.3	75	125			
Silver	33.1	0.266	mg/Kg-dry	32.36	102	75	125			
Sample ID: **1111062-007A MSD**			*Method:* **SW6020**		*Batch ID:* **5060**		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	141	0.399	mg/Kg-dry	113.6	110	75	125	3.23	20	
Cadmium	201	0.027	mg/Kg-dry	211.7	94.7	75	125	0.527	20	
Lead	68.1	0.053	mg/Kg-dry	61.65	94.5	75	125	1.31	20	
Selenium	58.3	0.533	mg/Kg-dry	60.19	96.9	75	125	2.70	20	
Silver	32.8	0.266	mg/Kg-dry	32.36	101	75	125	0.878	20	
Sample ID: **1111062-007A MST**			*Method:* **SW6020**		*Batch ID:* **5060**		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	129	0.399	mg/Kg-dry	113.6	99.2	75	125	12.4	20	
Cadmium	198	0.027	mg/Kg-dry	211.7	93.4	75	125	1.84	20	
Lead	66.1	0.053	mg/Kg-dry	61.65	91.4	75	125	1.56	20	
Selenium	55.3	0.533	mg/Kg-dry	60.19	91.9	75	125	2.53	20	
Silver	33.3	0.266	mg/Kg-dry	32.36	102	75	125	0.576	20	
Sample ID: **5060-PB FILTERED**			*Method:* **SW6020**		*Batch ID:* **5060**		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	ND	3.00	mg/Kg							

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: 5060

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***5060-PB UNFILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	ND	3.00	mg/Kg							
Sample ID: ***5060-LCS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	9920	6.00	mg/Kg	11250	88.2	80	120			
Sample ID: ***1111062-007A MS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	28100	16.0	mg/Kg-dry	14980	100	75	125			
Sample ID: ***1111062-007A MSD***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	29500	16.0	mg/Kg-dry	14980	109	75	125	4.57	20	
Sample ID: ***1111062-007A MST***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	30100	16.0	mg/Kg-dry	14980	113	75	125	6.57	20	
Sample ID: ***5060-PB FILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	3.03	0.200	mg/Kg							
Copper	0.141	0.125	mg/Kg							
Nickel	0.103	0.100	mg/Kg							
Zinc	0.352	0.300	mg/Kg							
Sample ID: ***5060-PB UNFILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	2.79	0.200	mg/Kg							
Copper	0.175	0.125	mg/Kg							
Nickel	0.068	0.100	mg/Kg							J
Zinc	0.332	0.300	mg/Kg							
Sample ID: ***5060-LCS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	337	0.400	mg/Kg	294.0	115	80	120			
Copper	71.9	0.250	mg/Kg	63.20	114	80	120			
Nickel	186	0.200	mg/Kg	163.0	114	80	120			
Zinc	270	0.600	mg/Kg	262.0	103	80	120			
Sample ID: ***1111062-007A MS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	489	0.533	mg/Kg-dry	391.5	117	75	125			
Copper	171	0.333	mg/Kg-dry	84.16	117	75	125			
Nickel	271	0.266	mg/Kg-dry	217.1	112	75	125			
Zinc	441	0.799	mg/Kg-dry	348.9	99.7	75	125			
Sample ID: ***1111062-007A MSD***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	515	0.533	mg/Kg-dry	391.5	124	75	125	5.16	20	
Copper	168	0.333	mg/Kg-dry	84.16	113	75	125	1.72	20	
Nickel	276	0.266	mg/Kg-dry	217.1	115	75	125	2.03	20	
Zinc	449	0.799	mg/Kg-dry	348.9	102	75	125	1.69	20	
Sample ID: ***1111062-007A MST***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	486	0.533	mg/Kg-dry	391.5	116	75	125	0.795	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

MSE Analytical Laboratory
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200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: 5060

Sample ID: ***1111062-007A MST*** *Method:* ***SW6020*** *Batch ID:* ***5060*** *Analysis Date: 11/30/2011 2:00:59 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Copper	159	0.333	mg/Kg-dry	84.16	103	75	125	7.18	20	
Nickel	265	0.266	mg/Kg-dry	217.1	110	75	125	2.05	20	
Zinc	436	0.799	mg/Kg-dry	348.9	98.2	75	125	1.24	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: 5064

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***5064-PB***			*Method:* ***E245.5***		*Batch ID:* ***5064***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Mercury	ND	0.100	mg/Kg							
Sample ID: ***LCS-5064***			*Method:* ***E245.5***		*Batch ID:* ***5064***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Mercury	14.0	0.553	mg/Kg	16.00	87.8	80	120			
Sample ID: ***1111062-002A-MS***			*Method:* ***E245.5***		*Batch ID:* ***5064***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Mercury	18.2	1.66	mg/Kg-dry	21.40	84.9	75	125			
Sample ID: ***1111062-002A-MSD***			*Method:* ***E245.5***		*Batch ID:* ***5064***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Mercury	21.3	1.66	mg/Kg-dry	21.40	99.2	75	125	15.5	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: 5079

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1111062-002B-D***			*Method:* ***AVS-SEM***		*Batch ID:* ***5079***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Sulfide	ND	1.50	µmoles/g					0	35	
Sample ID: ***1111062-002B-S***			*Method:* ***AVS-SEM***		*Batch ID:* ***5079***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Sulfide	11.1	1.50	µmoles/g	10.59	105	80	120			
Sample ID: ***LCS-5079***			*Method:* ***AVS-SEM***		*Batch ID:* ***5079***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Sulfide	13.7	1.50	µmoles/g	12.58	109	85	115			
Sample ID: ***5079-PB***			*Method:* ***AVS-SEM***		*Batch ID:* ***5079***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Sulfide	0.89	1.50	µmoles/g							J

Qualifiers: NA Sample conc. Is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: *02-Dec-11*
Report Date: *02-Dec-11*

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: R18192

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1111062-006A-D***			*Method:* ***ASTMD422***		*Batch ID:* ***R18192***		*Analysis Date: 11/17/2011 4:55:00 PM*			
1" Gradation	ND	0.10	%					0	35	
2mm Gradation	0.13	0.10	%					12.9	35	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: R18203

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
*Sample ID: **1111062-004A-D***			*Method: **MSA15-5***		*Batch ID: **R18203***			*Analysis Date: 11/17/2011 6:50:00 PM*		
% Clay	10.0	0.1	%					0	35	
% Sand	86.0	0.1	%					0	35	
% Silt	4.0	0.1	%					0	35	
Soil Class	LOAMYSAND									

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM

Work Order: 1111062
BatchID: R18208

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
*Sample ID: **1111062-002A-D***			*Method: **OM_WALKLE***	*Batch ID: **R18208***			*Analysis Date: 11/18/2011 2:19:00 PM*			
Organic Matter - Walkl	2.29	0.20	%					11.9	35	
*Sample ID: **LCSQ5771***			*Method: **OM_WALKLE***	*Batch ID: **R18208***			*Analysis Date: 11/18/2011 2:19:00 PM*			
Organic Matter - Walkl	0.55	0.20	%	0.5965	92.9	70.7	109			
*Sample ID: **PB***			*Method: **OM_WALKLE***	*Batch ID: **R18208***			*Analysis Date: 11/18/2011 2:19:00 PM*			
Organic Matter - Walkl	ND	0.20	%							

Qualifiers: NA Sample conc. is > 4*spike level   S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: R18241

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1111062-001A-D***			*Method:* ***D2216***		*Batch ID:* ***R18241***		*Analysis Date: 11/16/2011 3:00:00 PM*			
Percent Moisture	14.9	0.05	wt%					2.14	35	
Sample ID: ***1111062-007A-D***			*Method:* ***D2216***		*Batch ID:* ***R18241***		*Analysis Date: 11/16/2011 3:00:00 PM*			
Percent Moisture	25.8	0.05	wt%					3.45	35	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

AECOM

1111062-

CHAIN OF CUSTODY RECORD

7.4°C Rec'd in cooler w/ ice
custody seal on cooler

Client/Project Name: 058	Project Location: FCETL/AECOM
Project Number: 60225262-058	Field Logbook No.:
Sampler (Print Name)/(Affiliation): Gordon WN / coeur; Christina Needham / AECOM	Chain of Custody Tape Nos.: 42986
Signature: Christina Needham	Send Results/Report to: Rami.Naddy@aecom.com — TAT: Std

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Analysis Requested

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	TOC (Walkley Black)	Total Metals (Al, Cr, Ni, Ag, Zn, As, Cd, Cu, Pb, Se)	Mercury	% Coarse Material	Rapid Hydro (% clay, sand, silt)	AVS						Lab I.D.	Remarks
Form Sed	11/10/11	1100		X	8oz P Jar	Sed	cool		X	X	X	X	X							001A	
Lower slate	11/10/11	1100			8oz P Jar				X	X	X	X	X							002A	
Lower slate	10/3/11	UNK			4oz glass									X						002B	
Inlet upper slate	11/10/11	1100			8oz P				X	X	X	X	X							003A	
Inlet upper slate	10/4/11	UNK			4oz glass									X						003B	
Middle slate	11/10/11	1100			8oz P				X	X	X	X	X							004A	
Middle slate	10/4/11	UNK			4oz glass									X						004B	
Middle Sherman	11/10/11	1100			8oz P				X	X	X	X	X							005A	
Middle Sherman	10/4/11	UNK			4oz glass									X						005B	
Lower Sherman	11/10/11	1100			8oz P				X	X	X	X	X							006A	
Lower Sherman	10/3/11	UNK			4oz glass									X						006B	
Lower Johnson	11/10/11	1100			8oz P				X	X	X	X	X							007A	
Lower Johnson	10/3/11	UNK			4oz glass									X						007B	

Relinquished by: (Print Name)/(Affiliation)	Date / Time	Received by: (Print Name)/(Affiliation)	Date / Time
Christina Needham / AECOM; Signature: Christina Needham	Date: 11/14/11; Time: 1300	Kitrina Wilkins; Signature: Kitrina Wilkins	Date: 11/15/11; Time: 11:00
Signature:	Date: ; Time:	Signature:	Date: ; Time:
Signature:	Date: ; Time:	Signature:	Date: ; Time:

Analytical Laboratory (Destination):
~~AECOM Toxicology Lab~~
~~4303 W. Laporte Avenue~~
~~Fort Collins, CO 80521~~
~~(970) 416-0916~~
~~(970) 490-2963 (FAX)~~
MSE

Sample Shipped Via: UPS FedEx Courier Other

Temp blank: Yes No

Q:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft. Collins_10_07.doc

Serial No. № 51788

MSE Lab Services

Sample Receipt Checklist

Client Name AECOM_INC

Date and Time Received: 11/15/2011 11:32:02 AM

Work Order Number 1111062 RcptNo: 1 Received by kgw

COC_ID: CoolerID:

Checklist completed by B. O'Donnell 11/15/11 Reviewed by SW 11/16/11
Signature Date Initials Date

Matrix: Carrier name FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Water - VOA vials have zero headspace?	No VOA vials submitted ☑	Yes ☐	No ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Blank ☐

Adjusted? NA Checked by BO 11/15/11

Sediments

Any No and/or NA (not applicable) response must be detailed in the comments section be

Client contacted ______ Date contacted: ______ Person contacted ______

Contacted by: ______ Regarding: ______

Comments: TEMP = 7.4 - SEDIMENT SAMPLES

Corrective Action ______

AECOM
Environmental Toxicology
4303 West LaPorte Avenue, Fort Collins, Colorado 80521-2154
T 970.416.0916 F 970.490.2963 www.aecom.com

AECOM

January 27, 2012

Kevin Eppers
Coeur Alaska Inc.
Kensington Gold Mine
3031 Clinton Drive
Suite 202
Juneau AK 99801

Subject: Result of sediment toxicity test

Dear Mr. Eppers:

Enclosed is a copy of the report for the sediment toxicity test conducted with *Hyalella azteca*. While there were no significant survival effects, there were significant growth effects in several of the sediments. All analytical data are included in the report.

We greatly appreciate the opportunity to complete this study for Coeur Alaska Inc.. Please do not hesitate to call us if you have any questions.

Sincerely,

Amber Potts (Roberts)
Data Analyst
amber.roberts@aecom.com

Rami B. Naddy, Ph.D.
Study Director / Environmental Toxicologist
rami.naddy@aecom.com

Attachment

60225262-058-(069-074)

Coeur Alaska, Inc.
Juneau, Alaska

Report of Short-Term Toxicity of Whole Sediment to *Hyalella azteca*

Prepared by

AECOM

AECOM Environment
Environmental Toxicology
Fort Collins, CO

60225262-058-(069-074)
December 2011

Report of Short-Term Toxicity of Whole Sediment to Hyalella azteca

Project IDs: 60225262-058-(069-074)
November 2011

Sponsor and Laboratory Information

Sponsor	Coeur Alaska Inc. Kensington Mine 3031 Clinton Drive Suite 202 Juneau, Alaska 99801
Project Officer	Kevin Eppers (907) 523-3328
Testing Facility	AECOM Environment Fort Collins Environmental Toxicology Laboratory 4303 West LaPorte Ave. Fort Collins, CO 80521 Fax: (970) 490-2963 State of Florida NELAP Laboratory ID: E87972
Study Director	Rami B. Naddy, Ph.D (970) 416-0916 email: rami.naddy@aecom.com
Report Author	Amber Potts (Roberts) (970) 416-0916 email: amber.roberts@aecom.com

Test Information

Test	Short-term chronic screening toxicity test of sediment	
Basis	USEPA (2000) and ASTM (2009)	
Test Protocol	HA3AK.TIE058.007	
Test Period	November 4, 2011 @ 1100 to November 14, 2011 @ 0900-1120	
Test Length	10 days	
Species	*Hyalella azteca*	
Test Material	Whole sediment	
Sediment ID	Sample ID	AECOM Laboratory ID
	Inlet Upper Slate	25192
	Lower Sherman	25193
	Middle Slate	25194
	Lower Slate	25195
	Lower Johnson	25196
	Middle Sherman	25197
Control Sediments	Silica Sand	
Overlying water	Moderately hard reconstituted water prepared according to USEPA (2002), augmented with approximately 50 mg/L Cl^- (as NaCl)	
Test Concentrations	0 (control) and 100% of each test sediment	

- *Results described in this report apply only to the samples submitted to the laboratory and analyzed, as listed in the report*
- *Test results comply with NELAC standards. Reports are intended to be considered in their entirety; AECOM is not responsible for consequences arising from use of a partial report*
- *This report contains 7 pages plus 3 appendices*

Sediment Collection and Receipt

Sample ID	Collection Date and Time	AECOM No.	Date of Receipt	Temp. at Arrival (°C)[a]
Inlet Upper Slate	10/06/11 @ 1200	25192	10/11/11	3.4
Lower Sherman	10/04/11 @ 1200	25193	10/11/11	3.4
Middle Slate	10/03/11 @ 1200[b]	25194	10/11/11	3.4
Lower Slate	10/03/11 @ 1200	25195	10/11/11	3.4
Lower Johnson	10/03/11 @ 1200	25196	10/11/11	3.4
Middle Sherman	10/04/11 @ 1200	25197	10/11/11	3.4

[a] Air temperature of cooler
[b] Sample collection was started on 9/26/11 but due to weather constraints had to be completed on 10/03/11.
Note: See Appendix A for copies of chain of custody records

Control Sediment

The primary control sediment was silica sand, obtained from a local commercial supplier.

Test Sediment Preparation

Sample ID	Date Homogenized	Time Homogenized
Inlet Upper Slate	November 3, 2011	1030-1033
Lower Sherman		1015-1018
Middle Slate		1045-1048
Lower Slate		1040-1043
Lower Johnson		1042-1045
Middle Sherman		1028-1031

Before, during, and after homogenization, any noticeable debris (including sticks and other plant material) and large stones were removed from the sediment and discarded.

Test Conditions

Test Type	Static sediment with continuous replacement of overlying water
Test Duration	10 days
Overlying Water Delivery System	Continuous renewal (flow-through)[a]
Test Endpoints	Survival, dry weight per original and surviving organism
Test Chambers	500 ml glass beakers
Test Sediment Volume	100 ml
Overlying Water Volume	175 ml
Replicates per Treatment	8
Organisms per Replicate	10
Test Temperature	23 ± 1°C
Lighting	Fluorescent, 16 hours light:8 hours dark
Chamber Placement	Randomized
Test Sediment Renewal	None
Test Overlying Water Renewal	Approximately two volume additions per test chamber per day

[a] Continuous replacement via a drip system

Test Organism

Species and Lot Number	*Hyalella azteca*, FCETL Lot 11-025
Age	8 – 10 days
Size (pre-test wt.)	0.018 mg/organism (mean)
Source	Aquatic BioSystems (ABS), Fort Collins, CO
Overlying Water	Moderately Hard Reconstituted Water with added chloride (49 mg/L) as NaCl, RW # 10089
Reference Toxicant Testing	Initiated November 4, 2011 using sodium chloride (NaCl)

TEST RESULTS

Biological Data – Survival and Dry Weight

Sample ID	Percent Survival	Dry Weight (mg)	
		Per original organism	Per surviving organism
Sand Control	98.8	0.081	0.082
Inlet Upper Slate	96.2	0.070	0.073
Lower Sherman	96.2	0.071	0.074
Middle Slate	93.8	0.058[a]	0.062[a]
Lower Slate	95.0	0.072	0.076
Lower Johnson	96.2	0.074[a]	0.077
Middle Sherman	98.8	0.068[a]	0.069[a]

[a] Statistically significant reduction in weight relative to the control using Toxstat Version 3.5 (WEST, Inc. and Gulley 1996)
Note: See Appendix B for test data sheets

Analytical Data

Parameter	Sample Identification					
	Inlet Upper Slate	Lower Slate Creek	Middle Slate Creek	Middle Sherman Creek	Lower Sherman	Lower Johnson
Metals (mg/kg-dry)[a]						
Aluminum	22,500	13,600	20,100	19,000	18,200	13,100
Chromium	127	29.4	29.5	43.4	46.2	31.5
Zinc	130	220	1,360	120	110	93.3
Arsenic	17.9	16.2	30.0	55.7	28.9	16.2
Cadmium	0.722	1.46	20.9	0.175	0.389	0.238
Copper	53.4	56.7	88.4	97.1	94.0	73.1
Lead	3.37	7.79	8.50	17.3	6.70	9.76
Nickel	87.5	47.4	143	44.0	45.9	27.3
Selenium	0.809	0.720	1.41	ND	ND	ND
Silver	0.120 J	0.134 J	0.233 J	0.633	0.137 J	0.164 J
Mercury	ND	0.0502 J	0.0692 J	ND	ND	ND
Particle Size (%)[b]						
Clay	4.0	2.0	10.0	2.0	2.0	2.0
Sand	94.0	94.0	86.0	96.0	96.0	96.0
Silt	2.0	4.0	4.0	2.0	2.0	2.0
Texture	Sand	Sand	Loamy Sand	Sand	Sand	Sand
Coarse Material (2 mm)	ND	0.44	1.65	0.22	0.11	ND
TOC (%-dry)[c]	5.46	2.04	11.0	1.17	0.54	0.89
Acid Volatile Sulfide (umoles/g)	1.39	ND	ND	1.01	1.50	ND

[a] Al, As, Cd, Cr, Cu, Pb, Ni, Se, Ag and Zn by SW-846 Method 6020; Hg by SW-846 7471B (USEPA 1986)
[b] Particle size was determined using ASTM Method D422 and Modified ASA 15-5
[c] TOC was determined using the Walkley Black Method
J = The concentration was below the Reporting Limit but above the Method Detection Limit
ND = Not Detected at the Method Detection Limit (MDL)
Note: See Appendix C for a copy of the report from the analytical laboratory (MSE Analytical Laboratory, Butte, MT)

Total and Total Volatile Solids

Sample ID	Percent Total Solids[a]	Percent Total Volatile Solids[b]
Inlet Upper Slate	72.10	4.12
Lower Sherman	73.15	2.75
Middle Slate	60.17	7.81
Lower Slate	78.00	3.38
Lower Johnson	74.28	2.01
Middle Sherman	72.45	2.82

[a] Total solids were determined using Standard Methods 2540B (APHA 1998)
[b] Total volatile solids were determined using Standard Methods 2540E (APHA 1998)
All values are means of duplicate analyses
Note: See Appendix B for data sheets (these parameters were determined at the AECOM/FCETL)

Physical and Chemical Data (Min/Max)

Sample ID	pH (units)	DO (mg/L)	Cond. (µS/cm)	Temp. (°C)[a]	Ammonia as N (mg/L)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
Sand Control	8.0/8.5	6.7/7.2	510/661	22/24	<1.0	88/124	67/89
Inlet Upper Slate	8.0/8.3	6.1/7.2	488/675	22/24	<1.0	116/140	78/93
Lower Sherman	8.1/8.3	6.3/7.1	499/620	22/24	<1.0	104/130	79/92
Middle Slate Creek	8.0/8.2	5.6/6.7	602/811	22/24	<1.0	156/156	112/121
Lower Slate	7.9/8.1	6.0/6.7	479/628	22/24	<1.0	96/126	65/85
Lower Johnson	7.8/8.1	5.9/7.0	484/677	22/24	<1.0	90/130	68/87
Middle Sherman	8.0/8.3	5.9/7.0	494/686	22/24	<1.0	88/136	70/93

[a] Temperature in test chambers

Reference Toxicant Test Results for *H. azteca*

Organism Lot Number	Test Dates	96-Hour LC_{50}	AECOM/FCETL Historical 95% Control Limits	
			Low	High
11-025	11/04/11 to 11/08/11	2,943	1,030	3,306

Note: Values are expressed as mg/L chloride

References

APHA. 1998. Standard Methods for the Examination of Water and Wastewater. Amer. Public Health Assoc., Amer. Water Works Assoc., Water Pollut. Control Fed., APHA, Washington, DC.

ASTM. 2009. Standard Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates. Method E 1706-05 In *2009 Annual Book of ASTM Standards, Section 11, Water and Environmental Technology, Volume 11.06, Biological Effects and Environmental Fate; Biotechnology*. American Society of Testing and Materials. West Conshohocken, PA.

USEPA. 1986. Test Methods for Evaluating Solid Waste. Third Edition. SW-846.

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Statement of Procedural Compliance

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, accurate and complete.

R. Naddy   January 26, 2012

Rami Naddy, Ph.D.
Study Director   Date

Statement of Quality Assurance

The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with standard operating procedures, and that the resulting data and report meet the requirements of the NELAC standards. This report is an accurate reflection of the raw data.

Anita Rehner   January 26, 2012

Quality Assurance Unit   Date

APPENDIX A

Chain of Custody

Sat 7-26-2011

AECOM

CHAIN OF CUSTODY RECORD

(063-064-065-#Ref1-066)

Page 1 of 1

Client/Project Name: Coeur Alaska	Project Location: FCETL
Project Number: 60147217-058	Field Logbook No.:
Sampler (Print Name)/(Affiliation): GORDON WN ADF+G	Chain of Custody Tape Nos.: 41156 *intact*
Signature: gwn	Send Results/Report to: / TAT:

Analysis Requested

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Field Sample No./Identification	Date ⊛	Time △	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	Analysis	Lab I.D.	Remarks
INLET UPPER SLATE	10/6	1200	X		1 g jar		ICE		X	25192	
LOWER SHERMAN	10/4	1200	X		1 g jar		ICE		X	25193	
MS (middle slate)	~~9/26~~ 10/3	1200	X		1 g jar		ICE		X	25194	
LOWER SLATE	10/3	1200	X		1 g jar		ICE		X	25195	
L JOHNSON	10/3	1200	X		1 g jar		ICE		X	25196	
MIDDLE SHERM	10/4	1200	X		1 g jar		ICE		X	25197	
00388 LOWER JOHNSON	10/3	1200	X		1 4oz jar		ICE		X	25196	
000458 LOWER SH	10/3	1200	X		1 4oz jar		ICE		X	25193	
000389 LS	10/3	1200	X		1 4oz jar		ICE		X	25195	
000383 MS	10/4	1200	X		1 4oz jar		ICE		X	25194	
000463 UPPER SLATE	|	1200	X		1 4oz jar		ICE		X	25192	
000457 MID SHERM	|	1200	X		1 4oz jar		ICE		X	25197	

Relinquished by: (Print Name)/(Affiliation)	Date/Time	Received by: (Print Name)/(Affiliation)	Date/Time
GORDON WN ADFG; Signature: gwn	Date: 10/10; Time: 0730	Amber Potts / AECOM; Signature: Amber Potts	Date: 10/11/11; Time: 1020
Relinquished by: (Print Name)/(Affiliation); Signature:	Date: Time:	Received by: (Print Name)/(Affiliation); Signature:	Date: Time:
Relinquished by: (Print Name)/(Affiliation); ⊛ All samples were collected in the year 2011. Signature:	Date: Time:	Received by: (Print Name)/(Affiliation); Signature:	Date: Time:

(D53)

Analytical Laboratory (Destination): rec'd on ice via FedEx @ 3.4°C (cooler temp)

AECOM Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 490-2963 (FAX)

Sample Shipped Via: UPS **FedEx** (circled) Courier Other

Temp blank: Yes **No** (circled)

△ All sample times were confirmed with client via phone conversation. 12/13/11 de

Serial No. № 51474

APPENDIX B

Data Sheets

H. azteca 10-day Survival and Growth, Testing Cover Page

Project Number:	60225262-058-(069-074)			Protocol #:	~~HA3AK.TIE058.007~~		1/5/11 AEO 1/19/12
Test Substance:	Sediment						
Test Species:	*H. azteca*	Lot #:	11-025	Age:	8-10 days (7-14 days)	Supplier:	ABS
Test Type:	Chronic, Static Renewal						
Overlying Water:	Reconstituted Fresh Water (Smith et al., 1997) - (RW 10089)			Investigators:	CW/KAM/BP/AB/MJ/K/AP/SNM/AS/AD		
Sampling Date(s):	10/3/11-10/6/11; Middle Sherman was sampled on 9/26 but completed on 10/3 due to weather.			Sampling Time(s):	1200		
FCETL Sample #(s):	25192, 25193, 25194, 25195, 25196, 25197						
Test Initiation Date/Time:	11/4/11 @1100						
Test Termination Date/Time:	11/14/11 @0900-1120						

Renewal Frequency:	Cont. drip, 2+ vol/da	Feeding Freq:	daily	Food Type/Amount:	1 ml YTC daily	Test Temp:	23 +/- 1 deg C
Test Chamber Capacity:	500-ML	Test Soltn. Vol:	100 mL sed/175 mL H2O	# Repl's/Trtmnt:	8		
Test Duration:	10 days	# Org.'s/Repl:	10	Env. Chmbr/Bath	3		

Water Characterization: Minimum of Hardness, Alkalinity, & Conductivity on days 0 and 10; Ammonia on days 0, 3, 7, and 10; No TRC; pH, temperature & DO daily on overlying water
aerate if dissolved oxygen <2.5 mg/L

Test Sediment (s):

1)	Sand (cont)	2)	Inlet Upper Slate	3)	Lower Sherman
4)	Middle Slate	5)	Lower Slate	6)	Lower Johnson
7)	Middle Sherman	8)		9)	
10)		11)			

Reference Tox. Dates:	11/4/11 - 11/8/11	LC50:	2943 mg/L Cl-	Hist. Limits:	1030-3306	Method:	T-S-K
Study Director Initials:	CW for RBN	Date:	11/4/11				

Overlying water added at a minimum of 2 volume additions/day; equivalent to >350 ml/day or >0.24 ml/min

SEDIMENT/SOIL PREPARATION

Project Number: 60225262.058 - (069 - 074)

★ 1/5/12
QA: AR 01/19/12

Artificial soil	
Constituent/source	**Amount added (g)**
Coarse Silica Sand	1242
Silt/Clay (ASP 400)	219
Dolomite	7.5
α-cellulose	77.3
Humic Acid	0.15
Total	1545.95

Notes: Container was placed into tumbler for a minimum of an hour to homogenize prior to use

②

Soil/sediment	FCETL#	Homogenization			
		Date	From	To	Analyst
Sand Cont. ⊛	NA	11/3/11	1007	1010	cu
Inlet Upper Slate	25192	11/3/11	1030	① ~~1040~~ 1033	mt
Lower Sherman	25193	11/3/11	1015	1018	AB
Middle Slate (MS)	25194	11/3/11	1045	1048	cu
Lower Slate	25195	11/3/11	1040	1043	mt
Lower Johnson	25196	11/3/11	1042	1045	AB
Middle Sherman	25197	11/3/11	1028	1031	cu

⊛ added overlying water during homogenization process

① mt 11/3/11 E

② cu 11/3/11 NA

BIOLOGICAL DATA *H. azteca* Chronic, Static Renewal Project 60225262-058-(069-074) QA: ARP 1/19/12 CW 11/14/11

Test termination date 11/14/11

Sediment	Test Termination	A	B	C	D	E	F	G	H	Remarks: % survival
Sand (cont)	# Surviving	10	10	10	9	10	10	10	10	98.8%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0	0	0	1	0	0	0	0	
	Initials	TK	AP	AP	CW	AP	CW	AD	AD	
Inlet Upper Slate	# Surviving	9	10	10	9	9	10	10	10	96.2%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	1	0	0	1	1	0	0	0	
	Initials	TK	AP	AP	CW	AP	AD	Am	TK	
Lower Sherman	# Surviving	10	9	10	8	10	10	10	10	96.2%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0	1	0	2	0	0	0	0	
	Initials	MT	AD	AP	MT	Am	CW	CW	AD	
Middle Slate	# Surviving	9	10	10	10	7	10	10	9	Note: Rep B had no overlying H_2O on Day 8
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	~~1~~ 0 ①	0	0	0	3	0	0	1	93.8%
	Initials	Am	AP	AP	Am	TK	MT	GWM	CW	
Lower Slate	# Surviving	10	8	10	9	9	10	10	10	95%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0	2	0	1	1	0	0	0	
	Initials	Am	AP	AP	MT	AD	GWM	CW	GWM	
Lower Johnson	# Surviving	9	10	10	10	10	9	10	9	96.2%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	1	0	0	0	0	1	0	1	
	Initials	AP	Am	AP	CW	TK	GWM	Am	CW	
Middle Sherman	# Surviving	10	10	10	10	10	9	10	10	98.8%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	0	0	0	0	0	1	0	0	
	Initials	Am	Am	② ~~TK~~ AP	TK	Am	CW	GWM	TK	
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
	# Surviving									
	# Observed Dead									
	# Not Found									

① Am 11/14/11 E
② TK 11/14/11 WP

Note: when transferring organisms to drying pans, the Lower Sherman organisms were inadvertently placed on the pans labeled "Lower Johson", and vice versa. (ARP 1/19/12 transcribed from temporary note)

QA: ARO 1/19/12
~~*~~ 1/5/12

CHEMICAL DATA (Composite of Overlying Water) *H. azteca* Chronic, Static Renewal Project 60225262-058-(069-074)

Parameter	Sediment	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day	Meter	Date	Time	Initials
Dissolved	Sand (cont)	6.9	6.8	6.8	7.0	6.9	7.2	6.6	6.7	6.9	6.8	6.8	0	5	11/04/11	0935	CN
Oxygen	Inlet Upper Slate	6.9	6.5	6.6	6.8	6.7	7.2	6.1	6.1	6.7	6.7	6.6	1	5	11/5/11	1750	BP
(mg/l)	Lower Sherman	6.8	6.7	6.5	~~6.2~~ 7 ①	6.8	7.1	6.4	6.3	6.6	6.3	6.5	2	5	11/6/11	1610	BP
	Middle Slate	6.5	6.6	5.8	6.7	6.4	6.3	~~5.7~~ ②	5.6	6.6	5.6	6.1	3	5	11/7/11	1115	G
	Lower Slate	6.5	6.5	6.0	6.7	6.6	6.4	6.4	6.3	6.5	6.0	6.5	4	5	11/8/11	0915	TR
	Lower Johnson	6.6	6.3	6.2	6.3	7.0	6.4	6.4	6.2	6.5	5.9	6.6	5	5	11/9/11	1115	AB
	Middle Sherman	6.6	6.3	6.8	6.6	7.0	6.7	6.4	6.2	6.5	5.9	6.7	6	5	11/10/11	1500	mt
													7	5	11/11/11	UNK	AB
													8	5	11/12/11	1110	AM
													9	5	11/13/11	1045	AM
													10	5	11/14/11	0935	mt
Temp	Sand (cont)	23	24	23	23	23	23	24	23	22	23	22	0	047	11/04/11	0935	CN
	Inlet Upper Slate	23	24	22	23	23	23	24	23	22	22	22	1	D47	11/5/11	1750	BP
(deg C)	Lower Sherman	23	24	23	22	23	23	23	23	22	23	22	2	D47	11/6/11	1610	BP
	Middle Slate	23	24	23	23	23	22	23	23	22	23	22	3	D47	11/7/11	1110	G
	Lower Slate	23	24	22	24	23	22	23	23	22	22	22	4	D47	11/8/11	0915	TR
	Lower Johnson	23	24	23	24	23	23 ③	24	23	23	22	22	5	D47	11/9/11	1115	AB
	Middle Sherman	23	24	22	24	23	~~24~~ 23	23	23	23	23	22	6	D47	11/10/11	1500	mt
													7	D47	11/11/11	UNK	AB
													8	D47	11/12/11	1030	AM
													9	D47	11/13/11	1045	AM
													10	D47	11/14/11	0845	CN
pH	Sand (cont)	8.2	8.0	8.1	8.3	8.3	8.3	8.2	8.2	8.4	8.1	8.5	0	12	11/04/11	0935	CN
	Inlet Upper Slate	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.0	8.2	8.1	8.3	1	12	11/5/11	1845	TR
	Lower Sherman	8.1	8.2	8.2	8.1	8.2	8.2	8.1	8.1	8.3	8.1	8.2	2	12	11/6/11	1610	BP
	Middle Slate	8.0	8.1	8.0	8.0	8.1	8.1	8.0	8.0	8.2	8.1	8.1	3	16	11/7/11	1115	G
	Lower Slate	8.0	7.9	8.0	7.9	8.0	8.0	8.0	7.9	8.1	8.0	8.0	4	16	11/8/11	0915	TR
	Lower Johnson	8.0	7.8	7.9	7.8	8.0	7.9	8.0	7.9	8.1	7.9	8.1	5	16	11/9/11	1115	AB
	Middle Sherman	8.0	8.0	8.0	8.0	8.1	8.2	8.0	8.0	8.3	8.0	8.0	6	16	11/10/11	1500	mt
													7	16	11/11/11	UNK	AB
													8	16	11/12/11	1050	AM
													9	16	11/13/11	1045	AM
	Replicate	A	B	C	D	E	F	G	H	A	B	C	10	16	11/14/11	0935	mt

① G 11/7/11 E

② mt 11/10/11 E, CF DO = 6.1

③ AB 12/23/12 E

OVERLYING WATER CHARACTERIZATION *H. azteca* Chronic, Static Renewal Project No. 60225262-058-(069-074)

QA: ARO 1/19/12
A 1/5/12

	Conductivity (s/cm)		Hardness (mg/L as CaCO3)		Alkalinity (mg/l as CaCO3)		Ammonia (mg/l)			
Sediment	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 3	Day 7	Day 10
Sand (cont)	510	661	88	124	67	89	<1.0	<1.0	<1.0	<1.0
Inlet Upper Slate	488	675	116	140	78	93	<1.0	<1.0	<1.0	<1.0
Lower Sherman	499	620	104	130	79	92	<1.0	<1.0	<1.0	<1.0
Middle Slate	602	811	156	156	121	112	<1.0	<1.0	<1.0	<1.0
Lower Slate	479	628	96	126	65	85	<1.0	<1.0	<1.0	<1.0
Lower Johnson	484	677	90	130	68	87	<1.0	<1.0	<1.0	<1.0
Middle Sherman	494	686	88	136	70	93	<1.0	<1.0	<1.0	<1.0
							~~x~~ ①			
Overlying H2O	469	NM	86	NM	62	NM	<1.0®			
(Run# 10889)										
Cl- = 49.3mg/L										
Meter #	15	15	Titr #1	Titr #1	Titr #1	Titr #1	HA#1	HA#1	HA#1	HA#1
Date:	11/4/11	11/14/11	11/4/11	11/14/11	11/4/11	11/14/11	11/4/11	11/7/11	11/11/11	11/14/11
Time:	1100	1010	1100	1010	1100	1010	1650	1130	1600	1600
Initials:	CW for TK	CW for ANP	CW for TK	CW for ANP	CW for TK	CW for ANP	CW for NLT	[illegible]	CW for AB	CW for TK

®measured in source water

① CW for AMR 11/30/11 NR

DAILY TESTING LOG *H. azteca* Chronic, Static Renewal Project No. 60225262-058-(069-074)

Day -1	Sediment Homogenized @ 1010-1048 Overlying water added to chambers @ 1100			CW 11/08/11 AA: AR 01/19/12
Day 0	Test organisms added to chambers @ 1100		Feeding: @1525 CW	Initials/Date: CW/AM 11/04/11
Day 1	Bath CT = ~~25~~.8 °C	Range = 23.8 - 26.6 °C	Feeding: @1755 BP	Initials/Date: BP 11/5/11
Day 2	Bath CT = 25.0 °C	Range = 23.8 - 26.6 °C	Feeding: 1620 BP	Initials/Date: BP 11/6/11
Day 3	Bath CT = 24.2 °C	Range = 24.2 - 24.8 °C	Feeding: 1045 AG	Initials/Date: AG 11/7/11
Day 4	Bath CT = 24.4 °C	Range = 24.2 - 24.4 °C	Feeding: 1630 CW	Initials/Date: F 11/8/11
Day 5	Bath CT = ~~25.2~~ °C ② 24.2	Range = 23.6 - 24.4 °C	Feeding: 1700 AB / AD	Initials/Date: AB 11/9/11
Day 6	Bath CT = 23.2 °C	Range = 23.0 - 24.4 °C	Feeding: 1700 AD / AD	Initials/Date: MT 11/10/11
Day 7	Bath CT = 24.2 °C	Range = 22.0 - 25.2 °C	Feeding: 1630 AB	Initials/Date: AB 11/11/11
Day 8	Bath CT = 24.8 °C	Range = 24.2 - 25.8 °C	Feeding: 1700 AM	Initials/Date: AM 11/12/11
Day 9	Bath CT = 24.6 °C	Range = 24.2 - 25.20 °C	Feeding: 1545 AM	Initials/Date: AM 11/13/11
Day 10	Bath CT = 24.4 °C	Range = 24.2 - 24.8 °C	Feeding: None	Initials/Date: CW 11/14/11

At 0900 on 11-~~07~~ 06 ①-11, the lab clocks were set back one hour to 0800 to adjust time to Mountain Standard Time. All times recorded for data on this day are Mountain Standard times. Initials: BP.

② AB 1/24/12 E

① BP 11/6/11 E

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

QA: CW 11/29/11 ★ 11/27/11

Project Number: 00225262-058-069-074	Test Substance: Sediment (Pre-weights)	Comments:
Species: H. azteca	Analyst Tare: CJ Analyst Gross: mt / [illegible]	Analytical Balance ID: Sartorius #1 Dried in Oven # 3 from Date: 11/4/11 Time: 1215 to Date: 11/7/11 Time: 0945
Date/Time of Tare Wt.: 11/4/11 @ 1120	Date/Time of Gross Wt.: 11/7/11 @ 1020	

Weight Type (Circle): Wet Blot Dry Dry (60-90°C ~~>100°C~~) AFDW (>500°C)

Lot or Batch Number: 11-025

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	1			0.95618	0.95633	0.00015					15		
	2			0.94936	0.94945	0.00009					15		
	3			0.94870	0.94887	0.00017					14		
	4			0.94809	0.94835	0.00026					15		
	5			0.95049	0.95079	0.00030					15		
Blank				0.95719	0.95716	-0.00003							
Range													
Mean													

Test Solution Volume:	Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

① CW 11/22/11 CF

FCETL QA Form No.010
Revision 5
Effective 08/99

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

QA: cw 11/29/11 ✱ 11/29/11

Project Number: 60225262-058	Test Substance: Hyalella azteca Pre-weights	Comments: Analytical Balance ID: Sartorius #1
Species: Hyalella azteca	Analyst Tare: NA Analyst Gross: AB	Dried in Oven # 3 from Date: 11/4/11 Time: 1215 to Date: 11/7/11 Time: 0945
Date/Time of Tare Wt.: NA	Date/Time of Gross Wt.: 11/7/11 @ 1045	

Weight Type (Circle): Wet Blot Dry Dry (~~>100°C~~ 60-90 °C) AFDW (>500°C)

Lot or Batch Number: 11-025

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	1					0.00023					15		
	2					0.00028					15		
	3					0.00021					14		
	4					0.00028					15		
	5					0.00030					15		
Blank													
Range													
Mean													

Test Solution Volume:	Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

① cw 11/22/11 cc ② AR for CN 01/19/12 E

Note: weights on this page were obtained by tareing a new pan to zero removing organisms from old pan and placing on newly tared pan, and obtaining ~~gross~~ net② weight.

QA: cw 11/29/11
11/27/11

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074)   Species: *H. azteca*

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Org. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
Initial wts	A				0.00023	0.00023	15	0.015	0.0175	15	0.015	0.0175
	B				0.00028	0.00028	15	0.019		15	0.019	
	C				0.00021	0.00021	14	0.015		14	0.015	
	D				0.00028	0.00028	15	0.019		15	0.019	
					0.00030	0.00030	15	0.020		15	0.020	
Blank					0.00000							

Summary Statistics for Growth Data (dry wt per original)

Treatment	N	Min	Max	Mean	SD	C.V.
Initial wts	4	0.015	0.019	0.0175	0.0020	11.551%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Initial wts	4	0.015	0.019	0.0175	0.0020	11.551%

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

QA: cw 11/22/11
QA: AR 01/19/12

Project Number: 60225262-058-(069-074)	Test Substance: Sediment	Comments:
Species: Hyalella azteca	Analyst Tare: KB Analyst Gross: AP	Analytical Balance ID: Sartorius #1 Dried in Oven # 3 from Date: 11/14/11 Time: 1500 to Date: 11/18/11 Time: 1230
Date/Time of Tare Wt.: 11/14/11 @ 1040	Date/Time of Gross Wt.: 11/18/11 @ 1600	

Weight Type (Circle): Wet Blot Dry **Dry** ~~(>100°C)~~ 60-90°C ② AFDW (>500°C) — **Lot** or Batch Number: 11-025

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	Sand	A		0.93738	0.93812	0.00074		③ ~~10~~ 9			9 Ⓐ		
		B		0.93648	0.93723	0.00075		10			10		
		C		0.93850	0.93935	0.00085		10			10		
		D		0.94034	0.94115	0.00081		10			9		
		E		0.93682	0.93764	0.00082		10			10		
		F		0.93901	0.93979	0.00078		10			10		
		G		0.93822	0.93901	0.00079		10			10		
		H		0.93809	0.93894	0.00085		10			10		
	inlet	A		0.93961	0.94009	0.00048		③ ~~10~~ 9			8 Ⓐ		
	upper	B		0.94125	0.94190	0.00065		10			10		
	Slate	C		0.93915	0.93985	0.00070		10			10		
		D		0.93873	0.93934	0.00061		10			9		
Blank				0.93894	0.93896	+0.0000~~7~~2 ①							
Range													
Mean													

Test Solution Volume:	Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

① ~~7~~ for AP 11/22/11 E
② cw 11/22/11 cf
③ cw for ANP 11/22/11 E

Ⓐ one organism lost during drying process.

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074)
Species: Hyalella azteca
Date/Time of Tare Wt.: 11/14/11 @1040

Test Substance: Sediment
Analyst Tare: KB   Analyst Gross: AP
Date/Time of Gross Wt.: 11/18/11 @ 1600

AP 11/22/11
QA: cw 11/22/11
QA: AR 03/19/12
Comments:
Analytical Balance ID: Sartorius #1
Dried in Oven # 3 from Date: 11/14/11 Time: 1500
to Date: 11/18/11 Time: 1230

Weight Type (Circle): Wet Blot Dry Dry ~~(>100°C)~~ 60-90°C ② AFDW (>500°C)

Lot or Batch Number: 11-025

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	Inlet	E		0.93976	0.94049	0.00073		10			9		
	Upper	F		0.93703	0.93776	0.00073		③ ~~10~~ 9			9 Ⓐ		
	Slate	G		0.93744	0.93832	0.00088		10			10		
	(cont.)	H		0.938~~44~~18 ①	0.93891	0.00073		10			10		
	Lower**	A		0.93978	0.94054	0.00076		10			9		
	Sherman	B		0.92878	0.92950	0.00072		10			10		
	(Lower Johnson)	C		0.92680	0.92754	0.00074		10			10		
		D		0.93186	0.93268	0.00082		10			10		
		E		0.93886	0.93963	0.00077		10			10		
		F		0.93633	0.93701	0.00068		10			9		
		G		0.94047	0.94125	0.00078		10			10		
		H		0.94185	0.94253	0.00068		10			9		
Blank													
Range													
Mean													

Test Solution Volume: Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

① KB 11/14/11 E
② cw 11/22/11 CF
③ cw for ANP 11/22/11 E

Ⓐ one organism lost during drying process.
** organisms on pans labeled "Lower Sherman" are actually organisms from "Lower Johnson"

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

KE 11/22/11

QA: CW 11/22/11

QA: ARO 1/19/12

Project Number: 60225262-058-(069-074)	Test Substance: Sediment	Comments:
Species: Hyalella azteca	Analyst Tare: KB Analyst Gross: AP	Analytical Balance ID: Sartorius #1
Date/Time of Tare Wt.: 11/14/11 @ 1040	Date/Time of Gross Wt.: 11/18/11 @ 1600	Dried in Oven # 3 from Date: 11/14/11 Time: 1500 to Date: 11/18/11 Time: 1230

Weight Type (Circle): Wet Blot Dry Dry (~~>100°C~~ 60-90°C)① AFDW (>500°C) Lot or Batch Number: 11-025

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	Middle Slate	A		0.94351	0.94407	0.00056		10			9		
		B		0.94660	0.94717	0.00057		10			10		
		C		0.94937	0.95006	0.00069		10			10		
		D		0.94942	0.95008	0.00066		10			10		
		E		0.95253	0.95299	0.00046		10			7		
		F		0.95226	0.95293	0.00067		10			10		
		G		0.94895	0.94949	0.00054		10			10		
		H		0.94130	0.94177	0.00047		10			9		
	Lower Slate	A		0.94488	0.94558	0.00070		10			10		
		B		0.94660	0.94716	0.00056		10			8		
		C		0.94505	0.94597	0.00092*		10			10		
		D		0.94402	0.94457	0.00055		10			9		
Blank													
Range													
Mean													

Test Solution Volume: Loading Rate:

[1] Add in weight loss of blank boat, if appropriate. * large orgs ① CW 11/22/11 CF

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

AP 11/22/11

QA: CW 11/22/11
QA: AR 01/19/12

Project Number: 60225262-058-(069-074)
Test Substance: Sediment
Comments:
Analytical Balance ID: Sartorius #1
Species: Hyalella azteca
Analyst Tare: KB
Analyst Gross: AP
Dried in Oven # 3 from Date: 11/14/11 Time: 1500 to Date: 11/18/11 Time: 1230
Date/Time of Tare Wt.: 11/14/11 @1040
Date/Time of Gross Wt.: 11/18/11 @1600

Weight Type (Circle): Wet Blot Dry Dry ~~(>100°C)~~ 60-90°C @ AFDW (>500°C)

Lot or Batch Number: 11-025

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	Lower	E		0.94320	0.94408 ①	0.00088		10			9		
	Slate	F		0.94318	0.94384	0.00066		10			10		
	(cont.)	G		0.94218	0.94311	0.00093*		10			10		
		H		0.94151	0.94211	0.00060		10			10		
	Lower**	A		0.93073	0.93154	0.00081		10			10		
	Johnson	B		0.93443	0.93512	0.00069		10			9		
	(Lower)	C		0.93645	0.93706	0.00061		10			10		
	Sherman	D		0.94011	0.94061	0.00050		10			8		
		E		0.94177	0.94249	0.00072		10			10		
		F		0.93882	0.93958	0.00076		10			10		
		G		0.93953	0.94025	0.00072		10			10		
		H		0.94142	0.94231	0.00089		10			10		
Blank													
Range													
Mean													

Test Solution Volume:
Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

① AP 11/18/11 CF 0.94408
*Large orgs
② CW 11/22/11 CF
**organisms on "Lower Johnson" pans are actually "Lower Sherman" organisms

FCETL QA Form No.010
Revision 5
Effective 08/99

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

AE 11/22/11

Project Number: 60225262-058-(069-074)	Test Substance: Sediment	Comments: QA: cw 11/22/11 am-ARO 11/1/12 Analytical Balance ID: Sartorius #1
Species: Hyalella azteca	Analyst Tare: YB Analyst Gross: AP	Dried in Oven # 3 from Date: 11/14/11 Time: 1500 to Date: 11/18/11 Time: 1230
Date/Time of Tare Wt.: 11/14/11 @ 1040	Date/Time of Gross Wt.: 11/18/11 @ 1600	

Weight Type (Circle): Wet Blot Dry **Dry** ~~(>100°C)~~ 60-90°C ① AFDW (>500°C) — **Lot** or Batch Number: 11-025

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	Middle	A		0.94070	0.94145	0.00075		10			10		
	Sherman	B		0.94150	0.94218	0.00068		10			10		
		C		0.94311	0.94372	0.00061		10			10		
		D		0.93768	0.93833	0.00065		10			10		
		E		0.93505	0.93565	0.00060		10			10		
		F		0.93303	0.93363	0.00060		② ~~10~~ 9			8 Ⓐ		
		G		0.93176	0.93245	0.00069		10			10		
		H		0.92924	0.93001	0.00077		10			10		
Blank													
Range													
Mean													

Test Solution Volume:	Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

Ⓐ one organism lost during drying process.

① cw 11/22/11 CF
② cw for ANP 11/22/11 E

ar.. Aca 1/19/12
QA: cw 11/29/11
11/23/11

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074)   Species: *Hyalella azteca*

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Orig. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
Sand Control	A		0.93738	0.93812	0.00074	0.00074	9	0.082		9	0.082	
	B		0.93648	0.93723	0.00075	0.00075	10	0.075		10	0.075	
	C		0.93850	0.93935	0.00085	0.00085	10	0.085		10	0.085	
	D		0.94034	0.94115	0.00081	0.00081	10	0.081		9	0.090	
	E		0.93682	0.93764	0.00082	0.00082	10	0.082		10	0.082	
	F		0.93901	0.93979	0.00078	0.00078	10	0.078		10	0.078	
	G		0.93822	0.93901	0.00079	0.00079	10	0.079		10	0.079	
	H		0.93809	0.93894	0.00085	0.00085	10	0.085	0.0809	10	0.085	0.0820
Blank			0.93894	0.93896	0.00002							

Project Number: 60225262-058-(069-074)   Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Sand Control	8	0.075	0.085	0.0809	0.0035	4.267%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Sand Control	8	0.075	0.090	0.0820	0.0047	5.756%

QA: ARO 1/19/12
QA: CW 11/29/11
JK 11/23/11

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Orig. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
Inlet Upper Slate	A		0.93961	0.94009	0.00048	0.00048	9	0.053		8	0.060	
	B		0.94125	0.94190	0.00065	0.00065	10	0.065		10	0.065	
	C		0.93915	0.93985	0.00070	0.00070	10	0.070		10	0.070	
	D		0.93873	0.93934	0.00061	0.00061	10	0.061		9	0.068	
	E		0.93976	0.94049	0.00073	0.00073	10	0.073		9	0.081	
	F		0.93703	0.93776	0.00073	0.00073	9	0.081		9	0.081	
	G		0.93744	0.93832	0.00088	0.00088	10	0.088		10	0.088	
	H		0.93818	0.93891	0.00073	0.00073	10	0.073	0.0706	10	0.073	0.0732
Blank			0.93894	0.93896	0.00002							

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Inlet Upper Slate	8	0.053	0.088	0.0706	0.0110	15.588%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Inlet Upper Slate	8	0.060	0.088	0.0732	0.0095	12.903%

QA: AR 01/19/12
QA: CW 11/29/11
11/23/11

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Orig. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
Lower Johnson	A		0.93978	0.94054	0.00076	0.00076	10	0.076		9	0.084	
	B		0.92878	0.92950	0.00072	0.00072	10	0.072		10	0.072	
	C		0.92680	0.92754	0.00074	0.00074	10	0.074		10	0.074	
	D		0.93186	0.93268	0.00082	0.00082	10	0.082		10	0.082	
	E		0.93886	0.93963	0.00077	0.00077	10	0.077		10	0.077	
	F		0.93633	0.93701	0.00068	0.00068	10	0.068		9	0.076	
	G		0.94047	0.94125	0.00078	0.00078	10	0.078		10	0.078	
	H		0.94185	0.94253	0.00068	0.00068	10	0.068	0.0744	9	0.076	0.0773
Blank			0.93894	0.93896	0.00002							

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Lower Johnson	8	0.068	0.082	0.0744	0.0049	6.584%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Lower Johnson	8	0.072	0.084	0.0773	0.0041	5.328%

QA: AEO 1/19/12
QA: CW 11/29/11
11/23/11

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Orig. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
Middle Slate	A		0.94351	0.94407	0.00056	0.00056	10	0.056		9	0.062	
	B		0.94660	0.94717	0.00057	0.00057	10	0.057		10	0.057	
	C		0.94937	0.95006	0.00069	0.00069	10	0.069		10	0.069	
	D		0.94942	0.95008	0.00066	0.00066	10	0.066		10	0.066	
	E		0.95253	0.95299	0.00046	0.00046	10	0.046		7	0.066	
	F		0.95226	0.95293	0.00067	0.00067	10	0.067		10	0.067	
	G		0.94895	0.94949	0.00054	0.00054	10	0.054		10	0.054	
	H		0.94130	0.94177	0.00047	0.00047	10	0.047	0.0577	9	0.052	0.0616
Blank			0.93894	0.93896	0.00002							

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Middle Slate	8	0.046	0.069	0.0577	0.0089	15.370%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Middle Slate	8	0.052	0.069	0.0616	0.0064	10.395%

QA: AR 01/19/12
QA: cs 11/29/11
11/23/11

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Orig. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
Lower Slate	A		0.94488	0.94558	0.00070	0.00070	10	0.070		10	0.070	
	B		0.94660	0.94716	0.00056	0.00056	10	0.056		8	0.070	
	C		0.94505	0.94597	0.00092	0.00092	10	0.092		10	0.092	
	D		0.94402	0.94457	0.00055	0.00055	10	0.055		9	0.061	
	E		0.94320	0.94408	0.00088	0.00088	10	0.088		9	0.098	
	F		0.94318	0.94384	0.00066	0.00066	10	0.066		10	0.066	
	G		0.94218	0.94311	0.00093	0.00093	10	0.093		10	0.093	
	H		0.94151	0.94211	0.00060	0.00060	10	0.060	0.0725	10	0.060	0.0762
Blank			0.93894	0.93896	0.00002							

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Lower Slate	8	0.055	0.093	0.0725	0.0161	22.265%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Lower Slate	8	0.060	0.098	0.0762	0.0154	20.251%

QA: AR 01/19/12
QA: EW 11/29/11
JK 11/23/11

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Orig. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
Lower Sherman	A		0.93073	0.93154	0.00081	0.00081	10	0.081		10	0.081	
	B		0.93443	0.93512	0.00069	0.00069	10	0.069		9	0.077	
	C		0.93645	0.93706	0.00061	0.00061	10	0.061		10	0.061	
	D		0.94011	0.94061	0.00050	0.00050	10	0.050		8	0.062	
	E		0.94177	0.94249	0.00072	0.00072	10	0.072		10	0.072	
	F		0.93882	0.93958	0.00076	0.00076	10	0.076		10	0.076	
	G		0.93953	0.94025	0.00072	0.00072	10	0.072		10	0.072	
	H		0.94142	0.94231	0.00089	0.00089	10	0.089	0.0713	10	0.089	0.0738
Blank			0.93894	0.93896	0.00002							

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Lower Sherman	8	0.050	0.089	0.0713	0.0119	16.737%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Lower Sherman	8	0.061	0.089	0.0738	0.0092	12.486%

QA: ARO 1/19/12
QA: CW 11/29/11
JR 11/23/11

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Treatment	Rep	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)	No of Orig. Organisms	Mean Wt./ Original Organism (mg)	Mean Wt./ Treatment (mg) (Original)	Number of Surv. Organisms	Mean Wt./ Surviving Organism (mg)	Mean Wt./ Treatment (mg) (Surviving)
Middle Sherman	A		0.94070	0.94145	0.00075	0.00075	10	0.075		10	0.075	
	B		0.94150	0.94218	0.00068	0.00068	10	0.068		10	0.068	
	C		0.94311	0.94372	0.00061	0.00061	10	0.061		10	0.061	
	D		0.93768	0.93833	0.00065	0.00065	10	0.065		10	0.065	
	E		0.93505	0.93565	0.00060	0.00060	10	0.060		10	0.060	
	F		0.93303	0.93363	0.00060	0.00060	9	0.067		8	0.075	
	G		0.93176	0.93245	0.00069	0.00069	10	0.069		10	0.069	
	H		0.92924	0.93001	0.00077	0.00077	10	0.077	0.0677	10	0.077	0.0687
Blank			0.93894	0.93896	0.00002							

Project Number: 60225262-058-(069-074) Species: *Hyalella azteca*

Summary Statistics for Growth Data (dry wt per original organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Middle Sherman	8	0.060	0.077	0.0677	0.0060	8.898%

Summary Statistics for Growth Data (dry wt per surviving organism)

Treatment	N	Min	Max	Mean	SD	C.V.
Middle Sherman	8	0.060	0.077	0.0687	0.0065	9.482%

QA: MR 01/19/12
[illegible] 11/29/11
QA: CW 11/29/11

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Summary Statistics for Survival

Title: 60225262-058-(069-074)
File: 058069s.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	8	0.9000	1.0000	0.9875
2	In. Upper Slate	8	0.9000	1.0000	0.9625
3	Lower Sherman	8	0.8000	1.0000	0.9625
4	Middle Slate	8	0.7000	1.0000	0.9375
5	Lower Slate	8	0.8000	1.0000	0.9500
6	Lower Johnson	8	0.9000	1.0000	0.9625
7	Middle Sherman	8	0.9000	1.0000	0.9875

Title: 60225262-058-(069-074)
File: 058069s.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Control	0.0013	0.0354	0.0125	3.5803
2	In. Upper Slate	0.0027	0.0518	0.0183	5.3771
3	Lower Sherman	0.0055	0.0744	0.0263	7.7301
4	Middle Slate	0.0113	0.1061	0.0375	11.3137
5	Lower Slate	0.0057	0.0756	0.0267	7.9571
6	Lower Johnson	0.0027	0.0518	0.0183	5.3771
7	Middle Sherman	0.0013	0.0354	0.0125	3.5803

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Summary Statistics for Growth per Original

✗ 11/29/11
QA:CW 11/29/11
QA: NZ 01/19/12

Title: 60225262-058-(069-074)
File: 058069g.dat Transform: NO TRANSFORMATION
Number of Groups: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.0820	0.0820
1	Control	2	0.0750	0.0750
1	Control	3	0.0850	0.0850
1	Control	4	0.0810	0.0810
1	Control	5	0.0820	0.0820
1	Control	6	0.0780	0.0780
1	Control	7	0.0790	0.0790
1	Control	8	0.0850	0.0850
2	In. Upper Slate	1	0.0530	0.0530
2	In. Upper Slate	2	0.0650	0.0650
2	In. Upper Slate	3	0.0700	0.0700
2	In. Upper Slate	4	0.0610	0.0610
2	In. Upper Slate	5	0.0730	0.0730
2	In. Upper Slate	6	0.0810	0.0810
2	In. Upper Slate	7	0.0880	0.0880
2	In. Upper Slate	8	0.0730	0.0730
3	Lower Johnson	1	0.0760	0.0760
3	Lower Johnson	2	0.0720	0.0720
3	Lower Johnson	3	0.0740	0.0740
3	Lower Johnson	4	0.0820	0.0820
3	Lower Johnson	5	0.0770	0.0770
3	Lower Johnson	6	0.0680	0.0680
3	Lower Johnson	7	0.0780	0.0780
3	Lower Johnson	8	0.0680	0.0680
4	Middle Slate	1	0.0560	0.0560
4	Middle Slate	2	0.0570	0.0570
4	Middle Slate	3	0.0690	0.0690
4	Middle Slate	4	0.0660	0.0660
4	Middle Slate	5	0.0460	0.0460
4	Middle Slate	6	0.0670	0.0670
4	Middle Slate	7	0.0540	0.0540
4	Middle Slate	8	0.0470	0.0470
5	Lower Slate	1	0.0700	0.0700
5	Lower Slate	2	0.0560	0.0560
5	Lower Slate	3	0.0920	0.0920
5	Lower Slate	4	0.0550	0.0550
5	Lower Slate	5	0.0880	0.0880
5	Lower Slate	6	0.0660	0.0660
5	Lower Slate	7	0.0930	0.0930
5	Lower Slate	8	0.0600	0.0600
6	Lower Sherman	1	0.0810	0.0810
6	Lower Sherman	2	0.0690	0.0690
6	Lower Sherman	3	0.0610	0.0610
6	Lower Sherman	4	0.0500	0.0500
6	Lower Sherman	5	0.0720	0.0720
6	Lower Sherman	6	0.0760	0.0760
6	Lower Sherman	7	0.0720	0.0720
6	Lower Sherman	8	0.0890	0.0890
7	Middle Sherman	1	0.0750	0.0750
7	Middle Sherman	2	0.0680	0.0680
7	Middle Sherman	3	0.0610	0.0610

Toxstat version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.

11/29/11
QA: 11/29/11
QA: 01/19/12

7	Middle Sherman	4	0.0650	0.0650
7	Middle Sherman	5	0.0600	0.0600
7	Middle Sherman	6	0.0670	0.0670
7	Middle Sherman	7	0.0690	0.0690
7	Middle Sherman	8	0.0770	0.0770

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Summary Statistics for Growth per Original

[handwritten initials] 11/29/11
QA: CW 11/29/11
QA: MR 01/19/12

Title: 60225262-058-(069-074)
File: 058069g.dat   Transform: NO TRANSFORMATION

Summary Statistics on Data   TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	8	0.0750	0.0850	0.0809
2	In. Upper Slate	8	0.0530	0.0880	0.0705
3	Lower Johnson	8	0.0680	0.0820	0.0744
4	Middle Slate	8	0.0460	0.0690	0.0577
5	Lower Slate	8	0.0550	0.0930	0.0725
6	Lower Sherman	8	0.0500	0.0890	0.0713
7	Middle Sherman	8	0.0600	0.0770	0.0678

Title: 60225262-058-(069-074)
File: 058069g.dat   Transform: NO TRANSFORMATION

Summary Statistics on Data   TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Control	0.0000	0.0034	0.0012	4.2545
2	In. Upper Slate	0.0001	0.0111	0.0039	15.6855
3	Lower Johnson	0.0000	0.0049	0.0017	6.5844
4	Middle Slate	0.0001	0.0089	0.0031	15.3699
5	Lower Slate	0.0003	0.0161	0.0057	22.2651
6	Lower Sherman	0.0001	0.0119	0.0042	16.7374
7	Middle Sherman	0.0000	0.0060	0.0021	8.8824

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Determination of NOEC and LOEC for Growth per Original

✱ 11/29/11
QA: CW 11/29/11
QA: AR 01/19/12

Title: 60225262-058-(069-074)
File: 058069g.dat Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	3.7520	13.5520	21.3920	13.5520	3.7520
OBSERVED	3	13	23	14	3

Chi-Square = 0.4596 (p-value = 0.9773)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: 60225262-058-(069-074)
File: 058069g.dat Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

******** Shapiro - Wilk's Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 56

Title: 60225262-058-(069-074)
File: 058069g.dat Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 20.3103 (p-value = 0.0024)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

Critical B = 16.8119 (alpha = 0.01, df = 6)
= 12.5916 (alpha = 0.05, df = 6)

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Determination of NOEC and LOEC for Growth per Original

JK 11/29/11
QA: CW 11/29/11
QA: AR 11/29/11

Title: 60225262-058-(069-074)
File: 058069g.dat Transform: NO TRANSFORMATION

Steel's Many-One Rank Test - Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	DF	SIG 0.05
1	Control	0.0809				
2	In. Upper Slate	0.0705	47.50	46.00	8.00	
3	Lower Johnson	0.0744	44.50	46.00	8.00	*
4	Middle Slate	0.0577	36.00	46.00	8.00	*
5	Lower Slate	0.0725	60.00	46.00	8.00	
6	Lower Sherman	0.0713	48.50	46.00	8.00	
7	Middle Sherman	0.0678	37.50	46.00	8.00	*

Critical values are 1 tailed (k = 6)

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Determination of **PMSD ONLY** for Growth per Original

dk 11/29/11
QA:CU 11/29/11
QA: ME 01/19/12

Title: 60225262-058-(069-074)
File: 058069g.dat Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	6	0.0024	0.0004	4.1015
Within (Error)	49	0.0047	0.0001	
Total	55	0.0071		

(p-value = 0.0021)

Critical F = 3.1948 (alpha = 0.01, df = 6,49)
= 2.2904 (alpha = 0.05, df = 6,49)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: 60225262-058-(069-074)
File: 058069g.dat Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Control	0.0809	0.0809		
2	In. Upper Slate	0.0705	0.0705	2.1117	
3	Lower Johnson	0.0744	0.0744	1.3230	
4	Middle Slate	0.0577	0.0577	4.7068	*
5	Lower Slate	0.0725	0.0725	1.7046	
6	Lower Sherman	0.0713	0.0713	1.9590	
7	Middle Sherman	0.0678	0.0678	2.6714	*

Dunnett critical value = 2.3700 (1 Tailed, alpha = 0.05, df [used] = 6,40)
(Actual df = 6,49)

Title: 60225262-058-(069-074)
File: 058069g.dat Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Control	8			
2	In. Upper Slate	8	0.0116	14.4	0.0104
3	Lower Johnson	8	0.0116	14.4	0.0065
4	Middle Slate	8	0.0116	14.4	0.0231
5	Lower Slate	8	0.0116	14.4	0.0084
6	Lower Sherman	8	0.0116	14.4	0.0096
7	Middle Sherman	8	0.0116	14.4	0.0131

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
List Data for Growth per Surviving

QA: AR 01/19/12
11/29/11
QA: CW 11/30/11

Title: 60225262-058-(069-074)
File: 058069gs.dat Transform: NO TRANSFORMATION
Number of Groups: 7

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.0820	0.0820
1	Control	2	0.0750	0.0750
1	Control	3	0.0850	0.0850
1	Control	4	0.0900	0.0900
1	Control	5	0.0820	0.0820
1	Control	6	0.0780	0.0780
1	Control	7	0.0790	0.0790
1	Control	8	0.0850	0.0850
2	In. Upper Slate	1	0.0600	0.0600
2	In. Upper Slate	2	0.0650	0.0650
2	In. Upper Slate	3	0.0700	0.0700
2	In. Upper Slate	4	0.0680	0.0680
2	In. Upper Slate	5	0.0810	0.0810
2	In. Upper Slate	6	0.0810	0.0810
2	In. Upper Slate	7	0.0880	0.0880
2	In. Upper Slate	8	0.0730	0.0730
3	Lower Johnson	1	0.0840	0.0840
3	Lower Johnson	2	0.0720	0.0720
3	Lower Johnson	3	0.0740	0.0740
3	Lower Johnson	4	0.0820	0.0820
3	Lower Johnson	5	0.0770	0.0770
3	Lower Johnson	6	0.0760	0.0760
3	Lower Johnson	7	0.0780	0.0780
3	Lower Johnson	8	0.0760	0.0760
4	Middle Slate	1	0.0620	0.0620
4	Middle Slate	2	0.0570	0.0570
4	Middle Slate	3	0.0690	0.0690
4	Middle Slate	4	0.0660	0.0660
4	Middle Slate	5	0.0660	0.0660
4	Middle Slate	6	0.0670	0.0670
4	Middle Slate	7	0.0540	0.0540
4	Middle Slate	8	0.0520	0.0520
5	Lower Slate	1	0.0700	0.0700
5	Lower Slate	2	0.0700	0.0700
5	Lower Slate	3	0.0920	0.0920
5	Lower Slate	4	0.0610	0.0610
5	Lower Slate	5	0.0980	0.0980
5	Lower Slate	6	0.0660	0.0660
5	Lower Slate	7	0.0930	0.0930
5	Lower Slate	8	0.0600	0.0600
6	Lower Sherman	1	0.0810	0.0810
6	Lower Sherman	2	0.0770	0.0770
6	Lower Sherman	3	0.0610	0.0610
6	Lower Sherman	4	0.0620	0.0620
6	Lower Sherman	5	0.0720	0.0720
6	Lower Sherman	6	0.0760	0.0760
6	Lower Sherman	7	0.0720	0.0720
6	Lower Sherman	8	0.0890	0.0890
7	Middle Sherman	1	0.0750	0.0750
7	Middle Sherman	2	0.0680	0.0680
7	Middle Sherman	3	0.0610	0.0610

Toxstat version 3.5
Study # 60225262-058-(069-074)
CCER Alaska Inc.

AK 11/29/11
QA: CW 11/30/11
QA: AR 01/19/12

7	Middle Sherman	4	0.0650	0.0650
7	Middle Sherman	5	0.0600	0.0600
7	Middle Sherman	6	0.0750	0.0750
7	Middle Sherman	7	0.0690	0.0690
7	Middle Sherman	8	0.0770	0.0770

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Summary Statistics for Growth per Surviving

dk 11/29/11
QA:cu 11/30/11
QA: AR 01/19/12

Title: 60225262-058-(069-074)
File: 058069gs.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	8	0.0750	0.0900	0.0820
2	In. Upper Slate	8	0.0600	0.0880	0.0733
3	Lower Johnson	8	0.0720	0.0840	0.0774
4	Middle Slate	8	0.0520	0.0690	0.0616
5	Lower Slate	8	0.0600	0.0980	0.0763
6	Lower Sherman	8	0.0610	0.0890	0.0738
7	Middle Sherman	8	0.0600	0.0770	0.0688

Title: 60225262-058-(069-074)
File: 058069gs.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Control	0.0000	0.0047	0.0017	5.7570
2	In. Upper Slate	0.0001	0.0094	0.0033	12.8429
3	Lower Johnson	0.0000	0.0040	0.0014	5.1204
4	Middle Slate	0.0000	0.0065	0.0023	10.5142
5	Lower Slate	0.0002	0.0155	0.0055	20.3264
6	Lower Sherman	0.0001	0.0093	0.0033	12.6317
7	Middle Sherman	0.0000	0.0065	0.0023	9.4825

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Determination of NOEC and LOEC for Growth per Surviving

11/29/11
QA: 11/30/11
QA: 01/19/12

Title: 60225262-058-(069-074)
File: 058069gs.dat Transform: NO TRANSFORMATION

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	3.7520	13.5520	21.3920	13.5520	3.7520
OBSERVED	0	19	17	16	4

Chi-Square = 7.3025 (p-value = 0.1207)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: 60225262-058-(069-074)
File: 058069gs.dat Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

******** Shapiro - Wilk's Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 56

Title: 60225262-058-(069-074)
File: 058069gs.dat Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 17.4005 (p-value = 0.0079)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

Critical B = 16.8119 (alpha = 0.01, df = 6)
= 12.5916 (alpha = 0.05, df = 6)

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Determination of NOEC and LOEC for Growth per Surviving

AK 11/29/11
QA:cw 11/30/11
QA: AG 01/19/12

Title: 60225262-058-(069-074)
File: 058069gs.dat Transform: NO TRANSFORMATION

Steel's Many-One Rank Test - Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	DF	SIG 0.05
1	Control	0.0820				
2	In. Upper Slate	0.0733	49.00	46.00	8.00	
3	Lower Johnson	0.0774	49.50	46.00	8.00	
4	Middle Slate	0.0616	36.00	46.00	8.00	*
5	Lower Slate	0.0763	60.00	46.00	8.00	
6	Lower Sherman	0.0738	48.00	46.00	8.00	
7	Middle Sherman	0.0688	38.00	46.00	8.00	*

Critical values are 1 tailed (k = 6)

Toxstat Version 3.5
Study # 60225262-058-(069-074)
Coeur Alaska Inc.
Determination of **PMSD ONLY** for Growth per Surviving

JR 11/29/11
QA: CW 11/30/11
QA: AR 01/19/12

Title: 60225262-058-(069-074)
File: 058069gs.dat   Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	6	0.0021	0.0003	4.4798
Within (Error)	49	0.0038	0.0001	
Total	55	0.0058		

(p-value = 0.0011)

Critical F = 3.1948 (alpha = 0.01, df = 6,49)
= 2.2904 (alpha = 0.05, df = 6,49)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: 60225262-058-(069-074)
File: 058069gs.dat   Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2   Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	Control	0.0820	0.0820		
2	In. Upper Slate	0.0733	0.0733	1.9962	
3	Lower Johnson	0.0774	0.0774	1.0551	
4	Middle Slate	0.0616	0.0616	4.6484	*
5	Lower Slate	0.0763	0.0763	1.3118	
6	Lower Sherman	0.0738	0.0738	1.8822	
7	Middle Sherman	0.0688	0.0688	3.0229	*

Dunnett critical value = 2.3700 (1 Tailed, alpha = 0.05, df [used] = 6,40)
(Actual df = 6,49)

Title: 60225262-058-(069-074)
File: 058069gs.dat   Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2   Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Control	8			
2	In. Upper Slate	8	0.0104	12.7	0.0087
3	Lower Johnson	8	0.0104	12.7	0.0046
4	Middle Slate	8	0.0104	12.7	0.0204
5	Lower Slate	8	0.0104	12.7	0.0057
6	Lower Sherman	8	0.0104	12.7	0.0082
7	Middle Sherman	8	0.0104	12.7	0.0132

APPENDIX C

Analytical Data

FCETL QA Form No.131
Revision 0
Effective 10/06

QA: AR 01/11/12

PERCENT TOTAL SOLIDS AND PERCENT TOTAL VOLATILE SOLIDS (TVS)

Project No: 60225262-058-(063-068)	TARE: Date/time: 12/8/11 @ 1515 Analyst: ARS / CW	Dried in Oven # 1 from Date: 12/8/11 Time: 1540
	DRY GROSS: Date/time: 12/9/11 @ 1250 Analyst: CW	Oven °C: 104 to Date: 12/9/11 Time: 1220
Analytical Balance ID: A+D #2	ASHED GROSS: Date/time: 12/12/11 @ 1025 Analyst: CW	Ashed in Furnace from Date: 12/9/11 Time: 1300 Furnace °C: 550 to Date: 12/9/11 Time: 1635

Dish No.	Treatment	Rep	Tare Weight of Dish (g) A	Dish + Wet Sample (g) B	Dry Gross Weight (g) (dish + dry sample) C	% Total Solids (g) [(C-A)(100)]/(B-A)	Ashed Gross Weight (dish + sample)(g) D	% Total Volatile Solids (g) [(C-D)(100)]/(C-A)
▲ 6	Inlet Upper Side		17.8731	38.1931	32.5184		31.9334	
▲ 5(side)	11		28.2599	57.4630	49.3248		48.4312	
▲ 54B	Lower		26.4402	55.5349	49.1594		48.3934	
▲ 52	Side 11		25.7186	46.9934	42.2961		41.7338	
7	Middle		19.9943	39.9894	32.0925		31.1624	
19	Side 11		18.0636	38.3900	30.2261		29.2623	
26	Lower		19.0541	42.1467	35.8163		35.3507	
15	Sherman 11		18.3875	39.9342	34.2720		33.8392	
16	Middle		19.1703	43.2400	36.4068		35.8727	
▲ 21	Sherman 11		19.9266	40.4985	35.0048		34.6220	
28	Lower		18.1432	39.7009	34.1146		33.7975	
10	Johnson 11		18.01~~39~~45 ①	41.6577	35.6213		35.2623	
▲ Blank	(53)		26.6048	~~26.6035~~ ②	② ~~26.6048~~ 26.6035		26.6043	
Blank	(1)		20.2117	~~20.2105~~ ②	20.2105		20.2114	

[1] Add in weight loss of blank boat, if appropriate.

① ARS 12/8/11 C
② CW 12/9/11 WP

▲ Ashed in furnace from 12/12/11 @ 1030 to 12/12/11 @ 1640
Ashed gross weight 12/13/11 @ 0950 CW

CW 12/20/11
QA: AR 01/11/12

Percent Total Solids and Percent Total Volatile Solids

Project Number: 60225262-058-(063-068)

Treatment	Rep		Tare Weight (g) A	Dish + Wet Sample (g) B	Dry Gross Weight (g) (dish + dry sample) C	% Total Solids [(C-A)(100)]/(B-A)	Treatment Mean % Total Solids	Ashed Gross Weight (g) (dish + sample) D	% Total Volatile Solids [(C-D)(100)]/(C-A)	Treatment Mean % Total Volatile Solids
Inlet Upper Slate	A		17.8731	38.1931	32.5184	72.0733	72.1029	31.9334	3.9945	4.1183
	B		28.2599	57.4630	49.3248	72.1324		48.4312	4.2421	
Lower Slate	A		26.4402	55.5349	49.1594	78.0871	78.0040	48.3934	3.3716	3.3818
	B		25.7186	46.9934	42.2961	77.9208		41.7338	3.3919	
Middle Slate	A		19.9943	39.9894	32.0926	60.5058	60.1709	31.1624	7.6879	7.8061
	B		18.0636	38.3900	30.2261	59.8360		29.2623	7.9244	
Lower Sherman	A		19.0541	42.1467	35.8163	72.5869	73.1541	35.3507	2.7777	2.7512
	B		18.3875	39.9342	34.2720	73.7213		33.8392	2.7247	
Middle Sherman	A		19.1703	43.2400	36.4068	71.6108	72.4530	35.8727	3.0987	2.8187
	B		19.9266	40.4985	35.0048	73.2951		34.6220	2.5388	
Lower Johnson	A		18.1432	39.7009	34.1146	74.0868	74.2778	33.7975	1.9854	2.0122
	B		18.0146	41.6577	35.6213	74.4688		35.2623	2.0390	
Blank 1			26.6048		26.6035			26.6043		
Blank 2			20.2117		20.2105			20.2114		

Friday, December 02, 2011

MSE Analytical Laboratory

Rami Naddy
AECOM
4303 W Laporte Ave
Fort Collins, CO 80521

RE: FCETL/AECOM

Work Order: 1111062

Dear Rami Naddy:

MSE Lab Services received 7 sample(s) on 11/15/2011 for the analyses presented in the following report.

Please find enclosed analytical results for the sample(s) received at the MSE Laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Sara Ward

Sara Ward
Laboratory Manager
406-494-7334

Enclosure

12/2/11 SW

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	FORM SED
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-001A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	1050	4.45	14.2		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	ND	0.103	0.354		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.061	0.006	0.024		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	7.31	0.130	0.472		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	0.940	0.097	0.295		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	0.390	0.011	0.047		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	0.986	0.068	0.236		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	ND	0.160	0.472		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	ND	0.087	0.236		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	3.92	0.216	0.708		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0366	0.126		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **dk**
Organic Matter - Walkley Black	25.3	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	8.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	86.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	6.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	LOAMYSAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	15.2	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-002A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	13600	5.04	16.0		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	16.2	0.116	0.401		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	1.46	0.007	0.027		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	29.4	0.147	0.535		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	56.7	0.110	0.334		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	7.79	0.012	0.054		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	47.4	0.077	0.267		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	0.720	0.182	0.535		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.134	0.098	0.267	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	220	0.244	0.802		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	0.0502	0.0393	0.136	J	mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	2.04	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	0.44	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	94.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	4.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	25.2	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/3/2011
Lab ID:	1111062-002B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	ND	0.55	1.50		µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	INLET UPPER SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-003A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	22500	5.25	16.7		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	17.9	0.121	0.418		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.722	0.007	0.028		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	127	0.153	0.557		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	53.4	0.114	0.348		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	3.37	0.012	0.056		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	87.5	0.080	0.278		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	0.809	0.189	0.557		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.120	0.103	0.278	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	130	0.254	0.835		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0489	0.169		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	5.46	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	4.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	94.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	28.2	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	INLET UPPER SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/4/2011
Lab ID:	1111062-003B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	1.39	0.55	1.50	J	µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	MIDDLE SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-004A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	20100	6.31	20.1		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	30.0	0.146	0.502		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	20.9	0.009	0.034		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	29.5	0.184	0.669		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	88.4	0.137	0.418		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	8.50	0.015	0.067		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	143	0.096	0.335		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	1.41	0.227	0.669		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.233	0.123	0.335	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	1360	0.306	1.00		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	0.0692	0.0545	0.188	J	mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	11.0	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	1.65	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	10.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	86.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	4.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	LOAMYSAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	40.2	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	MIDDLE SLATE
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/4/2011
Lab ID:	1111062-004B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	ND	0.55	1.50		µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	MIDDLE SHERMAN
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-005A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	19000	5.06	16.1		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	55.7	0.117	0.402		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.175	0.007	0.027		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	43.4	0.147	0.536		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	97.1	0.110	0.335		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	17.3	0.012	0.054		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	44.0	0.077	0.268		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	ND	0.182	0.536		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.633	0.099	0.268		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	120	0.245	0.804		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0412	0.142		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK			**OM_WALKLEYBLACK**				Analyst: **dk**
Organic Matter - Walkley Black	1.17	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	0.22	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	96.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	25.4	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services **Date:** *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	MIDDLE SHERMAN
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/4/2011
Lab ID:	1111062-005B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: kgw
Sulfide	1.01	0.55	1.50	J	µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER SHERMAN
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-006A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	18200	4.88	15.5		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	28.9	0.112	0.388		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.389	0.007	0.026		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	46.2	0.142	0.517		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	94.0	0.106	0.323		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	6.70	0.012	0.052		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	45.9	0.074	0.259		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	ND	0.176	0.517		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.137	0.095	0.259	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	110	0.236	0.776		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0455	0.157		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	0.54	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	0.11	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	96.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	22.7	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER SHERMAN
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/3/2011
Lab ID:	1111062-006B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	1.50	0.55	1.50		µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:				
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER JOHNSON
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	11/10/2011 11:00:00 AM
Lab ID:	1111062-007A	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES			**SW6020**	**SW3050B**			Analyst: **kgw**
Aluminum	13100	5.02	16.0		mg/Kg-dry	4	11/23/2011 3:10:21 PM
Arsenic	16.2	0.116	0.399		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Cadmium	0.238	0.007	0.027		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Chromium	31.5	0.146	0.533		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Copper	73.1	0.109	0.333		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Lead	9.76	0.012	0.053		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Nickel	27.3	0.076	0.266		mg/Kg-dry	2	11/30/2011 2:00:59 PM
Selenium	ND	0.181	0.533		mg/Kg-dry	2	11/21/2011 5:39:56 PM
Silver	0.164	0.098	0.266	J	mg/Kg-dry	2	11/21/2011 5:39:56 PM
Zinc	93.3	0.243	0.799		mg/Kg-dry	2	11/30/2011 2:00:59 PM
MERCURY IN SOIL/SEDIMENT - SW846 7471B			**E245.5**	**SW7471A**			Analyst: **tr**
Mercury	ND	0.0386	0.133		mg/Kg-dry	1	11/18/2011 9:32:00 AM
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**					Analyst: **dk**
Organic Matter - Walkley Black	0.89	0.09	0.20		%	1	11/18/2011 2:19:00 PM
PERCENT COARSE MATERIAL			**ASTMD422**				Analyst: **dk**
1" Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
2mm Gradation	ND	0.05	0.10		%	1	11/17/2011 4:55:00 PM
RAPID HYDROMETER (2 HOUR) MOD ASA 15-5			**MSA15-5**				Analyst: **dk**
% Clay	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Sand	96.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
% Silt	2.0	0.1	0.1		%	1	11/17/2011 5:50:00 PM
Soil Class	SAND					1	11/17/2011 5:50:00 PM
PERCENT MOISTURE			**D2216**				Analyst: **BO**
Percent Moisture	24.9	0.01	0.05		wt%	1	11/16/2011 3:00:00 PM

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *02-Dec-11*

CLIENT:	AECOM	**Client Sample ID:**	LOWER JOHNSON
Lab Order:	1111062	**Tag Number:**	
Project:	FCETL/AECOM	**Collection Date:**	10/3/2011
Lab ID:	1111062-007B	**Matrix:**	SEDIMENT

Analyses	Result	MDL	Rpt. Limit	Qual	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE-SIM. EXT. METALS			**AVS-SEM**	**AVS-SEM**			Analyst: **kgw**
Sulfide	ND	0.55	1.50		µmoles/g	1	11/18/2011 9:32:00 AM

Qualifiers:	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: 5060

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***5060-PB FILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	0.070	0.150	mg/Kg							J
Cadmium	0.012	0.010	mg/Kg							
Lead	0.020	0.020	mg/Kg							
Selenium	ND	0.200	mg/Kg							
Silver	0.078	0.100	mg/Kg							J
Sample ID: ***5060-PB UNFILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	0.150	0.150	mg/Kg							
Cadmium	0.004	0.010	mg/Kg							J
Lead	0.022	0.020	mg/Kg							
Selenium	ND	0.200	mg/Kg							
Silver	ND	0.100	mg/Kg							
Sample ID: ***5060-LCS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	85.9	0.300	mg/Kg	85.30	101	80	120			
Cadmium	153	0.020	mg/Kg	159.0	96.4	80	120			
Lead	44.4	0.040	mg/Kg	46.30	96.0	80	120			
Selenium	39.3	0.400	mg/Kg	45.20	87.0	80	120			
Silver	24.7	0.200	mg/Kg	24.30	102	80	120			
Sample ID: ***1111062-007A MS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	146	0.399	mg/Kg-dry	113.6	114	75	125			
Cadmium	202	0.027	mg/Kg-dry	211.7	95.2	75	125			
Lead	67.2	0.053	mg/Kg-dry	61.65	93.1	75	125			
Selenium	56.8	0.533	mg/Kg-dry	60.19	94.3	75	125			
Silver	33.1	0.266	mg/Kg-dry	32.36	102	75	125			
Sample ID: ***1111062-007A MSD***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	141	0.399	mg/Kg-dry	113.6	110	75	125	3.23	20	
Cadmium	201	0.027	mg/Kg-dry	211.7	94.7	75	125	0.527	20	
Lead	68.1	0.053	mg/Kg-dry	61.65	94.5	75	125	1.31	20	
Selenium	58.3	0.533	mg/Kg-dry	60.19	96.9	75	125	2.70	20	
Silver	32.8	0.266	mg/Kg-dry	32.36	101	75	125	0.878	20	
Sample ID: ***1111062-007A MST***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/21/2011 5:39:56 PM*			
Arsenic	129	0.399	mg/Kg-dry	113.6	99.2	75	125	12.4	20	
Cadmium	198	0.027	mg/Kg-dry	211.7	93.4	75	125	1.84	20	
Lead	66.1	0.053	mg/Kg-dry	61.65	91.4	75	125	1.56	20	
Selenium	55.3	0.533	mg/Kg-dry	60.19	91.9	75	125	2.53	20	
Silver	33.3	0.266	mg/Kg-dry	32.36	102	75	125	0.576	20	
Sample ID: ***5060-PB FILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	ND	3.00	mg/Kg							

Qualifiers: NA Sample conc. is > 4*spike level   S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM **Work Order:** 1111062
Project: FCETL/AECOM **BatchID:** 5060

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***5060-PB UNFILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	ND	3.00	mg/Kg							
Sample ID: ***5060-LCS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	9920	6.00	mg/Kg	11250	88.2	80	120			
Sample ID: ***1111062-007A MS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	28100	16.0	mg/Kg-dry	14980	100	75	125			
Sample ID: ***1111062-007A MSD***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	29500	16.0	mg/Kg-dry	14980	109	75	125	4.57	20	
Sample ID: ***1111062-007A MST***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/23/2011 3:10:21 PM*			
Aluminum	30100	16.0	mg/Kg-dry	14980	113	75	125	6.57	20	
Sample ID: ***5060-PB FILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	3.03	0.200	mg/Kg							
Copper	0.141	0.125	mg/Kg							
Nickel	0.103	0.100	mg/Kg							
Zinc	0.352	0.300	mg/Kg							
Sample ID: ***5060-PB UNFILTERED***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	2.79	0.200	mg/Kg							
Copper	0.175	0.125	mg/Kg							
Nickel	0.068	0.100	mg/Kg							J
Zinc	0.332	0.300	mg/Kg							
Sample ID: ***5060-LCS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	337	0.400	mg/Kg	294.0	115	80	120			
Copper	71.9	0.250	mg/Kg	63.20	114	80	120			
Nickel	186	0.200	mg/Kg	163.0	114	80	120			
Zinc	270	0.600	mg/Kg	262.0	103	80	120			
Sample ID: ***1111062-007A MS***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	489	0.533	mg/Kg-dry	391.5	117	75	125			
Copper	171	0.333	mg/Kg-dry	84.16	117	75	125			
Nickel	271	0.266	mg/Kg-dry	217.1	112	75	125			
Zinc	441	0.799	mg/Kg-dry	348.9	99.7	75	125			
Sample ID: ***1111062-007A MSD***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	515	0.533	mg/Kg-dry	391.5	124	75	125	5.16	20	
Copper	168	0.333	mg/Kg-dry	84.16	113	75	125	1.72	20	
Nickel	276	0.266	mg/Kg-dry	217.1	115	75	125	2.03	20	
Zinc	449	0.799	mg/Kg-dry	348.9	102	75	125	1.69	20	
Sample ID: ***1111062-007A MST***			*Method:* ***SW6020***		*Batch ID:* ***5060***		*Analysis Date: 11/30/2011 2:00:59 PM*			
Chromium	486	0.533	mg/Kg-dry	391.5	116	75	125	0.795	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: 5060

Sample ID: ***1111062-007A MST*** *Method:* ***SW6020*** *Batch ID:* ***5060*** *Analysis Date: 11/30/2011 2:00:59 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Copper	159	0.333	mg/Kg-dry	84.16	103	75	125	7.18	20	
Nickel	265	0.266	mg/Kg-dry	217.1	110	75	125	2.05	20	
Zinc	436	0.799	mg/Kg-dry	348.9	98.2	75	125	1.24	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM

Work Order: 1111062
BatchID: 5064

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***5064-PB***			*Method:* ***E245.5***		*Batch ID:* ***5064***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Mercury	ND	0.100	mg/Kg							
Sample ID: ***LCS-5064***			*Method:* ***E245.5***		*Batch ID:* ***5064***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Mercury	14.0	0.553	mg/Kg	16.00	87.8	80	120			
Sample ID: ***1111062-002A-MS***			*Method:* ***E245.5***		*Batch ID:* ***5064***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Mercury	18.2	1.66	mg/Kg-dry	21.40	84.9	75	125			
Sample ID: ***1111062-002A-MSD***			*Method:* ***E245.5***		*Batch ID:* ***5064***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Mercury	21.3	1.66	mg/Kg-dry	21.40	99.2	75	125	15.5	20	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM

Work Order: 1111062
BatchID: 5079

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1111062-002B-D***			*Method:* ***AVS-SEM***		*Batch ID:* ***5079***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Sulfide	ND	1.50	µmoles/g					0	35	
Sample ID: ***1111062-002B-S***			*Method:* ***AVS-SEM***		*Batch ID:* ***5079***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Sulfide	11.1	1.50	µmoles/g	10.59	105	80	120			
Sample ID: ***LCS-5079***			*Method:* ***AVS-SEM***		*Batch ID:* ***5079***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Sulfide	13.7	1.50	µmoles/g	12.58	109	85	115			
Sample ID: ***5079-PB***			*Method:* ***AVS-SEM***		*Batch ID:* ***5079***		*Analysis Date: 11/18/2011 9:32:00 AM*			
Sulfide	0.89	1.50	µmoles/g							J

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: R18192

Sample ID: ***1111062-006A-D*** *Method:* ***ASTMD422*** *Batch ID:* ***R18192*** *Analysis Date: 11/17/2011 4:55:00 PM*

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
1" Gradation	ND	0.10	%					0	35	
2mm Gradation	0.13	0.10	%					12.9	35	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: R18203

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1111062-004A-D***			*Method:* ***MSA15-5***		*Batch ID:* ***R18203***		*Analysis Date: 11/17/2011 5:50:00 PM*			
% Clay	10.0	0.1	%					0	35	
% Sand	86.0	0.1	%					0	35	
% Silt	4.0	0.1	%					0	35	
Soil Class	LOAMYSAND									

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

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Date: 02-Dec-11
Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: R18208

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1111062-002A-D*** — *Method:* ***OM_WALKLE*** *Batch ID:* ***R18208*** — *Analysis Date: 11/18/2011 2:19:00 PM*										
Organic Matter - Walkl	2.29	0.20	%					11.9	35	
Sample ID: ***LCSQ5771*** — *Method:* ***OM_WALKLE*** *Batch ID:* ***R18208*** — *Analysis Date: 11/18/2011 2:19:00 PM*										
Organic Matter - Walkl	0.55	0.20	%	0.5965	92.9	70.7	109			
Sample ID: ***PB*** — *Method:* ***OM_WALKLE*** *Batch ID:* ***R18208*** — *Analysis Date: 11/18/2011 2:19:00 PM*										
Organic Matter - Walkl	ND	0.20	%							

Qualifiers: NA Sample conc. is > 4*spike level   S Spike Recovery outside accepted recovery limits

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Report Date: 02-Dec-11

QA/QC SUMMARY REPORT

Client: AECOM
Project: FCETL/AECOM
Work Order: 1111062
BatchID: R18241

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***1111062-001A-D***			*Method:* ***D2216***		*Batch ID:* ***R18241***		*Analysis Date: 11/16/2011 3:00:00 PM*			
Percent Moisture	14.9	0.05	wt%					2.14	35	
Sample ID: ***1111062-007A-D***			*Method:* ***D2216***		*Batch ID:* ***R18241***		*Analysis Date: 11/16/2011 3:00:00 PM*			
Percent Moisture	25.8	0.05	wt%					3.45	35	

Qualifiers: NA Sample conc. is > 4*spike level S Spike Recovery outside accepted recovery limits

AECOM 1111062- **CHAIN OF CUSTODY RECORD** 7.4°C Rec'd in cooler w/ ice custody seal on cooler Page 1 of 1

Client/Project Name: 058	Project Location: FCETL/AECOM
Project Number: 60225262-058	Field Logbook No.:
Sampler (Print Name)/(Affiliation): Gordon WN / coeur; Christina Needham / AECOM	Chain of Custody Tape Nos.: 42986
Signature: Christina Needham	Send Results/Report to: Rami.Naddy@aecom.com; TAT: Std

Analysis Requested

Container Type: P – Plastic; A – Amber Glass; G – Clear Glass; V – VOA Vial; O – Other; E – Encore

Preservation: 1 – HCl, 4°; 2 – H2SO4, 4°; 3 – HNO3, 4°; 4 – NaOH, 4°; 5 – NaOH/ZnAc, 4°; 6 – Na2S2O3, 4°; 7 – 4°

Matrix Codes: DW – Drinking Water; WW – Wastewater; GW – Groundwater; SW – Surface Water; ST – Storm Water; W – Water; S – Soil; SL – Sludge; SD – Sediment; SO – Solid; A – Air; L – Liquid; P – Product

Field Sample No./Identification	Date	Time	COMP	GRAB	Sample Container (Size/Mat'l)	Matrix	Preserv.	Field Filtered	TOC (Walkley Black)	Total Metals (Al, Cr, Ni, Ag, Zn, As, Cd, Cu, Pb, Se)	Mercury	% coarse Material	Rapid Hydro. (% clay, sand, silt)	AVS					Lab I.D.	Remarks
Form Sed	11/10/11	1100		X	8oz P Jar	Sed	cool		X	X	X	X	X						001A	
Lower slate	11/10/11	1100		↓	8oz P Jar	↓	↓		X	X	X	X	X						002A	
Lower slate	10/3/11	unk			4oz glass									X					002B	
Inlet upper slate	11/10/11	1100			8oz P				X	X	X	X	X						003A	
Inlet upper slate	10/4/11	unk			4oz glass									X					003B	
Middle slate	11/10/11	1100			8oz P				X	X	X	X	X						004A	
Middle slate	10/4/11	unk			4oz glass									X					004B	
Middle Sherman	11/10/11	1100			8oz P				X	X	X	X	X						005A	
Middle Sherman	10/4/11	unk			4oz glass									X					005B	
Lower Sherman	11/10/11	1100			8oz P				X	X	X	X	X						006A	
Lower Sherman	10/3/11	unk			4oz glass									X					006B	
Lower Johnson	11/10/11	1100			8oz P				X	X	X	X	X						007A	
Lower Johnson	10/3/11	unk		↓	4oz glass	↓	↓							X					007B	

Relinquished by: (Print Name)/(Affiliation)	Date / Time	Received by: (Print Name)/(Affiliation)	Date / Time
Christina Needham / AECOM; Signature: Christina Needham	Date: 11/14/11; Time: 1300	Kitrina Wilkins; Signature: Kitrina Wilkins	Date: 11/15/11; Time: 11:00
Relinquished by: (Print Name)/(Affiliation); Signature:	Date: ; Time:	Received by: (Print Name)/(Affiliation); Signature:	Date: ; Time:
Relinquished by: (Print Name)/(Affiliation); Signature:	Date: ; Time:	Received by: (Print Name)/(Affiliation); Signature:	Date: ; Time:

Analytical Laboratory (Destination):
~~AECOM Toxicology Lab~~
~~4303 W. Laporte Avenue~~
~~Fort Collins, CO 80521~~
~~(970) 416-0916~~
~~(970) 490-2963 (FAX)~~
MSE

Sample Shipped Via: UPS FedEx Courier Other

Temp blank: Yes No

Q:\GRAPHICS\FORMS\Chain of Custody (COC)\Chain-of-Custody_Ft. Collins_10_07.doc

Serial No. № 51788

MSE Lab Services

Sample Receipt Checklist

Client Name AECOM_INC

Date and Time Received: 11/15/2011 11:32:02 AM

Work Order Number 1111062 RcptNo: 1

Received by kgw

COC_ID: CoolerID:

Checklist completed by B. O'Donnell 11/15/11
Signature Date

Reviewed by SW 11/16/11
Initials Date

Matrix: Carrier name FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Water - VOA vials have zero headspace?	No VOA vials submitted ☑	Yes ☐	No ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Blank ☐

Adjusted? NA Checked by BO 11/15/11

Sediments

Any No and/or NA (not applicable) response must be detailed in the comments section be

Client contacted ______ Date contacted: ______ Person contacted ______

Contacted by: ______ Regarding: ______

Comments: TEMP = 7.4 - SEDIMENT SAMPLES

Corrective Action ______

APPENDIX I: EMIGRATING FRY

Appendix I.–Pink fry counts in Slate, Johnson and Sherman Creeks.

Slate Creek					
Date	# Pink Fry Captured	# Pink Fry Mortalities	# Marked Pink Fry Released	# Marked Pink Fry Recaptured	# Other Fish Captured
4/11/2011	-	-	-	-	-
4/12/2011	-	-	-	-	-
4/13/2011	4,878	13	150	0	10
4/14/2011	16,380	108	0	38	28
4/15/2011	8,809	60	0	0	0
4/16/2011	11,841	150	0	0	2
4/17/2011	12,980	150	0	0	0
4/18/2011	4,095	160	0	0	19
4/19/2011	774	20	0	0	2
4/20/2011	1,095	29	150	0	6
4/21/2011	3,729	10	0	21	12
4/22/2011	2,398	13	0	0	2
4/23/2011	2,308	28	150	0	8
4/24/2011	5,930	80	0	0	9
4/25/2011	2,000	4,000	0	0	3
4/26/2011	1,200	2,700	0	0	14
4/27/2011	9,080	273	150	33	145
4/28/2011	6,813	320	0	2	23
4/29/2011	4,232	174	0	0	13
4/30/2011	6,916	467	150	70	12
5/1/2011	6,782	34	0	10	26
5/2/2011	8,397	53	0	0	22
5/3/2011	1,958	69	0	0	11
5/4/2011	1,622	26	0	0	9
5/5/2011	967	20	150	23	31
5/6/2011	1,660	47	0	14	15
5/7/2011	992	98	0	0	11
5/8/2011	419	21	150	9	9
5/9/2011	247	10	0	2	9
5/10/2011	303	15	0	0	5
5/11/2011	425	9	0	0	0
5/12/2011	230	2	150	12	2
5/13/2011	270	7	0	5	1
5/14/2011	91	4	0	0	6
5/15/2011	98	10	150	11	4
5/16/2011	131	13	0	1	0
5/17/2011	17	4	0	0	1
5/18/2011	17	4	0	0	3
5/19/2011	69	3	0	0	5
5/20/2011	49	6	0	0	7
5/21/2011	28	2	0	0	4
TOTALS	130,230	9,212			489

Johnson Creek					
Date	# Pink Fry Captured	# Pink Fry Mortalities	# Marked Pink Fry Released	# Marked Pink Fry Recaptured	# Other Fish Captured
4/11/2011	-	-	-	-	-
4/12/2011	-	-	-	-	-
4/13/2011	-	-	-	-	-
4/14/2011	-	-	-	-	-
4/15/2011	2,496	79	0	0	117
4/16/2011	5,041	130	0	0	212
4/17/2011	3,360	350	0	0	145
4/18/2011	2,649	155	150	0	33
4/19/2011	1,807	25	0	11	39
4/20/2011	4,014	9	150	0	150
4/21/2011	8,436	13	0	33	235
4/22/2011	7,570	8	0	0	234
4/23/2011	8,500	6	150	0	95
4/24/2011	9,010	40	0	20	80
4/25/2011	8,510	76	0	1	84
4/26/2011	13,275	57	0	0	210
4/27/2011	6,360	47	0	0	139
4/28/2011	7,950	30	0	0	77
4/29/2011	11,473	171	148	1	8
4/30/2011	2,250	26	0	42	151
5/1/2011	1,940	11	0	0	343
5/2/2011	4,130	12	0	0	291
5/3/2011	1,150	11	0	0	123
5/4/2011	1,188	13	0	0	70
5/5/2011	722	32	150	23	47
5/6/2011	1,351	15	0	1	92
5/7/2011	654	1	0	0	34
5/8/2011	929	3	150	28	53
5/9/2011	583	1	0	0	37
5/10/2011	1,000	5	0	0	67
5/11/2011	1,558	5	0	0	90
5/12/2011	786	5	150	22	147
5/13/2011	824	3	0	2	71
5/14/2011	836	4	0	0	33
5/15/2011	440	5	150	21	19
5/16/2011	202	3	0	4	9
5/17/2011	52	0	0	0	11
5/18/2011	52	32	150	11	11
5/19/2011	36	1	0	0	5
5/20/2011	78	1	0	0	11
5/21/2011	116	9	0	0	12
TOTALS	121,328	1,394			3,585

Sherman Creek					
Date	# Pink Fry Captured	# Pink Fry Mortalities	# Marked Pink Fry Released	# Marked Pink Fry Recaptured	# Other Fish Captured
4/11/2011	0	0	0	0	0
4/12/2011	185	3	0	0	0
4/13/2011	569	2	150	0	1
4/14/2011	2,011	5	0	59	0
4/15/2011	2,189	5	0	0	0
4/16/2011	666	26	0	0	11
4/17/2011	780	20	0	0	1
4/18/2011	718	55	150	0	1
4/19/2011	1,965	13	150	21	0
4/20/2011	749	17	0	29	0
4/21/2011	2,594	19	0	4	0
4/22/2011	2,359	11	0	0	0
4/23/2011	3,742	17	150	0	1
4/24/2011	4,240	120	0	11	0
4/25/2011	4,535	141	0	0	0
4/26/2011	3,782	115	0	0	0
4/27/2011	2,248	76	150	19	0
4/28/2011	1,076	51	0	0	1
4/29/2011	3,186	202	0	0	0
4/30/2011	3,202	96	149	10	0
5/1/2011	3,994	33	0	39	0
5/2/2011	3,273	35	0	0	0
5/3/2011	2,729	70	0	0	0
5/4/2011	907	60	0	0	0
5/5/2011	222	7	149	10	0
5/6/2011	304	1	0	8	0
5/7/2011	86	1	0	0	0
5/8/2011	127	4	150	3	0
5/9/2011	225	3	0	0	0
5/10/2011	158	6	0	0	0
5/11/2011	241	1	0	0	0
5/12/2011	160	6	0	9	0
5/13/2011	179	4	150	12	0
5/14/2011	134	2	0	0	0
5/15/2011	157	1	150	6	1
5/16/2011	148	8	0	16	0
5/17/2011	66	21	0	0	0
5/18/2011	66	21	113	10	0
5/19/2011	54	5	0	0	0
5/20/2011	53	5	0	0	0
5/21/2011	-	-	-	-	-
TOTALS	54,079	1,288			17

APPENDIX J: PINK SALMON ESCAPEMENT

Appendix J.–Pink salmon escapement.

Stream Reach	7/26/2011 Pink Salmon Counts				8/1/2011 Pink Salmon Counts				8/9/2011 Pink Salmon Counts			
	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass
0-100m	0	0	0	0	22	29	25.5	4	73	83	78	32
100-200m	0	0	0	0	75	92	83.5	10	215	230	222.5	82
200-300m	0	0	0	0	69	70	69.5	1	68	57	62.5	49
300-400m	0	0	0	0	36	30	33	3	92	79	85.5	10
400-500m	0	0	0	0	47	35	41	5	215	233	224	80
500-600m	0	0	0	0	71	55	63	0	93	91	92	12
600-700m	0	0	0	0	59	51	55	3	0	0	0	0
700-800m	0	0	0	0	0	0	0	1	0	0	0	0
800-900m	0	0	0	0	0	0	0	0	0	0	0	0
900-barrier	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	379	362	370.5	27	756	773	764.5	265

Stream Reach	8/16/2011 Pink Salmon Counts				8/23/2011 Pink Salmon Counts				8/30/2011 Pink Salmon Counts			
	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass
0-100m	42	39	40.5	46	213	208	210.5	n/a	398	385	391.5	n/a
100-200m	174	180	177	27	363	450	406.5	n/a	322	407	364.5	n/a
200-300m	301	261	281	48	385	418	401.5	n/a	441	431	436	n/a
300-400m	155	168	161.5	51	201	170	185.5	n/a	183	140	161.5	n/a
400-500m	187	186	186.5	83	203	247	225	n/a	72	54	63	n/a
500-600m	169	177	173	98	154	173	163.5	n/a	71	54	62.5	n/a
600-700m	236	275	255.5	61	45	31	38	n/a	139	142	140.5	n/a
700-800m	111	119	115	38	17	19	18	n/a	137	142	139.5	n/a
800-900m	6	6	6	5	0	0	0	n/a	52	49	50.5	n/a
900-barrier	0	0	0	0	0	0	0	n/a	9	3	6	n/a
Total	1381	1411	1396	457	1581	1716	1648.5	0	1824	1807	1815.5	0

Stream Reach	9/6/2011 Pink Salmon Counts				9/13/2011 Pink Salmon Counts				9/20/2011 Pink Salmon Counts			
	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass
0-100m	13	17	15	n/a	0	0	0	0	0	0	0	0
100-200m	61	46	53.5	n/a	23	23	23	3	0	0	0	7
200-300m	57	64	60.5	n/a	20	16	18	0	0	0	0	3
300-400m	36	35	35.5	n/a	5	5	5	6	0	0	0	4
400-500m	33	37	35	n/a	0	0	0	4	0	0	0	0
500-600m	12	13	12.5	n/a	0	0	0	25	0	0	0	0
600-700m	19	17	18	n/a	0	0	0	0	0	0	0	0
700-800m	1	2	1.5	n/a	0	0	0	0	0	0	0	0
800-900m	0	0	0	n/a	0	0	0	0	0	0	0	0
900-barrier	0	0	0	n/a	0	0	0	0	0	0	0	0
Total	232	231	231.5	0	48	44	46	38	0	0	0	14

Appendix J. Page 2 of 3.

Stream Reach	7/18/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass	7/25/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass	8/1/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass
Con-Lace	0	0	0	0	0	0	0	0	215	214	214.5	0
Lace-John Mouth	0	0	0	0	0	0	0	0	245	230	237.5	0
John Mouth-Trap	0	0	0	0	14	0	7	0	500	300	400	1
Trap Site-#4	0	0	0	0	10	22	16	0	100	150	125	31
#4-#7	1	1	1	0	75	75	75	0	100	300	200	4
#7-#10	0	0	0	0	75	75	75	0	200	160	180	24
#10-Power	0	0	0	0	0	0	0	0	450	140	295	44
Power-Log Falls	0	0	0	0	0	15	7.5	0	150	117	133.5	51
Log Falls-#15	0	0	0	0	0	0	0	0	75	13	44	41
#15-Falls	0	0	0	0	0	0	0	0	50	76	63	25
Total	1	1	1	0	174	187	180.5	0	2085	1700	1892.5	221

Stream Reach	8/8/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass	8/15/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass	8/22/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass
Con-Lace	400	400	400	48	0	0	0	17	0	0	0	0
Lace-John Mouth	400	400	400	69	17	0	17	50	1	0	0	0
John Mouth-Trap	600	300	450	44	600	0	600	0	500	30	265	0
Trap Site-#4	600	350	475	58	600	0	600	500	0	3	1.5	25
#4-#7	400	550	475	221	1000	0	1000	100	1000	60	530	0
#7-#10	500	600	550	195	1347	0	1347	200	0	85	42.5	100
#10-Power	800	100	450	77	500	0	500	250	600	25	312.5	100
Power-Log Falls	250	200	225	88	100	0	100	200	100	0	50	0
Log Falls-#15	200	350	275	86	500	0	500	101	0	0	0	0
#15-Falls	200	100	150	72	600	0	600	0	300	0	150	0
Total	4350	3350	3850	958	5264	0	5264	1418	2501	203	1351.5	225

Stream Reach	8/29/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass	9/5/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass	9/12/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass
Con-Lace	82	0	41	n/a	4	8	6	15	0	1	0.5	18
Lace-John Mouth	62	66	64	n/a	3	3	3	135	0	0	0	433
John Mouth-Trap	700	500	600	n/a	100	200	150	255	100	55	77.5	122
Trap Site-#4	900	700	800	n/a	165	150	157.5	510	56	140	98	403
#4-#7	650	1000	825	n/a	255	160	207.5	1800	134	205	169.5	0
#7-#10	750	600	675	n/a	120	80	100	0	57	85	71	1143
#10-Power	300	200	250	n/a	10	60	35	0	7	25	16	302
Power-Log Falls	220	120	170	n/a	13	0	6.5	48	0	10	5	15
Log Falls-#15	220	120	170	n/a	13	0	6.5	55	0	0	0	32
#15-Falls	185	50	117.5	n/a	0	0	0	37	0	0	0	2
Total	4069	3356	3712.5	0	683	661	672	2855	354	521	437.5	2470

Stream Reach	9/19/2011 Pink Salmon Counts Obs. 1	Obs. 2	Mean	Carcass
Con-Lace	0	0	0	n/a
Lace-John Mouth	0	0	0	n/a
John Mouth-Trap	56	56	56	n/a
Trap Site-#4	52	70	61	n/a
#4-#7	22	22	22	n/a
#7-#10	5	5	5	n/a
#10-Power	2	0	1	n/a
Power-Log Falls	0	0	0	n/a
Log Falls-#15	0	0	0	n/a
#15-Falls	0	0	0	n/a
Total	137	153	145	0

Appendix. J. Page 3 of 3.

	7/26/2011 Pink Salmon Counts				7/26/2011 Pink Salmon Counts				8/2/2011 Pink Salmon Counts			
Stream Reach	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass
0-50m	0	0	0	0	65	72	68.5	0	67	37	52	7
50-100m	1	1	1	0	28	20	24	0	60	66	63	3
100-150	0	0	0	0	12	15	13.5	0	36	40	38	4
150-200	0	0	0	0	25	22	23.5	0	125	124	124.5	6
200-250	0	0	0	0	31	29	30	0	95	93	94	2
250-300	0	0	0	0	37	32	34.5	0	115	87	101	8
300-350	0	0	0	0	21	26	23.5	0	78	59	68.5	1
350-below pool	0	0	0	0	34	32	33	0	79	87	83	5
Barrier pool	0	0	0	0	50	50	50	0	150	150	150	0
Total	1	1	1	0	303	298	300.5	0	805	743	774	36

	8/9/2011 Pink Salmon Counts				8/16/2011 Pink Salmon Counts				8/23/2011 Pink Salmon Counts			
Stream Reach	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass
0-50m	123	133	128	5	86	122	104	53	25	21	23	n/a
50-100m	115	126	120.5	3	57	58	57.5	22	10	15	12.5	n/a
100-150	50	52	51	16	23	46	34.5	0	16	18	17	n/a
150-200	102	107	104.5	17	34	43	38.5	35	25	28	26.5	n/a
200-250	198	207	202.5	17	68	57	62.5	27	33	35	34	n/a
250-300	132	147	139.5	36	35	33	34	11	22	17	19.5	n/a
300-350	143	205	174	29	33	19	26	46	10	9	9.5	n/a
350-below pool	78	80	79	7	26	18	22	53	26	6	16	n/a
Barrier pool	52	52	52	0	20	20	20	0	1	1	1	n/a
Total	993	1109	1051	130	382	416	399	247	168	150	159	0

	8/30/2011 Pink Salmon Counts				9/6/2011 Pink Salmon Counts				9/13/2011 Pink Salmon Counts			
Stream Reach	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass	Obs. 1	Obs. 2	Mean	Carcass
0-50m	93	108	100.5	n/a	41	41	41	n/a	56	61	58.5	15
50-100m	114	92	103	n/a	58	46	52	n/a	93	97	95	12
100-150	71	61	66	n/a	61	72	66.5	n/a	44	55	49.5	8
150-200	128	174	151	n/a	70	48	59	n/a	118	129	123.5	15
200-250	142	153	147.5	n/a	79	63	71	n/a	89	94	91.5	0
250-300	122	141	131.5	n/a	71	90	80.5	n/a	77	79	78	25
300-350	58	71	64.5	n/a	38	57	47.5	n/a	63	58	60.5	0
350-below pool	58	71	64.5	n/a	*	*	*	n/a	45	43	44	0
Barrier pool	46	43	44.5	n/a	*	*	*	n/a	11	11	11	0
Total	832	914	873	0	418	417	417.5	0	596	627	611.5	75

	9/20/2011 Pink Salmon Counts			
Stream Reach	Obs. 1	Obs. 2	Mean	Carcass
0-50m	3	3	3	2
50-100m	4	4	4	5
100-150	6	6	6	13
150-200	6	6	6	15
200-250	10	9	9.5	21
250-300	8	7	7.5	0
300-350	*	*	*	0
350-below pool	*	*	*	0
Barrier pool	*	*	*	0
Total	37	35	36	56

APPENDIX K: SPAWNING SUBSTRATE

Appendix K.–Spawning substrate.

Sample No.	Sieve Size 4"	2"	1"	1/2"	1/4"	#12	#40	#100	Imhoff	Sample Depth(cm)
Sherman Creek Reach 1, Sampled on 8/16/11										
1	0	300	680	490	345	625	245	50	30.5	20
2	0	310	190	290	350	740	200	50	42.6	20
3	0	240	410	250	275	680	440	105	48	18.5
4	0	370	595	325	360	710	225	45	39	18.5
Sherman Creek Reach 2, Sampled on 8/16/11										
1	0	125	125	350	320	1175	420	50	13.5	23.5
2	0	130	345	510	400	780	480	40	20.5	22
3	0	0	120	240	400	1050	210	40	27.5	20
4	0	740	390	275	275	480	120	20	12	18.5
Johnson Creek Reach 1, Sampled on 8/15/11										
1	0	0	60	500	925	910	290	120	95	25
2	0	0	50	360	625	1115	600	170	54.5	25
3	0	0	160	750	950	1030	260	150	199	25
4	0	0	75	470	950	450	900	100	60	25
Johnson Creek Reach 2, Sampled on 8/15/11										
1	0	0	415	780	700	1100	460	100	49	25
2	0	0	75	520	760	980	580	50	57	25
3	0	0	520	800	550	960	600	80	49	25
4	0	0	100	210	540	1410	240	50	33	25
Slate Creek Reach 1, Sampled on 8/17/2011										
1	0	0	470	260	360	425	225	20	22	18.5
2	0	70	460	250	200	280	100	25	8	20
3	0	280	240	210	290	440	100	70	20.5	18.5
4	0	0	350	350	175	1425	525	55	68	22.5
Slate Creek Reach 2, Sampled on 8/17/11										
1	0	130	305	200	205	350	200	20	11.5	20
2	0	120	320	405	335	740	415	85	53	22.5
3	0	400	350	295	290	540	200	40	17.5	22.5
4	0	100	450	580	320	390	160	15	28	21

APPENDIX L: COMPARATIVE RESULTS

Table L 1. Slate, Johnson and Sherman Creeks sediment toxicity survival.

Collection Date	Sample ID	*Chironomus dilutus* Survival (%)	*Hyalella azteca* Survival (%)
10/3/2011	Lower Slate	60	95
9/26/2011	East Fork Slate	78.3	93.8
10/6/2011	Upper Slate	61.2	96.2
10/3/2011	Lower Johnson Creek	58.8	96.2
10/4/2011	Lower Sherman	75	96.2
10/4/2011	Middle Sherman	55 [a]	98.8
	Sand control	75	98.8

[a] Significantly lower survival than the lab control.

Table L 2. Slate, Johnson and Sherman Creeks sediment toxicity growth.

	Chironomus dilutus Ash Free Dry Weight (mg)		*Hyalella azteca* Dry Weight (mg)	
Sample ID	per original organism	per surviving organism	per original organism	per surviving organism
Lower Slate	0.749	1.256	0.072	0.076
Middle Slate	0.718	0.926 [a]	0.058 [a]	0.062 [a]
Upper Slate	0.644 [a]	1.054	0.070	0.073
Lower Johnson Creek	0.836 [a]	1.170	0.074 [a]	0.077
Lower Sherman	0.631	1.120	0.071	0.074
Middle Sherman	0.649 [a]	1.167	0.068 [a]	0.069 [a]
Sand control	0.874	1.186	0.081	0.082

[a] Significantly lower growth than the lab control.

Table L 3. Slate Creek drainage Shannon Diversity and Evenness indices.

Slate Creek	Shannon Diversity (H)	Evenness (E)
Lower Slate	0.51	0.46
East Fork	0.64	0.52
West Fork	0.63	0.74
Upper Slate	0.97	0.74

Table L 4. Slate Creek drainage taxa proportions.

Taxon	Lower Slate	East Fork	West Fork	Upper Slate
Ephemeroptera	7.4%	14.8%	**64.6%**	**26.1%**
Plecoptera	6.1%	2.7%	14.6%	**28.5%**
Trichoptera	0.2%	1.1%	1.1%	8.2%
Chironomidae	**72.0%**	**16.7%**	10.0%	15.1%
Acari	0.6%	1.3%	0.7%	1.1%
Oligochaeta	5.0%	1.4%	4.6%	1.3%
Ostracoda	5.0%	4.4%	1.4%	15.8%
Amphipoda	0.4%	0.2%	0.0%	0.8%
Bivalvia	0.0%	**54.6%**	0.0%	0.0%

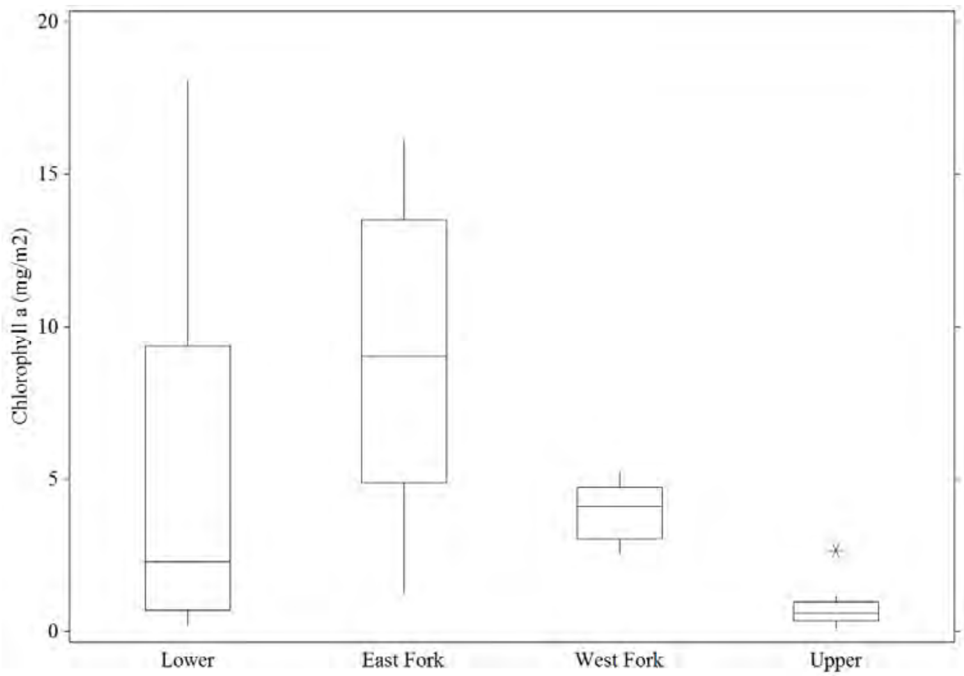

Figure L 1.Slate Creek drainage periphyton biomass.

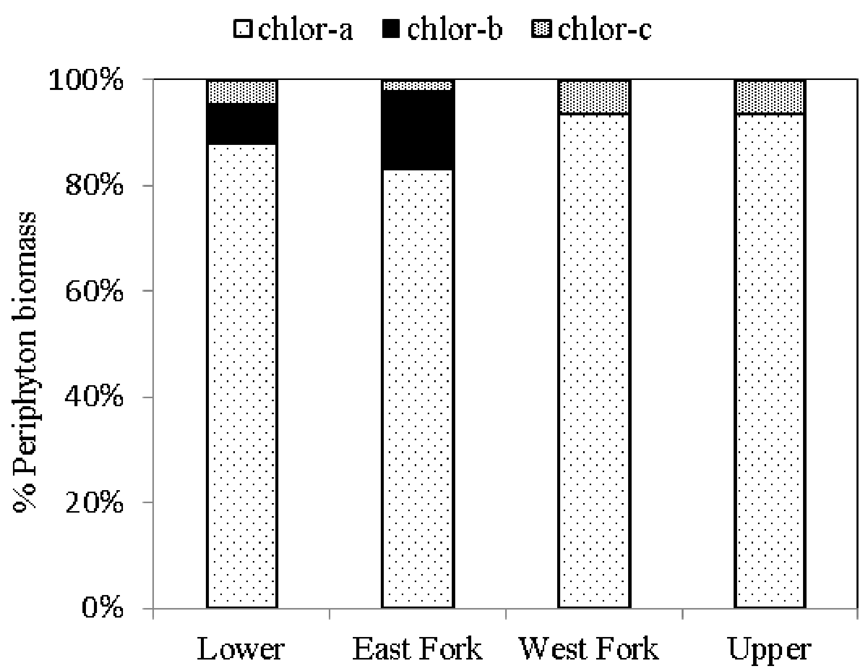

Figure L 2. Slate Creek drainage chlorophyll *a*, *b*,and *c* proportions.

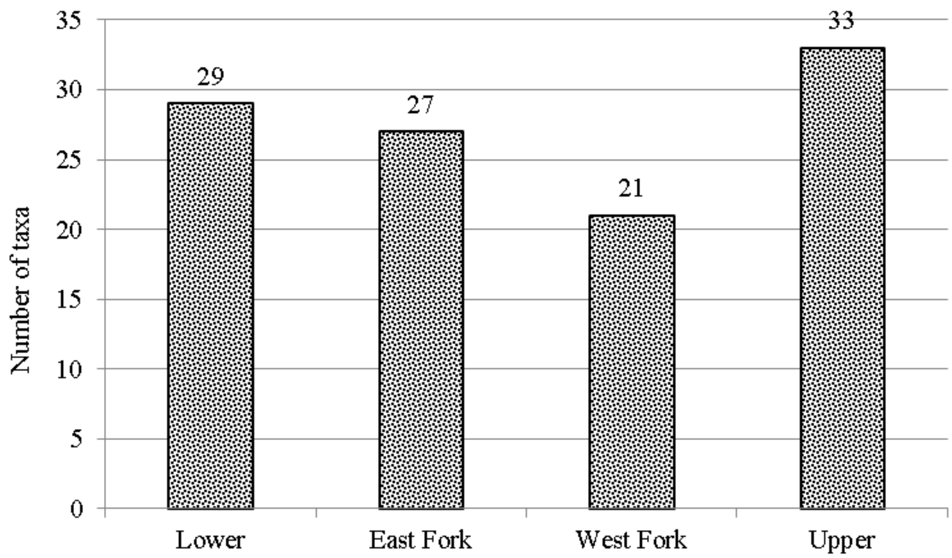

Figure L 3. Slate Creek drainage macroinvertebrate taxa.

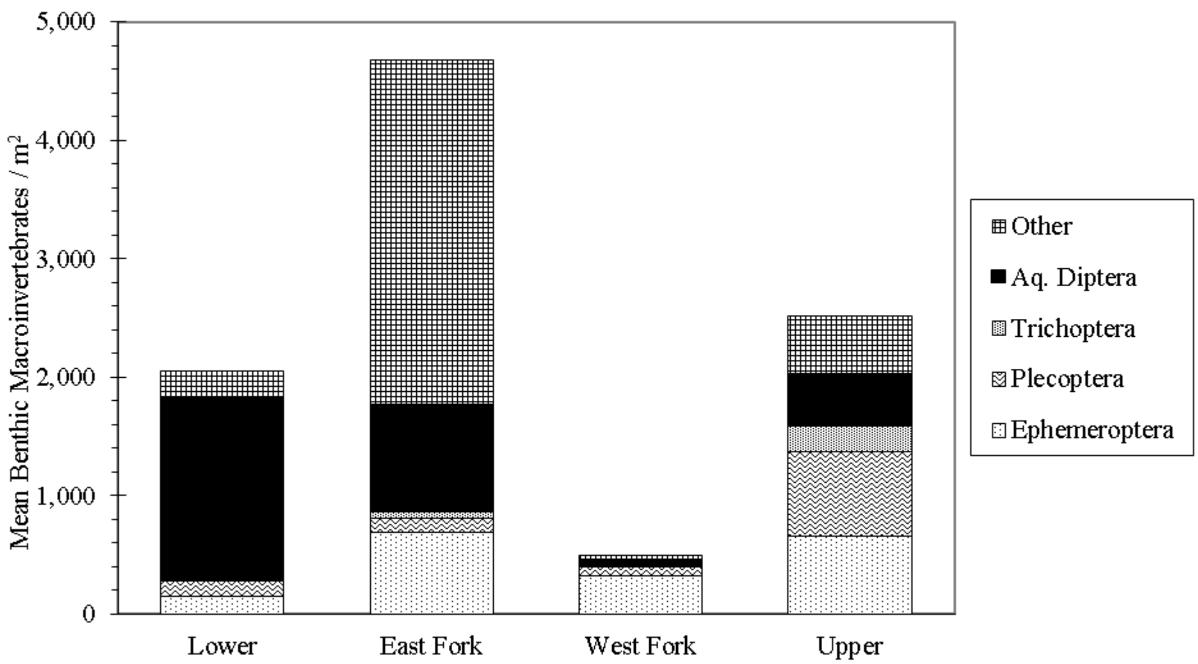

Figure L 4. Slate Creek drainage macroinvertebrate densities.

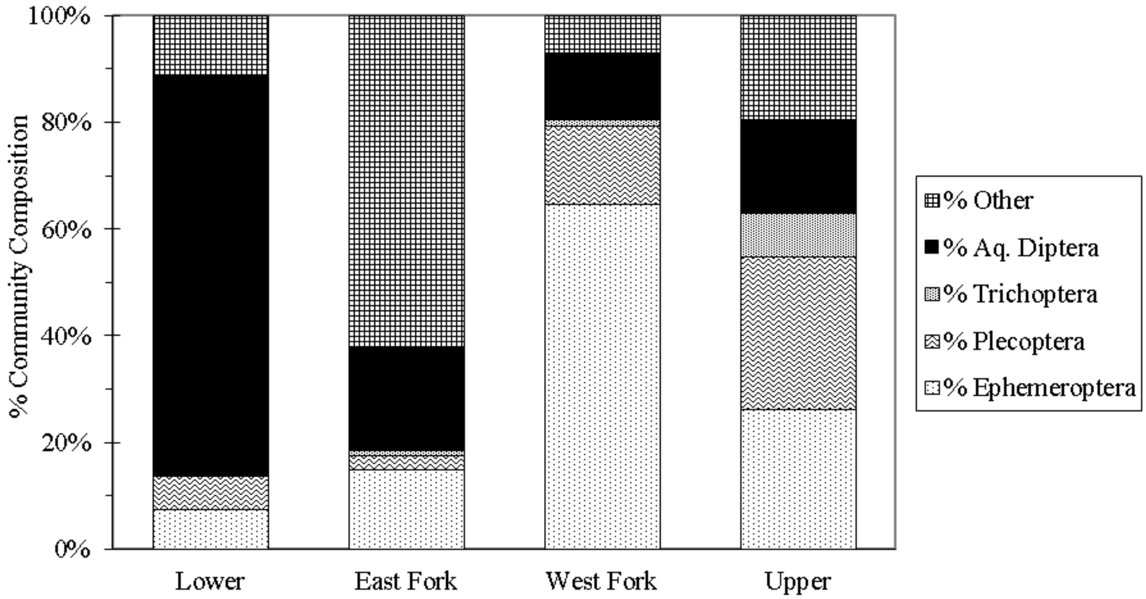

Figure L 5. Slate Creek drainage macroinvertebrate community composition.

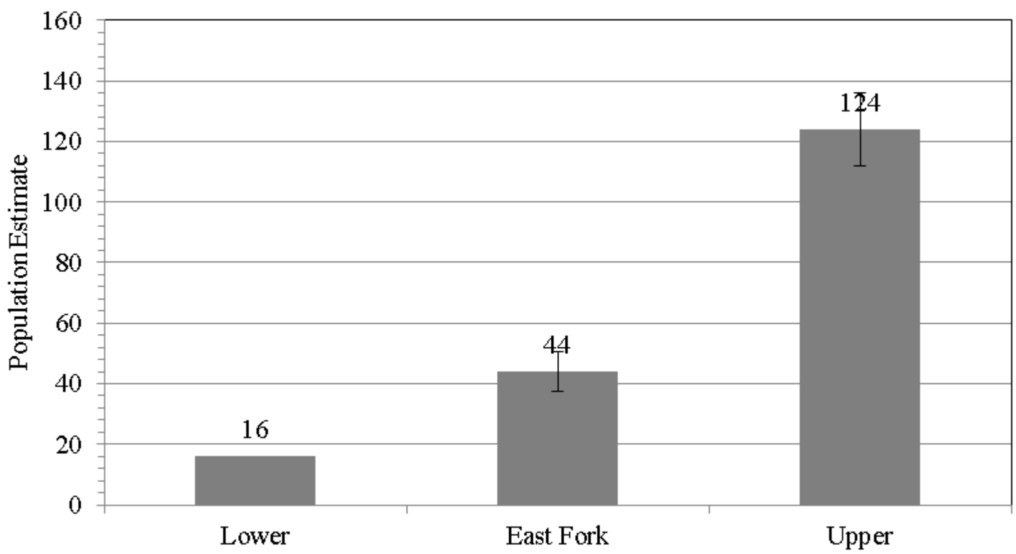

Figure L 6. Slate Creek drainage Dolly Varden char population estimates.

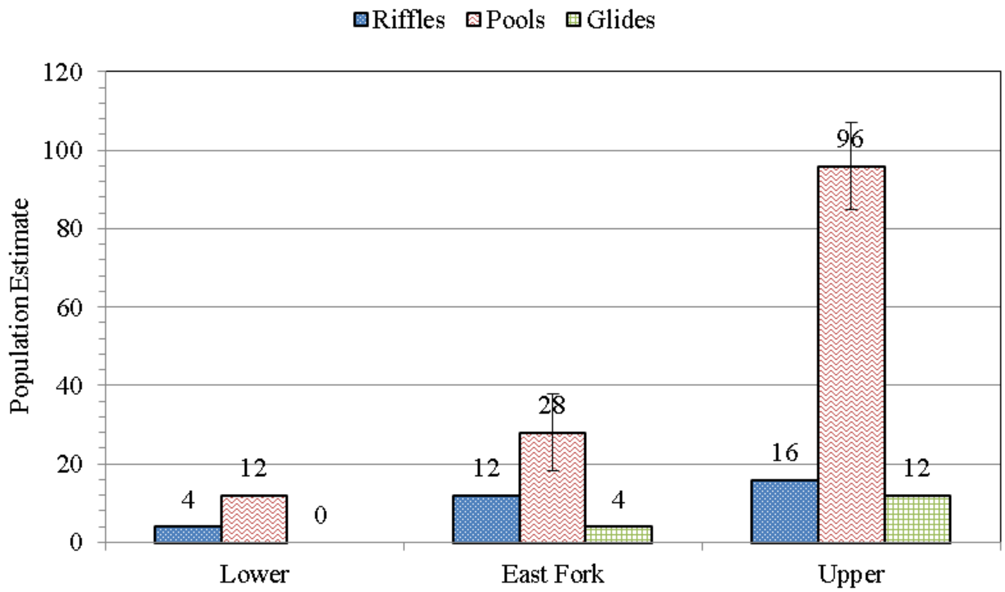

Figure L 7.Slate Creek drainage Dolly Varden char population estimates by habitat type.

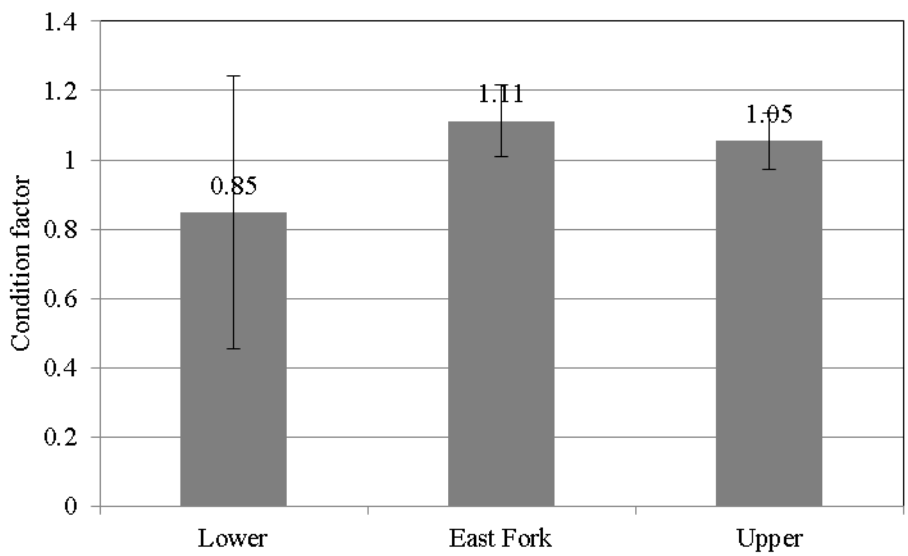

Figure L 8. Slate Creek drainage Dolly Varden char condition.

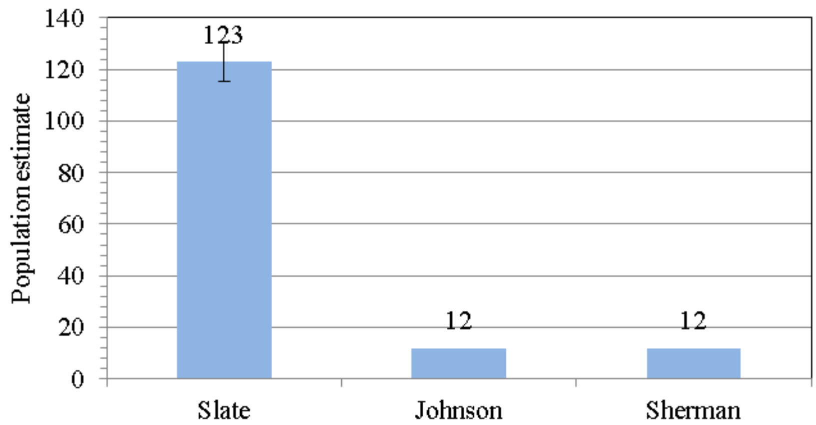

Figure L 9. Slate, Johnson and Sherman Creeks cutthroat trout population estimates.

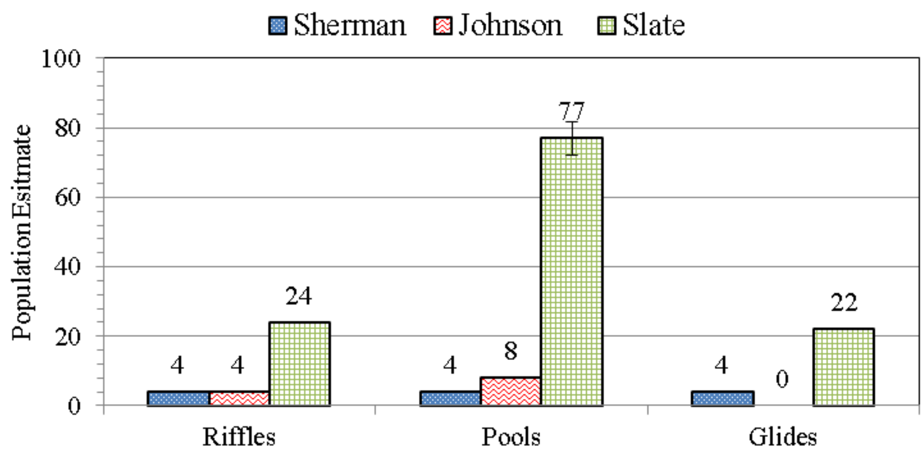

Figure L 10. Slate, Johnson and Sherman Creeks cutthroat trout population estimates by habitat type.

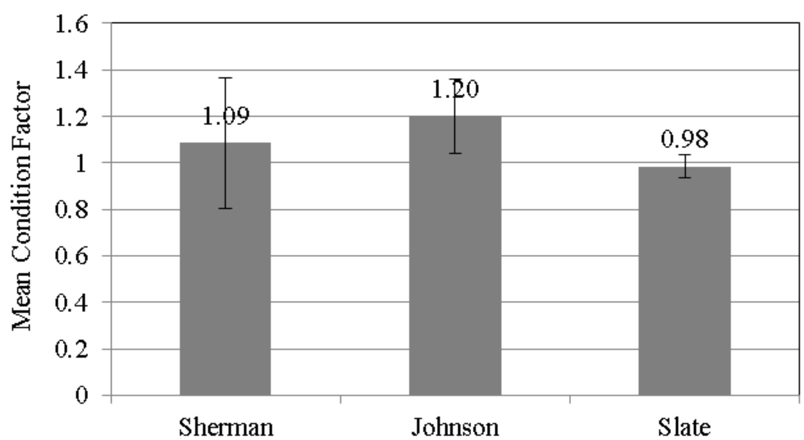

Figure L 11. Slate, Johnson and Sherman Creek cutthroat trout condition.

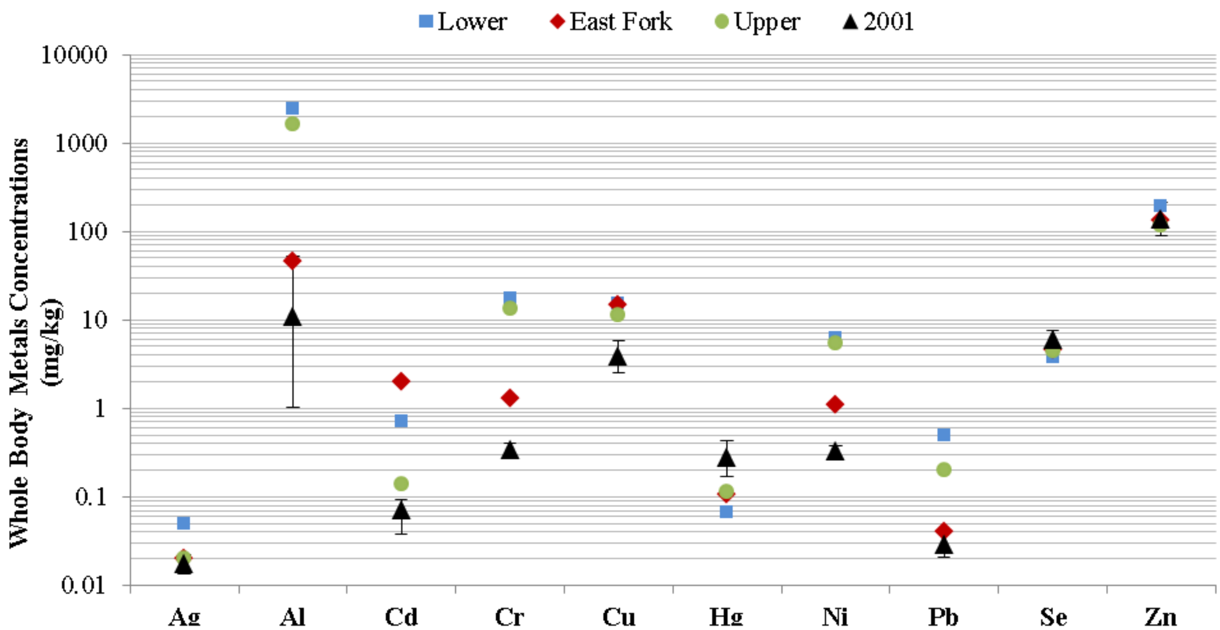

Figure L 12. Slate Creek drainage juvenile Dolly Varden char whole body metals concentrations by analyte, including data from Kline (2001).

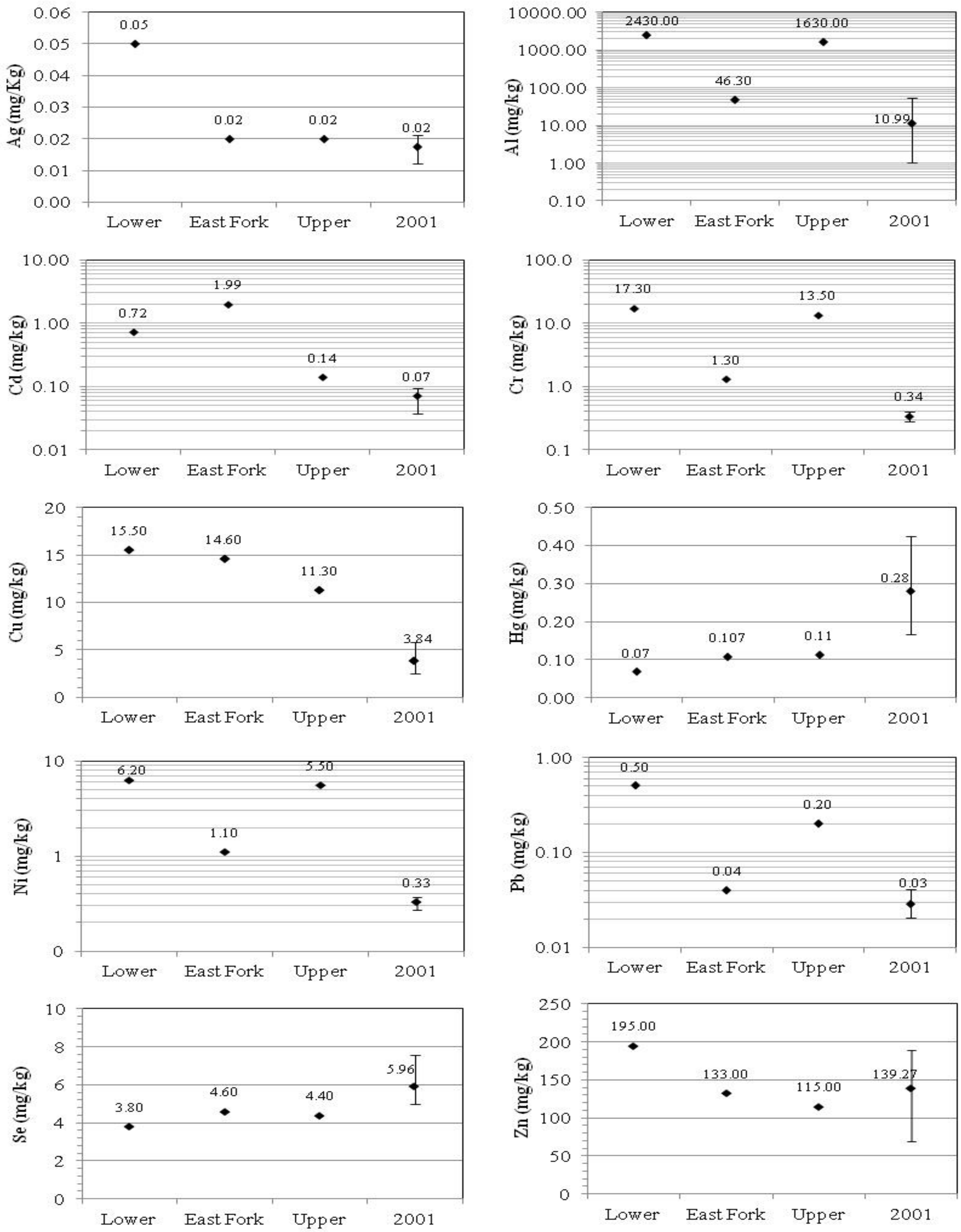

Figure L 13. Slate Creek drainage juvenile Dolly Varden char whole body metals concentrations by analyte, including data from Kline (2001).

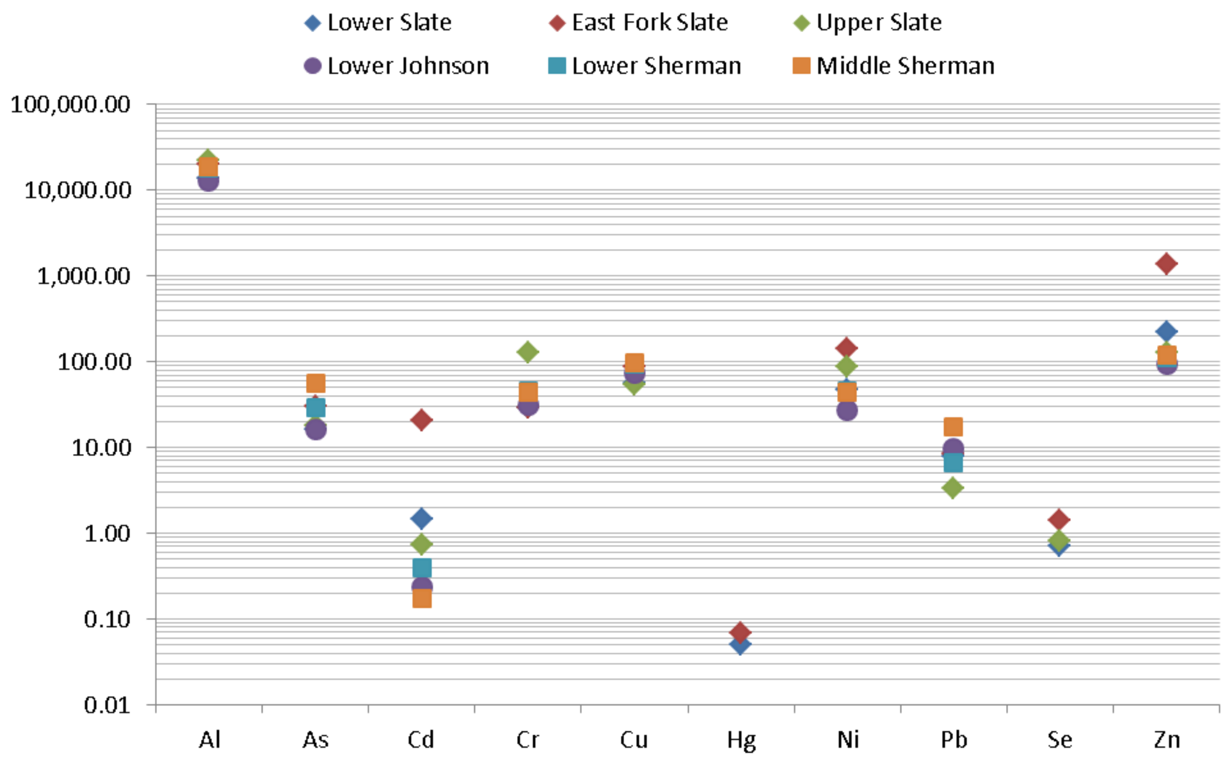

Figure L 14.Slate, Johnson and Sherman Creeks sediment metals concentrations.

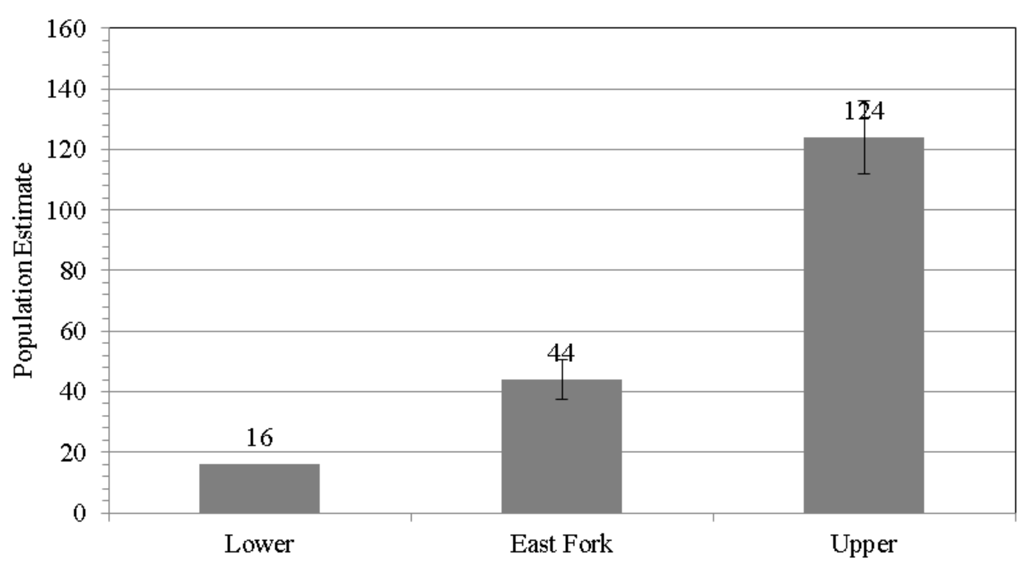

Figure L 15. Slate Creek drainage Dolly Varden char population estimates.

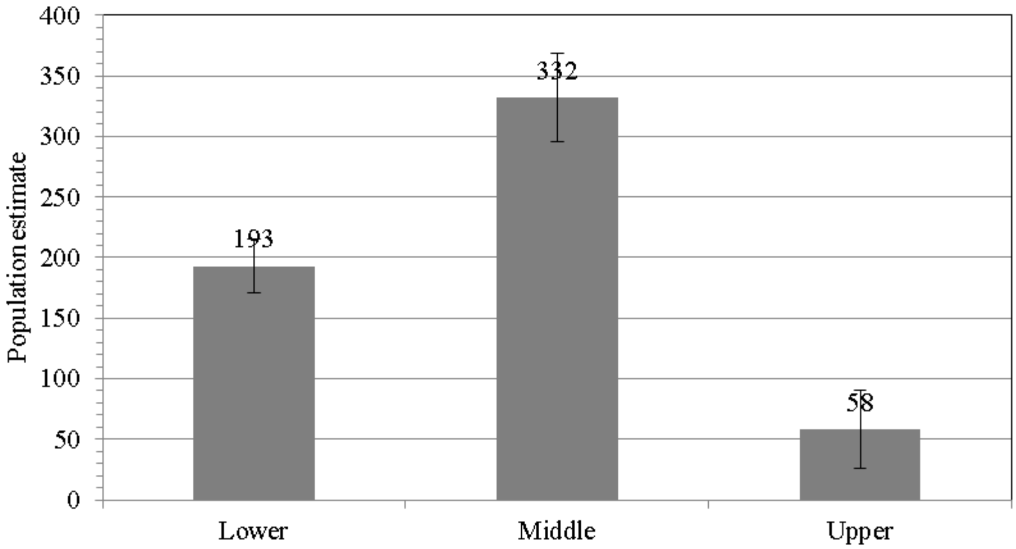

Figure L 16.Johnson Creek drainage Dolly Varden char population estimates.

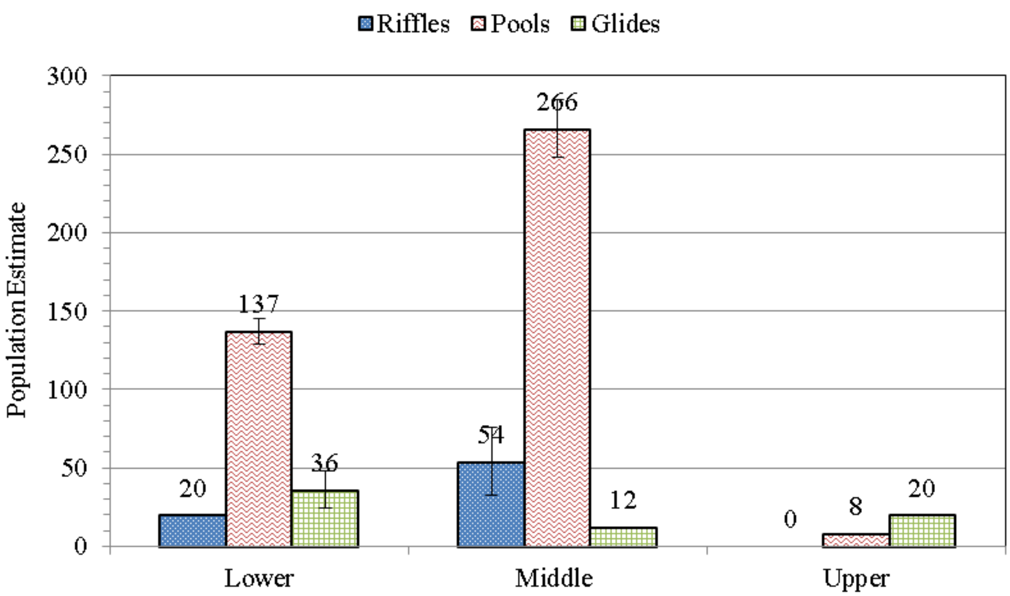

Figure L 17. Johnson Creek drainage Dolly Varden char population estimates by habitat type.

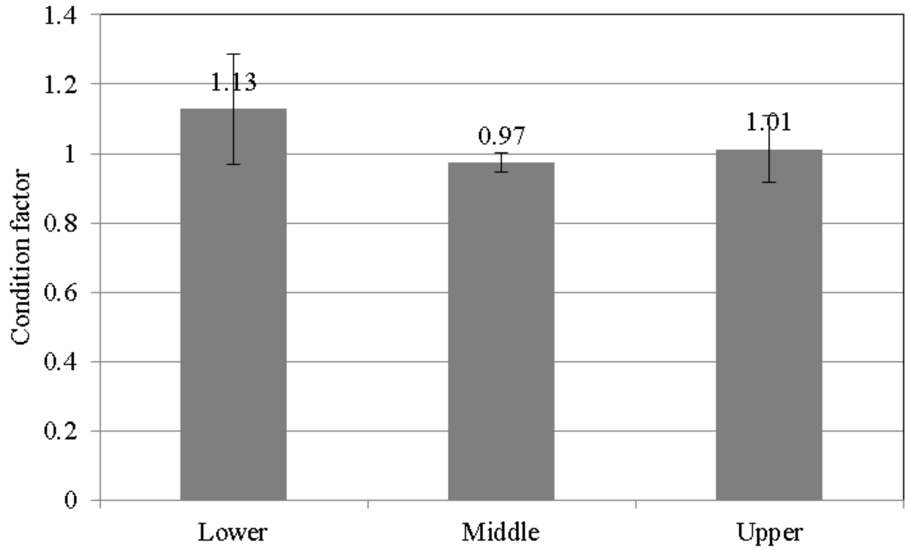

Figure L 18. Johnson Creek drainage Dolly Varden population condition

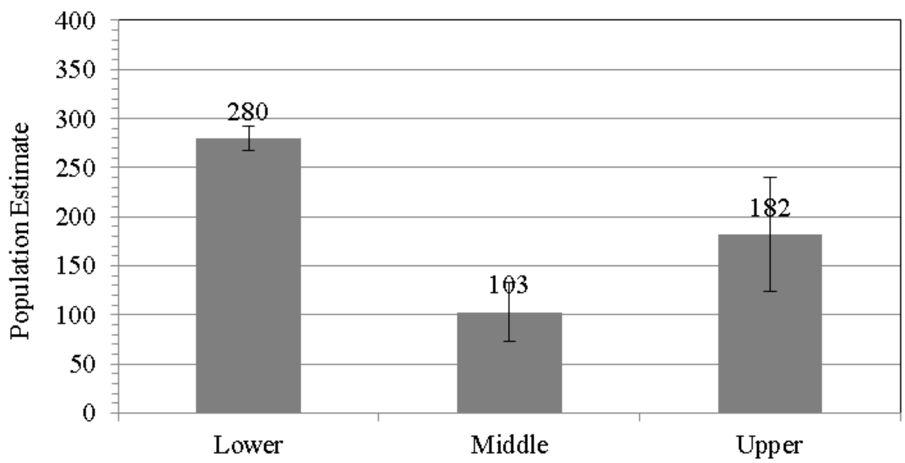

Figure L 19. Sherman Creek drainage Dolly Varden char population estimates.

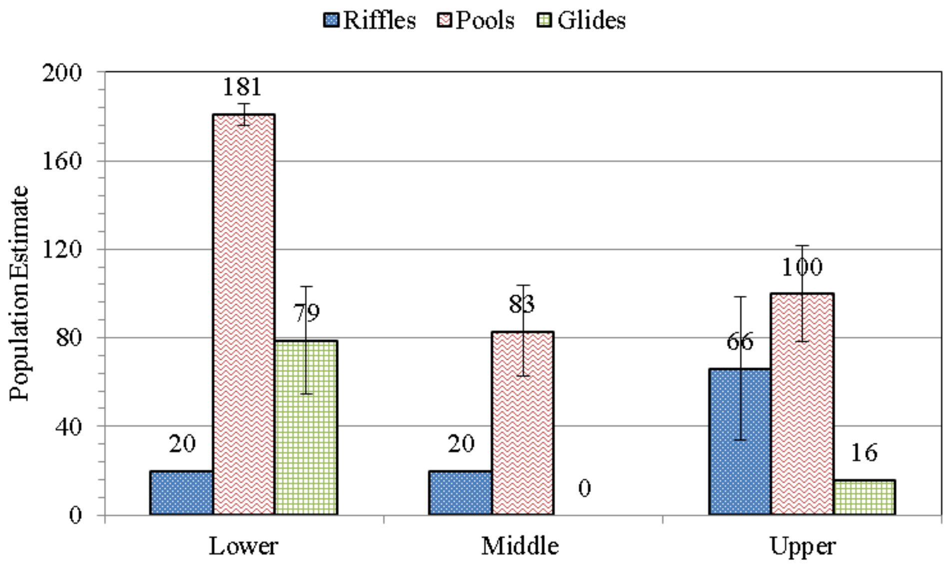

Figure L 20. Sherman Creek drainage Dolly Varden char population estimates by habitat type.

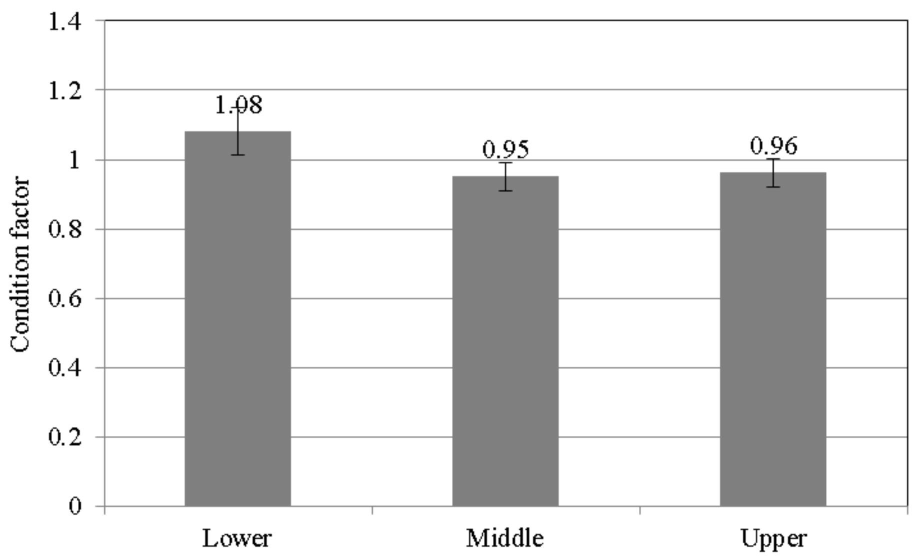

Figure L 21. Sherman Creek drainage Dolly Varden char condition.